INTERNATIONAL SYMPOSIUM ON GIS APPLICATIONS IN GEOGRAPHY & GEOSCIENCES

ABSTRACT BOOK

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EDITORS

Suha Ozden, Cengiz Akbulak, R. Cuneyt Erenoglu, Oznur Karaca, Faize Saris and Mustafa Avcioglu

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PREFACE

This book includes the abstracts of the all papers presented at the International Symposium on GIS Applications in Geography and Geosciences (ISGGG-2017), October 18-21, 2017, hosted by the Çanakkale Onsekiz Mart University. Totally, there were 237 oral presentations, 71 poster presentations and 262 participants coming from 16 different countries. The conference was held in 50 sessions on different topics such as geography, geology, archaeology, ecology, forestry, tourism, planning, spatial analysis etc.. Abstracts were organized according to the symposium topics. Note that the authors are solely responsible for the content of their manuscripts and the opinions expressed.

We would like to thank all the contributors and attendees. We were honored by your support and participation to the ISGGG 2017.

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TECHNICAL PROGRAMME

DATE	HOUR	SEVIM BULUC HALL	MUSTAFA AKSOY HALL	UMIT SERDAROGLU HALL	HALL B	HALL C
Wednesday 18 October 2017	10:00 – 10:45	OPENING CEREMONY				
	10:45 – 11:00	**COFFEE BREAK AND POSTER SESSION**				
	11:00– 12:00	KEYNOTE LECTURE I				
	12:00 – 13:30	**LUNCH BREAK**				
	13:30 – 14:15	KEYNOTE LECTURE II				
	14:15 – 14:45	**COFFEE BREAK AND POSTER SESSION**				
	14:45 – 16:00	ORAL SESSION-GM1	ORAL SESSION-NH1	ORAL SESSION-LU1	ORAL SESSION-SS1	ORAL SESSION-AF1
	16:00 – 16:15	**COFFEE BREAK AND POSTER SESSION**				
	16:15 – 17:45	ORAL SESSION-RS1	ORAL SESSION-HYD1	ORAL SESSION-EM1	ORAL SESSION-URP1	ORAL SESSION-UAV1
	19:00 – 23:00	**WELCOMING DINNER**				
Thursday 19 October 2017	09:00 – 10:00	KEYNOTE LECTURE III				
	10:00– 10:15	**COFFEE BREAK AND POSTER SESSION**				
	10:15– 11:00	KEYNOTE LECTURE IV				
	11:00 – 11:15	**COFFEE BREAK AND POSTER SESSION**				
	11:15– 12:30	ORAL SESSION - GL1	ORAL SESSION - NH2	ORAL SESSION-TR1	ORAL SESSION - ARC	ORAL SESSION - HG
	12:30 – 13:30	**LUNCH BREAK**				
	13:30 – 14:15	KEYNOTE LECTURE V				ORAL SESSION-CT1
	14:15– 14:45	**COFFEE BREAK AND POSTER SESSION**				
	14:45– 16:00	ORAL SESSION-GPS1	ORAL SESSION-HYD2	ORAL SESSION – NH3	ORAL SESSION - GO1	ORAL SESSION – RS2
	16:00– 16:15	**COFFEE BREAK AND POSTER SESSION**				
	16:15– 17:45	ORAL SESSION-URP2	ORAL SESSION - BG	ORAL SESSION – GL2	ORAL SESSION – EM2	ORAL SESSION - SS2
	19:00 – 23:00	**THE SECOND DAY'S DINNER**				
Friday 20 October 2017	09:00– 10:15	ORAL SESSION-UAV2	ORAL SESSION – RS3	ORAL SESSION - AF2	ORAL SESSION – LU3	ORAL SESSION-URP3
	10:15– 10:30	**COFFEE BREAK AND POSTER SESSION**				
	10:30– 12:00	ORAL SESSION-HYD3	ORAL SESSION – TR2	ORAL SESSION-GM3	ORAL SESSION - CT	ORAL SESSION - NH4
	12:00 – 13:00	**LUNCH BREAK**				
	13:00– 14:15	ORAL SESSION-LU2	ORAL SESSION – GO2	ORAL SESSION – NH5	ORAL SESSION - GP	ORAL SESSION - GM5
	14:15 – 14:45	**COFFEE BREAK AND POSTER SESSION**				
	14:45– 16:00	ORAL SESSION-UAV3	ORAL SESSION - AF3	ORAL SESSION-GM2	ORAL SESSION – RS4	ORAL SESSION-GPS2
	16:00– 16:15	**COFFEE BREAK AND POSTER SESSION**				
	16:15– 17:45	ORAL SESSION-GM4	ORAL SESSION-URP4	ORAL SESSION-HYD4		ORAL SESSION-CT2
	17:45– 18:00	CLOSING REMARKS				
	19:00 – 23:00	**GALA DINNER**				
Saturday 21 October 2017	09:00 – 17:00	**TECHNICAL TOUR I: ASSOS ANTIQUE CITY**				
		TECHNICAL TOUR II: HISTORIC GALLIPOLI PENINSULA MARTYRDOM TOUR				

ARC: Archaeology, AF: Agriculture/Forestry, BG: Biogeography, CT: Cost analysis/Transportation,
EM: Environmental Management, GL: Geology, GM: Geomatik, GO:Geomorphology,
GP: Geophysics, GPS:Global Positioning System, HG: Human Geography, HYD: Hydrology,
LU: Land Use, NH: Natural Hazards, RS: Remote Sensing, SS: Site Selection,
TR: Tourism, URP: Urban Planning, UAV: Unmanned Aerial Vehicle, CL: Climatology.

CONTENTS

ARCHEOLOGY

PHOTOGRAMMETRICAL APPLICATIONS AND GIS ANALYSES OF ANCIENT AGRICULTURAL TERRACES IN BOZBURUN PENINSULA

ID No: 94

Volkan DEMİRCİLER[1]

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ABSTRACT

An extensive field survey in Bozburun Peninsula carried out in 2009-2012. The study area limited with the Turgut Village in the north and beginning of the Loryma territorioum in the south. The main objective of the study was examination of the agricultural terraces and farmsteads within the framework of the ancient agrarian practices. The main proposition of the study was that the Rhodian control over the agricultural system during the Hellenistic period brought production increase despite the disadvantages caused by the topographical structure of the region. And the well organization of the terrace farming is an important indicator of the Rhodian involment in the intensification of agricultural production. Aerial photogrammetry and Geographical Information Systems (GIS) were applied for the analyses of the agricultural terraces in terms of their topographical structure and for interpretations of their relationship between farmsteads which were detected in the archaeological survey.

Key words: Agricultural terraces, Ancient farmsteads, Bozburun Peninsula

ANTHROPOLOGICAL APPROACHES TO GEOCHEMICAL CHARACTERIZATION OF THE EUPHRATES RIVER BANK SEDİMENTS

ID No: 96

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ABSTRACT

The Euphraes River is one of the most important rivers in the world. The Euphrates valley was the birthplace of the ancient civilizations from Sumer to present. Much historical data has been yielded by archaeological excavations on the banks of the Euphrates. The study includes comparison between chemical, lead isotopic compositions of metal object from Late Chalcolithic (3750 BC) to the Middle Bronze (1750 BC), and the Euphrates River bank sediments between the Palu Castel and Keban Dam Lake. The totally fifty river bank sediment samples were collected and analyzed for metals (Ni, Cu, Zn, As, Ag, Sb, Au, Co, Fe, Sn, Bi), and lead isotopic compositions. The sample code (A25) and its setting location (longitude 37580088E; latitude 4282415 N) show that $^{207}Pb/^{206}Pb$ (0.87281) and $^{208}Pb/^{206}Pb$ (2.17982) isotopic ratios indicate anthropogenic source, and also Au, Ag, Sn, Cu and As concentrationa are the hishest at the same location. These results indicate that anthropogenic sources may be the products either oxidation or weathering of the metal objects from the "royal" tombs (Bracelet Cu-Ag; Spiral Ring Ag-Cu; Pin Cu-As; Palace Hoard Cu-As alloys) or wastes of the ancient mining, and other related finds of Prehistoric people or "proto-Euphrateans" around the Palu Castel in the Euphrates valley district in between Neolithic and Early Bronze Age.

Key words: Euphrates river, Archeological chemistry, isotope analysis, Turkey

DETERMINATION OF POTENTIAL CLAY BEDS WITH GIS BASED APPROACH IN THE KERKÜŞTİ HÖYÜK AND ITS VICINITY

ID No: 97

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ABSTRACT

The main purpose of this study was to determine the clay bed with GIS analysis in the surrounding area of Kerküşti Höyük. The settlement is located in the district of Derik/Mardin in today's south-eastern Turkey. In addition to that the clay characterization and morphology is presented in the study. Comparing Geographical Information System (GIS) database with existing archaeometric analysis, this article aims to identify the geographical borders of the area that provided clay to local to make pottery in 6000BCE. To understand relationship between local clay bed and the potteries in the Kerküşti Höyük.

The aim to address this study by modelling and mapping using Geographic Information Systems (GIS). In particular, geological and hydrological databases are very helpful as much as slope and/or surface curvature in this modelling. In this context the potential clay deposit model using a 1 m Digital Elevation Model (DEM) and combination of derivatives such as slope, surface curvature defined, and slope location classification was based on a case-based reasoning approach.

Great amount of large calcium carbonate particles can be detected in the paste of the pottery of phases Va and Vb1, whereas the paste used during the sub-phases Vb2 and Vb3 has less amount of tiny calcium carbonate particles. This striking difference in the combination of paste may have been explained as a choice of different clay sources or of different techniques come through various contacts.

Key words: Clay bed, GIS, Pottery, Archaeology, Kerküşti

USING OF TERRESTRIAL LASER SCANNING AND UAV IN DOCUMENTATION OF ARCHAEOLOGICAL SITES: KONYA YUNUS EXAMPLE

ID No: 260

Murat YAKAR[1], Ali ULVİ[2], Abdurahman Yasin YİĞİT[1], Yunus KAYA [1], Adem KABADAYI [1], Kader ÇIKIKCI [1], Seda Sultan CATİN [1], Onur Alp ARSLAN [1]

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ABSTRACT

The country we live in has been hosted by many civilizations in terms of its position on the world. Therefore, today there are many cultural heritages belonging to these civilizations. Protecting this cultural heritage, and conveying it to future generations, is our cultural duty.These artifacts, due to different reasons over time, suffer great damage.

In order to protect the works, it must first be documented. Technological devices need to be used in order to make documentation as soon as possible.

This study was conducted in the Yunus district of the Seydişehir district of Konya. In the excavation work, the base mosaic was found, which had about 1400 years of history. A terrestrial laser scanner and Unmanned Aerial vehicle were used to document the archaeological site. The laser scanning process uses the FARO Focus3D X 330, a DJI Phantom 3 Advantage device as an unmanned aerial vehicle. At the end of the study, the point cloud of the excavation area was produced and the excavation works were documented

Key words: Archeology, Laser Scanning, Point Cloud, UAV

ENVIRONMENTAL MANAGEMENT

CONSERVATION OF WETLAND BASED ON ECOLOGICAL SENSITIVITY ANALYSIS: A CASE STUDY OF KIZILIRMAK DELTA

ID No: 63

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ABSTRACT

Wetlands that are natural museum are important part of the earth with natural richness and economic importance. At the same time, wetlands have ability to become a part of cultural heritage by influencing the tradition around them. For these reasons, the conservation of wetlands is an significant issue nowadays. In conservation activities that aimed to establish a balance between human and nature, ecological sensitivity analysis is an effective method determining the priority areas for protection since the regional eco-environmental components are assessed holistically. Geographic Information System (GIS) technologies are important tool that increase the effectiveness and scientific value of ecological sensitivity analyzes with powerful spatial data and computational capability. Kızılırmak Delta, which is a case study area, is a very important wetlands with many different and important habitats. Also, it is a area where strong competition between human and nature owing to economic attractive. For these reasons, Kızılırmak Delta is choosed as a case study area. The aim of the study in this context; find out ecosystem areas which have high level ecological sensitivity depending on natural and anthropogenic factors and make suggestion for sustainable use of these areas. In the study, ecological sensitivity was tried to be determined using a multi-parameter model. First, factors having an impact on ecological sensitivity has been determined with literature review and field works. These factors considered in the study; elevation, land use, soil, water systems, population density, settlements and roads. The weights of this factors in multi-parameter model has been determined with Analytic Hierarchy Process (AHP) method. Sensitivity and risk values which obtained are classified as; extremely sensitivity and risky, highly sensitivity and risky, moderately sensitivity and risky, light sensitivity and risky, non-sensitivite and risk. It has been determined that 11% of the delta is extremely and highly sensitivity and risky zone.

Key words: Kizilirmak Delta, Ecological Sensitivity, Geographic Information System, Analytic Hierarchy Process, Wetlands, Sus

MAPPING SPATIAL AND TEMPORAL DEPENDENCE OF AIR QUALITY IN TURKEY

ID No: 150

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ABSTRACT

Air quality is one of the major environmental concerns that directly relates to the health and livability of humans, plants and animals. Urbanization, industrial and agricultural production, and the use of fossil fuels give rise to air pollution, which has immediate and long term negative results on all living things and environment, such as respiratory system disorders, cancers and other medical conditions, deforestation, crop losses, and even global warming. It is important to monitor and evaluate air quality periodically through the measurement of air pollutant concentrations such as particulate matter, ozone, carbon monoxide, nitrogen dioxide, etc., and to see whether there is a temporal effect and to take measures when needed. Air management schemes should be geographically comprehensive since air, as a fluid, can carry pollutants to neighboring areas easily, depending on meteorological factors and terrain characteristics. This study aims to reveal the presence of spatial dependency and map neighboring effects of air pollution in Turkey, through the utilization Geographical Information Systems (GIS). The data covers monthly weather stations' reports from 2007 to 2017 for all cities in Turkey. Particulate matter concentration (PM_{10}) is taken as the air pollution indicator, since it is the only available pollutant data for all cities over ten years. The analysis covers three stages: First, Moran's I, as a global measure of spatial autocorrelation (SA), is used to calculate the degree of geographic dependency of air pollution. Second, statistically significant clusters of high and low concentrations of particulate matter are mapped by Local Moran's I. Third, the spillover effects and seasonal variations are discussed with the help of time series data, in order to portray the temporal dependence. Finally, the results are discussed with regard to government and local air quality management schemes, and the future policy implications.

Key words: Air quality, spatial autocorrelation, spatial clustering

MODELLING PARTICULATE MATTER (PM_{10}) AND SULPHUR DIOXIDE (SO_2) CONCENTRATIONS IN URBAN ANKARA USING CLIMATE PARAMETERS

ID No: 172

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ABSTRACT

As a result of population growth and industrialization in urban areas, air pollution has become a serious problem in Ankara as well as in the rest of Turkey. The process of urbanization has a large impact on the environment. As such, there is a need to understand the effects and consequences of urbanization. The city of Ankara has experienced fast urbanization after becoming the capital city of Turkey. For this reason, it is also the most important city when it comes to air pollution. When considering the long-term economic, social, cultural and environmental damages due to air pollution in Ankara, it is also an important requirement to consider the necessary precautions to prevent this pollution or at least reduce the damage it causes. First, the spatio-temporal variability of air pollutants should be investigated. It is therefore important to identify accurate methods for forecasting purposes. Studies involving traditional calculation methods are not powerful enough when it comes to variables which vary greatly in space and time. The aim of this study is to investigate the spatio-temporal variation of Particulate Matter (PM_{10}) and Sulphur Dioxide (SO_2) concentrations in Ankara and the effects of climate parameters of these variables. The study period that was considered was 2011–2014. Climate parameters, namely monthly precipitation, temperature, wind (direction and intensity) and humidity as well as Particulate Matter (PM_{10}) and Sulphur Dioxide (SO_2) concentrations were obtained from stations located in various regions in Ankara. The Kriging with External Drift (KED) was then applied to analyse the spatio-temporal variability of air pollution. The model was able to accurately model air pollution in Ankara on the spatial and temporal scale, with the use of the climate parameters. Regions with high concentrations of Particulate Matter (PM_{10}) and Sulphur Dioxide (SO_2) can therefore be further investigated for better environmental planning. Furthermore, this study shows that this method has potential for air pollution monitoring.

Key words: Urbanization, air pollution, Particulate Matter (PM_{10}), Sulphur Dioxide (SO_2), spatio-temporal analysis, Ankara.

SPATIAL MODELLING OF AIR POLLUTION CONCENTRATIONS WITH A SPATIAL AUTOREGRESSIVE MODEL : A CASE STUDY IN CANAKKALE CITY

ID No: 167

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ABSTRACT

Air pollution in Canakkale city is one of the most important environmental problems of daily life due to industrial facilities, utilization of poor quality fuels and traffic emissions. Air quality measurements show that in the city, increased pollution levels have becoming a threat to human health. Monitoring air pollution is the key issue for deciding policy measures to reduce air pollution levels. So typical pollutants have been monitored routinely at official air-quality monitoring stations which are under the control of the Ministry of Environment and Urban Planning. Three monitoring stations are active in the region i.e. Çanakkale, Lapseki and Çan stations in this study. At these stations, particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), nitrogen monoxide, nitrogen dioxide (NO and NO_2) and ozone (O_3) pollutant parameters that have recorded as hourly averages between the dates 01.03.2013 and 31.12.2016 were used as quality dataset for determining pollution status in the city. In addition to these pollutant parameters meteorological parameters such as temperature, wind direction, wind speed, humidity and pressure were also measured at Lapseki and Çan stations. It was aimed to characterize spatial variations and patterns of air pollutants in the region using GIS technique and spatial patterns of air pollution distribution were determined. Additionally in order to examine the contribution of different meteorological parameters on the levels of air pollution, regression models were employed. Standard and spatial regression models were employed on the measured emissions to reveal possible factors of air quality in the region using standard ordinary least squares (OLS) and spatially autoregressive (SAR) regression models. The two regression model results of the observed pollution concentrations were quantitatively analyzed. In the study SAR is found to be more appropriate compared to the OLS technique when dependent variables exhibit spatial autocorrelation resulting in a valid model.

Key words: air quality, spatial analysis, GIS, spatial statistics, SAR

SPATIAL AND TEMPORAL DISTRIBUTION OF AIR POLLUTION (PM_{10} & SO_2): THE CASE OF ISTANBUL

ID No: 53

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ABSTRACT

Air pollution is an important environmental problem in Turkey as well as in the world. Anthropogenic air pollutants are concentrated in the atmosphere of industrial and densely populated cities. The city of Istanbul is a densely populated city where many industrial establishments operate and the population and number of vehicles are constantly increasing. For this reason, the spatial distribution and temporal change of air pollutant parameters (PM_{10} and SO_2) in the İstanbul city between March 2013-December 2015 were aimed to demonstrate in this study. For this purpose PM_{10} and SO_2 data measured by Marmara Clean Air Center Directorate were used. The spatial distribution of pollutants causing air pollution were analyzed using Inverse Distance Weighted method. Also, bivariate correlation analysis was used to indicate how air pollutants change in terms of years and months in the study. Significant differences were observed between summer and winter seasons in terms of the concentration levels. It has been found that all pollutants are at higher levels in winter season. The highest concentrations were observed around Basaksehir, Esenyut, Umraniye and Kandilli where the population and traffic were the highest.

Key words: Air Pollution, GIS, Istanbul, PM_{10}, SO_2, Spatial Variation.

ENVIRONMENTAL EFFECTS OF QUARRIES IN NAIP PLAIN AND ITS SURROUNDINGS (TEKİRDAG)

ID No: 169

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ABSTRACT

In Turkey, the need for construction materials that has come out with the effect of urbanization increasing uncontrollably over the last years is mainly covered with the products produced at brick and tile factories. The materials used in the production of these products are obtained from quarries that mostly operate as an open-pit. However, the quarries used commonly and uncontrollably lead to various environmental problems over time. In the present study, it is aimed to explain the environmental effects of quarries in Naip Plain. Thus, it was found out how and to what extent Naip Plain, one of the most important geomorphological units of both the Thrace peninsula and Tekirdağ province, is affected from the mining activities carried out in open-pits. In the present study employing the GIS and RS techniques at the mapping stage, datas as well as maps of different scales and dates were used. In the end, an obvious increase was noted in the number of brick and tile factories and quarries used actively in Naip Plain. Such increase coming out uncontrollably resulted in environmental effects affecting the area in ecological, economic and aesthetical terms. For settling these problems, it is necessary to create a sustainable plan in the first place and then to prepare detailed environmental impact assessment reports regarding the quarries that operate actively. On the contrary case, it will be impossible to avoid potential problems involving irreversible losses in sensitive ecosystems in the surroundings of Naip Plain in the near future.

Key words: Guarry, Environmental effects, GIS, RS, Naip Plain.

USING GEOGRAPHIC INFORMATION SYSTEMS FOR EXPOSURE ASSESSMENT FOR MOLECULAR EPIDEMIOLOGY STUDIES; EXAMPLES OF HEAVY METALS AND PARTICULATE MATTER (PM2.5)

ID No: 170

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ABSTRACT

Environmental exposures have been associated with the 24% of the human diseases. In this context, environmental epidemiology focuses on etiology of diseases in terms of environmental exposure. Additionally, many cohort studies have been investigating the molecular mechanisms mediating between exposure and disease outcomes. However, the main problem in such studies is to determine the exact individual environmental exposure for global pollutants such as air pollution. In this case, anyone can not measure the exact exposure of pollutants which is important to link with the diseases. Therefore, in the present study, I applied the geographic information systems (GIS) with kriging algorithm to map the distribution of different pollutants (heavy metals in Can-Canakkale region in organism and particulate matter (PM2.5) in Istanbul using stationary data). Surfer for windows was used to plot the distribution maps of the pollutants in two different regions. It could be seen that the distribution maps show individuals exposure to heavy metals and PM2.5. Additionally, anyone can determine the exposure of any individuals in any region using plotted maps. In conclusion, GIS technology can be efficiently used to determine the exposure assessment of individuals for linking with molecular maker and diseases.

Key words: GIS technology, environmental exposure, heavy metals, particulate matter, health

MODELING OF ZİNAV LAKE ECOLOGICAL RISK ASSESSMENT USING GIS AND UA TECHNIQUES

ID No: 190

Saliha DİRİM BUHAN[1], Orhan Mete KıLıç[2], Nihal BEKTAŞ[1], Ekrem BUHAN[3], Fatih POLAT[4], Hakan Mete DOGAN[5]

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ABSTRACT

Zinav Lake is the largest natural landslide in Tokat Province. The lake is adversely affected by rural settlements and animal production facilities located in the upper basin. In this study, ecological risks of lake trophic index and other water pollutants were calculated and found high. Ecological risk assessment is modeled using GIS and UA techniques.

The authors thank to The Scientific and Technical Research Council of Turkey for their grand (TUBITAK, Project No: ÇAYDAG-110Y117). This study is also a part of the doctoral thesis of Saliha Dirim Buhan.

Key words: GIS, Remote Sensing, Zinav Lake, Ecological Risk Assessment.

MAPPING OF ARSENIC AND BORON POLLUTION IN THE INTENSE MINING CATCHMENT OF MUSTAFAKEMALPAŞA STREAM - NORTHWESTERN TURKEY

ID No: 311

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ABSTRACT

This study was aimed at mapping the spatial distribution of Arsenic and Boron Pollution in Mustafakemalpaşa catchment area using measured field data and considering the discharge of small tributaries. Arsenic (As) and Boron (B) are the most common water pollutants in northwestern Turkey. Literature studies suggest that mining activities and the geology of this region are responsible for these pollutions. Water samples were seasonally collected from 50 sampling points in the basin. Samples analyzed for the boron and arsenic pollution using inductively coupled plasma optical emission spectroscopy (ICP-OES). Inverse Distance Weighted (IDW) interpolation technique in ArcGIS 10.4.1 toolbox was used for pollution mapping. The results show, significant variation of both arsenic and boron concentration among the sampling points, however no significant seasonal variations for both boron and arsenic levels was noted. The obtained pollutant values are above World Health Organization (WHO) drinking water limits. The distribution of both arsenic and boron along the course of the streams is found to be closely related to mining activities in the area.

Key words: Mustafakemalpaşa Catachment, Arsenic, Boron, Pollution mapping

ENVIRONMENTAL MONITORING OF ACID MINE LAKES USING 1977-2016 SATELLITE IMAGE TIME SERIES

ID No: 310

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ABSTRACT

Availability of low cost and high resolution data has focused increased attention on the use of satellite images to monitor open-pit mining activities. Satellite images were successfully used in the last two decades to monitor mine sites and assess environmental impact. This study reports an investigation into the use and application of remote sensing time series analysis for monitoring the environmental impacts of acid mine lakes in Etili open-pit coal mine, northwest Turkey. The purpose of this study is to determine the effect of mining activities on areal change in acid mine lakes over a long period of a time based on Earth observation data. This study is based on time series data sets from Landsat, Landsat 5, Landsat 7, Quickbird, Worldview and Pleiades satellites. Satellite image data, in combination with field work data collected in the period 1977–2016, were applied to create acid mine lake maps and provide information about mining activities. Nine acid mine lakes were sampled to determine hydrochemical characterization. Using ArcGIS software, satellite images were analyzed in time series, lake borders were digitized and converted into vector data format. In addition, thematic maps of hydrochemical data from the acid mine lakes were created. The total area of nine acid mine lakes and mine waste were calculated as 10.9 ha and 102 ha in July 2016, respectively. The results show that the number of acid mine lakes increased and acid mine lakes present an environmental risk owing to low pH and high metal concentrations. The advantage of using remote sensing and geographic information systems for effective environmental management of mining areas is emphasized.

Key words: Acid mine lake, Coal mine, Satellite image, GIS.

GEOPHYSICS

MONITORING IONOSPHERIC DISTURBANCES AT Mw 7.8 NEPAL EARTHQUAKE AND PREDICTING MAGNITUDES OF EARTHQUAKES USING GNSS MEASUREMENTS

ID No: 31

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ABSTRACT

The ionosphere has been intensely studied by many scientists for a long time due to its unique feature responding well to many factors such as earthquake, magnetic storm, geomagnetic activity etc. In this study we analyzed seismic ionospheric disturbances after Nepal Mw 7.8 earthquake on 25 April 2015 using GNSS observations. The Nepal Earthquake occurred at 06:11:26 UTC on 25 April 2015 with its epicenter at 28.147^0 N, 84.708^0 E and its focal depth at 15 km under surface. Coseismic ionospheric disturbances were analyzed using Total Electron Content (TEC) from the Global Ionosphere Map (GIM) published by Center for Orbit Determination in Europe (CODE). Each TEC map has a spatial resolution GIM map resolution 2.5^0 X 5^0 in geographic latitude and longitude. GIM map can be used to detect lithospheric, atmospheric and ionospheric weather such as thunderstorm, ionospheric storm, earthquake anomalies.

In order to detect abnormal signals originating specifically from earthquakes, we applied the quartile-based running median statistical method. Firstly we computed the median (M), lower quartile (LQ) and upper quartile (UQ) for 15 days prior to the event day. As a result of analyses, the strong positive anomalies were observed 3 and 2 days just before the earthquake. We think that positive anomaly can be related to the earthquake, therefore this can be seen as the precursor of the Nepal earthquake. After detecting anomaly before the earthquake occurs, we try to estimate magnitude of the earthquake using the cumulative normalized deviation (S) of TEC value from the median. If the half of the computed S values is $2.1 \leq S \leq 3$, we can conclude magnitude of earthquake is $7.1 \leq Mw \leq 8$. In this study we find that S values indicate that the expected earthquake is $7.1 \leq Mw \leq 8$. In conclusion, it is possible to detect ionospheric anomalies 3 and 2 days before the earthquake, and also to correctly estimate the magnitude of earthquake using S values.

Key words: Nepal Earthquake, GNSS, TEC

DETERMINATION OF FAULT TYPES BY GIS APPLICATIONS ACCORDING TO EARTHQUAKE DEPTHS

ID No: 32

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ABSTRACT

Geographic information systems (GIS) are used in geophysical engineering as well as in many fields. It is used in applied geophysics and seismology, which is different disciplines of geophysical engineering. Also in applied geophysics, the GIS applications are used to create contour maps according to geophysical measurements, to 3D map of the data and to evaluate the results. In seismology, GIS applications are used to map the epicentral distributions of earthquakes and the location of the faults. It is very important to make an evaluation according to fault type (normal fault, reverse fault or strike-slip fault) because of the high destruction effect of strike-slip fault types, especially at the points where the earthquakes are close to the surface. In this study, it was aimed to map the earthquakes with magnitude M> 5.0, which occurred on different types of faults between 1900 and 2016 in selected region. Also the database was created by modeling the depths of the earthquakes with the help of GIS applications. The fault types were tried to be determined by investigating the depths of the earthquakes with the help of the created database. Thus, the database can be used in works where the earthquake effects should be reduced (for example, the determination of living areas, the design of buildings, etc.)In addition, GIS applications will provide significant contributions to large-scale earthquake risk studies with more detailed databases.

Key words: Seismology, Earthquake Depths, Fault Types, GIS applications

CRUSTAL STRUCTURE OF GOLBASİ-CELİKHAN SEGMENT, EASTERN ANATOLIA, TURKEY

ID No: 328

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ABSTRACT

We announce a new seismic crustal model in Golbasi-Celikhan fault segment where based on the East Anatolian Fault Zone (EAFZ) using the Local Earthquake Tomography method. In order to conduct the tomographic calculation, we have selected more than 2000 events from 2011 to 2017 by 35 recorders. The seismic network was installed by the Earthquake Department of the Disaster and Emergency Management Authority (AFAD). We showed that low Vp and low Vp/Vs represent the gas content which associated with geothermal origin beneath the Guzelyurt, Olgunlar, Akcadag, Sofular and Karlik regions, which are mostly connected with fault zone. Dominant high P- velocity values are observed beneath the subduction zone that is located at 30-40 km depths in nearly all depth cross section. Condrad discontinuity is detectable in 20 km depth. Our consequences proposed that the Moho depth is located at ~35 km and varying from 30 to 40 km in the Eastern Anatolia, Turkey.

Key words: Local earthquake tomography, eastern Anatolia, Crustal structure, geothermal energy

MODELING OF SOIL PARAMETERS OBTAINED BY GEOPHYSICAL METHODS USING GIS: A CASE STUDY IN TRABZON

ID No: 34

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ABSTRACT

The models obtained as a result of the use of geographic information systems (GIS) provide a better understanding of the results in geophysical data as well as in many areas. In this study, depth of bedrock, average S velocity (V_{S30}) up to 30 m and dominant period values were obtained by using geophysical measurements in Trabzon (Arsin) and the results were modeled by using GIS. Single Station Microtremor Records (SSMR) was used to obtain the predominant period values and depths of the bedrock that calculated from the empirical formula. S wave velocities were obtained by using Multichannel Analysis of Surface Waves (MASW) and Refraction Microtremor (ReMi) methods. When the results are examined, the ground predominant periods obtained with SSMR varies between 0.1-0.37 s. According to Kanai and Tanaka (1961), these values indicate that the ground consisted of "rocks, dense sandy pebbles". It is seen that the average depth of the bedrock calculated from SSMR is averagely 15 m. The S wave velocities obtained from the MASW and ReMi methods range from 162 to 2263 m/s, and according to these methods, the bedrock depth is around 10 m. The V_{S30} values calculated by using S-wave velocities range from 428-817 m/s. According to these values, the ground class of the study determined as C (NEHRP) and B (Eurocode 8) class. According to the NEHRP classification, class C is geologically expressed as "Very dense soil and soft rock"; According to the provisions of Eurocode 8 the geological explanation of class B is expressed as "Very dense sand, gravel or very stiff clay".

Key words: GIS, S Wave Velocity, Predominant Period, Depth of Bedrock

THE USE OF GEOGRAPHICAL INFORMATION SYSTEMS (GIS) IN SEISMIC MICROZONATION STUDIES

ID No: 30

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ABSTRACT

Humankind has experienced and been involved in problems caused by disasters since ancient times. As cities have expanded and become crowded, the impact of disasters on urban areas has increased accordingly. Losses of both lives and money have been incurred around the world due to natural disasters such as earthquakes, landslides, floods, etc. The application of technology required to control the effects of natural hazards comprises three significant elements, such as prediction, monitoring and safeguarding. In the recent years, different technologies have been developed showing possibilities for a wide range of disaster management and hazard mitigation. GIS can be used as a tool to minimize the damage resulting from these disasters.As natural disasters occur at any geographical location, they can be analyzed using GIS. The damage caused by an earthquake is inevitable. However, it can be possible to reduce or eliminate damage by measures taken before and after the disaster. Microzonation studies solve problems resulting from natural disasters such as earthquakes and landslides. It is highly difficult to perform such studies by means of classical methods. Therefore, a GIS is needed to respond to these questions accurately and quickly. In recent years, GIS has emerged to be a powerful computer-based technique that integrates spatial analysis, database management, and geographical visualization capabilities. For geotechnical purposes, GIS-based information systems have been developed and used to forecast and plan for natural hazards such as landslides or earthquakes. Particularly, in geotechnical earthquake engineering, there has been a number of research studies on GIS technology. This technology has been widely used in increasing numbers of seismic zonations for the prediction of earthquake-induced hazards.This study aims to create a GIS-based system in order to reduce or eliminate existing risks in urban areas before natural disasters, to contribute for seismic microzonation studies, and to reveal easy, quick, and effective land-use planning studies. In addition, it presents results from studies performed for seismic microzonation in Multidisciplinary Turkish State Planning Organization (DPT) Project carried out along the North Anatolian Fault Zone between Erbaa (Tokat) and Erzincan.

Keywords: Seismic microzonation, GIS, Geohazards, North Anatolian Fault Zone

INVESTIGATION OF THE RELATIONSHIP BETWEEN EARTHQUAKE MAGNITUDES AND IONOSPHERIC TEC ANOMALIES BEFORE THE EARTHQUAKE

ID No: 35

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ABSTRACT

Earthquakes are natural phenomena that shake the earth and cause many damage. Since the time of arrival of the earthquakes can not be determined directly, some signs before the earthquake should be examined and interpreted by examining the environmental changes. Because the time of arrival of the earthquakes can not be determined directly, some signs before the earthquake should be examined and interpreted by examining the environmental changes. One of the methods used for this is monitoring the ionospheric total electron content (TEC) changes. GPS satellites have begun to be used as a means of monitoring ionospheric TEC anomalies that occurred before the earthquake since they began to be used as sensors around the world. In this study, 28 earthquakes with a magnitude greater than 7 were selected globally. The magnitudes of these earthquakes, the percentage changes of TEC anomalies before the earthquake, and the number of days before the earthquakes occurred were examined. The ionospheric TEC anomalies before the earthquake were determined according to the 15-day running median statistical analysis method. Different solar and geomagnetic indices have been investigated to determine the active space weather conditions and quiet days before and after the earthquake. The TEC anomalies were determined during the quiet days before the earthquake by comparing the ionospheric anomalies that occurred before the earthquake after the determination of quiet days with the indices of the space weather conditions. Relations between these anomalies according to the magnitudes of the earthquakes have been investigated. When the relationship between earthquake magnitudes and the day on which the earthquake precursor with an ionospheric TEC anomaly is determined, it is seen that as the magnitude of the earthquake increased, the signs of the earthquake precursor appeared later. When the relationship between earthquake magnitudes and the percentage of ionospheric TEC anomalies is examined, it is seen that as earthquake magnitudes increase, the percentage of ionospheric TEC anomalies increases. This study is supported by TUBITAK CAYDAG grant no. 116Y109.

Key words: earthquake magnitude, GPS, space weather condition, total electron content, earthquake precursor

ESTABLISHING GPS/GNSS SITES FOR POST-SEISMIC DEFORMATION FROM THE 6 FEB 2017, MW 5.5, AYVACIK, ÇANAKKALE, TURKEY, EARTHQUAKE: THE PRELIMINARY RESULTS

ID No: 33

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ABSTRACT

A multi-disciplinary project has been executed just [right] after the 6 Feb 2017, Mw 5.5 and earthquake swarm that happened in the vicinity of Ayvacik south-western end of the Biga peninsular. The Departments of Geomatics Engineering, Geological Engineering, Geophysics Engineering and Geography Education of Canakkale Onsekiz Mart University have collaborated with the goal of exploring the conditions leading to dense earthquake activity throughout Ayvacık, Canakkale and surrounding area with the hope of mitigating seismic hazard and damage. The deformation rate exceeds to the highest level during and directly after the earthquake and then decreases with time, and depends partly on the rate of aftershock activity. The project team has deployed 9 GPS/GNSS sites around the causative Tuzla, Kocaköy and Babakale Faults, respectively, in order to measure the months-long relaxation of the crust (post-seismic deformation) after the February earthquake. The geology of the region is generally composed of the andesite, ignimbrite and tuff exposed from the volcanism occurred in Miocene. Site selection was undertaken at the beginning of the April, 2017 by investigators from the departments mentioned above. Sites were selected based on earthquake intensity map that showed earthquake induced horizontal and vertical deformation. Sites were located in areas of the expected vertical deformation as well as at horizontal intervals from the faults in order to measure relaxation on both block (foot and hanging walls) of the faults. Establishing GPS/GNSS sites in places quickly enough to record the post-earthquake deformation signal is a priority. Biga peninsula, which houses earthquake swarm zone, is one of the less studied areas of the western Anatolia in terms of GPS/GNSS activities. The result of the very few stations concluded that the movement of the Anatolia is switching the direction from western dominant direction to south-west dominant direction, yet, creating normal faults around Bababurnu. This outcome indicates that there may be velocity difference along the Biga peninsular. This project will provide prior information for future research work in the region concerned. Furthermore, it will help train the researchers in GPS / GNSS topics. Moreover, A GPS/GNSS network has been established that reflects the earthquake activity and fault structure in the region. The fault geometry and block structure can be modeled with the help of the obtained results from the post-seismic deformations by GPS/GNSS network. This study is supported by COMU BAP (FHD-2017-1200).

Key words: Earthquake, Post-seismic deformation, GPS/GNSS, Fault.

CATEGORIZATION OF MARMARA REGION EARTHQUAKES ACCORDING TO THE RISK THEY PRESENT TO CENTRAL İSTANBUL BASED ON HISTORICAL EARTHQUAKES

ID No: 181

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ABSTRACT

İstanbul is expecting an earthquake of significant magnitude in the upcoming decades. 1999 earthquakes of Gölcük and Düzce has resulted in serious damages for various settlements across the Marmara region. One of the affected cities from those natural disasters was İstanbul and, from the visualization of former affecting tremors, it can be seen that these earthquakes tend to cluster around İstanbul in a linear manner. This project is exploring the possibility of finding a buffer zone that encapsulates historical earthquakes in the hope of tracking the next earthquake that will occur on the same fault as 1999 earthquakes within a limited areal frame. Since recorded earthquake epicenters are not directly positioned over the faultlines, meeting them in a well-defined referential region might reduce the zonal prerequisites of mitigation and preparedness disaster management phases. The buffer zone was the product of an effort to find common grounds among historical earthquakes with local magnitudes greater than 6.0. The final output area, which was basically a 10 kilometer fixed width buffer centered along the North Anatolian Fault, did indeed include majority of powerful historical and weaker new earthquakes that occurred in the vicinity of that fault. During the creation and determination of the buffer a heuristic approach was used instead of mathematical models: A 10 kilometer buffer could easily involve all the notable seismological incidents that might have a similar impact as the 1999 ones since they were present around the same linear base.

Key words: Earthquakes, GIS, Istanbul.

EARTHQUAKE HAZARD ANALYSIS OF ÇANAKKALE'S INDUSTRIAL ENTERPRISES VIA GIS-BASED FUZZY LOGIC METHOD

ID No: 182

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ABSTRACT

Industrial enterprises has an important place in the development of the country's economy. It is known that the destruction of industrial enterprises which is emerging outside safety of life by devastating earthquake creates negative effects in the country's economy. For this reason, it is important that earthquake hazard analysis of industrial enterprises must be introduced within its location. Earthquake Hazard Analysis of Çanakkale's industrial facilities revealed via using Open Source Geographical Information System Software (QGIS) and Fuzzy Logic Method in this study. The location of industrial enterprises, the geology of the province, epicenter points of earthquakes which the magnitudes are 4 and over 4 that have occurred throughout the province between 1905-2016 years, fault lengths and distance of active faults to the town center are used for accounting. Thematic maps were created by evaluating a combination of these parameters. The dangerous districts have been identified in terms of the earthquake on created maps. Then the location of industrial enterprises has been interpreted within these maps. As a result of the study, it was determined that the value of earthquake hazard is high for 462 industrial organization which are operating in the county of Yenice, Biga and Çan.

Key words: Industry, GIS, Fuzzy Logic, Çanakkale.

EARTHQUAKE MODEL OF MIDDLE EAST (EMME) PROJECT: EARTHQUAKE HAZARD ASSESSMENT OF TURKEY AND SURROUNDING REGIONS

ID No: 185

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ABSTRACT

This study aims to investigate seismicity and earthquake hazard of Turkey and the surrounding regions which are one of the most seismically active regions of the world. We compiled and used seismicity, geology, and tectonic data to characterize the region.

This study consists of two main parts. The first part of the study is the compilation and determination of active fault parameters and construction of an Active Fault digital database. The active fault database is prepared for fault segments that may generate earthquakes with moment magnitude greater than 5.5. Fault sections are defined as part of a fault segment where at least one fault parameter (strike, dip, rake, seismogenic depth) is changed. The active fault database consists of 36 columns of entries such as fault length, strike, dip, rake, dip direction, slip rates, slip type etc. for each individual fault section. In this study a total of 1668 fault sections have been defined and mapped, and 36932 km of faults are fully parameterized to construct a digital active fault database with using ArcGIS (Geographical information system). A digital active fault map is also prepared in ARC-GIS format. The fact that the active fault database has a dynamic character that allows continuous updating, refinement and analysis is the most fruitful outcome of this study. The database also contains a digital library that includes pdf files of the relevant papers, reports and maps. The entries also include the reference codes from which the parameters have been retrieved and compiled. Separately full references were given in a relational database. The second part is the delineation of seismic source zones and calculation of earthquake hazard parameters for each seismic source zone. The study area has been divided into 54 earthquake source zones. Using a seismicity catalogue (Kalafat et al., 2011) covering the time period 1900-2010 seismicity parameters have been computed for each source zone. An earthquake hazard map has been prepared for Turkey and the surrounding regions in ArcGIS .

Key words: ArcGIS, Earthquake hazard, Seismicity, Turkey and Surrounding Regions

LAND USE

PREPARATION OF PRELIMINARY SURVEY REPORT WITH GIS IN LAND CONSOLIDATION PROJECTS

ID No: 268

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ABSTRACT

Land consolidation, which is implemented in rural areas by terrain and land regulation, is one of the important means of increasing productivity in agricultural production and applied all over the world.

After a decision has been made to consolidate a rural area, the first thing to do is to study it in all aspects of this area in detail. For this reason, the land consolidation projects require a comprehensive preliminary survey, including future plans, as there is a general change in the settlement area, ie the village, as well as the economic and social structure of the village. In the land consolidation project, both the agricultural area and the subdivision of the village settlement are subject to change. So, first of all, the current situation of the village should be determined. Because all subsequent operations will be done according to the information and documents that will emerge from here.

Land consolidation processes carried out in the preliminary survey; general definition of the region should be made ,the structural and sociological status of the village should be investigated and the sources of production (such as agricultural land, climate of the region, topographic status of the land, distance of settlements) should be investigated. In addition, the use of cultivable land should be explored (such as the number of plots, parcel sizes, parcel shapes, spreads of parcels, area losses due to border and edge strips, production decline caused by road insuficiency), information which the trend of development in the social and rural areas information needs to be acquired.

The Geographical Information System was used for the preparation of preliminary survey reports in the Land Consolidation projects. ownership survey for a example project has been in the GIS environment. This study demonstrates the usability of GIS in preparing preliminary surveys in land consolidation projects.

Key words: Land consolidation, Geographical Information System, Preliminary survey, Planning.

ASSESSMENT AND MAPPING OF SPATIAL VARIATION OF SOIL QUALITY AROUND THE GULF OF EDREMİT, TURKEY

ID No: 109

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ABSTRACT

The quality of soil is one of the most important factor for achieving sustainable land use and an inhibitor to prevent land degradation. The objective of this study is to explore the soil quality and the influence factors of negative consequences of human activities around the Gulf of Edremit. Soil Quality Index (SQI), which is an effective method to assess the soil quality for any region, was used to determine the soil condition in the study area. The assessment of soil quality in this study is based on indicators and indices derived from soil properties. Soil reaction, soil texture, soil depth, parent material, rock fragments, drainage and slope parameters has been used to generate SQI that is an important measure of land values. After, the study area was divided into a 3.0x3.0 km grid, samples have been collected using the systematic random method from soil pits at 0-30 cm depths that reflect the *influence* of *anthropogenic activities*. Field and laboratory research of soil has been conducted on samples from 100 pedological profiles taken with a professional soil auger. Soil texture and reaction were analyzed in the soil laboratory by using pH meter and Bouyoucos Hydrometer Method, and also Geographical Information Systems used to analyze both the spatial distribution of soil parameters and SQI model. Results showed that almost 4.07% of the study area was located in the high quality class, 75.65% was located in the moderate quality, and 21.28% was located in the low quality class of degradation. Soils of high quality and moderate quality were observed in plain and flat lands; but, at the same time, some part of these areas were most affected places by urbanization. This demonstrates that the urbanization cause the pressure on high quality soils which are potential agricultural areas around the gulf.

Key words: Geographical Information Systems, Land degradation, Soil quality, Soil quality index, Gulf of Edremit.

INVESTIGATION OF NORMALIZED DIFFERENCE VEGETATION INDEX AND LAND SURFACE TEMPERATURE USING REMOTE SENSING TECHNIQUES FOR 20 YEARS OF DIYARBAKIR PROVINCE

ID No: 222

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ABSTRACT

The relationship between vegetation and Land Surface Temperature (LST) using AVHRR (Advanced Very High Resolution Radiometer) for 17 years (1998-2014), NDVI for 20 years (1994-2014) over 94 % and cloud cover for 15 years of Diyarbakir are presented. It is found that the correlations between LST and Normalized Difference Vegetation Index (NDVI) depend on the season-of-year. For winter, the correlation between NDVI and LST is positive. Correlations between LST and NDVI decreased during the warm seasons. Thus temperature-related drought indices may only be used in the warm seasons from June to October, and should be used with caution during cold seasons in Diyarbakır. Since vegetation is high on April and May both month was also studied.

Key words: AVHRR (Advanced Very High Resolution Radiometer) Data, Diyarbakır, Climate, Remote Sensing, LST (Land Surface Temperature).

FUTURE MODELLING OF LAND USE AND LAND COVER (LULC) IN UPPER SEYHAN BASIN WITH MULTI-LAYER PERCEPTRON MARKOV CHAIN MODEL

ID No: 201

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ABSTRACT

Land Use and Land Cover are continuously exposed to transformation due to anthropogenic effects, natural process and natural disaster. LULC which has a dynamic structure results in the change of ecosystem good and service potential due to the transformation that is has undergone. The study is takes place in Eastern Mediterranean Region and Upper Seyhan Basin in Turkey. This area has vast forests because of altitude difference, suitable plantation conditions and mild temperate zone that it has. Forests are one of most important carbon sinks which terrestrial ecosystem has. Thus, there is a need for an estimation of future LULC in order to calculate the carbon sequestration in study area. In this respect, Landsat TM/ETM+/OLI images that belong to the study area in 1990, 2003 and 2014 were classified by hybrid classification approach. The Kappa statistics evaluation results are respectively 0.81, 0.85 and 0.87, which are obtained thanks to hybrid classification approach that is combine K-Means algorithm, Decision Tree algorithm and Object Based Classification method. Simulations related to future are run using Multi-Layer Perceptron Markov Chain Model. At the first stage, the LULC map of 2014 are simulated with the help of the LULC maps of 1990-2003. The simulation results were compared with the 2014 LULC map assess the validity of the simulation and the rate of overlap was observed to be 89%. As for the second stage, LULC map of 2025 was estimated using LULC of 2003-2014. According to the results, it is predicted that the area of bareground will reduce by 13.06% whereas the rate of forest and agricultural area will respectively by 7.53% and 5.5%.

Key words: Land Use Land Cover (LULC), Change Detection, Multi Layer Perceptron, Markov Chain, Simulation

DESIGNING LAND ADMINISTRATION DATA INFRASTRUCTURE SUPPORTING THE INTEROPERABILITY BETWEEN APPLICATIONS: LAND VALUATION EXAMPLE FOR TURKEY

ID No: 262

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ABSTRACT

Effective land information management is quite important issue for the governments in order to success sustainable development and progress. To achieve sustainable land information management, primary needs are reliable and standardized data about topology, topography, and property. In this point of view, applications like real estate valuation, rural-urban transformation, expropriation, land consolidation, etc. can effectively be performed throughout the government agencies only with the presence of the standardized and interoperable data. Availability of such data provides the opportunity to share data between applications and meet the needs of many applications ranging from public institutions, private sectors, and research institutions.

With growing technology, data can be obtained from various sources and manipulated in various software with different techniques. Therefore, interoperability and management of geographic data sets and services, has become an important requirement for meeting the needs. For the solution of the standardization and interoperability issues with the purpose of developing geographic data production and sharing standards, the concept of Spatial Data Infrastructures (SDI) has emerged. Governments and spatial data organizations developed their own SDI to specify their standards and manipulate their data effectively throughout the different applications. Within these SDI, most commonly used geospatial data production and sharing standards are ISO TC/211 19xxx series standards and OGC (Open Geospatial Consortium) open standards. Real Estate valuation has always been a weighty matter for societies and governments for taxation, market capitalization and economic activity purposes. There are many methods used in real estate valuation, yet no certain and objective method exists (Nisanci, 2005). The most used valuation methods are Sales Comparison, Cost and Income Methods (Candas, 2012; Nisanci, 2005). Also, with the developing technology advanced statistics and artificial intelligence can be a good tool for obtaining better results with the spatial analysis ability of GIS.

In this study, for integrated operability and collaboration between different applications, geospatial data that produced and shared from different institutions transformed into INSPIRE/TUCBS standards. Once the datasets have the same data structure and properties, they can be used effectively in any applications. In land administration concept, to analyse the affectivity of the transformed data in various thematic areas, real estate valuation example is performed using fuzzy logic and nominal asset approaches with other necessary standard datasets in GIS environment.

Key words: Land Administration, Data Standards, Interoperability, Land Valuation.

COMPARISON OF DIFFERENT SPECTRAL INDICES TO IDENTIFY VEGETATION COVER USING LANDSAT-8 OLI AND SENTINEL-2A MSI DATA

ID No: 214

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ABSTRACT

Accurate identification of forest areas and their changes by time are important to better understand process about climate change, ecology and carbon storage. Detection of land cover changes via traditional methods is time-consuming and costly, therefore remote sensing is a commonly used approach being fast, economic and accurate.

Landsat-8 OLI and Sentinel-2A MSI data provide valuable datasets for moderate resolution monitoring of the Earth Surface for different applications specifically for vegetation cover changes. Landsat-8 OLI and Sentinel-2A data complement each other with the corresponding bands in 430 and 2300 nm spectral range and being open access is one of the most important advantages of these datasets. This common spectral domain has advantages on vegetation cover applications for including visible and infrared region.

Istanbul is the most important metropolitan city of Turkey considering its population, economy and socio-culture. With the increasing population rate in İstanbul, there have been several land cover changes in the city specifically in the Northern part which also includes are study area. Our research area lies between 41°16’ and 41°03’ North latitudes, 28°48’ and 29°19’ East longitudes. Landsat-8 OLI satellite image acquired on 22 July 2016 and Sentinel-2A MSI image acquired on 24 July 2016 are used in this study. This study aims to analyse the performance of different special indices namely Normalized Difference Vegetation Index (NDVI), Green Normalized Difference Vegetation Index (GNDVI) and Chlorophyll Vegetation Index (CVI) obtained from different satellites in order to identify the vegetation cover. Since the spectral indices minimize the illumination difference and reduce the atmospheric errors, the original radiometric resolutions of the images are preserved and 16-bit digital number data are used for both images. Our results indicated that NDVI and GNDVI produce better accuracy values compared to CVI during the identification of the forest cover.

Key words: Sentinel-2, Landsat-8, NDVI, GNDVI, CVI, Vegetation Indices, Remote Sensing

COMPARISON IMAGE CLASSIFICATION METHODS USING LANDSAT 8 AND SENTINEL-2 DATA FOR LAND COVER / USE MAPPING

ID No: 261

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ABSTRACT

Land cover and land use maps, which produced using satellite images, are used effectively in many areas (Mapping activities, examination of natural resources, determination of basin management strategies etc.) and provide great conveniences.

In this study, methods of object-based classification, which used objects as a classification unit, and methods of pixel-based classification based on statistical analysis of pixels were used to determine the land cover and its use in around the Karapinar. Land cover and land use maps which produced using Landsat 8-OLI and Sentinel-2 images having medium resolution are compared. Furthermore, accuracy comparison was made with object classification method to pixel classification methods, which called maximum likelihood and SVM methods, by applying filters which known as post-classification analyzes such as Sieve, clump and majority / minority. As a result, approaching the accuracy results value of pixel-based land cover and land use maps using sieve, clump and majority / minority filters was observed when compared to the object-based classification result accuracy values

Key words: Land cover and land use, Landsat 8-OLI, Sentinel-2, object-based classification, SVM

DIGITAL CHANGE DETECTION METHODS IN RURAL-URBAN LAND AREA MONITORING: KARAPINAR DISTRICT

ID No: 202

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ABSTRACT

Karapınar district is one of the most crowded and grown district in Konya. It has also significant ecologically crucial sides that having the only desert area in Turkey. Also, it has one more importance that having rare crater lake, -Meke Lake-, is also touristic place in Karapınar. However, drought in the place is increased dramatically for last decades. One of the indicator for this situation, green zone loss is observed in the middle of the desert. In this application, it is aimed that analysis of urban-rural land use change during 1986-2016 in Karapınar district, Konya, based on remotely sensed and GIS data. It is widely used several digital change detection procedures for monitoring land cover changes. Accordingly, in the study; two different change detection methods are performed and produced land cover/use maps of the district for two different time, for monitoring main changes in 30 years. Urban growth is a dynamic process and it is quite complex to be modeled in one dimension. Besides this, monitoring total urban land area can be indicative with using multi-temporal RS imagery and landscape metrics. GIS evaluation for urban expansion and searching the diminution of forest area in the desert are main aims in the study, for modeling and monitoring land-cover changes in Karapınar, Konya.

Key words: Change detection, Land use / land cover classification (LULC), Urban and rural mapping

COMPARING SATELLITE IMAGE CLASSIFICATION IN DIFFERENT SOFTWARES FOR DETECTING SPATIAL CHANGES

ID No: 208

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ABSTRACT

Classification is a decision making process used in many sciences. Also, classification in remote sensing is to automatically assign all pixels in an image to classes corresponding to land. The approach that is one of the classification methods and used up to now is pixel-based classification approach by which the processing unit is pixel. In this approach, it is examined the color values of the pixels and their proximity associations to each other. In image processing and remote sensing technologies, one of the classical classification approaches is object-based classification. Classification in this approach is performed that neighboring pixels are classified and converted to meaningful regions. These approaches of pixel-based and object-based are used by different softwares. In this study, it is aimed to determine land use changes of Sapanca Lake Basin by using softwares of IDRISI Selva, ArcGIS Image Analysis and ERDAS Imagine and to detect the software that gives the closest result to the truth. For this purpose, it was used Landsat satellite images, high resolution satellite images and aerial photographies. These days were analysed by supervised classification and accuracy assessment methods.

Key words: Image Classification, Land use change, Sapanca Basin, ArcGIS, IDRISI, ERDAS.

A CASE STUDY ON COMPARISON OF THE CLASSIFIERS PROVIDED BY GOOGLE EARTH ENGINE FOR LAND COVER IDENTIFICATION

ID No: 216

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ABSTRACT

As the number of freely available geospatial data with higher spatial resolutions increase day by day, applications and processing tools begin to require more capabilities, thus, new methodologies evolve and new platforms emerge as a consequence. Google Earth Engine (GEE) is one of these platforms operating on cloud. It provides many readily available data sets as well as a platform for processing and visualization of geospatial data. In addition, GEE is freely available for research, education, and nonprofit use. This study explores classification algorithms and tools provided by the platform by using band combination of LiDAR Canopy Height Model and Rugosity with extracted principle components of hyperspectral image of same area. The LiDAR and hyperspectral image were collected by NASA Goddard's LiDAR, Hyperspectral and Thermal (G-LiHT) airborne imager and freely available for use under NASA's data and information policy. These two data were fused together to perform a land cover classification on the study area. For this purpose, various supervised and unsupervised classification algorithms were implemented and then compared by each other by assessing their validity. The results were obtained as a confusion matrix for each classifier and discussed thoroughly with respect to their performances for each cover type. We believe that this study will encourage other researchers to use GEE platform to take the advantage of accessing a large freely available data throughout the world and perform most state-of-the-art methods easily and efficiently to get fast results.

Key words: Google Earth Engine, Land Cover Identification, Supervised Classification, Unsupervised Classification

ANALYSIS OF LANDSCAPE CHANGES FOR A SUSTAINABLE URBAN DECISION MAKING

ID No: 119

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ABSTRACT

Urbanization is a major driving force of landscape change besides, this change is neither uniform nor constant. Geographical and historical trends should be considered as well as planning scenarios that shape the urban forms.

This study aims to analyse landscape change in terms of sustainability by considering the land use decisions such as master development and environmental plans in Bursa, Turkey. In this frame, subjected study focused on the aforementioned plans plus remotely sensed data between the period of 1924 and 2015. Analyses of urban landscape change are maintained by the comparison of Central Metropolitan Planning Zone plans and land use land cover map acquired by classification of remotely sensed data. Comparisons and assessments were made within GIS (geographical information system). Considerable change was observed especially between the years of 1975-2010. The commercial and industrial areas, mainly housing, have expanded more than 100% between the years 1976 and 2005. Until 2015, 113 km^2 agricultural area was shifted for urban use. Also, 10 km^2 area was degradated for agricultural use from the forest areas. The factors such as topography, transportation network, slope and decisions on urban policy were the dominant factors of the spatial growth pattern for the defined time periods. The greater agricultural land loss was observed when development was restricted by the steeper slopes.

The results confirmed that the urbanized landscapes are highly dynamic, complex and multifunctional. Therefore, detailed inventories of landscape conditions and monitoring of change trends are urgently needed in for the sustainability of urbanization.

Key words: Urban Planning, Sustainable Urban, Remote Sensing

TEMPORAL ANALYSIS OF LAND COVER AND LAND USE CHANGE USING REMOTE SENSING DATA AND GEOGRAPHIC INFORMATION SYSTEM: A CASE STUDY ZONGULDAK

ID No: 206

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ABSTRACT

The aim of this study is to produce Land-Cover and Land-Use Change (LCLUC) maps of Zonguldak and vicinity using remote sensing data and Geographic Information System (GIS) together.

For this purpose, Landsat-7 and Landsat-5 satellite images of 1987, 2000 and 2010 were acquired. Image enhancement and classification procedures were performed with the help of PCI V10.0.3. Then, using ArcGIS 9.3.1, the spatial analysis on the classification data were performed. Mapping and table calculation processes were applied to produce LCLUC maps for the years 1987, 2000 and 2010 in Zonguldak and vicinity. LCLUC analysis in the periods between 1987-2000 and 2000-2010 were performed respectively.

1987 LCLUC map of Zonguldak revealed that, % 38.4 of study area is classified as open area, 35.8% as sea, 23.8% as vegetation, 1.4% as settlement area and 0.1% as dam-river respectively. When LCLUC map of 2000 is taken into consideration, % 36.8 is classified as open area, % 36.3 as sea, % 25 as vegetation, % 1.7 as settlement and % 0.2 as dam-river. LCLUC map of 2010 depicts that % 40.9 of study area is open area, % 35.9 is sea, % 15.8 is vegetation, % 3.2 is settlement and % 0.2 is dam-river.

When 1987 and 2000 LCLUC maps are compared, it is observed that open area coverage decreased 4%, settlement, dam-river, vegetation and sea coverage increased 24.8%, 11.8%, 4.8% and 1.3% respectively. On the other hand, according to land use maps of 2000 and 2010, when coverage area of vegetation and sea decreased 36.9% and 1% respectively, settlement, dam-river and open area coverage increased 84.9%, 50.9% and 11.2% respectively.

Key words: Land Use/Land Cover (LCLUC), Temporal Analysis, GIS, Remote Sensing, Classification

SHORELINE CHANGE ANALIYSIS IN GÖKSU DELTA BY USING DSAS

ID No: 264

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ABSTRACT

According to coastal law, the shoreline is defined as a point where water from the sea, natural and artificial lakes or rivers touches the land, not considering flood conditions. Shorelines contain both the characteristics of the land ecosystem and the characteristics of the water ecosystem. As such, the identification of the shoreline in any coastal zone provides information about geological, geographic and hydrographic characteristics of that region. Therefore, the international community of geological informatics has defined the shoreline as one of 27 global geoindicators.

Being the dynamic points that combine land and water, the shoreline changes daily, seasonally and yearly. These changes occur in some areas due to physical factors such as currents, floods, sea level changes, erosions and accumulations on the coast and tectonic forces; in other areas, these changes are dependent on human factors such as construction of ports, industry, tourism and settlement. In recent years, rapid shoreline changes have occurred in the Göksu delta coasts due to physical and human factors. The aim of this study is to extract the Göksu delta coastlines by using high and medium resolution satellite images combined with different statistical methods and also to calculate the periodical change with the DSAS tool.

In conclusion, it was observed that rapid changes occurred in Göksu delta coastline and this situation has been realized faster in the recent years. The most prominent places where the coastal line changes are located are Göksu river mouth, İncekum edge, Paradeniz Lagoon and Altınkum. While the shoreline in the Göksu river mouth wing advances towards land favor; on the other hand, the shoreline has fallen in favor of the sea in Incekum edge, Paradeniz Lagoon and Altınkum. As a result, these changes in the Göksu delta coastline have caused a significant geometric change in the coastal band.

Key words: Shoreline Change, Göksu Delta and DSAS Tool

IDENTIFICATION OF FUTURE LAND-USE CONFLICT AND LANDSCAPE PATTERN IN DENİZLİ, TURKEY

ID No: 265

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ABSTRACT

Denizli city is one of the nine cities in Turkey that has grown the most in economy and population in the last thirty years. The growing economic structure and position of the city have caused the population increase. It is envisaged that the new urban areas required due to population growth will develop on agricultural landscapes, archaeological landscapes and natural landscapes. The prediction of the risks that occur in spatial planning is now possible through various scenarios. Paul Zwick's Land Use Conflict Identification Strategy (LUCIS) is one of the goal driven Geographic Information Systems (GIS) models that produces a spatial representation of where agriculture, conservation, and urban land-use suitabilities will be in future conflict and helps illustrate potential future alternative land-use scenarios. The overall goal of this research has to isolate and quantify future land-use conflict in Denizli and effectively create future land-use scenarios for future. Visualizing how land-use change was spatially distributed, and where competing land-use classifications will be in conflict, have been examined by using LUCIS for the future of Denizli. The change in fragmentation in the future land use was calculated using the FRAGSTATS program with landscape ecology approach. Past and future land use and landscape pattern change and conflict were compared. The analysis' results highlighted the escalating drive for future urban expansion into agricultural land and archeological land and the persistent effort to conserve only those lands currently in conservation. It has been found that the change causes the increase of fragmentation and patch losses especially in agricultural areas.

This study was carried out in the scope of the project called "Interaction of Landscape Pattern and Ecological Processes within Urban-Rural Fringe: The Sample of Denizli City (113O543-TOVAG-TUBITAK)" project funded by The Scientific and Technological Research Council of Turkey (TUBITAK). We are grateful to TUBITAK for their support.

Key words: Denizli, FRAGSTATS, GIS, LUCIS, Multicriteria Decision Analysis

DETERMINATION OF THE IMPACT OF MEGA PROJECTS ON MEGA CITIES WITH MULTI-TEMPORAL SATELLITE IMAGES: A CASE STUDY OF ISTANBUL

ID No: 129

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ABSTRACT

Istanbul city has a great importance for Turkey's economic, demographic and cultural belongings and development. It is bridging the European and Asian continents and plays an important role in commercial and cultural exchange between this continents. It is currently one of the most populated city with nearly 17 million habitants and it is already the largest city of Europe. As being a megacity with dense population, Istanbul facing uncontrolled urbanization and also transportation problems. In addition, the need for transportation facilities and housings results with a continuous construction process in the form of mega projects. Such kind of development progress has a great influence on Land Use / Land Cover (LULC) characteristics of the city mostly in a negative manner. There is a need for appropriate and regular monitoring of LULC changes over the city in order to provide valuable metrics of the change that can be used by stakeholders to evaluate the current situation and prepare future plans. At this point, analysis of satellite images periodically provide thematic information of the LULC. Aim of this study is to investigate the 40 years LULC change in northern part of The European side of Istanbul with 10 year periods using the 1987, 1997, 2007 and 2017 dated Landsat satellite images. This area has been facing a continuous LULC change with previous mining activities and current airport construction project which is considered as one of the mega project in Istanbul. LULC maps are produced by classification of the mentioned satellite images and changes are determined by GIS applications.

Key words: Land Use /Land Cover; multi-temporal satellite images; mega project; Istanbul

STATUS OF PASTURE AREAS AT LAND CONSOLIDATION

ID No: 267

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ABSTRACT

In Turkey land consolidation works are carried out with increasing acceleration in order to obtain more efficiency from agricultural land, which is limited resource and can't be produced, in recent years. These works are implemented on the basis of the Law No. 3083 "Agricultural Reform for Land Regulation in Irrigation Areas" and the Law No. 5403 "Soil Conservation and Land Use". Amorphous, scattered, fragmented and small piece of lands are brought together in land consolidation projects. In the meantime, Common Facilities Share (CFS) is deducted up to %10 for community land from lands within the scope of the project. Deducting has a uniform operation for private person and legal entity lands. But CFS is enforced differently at pasture areas arising from the Law No. 4342 "Pasture Law". Land consolidation works implementing by the Law No. 3083, pasture parcels can be registered in the name of the treasury by changing the allocation purposes with authority by the Law No. 4342. Thus consolidation, distribution and deducting procedures can be executed. There is no authority like this at works implementing by the Law No. 5403. For this reason CFS can't be deducted and boundaries of pasture parcels can't be changed. In this study, four different land consolidation projects were investigated. At land consolidation implemented by the Law No. 3083 of Demirci and Bekarlar Villages, Gülağaç-Aksaray, pasture parcels area decreased in the ratio of % 2.98 (approximate 11 hectares) by virtue of CFS. Contrary to this, deducting wasn't implemented on pasture parcels at the project by the Law No. 5403 of Kapaklı Village, Kızılırmak-Çankırı. In another project, Karaömer Village, pasture parcels was't included because CFS was in the ratio of % 24. As a result, land consolidation works needs to gather under a single law roof for preventing different application.

Key words: Land consolidation, Pasture, Land use.

A STUDY ON DETERMINATION OF OPTIMUM PARCEL SIZE IN LAND CONSOLIDATION

ID No: 269

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ABSTRACT

Our country is very favorable for agricultural production when its land and its climate are considered. But, that land fragmentation continues and enterprises shrink prevent from agricultural production is maintained efficiently.

The most important of the methods of rural area regulation is land consolidation, which is widely used in the world and our country. Land Consolidation projects have many benefits, including access to parcels, efficient use of water resources, consolidation of parcels, reduction of the costs of irrigation and drainage projects. Land consolidation in our country is carried out in accordance with the provisions of the "Law on Agricultural Reform of Land Regulation in Irrigation Areas" numbered 3083 and the provisions of the "Soil Conservation and Land Use Law" numbered 5403 and regulations and regulations based on these laws. Although the Land Consolidation projects in our country are carried out according to the provisions of two different laws, the steps of implementation are similar in general. The ministry in charge of the projects under both laws is the Ministry of Food, Agriculture and Livestock (GTHB).

In this study, the datas of a land consolidation project completed by the Provincial Directorate of Agriculture in 10.20.2016 has been used. According to the supplementary law no. 6537 issued in 2014, which is one of the land consolidation legislation numbered 5403 for Soil Conservation and Land Use Law, the parcel sizes were compared after the consolidation of the selected project area according to the soil norm. In addition, the effectiveness of the land norm sizes determined by the Ministry and the determination of the optimum parcel size have been researched.

Key words: Land Consolidation, Optimum parcel, Soil norm, Rural area

USING GIS BASED SUITABILITY ANALYSIS TO IDENTIFY DEVELOPMENT DYNAMICS OF KIRKLARELİ CITY CENTER AND EVALUATION OF LAND USE SUITABILITY

ID No: 126

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ABSTRACT

In an investigation of the urban development and planning processes in Turkey, it is faced with a series of problematic issues. Fragmented planning implementations oriented by the multi-actor system, urban growth pressures on ecological thresholds, demands for land use with rapid population growth, pollution and lack of waste management planning are some of them. In order to overcome these complicated difficulties seen in the field of urban planning, suitability analyzes based on Geographic Information Systems (GIS) play an active role in decision making process. As a result of suitability analysis performed by using natural / artificial factors and limiters such as altitude, slope, land use, transportation and infrastructure; an analytical framework is established for evaluating existing development trends in terms of sustainability and developing planning decisions. Another result of the analysis is also revealed the least suitable areas for the settlements which are the boundaries that form urban thresholds in the planning.

The aim of this study is to perform a GIS based analysis to determine suitable settlement areas and urban thresholds using natural / artificial environmental factors in Kırklareli city center. Due to fragmented applications the plan integrity has disrupted since 1991 and a spatial development, which is not expected in plan predictions, is appeared. From this point of view, sustainable urban development strategies can be defined for Kırklareli, which is the forefront of cultivated areas and agricultural production with the analysis to be done. The factors and limiters will be identified, classified and rated which are effective for suitability analysis. As a study result, suitability map and the future spatial development scenarios for Kırklareli city center will be generated.

Key words: Suitability Analysis, Geographic Information Systems, Urban Planning, Kirklareli.

AN EXAMPLE OF CAMPUS INFORMATION SYSTEMS: ÇANAKKALE ONSEKİZ MART UNIVERSITY TERZIOĞLU CAMPUS

ID No: 323

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ABSTRACT

Within their boundaries, university campuses resemble a town. The main aims of universities are to provide education-training and to complete scientific research. University campuses, in addition to being education and training areas for students, are also social activity areas and community activity areas for the residents of the city (health services, academic activities, social activities, etc.). Campuses providing environments for development of both students and society and social activities include a range of physical elements like faculties, hospital, childcare, seminar rooms, green areas, carparks and banking services.

Information systems easily reveal how the educational facility operates within the current structures and what the requirements of the facility are. Thus, information systems have the characteristic of being a road marker for people with decision-making responsibilities both inside and outside of the facility. If the prepared information system only provides a map of buildings in the university campus it is deficient, just as it is deficient if the system only includes verbal information.

In this study, the aim was to create a Çanakkale Onsekiz Mart University Information System (ÇOMÜBİS) to ensure rapid and healthy decisions in planning services related to the future of the university. Founded in 1992 and still in the process of development, Çanakkale Onsekiz Mart University has campuses in 16 different areas of Çanakkale province, including 6 in Çanakkale center. With ÇOMÜBİS the target was to create a healthy base for campus management and future planning in Çanakkale Onsekiz Mart University. In this way, physical elements in ÇOMÜ Terzioğlu Campus (faculties, laboratories, sports areas, social activity areas, etc.) were digitized using ArcGIS 9.3.1 software and a database created. In this way, easy, rapid and healthy access to the required information was ensured.

This system for our university, with an important place internationally, will be developed in the future to become web-based and it is very important that this new system be prepared in different languages. This study is supported by COMU BAP 2008-68.

Key words: University, Campus, Information systems, Çanakkale

THE IMPACTS OF LAND DEGRADATION ON THE SOCIO- ECONOMIC STATUS OF PEOPLE IN KHARTOUM STATE, SUDAN

ID No: 330

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ABSTRACT

This study aimed to evaluate the socio economic impacts of land degradation in Special Program for Food Security (SPFS) in wad Omer village in west Omderman area. Primary data was collected through personal interviews with individuals using a structured questionnaire and analyzed by descriptive statistics method. The main occupation of people in the study area was animal rising. After SPFS introduction some of those people began practicing crop production activities, growing sorghum, okra, water melon, cucumber and abusabaeen. All respondents complained from decline of their sorghum production due to diseases and birds, which destroyed their crops. Okra was also found to be exposed to diseases, leave shrinkage and scorch despite higher production that sufficient for farmer's home consumption. The average return of all crops was high, indicating that most of the respondents had profited from SPFS in generating income. Hence SPFS succeeded in achieving one of five the objectives, of increasing the income of the people in the study area. It created an opportunity of income source from agriculture.

Key words: Food security, Land degradation, Statistics method.

DETERMINATION OF SPATIAL DEVELOPMENT (1962-2017) OF ÇANAKKALE CITY WITH GIS

ID No: 336

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ABSTRACT

Land asset, which is located at the center of the natural resources and has a collimating effect for the natural resources potential, is used in different ways. The development of economic sectors (industry, agriculture, transportation and energy resources etc.) together with the accompanying growth in population, the need of food resources and then the need of the settlement areas have largely increased the activity and the effects of human on the land. The enlargement of the cities does not only include the population growth but also includes the processes of the spatial growth and the new settlement areas.

The Çimenlik Castle, located on the edge of the Dardanelles Strait, is the core of the settlement of Çanakkale city. Çanakkale has continued the development in both horizontal and vertical directions from the past to the present. This study aimed to investigate the Çanakkale's chronological history for the spatial growth process in the last 55 years. For this purpose, aerial photographs of 1962 and 1997, ASTER satellite image (2008), GPS measurements of 2006 and 2017 were used in determining the boundaries of the city. MapInfo 10.5 program is used for digitization and map output. Having a total city development area of 14.1 km², Çanakkale City has a spatial growth process of 12.4 km² in the last 55 years. The results show a 8.3 times increase. Last but not least, 60.1 % of improved land were opened for settlement.

Key words: Spatial Development, Çanakkale City, Urban Geography, GIS

TOURISM

THE APPLICATION OF GIS IN SUSTAINABLE TOURISM PLANNING: A REVIEW

ID No: 159

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ABSTRACT

Decision-making in tourism development and planning is becoming increasingly complex as organizations and communities have to come to terms with the competing economic, social and environmental demands of sustainable development. Geographical Information Systems (GIS) can be regarded as providing a tool box of techniques and technologies of wide applicability to the achievement of sustainable tourism development. Spatial (environmental) data can be used to explore conflicts, examine impacts and assist decision-making. Impact assessment and simulation are increasingly important in tourism development, and GIS can play a role in auditing environmental conditions, examining the suitability of locations for proposed developments, identifying conflicting interests and modeling relationships. Systematic evaluation of environmental impact is often hindered by information deficiencies but also tools for data integration, manipulation, visualization and analysis. GIS seems particularly suited to this task. This paper examines the progress tourism related organizations are making towards the utilization of GIS and its integration with the principles of sustainable development.

Key words: Geographical Information Systems, Sustainable Tourism Planning

GIS-FUZZY DEMATEL MCDA MODEL FOR THE EVALUATION OF THE SITES FOR ECOTOURISM DEVELOPMENT: A CASE STUDY OF "UZUNDERE", ERZURUM-TURKEY

ID No: 161

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ABSTRACT

In tourism sector, the interest for natural sites have been increasing with every passing day in the recent years and correspondingly the use of unspoiled, natural and cultural areas are coming into prominence. In these areas which are considered as the starting point of ecotourism, protection-usage and sustainability are one of the most important elements. Providing sustainability depends on wheter the planning has been done or not. In this context, planning is highly important during the exploration and opening them to tourism of suitable areas on a site for the development of ecotourism. Accordingly there are various methods which are being used to detect suitable areas and ecotourism types around the world. The goal of the study is to develop a model specific to each region by defining the land type for the development and planning of tourism. Forming a network hierarchy is a very important and creative act in the solving process of the problem; because it is highly important to take into account all the factors which affect the evaluation of the suitability of the area fort he development and interaction of ecotourism. Due to geographical factors existing in the investigation area and touristic destinations being complicated, the methodological hierarchical model which is being presented is based on GIS-MCDA structure. Thereby in order to identify the suitable areas for ecotourism and ecotourism types in Uzundere (Erzurum) district, it has been tried to contribute to the ecotourism studies on site by using GIS-Fuzzy DEMATEL and MCDA methods. In the method, the relative importance of the factors which take place in the decision making process is defined by using Fuzzy Decision Making Trial and Evaluation of Laboratory (FDEMATEL). In this study, which is done with the multi-criteria determining method, it has been aimed to determine the potential of ecotourism in the area by evaluating and guessing the sustainable ecotourism activities by using produced maps. The potential of sustainable ecotourism in the area has been evaluated by evaluating the area with sixteen evaluation criterions (FDEMATEL) and bringing them under four maintopics. The area has been analyzed with it's geographic conditions for being either suitable or not by classifying the areas as "Highly Suitable", "Suitable", "Barely Suitable" and "Not Suitable" with the Weighted Linear Combination procedure. This approach is necessary in terms of CBS's ability to manage the data on earth and to attain the true information. Besides MCDA flexibility is being used to be combine with expert views, standarts surveys and site studies etc. Thus, due to the ability of managing multiplexed spatial data from different sources, CBS is a quite soaring tool. Consequently, it has been detected that in terms of ecotourism, Uzundere district is not only covering a large area with suitable sites for nature tourism but also is Cittaslow. Suggestions have been made about the current ecotourism activities on working sites, detecting the potential ecotourism areas and new plannings about ecotourism activities and development with sustainable approach.

Key words: Ecotourism, GIS-Fuzzy DEMATEL and MCDA, Uzundere, Erzurum.

DEMONSTRATION OF THE TOURISM POTENTIALS OF DİM RIVER VALLEY IN GIS

ID No: 162

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ABSTRACT

Today, as a result of changing tourist expectations, understanding of tourism has begun to change gradually and tourism activities have begun to diversify. Now, many tourists are turning to alternative tourism types from the classic tourism called sea, sand, sun triology. In this way, new tourism destinations are gaining importance. Turkey has a lot of appropriate places for alternative tourism activities and Alanya is one of these with Dim River, Dim Cave, Damlataş Cave and etc.

In this study; it was wanted to research Dim River Valley, which is one of the important areas for alternative tourism of Alanya, and discover its tourism potentials. It was tried to find out tourism status like what are the tourists profiles, who visits Dim River Valley, which activities are preferred and what are the tourism expectations. Obtained informations was transffered to GIS programme and analyzed then they showed on the map. According to obtained results there are some problems in management and also advertisement. It is thought that Dim Valley may have a greater tourism potentials if more promotion is made. If the right steps are taken with public institutions and local businesses Dim River Valley may become a more important destination for tourism.

Key words: Alanya, Dim River Valley, Tourism, Alternative tourism, GIS.

DESIGNING A TOURIST INFORMATION SYSTEM FOR THE CITY OF KASTAMONU BY USING GEOGRAPHIC INFORMATION SYSTEMS

ID No: 163

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ABSTRACT

Nowadays, before performing touristic activities, being identified historical and cultural places needs arise. Using the spatial information technology in tourism provides to improve transportation for touristic areas with their description. When we look at the countries that gain the biggest profit from tourism, use Geographic Information System entirely and they are both advertising touristic attractions and serving people to access these places.

Considering to historical and cultural value of Kastamonu, most of civilization from prehistorical age were witnessed. Although Kastamonu has a big cultural inheritance, it is hard to claim that the city has not enough neither domestic nor foreign tourists. Performing Geographic Information System for tourism sector matters because of advertising the existing worth and increasing the number of the tourist. In this study, tourist information system is designed for foreign and domestic tourists to specify areas have touristic value and access the areas quick and easily in Kastamonu. With the aid of the touristic information system, contributing advertisement of the city is expected with increasing the number of incoming touristic places in Kastamonu.

Key words: Tourist Information System, Geographic Information System, Spatial Investigation, Kastamonu

A PROPOSAL FOR CREATING A SECOND HOME DATABASE IN TURKEY: THE CASE OF MANAVGAT, ANTALYA

ID No: 158

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ABSTRACT

Second-homes research is a growing area of academic interest in Turkey. Numerous exploratory studies have been conducted on the environmental, economic and socio-cultural impacts of second homes. In addition to this there are various research topics such as the motivations of the second home owners, the participation of the second homes in the tourism sector so on. Second homes hide the secret tourism giant in terms of accommodation capacity. Hence second homes constitutes an important accommodation supply in many countries. However it is always a difficult issue that determining the current numbers of second homes in Turkey and in the World. For this reason, the aim of this research is to develop a proposal about the determining of the second home stock in Turkey by using Geographical Information Systems. The research was carried out in the case of the Manavgat district. In the study at first second home data were provided as pdf files at the level of "main street, street, square and boulevard" through The Manavgat Municipality. The Municipality obtained this data from The Ministry of the Interior, General Directorate of Population and Citizenship Services. The number of possible holiday sites is given approximately in these files. Also these pdf files includes; block, sheet, parcel and door number. This data has been associated with zoning map of research area which is obtained from Manavgat Municipality. ArcGIS 10 software was used for the determining second home stock and constructing second home databases of the area. It is considered that the results obtained from the study will be an example of the studies about the issue of determining the second home stock in Turkey.

Key words: second homes, tourism geography, GIS, Manavgat, Antalya

CALCULATION AND EVALUATION OF THE PRINCES' ISLANDS LANDSCAPE STRUCTURE

ID No: 271

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ABSTRACT

Urban landscapes are influenced and shaped by many natural and cultural factors. For this reason, landscapes must be evaluated in a practical and suitable way in line with the principles of sustainability. There is a need for holistic tools that will be able to exhibit spatial, ecological, and sociological construction of landscapes and evaluate relationships between these structures so that landscape planning and management can be applied from regional scale up to details. In landscape assessment, it's essential to reveal the whole, constituted by landscape components, rather than all details of each component that constitutes the landscape. It's also important to produce applicable solutions against the factors that disturb this whole.

Located in the center of a metropolitan city like Istanbul, Besiktas is an area where urbanization is heavily influenced and where rapid changes in landscape patterns and functions are experienced. The short-term development of practical landscape planning strategies for such areas is of great importance.

GIS is an important tool that accelerates the evaluation process, before making decisions for urban landscapes. In this research, GIS technology was used to speed up the evaluation process and to systemize multi-componential complicated landscapes to get ready for analysis and evaluation.

For the classification of thematic data and for suitable, risk, multi criteria, spatial, pattern, time series analyses, GIS was used. This assessment could systematize the measurement and evaluation of many components of the urbanization process occur in an urban landscape.

Key words: Urban landscape planning, GIS technology, holism, multi-criteria

USE OF GIS IN SOME ISSUES OF LANDSCAPE PLANNING

ID No: 272

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ABSTRACT

GIS can be used in the different issues of the environmental planning process. Especially, GIS is very useful applied for the landscape planning in the process of getting, processing, developing, analyzing, visualizing and mapping of data. The aim of this study is to present the application areas of GIS in landscape planning studies used in different purposes. Firstly, the application areas of GIS have been taken as examples from a study based on European Landscape Typology applied in Turkey. In another study, the role of GIS in the analysis of landscaping measurements based on the patch, unit and diversity of the spatial pattern of the cypress (*Cupressus sempervirens* L.) forest is considered. At the classification of landscape types for first example study was used LANMAP recommended across Europe for landscape classification. The layers in LANMAP are overlayed to each stage according to GIS-based hierarchical order. Different layers are used in each stage respectively. Totally, three layers are used to classify the landscape in this study. In another study, spatial pattern analyze of cypress forest biotopes in the National Park Köprülü Kanyon was realized by measuring of area, density and diversity metrics. The Patch Analyst application, which is compatible with GIS studies, was used to calculate the landscape metrics in this study.

Key words: Landscape Classification, Landscape Metrics, GIS

DETERMINATION OF TREKKING AREAS IN GÖKÇEADA (IMBROS) WITH GIS

ID No: 164

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ABSTRACT

Gökçeada, known as Imbros in antiquity, is the largest island of Turkey with a surface area of 289 km^2. The island's unique flora and fauna features, variable topographic structure, local products, architectural structure and historical richness constitute an important potential in terms of tourism diversity. Ecotourism and trekking routes within this scope are also in these diversities. In this study, it was aimed to determine suitable routes for trekking in Gökçeada. The trekking area were determinated using evaluation factors such as slope, aspect, elevation, current land use, distance to water sources, land use capability class and distance to road. The evaluation factors used in the study and the value ranges of these factors are based on field observations, expert opinions and literature. After giving the suitability score for the range of values of the assessed factors, the weight points were determined considering the importance of the factors according to each other. In the process of determination for the weight points, the Analytical Hierarchy Process (AHP) method, which is one of the multi-criteria decision making techniques, is used. The thematic maps created by giving the scores of the appropriateness and weight to the evaluation factors were interrogated by GIS and the appropriate routes were determined spatially using the overlay method. The analyses revealed that 0.4% (122.2 ha), 16.6% (4668.5 ha), 74.2% (2095.5), and 7.4% (374.2 ha) of Gökçeada (i.e. Imbros) were highly, moderately, marginally suitable, and unsuitable for trekking, respectively.

Key words: Gökçeada (Imbros), Ecotourism, Trekking, Analytical Hierarchy Process (AHP), Geographical Information Systems (GIS)

MEDICAL TOURISM AND A RESEARCH ABOUT APPLICATIONS IN ANTALYA: EXAMPLE OF AKDENİZ UNIVERSTY HOSPITAL

ID No: 165

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ABSTRACT

The purpose of this research is, aplications of medical tourism in Antalya, that has been recently very important, to determine opinion of medical tourists and hospital staff who participared to the research in Akdeniz University Hospital and to put forth the potential of medical tourism research.

In this research a survey has been prepared for the participaters. Foreign patients were given a survey that consists totaly 5 chapters and 30 questions and hospital staff were given a survey that consists 11 questions. Surveys have been made to the 52 patients who came to the hospital between November 2016- February 2017 and also to the 26 staff face to face. Acording to the findings, medical tourists chose Akdeniz universty Hospital not because of the intermediary establishments, because of the friend advices, internet and the doctors.

Medical tourists defined that they are satisfied about staying, food and beverages, the service quality of the hospital staff. But education was not enough for the staff who look after to the foreign patients.

In medical tourism, the decision process of foreign patients starts with the cure of the illness' search. And then decision is made to travel, destination country is choosen and persons or institutions are choosen who present this service. Antalya has a very high potential for medical tourism because of its tourism experience, services in medical tourism institutions, financially satisfaying and staff quality who services to the foreign patients.

Key words: Medical tourist, Hospital staff, Medical tourism, Antalya

DETERMINING PHYSICAL CHARACTERISTICS AND DIFFICULTY DEGREES OF TREKKING TRACKS WITHIN HATILA NATIONAL PARK USING GIS AND AHP METHOD

ID No: 166

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ABSTRACT

Today's living conditions restrict the time that people can spend in the nature. Studies conducted in the recent years exhibit that people's longing for the nature constantly increases. Trekking is an activity that can be performed by almost everyone and it is among the sports activities people can perform in order to satisfy their longing for the nature. This study was conducted to evaluate degrees of difficulty and the quality of 45 in-forest tracks of the mainly mountainous Hatila National Park in Artvin in terms of being regarded as trekking tracks. The area is an important recreational spot where the characteristics of natural landscape meet cultural landscape, and is under protection owing to the flora and wild life it embodies. Within the scope of the study, the physical characteristics of the trekking tracks including the slope, walking distance, walking time, aspect and elevation were determined through the use of geographic information system (GIS). Besides, using the above-mentioned characteristics, the difficulty degrees of these trekking tracks were determined by using Analytic Hierarchy Process method (AHP). It is expected that findings obtained in the study constitute baseline for planning of protected areas and tourism development.

Key words: Trekking tracks, Hatila National Park, GIS, AHP.

THE IMPACT OF SYRIAN IMMIGRANTS ON ISTANBUL TOURISM FLOW

ID No: 160

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ABSTRACT

Tourism in Istanbul is affected substantially after the migrations. At least 540 thousand of the more than 3.1 million Syrian refugees in Turkey live in Istanbul. These immigrants are especially concentrated in Esenyurt, Başakşehir, Sultangazi, Küçükçekmece, Bağcılar, Zeytinburnu and Fatih districts. Fatih is one of the most touristic area because it has historical buildings of old Istanbul. The change of tourist activities have become more visible in last three years. It is believed that security is reduced in areas where refugees are located. In this research, the nations and numbers of tourists coming to Istanbul are shown statistically for 2015, 2016, 2017 years. It is revealed where the Syrian refugees have settled in Istanbul and how far they have influenced the tourism in these regions. The year-based density maps that show locations of Syrian immigrants are created in the QGIS software. Statistical data of tourists and population density maps were associated by using QGIS software.

Key words: tourism, syrian, refugee, QGIS, density map

AGRICULTURE / FORESTRY

CHALLENGES AND PROSPECTS OF GEO-INFORMATION SCIENCES IN AGRICULTURE-; THE NIGERIAN SITUATION.

ID No: 112

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ABSTRACT

Nigeria as one of the prosperous developing Nations with high population growth rate in Africa is witnessing changes. The dynamics of social changes and the peculiarities of educational initiatives in the Country do call for reviews with the aim of meeting the emerging needs and values of the society, arising from the need for relevance in form of education for functional living, self-sustenance, and self-reliance. These have re-shaped thoughts and practices in Nigeria. The reason being that the opinions and solutions that key stakeholders requests and needs for productivity and progress often make some of the components of the existing situation either obsolete or out of tune with currency. Whenever this happens, it sets pace for the country's review initiatives in value-orientation, poverty eradication, and wealth and job creation among many other reasons. One positive note is that both government and the entire citizenry are seeking better ways of doing things, that is, the anchorage of national values, as a tool for achieving results that would benefit the country. The fact remains clear that for any system to adequately respond to the challenges of national development for sustainable development, a virile, dynamic and prosperous approach becomes significance. The paper therefore presents a literary search of the major trends and issues in Geo-information sciences in Nigeria. In doing this, efforts were made to review of Geo-information sciences as a form of educational reformation; the early curriculum in Nigeria ; the contributions of examining bodies, commissions reports on Geo-information sciences trends before independence; curriculum trends and development from Nigerian independence along with the emerging issues and challenges at various times. All put together in the end, calls for a more cautious, conscious, purposeful and directional policy formulation.

Key words: Changing Trend, Geo-Information, Challenges, Prospects, Nigerian situation.

USING BOX-JENKINS MODEL TO FORECAST GUM ARABIC EXPORTS FROM SUDAN

ID No: 115

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ABSTRACT

Time series modeling and forecasting has fundamental importance to various practical domains. Thus a lot of active research works is going on this subject during several years. Many essentials have been proposed for improving the accuracy and efficiency of time series modeling and forecasting, one of them is Box and Jenkins is an important model used in time series methods, which differ from other types of forecasting models.

Sudan is the main um Arabic producer and exporter in the world that used in many manufactures such as Pharmaceutical, foods, cosmetics and other industries. It produced about 80% of the world Gum Arabic production, which exports to France, USA, Turkey, Germany and other countries.

This study aim to put standard models for Gum Arabic quantities exported from Sudan by using Box and Jenkins by determining an ARIMA models and go further to forecasting. We consider data of Gum Arabic exports from official sources for the period 1980-2015. The model building process involves three steps: tentative identification of a model from the ARIMA class, estimation of parameters in the identified model and diagnostic checks. Results showed that the appropriate model is simply an ARIMA (1,1,0) that used to forecast exports quantities, after that forecasting till 2023 and this used as scientific base to made exports plans.

Key words: Sudan, gum Arabic and ARIMA.

MAPPING SOIL EROSION RISK IN KARACAÖREN LAKE WATERSHED USING GIS AND LANDSAT IMAGE

ID No: 110

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ABSTRACT

In this study, soil losses were estimated according to RUSLE Method using by Geographic Information System (GIS) and Remote Sensing Techniques and mapping for the Karacaören Lake Watershed. In this research, the basin area maps, a variety of research results, the reports, meteorological data, statistical information, Landsat - 5 TM satellite image and the data as a result of field studies were used. The necessary parameters for the method RUSLE was prepared as a raster data into thematic layers using ArcGIS software and it was interacted due to method.

Erosion was seen as a dangerous level approximately 85% of Karacaören Lake Watershed. According to erosion map, potential of annual total soil loss from Karacaören Lake Watershed was estimated as 11,429,374 tons.year-1, the annual average soil loss was also estimated 47.51 tons.ha-1.

Remote sensing (RS) and geographic information systems (GIS) were found effective methods for predicting soil loss according to RUSLE model. Using of together with these techniques was allowed to producing an erosion map for lake watersheds. The results clearly demonstrated that the simulated annual soil losses have general relative validity. Consequently, the erosion severity map can be used to target areas where erosion control should have priority, particularly areas of high erosion which contribute sediment directly to the lake.

Key words: Erosion Risk, Karacaören Lake, Landsat 5, RUSLE

ECOLOGICAL RISK ASSESSMENT OF SOIL POTENTIAL IN TROY HISTORICAL NATIONAL PARK

ID No: 111

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ABSTRACT

This research study is intended to investigate some negative effects of available practices on soil potential which is located in Troy Historical National Park (THNP). In the methodology, three important parameters were taken into consideration to determine ecological risks: i) feasibility of the soil, ii) intensity of negative effects, iii) susceptibility to negative effects. The interaction among these three factors was examined, and thus potentially at-risk spaces were identified for each damaged landscape potential. As feasibility parameter, the usability of the natural resource was accepted. In the parameter of the intensity of negative effects, damage to the natural resources and changes in their properties caused by the existing or expected land use practices were regarded as negative effects. Susceptibility to negative effects was considered as the reaction of a natural resource or space to land use-induced effects

As a result of the study, such factors as uncontrolled administration of pesticides and fertilizers to soil, slope-erosion, soil compaction induced by field traffic, monoculture agriculture, and soil tillage/cultivation under unsuitable conditions, adverse draining conditions, degradation of soil's physical and chemical properties, and lack of organic material were identified as ecological risk factors of the areas. This study was supported by Çanakkale Onsekiz Mart University (Research Project: 2011/059) and utilized material from the project**.** We would like to thank the Scientific Research Projects Office of Çanakkale Onsekiz Mart University.

Key words: Troy Historical National Park, Ecological risk, Soil.

SPATIAL AND TEMPORAL CHANGES OF POTASSIUM AND CALCIUM WITH GEOGRAPHICAL INFORMATION SYSTEM (GIS) IN KUMKALE PLAIN

ID No: 114

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ABSTRACT

This study was carried out in Kumkale plain, which is one of the important plains of Çanakkale. Study area cover 5260 ha area. Soil samples collected from 0-25 cm depth. Spatial and temporal changes of potassium and calcium were examined at three different time periods (December-April and July). Soil sampling points were determined by using 1/100.000 scale soil map, geology map and land use types. Potassium (K) was analyzed with flame emission photometer (U.S. Soil Survey Staff, 1996) and calcium (Ca) was analyzed with titrimetric method (Sağlam, 2001). Coordinates of soil sampling points recorded by GPS, soil analyses which performed in laboratory digitized and recorded to geographical information system (GIS) database. Maps of spatial and temporal variation of K and Ca generated with the Inverse Distance Weighted (IDW) tool in GIS.

Key words: GIS, monitoring, Ca, K.

BURNED FOREST AREA MAPPING FROM SATELLITE IMAGES WITH RANDOM FOREST ALGORITHM

ID No: 99

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ABSTRACT

On June 2016, two forest fires occurred at Kumluca and Adrasan in Antalya, Turkey. During these fires, a large forest area was exposed to fire in both locations. In this study, these areas were extracted from Landsat 8 satellite images, which were taken after the fire. Image processing consisted of three steps for burned area classification. In a first step, image segmentation was performed to obtain image objects. In a second step, image objects metrics were calculated from spectral bands, band ratio and band indices. In a third step, Random Forest algorithm was applied for the classification of burned forest areas and other types of land use. Adrasan was selected as the training site and Kumluca as the test site for classification. Training data was collected from the training site for five land use classes, namely burned forest area, green vegetation area, water area, settlement area, and other areas. Random Forest algorithm was applied to the training dataset in order to develop a classification model. Following that, the dataset of the test site was classified by using this model. The obtained overall accuracy of the classification process was 93%, whereas the accuracy of classification of burned forest areas was 95%.

Key words: Remote Sensing, Classification, Burned Forest Area, Random Forest Algorithm

DETERMINING OF RISK AREA FOR FOREST FIRE OF KAHRAMANMARAS PROVINCE WITH GEOGRAPHİCAL İNFORMATİON SYSTEMS (GIS) AND ANALYTİC HİERARCHY PROCESS (AHP)

ID No: 100

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ABSTRACT

Forests are also important for the protection of the world's ecosystem, as well as meeting the needs of sustainable development, such as water, food and housing. However, this precious natural resource is widely consumed by the forest fires that take place every year. In our country, the Aegean and Mediterranean regions are sensitive areas for forest fires depending on the natural and human factors. The Kahramanmaras Province, which constitutes the research area, is also located in areas sensitive to forest fires. In this study, spatial analysis of 333 forest fires in Kahramanmaras Province between 2012 and 2016 was carried out. The analysis was made based on the effective factors in forest fire risk (elevation, slope, aspect, distance to settlement, distance to road lines, land use) and the effective factors in fire-fighting (distance to water resources, distance to fire-fighting teams, distance to fire observation towers). This factors were analyzed by means of GIS (Geographic Information Systems) and AHP (Analytic Hierarchy Process). As a result, it was determined that the factors affecting fire risk were more dominant in the study area. Forest fire susceptibility analysis was found that 56,7% (8133 ha) of the study area has a sensitive forest fires potency at the medium level.

Key words: Forestry, Risk of Forest Fires, Geographical İnformation Systems (GIS), Analytic Hierarchy Process (AHP), Kahramanmaraş Province.

EVALUATION OF DIFFERENT GPS TYPES ON FOREST ROAD NETWORK IN TURKEY

ID No: 102

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ABSTRACT

Forest roads are essential for forest management by providing corridors for transportation, haul routes for forest products, access for recreation and education, and infrastructure for fire protection. In the past two decades, surveying procedures improved in term of speed, accuracy and simplicity mostly due to use of computers and technical development in general.The aim of this study was to assess accuracy of different GPS - types and their range of application with emphasis the examination of its suitability for forest road surveys. For this purpose, Çaykara(Trabzon-Turkey) district forest road network, three different locations were selected with three completely different terrain configurations. At each location, 220 meters of a forest road were measured and from these measurements the site plan and the longitudinal profile for the measured road section were obtained. The measurements were performed using four different instruments: of handheld GPS, DGPS, CORS and Total Station devices. We want to compare the accuracy between different geodetic techniques on various terrains and to examine the rationality of the use of different surveying methods. The data obtained by the GPS device analysis accuracy by comparing with the data obtained was performed with a total station instrument. Finally the measurements accuracy with GPS in the reference to the forest road was calculated, the suitable results were brought and the relative suggestions for its indicated forest application in Turkey.

Key words: Forest, Forest road, accuracy, GPS, DGPS, CORS

FOREST FIRE RISK ESTIMATION WITH THE APPLICATION OF FUZZY ANALYTIC HIERARCHY PROCESS AND GIS

ID No: 103

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ABSTRACT

Forest fires are an important part of the Mediterranean ecosystems. Sometimes, the forest fires cause catastrophic destructions in these ecosystems characterized by scarce resources. It is a great advantage to identify the risky areas and to take the necessary measures in order to reduce the forest fire effect in large areas. The objective of this study is the estimation of forest fire risks in Çakırlar forest with the fuzzy analytic hierarchy process- FAHP and the mapping of risk levels using geographic information systems (GIS). Socio-economic, topographic, climatic, and stand structure have been considered as criteria to estimate fire risk. Each risk criteria and their sub-criteria membership grades have been estimated with the fuzzy set theory. The membership grades, obtained by fuzzy set theory, have been mapped as criterion weights by using GIS and a final risk map was established with weighted overlay analysis. Socioeconomic properties has been found as the highest impact on fire risk with 35%. The high risk degree of socioeconomic properties occured in shrublands with substantial fuel loads and young calabrian pine (*Pinus brutia* Ten.) forests in low elevation areas at the edge of roads, urban and urban periphery areas, south sloping, and steep sloped areas. GIS has a great importance in mapping the risky areas by using raster-based overlay techniques of criterion weights and further, in linking the areas to decisions making to measure spatially fire preventions.

Key words: Forest Fire, Risk Estimation, FAHP, GIS

GIS-BASED FOREST CRIME MAPPING USING ORDINARY LEAST SQUARES: CASE STUDY FOR EAST MEDITERRANEAN REGION

ID No: 104

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ABSTRACT

GIS, which is efficient and effective use in science, that has an important role in the modelling of confused problem about human-environment interactions in general. It makes more reliable model in order to estimate of the effective factors for solutions. Recent GIS-based work approaches in almost all forestry related studies show rapid growth trends. Somehow, political and social disciplines in forestry related works and researches use less GIS technologies than others. Social sciences in forestry are originally related to the public demands and management strategies on forests. Thus, human-forest conflicts which require interrelated search and modelling are certainly complicated because of combining public and political demands. For example, investigation of forest crimes necessitate geographic, demographic and ecological approaches to prevent illegal forestry activities. GIS software have ability gathering and analyze main and sub-factors not only applied sciences but also social sciences. In the main context of this study which supposed to investigate geostatistical modelling usage opportunity for forest crime analyze. Ordinary Least Square (OLS) was preferred to forest crime mapping, and estimating spatial model for three different Forest Enterprise Chiefs in Kahramanmaras in Turkey. The established statistical model involves 15 different decision variables and crime events used as dependent variable. First, all decision variables participated in model and showed normal distribution with 0,624 R^2. In order to make more success in estimation, decision variables which has variance inflation factor (VIF) values of more than 7.5 were excluded from model. The second OLS model with 10 decision variables can estimate with 0,619 R^2. As a result of excluded variables in second model did not entirely affect the estimation success. Forest crime modelling can be established effectively by using GIS. Consistency and accuracy of model may increase in results belongs to the collected data and preferred functions in analysis. Further studies on GIS-based forest crime analysis should require different geostatistical approaches on model improvements considering the locality.

Key words: Forest crime mapping, Geostatistic, OLS, VIF, human-forest relations

INVESTIGATING THE TRANSITION RATIO OF CHANGES IN SELECTED LAND USE/LAND COVER CLASSES FOR MODELLING

ID No: 316

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ABSTRACT

Composition and configuration of forest ecosystems has been changing rapidly. Climate change, urbanization, afforestation or utilization have certain effects on forest dynamics. Over the last decades, forest managers have tried to integrate decision support systems and modelling to forest management planning. One of the challenges in developing future scenarios is the determination of initial tree species or mixture after regeneration or planting. Moreover, sometimes stands changed from one land use/land cover class to another within the planning period that should be integrated into the planning procedure. In this study, the transition ratio or probability of the changes from one land use/land cover class to another was tried to displayed in a selected planning unit called "Of". Besides, several conducted studies from different regions were analyzed including different tree species to introduce the current status in Turkey. The results indicated clear changes in the temporal dynamics of land cover/forest cover. For instance, 1536.7 ha Alder forests naturally established between the period of 1971 and 2010. Moreover, 10.1 ha Fir forests were disappeared in the same period. While 6742.6 ha degraded stands were changed into open lands, 2569.2 ha open lands changed into mixed stands. However, 821.8 ha mixed stands turned into open lands. Finally, it is concluded that for the last three decades, there has been drastic changes from one class to another with high ratios in different regions as well as "Of" planning unit. The results of obtained from this study can be used as reference in modelling or decision support systems.

Key words: Land use/land cover, transition ratio, Of planning unit, forest management, modelling, decision support systems.

USE OF GIS FOR TIMBER EXTRACTION SYSTEMS: A CASE STUDY

ID No: 107

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ABSTRACT

Forestry operations in Turkey are carried out at different parts of the country under different conditions. Only the best forest road networks can provide conditions for working in wide, scattered and difficult mountainous areas. The forest areas found in mountainous lands with harsh slopes in Turkey makes timber extraction systems more problematic and more complex.

The aim of this study was to determine timber extraction sysytem using Geographical Information Systems (GIS) Trabzon Regional Directorate of Forestry in Turkey. In the work done for this, it has been decided that the most suitable method of extraction by taking into account the slope , the distance of skidding, the age of the stands, development stage, canopy and the direction of extraction. Before deciding on extraction methods, the roads on the land were planned to be built in places that were drawn and inadequate using satellite imagery in the GIS program. It is planned to have a maximum slope of 12% in the planning of new roads. Our total area is 6003 ha. The general road density is 18 m / ha, the actual road density is 19 m/ha and the opening ratio is 83%. During the removal process, new systems with low cost can be developed by taking advantage of technological improvements so that youth and forest are not damaged.

Key words: Road density, Timber extraction system, GIS, Turkey

THE PERFORMANCE EVALUATION OF COMMONLY PREFERRED DEMS USING VISIBILITY ANALYSIS FOR FOREST FIRE TOWER

ID No: 106

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ABSTRACT

GIS, which is the most useful tool for mapping and analysis, is commonly preferred in natural resource management. Large areas such as forest lands are also managed effectively and planned by using GIS. The developed extensions and tools for GIS, which are provide cost-effective work, are generally use in forest resource management and planning such as transportation planning, estimating fire access zones, forest mapping, visibility analysis for fire tower and so on. Sure, the accuracy degree and efficiency levels of GIS use in analysis that is depend on the quality of performed data. All spatial analysis in forest lands use digital elevation models (DEM) that have different resolutions and type considering derivation technique of elevation products. DEM is one of the essential data which is preferred to analysis in many scientific publications. For example, forestry related disciplines use open-access DEMs for large land assessments, yet the success of GIS belongs to the quality of data in spatial analysis. Hence, this study aims to investigate of DEMs success in visibility performance considering 1:25000 scaled topographic map as reference for six different located fire towers. ASTER GDEM and SRTM V3 data were performed and compared. The comparison study of visibility analysis designed into 2 land cover groups (forests and others) in the border of Forest Enterprise Directorate of Kahramanmaras. Briefly, the results indicated that the location of forest fire towers' showed negligible difference between visibility performance of three DEM data for the study area. Visibility performance for invisible lands was determined as contour-based derived DEM of 46.53%, ASTER GDEM of 47.51%, SRTM of 44.38%, respectively. Beside visible forest land ratios were determined as contour-based derived DEM of 46.53%, ASTER GDEM of 47.51%, SRTM of 44.38%. As a result of this study, all performed DEMs can be use for viewshed analysis. It can be suggested that both ASTER GDEM and SRTM are GIS products that are offered free of charge handle, can used to locating of fire watching tower in study area.

Key words: Forest fire towers, Visibility analysis, Satellite based DEMs, Performance assessment, GIS

COMPARISON OF FOREST FRAGMENTATION BETWEEN 1986 AND 2010 IN ÜNYE PLANNING UNIT

ID No: 322

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ABSTRACT

Land cover of the world has been changing because of natural and artificial reasons. From largest to smallest, land use/cover classes can enlarge or shrink over time. On the other hand, forest managers have to consider these changes in terms of fragmentation especially in forest areas, as the patches tend to multiply and expand until eventually the forest is reduced to scattered, disconnected forest islands. Therefore, the purpose of this study is to determine the temporal fragmentation of forest areas for the selected period of 1986 and 2010. Stand type maps of forest management plans were used and digitized using ArcGIS 10.2 software to conduct the study. Fragmentation was tried to displayed in terms of numerous indices such as number of patches, mean patch size or largest patch index for the two different periods for "Ünye" planning unit. The study area had large pure and mixed forest stands including hornbeam, beech, chestnut, alder and oak species with 10,380 ha and open areas with 38,663 ha as well in 1986. However, forest area increased to 12,948 ha in addition exotic pine species and open areas decreased to 36,095 ha in 2010. On the other hand, those changes had certain effects on forest fragmentation. Fragmentation increased when considering the 24 years. For instance, the number of patches increased from 645 to 1983 in forest lands and those was also increased from 57 to 164 in open lands. Accordingly, the patch size in forest areas decrease from 13.6 ha in 1986 to 5.3 ha in 2010. It can be concluded that, forest area increased by 2,568 ha, however, forest lands moved into more fragmented structure and become more susceptible to harsh conditions in the same period.

Key words: Land cover, fragmentation, Ünye planning unit, GIS

SPATIOTEMPORAL CHANGE OF FOREST AREAS IN TURKEY

ID No: 37

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ABSTRACT

In Turkey, the first modern forest management plan was made in 1917. Later, the first forest management map titled "The Map of Forest Areas in the Republic of Turkey" (scale 1:1,000,000) was prepared in Ottoman Turkish in 1926 based on the data available. The map has been updated at certain intervals until the present day. In the year 2015 that encompasses the most recent period and has been recorded as the latest inventory year, the "Map of Forest Areas in Turkey" was drawn in the light of the most recent data. The present study aims to evaluate the changes that occurred in the forest areas in Turkey from 1917 to 2015 on a spatiotemporal scale. The changes taking place in a timescale of nearly a century (98 years) were explained as spatial differentiation within the scope of some fundamental types of tree. The data were obtained from the first forest management map drawn out according to a plan and from the Directorate General of Forestry affiliated to the Ministry of Forestry and Water Affairs of the Republic of Turkey. According to the results of the study, an increase of approximately 9.2 million hectares occurred in the entire forest area in Turkey over the last century. It was found out that that this increase mainly came out due to afforestation activities, but also because not the whole current annual increment was taken; the population living in the forest areas and the surroundings migrated to cities; the forests that contained empty areas were improved; and the inventory techniques and tools changed.

Key words: Forest areas, spatiotemporal change, Turkey.

DETERMINING TRANSFORMATION METHOD FOR THE ALIGNMENT PROCESS OF ROAD MATCHING

ID No: 286

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ABSTRACT

Road matching is one of the crucial phases of data integration. It establishes links between objects of different spatial datasets. It is used for several purposes of data integration (e.g. transferring objects or attributes, updating, evaluating and improving quality of data etc.). There have been developed many algorithms, consist of geometric, topologic and attribute parameters, to match the objects that represent the same entities in real world. Since the characteristics of road networks are complex, these methods are generally data depended. Matching algorithms have three main steps including; pre-process, matching process and post-process. While matching process determines matching candidates of source and target datasets, post-process evaluates the certain matching results comparing with manual matching results. In this paper, it is aimed to determine the transformation method, often used during the pre-process step of road matching. Transformation is to align a road network to the other road network from another source, vertically represent the same area. A navigation road dataset (TOMTOM) and a volunteered geographic dataset (Open Street Map) were tested with the transformation methods; linear and natural neighbor rubber-sheeting, affine and projective in 1 km x 1 km study area containing several road patterns. To evaluate these methods, matching processes were carried out with each transformation result. Some statistical tables summarizing the results were also given in this paper.

Key words: Rubber-sheeting; Affine; Projective; Transformation; Matching; Conflation.

GEOLOGY

GEOLOGICAL ANALYSIS OF ÇINARCIK BASIN AND SURROUNDINGS: TECTONIC AND PALAEOCLIMATIC PROPERTIES, EASTERN MARMARA

ID No: 5

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ABSTRACT

The MTA Research Ship (Turkuaz), which was built by the General Directorate of Mineral Research and Exploration and will start to work in our seas at the beginning of 2017, has the ability to carry out many scientific studies and it will be one of the important values of our country. For this reason, required preparations have been started making for both national and international scientific studies. For this purpose, the project which is planned to be applied between 2017-2018 years and will be carried out simultaneously with the test trial works consists of three important remarks. These are; (1) to investigate the paleoclimatic conditions of the shelf area due to the cores to be taken from the Prince Islands area in the Eastern Marmara, (2) limited seismic profiles were taken in N-S and E-W direction to define the propagation of the KAFS in the Çınarcık Basin in the Eastern Marmara and sea floor morphology will be determined, (3) it is also aimed to investigate the seismo-turbidites of the previous earthquakes by using the cores to be taken from the depocenter of the Çınarcık Basin.

In this context, 12 cores with approximately 20-100 m water depth, 1,5 m in length were taken from the Prince Islands area which is the first step of project with MTA Selen Research Ship. 12 of these cores were analyzed with Multi-Sensor Core Logger (MSCL) and 4 of them were analyzed with ITRAX in ITU, EMCOL Laboratory. In addition, a limited number of seismic data are collected with the MTA Research Ships (Selen and Turkuaz) and will continue to work again when weather conditions are favorable. Furthermore, it is planned in 2017 to apply the studies belonging to previous earthquakes by taking deep cores from the depocenter of Çınarcık Basin after the coming of MTA Research Ship (Turkuaz).

For participants of Congress, detailed information about the literature studies, preliminary results of the core analyses around Prince Islands area and future plans will be provided.

Key words: East Marmara, Çınarcık Basin, Sismo-turbidite, paleoclimate, MCSL, ITRAX.

KINEMATIC AND STRUCTURAL CHARACTERISTICS OF THE FETHİYE-BURDUR FAULT ZONE BETWEEN BOĞAZİÇİ AND ÇENDİK (BURDUR), SW ANATOLIA, TURKEY

ID No: 6

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ABSTRACT

The Fethiye-Burdur Fault Zone is a complex belt of major fault zones in southwestern Anatolia extending northeastward from the Gulf of Fethiye on the south to Çay-Afyon on the north, a distance of about 310 km. The fault zone includes subparallel to parallel branching and en echelon faults that lie nearly parallel belt widening from north to south. This complex zone of movement consists of the traces of the recent movement. The direction of movement in the fault zone has been oblique-slip in the left lateral sense.

In this study, Burdur-Boğaziçi section of the fault zone was investigated. The research summarizes the structural features of the area uniting the data acquired from the detailed mapping and neotectonic studies. Rock units found in and adjacent to the study area include the Late Triassic-Late Cretaceous ophiolites and recrystallized limestones referred to the Lycian Nappes, the Late Miocene-Early Pliocene Burdur Formation, the Late Pliocene-Early Pleistocene Tefenni Formation as well as older and younger alluvium. The Burdur basin in the investigated area trends northeast-southwest and contains two infills bounded on both sides by oblique-slip normal faults. The older and deformed infill resting with angular unconformity on the pre-Late Miocene basement rocks consists of lacustrine-fluvial sedimentary sequence. The younger infill is composed of alluvium and rests on the older infill with angular unconformity.

The basin bounding faults Karakent fault on the northwest and the Burdur and Karacaören faults on the southeast displays well-preserved fault slickensides and slickenlines. The structural analysis revealed that the Burdur basin in the study area was developed as a result of NE-SW trending left lateral shear tectonics. Paleostress analysis of the fault slip data indicated that the region was dominated by NW-SE trending extensional stress regime.

Key words: Fethiye-Burdur Fault Zone, Burdur Basin, paleostress analysis, Boğaziçi-Çendik

GENESIS OF THE BIMODAL VOLCANIC ROCKS IN THE YÜKSELEN AREA, KONYA, CENTRAL ANATOLIA

ID No: 12

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ABSTRACT

The Neogene volcanic rocks are represented by anorogenic, sodic alkaline OIB type basalts and orogenic, enclave-bearing adakitic dacites in the Yükselen area (Central Anatolia, Turkey). According to all geochemical and isotopic data there is a bimodal volcanic activity which can be explained by slab roll-back and break-off process in the convergence system between the African and Anatolian plates.

According to EPMA data Yükselen basalts include olivine (Fo:0.8-0.9), diopsite as clinopyroxene phase, labrador and rare anorthoclase as feldispar phase. However, dacites include biotite (Mg# = 0.55-0.65), magnesio-hornblende and magnesio-hastingsite as amphibole phase and andesine as plagioclase phase. Application of amphibole geothermobarometry and clinopyroxene-liquid thermobarometry to Yükselen volcanic rocks has yielded temperature estimates in the range of 833-988 ^{o}C for the dacites and 1138-1170 ^{o}C for the basalts. Pressure estimates from pyroxene and Al-in-hornblende geobarometers are in the range of 1.5–4.6 kbar for for dacites and 0.2-3.1 kbar for basalts. In dacites amphibole phenocrysts' rims yield temperature and barometer estimates 16 ^{o}C to 89 ^{o}C and 1.2 to 1.6 kbar higher than their cores, respectively. This feature may suggest that throughout the formation of the volcanic suites the magma chambers were periodically heated up, probably through recharge of hotter magma to the base. Considerably variable pressures of crystallization, further indicate that the magmas which produced the volcanic suite have polybaric origins. During magma storage and ascent, changes in melt composition may occur due to fractional crystallization or magma mixing/mingling.

Key words: Adakitic, Alkaline Basalt, Bimodal, Magma chamber, Recharge, Temperature

COMPARATIVE STRUCTURAL ANALYSIS AIDED BY FIELD OBSERVATIONS AND SATELLITE IMAGES FOR THE AREA BETWEEN SİMAV FAULT AND KÜTAHYA FAULT (CENTRAL-WESTERN ANATOLIA)

ID No: 15

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ABSTRACT

Geologic, tectonic and geomorphological characteristics are generally determined as a result of field studies. Especially for determination and mapping of large-scale structures, traces of structural elements may not be clearly observed. In this situation, studies completed with the aid of satellite images may be very beneficial. Remote sensing studies are completed simultaneously with field studies, ensuring ease in defining large-scale structural elements. These studies are generally based on the principle of processing satellite images with a variety of methods.The study area encompasses the region of Central-Western Anatolia between the Simav Fault and Kütahya Fault. Firstly in this study, lineations were determined with the aid of a variety of band combinations (4, 5 and 7 bands appropriate for geological research) on LANDSAT satellite images. Additionally, NE-oriented filtering, perpendicular to the general orientation of lineations, was applied. During lineation analysis completed on ALOS-PALSAR images, image improvement methods like texture analysis, removal of parasites and edge definition/enhancement were applied. With all these methods, 158 lineations were determined on LANDSAT satellite images in the study area with these lineations observed to intensify at N10°-30°E strike. Both visual evaluation and filtering techniques were used for PALSAR satellite images and 142 lineations were observed. These lineations were found to intensify with strikes of N20°-30°E and N20°-50°W.

The fault map obtained during field studies was overlaid with lineations from LANDSAT and PALSAR satellite images to obtain a single map and their compliance was investigated. All data were in good compliance with data mapped during field studies representing active structures between Simav and Kütahya. As a result of the comparison of lineations obtained from satellite images and faults mapped in the field, it was concluded that lineations obtained from PALSAR satellite images were in better accordance with field data.

Key words: Simav Fault, Kütahya Fault, LANDSAT, ALOS-PALSAR, Lineation analysis, field studies

THE USE OF GIS IN THE INTEGRATION OF FAULT RUPTURE HAZARD AND FAULT AVOIDANCE ZONES TO LAND PLANNING: A CASE STUDY FROM THE NORTH ANATOLIAN FAULT ZONE

ID No: 117

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ABSTRACT

As natural disasters occur at any geographical location, they can be analyzed using GIS. The damage caused by an earthquake is inevitable. However, it is possible to reduce or eliminate damage by several measures taken before and after the disaster. Microzonation studies solve problems resulting from natural disasters such as earthquakes and landslides. In recent years, different technologies have been developed showing possibilities for a wide range of disaster management and hazard mitigation. GIS can be used as a tool to minimize the damage resulting from these disasters and has emerged to be a powerful computer-based technique that integrates spatial analysis, database management, and geographical visualization capabilities. GIS-based information systems have been developed and used to forecast and plan for natural hazards such as landslides or earthquakes.

In our country, especially 1999 Kocaeli earthquake and the other natural hazards that took place before, it has been shown that it is not possible to reduce the disaster risks by conventional practices. Instead, the concept of "disaster-sensitive" planning has become a prominent approach in recent years. In “disaster sentsitive” planning, it is very important to integrate geological data very precisely into plans. It is known that most of our country faces various disaster risks, especially earthquakes. The number of provinces and districts crossed by active faults is 468 in the active fault map of Turkey updated by the MTA. This is a serious figure and it is very important that the earthquake producing potentials of these active faults which are large enough to produce surface ruptures should seriously be revealed in the geological and geophysical studies. GIS implementations make a great contribution to the integration of these data, which are revealed by paleoseismological studies, to the zoning plans of 1: 1000 and 1: 5000 scale.

Key words: Fault rupture hazards, GIS, fault avoidance zone, North Anatolian Fault Zone

CLASSIFICATION OF GEOLOGIC UNITS, AGE AND LITHOLOGY CORRELATIONS WITH THE AID OF SATELLITE IMAGES NEAR YENİCE-GÖNEN FAULT AND SURROUNDING AREA (ÇANAKKALE, TURKEY)

ID No: 13

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ABSTRACT

As known, in determination of the geological characteristics of an area, remote sensing techniques are currently commonly used in addition to field studies. The data obtained in these studies are compared with field studies and/or available geological maps and attempts are made to obtain results with a high degree of accuracy. Remote sensing studies are generally based on the principle of processing satellite images with a variety of methods.

The study area comprises the Yenice-Gönen Fault (Çanakkale, Turkey) and close surroundings, encompassing İ17, İ18, H18 and H19 sheets on 1/100,000 scale maps. An active tectonic structure, the Yenice-Gönen Fault and surroundings have had many rock units differentiated based on age and lithological characteristics in previous studies. However, in some situations in accordance with the aim of the study, there is a need to obtain simpler geological maps. For this some classification methods (uncontrolled classification and controlled classification) are used.

This study attempted to determine the geologic units near Yenice-Gönen Fault and surroundings in terms of age and lithological characteristics with the controlled classification method. First uncontrolled classification using a variety of class numbers was completed on LANDSAT ETM+ satellite images of the study area. Later with the controlled classification method, geological units were combined into units based on similar age and lithologies to simplify the geological map. This simplified map was compared to geological maps available in the literature and results with a high degree of accuracy were obtained for relatively young units and units with broader distribution. In this way young units determined with the remote sensing method were found along with current relationship to the Yenice-Gönen Fault.

Key words: Yenice-Gönen Fault, LANDSAT, controlled classification, geologic map

RELATIONSHIP INVESTIGATION BETWEEN ROUGHNESS AND TEMPERATURE OF ROCK SURFACES

ID No: 18

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ABSTRACT

Roughness properties of rock structures have a significant impact on surface reaction to some processes like weathering. In this study, relationship between roughness and temperature of rock surface which is located in Istanbul Technical University Ayazaga Campus was investigated. Size of the selected object is 3 m x 1 m and it is partly weathered. 3D mesh model of rock surface was produced by means of terrestrial photogrammetric technique using 17 control points which were homogeneously distributed on the object. Position of control points were determined in local coordinate system. Accuracy of 3D model is approximately 5 mm according to calculations done by using field and model coordinates. Temperature values of all ground control points were measured with the help of infrared thermometer. These values were used as basic data to produce temperature map of the rock surface. Temperature distribution map was produced by IDW method in a commercial GIS software. On the rock surface, several cross sections were produced and temperature values and roughness values obtained from these cross sections were overlaid to obtain information about the relationship between roughness and temperature of rock surfaces. Obtained results presented that there is a strong relationship between roughness and temperature of the rock surfaces.

Key words: IDW, Photogrammetry, Rock, Roughness, Temperature

IMAGING OF SPECTRAL PROPERTIES OF OPAL MINERAL USING SENSOR DATA, YENICE DISTRICT, NORTH-WESTERN TURKEY

ID No: 17

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ABSTRACT

Multispectral imaging provides the powerful technology for earth sciences, agriculture, industry and other disciplines around the world. Multispectral imaging involves acquisition of multiple images of the same scene utilizing different spectral filters, representing a great compromise between hyper spectral imaging and broadband imaging. Spectral data can be acquired from the response of individual spectral filters, subtractions, ratios, and/or combinations of multiple filters. In this study, three filters were employed as the bands of green, red and near-infrared radiation equivalent to Landsat Thematic Mapper bands TM2, TM3 and TM4. These bands are the basis for the standard "false color" composite images that have become associated with multi-spectral imagery. They provide an excellent sign of soil and rock conditions. Sensor dimensions are 6.55 mm x 4.92 mm. The size of pixel is 3.2 microns. The focal length of the camera lens is 8.43 mm. The range of the sensor is 520nm to 920nm.The multispectral sensor features extremely high visible and NIR spectral fidelity. The sensor gathers the radiation that passes through its filters to form a multi-spectral digital image made up of 2048 x 1536 pixels.In this study, opal mineralizations from Yenice district are selected for imaging of spectral properties of opal mineral using sensor data. The opals occur as veins in lower Miocene andesite host rock where outcrops at the south of Yeniköy district, northeast of Bayramiç village. Macroscopically, opals are beige, yellowish – beige to sub transcluent red and brown coloured. The opal veins are fractured and more altered to clay minerals near the surface. The XRD analyses revealed that Yenice opals are composed of opal – CT, opal – C and alpha quartz. The opals are made up of tiny spheres that can be observed with scanning electron microscopy (SEM). There is a large variations sphere in size. The major element composition of the opal by SEM reveals that opals are mainly composed of silica. Al, Fe and Ca are also present as the main impurities.

According to the preliminary results, time-resolved multispectral imaging enables characterizing and classifying some features like minerals more efficiently and in less time. The additional data obtained from multispectral imaging over opal mineral provides new opportunities for feature measurements.

Key words: Opal, Mineral, Multispectral Image, Band, Calibration.

HYBRID COLOR COMPOSITES AND SPECTRAL INDICES FOR LITHOLOGIC MAPPING OF THE ACCRETIONARY COMPLEX WITH ASTER DATA

ID No: 16

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ABSRACT

One of the most appropriate approaches to better understand and interpret geologic evolution of an accretionary complex is to make a detailed geologic map. The fact that ophiolite sequences consist of various rock types may require a unique image processing method to map each ophiolite body. The study area is located on the Late Cretaceous accretionary complex (within İzmir-Ankara-Erzincan Suture Zone) in the northern Sivas. The accretionary complex in the study area is consists mainly of ophiolitic and metamorphic rocks along with epi-ophiolitic sedimentary rocks. This presentation attempts to delineate the accretionary complex in study area, using the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) data. Hybrid color composite images combine principle component (PC) and band ratio images as well as original bands applied to the visible near infrared (VNIR) and shortwave infrared (SWIR) bands of the ASTER data to delineate peridotites, gabbros, basalt, and epi-ophiolitic sedimentary rocks of the accretionary complex. In addition, the resultant ASTER VNIR and SWIR images were draped over Google Earth images used as base maps to outline the lithologic boundaries in detail to generate a local geologic map of the accretionary complex and associated rocks in conjunction with fieldwork data. The encouraging lithologic maps generated in this research were also verified by the geologic map based on the comprehensive fieldwork.

This study was funded by 112Y123 numbered TÜBİTAK project.

Key words: Accretionary complex, ASTER, hybrid color composite, Google Earth, mapping, spectral band

OBTAINING A SIMPLIFIED GEOLOGIC MAP WITH THE CONTROLLED CLASSIFICATION METHOD: EXAMPLE FROM CENTRAL-WESTERN ANATOLIA (TURKEY)

ID No: 14

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ABSTRACT

In any region classification methods used on satellite images are very beneficial to obtain a general idea about the study area. Classification can be completed with two methods; uncontrolled and controlled. The uncontrolled classification method generally is chosen in situations where there is insufficient data about the study area and the geologic structure of the region is not fully known. When the geologic and morphologic structure of a region is known and there is the possibility of using available geological maps, the controlled classification method may be chosen. Though the controlled classification method allows the possibility of obtaining reliable and simpler data, there is the possibility of obtaining erroneous data due to class conflict. The data obtained from classifications provides information about geological units, with the boundaries of these units tectonic in some cases. This study attempted to determine the geologic map around Simav-Gediz-Kütahya (Central-Western Anatolia, Turkey) with controlled and uncontrolled classification methods. The geological map obtained with the controlled classification method was compared with the available geological maps.

For the study area, uncontrolled classifications were completed with a variety of class numbers (10, 12, 15, 20, 25, 39) on LANDSAT ETM+ satellite images. The study area is very complicated in terms of geological units, with a total of 39 different geological units present in terms of age and lithology according to available geological maps. With the controlled classification method, the study area was geologically simplified with similar lithological units combined to form 12 classes. The results of the study compared the simplified geological map obtained with the controlled classification method with the available geological map. The results of this comparison found the geological map obtained with controlled classification relatively differentiated Paleozoic and Mesozoic basement units. However, it was concluded that it differentiated younger Cenozoic-age units (Oligo-Miocene granitic rocks, Miocene and Pliocene continental clastics, Quaternary units) with high accuracy.

Key words: Simav Fault, Kütahya Fault, LANDSAT, uncontrolled classification, controlled classification, geologic map

INVESTIGATION OF SURFACE DEFORMATIONS AFTER 06.02.2017 AYVACIK (ÇANAKKALE) EARTHQUAKE BY USING SYNTHETIC APERTURE RADAR INTERFEROMETRY (INSAR) METHOD

ID No: 29

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ABSTRACT

In this study, Synthetic Aperture Radar Interferometry (InSAR) method is used to determine whether surface deformations occur in the region after the 5 different earthquakes with a magnitude of 5.0 (Mw) and over occurred at a distance of 22.5 km from the Ayvacık district of Çanakkale province, first of which was occurred on 6 February 2017 at 6:51 local time. We attempted to determine the presence of deformation from the interferogram created by analyzing two Synthetic Aperture Radar (SAR) images of the Sentinel-1A fit before and after the earthquake. As a result of the evaluation of the interferogram, a surface deformation about 8 cm in the Line of Sight (LoS) was observed in the region. This deformation is mostly concentrated in Gülpınar town, which is located on the southwest of Ayvacık district. The epicenter of the main and aftershocks of the earthquakes occurred in the region and the interferometry image formed by the inversions of the InSAR coincide with each other and proofs the resulting deformation after the earthquake. The focal mechanism solution of the earthquake shows a normal fault with a SW side downthrown. The obtained data are also in good agreement with the field data obtained by some researchers after the earthquake.

Key words: InSAR, Surface deformation, Ayvacık Earthquake, Çanakkale

CONTRIBUTION OF GIS IN MAPPING OF THE MINERAL RESOURCES OF THE EASTERN PART OF ALGERIA , APPLICATIONS, DATA PROCESSING AND INTERPRETATION

ID No: 1

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ABSTRACT

The advent of Geographic Information Systems (GIS) is an essential tool for the development of mapping, interoperability of geological information and understanding of the distribution of mineral resources.

In this perspective, the proposed GIS data model allows the characterization of a new point of view of the structural, geological and topographic information of the mineralization of the eastern part of Algeria.

From a geomatic point of view using Arcgis software and these applications (Arcatalogue, Arcmap, Arc toolbox), we have been able to design several thematic maps at different scales of the eastern part of Algeria, including the structural map and the geological map with an option to represent the mineral indexes.

The spatial relationships carried out on the various map supports (tectonic map, geological map and mineral index map) are managed by the database "Ore_deposits_eastern_algeria". It is structured according to several categories of information (deposits, indexes and mineralized points, geological formations, tectonics and geophysical data).

In the area of mining prospecting, graphic materials are an essential element in the analysis, processing and interpretation of data. Thus, the distribution of mineralization in eastern Algeria shows that most of them are concentrated along large structures (some of which are important tectono-stratigraphic boundaries) or are located at the periphery of triassic intrusions. They also show a close relationship with the deformation zones. The preferential directions of the mineralized axes are generally NE-SW and NW-SE and the deposits of the mineralization are rather near or at the intersections of the lineaments in the same direction.

Finally, this digital platform allows integration in this part of Algeria, data and geological information complete in GIS format. It also evaluates the mineral potential of a region, zone or sector from which new mineral exploration targets can be generated.

Key words: GIS, exploration, database, eastern_Algeria, ArcGis**.**

TECTONO-STRATIGRAPHIC EVOLUTION OF THE HAYMANA BASIN (CENTRAL ANATOLIA, TURKEY): INFERENCES FOR EUROPEAN-AFRICAN CONVERGENCE ALONG NEOTETHYS OCEAN

ID No: 2

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ABSTRACT

The tectonic position of the Haymana Basin is defined by the intersection of two Neotethyan suture zones ─ Izmir-Ankara-Erzincan (IAESZ) and Intra-Tauride (ITSZ) suture zones ─ where three tectonic terranes ─ Pontides (Europe), Tauride Block (Africa) and Kirsehir Block (Africa) ─ are connected. The deposition in the basin is represented by almost 7-km-thick and continuous Upper Cretaceous – Eocene fore-arc to foreland sequences lying on pre-Cretaceous complex basement including ophiolitic melange and subduction related-metamorphic rocks. In this regard, the tectono-stratigraphic evolution of the basin provides data directly associated with the late-stage evolution of the Neotethys Ocean and the relative movements of the tectonic blocks in the region. To this end, the main aim of the study is to shed some light on the characteristics and timing of the Neotethyan closure (fore-arc deposition) and subsequent continental collision (foreland deposition) events occurred in the region.

In addition to Neogene cover units, four Upper Cretaceous to Paleogene key sequences are, based on the depositional environments, defined in the basin. These sequences grade laterally and vertically into each other and are continuous whereas local progressive syn-sedimentary unconformities and frequent depocenter migrations are common. Furthermore, post-Middle Paleocene to Middle Eocene sequences coarse upwards. These characteristics possibly reflect a response to local uplift and subsidence in front of a fold and thrust belt in a tectonic setting of transition from fore-arc to foreland settings, subsequent to the terminal subduction of the Neotethys at the end of early Paleocene. To sum up, it is proposed that the Haymana basin evolved as a fore-arc basin at the junction of the two suture zones, then after Early Paleocene, the basin evolved into collisional setting.

Key words: Haymana Basin, Stratigraphy, Central Anatolia, Tectonic, Convergence

DETERMINATION OF PRINCIPAL STRAIN DIRECTIONS BY EVALUATING TO ANISOTROPY OF MAGNETIC SUSCEPTIBILITY RESULTS FROM NEOGENE SEDIMENTARY ROCKS AROUND CENTRAL ANATOLIAN BASINS

ID No: 3

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ABSTRACT

The anisotropy of magnetic susceptibility (AMS) technique as a paleomagnetic tool has been increasingly applied on wide range of geological application since last decades. The AMS is often determined by directional variances of induced magnetization strength properties of a rock sample when measuring in different directions within the certain amount of applied magnetic field and represents preferred orientation of the magnetic properties (susceptibility) of minerals within a rock unit. The AMS technique can be used in nearly all types of rocks, even in the case of absence of lineation and foliation and provides non-destructive, fast, accurate and inexpensive way to determine the petro-fabric characteristics of minerals and their preferred orientations within a rock. The principal directions of anisotropy in the rocks generally close related to important deformation indicators such as orientation of folds, faults, foliations and lineations as a structural features.The present day tectonic configuration of the central Anatolia dominated by under multi-tectonic deformations due to subduction to continental collusion throughout two main suture zones; a) the İzmir-Ankara- Erzincan (İAESZ), and b) the Intra-Tauride Suture Zones (ITSZ) end up with large block rotations because of its mosaic structure. These two suture zones intersect around the southeastern corner of the Haymana Basin where approximately E-W trending the İAESZ distinctively makes V shape and curved between the Pontide and the northern Kırşehir Block, while the ITSZ linked with the İAESZ in its apex of the V-shape and makes NW- SE trending parallel to the Tuz Gölü fault zone between the southern edge of the Kırşehir and Tauride Blocks.

In this study, we present first results of AMS analysis on the Neogene rock units; mostly sandy, muddy, and clayey sediments in northern central Anatolian basins which are Haymana, Tuz Gölü, Kırıkkale-Bala, and Alcı-Orhaniye basins. Different from a general tectonic view, all 4 basins, at the center, represents their unique deformation results which cannot be explainable a single geological block model for the Anatolian Neotectonic deformation.

Key words: AMS, Paleomagnetism, central Anatolian Basins, İAESZ and ITSZ, Neogene deformation

ANALYSIS OF NEOTECTONIC CRUSTAL DEFORMATION IN THE ANATOLIA: SYNTHESİS OF PREVİOUS PALEOMAGNETIC RESULTS AND COMPARİNG TO THE OTHER SHORT TERM KINEMATIC METHODS

ID No: 4

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ABSTRACT

Consumption of the Neo-Tethys oceanic lithosphere, within the Eurasian Continent that formerly fragments of Laurasia and the Arabian-African Plates which separated from Gondwana in the south has been turned up with the Alpide orogeny which make up the Anatolia due to collisional settings of their various continental fragments, named terranes (continental blocks) since Mesozoic. Since multi-fragment structure (mosaic) was resulted by multiple subduction zones (at different times and/or partly synchronous), so several scenarios have been proposed due to tectonic development of the Anatolia.

The previous paleomagnetic studies were applied generally to figure out local to medium scale structural reconstruction, basin evolution, main strike-slip fault deformation, age&sedimentation rate of a stratigraphic unit, and few of them to determine large scale plate tectonic motion and paleolatitude studies on the ancient continental remnants.

In this study, the main purpose to determine the vertical-axis bock rotations history of the region, as well as to constrain timing of eventual rotation patterns, in order to manage to correlation of a regional scale geodynamic processes in the central Anatolia. With the utilizing of previous paleomagnetic studies; we handled all the results after checking to reliability analysis as a whole integrated domains for the area in point of the paleomagnetic aspect (vertical axis block rotation). To examine neotectonic crustal deformations in the central Anatolia, apart from paleomagnetic methods, there are also several independent investigation procedures which is the most reliable and gives the quantitative results according to the reference locations, the Global Positioning System (GPS). Due to the GPS surveying, contemporary relative movements and further with the using earthquake data can be resolved (neotectonic phase) large or small scale, possible block movements with their rotations in the Anatolia. While the youngest paleomagnetic results (Quaternary) generally fit with the GPS data, some regions especially western Anatolia has clockwise vertical axes block rotations unfit with the general models in literature.

Key words: Paleomagnetic, vertical block rotation, central Anatolia, GPS, Neotectonic

CHARACTERIZATION AND EVALUATIONS OF THE CAMBRIAN TIGHT SAND RESERVOIR, IN AMENAS REGION, ILLIZI BASIN, ALGERIA.

ID No: 7

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ABSTRACT

With the growing of the energy demand and decline of production, Algeria is developing new resources and exploration as well as exploitation methods. This is the case of the deep petroleum fields, high pressured and high temperature reservoir named 'Tight sand reservoir'. Tight gas reservoir is major resources composite that are difficult and expensive to explore.

Looking to the importance of the tight gas reservoirs, Algeria is completing studies and research regarding this type of reservoirs, however, until now studies have reached only exploration step. One of the main objectif of these studies concernes the Cambrian and the Ordovician reservoirs of the In Amenas region (Illizi bassin)

These compact gas reservoirs are full with fine grains (silicate or carbonate precipitation), decreasing porosity and permeability and obscuring gas drain capacity. Further, these reservoir are called also closed reservoir (permeability < 0.1 mD). Lithological nature of these réservoirs maybe sandy or carbonate. When permeability is less than 0.001 mD reservoirs is called very compact. The study of the tight sand reservoir has revealed that:

- The Cambrian and Ordovician reservoirs present all the characteristics of tight gas within the In Amenas region.
- Gas column exceed the structural closure, indeed gas trap is assured by the low permeability.
- These reservoirs are not producing by hydraulic fracturation nor horizontal drilling.

Key words: Characterization, tight reservoir, permeability, Ordovician and Cambrian.

ANALYSIS OF THE TENDANCY EVALUATION COMPLEX OF THE DIFFERENT CAMBRIAN RESERVOIR « RA » 1A ZONE HASSI MESSAOUD FIELD, ALGERIA

ID No: 8

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ABSTRACT

The hassi Messaoud field has a large anticlinal form covering an area of 4200 km^2. the Cambrian deposits are composed of Ra, Ri, R1 and R2 reservoirs related to sandy fractured quartzites, eroded beneath the Hercynian unconformity covered with thick Triassic deposit.

This sandstone reservoir is characterized by heterogeneity traduced by extreme variation of petro-physical parameters reflecting production variation from zone to zone and also from well to well.

The extension of the Hassi Messaoud involves variability of production within its different parties. This is well noted within the cumulated production history to this day. This study concerns the 1A zone with the object of analyze and distribution of the different heterogeneity. Ra reservoir is the focus of this study and consists on analyzing different tendency variation of reservoir parameters and determination of different anomalies allowing doing a projection of the best simulation and hydrocarbons recovering.

Following this study, the best producing zones are located within the Western zone of D2, central and southern D4, all the eastern part, southern and a part of the northern D5, western and south eastern D4, central D5 north eastern and southern D3. The most producing zones are located in western drain D4, central D5 and north eastern D3. Medium producing zones are located in norther, south eastern and south western D5, western D2 north eastern, central and south D3 and north west central and south western D4.

Key words : Analysis , Tendency, reservoir parameters, Cambrian, Ra, Zone 1A, Hassi Messaoud.

A RESEARCH FOR THE CHARACTERIZATION OF COASTAL SANDS IN EAST MEDITERRANEAN (BETWEEN SAMANDAĞI AND NARLIKUYU) AND TRNC BY ARCGIS

ID No: 10

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ABSTRACT

In this study, determining the heavy metal contents of coastal sands of selected locations of Turkish east Mediterranean (between Samandağı and Narlıkuyu) and TRNC (Turkish Republic of Northern Cyprus) was investigated. 32 samples were taken from appropriate locations. The samples whose coordinates were determined by GPS were pinned on the map with 1/100.000 scale. Controls of formations of the area were performed and informations about the region were saved. Photographes of the sample locations were taken.Chemical and heavy metal compositions of the materials were determined by ICP/ICP MS chemical analysis in Canada (in ACME laboratories). Two samples of each location were sent to the analysis. Arithmetic means were calculated and showed in this paper. Besides, the particle size distributions were detected by wet sieve analysis and the cumulative passing curves were plotted. The chemical analysis and the particle size (d50 and d80) results of the samples were graphed by running ArcGIS 10.1 computer software. The research reveals that Mersin coasts have significant grade of chromium (2 %), Karataş coasts have considerable grade of zirconium and Hatay coasts have important grade of nickel.

It is thought that this research dealing with the characterization of Turkish coastal sands will contribute positive feedbacks to the literature. This research was a source for the determining of the origin of these useful elemental contents in the East Mediterranean Coastal Sands.

Key words: Heavy metal, coastal sand, East Mediterranean, ArcGIS.

A MODEL FOR MAPPING AND MEASURING PROCESSES OF HYDRIC EROSION IN COASTAL MEDITERRANEAN ZONE; CASE STUDY: THE LOWER ISSER OUED VALLEY (ALGERIA)

ID No: 116

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ABSTRACT

Since the 1950's much attention has been paid to processes of hill slope denudation, and the study of slope material strength and resistance has been brought into the subject only in the 1970's. There is a relation between hill slope denudation and slope material strength and resistance. The erosion process is responsable for the creation of soil and broken rocks which most of hill slope are formed. Hydrolic erosivity can be mapped for any area for which there are sufficient detailed data. Indices of erosivity are most useful where they can be used to predict the erosive effects of rain fall and so influence the design of land management and conservative plans. A geographical information system (GIS) was set up in the Lower Isser Oued Valley east of Algiers. This project aims at determining how this tool could be used to define efficient land use strategy.

One of the main acquisitions of this project is the development of a strength mapping method, since it able us to present on the same map not only the dynamic but also present process and potential of erosion, identifying the signs and symptoms of desertification. This approach could be used for planning coastal zones like it is recommended in the instructions of the PAP/CAR.

Key words: Hydric erosion, Isser Valley, GIS, Mediterranean zone.

A SPATIAL STATISTICAL ANALYSIS OF THE KONYA COVER COLLAPSE SINKHOLES

ID No: 301

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ABSTRACT

Konya- Karapınar Sinkholes are located in the lacustrine limestone, which is widely distributed in the basin. The formation of sinkholes is continuing with a rate of 0.5 in a year approximately. Although a lot of risk assessment studies were performed about the estimation of the location of new sinkholes, there are still an uncertainty in the analysis. They can seriously damage structures, agricultural areas and settlements. The purpose of this study is to analyze the distribution of sinkholes by spatial statistical methods such as quadrant count analysis, average nearest neighbor, global Moran's I, Getis–Ord general G, Anselin Local Moran's I, Getis–Ord Gi, kernel density estimation, and geographical distributions like directional distribution, central feature, mean center and median center. All of these analyses were performed by a well-known Geographical Information System (GIS) software, ArcGIS, Spatial Statistics Module. According to the analysis of distribution of the sinkholes, some assessments were performed about the evolution of the new sinkholes in the area. And the results show that these techniques can detect clusters in the spatial patterns of the distribution of sinkholes, both global and local statistics indicate that the sinkholes are clustered in the Konya - Karapınar Basin. According to the results of the analysis a sinkhole hazard map was suggested.

Key words: Konya Obruks, Spatial statistics, Cover collapse sinkhole.

RELATIONS BETWEEN LINEAMENT SYSTEMS AND VOLCANIC STRUCTURES: CAN-ETİLİ (TURKEY)

ID No: 315

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ABSTRACT

Lineation analysis holds a special place in preparation of geological maps and mineral research. Lineations are linear or curved characteristics related to faults, contacts, a variety of tectonic elements and geomorphologic traits. Remote sensing techniques are commonly used for determination of lineations and provide very good results. There are many benefits of using remote sensing in studying volcanic areas of the earth. Careful analysis of spectral reflection, textures on the image and topographic data may provide information about paleovolcanology and lithology.

This study aimed to reveal the correlations between paleotectonic and neotectonic lineations and volcanism in the Can-Etili (Turkey) region of the Biga Peninsula with satellite images. With this aim, the study used images from two different satellites (ASTER and ALOS-PALSAR) and a digital elevation model (DEM) of the region. While multispectral optical remote sensing data provide information about material composition, radar data reflect surficial roughness and morphology better. The important third dimension for analysis of many geological characteristics like structural elements determined with morphological traits was added to images with the DEM. With the aid of three dimensional images, not only were the lineations in the region mapped, but volcanic structures (caldera, output cones and flow structures) were determined.

For mapping of lineations on satellite images, in addition to visual evaluation, image processing techniques were used. Various directional filters were used for mapping of lineations. A variety of directional filters were used on ASTER satellite images and the lineations in the study area were mapped. The Lee-sigma filter was applied to PALSAR satellite images for processing. The lineations on these images were determined with visual methods. Using ASTER and PALSAR satellite images with DEM, 126 lineations were mapped. According to a rose diagram prepared using these lineations, the general orientation of the lineations is NE-SW and this complies with the nearly NE-SW-trending Çan-Etili fault. Some of the lineations obtained from satellite images have NW-SE orientation and these again comply with NW-SE trending faults in various sections of the study area. Some curved lineation structures in sediments in the Çan basin are interpreted as related to caldera development.

Key words: Satellite images, lineament analysis, Can, volcanic structures

CRUSTAL STRUCTURE AND GEOTHERMAL EXPLORATION IN WESTERN ANATOLIA OF TURKEY USING LOCAL EARTHQUAKE TOMOGRAPHY

ID No: 329

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ABSTRACT

This study reveals initial results of the crustal structure of Western Anatolia from the Local Earthquake tomography (LET). Study area spans 26-30^{o}E longitudes and 37.5-39.5^{o}N latitudes. Based on tomographic images, crustal structure generally reveals low Vp and low Vp/Vs beneath geothermal areas. We suggest Aliaga, Bigadic, Denizli, Doganbey, Kosk and Menemen areas as low Vp, low Vp/Vs anomalies which are an indicator of steam, CO_2 or mixture of them. Low Vp, high Vp/Vs models which propose geothermal fluids, are clearly visible near Buharkent, Kosk, Kuyucak, Saraykoy and Suzbeyli region. We also report that Candarli, Kalekoy, Ortakoy, Saruhanli, Yelki regions might be good candidate for new potential geothermal resources.

Key words: Local earthquake tomography, western Anatolia, LOTOS, geothermal energy

GLOBAL POSITIONING SYSTEM

INVESTIGATION OF THE RELATIONSHIPS OF DISCRETE WAVELET TRANSFORM COMPONENTS IN GNSS TIME SERIES

ID No: 225

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ABSTRACT

In this study, we investigated 788 days of spatial behaviors of AKHR, BEYS, CIHA, KAMN, YUNA, AKSI and KNYA GNSS stations of CORS-TR network in located in the Central Anatolia Region of Turkey. Observations recorded from stations were evaluated and discrete wavelet transform (DWT) were applied to coordinate time series. Decomposition level for DWT was chosen 9, so 9 detail components (D1-D9) and 9 approximation components (A1-A9) were obtained. Then, cross correlation analysis were performed between original signal and these components. It was determined that cross correlation values between original signal and approximations is going to be weakened from A1 to A9. For North and East series, D8 and D7 had the highest values and they were 0.5. For Up series, D2, D3, D4, and D5 had the highest values and they were about 0.5. As a result of the assessments, the Approximation components of the North, East and Height time series were very strong in relation to the time series but weak with the detail components. While the results of the analysis for the North and East time series for the same station in the detail components were similar, the results obtained in the Up time series differ from those of the two coordinate components. In the cross-correlation analysis, the main series and the component series were considered as two different variables, but the component time series were obtained from the main series.

Key words: Coordinate Time Series, GNSS, CORS-TR, Wavelet

INVESTIGATING THE EFFECT OF STOCHASTIC MODEL IN THE TIME SERIES ANALYSIS: NOISE MODELS CONCERNED

ID No: 227

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ABSTRACT

GPS time series consisting of thousands of daily coordinates have been used frequently to determine geophysical phenomena such as plate motion. In this study, it is aimed whether there is any statistical difference between velocity estimations using both maximum likelihood estimation (MLE) with noise models and least square estimation (LSE) without noise models as the number of coordinates in the time series increases. Furthermore, it is generally suggested that at least 2.5 years data span ought to be adopted in the literature. For this purpose, the time series of continuous GPS stations (GOLD, JPLM, PIN1, PIN2 and VNDP) operated over two decades, whose data have been archived and published by the JPL, were used. Initially, the first 2.5 years data span of each time series was extracted and analyzed via Hector v1.6 using MLE by introducing white noise and power-law noise combination. The data were also analyzed using LSE and applying harmonic analysis by including annual and semi-annual terms and not introducing any noise model. Following that, the time series were analyzed over longer periods by extending the 2.5 year data 6-months at each step until all the data belonging to a station were analyzed. At each analysis step, hypothesis testing was applied to test the significance of the difference in estimated velocities. Approximately 96% of the differences were found to be statistically not significant.

Key words: GNSS, Time Series Analysis, Noise

GEOID DETERMINATION BY COMBINATION OF EVALUATED GNSS PPP DATA WITH ONLINE INTERNET SERVICES AND LEVELLING DATA IN 3-D EARTH SCIENCE APPLICATIONS

ID No: 230

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ABSTRACT

In the 3-D earth science applications it is necessary geoid undulations obtained by the combinations of Orthometric heights from the sea level and ellipsoidal heights which determined with GNSS measurements. However, geoid undulations cannot be measured in each point on the earth. Geoid surface is therefore established by the various survey combinations and prediction models on the adequately dense surface points.

In this study the geoid model was investigated which was generated using PPP and precise levelling derived data together. It is shown that the real time positioning data obtained from single GNSS (Global Navigation Satellite Systems) that is not connected to any geodetic network can be converted automatically to PPP data rapidly and free of charge using web based services wtih precision of ± 2-6 cm. This PPP data was combinied with the precise levelling data, which is in ± 2-4 cm precision, and resulted in Geoid height with ± 5 cm precision. This procedure was followed by generation of 3D Geoid surface model using the krigging prediction method. Thus, the transformation of GNSS observations from ellipsoidal height to orthometric height was performed. As a result of this sutdy it can be concluded that these orthotmetric height values can be used for all kinds of geo-scinece related applications.

Key words: GNSS, Leveling, Online GNSS processing, PPP, Geoid.

SINCE ITS INCEPTION ANALYSES OF CORS-TR USERS ON GIS APPLICATIONS

ID No: 243

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ABSTRACT

The use of GIS applications has increased with the processing of landmark based data into databases. So, the most effective data type in GIS applications is spatial data. It is difficult to produce spatial data that is continuously updated and processed in the instant database. GNSS applications that enable fast measurement and resolution in instantaneous data processing come to the forefront. Instant data can be generated by CORS systems from GNSS applications at any time and place in centimeter accuracy, which corresponds to the network-RTK measurement method and enables for obtaining map and geographical position information. CORS systems are similar to GIS systems in terms of establishment and operation. For example, with the establishment of the CORS infrastructure in Turkey, the locations of all users have been processed into the database until today. In the control centre with the internet infrastructure provided by GSM operators, instant locations of the users can be processed on the data base and displayed on screen. GIS applications are an alternative method for extensive query and analysis.

Since its inception TUSAGA-Active (CORS-TR) user data, which in the database of General Directorate of Land Registry and Cadastre and General Command of Mapping, have been evaluated on Q-GIS which is open source software in this study. The topics such as types of users, regional distributions, densities according to years, pursuing fixed stations have been analysed. As a result of the evaluation, results are presented in thematic maps with statistical tables and graphs. This work, which may be an example to decision support systems, leads to plans to be made for both institution and country in the future. In addition, the transfer of TUSAGA-Active system data to the TAKBIS system used by the institution has been discussed and also their using together in the future. Finally, data security gaps and sharing gaps have been scrutinised.

Key words: TUSAGA-Active, CORS-TR Users, GNSS Data Processing, Analyses on GIS.

INVESTIGATING THE ACCURACY ANALYSIS OF SINGLE BASELINE RTK

ID No: 78

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ABSTRACT

This paper presents the initial results of RTK/OTF satellite measurements made using TCP/IP internet data transmission. One permanent reference station (TVSN) belonging to Tavsanlı Municipality, Kutahya Turkey was used for test measurements. As a result of measurements taken at eight measurement points situated about 1 kilometre to 35 kilometres from the reference station (TVSN) the accuracies of up to a few centimetres were obtained for points situated in the open terrain. The accuracies obtained at the point with numerous covers in the form of tree branches and leaves ranged from several centimetres to almost 10 centimetres, which is characteristic for GPS measurements taken under conditions of limited availability of satellites.

Key words: Performance; Single Baseline RTK, precise point positioning, Accuracy

ESTIMATION OF CRUSTAL DEFORMATIONS IN MARMARA REGION USING CONTINUOUS GNSS STATIONS' OBSERVATIONS

ID No: 247

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ABSTRACT

Earthquakes occur as a result of the release of accumulated energy that in consequence of the relative movement of blocks to the each other. Most of the earthquakes have devastating effects occur the result of faulting. Therefore, some of information, such as the structure of the faults, age, seismic motion and the speed of the blocks have a great importance for the interpretation of earthquakes that occur on the faults. When you look at the history of the Marmara Region, there are many devastating earthquakes on the area (especially the North Anatolian Fault). For this reason, the speeds of the GNSS stations, which are continuously monitored by different institutions and organizations, are estimated using the GAMIT / GLOBK program, in order to learn about the faults in the area and to monitor their behavior. For the data evaluation and speed estimation, five days of data were taken every month since the stations started to work. Strain analysis was performed using the velocities of the stations obtained. as a result of the strain analysis, it is seen that the region generally has wider values of extension. An extension in the northwest-southeast direction and a compression in the northeast-southwest direction are observed at the Yalova and Gölcük region. There is a deformation in the regions between İznik-Bilecik-İnegöl and between Karacabey-Mustafakemalpaşa and between Gemlik-Yalova where the extension is predominant. It has been observed that the extension changed direction by turning anticlockwise from north to south movement in the Çınarcık and Kumburgaz segments. In the north of the region, the northeast-southwest extension is observed almost north-south in the south. As a result of the study, the speeds of the selected stations were calculated with higher accuracy than the campaign types. Besides the advantage of speed estimation with high accuracy, the low density of the stations is a major disadvantage.

Key words: GNSS, Marmara Region, Strain, Velocity

GEODETIC APPLICATIONS OF "ILGAZ 15 TEMMUZ İSTİKLAL" TUNNEL CONSTRUCTİON

ID No: 252

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ABSTRACT

Tunnels, which's main usage area are motor vehicle transportation (e.g highway, railway, subway, etc.) and water transportation, are one of the most important civil engineering constructions. Turkey, especially its Black Sea Region has very mountainous topography. It is troublesome and high costly to plan a route while constructing highway or railway on this kind of topography. If projects are required, tunnel constructions are planned to shorten the route. In the civil engineering projects, especially tunnel constructions, one of the most important things is the geodetic network which must be designed very precise. Besides, for the consistence of the geodetic networks established to the two sides of the tunnels, they must be observed very precise and the coordinates of the geodetic networks points must be determined very accurately.

"Ilgaz 15 Temmuz İstiklal" Tunnel, which connects the Central Anatolia Region to West Black Sea Region, is planned as two tubes that one's length is about 5.4 km. The tunnel decreases the length of the Ilgaz Mountain road from 16.8 km to 11.4 km and it also decreases the travel time from 35 minutes to 8 minutes. In this study, the geodetic network that established for the tunnel and its GNSS observations were mentioned. The observations were made as two periods. The zeroth period was made on 10.01.2014 and in this period, TUSAGA-Aktif stations were employed as reference stations and geodetic network's 13 points as pillar were observed from 3 to 8 hours. The first period was made on 24.06.2015. In this period, 9 pillars which are mostly employed by project staff and close to the two sides of tunnel were observed from 3 to 8 hours. At the end of the two periods, mean square errors of horizontal and vertical positions were determined as ± 0.8 cm and ± 1 cm respectively.

Key words: Geodetic Network, Tunnel Construction, GNSS, TUSAGA-Aktif

LOCAL GEOIT DETERMINATION: A CASE STUDY OF ISTANBUL METROPOLITAN AREA

ID No: 256

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ABSTRACT

Geoid determination is the modeling of data in a way that allows geoid height to be obtained numerically or analogously at a known horizontal location. With the increasing use of satellite technologies and the increase of the precisions, geodetic determination in geodetic environments has become a necessity. Because it is a natural connection between the height of the ellipsoidal (h) determined by the geoid satellites and the measured orthometric height (H). With the use of Geoid, these two heights can easily be converted into each other. Geoid models can be developed for local, regional or global areas. In this study, local geoid determination studies were performed with the help of polynomials in the metropolitan provincial borders of Istanbul within the scope of the IGNA project using approximately 1200 points, both orthometric heights and GPS measurements and ellipsoidal heights. The results show that polynomial coefficients and local geoid calculations can be used in Istanbul.

Key words: Geoid height, GPS, polynomials, orthometric height, ellipsoidal height, IGNA

GALILEO SATELLITE DATA CONTRIBUTION TO GNSS SOLUTIONS FOR SHORT AND LONG BASELINES

ID No: 258

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ABSTRACT

GALILEO (Europe's Global Navigation Satellite System) is going full speed ahead to achieve full constellation by 2020. Since GALILEO is currently an emerging system, the contribution of these satellites to GNSS (Global Navigation Satellite System) solutions needs to be investigated. For this purpose, GNSS data collected at three IGS (International GNSS Service) MGEX (Multi GNSS Experiment) stations are analyzed. For the analyses, GPS (Global Positioning System) only, GLONASS (Russia's Global Navigation Satellite System) only, GALILEO only and combined solutions are tested and also effects of baseline length is examined. The results indicate that compared to GPS, GLONASS and ALL (GPS+GLONASS+GALILEO) solutions, GALILEO results vary greatly. When GALILEO observations are combined with other observations, the precision goes down. For the short baseline solution, in horizontal, GALILEO results change within about 1 cm and in the vertical, variations are up to 5 cm. For the long baseline solution, in horizontal, GALILEO results change within 2-2.5 cm and in the vertical, variations are around 8 cm.

Key words: GALILEO, GPS, GLONASS, GNSS, IGS MGEX, Baselines, Standard Deviations

DESCRIPTION OF BEHAVIORS OF GNSS STATIONS BY SIGNAL PROCESSING METHODS IN KONYA CLOSED BASIN

ID No: 226

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ABSTRACT

In this study, the effects of underground water level changes measured from Konya Closed Basin wells to the locations of stationary GNSS stations in this region were investigated by time series analysis and cross correlation function. As a result of trend component analyses of time series according to ITRF08-fixed stabilization, it was determined that horizontal positions of all GNSS stations in this region were moving in the Northeast direction (18.88 mm/year). For vertical (Up), while ANRK, KLUU, and NIGD stations have movement (0.56 mm/year) in up direction, the other stations have movements in down directions. Annual vertical movement of KNY1 stations that has 560-day data is 70.96 mm in down (-) direction and this is the highest value of vertical movements for GNSS stations in this region. For underground water level changes, linear changes in the decreasing direction were determined as a result of the trend analysis carried out in 19 wells and the mean is -39.22 cm/year. The majority of the decrease in the water level of the wells in the Konya Closed Basin is statistically significant and is m. level in some wells. As a result of the cross-correlation analysis, there was a negative correlation between the GNSS stations and the groundwater level time series for north and east coordinates, while a positive correlation was found for up coordinates.

Key words: GNSS, CORS-TR, Konya Closed Basin, Time Series Analysis, Trend Analizi, Cross-correlation

MULTIPAH MITIGATION USING THE BANDPASS FILTER TECHNIQUE FOR GPS APPLICATIONS

ID No: 233

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ABSTRACT

Global Positioning system (GPS) is designed to serve both civilian and military applications. However, the GPS performance suffers from several errors, such as ionosphere delay, troposphere delay, ephemeris error, and receiver noise and multipath errors. Among these errors, the multipath is one of the most unpredictable error sources in high-accuracy navigation. In this study analysed the multipath characteristics of each station using a quality-checking software package called TEQC. In addition, this paper applies a band pass filter to reduce code multipath errors in GPS.

Key words: GPS, TEQC, Accuracy, Signal Processing, Bandpass filter

THE IMPACT OF DIFFERENT GPS/GNSS PARAMETERS ON LANDSLIDE MONITORING

ID No:236

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ABSTRACT

Landslides are one of the most dangerous types of natural disasters. In last decades, the Global Positioning System (GPS/GNSS) technology has shown that it is capable to monitor sub-centimeter landslide deformations. In this study, it is aimed to observe an active landslide area with the help of a micro-geodetic GPS/GNSS network and to determine statistically significant point deformations. In addition to this purpose, it is aimed to develop an optimum measurement and evaluation strategy for effective monitoring of active landslides by studying some parameters such as observation time, baseline lengths and altitude differences depending on the selected GPS/GNSS measurement technique. In this context, a micro-geodetic GPS/GNSS network was established after the geodetic network optimization. GPS/GNSS measurements were performed in 3 periods with static, rapid static and RTK methods. In the evolution of GPS/GNSS data, academic research software were used. The data obtained from the field were divided into subgroups and the effect of observation period, multipath effect, phase shift, atmospheric effects were investigated. As a result, one or more displaced points were found in the landslide area.

Key words: Landslide, Static Survey, Rapid Static Survey, RTK, Deformation Monitoring, Natural Hazards.

EVALUATION OF THE HEIGHT ACCURACY OF SOME LEVELLING TECHNIQUES

ID No: 237

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ABSTRACT

Applications in geodesy and engineering surveying require the determination of the heights of the vertical control points in the national and local networks using different techniques. These techniques can be classified as geometric, trigonometric, barometric and Global Positioning System (GPS) levelling. The purpose of this study is to analyse height differences obtained from these three of these four techniques using precise digital level and digital level (geometric levelling), total station (trigonometric levelling) and GPS which collects phase and code observations (GPS levelling). The accuracies of these methods are analysed. The results obtained show that the geometric levelling is more stable and reliable than the other two methods. The results of the three levelling methods agree with each other within a few millimetres.

Key words: GPS Levelling, Trigonometric Levelling, Digital Levelling, Precise Digital Levelling, Accuracy

ACCURACY OF REGIONAL PPP RESULTS

ID No: 244

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ABSTRACT

In recent years, several studies based on the accuracy of Global Positioning System (GPS) positioning have been investigated. In these studies, it has been determined that the accuracy of GPS positioning depends on a number of parameters such as atmospheric events, the method of measurement and the duration of observation. In these studies, the relationship between the baseline length and session duration were investigated for the relative positioning method while relationship between geographical latitude and session duration were investigated for the Precise Point Positioning (PPP) method. The aim of this study is to determine the regional positional accuracy of the International GNSS Service (IGS) stations by means of PPP. For this purpose, GPS data sets from 18 IGS stations were selected in different latitudinal regions (poles, midlatitudes, and the equatorial belt). GPS data were obtained from SOPAC (Scripps Orbit and Permanent Array Centre) archives, from consecutive three days of each month in 2013 and 2014. Each day's 24h GPS data were subdivided into mutually non-overlapping 12h, 8h, 6h and 4h sessions and were processed using the GIPSY OASIS II v6.3 software. The RMS values obtained from the processing solutions were used to determine the effect of geographical latitude and session duration on positional accuracy. Initial results indicate that in addition to the observation session, there is also the effect of geographical location on the accuracy of GIPSY PPP results.

Key words: GPS, GNSS, accuracy, PPP

INVESTIGATING EFFECTS OF USAGE OF ZENITH TROPOSPHERIC WET DELAY MODELS ON POSITIONING ACCURACT

ID No: 338

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ABSTRACT

Global Navigation Satellite System (GNSS) is actively being used for various purposes such as engineering studies, deformation measurements, meteorological predictions, navigation. The method would be used depends on work to be applied. Relative and absolute positioning techniques are the two main methods that distinguish positioning with GNSS as the working methodology. Precise Point Positioning (PPP) which is an absolute positioning technique has stood out among these techniques in recent years and is becoming more popular, has become an important alternative to relative positioning technique in evaluating GNSS data (postprocessing) in terms of position accuracy it provides. This improvement in accuracy relies on modelling of the errors in post-process phase. There are many error sources those have an effect on positioning accuracy. Atmospheric error sources are ionospheric delay and tropospheric delay. While ionospheric delay error can be eliminated with using L1-L2 phase and also code observation differences, tropospheric delay needs to be modelled because it is not predictable due to constantly changing water vapour in the layer. In this study, 3 IGS station couples those have horizontal distance less than 160 km from each other with significant height difference were selected. Coordinates were obtained for 7 days from Scripps Orbit and Permanent Array Center (SOPAC) to perform repeatability analysis. At first, these datas were processed in GIPSY-OASIS 6.4 (GNSS-Inferred Positioning System and Orbit Analysis Simulation Software) with Kinematic PPP approach using 5 minutes intervals while Zenith Tropospheric Wet Delay (ZWD) modelling on, and then secondly off. The results were compared to absolute position of the sites to determine effects of ZWD modelling on coordinate values as in RMS values. The purpose of the study was to see if there was a correlation between height difference and RMS improvement with usage of ZWD modelling.

Key words: GNSS, Kinematic PPP, Tropospheric Delay

NATURAL HAZARDS

A SEMI-AUTOMATIC DETERMINATION OF LANDSLIDE LOCATIONS AND LANDSLIDE SUSCEPTIBILITY ASSESSMENT AT ULUS (BARTIN) REGION

ID No: 175

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ABSTRACT

The type of natural disasters that cause the greatest loss of life and property in Turkey are the landslides, following the earthquakes. Landslide inventory studies have been attracted great interest by many researchers. When the literature on landslide mapping is examined, the main factor emphasized in almost every study that is to produce a database with a reliable landslide inventory map. The main purpose of this study is to create the database by extracting the spectral, morphologic and textural properties of the landslide and non-landslide objects of each segment with the image segmentation analysis of the study area. Therefore, in a landslide and non-landslide areas, a GIS-based database will be automatically generated based on these selected properties (spectral, morphologic and textural) and landslide location characteristics. In addition, the determination of the possible landslide locations by Artificial Neural Networks (ANN) method using the selected properties as one of the other purposes of the study. For all these purposes, Ulus (Bartın) region located in the Western Black Sea Region which is known as one of the most landslide prone areas in Turkey was chosen as the study area. Based on the inventory map of the study area generated by ANN method, 78.2% of the landslides were estimated correctly. This value is a quite satisfactory value and it is only valid for this study area. In other words, while this method is feasible in different areas, it is necessary to examine the spatial properties to be considered in a healthy way. In the last step of the study, a landslide susceptibility map of the study area was produced with ANN method. In order to evaluate the performance of the susceptibility map of the study area, the ROC curve was plotted and the Area Under Curve (AUC) value was calculated as 0.743.

Key words: Landslide inventory, spectral, morphologic and textural properties, image segmentation analysis, Artificial Neural Network (ANN), Ulus (Bartın) region, ROC curve, Area Under Curve (AUC)

DRONE PHOTOGRAMMETRY FOR DEM PRODUCTION TO BE USED IN FLOOD MANAGEMENT: YUZUNCU YIL UNIVERSITY CAMPUS CASE

ID No:184

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ABSTRACT

3D spatial data provided by drone photogrammetry is vital for large scale spatial applications such as disaster management, security, urban design, spatial planning, etc. The existing methods (Aircraft and Satellite based) have some disadvantages such as high cost, low temporal resolution, low spatial resolution, and a need for specialized human power. Today, unmanned aerial vehicle (UAV) photogrammetry is used in large scale spatial applications with its advantages such as low cost, high temporal resolution, and less human power. In all stages of disaster risk management circle, UAV photogrammetry products; point cloud, orthophoto and DTM constitutes valuable inputs of flood simulation software to survey and identify disaster-prone areas for a better understanding of flood risk. The study showed that the use of UAV in the production of precise DTM for an area with high flood risk in the Yuzuncu Yil University Campus located on the shore of Lake Van, gave successful results with its relatively low application cost and high spatial, temporal resolution.

Key words: Drones, Photogrammetry, Flood, DEM.

THE GIS-BASED EARTHQUAKE RISK AND NETWORK ANALYSIS OF DEĞIRMENDERE

ID No: 189

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ABSTRACT

A system is developed within Geographical Information Systems (GIS) with the aim of hazard mitigation of earthquakes in Değirmendere for disaster management.

Initially, former studies conducted in the region have been examined; the damages during the earthquake on August 17, 1999 and their reasons have been investigated. Regarding the earth sciences data that affect buildings during an earthquake ratios of risk and in relation to degree of affect of sub-categories of these data to buildings during an earthquake have been identified.

In order to be able to evaluate the risk analysis of the region for earthquakes within GIS, the weighting of these data have been realized with the method of Analytic Hierarchy Process (AHP).

In contrast to other GIS studies which take regions as basic mapping unit, all data have been transferred into GIS medium as a attribute value for building entities.

Demographic information on the residents of the region have been obtained from the General Directorate of Civil Registration and Nationality, and transferred into GIS medium as another value for each building.

Afterwards, risk and network analyses have been conducted in GIS Medium, and the buildings under risk and their ratios have been determined. As a contrast to other studies of disaster management, demographic data of the population living in buildings under risk have also been evaluated and suggestions have been made for these cases.

Key words: Disaster management, Analytic hierarchy process (AHP), Geographical Information Systems (GIS), Risk analysis, Network analysis, Hazard mitigation.

STREET NETWORK ASSESSMENT FOR FLOOD EVACUATION EVENTS USING ACCESSIBILITY AND CONNECTIVITY INDICES IMPLEMENTED IN GIS ENVIRONMENT

ID No: 193

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ABSTRACT

This ongoing study will investigate the street network resilience in urban areas, by implementing GIS analysis. The study will determine the effects of floods due to excess rainfall on street networks. This study also will take into consideration cases of probable evacuations by planning accessible alternative routing for the residence. The study will implement 1 and 2-dimensional risk mapping of floods on the street networks. The probable inundated streets will be determined and their resulted blockage will be investigated via applying GIS modelling, spatio-temporal model, of the study area. In the next stage, several measures to determine the resilience of the street network will be investigated, while the inundated streets are out of service. For that purpose, accessibility and connectivity measures will be used to assess the street network status. Accessibility refers to the possibilities of traveling to destination opportunities and the level of service associated with a wide range of travel options. On the other hand, connectivity refers to shorter trips; a wider variety of travel choices; and more cost-effective public services and infrastructure. Each of these measures has several indices capturing different patterns. For instance, distance, cumulative-opportunities, gravity, utility-based, time-space are among the most used accessibility indices, while intersection density, street density, connected node ratio, link-node ratio, average block length, effective walking area, gamma index and alpha index are among the most used connectivity indices. The change in accessibility and connectivity will be compared before and after probable flood events take place. The street network will be assessed and recommendations will be provided to the related authorities aiming to increase the street network efficiency in such cases.

Key words: GIS, Street networks, Resilience, Flood, Modelling.

AUTOMATICALLY LANDSLIDE SUSCEPTIBILITY ANALYSIS BY GIS

ID No: 305

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ABSTRACT

Landslide is one of the natural disasters that cause a considerable loss of life and property. Therefore, it is extremely important to determine the susceptibility of landslide areas and to do natural disaster planning accordingly. The Landslide Susceptibility Maps (LSM) produced should be used as a base to be able to do proper planning. In the literature, various studies have been carried out with many different methods related to the landslide susceptibility analysis. Different methods and parameters were used to produce the most accurate LSM in each of the studies.

In this study, it was aimed to produce a GIS-based LSM by the The Frequency Rate (FR) method in the selected study area, to calculate the accuracy of the produced LSM and to perform all these operations fully-automatically. The surroundings of Şavşat district of Artvin (Turkey) province, which is one of the regions with the highest landslide risk, was selected as the study area. On the other hand, a total of 9 parameters such as slope, aspect, elevation, lithology, distance to fault, distance to river, Normalized Difference Vegetation Index (NDVI), land use and rainfall were used for the landslide susceptibility analysis in the study. In line with this purpose, user-interface programs were developed in the GIS environment. The FR method that is commonly used in the literature and gives high accuracy was used to produce an LSM. Slope, aspect, elevation, lithology, distance to fault, distance to river, Normalized Difference Vegetation Index (NDVI), land use and rainfall parameters were taken into account to produce the LSM. At the same time, the accuracy of the LSM obtained by the FR method was calculated to be 73%. Consequently, this presented method was designed in the manner that it could be applied in any landslide area.

Key words: GIS, Landslide susceptibility analysis, Frequency rate.

DETECTION OF TEMPORARY SHELTER AREAS BY GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

ID No: 306

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ABSTRACT

Despite the acceleration of works on the natural disasters in our country after the 1999 Marmara earthquake, the inadequacy of the first gathering and temporary shelters after the disaster hinder to the implementation of a literally disaster management. As a matter of fact, the Van earthquake that we experienced in 2011 revealed the troubles we had in terms of shelters. In this context, there is a need for areas where people can easily reach and can stay healthy after a disaster or an emergency.

There are standards in the world such as the United Nations High Commissioner for Refugees (UNHCR), the World Health Organization (WHO) and the Minimum Standards and Humanitarian Charter for Sustainable Development - Sphere Project. In Turkey, the Disaster and Emergency Management Authority (AFAD) issued its guidelines on December 2015 and set the standards for the establishment, management and operation of temporary accommodation areas.

In this study, it was aimed to detect the most appropriate areas of temporary shelter by satellite images (LANDSAT 8), the Analytical Hierarchy Process (AHP) and GIS. The obtained data were integrated with the Address Registration System (ARS) to be assigned to residential and work places premises according to the closeness to places for providing shelter after disaster. Building-based queries can be performed by user-interface programs developed on GIS environment. Thus, every information about the area of shelter can be accessed by the created system.

Key words: GIS, Disaster Management, AHP, Interface, Temporary Shelter Area

MONITORING NATURAL DISASTERS USING GEOGRAPHICAL INFORMATION SYSTEMS: A CASE STUDY OF KAYSERI

ID No: 178

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ABSTRACT

Turkey is a country, where many natural disasters occur and loss of lives and properties emerge. In order to minimize those losses originating from natural disasters and to take measures, various methods and techniques are utilized. From the aspect of creating the position-based maps, the leading one among those methods and techniques is the Geographical Information System (GIS). In this study, by using the Geographical Information System technologies, it is aimed to obtain the natural disaster risks of Kayseri City and the web-based risk maps regarding those risks. During this study, for Kayseri city, the earthquake, landslide, rock fall, and avalanche maps to shed light to the policies for preventing the natural disasters and selecting the locations were prepared. Moreover, the study will also be guiding in terms of determining the natural disaster danger and risk status of Kayseri city, to prepare the base maps that city and region planners would need for revising the plans, and to convey true, fast, reliable, and momentary information to administrator in decision-maker position

Key words: Monitoring natural disasters, Geographical informatıon systems, Kayseri

DEVELOPMENT OF GIS-BASED BUILDING MANAGEMENT MODEL FOR NATURAL DISASTERS

ID No: 174

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ABSTRACT

There are many mass events around the world. One of these mass events is disasters. A disaster is a natural phenomenon that occurs suddenly, is difficult to prevent by people after it starts, and causes loss of life and property. The events that cause the loss of life and property created by people are considered as human disasters. Disasters affect countries economically, socially and psychologically. During these disasters, the most important point is measures to be taken during risk and crisis management. One of the things to be aware of when these precautions are taken is the number of individuals affected by these events. In disasters, there is a great loss of time during the detection of individual numbers. It provides assistance such as search and rescue, health care, housing, and food.

In this work, it is aimed to employ electronic infrared human counter used for commercial purposes to prevent this loss of time. The infrared human counter uses advanced image processing technologies to count people passing wherever they are. In stores, shopping centers, every kind of public area offers a complete, efficient, economical and quick solution due to its high accuracy and counting reports. These can be accessed anywhere in the world and instant recording of these data. This enables the creation of a building management model during extra-ordinary events that take place in the buildings in the targeted buildings. Using the artificial intelligence and artificial vision algorithms, the system can work without loss of performance in crowded entrances and exits, and also even shadowy environments. Persons close to each other can distinguish between persons who pass in different directions at the same time. With its flexible infrastructure, it has a high performance ratio with its fully multi-language interface, reporting pages and user-definable infrastructure that makes it possible to create panoramic images by combining images taken from multiple cameras at the same time.

By means of instantaneous transfer of the report data provided by this counter system to the GIS environment, a public institution and foundation building management model is designed so that the search and rescue activities can be successfully carried out efficiently after a possible natural disaster. Because the proposed building model allows the identification of the numbers and locations of the individuals in the building at the moment of disaster, it is possible to determine the possible time losses in a concrete way. Finally, a workflow will be provided for the GIS-based building management model for natural disasters.

Key words: GIS, Natural disaster, Infrared human counter, management model

MONITORING OF ENGINEERING BUILDINGS BEHAVIOUR WITHIN THE DISASTER MANAGEMENT SYSTEM

ID No: 238

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ABSTRACT

The Disaster management aims to prevent events that result in disaster or to reduce their losses. Monitoring of engineering buildings, identification of unusual movements and taking the necessary precautions are very crucial for determination of the disaster risk so possible prevention could be taken to reduce big loss. Improving technology, increasing population due to increased construction and these areas largest economy lead to offer damage determination strategies. Structural Health Monitoring (SHM) is the most effective of these strategies. SHM research is very important to maintain all this structuring safely. The purpose of structural monitoring is determining in advance of possible accidents and taking necessary precaution. In this paper, determining the behavior of construction using Global Positioning System (GPS) is investigated .For this purpose shaking table tests were performed. Shaking table was moved at different amplitude and frequency aiming to determine these movement with a GPS measuring system. The obtained data were evaluated by analysis of time series and fast Fourier transformation techniques and the frequency and amplitude values are calculated.

Key words: Structural monitoring, GPS, Shaking table

MULTIHAZARDS EARLY WARNING SYSTEM FOR THE NE COAST OF THE BLACK SEA AND CABARET APPLICATIONS

ID No: 312

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ABSTRACT

The multihazards early warning system has been developed and deployed in the sea and on land to the border region between Romania and Bulgaria, for coastal communities. It covers several natural hazards threatening the costal areas of both countries. The main focuses of the system are marine hazards – earthquakes, tsunamis, storm surges, floods. The system consists of several types of sensors – strong motion seismic devices, GNSS stations, bottom pressure tide gauges, extensometers, complex meteorological stations and data acquisition centers in Varna (BG) and Constanta (ROM). The decision matrix has been developed establishing the rules for warning levels issues. The existing problems are due to regulatory rules and legislation deficits. The Bulgarian experience of the establishment of a multihazrds system could be very useful for the EU Project CABARET. The CABARET (***CA***pacity ***B***uilding in ***A***sia for ***R***esilience ***E***duca***T***ion) Project is funded by the European Union, under the Erasmus + programme, to foster regional cooperation for more effective natural and man-made multi-hazard early warnings and increased disaster resilience among coastal communities. The project is inspired by the UN Sendai Framework for Disaster Risk Reduction - 2015. It includes a strong call for higher education to support the understanding of disaster risk and promote risk-informed decisions and risk sensitive planning from the local to the global levels. It also calls for the coordination of existing networks and scientific research institutions at all levels and all regions.

Key words: CABARET Project, Multihazards Early Warning System, Education

SPATIO-TEMPORAL ANALYSIS OF HISTORICAL EARTHQUAKES IN AYVACIK REGION IN CANAKKALE CITY WITH GIS

ID No: 173

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ABSTRACT

Ayvacik region has been seismically active over the last few months with a series of earthquakes and many aftershocks varying magnitudes around Çanakkale. Generally the series of mid-sized earthquakes have been occurred at the intersections of the different fault zones (Edremit, Kestanbol,..etc) in the region. Since similar quakes will not be surprising in the future the seismicity around the region should be closely monitored. The aim of this study is to apply spatial pattern analysis techniques to earthquake data in the Ayvacik region to detect clusters and explore global and local spatial patterns in the occurrence of earthquakes over the years from 1900 to 2017. Geographic Information Systems have been proved to be useful for analyzing natural risks such as earthquakes which involve complex interactions with the nature. The application of GIS for geospatial modeling in natural hazard risk management is important for risk reduction. As it is known spatial statistics is a powerful tool for both presentation of existing spatial phenomena (earthquakes,..etc), and investigating relationships between different locations of a particular event (i.e. earthquake) applying specific statistical technique. This study aimed to investigate the regionwide eartquake characteristics, detect clusters at the region and evaluate differences in the earthquake characteristics inside and outside identified clusters. The spatial pattern analysis techniques chosen for this study were quadrat analysis, nearest neighbor index, global Moran's I, Getis-Ord general G, Anselin Local Moran's I and kernel density estimation. In our study, the 117-year data set of earthquakes was integrated at the region level for spatiotemporal cluster analysis. To conduct a GIS-based analysis, earthquake catalog data was obtained from Turkey's Disaster and Emergency Management Authority (AFAD). It has been shown that both global and local spatial statistics were capable of detecting clusters in the spatial patterns of the occurrence of the earthquakes in the region.

Key words: Earthquake, spatiotemporal analysis, GIS, spatial statistics

LANDSLIDE SUSCEPTIBILITY ANALYSE USING INSAR DATA BY THE HELP OF ANALYTIC HIERARCHY METHOD

ID No: 194

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ABSTRACT

Landslides are one of the most effective natural disasters that cause loss of life and economic loss and landslide susceptibility models have been made by various methods in order to minimize these damages. Many methods have been used to produce the landslide susceptibility maps in the literature. In this study, Geographical Information Systems (GIS) technology, which is a powerful tool, and Analytical Hierarchy Process (AHP) method, which is one of the Multi Criteria Decision Analysis techniques, were used together. AHP is a method which can be widely used to solve complex and multi-criteria problems and based on expert opinion that allows pairwise comparison of parameters and determining priorities. Furthermore it is very important to monitor landslide movements in terms of geodetic. PS-InSAR (Persistent Scatterer Interferometric Synthetic Aperture Radar) technique is one of the most commonly used method to monitor landslide movements in recent years. Koyulhisar region was selected as the study site and this region is frequently exposed to landslides. For this reason, monitoring landslide movements is very important in this region. In the scope of the study, landslide causative factors were considered to produce susceptibility model. Factors, such as lithology, slope, aspect, topographic wetness index (TWI), distance to tensile cracks, normalized difference vegetation index (NDWI) were considered. In addition to this, distribution of the deformation data in the line of satellite sight obtained by PS-InSAR method was integrated in GIS environment and used in landslide susceptibility map production and landslide susceptibility areas were determined.

Key words: GIS, AHP, Landslide Susceptibility, PS-InSAR

LANDSLIDE SUSCEPTIBILITY ASSESSMENT OF THE ERMENEK RIVER WATERSHED USING DECISION TREE TECHNIQUE WITH CHI-SQUARED AUTOMATIC INTERACTION DETECTION ALGORITHM

ID No: 195

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ABSTRACT

Landslide susceptibility maps provide significant improvements for understanding the regional effect of landslides. The reliability of the landslide susceptibility maps mostly depend on the completeness of the landslide inventory, selection of the appropriate landslide conditioning factors and the susceptibility methods. In this study, landslide susceptibility assessments were carried out in Ermenek River watershed of 4020 km^2 which is one of the major tributary of the Göksu river in the Mediterranean region of Southern Turkey. Landslide inventory map revealed that 4.32 % of the area was affected by landslides which are mostly in the type of rotational slides and complex movements. 353 landslides were delimited in the study area with average size of 0.47 km^2. The geology, digital elevation model, slope, plan curvature, profile curvature, topographic wetness index, linear aspect, slope aspect ratio, surface relief ratio, dissection, roughness maps were considered as landslide conditioning factors and were prepared in geographical information systems. The landslide susceptibility map of the study area was prepared using decision tree technique with Chi-squared automatic interaction detection algorithm (CHAID). CHAID can be used for prediction as well as classification, and for detection of interaction between landslides and landslide preparatory factors. In the context of landslide susceptibility CHAID algorithm was used to select the certain type of landslide and predict how their responses to some of the environmental variables affect other variables. The performance evaluations of the susceptibility maps have been carried out using receiver operating characteristics (ROC). The area under the ROC curve was found 0.914. As a consequence, it has seen that the produced susceptibility map has higher prediction capacity where 86.73 % of the substantial landslides were located in the high and very high susceptible classes corresponding 22.44 % of the entire area. It can be suggested that the results obtained in this study would provide important contribution in the landslide hazard mitigation studies of the study area.

Key words: Landslide susceptibility maps, Ermenek river, Decision tree, CHAID.

A COMPARATIVE ASSESSMENT OF SINMAP MATHEMATICAL MODEL AND ARTIFICIAL NEURAL NETWORK BASED LANDSLIDE SUSCEPTIBILITY EVALUATIONS

ID No: 332

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ABSTRACT

Landslide susceptibility mapping techniques can be classified as (i) expert evaluations; (ii) statistical and data mining techniques, and (iii) physical models. Actual landslide information is not necessary in expert methods while a complete landslide inventory is indispensable for statistical and data mining techniques. On the other hand, the main limitation for the physical models is over simplifications in mechanical and hydrological factors with respect to mapping scale. Depending on the increment of mapping scale the uncertainties due to the simplifications can be decreased. In the present study, steady state hydrology and infinite slope stability model based shallow landslide susceptibility evaluations were performed for a well-documented landslide prone area located at the Buyukkoy Catchment Area (Cayeli, Rize) at the Eastern Black Sea Region of Turkey. For this purpose, the SINMAP mathematical model was implemented. The SINMAP mathematical model considers the infinite slope stability model with pore pressures obtained from a digital elevation model based steady state hydrology in landslide susceptibility evaluations. In order to assess the results of the physical model, a comparison procedure was carried out by using shallow landslide susceptibility map of the study area previously produced by an artificial neural network model. As a consequence; the conceptual differences and spatial performances of the physical model and artificial intelligence technique based landslide susceptibility evaluations were discussed.

Key words: Landslide Susceptibility, SINMAP, Artificial Neural Network, Cayeli, Rize, Turkey

LANDSLIDE SUSCEPTIBILITY ASSESSMENT OF THE ÇUBUK - KALECIK (ANKARA) BETWEEN ŞABANÖZÜ (ÇANKIRI) REGION USING ARTIFICIAL NEURAL NETWORK

ID No: 196

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ABSTRACT

A landslide susceptibility map is very important and necessary to efficiently prevent and mitigate the losses brought by natural hazard for a large area. For the purpose of landslide susceptibility analysis for Çubuk - Kalecik (Ankara) Between Şabanözü (Çankırı) Region (2360 km^2). According to the inventory map that represents about 5,16 % of the spatial distribution of landslide at study area. According to the Turkey Landslide Inventory database prepared by MTA, 876 landslides covering 122 km^2 were identified in the study area. A total of nine independent variables were used for the landslide preparatory factors during the susceptibility assessments which are lithological maps, landform classification, digital elevation model, slope, profile curvature, plan curvature, roughness index, stream power index, topographic position index. In order to be used in Artificial Neural Network (ANN) analysis, the causal factors of landslides have been normalized linearly between the range of 0 and 1, and the data set has been created together with the landslide inventory map of the study area. The data sets of the model created with 10 % test, 10 % validation and 80 % analysis sets using random selection method from the landslide causal parameters. Landslide susceptibility maps obtained from the scaled conjugate gradient back propagation method have been classified according to the natural breaks interval into five susceptibility classes from very low to very high. The performance evaluations of the susceptibility maps obtained from the study have been carried out using receiver operating characteristics (ROC). The area under the ROC curves is AUC=0.76 in susceptibility map. The high and very high susceptible areas represents 35 % of the entire area where majority of the landslides were located hereinto.

Key words: Landslide inventory, Landslide susceptibility, Artificial Neural Network.

2D SIMULATION OF PROBABLE DEBRIS FLOW IN KOYULHİSAR, TURKEY

ID No: 176

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ABSTRACT

Landslides are one of the most dangerous disasters causing loss of life and property in the world. The landslide is the most common type of disaster after the earthquake in Turkey. The study area is located to 150 km northeast of Sivas city. Koyulhisar region is highly prone to earthquakes and landslides. A recent landslide has occurred about 10 km east of Koyulhisar County of Sivas on 17.03.2005. The settlement Yukarıkale neighborhood where the landslide has formed on the fan at the end of the stream and having hazard from about 1 km away landslide. It was observed that movement continued on the landslide surface at the north of Yukarıkale during fieldwork. It is thought that landslide mass is expected to show a behavior as debris flow due to heavy rainfall, water leakage on the scarp and increasing the water content. Debris-flow is initiated by intense, rapid precipitation capable of mobilizing soil, colluvium and, more generally, unconsolidated materials [1]. Similar incident occurred on 17.03.2005 Sugözü landslide and 21 houses buried, and 15 people lost their lives at the Sugözü village. We used TopRunDF 2.0 software for debris flow simulation. The main parameters of an Open Source Software TopRunDF are volume, mobility coefficient, a start point and digital terrain model [2]. In addition, a spatial distribution of an elevation step and barriers could be used optional.Probable Yukarıkale debris flow event was simulated with 11.5x11.5 meter resolution Digital Elevation Model (DEM) data was used for terrain model. Recommended resolution is 2.5x2.5 m Lidar data with this software was not available for this region. The start point location was chosen in the stream north of the settlement. It was assumed that mass volume is about 100.000 m^3. TopRunDF is used to predict potential deposition areas, k_{Bpred} a mobility coefficient based on the average slope of the channel S_c as well as the average slope of the fan S_f, can be estimated [2]. S_c, S_f and K_{Bpred} were calculated as % 30, %15 and 46 respectively. No barrier data was used in simulation. The output results are the deposition areas with deposition height and overflow possibility of a debris-flow. Average deposition height was calculated as 0.54 m. Deposition and spreading data were simulated by using GIS software and reclassified as high risk and low risk area. These data could be used for site selection, planning and disaster mitigation studies.The geological units of study area are similar to those of Sugözü. They have formed within volcano-sedimentary rocks. Decayed and loosed outcrops in the streams and road cuts were observed. Geological, topographical and climatic characteristics of the region are suitable for the landslide. Moreover one of the most active fault zone of Turkey the North Anatolian Fault Zone (NAFZ) runs 4 km away from study area. Because of all these reasons, it is very important to analyze natural disasters like landslides, rock falls, avalanche and flooding. It is also important to be used disaster risk reduction for decision makers. In this study, a probable debris flow spreading zone for posed risk to the settlement was obtained.

Key words: Debris flow, 2D simulation, TopRunDF, landslide, Koyulhisar

WEIGHTED OF EVIDENCE PREDICTIVE MODELLING OF LANDSLIDES AND SURFACE DEFORMATIONS BASED ON ALOS PALSAR-1 SBAS PROCESSING IN KÜÇÜKÇEKMECE-BÜYÜKÇEKMECE (İSTANBUL) REGION

ID No: 191

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ABSTRACT

Weigth of evidence (WOFE) is a data-driven spatial modelling method used to produce a prospectivity map. The purpose of this study is to reveal the relationship between spatial data layers and landslide movements/surface deformations quantitatively determined from ALOS Palsar-1 SBAS analysis and to generate the predictive map of the probability of landslides and surface deformations by using weight of evidence (WOFE) method in Küçükçekmece-Büyükçekmece (İstanbul) region. For this purpose, firstly landslide and surface deformation areas was determined by using small baseline subset (SBAS) with ALOS Palsar-1 SAR images. To determine the spatial relations between landslides/surface deformations and specific parameters (lanslides/surface deformation and lithological units, tectonic structures, slope, vegetation, geomorphology, hydrogeology, liquefaction tendency and urbanization) were analysed by using WOFE. As a result of these analyses, the landslides and surface deformations in this region have a quite high spatial relationship with litological units. The spatial relationship with tectonic structures is more limited. In analysis with the slope map generated from ALOS DEM, a good spatial relationship was seen at areas which have 0-30^{o} slope angle. The analysis with ASTER-NDVI map demonstrates that there is no spatial correlation with vegetation. Geomorphologically, a spatial relationship was emerged at the filling surface of Upper Miocene valley floor. In terms of hydrogeology and relative permeability, a higher spatial relationship was seen with permeable units. In addition, a relatively high spatial correlation was determined with the river floods sediments. As a result of the WOFE prospectivity modelling based on ALOS Palsar-1 SBAS analysis, a predictive map of landslide movements and surface deformations was produced with a score range of 0.35-0.99.

Key words: Küçükçekmece-Büyükçekmece (İstanbul), landslide, ALOS Palsar-1, interferometry, small baseline subset (SBAS), weight of evidence (WOFE), spatial data modelling

GIS-BASED AVALANCHE SUSCEPTIBILITY MAPPING FOR DAVRAZ MOUNTAIN, ISPARTA, TURKEY

ID No: 294

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ABSTRACT

Due to its geographical features, Davraz Mountain is an important centre for winter tourism. The ski tracks at 2,150 metres above sea level, thick snow cover, sloping structure and slopes devoid of vegetation cover increase the avalanche potential in the area.

In this study, potential avalanche zones were determined for Davraz Mountain in Isparta province, and maps of susceptibility and the propagation zone were developed. For these analyses, geographic information systems (GIS) and CONEFALL programs were used. Elevation, slope, aspect, curvature and land use parameters were used in the creation of the maps. From the analysis, it was found that Davraz Mountain's southern side carries an avalanche risk. The northern slope, where the facilities are situated, was determined to be safer.

In the absence of such a study of Davraz Mountain, it is thought that these theoretically prepared maps can be used as a guide for planning, risk management and location site selection for decision makers and local governments.

Key words: Avalanche, Geographic Information Systems, CONEFALL, Davraz Mountain

DETERMINATION OF SURFACE STRAIN BY GNSS METHOD; A CASE STUDY FROM THE KOYULHISAR LANDSLIDE AREA, SİVAS, TURKEY

ID No: 228

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ABSTRACT

Reducing the negative effects of the landslides by monitoring them holds a great importance. Two major landslides occurred in the Koyulhisar region, located to the northeast of Sivas, Turkey along the North Anatolian Fault Zone, in 1998 and 2000 years. It is known that there are still surface deformations existing in the region. Therefore, surface deformations were obtained by GNSS method and areal strain values were calculated. The compression and extension directions of the strain vectors show the characteristics of the faults in the region. Fault kinematics results are also consistent with the results obtained from this study. Furthermore, compression and extension directions were calculated as in N-S and E-W directions respectively where the study area was under the effects of North Anatolian Fault Zone, which is very close to the study area. This study proves that there are still surface deformations in the same-directions in the region and reveals the landslide hazard still existing.

Key words: GNSS, Deformation, Kinematic analysis

MONITORING LAND SUBSIDENCE BEHAVIOUR IN KONYA CLOSED BASIN BY MEANS OF GPS CORS MEASUREMENTS

ID No: 259

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ABSTRACT

Konya Closed Basin (KCB) is covering about 55000 km² that is located in the central part of Turkey. The basin is a highly agricultural productive area and inhabited by more than 3.5 million people. Rapid rise of population, industrial activities and agricultural irrigation have laid to basin excessive groundwater usage and accompanying land subsidence occurrences.

In this study, geodetic monitoring results of land subsidence have been presented in KCB by means of GPS CORS (Continuously Operating Reference Station) measurements. For this purpose, three CORS (KNY1, KAMN and BELD) station data has been acquired and analyzed with GAMIT/GLOBK V10.6. Daily solutions have been combined and yearly time series have been created for the all stations between 2009-2016. Time series analysis techniques have been performed such as Kalman filter and moving average filter in order to find the correlation out between the groundwater level extraction and land subsidence. According to the results, vertical deformation values show annual variability and change within -7 mm/yr to -90 mm/yr. Time series of up coordinates behavior are changeable within the year and up to 90% of cross-correlation with groundwater level has been detected.

Key words: Land subsidence monitoring, CORS, GPS, Groundwater level

RISK ANALYSIS OF FOREST ROADS USING LANDSLIDE SUSCEPTIBILITY MAPS AND SUITABLE FOREST ROAD ROUTE SELECTION: A CASE STUDY IN MAÇKA FORESTRY OPERATION DIRECTORATE, TRABZON

ID No: 177

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ABSTRACT

Nowadays forest roads are an important term in the way of forest management for transportation. Landslide that causes destruction of forest roads is one of the most important natural hazards. Thus landslide must be taken into account in the planning of forest roads network and must be produced risk and inventory maps for the site. Otherwise landslide which occurs in the site can cause discontinuation of forestry activities as well as property and human loses substantially.

Firstly landslide susceptibility map has been produced by using analytical hierarchy process (AHP) for the study area. The landslide inventory map has been used to generate landslide susceptibility map. This map give information landslides that occurs from past to present in terms of their location and size. Six layers (land cover, aspect, lithology, slope, elevation, topographic wetness index) have been determined for this application in production landslide susceptibility map and each layer has been intersected with landslide inventory map. So frequency values for each layer have been calculated. Then weights of each layer have been determined according to each other taking into account literature researches and expert opinions. According to weights landslide susceptibility map has been produced by using map algebra techniques. Secondly landslide susceptibility map has been intersected with available forest roads and landslide risk analysis of forest roads has been calculated and classified as their risk status. In this way landslide risk map was produced for study area.

The aim of this work is determining of landslide risk potential and production of risk map for available forest roads that are an important factor with regard to forest management. Besides suitable forest road route network has been calculated for by taking into consideration available parameters and landslide susceptibility map by raster - based network analysis.

Key words: Landslide susceptibility map, Analytical hierarchy process, Forest road route, Raster-based network analysis

WILD FIRE TEMPORAL RISK ASSESSMENT USING MULTI-CRITERIA ANALYSIS WITH THE INTEGRATION OF REMOTE SENSING AND GIS: CASE STUDY OF A MEDITERRANEAN AREA OF TURKEY

ID No: 186

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ABSTRACT

The wild fire risk is estimated with Remote Sensing and GIS supported indexing method for Kozan Forestry Region which is one of the most important region of Turkey in terms of surface coverage, economy, population and significant effect of climate change. The combination of these unique physical and socio-economic conditions arise many ecological threats especially wildfire risk. Long periods of dry and hot weather which increase with climate change lead to increasing probability of forest fires. Wild fires cause the results of loss of ecosystems and biodiversity, forest degradation, decline in air quality and air pollution, soil degradation, increase of floods, aesthetic degradation and all these end up with human well-being, health and economic losses.

The wild forest fire occurrence probability is depending several factors such as climate, fuel condition, topography, land use, and human occurrence. Some of these factors except climate can be mentioned as static in terms of seasonal chance. However the climate factors which directly effecting the fire occurrence risk for forests such as temperature, precipitation, humidity, evapotranspiration and wind speed is dynamic in a season. So the wild fire risk modeling processes should consider temporal structure of climatic factors.

Wildfire occurrence probability is spatially estimated in monthly periods in terms of risk index for Kozan Forestry Region using Remote Sensing and GIS supported Multi Criteria Analysis (MCA) which involves analyzing a series of factors. Several factors which have effect on fire occurrence are evaluated with MCA process and mapped as monthly periods of a season. The results are indicate that the wild fire occurrence risk is changeable for Kozan Forestry Region over the months of a year.

Key words: Temporal wild fire risk, multi-criteria analysis, remote sensing, GIS, soil moisture index, fuel moisture index, Kozan Forestry Region

APPLYING GIS AND MULTI CRITERIA EVALUATION IN FOREST FIRE RISK IN BAKİRÇAY BASIN

ID No: 192

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ABSTRACT

Forest fire is one of the abiotic factors that have an effect on the forest ecosystem. Forest fires have significant local effects on soil degradation, soil erosion, natural habitat and biodiversity. However, since greenhouse gases have a significant share in gas emissions, forest fires have global impacts. Spatial analysis by GIS (Geographic Information System) provides a tool for accurately zoning the area with high potential risk of forest fire. Through GIS spatial analytical procedure, the forest fire risk ranging from high to low is derived, according to its sensitivity to fire or fire-inducing capability. In this study, vegetation (vegetation type, vegetation density), topographic (elevation, slope, aspect, topographic wetness index), climatic (average precipitation of the warmest quarter, area solar radiation WH/m^2) and human-made (distance from settlements, distance from roads) parameters were used as causative factors of fire to determine the risk by using combination of GIS in spatial analysis and multi criteria evaluation in Bakırçay Basin. Each causative factor was classified and weighted according to its own fire sensitivity and fire-inducing potential. Spatial resolutions of these biophysical and human-made parameters were set as 30 meters. Protection measures for forest fires can be taken beforehand and the results of this study were very useful in determining the potential hotspots. In addition, this study also demonstrates the potential of multi criteria analysis integrated with GIS which is an effective tool in assessing “where and when” forest fires are likely to occur frequently.

Key words: Forest fire risk, GIS, Multi criteria evaluation, Bakırçay Basin

QUANTIFYING BURNED AREAS IN SEFERIHISAR, TURKEY BY USING NDVI AND NBR INDICES AND CLASSIFICATION METHOD

ID No: 198

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ABSTRACT

Wildfires are one of the most destructive natural hazards not only affects the ecosystem adversely but also causes serious problems in economic and social life. Based on the statistical data of general directorate of forestry in Turkey between 1988 and 2015, 58.125 forest fires were occured and 298.699 hectares of forest were burned most of where are located in the Aegean and Mediterranean regions of Turkey. Different satellite images (Landsat, MODIS, SPOT, etc.) have being used to extract different levels of fire severity, fire damages and burned areas in many studies. In this study, the capacity of Normalized Burn Ratio (NBR) and Normalized Difference Vegetation Index (NDVI) indices derived from Landsat 5 images were analyzed in order to assess the fire severity. For this aim, Seferihisar district of Izmir-Turkey was selected for the case study area. In the region, one of the largest wildfires in Turkey was occurred in 2009 August. Two Landsat images acquired in July 2009 and August 2009. The Normalized Difference Vegetation Index (NDVI), Normalized Burn Ratio (NBR), differenced Normalized Burn Ratio (dNBR) and differenced Normalized Difference Vegetation Index (dNDVI) were calculated from Landsat at-sensor-reflectance data. Besides NDVI and NBR indices results, supervised classification method was applied to pre and post fire satellite images. Based on the three different methods, the results are compatible and rational. All processes were carried out with Landsat data in ENVI remote sensing software.

Key words: Forest fire, NDVI, NBR, Seferihisar-Izmir, dNBR, dNDVI

EXAMINATION OF FOREST DESTRUCTION CAUSED BY THE PRODUCTION OF IIA GROUP MINES OF TÜRKIYE USING SENTINEL-2 SATELLITE IMAGERY

ID No: 204

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ABSTRACT

Rocks such as Aggregate (used as construction material), Calcite, Dolomite, Limestone, Granite, Andesite, and Basalt were classified as IIA Group Mines with the mining law No. 3213 in 2015. The vast majority of these mines are produced from karstic formations located in the forests of our country. According to the Article 16 of the Forest Law No. 6831, exploration and operation of mining and mining activities in forested areas can be conducted if the permission can be obtained from the ministry of forestry and water affairs in accordance with the mining law No. 3213. However, according to Article 9 of the Environmental Law No. 2872, a circular was published in 03 March 2014 in order to protect biodiversity, ecosystem, wetlands and endangered species. In spite of the regulations stated above, if the mining company has its license from general directorate of mining affairs before 2014, the company can continue mining activities and so forest destruction in this areas can reach dangerous extents.

The aim of this study is investigate forest destruction caused by the production of IIA Group Mines using Sentinel-2 images. In study area, there are twenty-one IIA Group Mines with total area size 3415 square kilometers and all of these mines were generated in consequence of forest destruction. Sentinel-2 satellite is one of the newest earth observation satellite and it has satisfying spatial resolution (10m) in visible and Near Infrared (NIR) bands. In order to determine IIA Group Mines in images supervised image classification method was applied and vectorization of satellite image was conducted to reveal the area of the mines. Sentinel-2 images are effective to observe the changes on Earth and it has advantages in spatial resolution of visible and NIR bands as compared to other equivalent value satellite such as Landsat.

Key words: IIA Group Mines of Türkiye, Forest Destruction, Sentinel 2, Supervised Classification, Zonguldak

AN ASSESSMENT OF DISASTER MANAGEMENT FROM THE VIEWPOINT OF GEOGRAPHICAL INFORMATION SYSTEM

ID No: 342

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ABSTRACT

Geological structure of Turkey contains many natural disasters and the effects that they shall cause. Millions of our people face with the risk of being exposed to and suffering from the effects that natural disasters shall cause. The first step of responding to potential risks and making through them with minimum damages is to be prepared. All technological solutions must be considered to minimize the potential damages against the destructive effect of nature. Regardless of the natural disaster to occur, the preparations to be made shall always minimize any potential damage. Inter-regional differential land structures lead to the requirement of making a separate preliminary preparation for the risk born by each region. In the face of differences in lands structures and the risks that they pose, the contribution of the information to be saved the Geographical Information System in the disaster plans to be prepared for reasons such as risk of earthquake, landslide etc. is incontrovertible.

Emergency response plans against any potential disaster are primarily based on the time for arriving at disaster area for response. Faster people arrive at the disaster area, more important steps shall be taken for minimizing the losses of life and property. First of all, Geographical Information Systems must be studied for regions, then geographical systems must be created for the locally different areas, and information on these areas must be considered within the disaster planning. Using this information in the disaster management planning shall make serious contributions toward making quick and accurate decisions in the process of solution against the disaster occurred.

Risks to which Turkey is exposed regarding disasters require disaster management to be perfect. Presence of a specialized geographical information expert within emergency response units in the stage of Disaster management would be a substantially complementary solution for response to a disaster.

Key words: Disaster Management, Disaster Emergency, Geographical Information System

DEVELOPMENT OF MOBILE APPLICATION WITH GEODATABASE IN DISASTER MANAGEMENT

ID No: 302

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ABSTRACT

Real-time determination and reporting of all disaster and emergency incidents that we may encounter in our daily lives are crucial. That is especially true of the natural hazard types common in the geographic location of our country and of terrorist incidents. Systematic reporting of disaster and emergency situations is required to promote safety of life and property and to rapidly and reliably determine the scope and degree of the disaster. Besides each disaster and emergency incident has spatial data properties, those incidents are represented as real objects in the geographic information system (GIS) solutions, and databases aimed at modeling the relationships between those objects are developed. The main goals of this project are to develop a crowdsourcing management model for disaster and emergency alerts and to develop a GIS database model by defining data classes and attribute information. Crowdsourcing management has been used effectively in such quick, assessment-oriented studies. The primary steps toward achieving those ends will be to obtain research outputs that result in social benefits concerning the goals of the study, to increase awareness by developing a model that also includes social components in emergency and disaster management organizations, and to identify cultural differences in emergency management. In this study, Mobile application was developed on the Disaster and Emergency Alert. A mobile application and web server services have been discussed with content devoted to crowdsourcing and the dissemination of information.

Key words: Disaster Management, Emergency, Geodatabase, Mobile Application

URBAN PLANNING

APPLIED RURAL PLANING BASED ON GEOSCIENCE DATA BY OPEN SOURCE GIS ON INTERNET

ID No: 121

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ABSTRACT

The services of public institutions and municipalities; such as mapping, zoning, planning, transportation, infrastructure, environmental protection, security, health, first aid are very expensive applications; are trying to fulfill these services with the financial support provided by the central government for them, collected taxes or loans with foreign credits. In addition to this, municipalities must also establish geographical based information systems that include these services as well as laws.

The use of open source software for the analysis of spatial data is increasing day by day, in order to make public investments of developed and developing countries more affordable. Production of spatial data as accurate, high quality and standard, and sharing with all institutions has become easier with the help of today's technology.

The documentation of these services for the community, elimination of repetitive and unnecessary information, and therefore the prevention of waste of national resources, is made possible through GIS. Unfortunately, municipalities are producing palliative solutions in this regard. While some administrations are transferring resources to high-cost GIS software, the system's infrastructure can not be established efficiently, lack of qualified personnel, inadequate support of decision mechanisms, etc. can not make progress for reasons. Administrators can solve these problems with open source GIS on internet. Compared to desktop software, Open Source GIS more effective interfaces, rich application capabilities and not least from commercial markets, additionally free and open-source software that capable of development.

In this study; Open Source GIS software and internet based database applications of the zoning plans based on geoscience data of village settlements in our country and the establishment of Rural Information System have been examined. Karabük province, Safranolu district Tokat village is discussed in the application. Successful results were obtained by ensuring the collection, processing and submission of geoscience data to the study area in the internet. Relational database on QGIS API CLOUD and GEO SERVER has been established by using free Sentinel-2 data and QGIS open-source software for land use cloud computing. Earth sciences related to landslides, tectonic faults and seismicity relations are taken from e-government environment and integrated into the cloud system. Graphical and attribute data of the reconstruction data types of infrastructure usage are similarly transferred to Open Source GIS software and integrated into the system. Finally, analysis and query modules were created.

Key words: Open-Source GIS, Rural Planing, Data Management,Cloud Application

ANALYSIS OF URBAN BUILT ENVIRONMENT WITHIN THE SCOPE OF ASSESSING URBAN QUALITY OF LIFE

ID No: 125

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ABSTRACT

rban quality of life simply refers to living conditions and well-being in cities. There have been numerous attempts to define Quality of Life (QoL) in cities, however these may vary based on the perspective of the evaluator or specific discipline. The most convenient way to define QoL is to describe it based on indicators of QoL. QoL is measured through subjective indicators that depend on individuals' perceptions derived via inquiries or objective indicators that are measurable. Compared to subjective indicators, objective indicators have superiorities as they are more accurate, stable, reliable and can produce comparable results to other studies.

This study builds QoL research on measurable material phenomenon from a city planning perspective that scope physical-environmental variables, so called environmental urban QoL. Environmental Urban QoL is described by five broad categories namely; economy, accessibility, security, environmental conditions, and built environment. This study investigates one of the five categories, that is 'built environment' as an indicator. Conditions that describe built environment such as population density, building density, building quality, building proximity, pavement width, etc. are quantified.

QoL analysis is implemented for İzmit city which encountered heavy industry leap in 1960's. City preserved its character of being an industrial city until today, it faced many environmental and social problems brought about by rapid urbanization due to migration, lack of a proper plan, massive destruction with earthquake in 1999 followed by rash decisions for recovery.

Results highlight the variation of quality of built environment within the scope of assessing QoL and reveal inequities and detoriation across the city.

Key words: GIS, Quality of Life (QOL), Environmental Urban QoL, İzmit

SPATIAL IDENTIFICATION AND ANALYSIS OF LAND SUITABILITY TO GREEN OPEN SPACE PLANNING IN JAKARTA, INDONESIA

ID No: 127

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ABSTRACT

According to the regulation in Indonesia constitution law number 26 of 2007 concerning on spatial planning, green open space is environmentally components which means as a landscape, hardscape, parks or recreation space in the urban area. Green open space that will be studied is the public open green space with major ecological function especially as a pollution reduction area, social urban areas as space to interact with others. The case studies in this research was conducted in Jakarta with all the complex urban problems, one of them is the lack of availability of public green open space. Jakarta population density reaching a peak at 15.366.87 person/km^2 and the mainstream of residential area and buildings also must be balanced with public green open space. Size of green open space in Jakarta has reached 66,233 hectares of which only reached 10% of the 30% required by law. This means that Jakarta still needs about 20% of public green open space. This research aims to identify suitable areas for public green open space built with a geographical perspective. Overlay techniques and spatial analysis in GIS as a tools in this research. The analysis revealed the identification of land suitability area reserved for the availability of green open space by classifying region into classes; not suitable, quite suitable, and very suitable. The development of public green space can generally be done on unused or empty land by using it as playgrounds, soccer field, and public recreation areas. In a larger space to built a city forest, public recreation areas, or public cemeteries. Since Jakarta is a coastal city with 13 rivers which pass through it, the development of public green space can also be done on the coastal border and the river, by proper management.

Key words: Green open space, Jakarta, land suitability analysis, overlay and spatial analysis.

URBAN MORPHOLOGY AND ABANDONMENT IN HISTORICAL CITIES: ARE THEY RELATED?

ID No: 130

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ABSTRACT

Historic cities are in motion in terms of abandonment especially in the developing countries. How people use the space changes in time due to the changing needs or everyday practices. If the current spatial structure does not cover the household needs, abandonment becomes an option, and abandonment is a serious thread in historical cities. In the absence of inhabitants, historic cities cannot be sustained or protected. Besides social and economic factors, abandonment may be related with morphological factors. The aim of this study is to answer the question whether urban morphology and abandonment are related in historical cities or in historical parts of the cities. A mid-size city in western Turkey, Bayindir, is selected as the study area. Bayındir's historical city centre faces the threat of abandonment. A survey of the current situation reveals that the abandonment rate is approximately 35%.

Typology analysis is a powerful tool for analyzing urban morphology. It can be used for classifying urban elements including buildings, plots, and urban blocks regarding their physical characteristics. Typology analysis is applied at the plot level using a geographic information system (GIS), and the plots are classified and grouped regarding physical characteristics including the placement of buildings, size, and width/length ratio. The results from the ANOVA tests indicate that the abandonment rates for the groups differ, and these results are statistically significant. These results show that historic preservation should consider urban morphology in policy making regarding historical cities and historical parts of the cities.

Key words: Abandonment, typology analysis, GIS

DESIGNING A GEO-DATABASE MODEL FOR URBAN REGENERATION PROCESS IN TURKEY

ID No: 135

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ABSTRACT

The word regeneration is understood as reforming something spiritually, raising it morally, giving new strength or life to something, restoring lost qualities to something and finally growing again. A regenerated building, a regenerated part of a town, a regenerated city or regenerated society can be assumed as having the above-mentioned aims. In Turkey, The Law of Transformation of Areas under Risk of Disaster (Law No. 6306) entered into force on May 16, 2012 due to the need of legal regulation in order to reconstruction of buildings that pose a zoning risk in particular before the realization of any disaster risk. In every zoning planning application, all data or document relevant to location, ownership and obligation should be transferred and associated on proper geo-database environment. As a result; important operations like stint, follow-up and supervision of the information system based regeneration process can enforce more effective, rapid and economic way. And so, evaluating and managing the necessary data using geo-information systems, designed and modelled for the urban regeneration processes has a priority before implementing the projects. In this paper, the need for collecting, processing and reclamation of spatial data within the geographical information context for sustainable urban regeneration is evaluated and modelled depending upon the professions that has a critical role in regulation and implementation process.

Key words: Urban Regeneration, Spatial Data, GIS

SPATIAL PLANNING OF HEALTH CENTERS IN THE CENTER TOWN OF AFYONKARAHISAR PROVINCE, TURKEY

ID No: 281

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ABSTRACT

Facility location-allocation analyses evaluate the efficiency of service locations based on the spatial distribution of residential population. Previous research has shown the importance of locating Health Centers within a reasonable distance from residential homes. The aim of this study is to evaluate the locations of 29 current Health Centers in the center town of Afyonkarahisar province and then suggest alternative spatial locations for the Health Centers, with an objective of improving the spatial distribution of Health Centers with the spatial distribution of residential population. Binary dasymetric approach was used to generate spatial distribution of residential population for the center town of Afyonkarahisar city because small area population estimates are not available. The spatial distribution of residential population together with current locations of health centers and roads data were used as inputs to a location-allocation analysis. The suitability of optimal locations of the Health Centers was assessed using the mean distance between demand and the nearest selected new locations. The analysis classified Health Centers based on demand weighted distance in order to allocate residential population to each Health Centre. This suggests its catchment and indicates the likely geographical coverage for each location. Preliminary results show fewer numbers of Health Centers to be located would provide almost the same coverage as the 29 current locations. The study showed that fewer Health Centers sited in different locations than the current ones could satisfy the spatial distribution of the residential population. The results suggest that such location-allocation methods can be used to support and inform decision making and spatial planning.

Key words: Health facility location-allocation, Spatial planning, Binary dasymetric mapping, Small-area population estimates

EXAMINING THE FACTORS RESPONSIBLE FOR THE VARIATION IN ACCESSIBILITY TO HEALTHCARE FACILITIES IN TAMALE, GHANA

ID No: 340

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ABSTRACT

One of the current issues of discussions in recent times is on rapid population growth in the coming years and its accompanied consequence that is expected to take place in urban cities of developing counties and not in rural communities. Rapid population growth often occurs with its accompanied consequences rendering parts of cities not conducive for a living. To curb this accompanied consequence of population growth, analysts came out with a good number of critical socio-economic issues that needs to be addressed ahead of the expected growth. These include attainable sanitation measures, adequate healthcare facilities and schools, different sources of income, sufficient open space for recreations etc. Among these critical socio-economic issues, is adequate and accessible healthcare facility, which many suggest should be given the greatest attention, for health is so important that it is sometimes equated to wealth of the people. Literature reviewed portrays that most researchers in measuring accessibility to healthcare facilities, concentrated on socio-economic factors of the inhabitants and geographical distance factors without much assessment of the spatial structure of the city. This necessitated the research that is to examine the factors responsible for the variations to healthcare facilities in an urban city of Tamale in Ghana, using ArcMap online data and data from Tamale Municipal Planning Unit and Tamale Health Directorate. The healthcare facilities are categorized as government and private and according to hierarchy. The data is analyzed using methods of spatial analysis such as (1) Voronoi diagrams to illustrate the catchment area of each healthcare facilities;(2) Network analyst to estimate the service areas of government and private healthcare facilities; and (3) Graph-theory-based centrality indices to estimate levels of accessibility to each of the government and private healthcare facilities.

The results reveal that the spatial distributions of healthcare facilities do not meet the needs of the population distribution. Also, there are major differences in accessibility levels of spatial distributions of public and private healthcare facilities. Healthcare facilities should be located at central parts of the city where there exist concentration of populations to have access to these facilities.

Key words: Accessibility, health care facilities, population, Tamale

GIS ANALYSIS FOR URBAN SUSTAINABILITY IN NEIGHBORHOOD SCALE

ID No: 318

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ABSTRACT

Achieving the sustainability of urban areas is one of the emerging topics in the field of urban planning and the other built environment related professions. There are many assessment systems like LEED-ND and BREEAM Communities that evaluates the neighborhoods sustainability by using several methodologies. Besides, geographical information system applications are growing fast also in urban analysis. Especially, network analysis and 3d analysis capability of GIS is providing useful contributions for assessing urban sustainability.

The scope of this study is to assess the components of urban sustainability by using GIS applications and present an index value for the current or planned situation of a neighborhood of an urban area. As materials of the study, road network and elements, buildings, land use, topography and base maps are collected from Open Street Map and Odunpazarı Municipality of Eskişehir.

At first the urban data is classified and converted to related format. Then, the 3D environment and DEM data is created for physical environment analysis. In this study, sky view factor analysis, analysis of orientation of buildings and blocks, network analysis for accessibility, etc. are used for the assessment of urban sustainability in a neighborhood of Eskişehir. The findings are presented as the success rate of urban sustainability components individually and as a compound index value.

Key words: Urban Sustainability, Sky View Factor, Network Analysis

EVALUATION THE EFFICIENCY OF KRIGING, COKRIGING AND IDW INTERPOLATION METHODS FOR NOISE MAPPING: A CASE STUDY AT SISLI/ISTANBUL

ID No: 325

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ABSTRACT

Rapid urbanization and construction activities resulting from increasing population density lead to an increase of noise in urban areas. Moreover, the increment in motor vehicle use escalates the noise in urban areas. Measuring and mapping the noise level in cities accurately is needed to take precautions and develop effective urban planning strategies for noise pollution which affects the quality of urban life negatively and cause physical and psychological damages on human health. Through advancing technology, it is now possible to detect the noise level at a point, even using very simple smartphone applications. In order to make accurate noise maps, there are two requirements: Homogeneous distribution of measurement points within the research area, and the efficiency of the chosen method to generate the spatial distribution of the point data collected. This paper aims to evaluate the efficiency of Kriging, Cokriging and Inverse Distance Weighting (IDW) interpolation methods for noise mapping in ArcGIS, and it targets to compare the results of three techniques for accuracy and roughness. The first step of the research was measuring noise levels at predetermined points on road networks within the research area by using "Noise Meter" application of Windows Smart Phone. In the second step, the collected point data was transferred to ArcGIS and noise maps were created by using the IDW, Kriging and Cokriging interpolation methods via Geostatistical Analyst. Four different power values were used in the IDW method and Exponential variogram model was used in Ordinary Kriging method. In the Cokriging method, the road widths were included as a secondary dataset and mapped by using the Exponential model with trends and trend removing process. In conclusion, the results were compared through cross-validation, and the methods were evaluated for efficiency, accuracy and roughness.

Key words: Noise mapping, Kriging, Cokriging, IDW, GIS, Smart phone application, Istanbul.

ASSESSING THE ACCURACY OF OPENSTREETMAP BUILDING DATASET IN ISTANBUL, TURKEY

ID No: 122

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ABSTRACT

Geographically referenced vector data corresponding spatial databases are usually obtained by using land surveying or remote sensing methods. Undoubtedly, with the widespread using of internet, the technologies that are developed together further increase the production diversity of the geographical data. Web 2.0 have facilitated the sharing, distribution and distribution of geographical information by volunteers over location-based services. Volunteered Geographical Information (VGI) has taken part in the literature as the general name of the data resulting from this production. Open Street Map (OSM) project, founded in 2004, has rapidly grown and has become very big VGI data source. The aim of this study is to evaluate the location accuracy of OSM building footprints which is collected and shared by volunteers in Istanbul city in Turkey. Considering the distribution and intensity of OSM data in the city, District of Cihangir is selected as the study area. The high resolution building footprints as used in reference to comparison were obtained from a topographic map at scale 1:1000. In the accuracy analysis, only the geometrical properties of the buildings are examined, because there is not enough semantic information on the vectorized buildings in OSM database. The analysis of geometric properties was carried out using various criteria on buildings such as total number, total area, location of centroid etc. These criteria provide information to users about the accuracy of OSM building footprints. In the study area, a total of 473 building features in the reference map are associated with the OSM dataset. Among them, 351 building that correspond to both data are easily identified. The percentage of overlapping area is between building polygon features obtained from topographic map and OSM dataset is 78.8%. The centroid of 89.4% of the reference buildings is located anywhere within the polygon features in the OSM dataset. 27 buildings from the reference map have not match any OSM buildings. As a result, the OSM features are created by the volunteers are not compatible with the details of the building footprints in topographic maps at the scale 1: 1000. On the other hand, the assessments show that the OSM dataset may be suitable for the utilization at a lower level of detail mapping study.

Key words: VGI, Spatial Data Quality, Specifications, Topographic Map, LBS

AUTOMATIC MODELING OF DWELLING UNITS FROM 2D BASEMAP FOR 3D SPATIAL DATA MANAGEMENT

ID No: 123

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ABSTRACT

3D city models are digital representation of cities and nowadays, beyond visualization they are used for 3D spatial data management. There are many large scale 3d city models for many cities such as New York, Berlin etc. and these 3D spatial datas are publicly available.

In Turkey, generally 3D spatial data doesn't exist. One option is to generate 3D models from 2D base maps to obtain 3D data. Generation of 3D data is based on extrusion of building footprints from 2D basemap according to buildings heights. After that process, for each building footprint, block models which represent actual buildings are obtained. As a result of generation process in such a way, every building are stored as a single polyhedral geometry record.

To represent sub-building objects such as dwelling units are impossible in this block model. Many applications require sub-building based query and analysis particularly in real estate sector. For instance, selection of suitable dwelling units for rent in a large 3d city model.

In this work, a Python application that models all dwelling units in a city has been developed. The application models all sub-building units in the city model in only one process and full automatic way. "Multipatch" geometry type has been used to represent 3D data and "Esri shapefile" which is a widely used open GIS data format, has been used to store 3D data. Thanks to the application, dwelling units can be stored, queried, analyzed and visualized individually.

This work concludes that dwelling units can be modelled 3d automatically by using 2D basemap that can be used widely and gathered easily, also 3D spatial data can be managed in sub-building level easily and effectively.

Key words: Dwelling Units, 3D Modeling, Multipatch, 3D Spatial Data Management

RECOGNISING BUILDING PATTERNS IN TOPOGRAPHIC MAPS WITH HDBSCAN CLUSTERING ALGORITHM

ID No: 142

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ABSTRACT

In topographic maps, meaningful groups of buildings form various patterns. Those buildings are generalised in a way as to retain significant pattern characteristics during contextual generalisation. One of the main problems in this process is that those patterns are not available in datasets. For this reason, they need to be recognised with appropriate approaches. In this context, clustering methods in data mining are used quite commonly. So, this paper investigates the effectiveness of relatively new Hierarchical Density-Based Spatial Clustering of Applications with Noise (HDBSCAN) algorithm in the building pattern recognition based on several geometric, structural and semantic characteristics of buildings such as location, nearest road distance, and convexity. HDBSCAN uses unsupervised learning to find clusters of a dataset, which extends DBSCAN by converting it into a hierarchical clustering algorithm. The algorithm first transforms the data space by density and builds the minimum spanning tree (MST) of the distance weighted graph. Then it constructs a cluster hierarchy of connected buildings and condenses that. At the end, it extracts the final clusters from the condensed tree. In experimental tests, urban blocks were created by means of road networks as a topological constraint for buildings. Preliminary results indicate that HDBSCAN is sufficiently effective for discovering collinear and curvilinear building patterns, especially in well-structured urban blocks according to Gestalt factors. In case of circular, u-shaped and unstructured building patterns, results are not efficiently successful. Future works will possibly focus on applying clustering algorithm in successive manner based on aforementioned main building characteristics.

Key words: Building Patterns, Clustering, HDBSCAN, Generalisation, Topographic Maps

ESTABLISHING IRREGULAR BUILDINGS INVENTORY DATABASE OF ESKİSEHİR BUILDING STOCK USİNG GEOGRAPHIC INFORMATION SYSTEMS

ID No: 297

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ABSTRACT

There are some common problems of collapsed or heavily damaged buildings in past earthquakes, most of these problems are defined as irregularities and structural defects in many design codes. The presence of irregularities and structural defects affect the seismic performance of the building negatively. Some of these irregularities and structural defects are soft story and weak story irregularities, corner column problem, strong beam-weak column problem and frame discontinuity problem. Both engineers and architects should avoid these problems in their building designs, but in the existing building stock of Turkey and many developing countries, there are vast amount of buildings have irregularities and structural defects. In order to establish the effects of these problems to seismic performance of existing buildings, it is very important to investigate the buildings individually in terms of these problems. In this study, 310 existing reinforced concrete buildings were investigated in terms of irregularities and structural defects in Eskisehir, Turkey. An irregular buildings inventory database has been established by using geographic information systems (GIS). According to analysis conducted in the GIS environment, 30% of the buildings have soft and weak story irregularities, 9% of the buildings have strong beam-weak column problem, 6% of the buildings have corner column problem and the 41% of the buildings have frame discontinuity problem. As a conclusion, GIS applications can be very useful for governments and local authorities to make better decisions in managing existing building stock. Authors suggest that, a GIS-based database should be created for existing building stock in earthquake prone areas and every new building should be investigated in terms of irregularities and structural defects before having building license and it should be added to the GIS database.

Key words: Buildings, Reinforced Concrete, Irregularities, Structural Defects, GIS

APPLICATION OF DIRECTNESS-BASED ACCESSIBILITY MEASUREMENT APPROACH TO URBAN PLANNING BY USİNG GIS, A CASE STUDY OF SELCUK UNIVERSITY CAMPUS, KONYA

ID No: 120

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ABSTRACT

Directness (or circuity) concept is defined by the ratio of the Euclidian based distances to the network based distances in the literature. Directness based measures are widely used by many geography and geosciences related disciplines and directly related to accessibility concept.

In this study, a GIS based analysis has been carried out to understand how directness measures can be used as a decision support system in urban/transportation planning fields. Usage of directness measures in urban/transportation planning process could directly help decision makers who are supposed to deal with accessibility, location/allocation, and origin/destination related issues a) to understand how different connectivity related planning decisions make changes on accessibility of locations b) to understand the effects of different urban planning and transportation planning related scenarios on accessibility c) to compare accessibility of different planning alternatives in a quantitative manner.

Directness measurement and evaluation requires geographical information systems (GIS) related technologies for its complexity. In the proposed approach, at first origin and destination locations are defined in GIS environment. In this step all attraction points in the campus (facility locations) are digitized including faculties, library, sport and recreational centers, shopping centers, lodgings, guest houses and public transport stations. Secondly directness measures are calculated between all of the defined origin and destination locations in the campus by using the spatial and network analysis capabilities of GIS. Afterwards problematic areas in terms of accessibility are determined by the help of the calculated directness measures and finally strategic decision making processes were performed to improve physical accessibility in the problem areas of the campus.

The findings of the research demonstrates that directness measures can be effectively used in urban planning and transportation planning area by the help of the GIS technologies and could successfully guide decision makers on how directness measures can be used as a decision support system in urban/transportation planning related fields.

Key words: Accessibility, Directness, Circuity, Location, Allocation, Origin, Destination, Campus of Selcuk University

DETERMINATION OF PEDESTRIAN ACCESSIBILITY OF SOME TECHNICAL INFRASTRUCTURES IN ZONING PLANS

ID No: 137

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ABSTRACT

Zoning plans are made for increase life quality and answer needs of humans who will lived in planning areas. In the zoning plans, new living areas, new routes, new hospitals, new schools and new religious facilities are planning. When the development plans are being prepared it take into consideration how many people will live here and what will they need. Technical and social infrastructures and location of them is important for the answer needs of humans. For the creating healthy life conditions and high quality living areas, roads, hospitals, schools, shopping areas, green fields, transportation stops, place of worship etc. must be accessible for the all types of pedestrians. In this study pedestrian accessibility of social and technical infrastructures determine with network analysis on GIS. The study area are about 20 km^2 and includes Denizevleri, Esenevler, K.Kolpınar, Balaç, Mevlana, Mimarsinan, Cumhuriyet, İstiklal, Yenimahalle, Çobanlı, Körfez communities in Atakum District. Main road axes are selected as the boundary for pedestrian availability in the study area. Pedestrian accessibility in the specific time for tramway stops, community clinics, schools, religious facilities, parks, and carparks determined with service area analysis and coverage areas of the selected features were defined in the study area.

Key words: Development Plan, Network Analysis, Pedestrian Accessibility.

DEVELOPMENT OF A NEW SILHOUETTE ANALYSIS TOOL FOR URBAN PLANNING APPLICATIONS

ID No: 131

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ABSTRACT

3D city models are digital models of urban areas that represent terrain surfaces, sites, buildings, vegetation, infrastructure and landscape elements as well as related objects belonging to urban areas. 3D city models support presentation, exploration, analysis, and management tasks in a large number of different applications such as urban planning, disaster management, facility management, logistics, security, telecommunication, location-based services, real estate portals as well as urban-related entertainment and education products and 3D spatial analysis. Silhouette analysis, one of 3D spatial analysis, is important for urban and landscape planning. Silhouette analysis is especially used to protect the silhouette of historical buildings in cities. ArcGIS is one of the most popular software in GIS market. It has "3D Analyst Tools" with functions such as construct sight lines, intervisibility, line of sight, skyline, shadow, viewshed and visibility analysis. However, 3D Analyst Tools does not have a function that will create a silhouette view of buildings. In this study, a silhouette analysis tool is developed using python programming language for ArcGIS software. The silhouette analysis tool creates silhouette view of the buildings in 3D city model. This newly developed silhouette analysis tool calculates the maximum height of new buildings and analyses whether the new buildings will distort the silhouette of the historical buildings.

Key words: 3D GIS, 3D City Models, Silhouette Analysis, ArcGIS, Python.

AN OVERVIEW OF MOBILE LIDAR SYSTEMS AND THEIR USABILITY IN CORRIDOR MAPPING STUDIES

ID No: 200

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ABSTRACT

Mobile laser scanning systems is currently one of the most popular topic in the LIDAR industry and evolving measuring technology. These systems can be integrated on mobile platforms to provide highly accurate 3D point data for different application areas. Mobile LIDAR systems consist of many different subsystems such as IMU, GNSS, laser scanner, camera and control units. In this study, detailed information on mobile laser scanning technologies and detailed information about positioning, scanning and imaging devices used in these systems and how to integrate these devices into Mobile LIDAR system. Process steps from the raw data obtained by the system to the creation of point cloud data have been explained. In addition, the advantages and disadvantages of these systems compared to the airbonre LIDAR , terrestrial LIDAR, photogrammetry and classical measurement methods are explained. In this study, it is aimed to test the possibilities of using Mobile LIDAR systems for corridor mapping, inventory mapping and 3D city modelling applications. For this purpose, Mobile LIDAR data collected from urban area was used. As a result of this work road surface geometry, including the road shoulder, and all objects on, above or near that surface, like road sides, road markings, street lights, traffic lights, traffic signs, crash barriers, buildings and vegetation were extracted.

Key words: Mobile LIDAR, Corridor Mapping, 3D City Modelling

A NEW METHOD FOR EXTRACTING URBAN ROADS FROM LIDAR DERIVED DATA

ID No: 203

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ABSTRACT

Although remotely sensed data, aerial imagery, satellite imagery, high-resolution airborne **S**ynthetic **A**perture **R**adar (SAR) data etc., has been used in many different ways to detect roads, **Li**ght **D**etection **A**nd **R**anging (LiDAR) data, a kind of laser scanner sensing system using to collect high precise spatial information, has become an increasingly effective for extracting features in the recent years. This data provides both elevation and intensity information of terrain.

Using only height or intensity information for detecting roads from LiDAR data is also very difficult. Therefore, height and intensity information are used together to get accurate results for identifying roads. For example, having different intensity thresholds and height differences, a bridge, at the intersection of the road and the creek, cannot be detected by classifying binary image.

In this study, a new algorithm is developed to extract urban roads using LiDAR derived intensity data and height information. Having different road surfaces such as asphalt, concrete, composite, etc. in the study area, Denton, Texas in USA, the range of intensity threshold is kept very high. Although average intensity threshold of the asphalt surface road is about 17%, intensity threshold of the algorithm is set between 4% and 45%. So that, it is aimed to detect all kinds of road surfaces via developed algorithm written in MATLAB software. After getting results, detected roads were compared to road truth model in terms of completeness, correctness and quality.

Key words: Road Detection, LiDAR, Remote Sensin

GIS BASED 3D MODELLING OF CITY OBJECTS WITH PROCEDURAL MODELLING

ID No: 291

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ABSTRACT

Developments in 3D GIS era has been evolving in recent years. 3D models of cities are well in the way of visual effects, running performance on PC and some limited GIS functions. Some sectors create higher quality 3D models but not having GIS capabilities. Many people working on 3D era don't have awareness about GIS functionalities. Other side 3D modelling of city objects in the way of manual methods is too labor intensive and takes much time, this brings an obstacle for fast and updated 3D city models. In this study procedural (rule based) modelling was used for modelling city objects. Computer Generated Architecture (CGA) was the chosen method. Study area was some districts of Trabzon city in Turkey. Related geodatabase was derived from local authorities then 3D models were built on this database after refinement operations on data. All the 3D modelling operations were done automatically with related parameters. Attribute files of these 3D models were linked, so 3D models have included comprehensive GIS datasets. Finally, all the models were moved to cloud with their attribute files. 3D GIS analysis and queries were tested on these models. Results stated that chosen methods are hope inspiring behind the purpose of 3D city models in the new ways.

Key words: GIS, 3D modelling, 3D analysis, Cloud GIS, Procedural Modelling

SPATIAL ANALYSIS OF MOSQUE AREAS IN TURKEY WITH THE HELP OF GIS APPLICATIONS: A CASE STUDY OF ERZİNCAN

ID No: 144

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ABSTRACT

Within the framework of planning literature, process and studies in our country, there is no accepted regulation in laws or regulations for location and spatial positioning of mosque areas. Capacity, demand and accessibility are not taken into account when selecting these areas in cities, and there is generally a building based on activities and volunteerism. In a study conducted in 2016, the Turkish Directorate of Religious Affairs set a number of standards for the selection of mosque space and the features which it should possess. These standards are aimed to determine user capacity, parcel size, mosque type, population demand, transportation-access relations, parking area and environmental characteristics for mosque areas. In the scope of the study, comparative analysis is made in the context of spatial criteria and determined standards related to the current location of the mosque areas in the central area of Erzincan. On the one hand, the evaluation of the appropriateness of location selection as a result of the planning process is supported in terms of social criteria. These social criteria include suitability for the use of disadvantages such as older, disabled, young and pregnant women; population domain and property assessments. At the end of the study, it will be revealed whether the selection of the mosque areas from the social and spatial point of view is appropriate by means of multi criteria decision making and GIS applications. In the first part, the mosque areas will be mentioned in terms of planning and problematic. In the second part, social and spatial criteria will be determined and analysis will be done with the help of GIS and the appropriateness of the site selection decisions will be tested according to the standards. Finally, the applicability of this method to other cities in our country will be discussed in urban and regional planning context.

Key words: Geographic information systems, Multi-Criteria Decision Making, Spatial Analysis

GIS AND MULTICRITERIA DECISION ANALYSIS FOR SELECTION OF LANDFILL SITE IN EDIRNE PROVINCE

ID No: 148

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ABSTRACT

Edirne, as a former capital of the Ottoman Empire, has a rich history in the Border Region. Therefore it has an international importance of cultural inheritance that attracts sightseers by over 500 monuments, its tradition and historical sites including mosques, bridges etc. There are also 185 archaeological sites in the province, as well as protected areas like the Gala Lake, the Danişment resort and the Wild Life Protection Area of Mounth Koru. Gala Lake National Park, a habitat for various species of animal and plant, has three wetlands including "Maritza Delta" class 1 wetlands and "Saros Bay" class 2 wetlands and "Ergene Basin". The province is also very fertile in terms of underground and surface water resources. Maritza, Tunca and Ergene rivers are the major rivers of the province. In this area, soil *capability* is predominantly *class 1*, 2, 3 and therefore considered as prime agricultural land. The province is also wealthy in terms of fauna and flora.

On the other hand, the region has an increase of solid wastes due to the rapid population growth which damages the sensitive ecosystem of the province by uncontrolled waste disposal. In addition, the city is strategically important as it acts as an international transition zone. In this context, this paper aims to determine landfill site selection by multi-criteria decision analysis building on environmentally sensitive areas approach in Edirne. Regional factors are identified which evaluate the risk of contamination for many environmental components such as: the natural values, the sensitive ecosystems and the special habitats. At last alternative landfill sites were proposed by applying GIS-based analysis.

Key words: GIS, Selecting Landfill Sites, Geospatial Analysis, Multi-Criteria Evaluation

MAPPING OF SOIL ENGINEERING PROPERTIES IN ESKİŞEHİR URBAN AREA

ID No: 300

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ABSTRACT

It is known that the local geological ground structure changes the character of seismic motion. At the time of an earthquake, the amplitude of the seismic wave advancing in the alluvium is growing. Eskisehir city center settlement is built on a large scale plain and alluvial ground. It is possible that structures built on these floors may be damaged. For this reason, it is very important to know the soil engineering properties and to map these properties. In addition, these maps will provide great convenience to decision makers when there is an existing settlement and in new settlement areas. In the study, ground engineering properties (dynamic and elastic parameters) were mapped using GIS techniques using SPT-N values obtained from wells in Eskisehir city center and seismic wave velocities measured by seismic methods. These studies using GIS provide superiority over other soil studies. The ability to store each data in a single database and to query for a desired area in the study area are some of the advantages of soil studies using GIS.

Key words: Soil Engineering Properties, Geographic Information Systems, Eskisehir

BIOGEOGRAPHY

SPATIAL DISTRIBUTION OF DEMERSAL FISH SPECIES IN SAROS BAY, THE NORTHEASTERN AEGEAN SEA: A GIS APPROACH

ID No: 36

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ABSTRACT

Fisheries data (dependent-catch and effort and independent-survey data) have a strong spatial component. These data are also multi-dimensional, making them difficult to visualize and analyze, prompting the use of spatial analysis to facilitate an understanding of their relationships. The most common type of data used in Geographical Information System (GIS) for fisheries management is catch and effort data that can used to illustrate a point representation of fishing activity and the changes in fishing pressure at certain areas. This same information can be further analyzed for spatial and temporal patterns by creating density surfaces where the catch per unit effort (CPUE) can be calculated by area. Using a GIS this paper sought to analyze the relative abundance of commercial demersal fishes based on CPUE and compare it with bathymetry in the Saros Bay, the Northeastern Aegean Sea. The survey data were collected by using bottom trawl at depths of 0-50m, 50-100m, 100-200m and 200-500m between 2006 and 2008. ArcGIS was used as an auxiliary to visualize spatial and bathymetric trends that could not be seen from the statistical analysis. Species modelled were blue whiting (*Micromesistius poutassou*), red mullet (*Mullus barbatus barbatus*), european hake (*Merluccius merluccius*), greater forkbeard (*Phycis blennoides*), black-bellied angler (*Lophius budegassa*), piper gurnard (*Trigla lyra*), Common sole (*Solea solea*), Atlantic spotted flounder (*Citharus linguatula*), common pandora (*Pagellus erythrinus*), axillary seabream (*Pagellus acarne*), Morocco dentex (*Dentex maroccanus*), Red porgy (*Pagrus pagrus*), fourspotted megrim (*Lepidorhombus boscii*), John dory (*Zeus faber*), striped red mullet (*Mullus surmuletus*) and tub gurnard (*Chelidonichthys lucerna*) and thornback ray (*Raja clavata*). Spatial maps indicated that the relative abundance (CPUE) of the fishes is not uniformly distributed in space. From the spatial grids, it appeared that abundance of five species (blue whiting, european hake greater forkbeard, black-bellied angler, fourspotted megrim) predominantly in deeper waters. GIS is found to be useful in visualizing spatial distribution and abundance pattern of these economically important fish species.

Key words: Saros Bay, Fish distribution, CPUE, Geographical information system

ASSESSMENT OF LAND USE AND SEA TURTLE NEST DISTRIBUTION BY GIS IN SAMANDAĞ BEACHES

ID No: 38

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ABSTRACT

Samandağ beach is not only important for tourism and agricultural activities, but also have ecologically importance particularly for green turtle nesting area. To date, the land use of Samandağ was taken into consideration by tourism and agriculture and also many academic studies focused on the how the beach is important for sea turtle nesting habitat. In general, tourism and agriculture are two main human activities is charged with negatively affect the native habitat. The human centered land use is general characteristics of developing country and management plans is compiled these scoop. However, the land use may be assessed by ecologic data such as sea turtle nesting data and with a holistic approach ecosystems can be used in sustainable way by a logical, useful and strong management plan. There is a big gap on the studies about combined the land use and ecological importance of a particular beach which is the main nesting habitat of an endangered species. In this study the sea turtle nest distribution data collected in 2016 in Samandağ Beach were integrated with land use data obtained CORINE system using ArcGis software. The habitat use of sea turtle and human were assessed together using GIS in order to understand the impact of anthropogenic pressure on green turtle nesting habitat.

Key words: Green turtle, Land use, ArcGis, Coastal management

BIODIVERSITY MAPPING USING LANDSCAPE COMPLEXITY AND BIRD SPECIES AS INDICATORS BY REMOTE SENSING AND GIS

ID No: 40

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ABSTRACT

Biodiversity of a region is directly depends on biotope variation and environmental comfort for the different life forms. Biotope variation is a result of landscape complexity and this variation provides suitable life conditions for many various living organisms. In this research, biodiversity of the Bendimahi Basin that is located on the Northeast of Van Lake, was predicted using landscape complexity and bird species by a simple biodiversity index in GIS environment. Research was designed in three stages as; a) Land use cover classification to define habitats in 30m spatial resolution, b) habitat definition of the birds using interactive open source spatial and literature based maps to weight the habitat priorities and, b) fuzzyfication and weighting the all habitats in 300m spatial resolution. A biodiversity mapping model was developed using areal diversity of the biotope in a grid (%), priority degree of the biotope (defined from birds) and biotope variation in a grid (biotope count). Biodiversity map of the region was produced between 0 and 1 values in 300m spatial resolution. Mapping results showed that particularly wetland areas and diverse natural landscapes were richer than other places on biodiversity. Pure alpine areas was of the lowest biodiversity degree in the region.

We authors would like to thanks to the TUBİTAK project no: 214O392 for the financial and technical supports.

Key words: Landscape complexity, Biodiversity, Model development, Biotope variability, GIS.

THE IMPACT OF CLIMATE CHANGE AND HUMAN FACTORS ON VEGETATION COVER IN WEST KORDOFAN STATE BY USING NDVI ACCORDING TO THE GENERAL TREND

ID No: 49

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ABSTRACT

The West Kordofan State is considered as the one of the larger States in Sudan, its climatic regions vary and characterize differently from south to north. The environments are valid for Biological Diversity, despite the spread of the desert in the north, the poor savannah in the centre and the rich savannah in the south. The position of this state in the hot tropical region leads the climate to be classified as hot and dry during the course of the year, mainly in summer, with slight reduction in temperature values in winter. The annual rainfall ranging between 400 mm in the north, and more than 800 mm in the adjacent to the South Sudan State. The length of dry season leads to the disintegration of sandy soils, since they cover vast areas in the north and clay soils in the southern parts of the state.

Climate elements have the ability to control the environmental characteristics of biodiversity of vegetation cover. Drought, floods and dust storms are manifested in the West Kordofan State, due to climate change, which is a defect in natural climate conditions, such as, temperature; wind patterns and precipitation, as a consequence of critical deterioration in the natural biodiversity patterns.

This study attempts to investigate the impact of climate change and human factors on vegetation cover in the West Kordofan State by applying Normalized Difference Vegetation Index (NDVI) time series obtained by Terra Moderate Resolution Imaging Spectro-radiometer (MODIS) during the rainy season from April – November from 2000 to 2015, in an area of resolution 250*250 m. as well as rainfall data are collected from the Tropical Rainfall Measuring Mission (TRMM), for the same period, to check the accuracy of The NDVI general trend.

Key words: Climate change, Vegetation cover, Human factors, West Kordofan State.

DETERMINATION OF SPATIAL BIOLOGICAL DATA IN DETERMINING PROTECTION PRIORITIES:BOZCAADA SAMPLE

ID No: 124

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ABSTRACT

It is becoming more important to ensure for sustainable usage of decision of Systematic Protection Planning. It can be described briefly as "the process of establishing a conservation management whose protection objectives are represented in a permanent (long-term) manner and whose biological diversity clearly defined is not limited solely to protected areas ". In this context, Detection of Protection Gaps (GAP) is one of common method for Protection Systematic Planning. Conservation gaps are a step in the identification of biodiversity species that are not protected yet on an area.

In this research, the spatial identification of the biological data (species distributions and ecological life unions) that should be done as a prior in order to detect of gaps in Bozcaada identification of biologic data Bozcaada was carried out through GIS. For this purpose, in the first stage of the research, an ecological community map (biotope map) was produced by utilizing the satellite image of 2012. Validation studies were carried out in the field of classified areas. In the second stage, species distributions were determined to be used in determining protection priorities. Within this scope, land studies and literature researches were made and digital plant maps were produced by determining Important Plant Areas (IPA) through GIS. While IPA spatially determined, the criteria of "Uniqueness" and "Sensitivity" are considered as thresholds values. In the sensitivity criterion; the species that are on the IUCN red list are considered such as the critically endangered species (CR), the endangered species (EN) and the vulnerable species (VU). Also, in the uniqueness criterion, there are criteria such as narrowly spread plants, plants with broad but clustered distribution, localization with global prescription, etc. were evaluated. Within the scope of biologicals, the data about biotope, plant species, and wild life were taken into consideration in order to determine Important Bird Areas (IBA), Important Natural Areas (INA), etc.

As a result of the research, a digitally thematic biodiversity map has been produced in Bozcaada that going to be used in protected areas and other planning decisions.

Key words: Systematic Protection Planning, Bozcaada, Protection Gap

ANALYSIS HOLDRIDGE LIFE ZONES VIA GIS

ID No: 307

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ABSTRACT

The aim this study is analysis Turkey's vegetation types based on the Holdridge life zones (HLZ) method by Geographic Information System (GIS). In the HLZ approach, the related vegatation types are determined by long-term climate conditions. That'is, the life zones are determined by using the average precipitation, bio-temperature and potential evaporatranspiration ratio. Monthly resolution data values used in the study were obtained from the 242 stations of theTurkish State Meteorological Service from 1970 to 2016. The missing values were completed by kriging method developed a Fortran 95 source code. The results were mapped by Archinfo, a GIS software. According to the results, 12 HLZ classeses were obtained, among which the most commons are "Cool Temperate Steppe, Warm Temperate Dry Forest, Cool Temperate Moist Forest, Lower Montane Dry Forest and Montane Moist Forest". The "cool temperate steppe" life zone is seen in almost every region of the country; the "warm moist dry forest" life zone is mostly seen in the Aegean region of our country, Trakya division of Marmara region and in some parts of Southeast Anatolia. In addition, the "cool temperate rain forest" and the "cool temperate moist forest" life zone are mostly seen in the Black Sea coasts of the country. On the other hand, the "lower montane dry forest" and "lower montane moist forest" life zones are seen in the Mediterranean coasts. The northern and the Hakkari area of the country seem "montane moist forest" and "montane rainy forest". When all these results were examined in detail and compared with previous studies in the literature, it was seen that some of the habitats were shifting due to possible effects of climate change.

Key words: Climate; Classification; GIS; Holdridge; Turkey; Vegetation

GEOMATICS

COMPARING THE PERFORMANCE OF REVERSE GEOCODING SERVICES: GOOGLE AND BING MAPS

ID No: 72

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ABSTRACT

Nowadays, it is possible to achieve in detailed geographic information rapidly using mobile devices over the location based services (LBS). The point features on digital maps, which refer to points of interest (POI) for people, have an important role in LBS. A point of interest on a map is positioned with a coordinate pair, such as latitude and longitude values in geographic coordinate system. Addresses are one of the fundamental means by which people conceptualize location in the modern world. Local governments and public institutions around the world need address information in many fields of work in line with their requirements. In this context, the inverse geocoding process (i.e. reverse geocoding) is also needed in the extraction of textual information, such as a name or an address, from geographic coordinates.

The purpose of this study is to obtain the postal address from the coordinate pairs belonging to points determined from the map services and to examine the compatibility of the services with each other. Methodology is elaborated in two experimental testing regions in Turkey and the United States: Fatih district of Istanbul province and Miami Beach of Florida State. In the preprocessing step, the address data of accommodation places in these regions was collected by means of scraping software from the Booking.com web site. Some accommodation buildings in Fatih district and in Miami Beach were selected as reference POIs respectively and their geographic coordinates were obtained and verified employing the land surveying. In the second stage, the postal addresses are derived by means of programming codes developed on reverse geocoding from the Google and Bing Maps services. They are compared with the each other and the reference data using the Levenshtein distance utilized by internet search engines. The postal addresses obtained from the geographic coordinates in Fatih district are approximately 60% similar to reference data and each other. In Miami Beach, Google service produces better Levenshtein values, and both services present highly compatible results.

Key words: POI, Postal address, Reverse geocoding, Levenshtein distance.

PYTHON GIS APPLICATION AND SQL USAGE

ID No: 326

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ABSTRACT

Geographic Information Systems (GIS) is a system that provides a cooperative organization of spatial data and non-spatial data. Spatial and non-spatial data are stored in databases together. Getting help from a programming language is necessary to organize the data used in the GIS analysis easily and to overcome the transaction intensity. Python is an open source language, is easy to write and understand. It has comprehensive and extensive libraries. The use of the Python software language in GIS analysis and data management will enable faster and more efficient operation. In GIS applications it is possible to define task arrays with a script in python language. Geoprocessing tools can be imported Python scripts. In addition to running analyzes with Python scripts, database modules are called and the database can be edited with cursor. The cursor is a line area in databases. Together with the cursor, you can navigate through the tables in the relational databases to make changes and edits. Thanks to these features of the Python software language, making GIS analysis is fast and

Key words: GIS, Python scripts, SQL, Database management.

A WEB SERVICE IMPLEMENTATION SERVING USER-GENERATED GEOSPATIAL DATA AND WEB GIS ANALYSIS

ID No: 74

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ABSTRACT

Geospatial databases, data handling facilities and also data producer and consumer interactions are main components of geospatial data infrastructure. Locally produced geospatial data's being managed and served globally is based on the technical policies, standards, human resources, and technologies.

In our previous studies, we have proposed web based system architecture in order to create a geospatial data infrastructure that makes geodetic and geodynamic data manageable and analyzable on web. The designed architecture is based on multitier architecture that is compliant with INSPIRE, and includes data layer, service layer and application layer.

This study can be considered as presentation of the preliminary steps through realization of the proposed system architecture demonstrated in our previous work. We present the implementation steps for service layer components to store, to manage user-generated geospatial data and geodynamic data, and to perform GIS analysis on that data and to make the analysis results and data itself web accessible. Service layer follows Service Oriented Architecture (SOA) principles, and Representational State Transfer (REST) provides data transfer between client side and server side. Interoperability and continuity of the service layers depends on Open Geospatial Consortium (OGC) Standards such as Web Map Service (WMS), Web Feature Service (WFS), and Web Process Service (WPS).

Key words: GIS, Geospatial data as a service, OGC standards.

AN APPLICATION DEVELOPMENT FOR USE OF BOREHOLE DATA ON IOS BASED MOBILE DEVICES

ID No: 77

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ABSTRACT

A number of mobile-based applications has also increased with the widespread use of mobile devices. The mobile applications are being developed in many fields, including primarily cartography. The cloud-based data management system instead of a local data management system provides centralized storage, management and protection of the update. A database system used in this study is NoSQL as an alternative solution to the relational database system. The most important difference of the NoSQL database system is that data is stored in Javascript Object Notation (JSON) format rather than being stored in tables and columns. Firstly, both semantic and geometrical borehole data is prepared in order to be used in this study. An application that uses this data and can display it on the map has been developed to be compatible with iOS-based devices. The Swift, the new programming language, is used in the development process. Model View Controller (MVC) software architecture is chosen. Thanks to this architecture, the software code can be easily developed and tested by separating the code components that serve different purposes. A two-dimensional map library named Apple Company's Mapkit is used. In this application, the user can see the position on the map with the sensors and GPS receivers on the device. Consequently, in this application, both geometrical and semantic information can be effectively displayed even on small screen smart devices. In addition, the structure of the cloud database is tested for performance in a mobile application and the obtained results are at the expected level.

Key words: Borehole, Mobile application, Mobile database.

EVALUATING GRACE-DERIVED TERRESTRIAL WATER CHANGES IN TURKEY BASINS USING GLDAS LAND HYDROLOGY MODEL DATA

ID No: 51

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ABSTRACT

Monitoring Terrestrial Water Storage (TWS) changes contributes to predict climate change, model the water cycle at global scale as well as local scale, plan water management, forestall flooding, etc. The Gravity Recovery And Climate Experiment (GRACE) satellite mission, launched in March 2002, enables to estimate the global or regional changes in TWS accurately. Because, most of temporal gravity changes are indeed related to changes in hydrologic reservoirs. In this study, GRACE monthly gravity data from April 2002 to May 2016 are used to investigate the TWS changes in Turkey and its near region. The GRACE data for this study, considered in terms of Equivalent Water Thickness (EWT), are based on two different types of the most recent Release-05 solutions: 1. Spherical harmonic coefficients, 2. Mass concentration blocks (mascons) from the University of Texas - Center for Space Research (CSR) and the Jet Propulsion Laboratory (JPL). Generally speaking, TWS changes in the study region from the spherical harmonics agree with those of the mascons. The correlation coefficients of both solutions are 0.97 for CSR and JPL, separately. The results show that the mean trends of TWS changes are decreasing at 5.2 ± 1.2 mm/year, 3.8 ± 1.2 mm/year, 6.0 ±1.2 mm/year and 3.3 ± 1.2 mm/year from CSR spherical harmonic, CSR mascon, JPL spherical harmonic and JPL mascon solutions over the 2002–2016 period, respectively. And the velocities of TWS changes have been different on the spatial distribution, especially higher in the southeastern. Moreover, the GRACE-derived TWS changes are compared with the results from the Global Land Data Assimilation System (GLDAS) hydrological model between April 2002 and January 2015. The GRACE and GLDAS results have a good agreement in their secular trend. The mean trend of TWS changes in the study region is -4.5 ± 1.3 mm/year from GLDAS.

Key words: GRACE, TWS changes, EWT, GLDAS, Turkey

COMPARISON OF SPATIAL INTERPOLATION METHODS USED FOR GEOID MODELING

ID No: 71

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ABSTRACT

The heights determined by GPS are ellipsoidal heights and differ from the orthometric heights used in mapping practices. The ellipsoidal heights determined by GPS can be converted into orthometric heights. The geoid heights must be known in order to accomplish the conversion. The most widely used method for determination of geoid heights is the GPS/Levelling method. In this study, in two separate geodetic networks, the geoid heights of test points were interpolated through five different spatial interpolation methods by using the control points whose geoid heights are determined by the GPS/Levelling method and the accuracy of the interpolation methods are evaluated. Four of the applied interpolation methods were deterministic and these were; Original and Modified Shaperd methods of Inverse Distance Weighted (IDW) methods, Polynomial interpolation methods and Multiquadratic interpolation method. The fifth method was, on the other hand, Ordinary Kriging method, which is a geo-statistical method. The difference values were found by subtracting the $N_{measurement}$ geoid height values found through the GPS/Levelling measurement method from the $N_{estimated}$ geoid height values that are estimated through the interpolation method. The minimum and maximum errors, the mean absolute errors and root mean square error values of the differences have been calculated for each method. The most accurate interpolation method used in geoid modeling has been selected by comparing these values. As a result of the studies, it has been found that the geoid height determination results using the Ordinary Kriging method were more precise compared to the deterministic methods.

Key words: Geoid, Spatial Interpolation, Inverse Distance Weighting, Polynomials, Kriging.

DETERMINATION OF SEISMIC ACTIVITY ON THE MAIN MARMARA FAULT

ID No: 75

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ABSTRACT

Plate motion affecting the Earth's crust have occurred for millions of years. This slow but continuous movement that has been going on for millions of years can only be followed by instrumental measurements. In recent years, this process has been done with GPS very accurately. The North Anatolian Fault (NAF) is a major right-lateral, strike-slip fault that extends more than 1200 km extends along all North Anatolia from Bingol to Saros Gulf. The NAFZ is dividing into Southern and Northern Branches to the east of Marmara region that several destructive earthquakes occurred there, such as Izmit (in 1999, Mw=7.4) and Duzce (in 1999, Mw=7.2) in last century. MMF (Main Marmara Fault) which is the part of the Northern Branch in the Marmara Sea, starting in from the Gulf of Izmit-Adapazarı and reaching the Gulf of Saros. According to recent studies, the MMF is the largest unbroken part of the fault and is divided into segments (among which the Central Marmara-CM and Prince's Island-PI segments). The determination of the deformation accumulated on the MMF has become extremely important especially after the 1999 Izmit earthquake. Recent studies have demonstrated that the Prince's Island segment is fully locked. However, studies that are focused on the Central Marmara segment, that is located offshore Istanbul, a giant metropole that has more than 14 million populations, do not conclude about the presence of a seismic gap, capable of generating a big earthquake.

Therefore, in the scope of this study, a new GPS network will be established at short and long distance from the Main Marmara Fault, to densify the existing GPS network. The evaluation of the data will be done by GAMIT/GLOBK software and the kinematics of the Central Marmara Basin will be determined.

Key words: Plate motion, GPS network, North Anatolian Fault

CONTRIBUTION TO GIS MODELS: DETERMINATION OF THE GEOID THROUGH USING THE FIRST DIGITAL ZENITH CAMERA SYSTEM IN TURKEY

ID No: 76

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ABSTRACT

Height systems established at local, national, regional or global level play an important role as a primary component of geodetic infrastructure for GIS (Geographic Information System) and related applications. To create a complete and sustainable GIS model, every detail on the earth including its real shape, which is called geoid, should be known. In this context, determining earth's real attraction potential and geoid have been a matter of debate over the years between geoscientists. There are several techniques providing necessary data for the definition of geoid such as spirit levelling, gravimetric and astro-geodetic techniques. Astro-geodetic techniques allow determination of geoid using geodetic and astronomical coordinates. Thanks to the GNSS (Global Navigation Satellite System) technology, geodetic coordinates can be obtained easily, but astronomical coordinates can only be obtained observing stars or other celestial bodies. Because of measurement difficulties, the astro-geodetic methods were ignored until the late 19th century. With the invention of CCD (Charge Coupled Device) technology in 1969, major changes took place in the use of astro-geodetic techniques in geodesy. Telescopes equipped with CCD and GNSS equipment, which called Digital Zenith Camera System (DZCS) are today an efficient tool for astro-geodetic techniques. Such systems have not only shortened the observation time, but also increased the accuracy of astronomical coordinates obtained. Turkey's first national DZSC called Astro-geodetic Camera System (ACSYS) was developed, and used successfully for the determination of geoidal height changes in 2015. Starting from the beginning of 2016, ACSYS has gone under modernization to increase its accuracy and to provide ease of use. The ACSYS and levelling data collected in the Istanbul metropolitan area will be used for local geoid determination, which is an important tool for GIS applications providing orthometric heights.

In this paper, first national DZCS and its equipment components are described in detail. In addition, first observations in Istanbul metropolitan area and the results of ACSYS, future plans and modernization processes are discussed.

Key words: Geodetic infrastructure for GIS, Geoid, Deflection of Vertical, Digital Zenith Camera System, Astro-geodesy

SPATIAL STATISTICS FOR MODEL GENERALIZATION OF STREAM NETWORKS IN GIS

ID No: 70

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ABSTRACT

Spatial statistics occurs in the intersection of GIScience and Statistical Science. Spatial statistics are a set of exploratory techniques for describing and modelling spatial distributions, patterns, processes, and relationships in Geographic Information Systems (GIS). The GIS community needs to use the work of the spatial statistician to help find meaning in spatial data.

Different representations (scales/resolutions) in GIS are stored in different levels of detail using model and cartographic generalization methods, and this supports flexibility to the system. Generalization is a process used for reducing the volume of data of a spatial data set while preserving important structures. Map generalization operations could be grouped into two categories: (1) model generalization which is a filtering process to obtain a subset of a target database for data analysis, and (2) cartographic generalization which is the set of operations concerned with the optimal visualization of the selected data.

In this study, model generalization of a stream network was evaluated between the scales of 1:25,000 and 1:50,000 based on the attributes such as stream length, slope, type, level, and the Voronoi polygon areas of the tributaries which were converted to points. Voronoi polygons were used to determine the gaps between tributaries. The attributes were weighted using Pearson's chi-square independence test. Furthermore, spatial statistics methods such as k-means clustering or degree of clustering measurements were implemented to find meaning in the model generalization of stream networks.

Key words: GIS, Spatial Statistics, Cartography, Generalization

EVALUATIONS ON DIGITAL ELEVATION MODEL GENERATION BY USING AIRBORNE LIDAR TECHNIQUE IN WEST OF TURKEY

ID No: 80

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ABSTRACT

Digital Elevation Models (DEMs), an important data source for geographical information systems, can be produced by classical measurement techniques as well as by LIDAR (Light Detection and Ranging) system. Because of the three-dimensional data generated by the combination of the Global Navigation Satellite System (GNSS), the Inertial Navigation System (INS) and the laser scanning device, LIDAR is more useful than the conventional methods. LIDAR systems have recently encountered frequently in many areas of geomatics applications. The density of the point cloud data obtained with this technology that differs according to the used laser system and the flying altitude. This directly affects the quality of the models to be obtained in the point cloud according to the application. DEMs are successfully used in 3D (3 dimension) urban information systems, disaster applications, military applications, engineering and architectural studies and also in various 3D visualization studies such as restoration. The accuracy of the produced DEM also has a great importance for many applications. Therefore, evaluating the accuracy of the generated models is essential in practice. In this study, point cloud data in different densities obtained from LIDAR measurements at two different flying altitudes (1200 m and 1600 m) are analyzed. Before these analyses are performed, filtering procedure is applied to remove noises on the raw data with Cloud Compare open source software. The resulting products (DEMs, DSMs, buildings, energy transmission lines and trees) from the point cloud diluted by filtration are obtained from Envi software for the rural area under consideration. The results are compared each other in order to clarify superiorities and weaknesses for the data obtained from the different flying altitudes and LIDAR systems. We acknowledge General Command of Mapping of Turkey for providing Airborne LIDAR data.

Key words: DEM, LIDAR, Point Cloud, rural area, western Turkey

OBSERVATION SPECIFICATIONS AND RESULTS OF THE REGION 3 PRECISE LEVELING PROJECT

ID No: 88

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ABSTRACT

Geodetic Leveling Observations (GLO) for Benchmarks in Region-3 Kingdom of Saudi Arabia (KSA) project started in 2013 and finished in 2016. The aim of this project is to re-establish the Geodetic Level Network (GLN) with Second Order/Class I accuracies by the installation, measurement and computation of new replacement stations throughout the project area. The project covers an area of approximately 630,000 km².

The measurements have been done using Trimble DINI03 Electronic Digital/Bar-Code leveling ınstrument with single piece invar rods suitable for SOC1 surveys. Rods are Trimble Invar Rod LD13 (3m, code-graduation with certificate including factor extension for the rod). Temperature system used in the project was Dostmann P755-LOG data logger and Pt100 temperature probes with an accuracy of 0.03 ^{o}C.

The network consist of 16 150 sections with average length 1.6 km, 32 lines, 11 loops. Total length of levelling lines is 7025 km. The levelling sections have been measured forward and backward. Length of sight was up to 50 m, sequence of reading “backward forward - forward – backward (BFFB)”. Each station observations were corrected for scale, temperature and earth tide. Before and after every field season the rods were calibrated. The measurement results used in this study were corrected due to rod scale, temperature and earth tides. All the works in the project in conformance with the methods and accuracy specifications based on the standards, specifications and requirements of the National Geodetic Survey (NGS) Geodetic Leveling and Federal Geodetic Control Committee Standards and Specifications for Geodetic Control Networks (FGCC).

Rod scale and rod temperature corrections calculated for all sections as min=-0.65 mm, max=0.96 mm, stdev=0.07 and mean=0.0) Rod scale and rod temperature corrections using calibration parameters of rods are also very small, which reach its maximum value as being 14 mm with -1033 m elevation difference and 355 km length (0.04mm /km). For the remaining lines they are almost negligible. Earth curvature corrections calculated for all sections as min=-0.10 mm, max=0.10 mm, stdev=0.02 and mean=0.0). The Maximum collimation error in a single line of sight is ensured to be less than ± 0.05 mm/m. Astronomic correction is found to be at 0.06 mm/km level as an average. The astronomic correction is small, amounting at most to 0.1 mm/km. Correction is calculated for each set up as min=-6.05, max=6.7, stdev=0.76 and mean=0.0 in mm).

Key words: Precise geodetic leveling, Rod scale, Loop closure

THE DISTRIBUTION OF THE TOTAL SCALE FACTOR IN LARGE SCALE MAPPING IN TURKEY BY MAP PROJECTION AND TOPOGRAPHY

ID No: 92

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ABSTRACT

A map projection is systematic way of representing all or a part of the Earth on a projection surface such as a plane map surface. Projections are largely considered in two dimensions. A curved 2D surface is transformed to a flat 2D surface, with a resulting scale factor, that increases or decreases with the size and the location of the area being projected. The maximum value of the scale factor depends on the map projection being implemented. In Turkey, Gauss-Krüger projection system has been used in 3° zones according to official regulations for 1:5000 scale and larger mapping activities. This is a transverse cylindrical-conformal map projection. The reference surface is GRS80 ellipsoid. Since it is an interrupted system, the whole country is divided into 7 zones, each representing an individual coordinate system. The differential scale increases away from the central meridian, on which the scale is true. Another factor that affects the scale is the topography, i.e. height above sea level. The total scale factor is the multiplication of both factors caused by projection and topography. The total scale factor on a point depends on the height and distance to the central meridian, accordingly. Because of varying topography across Turkey, the total scale factor can reach up to 700 ppm that is a high value for large scale mapping activities. In this study, the scale factors by projection and height are calculated on a grid with 30” resolution. The extreme values are determined and their distribution is depicted by using thematic maps. The results show that the scale factors are far beyond the acceptable limits. This fact highlights the importance of corrections for horizontal distances due to topography and projection. Furthermore, we created a map mashup that calculates scale factor on a point selected by the user, which is a web-based tool that is publicly available. The distribution on a desired area can also be visualized. With help of this tool, surveyors can determine the effect of the scale factor in any area within Turkish territory.

Key words: Gauss-Krüger Projection, Differential scale, Topographic correction, Large-scale mapping

THE DETERMINATION OF SUITABLE REGIONAL TRANSFORMATION PARAMETERS WITH ROBUST ESTIMATION AND LEAST ABSOLUTE VALUE METHODS

ID No: 134

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ABSTRACT

The fundamental changes were made in the national coordinate system of Turkey in last years. Then, the transformation between old and new coordinate system was introduced with article 82 of the large Scale Map and Map information production regulation. The coordinate transformation is based on the common points, which coordinates are known two coordinate systems. It is tried to determine the relationship between two coordinate system using common points coordinates. The precision of coordinate system is related to the selection of common point distribution and the common point coordinate accuracy.

The outlier measurements are existed on the measurement inevitably. Therefore, the measurement errors do not fit the normal distribution. The results of evaluation were effected the outlier measurements. The outlier measurement detection methods are separated to two groups. While, some methods are used the adjustment results for determination the outliers like robust estimation, the other methods change the aim function of adjustment like the least absolute. In this study, the 2D affine coordinate transformation method advised with the large Scale Map and Map information production regulation were realized between old and new national coordinate systems. The outlier detection was made using the robust estimation method on the results of the least square adjustment method. Also, the coordinate transformation was realized with the least absolute value. The results of two applications were compared for determining these methods advantages and disadvantages.

Key words: Affine coordinate transformation, robust estimation, least absolute value method

ESTIMATION OF POSITIONAL INFORMATION FOR MOBILE VEHICLE WITH KALMAN FILTERING

ID No: 246

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ABSTRACT

Estimation of the position information any mobile vehicle or robotics is depended on that the dynamic modeling processing, which possess Kalman Filtering, Extended Kalman Filtering and Particle Filtering methods, etc. The key point of the dynamic modeling is that the state of the model whether the linear or not. This study covers estimation of position and velocity information; hence the linear dynamic modeling will be applied.

According to the main objective of the study, the two different types of data are obtained in order to determinate the position and velocity of the mobile vehicle, which is chosen as a car. One of them consists of GPS observations, which possess one-second interval, employing the Real-time kinematic method. The other type of data is a video sequence (30 fps), which is acquired with the constant flight altitude ~100 m above from ground by using the unmanned aerial vehicle (UAV). With a view to compare these different types of observations in the same coordinate system, four ground control points (GCPs) are established and observed. After that, the dynamic modeling will be implemented on images considering the principle of the state. Besides, the actual position and velocity of the car will be estimated and compared with the GPS-RTK data.

Key words: Object Tracking, UAV, Image Processing, Kalman Filtering,GPS-RTK

BUILDING INFORMATION SYSTEM BY GIS: PRACTICE ON SÜLEYMAN DEMİREL UNIVERSITY BUILDING OF FACULTY OF ARTS & SCIENCES

ID No: 79

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ABSTRACT

In today's world of information and technology, Geography is emerging as one of the most powerful disciplines to study the relationship between man and space. The place, on the other hand, is perceived in human perception in many different scales from global scale to cities, cities to buildings. In this context, people tend to recognize, manage and sustain all aspects of the physical environment in which they are part. At this point, GIS emerges as an integration of geography and information technologies with its solutions for application capabilities and spatial knowledge.

In this study, it is aimed to editing with the aid of GIS software and tools, to transfer the data into an updateable geodatabase, to enter all the information about the building and to make inquiries and analysis on this information light in Süleyman Demirel University Science and Arts Faculty which is selected as the sample application area. For this purpose, CAD drawings of the building have been provided and made suitable for use in GIS with data conversion functions and editing tools. On this data which is created and drawn on real coordinates, all the walls, corridors, rooms, doors and stairs belonging to the building and the information about these elements are added. A number of analytical functions have been developed for presenting this database to the service of users. The most important of these is the way to navigate through corridors and stairs from one point to another by 3D network analysis, apart from the ability to query and display information in the building. In order to present all information and functions belonging to the building to the relevant persons, the web server applications have been transferred to the server, which has an interactive interface with the search engine through this server.

As a result, buildings with the highest utilization rates by people need to be effective, sustainable, quick and easy to manage like many other elements of the space. This work produces a solution with a spatial dimension using these necessary GIS software and tools. Providing location and direction information for the audience using the building, providing support for all the elements belonging to the building staff and providing guidance and convenience at the point of making decision to the administrators in the building are some of these solutions. Similar to many information systems such as city, cemetery, bus line, drinking and wastewater networks, land registry and cadastral information, which are operated by GIS infrastructure, the building information system is also seen as a matter of work that needs to be widespread by being put into use for today's information and technology society.

Key words: Building, Geodatabase, Spatial Information, 3D Network Analysis, GIS

COMPARISON OF 3D MODELS GENERATED FROM IMAGES AND VIDEO FILE USING SFM TECHNIQUE

ID No: 86

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ABSTRACT

Structure From Motion (SFM); is a low-cost and user-friendly photogrammetric range imaging technique that makes it possible to work on high resolution datasets. SFM provides the creation of digital models of three-dimensional (3D) structures using two-dimensional (2D) images taken as a series of sequences. In the SFM method, the model geometry and camera position information are solved automatically and simultaneously. In order to be able to relate images, features must be viewed from one image to another. The route that the properties follow over time is used later in the prediction of the 3D position of the features and camera movement. In this study; two 3D models, one generated from image sequences and the other one generated from the video of the same object, were compared. Images and video of the same object obtained with a mobile device which has a high-resolution camera. To generate models from these different datasets, various 3D modeling software were used. Comparisons of 3D models were carried out with CloudCompare, an open-source 3D point cloud and triangular mesh processing software. The results of this study showed that objects can be modeled using video files as well as using images. Using video files speeds up data collection process and frames from any moment can be obtained from that video file.

Key words: Close-Range Photogrammetry, 3D Modeling, Structure from Motion

STRIP ADJUSTMENT OF MOBILE MAPPING POINT CLOUDS: CASE STUDY IN ISTANBUL TECHNICAL UNIVERSITY (ITU) AYAZAGA CAMPUS

ID No: 89

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ABSTRACT

Mobil LIDAR (Light Detection and Ranging) systems include several laser scanners and multi-view cameras, IMU (Inertial Measurement Unit) and GNSS (Global Navigation Satellite System) systems. All of these systems work cooperatively to generate the point clouds in three-dimensional (3D) geodetic coordinate system. The point clouds, obtained from multiple scans, are overlapped. Especially, the LIDAR systems having multiple laser scanners may suffer from noise and other error sources such as inertial drift, GNSS error sources, rigid platform calibration etc. The measurements with multiple scanners in Mobile mapping require calibration in order to overcome the disadvantages by high noise rates as well as the overlapping problem in strips. The calibration process is proceeded between Laser and IMU, CCD (Charge coupled of Device) Camera and Laser Scanner or GNSS receiver and carried out along the boresight. After the calibration steps, CCD Camera and Laser scanners can become ready to use. However, the calibration may not be sufficient to eliminate all errors and provides an appropriate point cloud for modelling. In such situations, registration between LIDAR point clouds, which is called “strip adjustment” is applied. The strip adjustment is a critical process for generating a useable point clouds. In this paper, we focus and aim to solve strip adjustment problem for point cloud registration. For this reason, a case study is carried out in the Ayazaga campus of Istanbul Technical University (ITU). The point clouds of Ayazaga campus are produced using Riegl VMX-450 Mobile Mapping System. Using Cloud Compare and Matlab platforms, the point clouds are registered in different regions for the unique case study area. In conclusions, the preliminary results are evaluated by means of feasibility and the potential of the approach for strip adjustment is clarified. Koyuncu Harita ve Mühendislik Company is acknowledge for providing the mobile mapping systems to the study.

Key words: Mobile Mapping, LIDAR, Registration, Strip Adjustment

DEVELOPING MOBILE GIS APPLICATION USING SMARTPHONE'S GPS CAPABILITIES

ID No: 90

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ABSTRACT

With the developing technology, smart devices are taking more place in our lives. The biggest indicator of smart devices entering our lives is seen with the increasing use of smartphones. The most noticeable feature of these devices is the GPS feature. The location of the smartphone user can be determined instantly through both WiFi, the phone network line and the GPS receiver in the phone itself. By means of this identified location, it contributes to areas such as help in case of emergency, navigation, identifying places, logistics services. In this study, an Android and iOS based mobile application have been developed that enables users to get 25K, 50K and 100K map section information of the current position. It also displays map section information of instant location on the map. Additionally the application let users to convert obtained coordinates between Universal Transversal Mercator (UTM) coordinate system and Gauss – Kruger coordinate systems. This transformation is done with several datum such as WGS84, ED50. During the development phase, Java programming language was used for Android based devices, and Swift programming language was used for iOS operating system devices. As a result, it is possible for the user to obtain information about the map section information of the instant position from the smartphone and to easily make the desired coordinate system transformations.

Key words: Map Section Information, Coordinate Transformation, Mobile Application

GIS & THREE-DIMENSIONAL MODELLING FOR CULTURAL HERITAGES

ID No: 91

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ABSRACT

Documentation of cultural heritages which bridge among our past and future to maintain is a great significance. Cultural heritages are our history and history forms our identity. Therefore protection of cultural heritages means protection of our history and identity. Documentation studies need robust and scientific methods. These studies are important for documentation, preservation, restoration and identification of current status of cultural heritages. In the documentation studies, processing information of historical monuments on computer according to GIS and documenting in three-dimensional with digital terrestrial photogrammetry is one of the main methods.

In this study for documentation, all datas of forty six historical monuments located in Silifke/Mersin were collected and transferred to database so it is made queryable. Inventory that presenting detailed information has been created for each monument. Finally photogrammetric survey was carried out. These studies shows us that digital terrestrial photogrammetric methods provide great convenience for the protection of historical and cultural heritage in documenting. After the short-time field survey, all the other studies can be perform easily with hardware and software which does not take more time and not cost more. Historical and cultural heritage can be obtain in digital media as a three-dimensional scaled models.

Key words: GIS, Photogrammetry, Historical Monument, 3D Modelling

HOW POPULAR CAMERA CALIBRATION PROGRAMS REACT TO DIFFERENT CAMERAS?

ID No: 242

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ABSTRACT

Camera calibration has become widespread day by day as the need for 3D modeling of existing objects is rising with the virtual/augmented reality applications, Earth's surface modeling, 3D navigation maps, documentation of cultural heritage and so on. 3D modeling of existing objects is handled with photogrammetry in most cases, owing to advantages of higher accuracy and lower costs when compared to laser scanners. However, camera calibration has to be done to calculate the interior and/or exterior orientation parameters of the camera(s) for photogrammetric 3D modeling. Camera calibration was known as a difficult task and could be performed by qualified people in previous decades. Yet, almost all the steps of camera calibration can be automatized with the enhancements in the current software technologies and this technique makes it easier than before. Unfortunately, such ease comes with lower accuracy in camera parameters, which is not desired in most cases. Therefore, the product's accuracy also decreases. In this study, some of the popular camera calibration software were compared to analyze their accuracies. These analyses were carried out for interior orientation parameters that the programs calculate. A smartphone's camera and Nikon D800 with 50mm prime lens were calibrated using MATLAB, Agisoft Lens, PhotoModeler Scanner (PMS) and 3D Flow Zephyr programs. Each software's test field options were used for calibration images. The used test fields are as follows; different size of grids for MATLAB and Agisoft Lens, single-sheet and multi-sheet calibration for PMS. The differences in calculated parameters were observed for different test fields. The root mean square errors that each program calculated was shown that such software should not be used for projects that need high accuracy, but they could be useful for some studies that do not need high accuracy.

Key words: Photogrammetry, Camera calibration, Camera calibration software, Comparison

MODELLING LAND REGISTRY AND CADASTRE TRANSACTIONS WITH UML: A CASE OF TURKEY

ID No: 87

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ABSTRACT

Many institutions (Eg. Municipality, notary, court) and documents (Eg. real estate value statement, certificate of inheritance, warrant of attorney) are involved in the transactions carried out in the land registry and cadastral directorates. The process step and the required documents can be changed in each land registry and cadastre transactions. In this context, there is a need for a systematic modeling approach that will manage the land registry and cadastral procedures necessary for the implementation of sustainable land management

Unified Modeling Language (UML) is used in general-purpose visual modeling language for the determination of system components for the visualization and documentation. Todays, UML has taken standard language version both designing conceptual object-oriented software and many other applications. This language can be used to modeling the structural diagram of a data model conceptual level. UML is frequently used in the design followed and supported models which reflects the real world by the system designers and agencies. In this context, It is a useful modeling language to model the requirements of internal and external information systems in terms of both data and functional. UML is a suitable model to define the relationships between cadastre and land management components when considered in terms of design of information systems and development business processes.

In this study, the use of UML in the modeling of land registry and cadastral transactions has been examined. In this context, it can be demonstrated that using of UML in land registry and cadastre transactions modeling effectively with modeling some land registry and cadastre transactions process using UML diagrams.

Key words: Land registry, Cadastre, UML, Land management

THE ANALYSIS OF POINT COORDINATE TEMPORAL CHANGES USING HYPOTHESIS TESTS

ID No: 93

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ABSTRACT

The temporal changes or deformation in the geometric shapes on the earth are very important for human life. There have been done many works until today related to this issue. The deformation analysis generally can be defined as observing of ground movement, determination of geometric shape changes structure and interpretation the results using some models.

There are two model approaches for determining the deformation analysis as geodetic and non-geodetic. The geodetic methods are used to investigate earth deformation and local movements by geodetic control network and measurements. The geodetic control network must be covered both all of the region where the movement expected and some external area. The deformations are determined with measurements on the control network made at regular periods and the control point coordinates are obtained. The significance between point coordinates changes can be evaluated using hypothesis tests.

In this study, geodetic control network has been created for investigate of the moving in landslide region. The measurements were made with specific periods. These measurements were evaluated and the point coordinates were obtained according to free network adjustment methods. The points, which have got significance changes, have been determined. Also, the directions of significant changes have been obtained.

Key words: Deformation, control network, landslides, hypothesis tests

ANALYSIS OF SEA LEVEL RISE ALONG THE BLACK SEA COAST USING OPEN SOURCE GIS

ID No: 241

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ABSTRACT

Thermal expansion and ice melt due to global warming as well as climate-driven or anthropogenic changes in land water storage mostly cause sea level rise. The local factors such as ground subsidence, ocean currents and differences in the Earth's gravitational field induce non-uniform rates of sea level rise around the world. The multi-mission satellite altimetry data set from the French Archiving, Validation and Interpretation of the Satellite Oceanographic Data (AVISO) portal has indicated that the Black Sea level increased by 3.2 mm per year on average, for a total sea level rise of ~67 mm from 1993 to 2014. According to this, the Black Sea coast is projected to face sea level rise of 0.28 m by the end of the 21th century without any acceleration. In this study, the future impact of sea level rise on the Black Sea coast is investigated by operating spatial analysis of the Free and Open Source Geographic Information System (QGIS) with global Digital Elevation Models (DEM)s that are based on high resolution elevation data. For this aim, we consider the projected sea levels within next 500 years according to the trend value obtained in this study. Here, we assume that the Black Sea level rise will not be above its present rate for the next centuries; that is, the velocity of sea level change will be same as rate. The results show that some areas particularly low-lying deltaic plains along the Black Sea coast are highly vulnerable to the future sea level rise. For example, 98.6 km^2 of Kizilirmak Delta will be flooded before 2500. This area corresponds to 17.6% of the Kizilirmak Delta. Moreover, a new strait in the north of Crimean Peninsula will be formed, connecting the Black Sea and Azov Sea within ~300 years, and thus this peninsula will turn into an island.

Key words: Black Sea, Sea level rise, Sea level projection, QGIS, DEM

AN EVALUATION OF GEOGRAPHIC INFORMATION SYSTEMS EDUCATION FOR GIS INDUSTRY AND ACADEMIC CAREER IN TURKEY

ID No: 288

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ABSTRACT

Geographic Information Systems (GIS) since its advent has utterly adopted to new technologies and evolved from a mapping, analysis and cartographical tool into a sophisticated instrument to organize complex analyses and support decision making which make it indispensible for various fields and industries or anything that necessitates a geographic reference. Today's demands for standardization and interoperability of geographic/spatial data at regional/global level and need to construct spatial data infrastructures (SDI) also requires effective use of GIS in GIS projects at institutions and organizations that work with geographic/spatial data. Advanced level of GIS education therefore appears to be a necessity for developed and developing countries, not excluding Turkey.

This study evaluates the GIS education in Turkey that can contribute to advance level of operating of geographic information. Therefore, schools and departments that offer a complete integrated GSI education in Turkey were investigated within the scope of the study. These schools include undergraduate of graduate departments or institutes that are entitled with geoinformation, geomatics, GIS, GI or GI technologies, etc. Alternatives that offer distant GIS education in Turkey or from abroad were also examined. Career tendencies and major industries of the graduates were investigated. Furthermore, academic career options for those who graduate from one of these schools that offer GI education is explored. Study concludes with recommendations about GI education in Turkey for GIS industry and academic society.

Key words: GIS, GI, graduate education, GI industry, academic career, Turkey

A GEODETIC GIS APPLICATION WITH QGIS SUPPORTED BY PYTHON SCRIPTS

ID No: 299

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ABSTRACT

GIS (Geographical Information System) is a very useful tool to store, analyze and visualize any kind of data in the various study fields. To develop a GIS application in any study field, there is a lot of free GIS software. Some well-known software names can be given at this stage as QGIS (Quantum GIS), GRASS (Geographic Resources Analysis Support System) GIS, and SAGA (System for Automated Geoscientific Analysis) GIS ...etc. In this study, it is intended to give a method how a GIS application can be constructed by means of QGIS for two well-known geodetic problems as the 3D similarity and the velocity transformation. There are three types of geodetic networks (or points) used on the Earth. These are an A-level geodetic network (the IGS network established by International GNSS Service), and B-level geodetic networks {for example Turkey National Fundamental GNSS Network (TNFGN) monitored by General Command of Mapping (GCM) in Turkey}, and C-level geodetic networks which are observed and computed by Geomatics engineers. While the velocities of C1-C2 level points in C-level groups are also calculated from the velocities of B-level points monitored by GCM, the velocities of C3-C4 level points are not computed. The GIS application is designed as six layers. The first three layers involve Turkey's nation, city and town borders which can be accessed from the GCM website in shape file format (.shp). The fourth layer covers the point coordinates and velocities of TNFGN network in text or electronic table format (.txt or .xls ...etc.) which are also taken from GCM with charge. The last two layers are constituted with C1-level and C3-C4 level points obtained by GNSS observations in WGS84 datum. The point coordinates are taken from First Technical Report arranged for inspecting the Geodetic Studies for the project that is "Productions of 1/1000 scaled digital photogrammetric base map and colored orthophoto for Kocaeli Metropolitan Municipality (KMM)". The report was prepared by the first author and the coordinates included in the layers are computed by the author for controlling Kocaeli Metropolitan Municipality Geodetic Network. In the designed QGIS application for the proceeding, to access the layer features (columns) and determine the common points between TUTGA layer and C1_SERBST layer and transform the C-level coordinates to TNFGN network and compute the C1-level point velocities, some python scripts are developed in Python environment nested in QGIS. All results are reported by GIS point of view and argued with the real (similarity and velocity) transformations performed onto the Network of Kocaeli Metropolitan Municipality. Finally, some results about QGIS, python scripts, the similarity, and velocity transformations are summarized.

Key words: QGIS, Python, File Formats, Similarity and Velocity Transformations.

MOBILE APPLICATION DEVELOPMENT WITH LOCATION BASED SERVICES FOR ANDROID DEVICES

ID No: 348

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ABSTRACT

Mobile devices gain paramount importance owing to increased demand for quick access to the information. However, with the increased interest in spatial data, the demand for location-based services and mobile applications developed has increased. The organizations and the companies are making effort to meet the needs of users by updating software technologies on behalf of the mobile technologies. In addition, the developments in the Mobile Geographic Information Systems has revealed the importance of Global Position System (GPS) data. Therefore it has become one of the most practical methods employed recently. The improving mobile network infrastructure has provide the users with direct accessibility from the application's location which renders easier to connect to a centralized system through the developed software. Mobile devices perform three different technologies for location detection. These are named as GPS, GSM base stations and Wi-Fi. Android APIs provide a detailed library that shares the user's location for applications. In this work, the application was developed using android's location-based services. The location information of the user was obtained by using the above-mentioned technologies. The pharmacy closest to the user was described on the map with an algorithm developed based on the user's location and the distances to where the pharmacists are located. It was also presented to the user in the list. It is also possible to adjust the distance between 2 and 10 kilometers within 2 km intervals. Additionally, pharmacists on duty outside the office hours of pharmacies are shown directly without the user having to enter any time data. The details of selected pharmacies were presented in detail. In addition to the location based search, the search feature according to the province and the verbal search feature were also presented to the users. As a conclusions, the current study is promising in terms of providing technical infrastructure for many applications.

Key words: Location based System, Android, Global Position System

TRANSFORMATION BETWEEN INERTIAL AND EARTH-FIXED FRAMES: A REDUCED-DYNAMIC ORBIT EXAMPLE

ID No: 69

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ABSTRACT

The celestial reference system is an inertial reference system in which laws of physics are valid without the need to apply any corrections for rotations. Since the motion of satellites follows the Newtonian mechanics, an inertial coordinate system (non-rotating) should be defined. In order to fulfill this requirement, International Celestial Reference System (ICRS) is defined by International Earth Rotation and Reference Systems Service (IERS). The ICRS can be connected to the International Terrestrial Reference System (ITRS) by use of the IERS Earth Orientation Parameters (EOP).

In this contribution, the coordinate (and velocity) transformation between the ITRS and the Geocentric Celestial Reference System (GCRS) is studied following the IERS technical conventions and International Astronomical Union (IAU) resolutions. The transformation matrices including precession, nutation, rotation of the Earth around the axis associated with the pole and polar motion as well as the time systems are briefly described.

The reduced dynamic orbit coordinates and velocities of a GRACE satellite estimated in the Earth Centered Earth Fixed (ECEF) system was transformed to the Earth Centered Inertial (ECI) system. These transformed coordinates and velocities were compared with those of a known orbit in ECI system. The results were analyzed and discussed.

Key words: Celestial Reference System, Inertial, ECEF, ECI

WEB-BASED GEOID CALCULATION TOOL FOR PRACTICAL HEIGHT TRANSFORMATION IN TURKEY

ID No: 81

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ABSTRACT

Height determination within a consistent datum, which is regionally defined for a country, constitutes an essential base to large number of activities, such as topographical mapping, constructing engineering facilities, environmental and hazard monitoring, navigation, management of natural resources. In conventional manner determination of heights and vertical control in surveying and geodetic applications have been carried out using leveling observations via high order vertical control networks. The conventional way of vertical control brings certain limitations and disadvantages with it. However, recent developments in satellite based global positioning systems provide relatively practical and precise opportunity for users to obtain 3-dimensional positions. Although the GNSS ellipsoidal heights are solely geometric definitions and do not mean physical reality of Earth's gravity field, it is possible to transform these heights into the regional vertical datum using a precise Geoid model. Today, new technologies in terrestrial and airborne gravimetry and also the launch of satellite gravity missions greatly enhance the accuracies in Geoid modelling capabilities, providing an alternative to vertical control with leveling networks. Servicing these models to the users efficiently is another issue that should be considered under height systems modernization programs. In this study the development of grid-wise experimental Geoid model for Turkey and it's servicing using a web-based Geoid undulation calculation tool, developed with PHP codes employing SQL query language is explained and introduced. In the content of the contribution, the terrestrial data quality for geoid modeling in Turkey, the statistical assessment results of the experimental Geoid model that is calculated using hybrid data, design and use of web-based calculation tool for providing the practical use of the geoid model data are explained.

This study is carried out as a part of scientific research project financially supported by TUBITAK under contract with the number of 114Y581.

Key words: Geoid, Height Transformation, Inverse Distance Weighting, Web service.

COMPARISON OF GEOSTATISTICAL KRIGING AND LEAST SQUARES COLLOCATION IN GRAVITY FIELD DATA INTERPOLATION

ID No: 83

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ABSTRACT

In terrestrial gravity measurements on physical surface of Earth, the g values at discrete observation points are obtained. Comparison of gravity observations with the values that are produced according to an arbitrary physical model of the Earth at the observation points, leads to a corresponding set of gravity anomalies. These physical data at the discrete observation points constitute the essential input to the high-resolution Geoid model calculations and their Stokes' integral evaluation gives us the disturbing potentials and hence the Geoid undulations that are used for vertical datum and height system definitions. Regarding to this, the density and distribution of the terrestrial gravity observations has critical role in precise determination of the Geoid models. This study focuses on interpolation of sparse gravity observations in order to reach an optimal Geoid model precision. Hence a comparison among the two commonly used techniques, least-squares-collocation and geostatistical Kriging, in interpolating high-frequency gravity field signals in the case study area is provided. The sparse gravity anomalies at discrete points in an area of 3° by 4° in northwest of Turkey are interpolated in a 3′ resolution grid using the two techniques and evaluated in calculating the Geoid models using remove-compute-restore method. The validations of the test Geoids using GPS/leveling data reveal the optimum interpolation approach in conclusions. The Kriging method, as one of the applied interpolation technique in the study, is one of the most extensively used estimating method in mathematical Geology whereas least-squares-collocation method is commonly used in Geodesy. The performance comparisons between the two techniques are provided in the numerical statistics of tests that are carried out in the content of the study.

This study is carried out as a part of scientific research project financially supported by TUBITAK under contract with the number of 114Y581.

Key words: Gravity, Interpolation, Kriging, least-squares interpolation, remove-compute-restore technique

ANALYSIS ON THE QUALITY OF HIGH-RESOLUTION GLOBAL DIGITAL TERRAIN MODELS (DTM) USING GPS/LEVELING DATA IN TURKEY

ID No: 84

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ABSTRACT

The topographical heights are required in practice for a number of engineering applications. Beside of their practical use, the specific correction terms to the gravity observations, carried out on the Earth surface, which are typically the terrain corrections, downward contuniation corrections etc., are also calculated using the topographical heights for Geoid modeling and Geophysical exploration purposes. Using a high resolution Digital Terrain Model (DTM) is the most practical and economical way for obtaining the height data nowadays. However, whatever its generation method is, these models are generated relying on the observational data and naturally they include errors that are not uniformly distributed. So, it is important to clarify the accuracy of the DTM in the study area before using its data. In general, validating the DTMs using independent point-wise data such as GPS and leveling heights provide an overall accuracy measure in terms of root means square error of the DTM derived heights. Beside of validating at discrete control points, the DTM qualities are assessed from varying perspectives including terrain slope analyses, information loss percentages, generation method of the data, blundered and void parts of the data etc. In this study three high resolution digital elevation models ASTER (Advanced Space-borne Thermal Emission and Reflection Radiometer), SRTM (Shuttle Radar Topography Mission) and Turkey Digital Topographic Data are assessed using GPS/leveling data. Using three different sets of GPS/leveling data in validations it is aimed to clarify the role of distribution of the ground-control points as well as the region's characteristics, such as roughness of topography, land-cover etc., in the validation results.

This study is carried out as a part of scientific research project financially supported by TUBITAK under contract with the number of 114Y581. USGS The Land Processes Distributed Active Archive Center (LP DAAC), NASA and METI are gratefully acknowledged for the availability of ASTER GDEM and SRTM data sets.

Key words: DTM, Validation, Turkey National Vertical Control Network, GPS/Leveling

VALIDATION OF BERNESE-DERIVED PRECISE ORBITS FOR GRACE SATELLITES

ID No: 321

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ABSTRACT

Precise orbit determination of satellites is an important issue for geodetic community, especially for gravity field missions like GRACE (The Gravity Recovery and Climate Experiment). GRACE is a twin satellite system equipped with a dual-frequency BlackJack GPS onboard receiver, a SuperSTAR accelerometer, a star tracker, a K-band ranging (KBR) system and a satellite laser ranging (SLR) retroreflector. The data related to those scientific instruments are provided to users through the Information System and Data Center (ISDC). Also International GNSS Service's or Center for Orbit Determination in Europe's (CODE) data products (GPS precise sp3 orbits and high-rate clock corrections) are used.

In this study, daily GRACE Level-1B data were used to estimate the kinematic and reduced-dynamic orbits of GRACE-A and GRACE-B satellites using Bernese 5.2 Processing Engine (LEOPOD.PCF). The accuracy of orbits is assessed using several validation procedures. These can be classified into two groups: Internal validation method and external validation methods. Internal validation method consists of the comparison of kinematic and reduced-dynamic orbits estimated by the user. External validation methods consist of KBR validation, independent validation of the orbit quality with SLR and the comparison with GNV1B orbit of Jet Propulsion Laboratory (NASA/JPL).

Daily orbit estimations were performed for one month and the results were validated using above-mentioned methods. Results were analyzed and interpreted.

Key words: Precise Orbit Determination, GRACE, Low Earth Orbit

HUMAN GEOGRAPHY

A GIS-ASSISTED INVESTIGATION INTO POVERTY IN TURKEY ACCORDING TO NUTS 2

ID No: 277

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ABSTRACT

Presently, poverty is among the major concerns in both developed and developing countries. Thus, the Millennium Development Goals by the United Nations highlights the cruciality of poverty and sets goals to eradicate it. Although poverty has been mitigated thanks to the positive effects of modernization and industrialization in Turkey, it remains to be a major problem. The extent and severity of poverty in Turkey vary across regions.

The present study investigates the distribution of poverty in Level 2 regions of Nomenclature of Units for Territorial Statistics (NUTS) in consideration of the data from *Household Budget Survey 2015* and *Income and Living Conditions Survey 2015* of Turkish Statistical Institute. To this end, it attempts to explore the relationships between poverty and such variables as age, gender, education, health, employment, income and income source of household members. These variables were mapped in layers according to NUTS 2 by using GIS. The relationships between poverty and the variables were interpreted and discussed by regions in consideration of these maps. Moreover, by-region relationships between poverty and each variable were revealed by conducting correlation analyses. The obtained results indicated that TRA2 (Ağrı, Kars, Iğdır, and Ardahan) was the poorest region. It was followed by TRC2 (Şanlıurfa and Diyarbakır) and then TR61 (Antalya, Isparta, and Burdur). The conducted correlation analyses showed that there were strong relationships between poverty and the variables of education and employment.

Key words: Poverty, GIS, Turkey, NUTS 2

THE ASSESSMENT OF SUBJECTIVE WELL-BEING MAP OF TURKEY

ID No: 280

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ABSTRACT

Edward Soja says that people are as spatial as social, the space is socially produced and therefore changed by socially. Accordingly, whatever your area of research is, if you do not acquire a spatial perspective, your work will not be qualified enough.

From this point of view the aim of this study is to determine the level of subjective well-being of the provinces in Turkey and to determine spatial distribution of subjective well-being throughout the country. The data set of the study constitutes the results of the 2013 Life Satisfaction Survey conducted by the Turkish Statistical Institute (TURKSTAT). 25 variables were evaluated in this study, including income, education-health, access to public services and social networks, which are assumed to be components of subjective well-being. Principal Component Analysis (PCA) analysis is applied. Accordingly, it is determined that 4 principal components explain 76.6% of the total variance. The first principal component alone is the key component with the highest variance explanatory rate, accounting for 51.9% of the variance. For this reason, using the first principal component, the level of subjective well-being was determined by multiplying the value of the variable used and the value of the principal component.

According to the findings, there are significant differences in the spatial distribution of subjective well-being in Turkey. In the western part of the country, the level of subjective well-being is higher, whereas in the eastern part of the country it is very low. In addition the variables with the highest degree of relationship with subjective well-being are those related to public services. As a result, it is possible to say that inequality of subjective well-being is another social problem in addition to the problem of spatial inequality in income and consumption which represents the material aspect of wealth in the whole country.

Key words: Subjective Well-being, Social Geography, Turkey

INTERNAL MIGRATION AND SPATIAL REPRESENTATION: HOW MUCH ARE WE ISTANBUL?

ID No: 279

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ABSTRACT

Istanbul, which has an important place in internal migration, has been the destination of the region between 16% and 25% of the population participating in the internal migration since the 1950s. Because of the accumulation of immigrants in this process and their place in the city has changes greatly demographic structure and homogeneity of the city. In this study, net migration rate, population density, migration motion speed, location quotient, ındex of concentration and ındex of redistribution were used in order to explain the numerical and spatial changes caused by the migration of Istanbul from other provinces. Population and area data of provinces for ındex of concentration, population data for the place of birth Istanbul's for the location quotient location and provincial population for the index of redistribution. In addition, the results are mapped to transferred the ArcGIS 10.0 program. According to results obtained from ındex of concentration it is determined that the population of Turkey has an unbalanced distribution of %37, the population is concentrated in certain areas due to migration and Istanbul is the most important gathering center with %9 coefficient. Also according to the results of the location quotients 52% the population of Istanbul was formed by outsiders which resulted in a big change in the demographic structure and space. According to the number of people registered in other provinces in Istanbul, Ardahan with people is already more than Ardahan province population. On the other hand, due to decentralization, the tendency of to decrease of net migration amount of province is predicted to increase the population born in Istanbul in the future although its origins are different. Nevertheless the share of the population in Turkey is increasing due to the fact that it is still the province that receives the most migration. With increasing population density and demographic changes in the coming years, the pressure on city will continue.

Key words: Internal migration, Istanbul, migration motion speed, concentration and redistribution index, location quotient.

"FROM OLD AGE TO ADVANCED AGEDNESS": THE SPATIAL DISTRIBUTION AND GROWTH OF POPULATION AGEING IN TURKEY

ID No: 283

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ABSTRACT

One of the changes that the Turkish population has experienced with the demographic transition during the last century is the beginning of a tendency to aging in the population. Declining fertility rates as well as the considerable increase in the average life span has lead to aging. A rise in average life span more than two-fold has started to lead to aging as well as a rapid increase in the number of senior citizens among the elderly group. The elderly population is not homogeneous in itself and senior citizens are especially disadvantaged in terms of both health and social factors as well as environmental factors. This situation should be manifested by research carried out in social sciences and the results should contribute to the formulation and implementation of all kinds of planning and applications for the aging and elderly population. In this context the study intends to explain the development and various characteristic features and the spatial distribution of the elderly senior citizens among the aged population during the Republican era. The age-related data for the population used in the study were obtained from the censuses and the ADNKS (Address based population registry system) according to provinces. Statistical analysis (Pearson Correlation Analysis, Linear Regression Analysis) and spatial statistical methods (Morans I and Local Morans I) were applied to analyze the present situation. And the spatial distribution and change in the elderly population was visualized using thematic maps.

The rate of increase in the elderly population, which constitutes 0.6% of the Turkish population and the 65+ elderly population which counts for 8% of the population has reached remarkable proportions. In 1950, the elderly population, which was only 50 thousand has increased over 10 fold and approached 550 thousand in 2016. The tendency for aged females is even more pronounced in the elderly (68%). A large proportion (70%) of older elderly people (80%) who are still living in urban areas have lost their spouses. Also, disability has become more visible in this age group (44%). The distribution of the elderly population shows significant regional differences in spatial distribution, depending on the relationship between average life span ($r = 0.43$) and inversely proportional to fertility rates (-0.68). The elderly population, which manifests itself in a significant clustering tendency at the lowest levels in Turkey's south east, becomes more prominent in the rest of the country.

The tendency to aging, which we have started to encounter with the demographic transition, will progress into advanced aging in the future. The spatial distributional differences of the stages of demographic transition and the average life span in the country shape the distribution of the elderly population, which in turn determines the spatial distribution of policy priorities.

Key words: Aging, Elderly Population, Regional Differences, Turkey

OVERCAPACITY OF LOWER-LEVEL MUNICIPALITIES IN METROPOLITAN REGION: CASE OF BAGCILAR

ID No: 284

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ABSTRACT

Migration is an important factor that affects space and spatial capacity because of the huge number of residents, small-sized spaces in terms of surface area and large-sized spaces in terms of population especially Bagcilar. This study aims at revealing the relationship between space and resident population in Bagcilar and how they affect each other. Also it covers whether space gets enough population, and its carrying capacity via some parameters and indexes like person per square kilometer, person per the amount of park and green area, and stuff like that by comparing with international standards. Thus it finds out whether this space gets much more migrant population.

In this study, it was used statistical data that is obtained by some government agency such as Turkish Statistical Instıtute (TUIK), district municipality, the Ministry of National Education (MEB) and Ministry of Environment and Urbanization, and neighborhood map getting from the municipality. All data were showed on ArcGIS program. In the result of the study, findings were obtained that the municipality got enough migrant population, and there is no space on district for other new migrants. Also currently population needs social fields, and goes to the other districts having social fields to satisfy their needs.

Key words: Bagcilar (Istanbul), In-migration, Overcapacity

REMOTE SENSING

CLASSIFICATION OF SENTINEL-1A SAR DATA USING PRINCIPAL COMPONENT ANALYSIS AND KERNEL PRINCIPAL COMPONENT ANALYSIS

ID No: 303

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ABSTRACT

Spectral context of remotely-sensed data presents significant details for analyzing the Earth's surface in numerous applications. In this study, the impacts of the extracted spectral features from Principal Component Analysis (PCA) and Kernel Principal Component Analysis (KPCA) for the classification of Sentinel-1A SAR (Synthetic Aperture Radar) data were investigated. Dual-polarized Sentinel-1A (VV and VH) SAR data and three additional bands from the original data (VV-VH, VV+VH, VVVH/VV+VH) were used for the study region in Istanbul, Turkey. Pre-processing steps were applied to the data as following; apply the precise orbit file, calibration, multi-looking, speckle filtering and terrain correction. Following the pre-processing steps, PCA and KPCA transformations were carried out to extract the spectral features from the data. These transformations, are mapping the data from the input space to a new feature space, were applied to the three bands (VV, VH and VV-VH) first and then to the all bands (five bands). Support Vector Machines (SVM), Random Forests (RF) and K-Nearest Neighbors (KNN) methods were implemented for the classification of the data. Original features were compared to the extracted spectral features from PCA and KPCA within classification accuracy. Our results suggest that spectral features from PCA achieved higher classification accuracies compared to original features for SVM and RF while features from KPCA decreased the classification accuracies for all methods. Highest classification accuracy (81.39 %) were obtained by SVM along with the spectral features from PCA. Furthermore, it is proven that spectral features from PCA and KPCA have different impacts on each method.

Key words: Image Classification, Synthetic Aperture Radar, Kernel Principal Component Analysis, Support Vector Machines, Random Forest

CROP WATER STRESS INDEX (CWSI) USE OF OPPORTUNITIES IN CREATING AN IRRIGATION PROGRAM

ID No: 209

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ABSTRACT

Competition for fresh-water resources in arid and subarid areas is increasing seriously in recent years. Correspondingly, the pressure on using less water on agricultural irrigation that is the main water user is increasing. If applications aim to reduce crop water usage are not managed precisely that could cause decrease in productivity, Therefore, determining when and how much water should be applied in irrigation programming is of great importance in agricultural irrigation**.** In plant growing, water stress is one of the most significant factors that impact the plant development. That said the amount and time of water needed and making an appropriate irrigation plan is enhancing importance in arid and sub-arid areas where most of the irrigation water is used. While an irrigation plan is made, generally crop, soil and atmospheric impacts are taken in to consideration. Since the crop presents the soil and atmosphere's impacts, with help of remote sensing irrigation plans that are made dependent on crop has become widespread. Many indexes are developed on based on crop water stress monitoring and reflection in spectral mapping and crop surface measurement. Crop water stress index (CWSI), widest used of these indexes showing crop water status is one of the most successful indicators. In this research, by using CSWI in irrigation programs used in varied crop materials will be elaborated and availability will be studied in our country and in the world.

Key words: Spectral reflectance, Remote sensing, Crop surface measurement

COMPARISON OF PCA AND NLPCA METHODS FOR BAND REDUCTION OF HYPERSPECTRAL IMAGES

ID No: 199

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ABSTRACT

In this study, two different dimension reduction methods namely Principle Component Analysis (PCA) and Non-Linear Principle Component Analysis (NLPCA) were applied to Indian pines hyperspectral test data acquired by AVIRIS airborne platform. The performance of each method was evaluated in terms of reconstruction errors and Support Vector Machine (SVM) classification accuracy. Results of the study demonstrated that hyperspectral data could be better represented with non- linear components compared to linear components. SVM classification of NLPCA using 4 components provided higher accuracy with %70, when compared to SVM classification of PCA which provided %68 accuracy using 4 components for the 16 LCLU classes defined in reference classification data. In addition, SVM classification accuracy tend to increase with increased number of components for both methods. Moreover, reconstruction of the data from NLPCA components resulted with less erroneous pixels than reconstruction from PCA components. Similarly, reconstruction efficiency increased with increased number of components for both methods. Lastly, the computation cost for NLPCA method is higher than the PCA method due to its complex structure thus, it is recommended to consider the processing performance and hardware requirements to apply the method in further studies.

Key words: PCA, NLPCA, Band, Hyperspectral images

TEXTURE BASED CLASSIFICATION OF HYPERSPECTRAL IMAGES WITH SUPPORT VECTOR MACHINES CLASSIFIER

ID No: 207

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ABSTRACT

Hyperspectral images offer detailed color information owing to their high spectral resolutions. These images are being used in many practical applications for better interpretation of the surface of the earth. One of the biggest disadvantages of this type of images is that they include repetitive information, which may be considered redundant for most classification applications. In such cases, it is more reasonable to reduce the data to minimize the computational load while increasing the classification accuracy. Another procedure that may be useful to increase the classification accuracy is the integration of complimentary data like texture information to the hyperspectral image to be classified. In this study, the Gabor and Gray Level Co-occurrence Matrix (GLCM) based texture information is exploited together with principle component analysis (PCA). The performance of classification is evaluated with the Support Vector Machines (SVM) classifier to investigate whether or not the texture information is capable of increasing the classification accuracy. In this study texture information is used not only for increasing the classification accuracy, but also for analyzing useful texture features according to their capability to classify different regions on hyperspectral images of different areas like urban, rural or suburban. In order to evaluate and compare the results with other studies, publicly available hyperspectral images are used in this study. Results show that texture information can improve classification performance over what is achieved by using spectral information or data itself.

Key words: Texture extraction, Support Vector Machines, Principal Component Analysis, Gabor

INVESTIGATION OF GEOLOGICAL FORMATIONS IN TERMS OF LAND USE LAND COVER (LULC) MAP EXTRACTED USING SENTINEL-2 IMAGE

ID No: 205

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ABSTRACT

In accordance with the recent developments in remote sensing technologies, image analyses using satellite imagery have become more practical in terms of studying on a large scale and obtaining data about the surface of the Earth. In this context, examining geological and geomorphologic information of an area has been possible and attractive by the use of the recent technologies mentioned above.

In this study, Zonguldak region, known as a mining area and situated at Black Sea region, was chosen as study area. It has an undulating ground and rough topography and it is one of the most forested cities in Turkey as well. In this region, 23 geological formations have been observed and a geological map having a scale of 1/100000 of the study area was provided. There are developed units identified and classified in Precambrian-Quaternary period. Compared to the magmatic and metamorphic rocks, the formations containing sedimentary rocks are much commonly noticed in the area. The least spreading formations are the ones containing metamorphic rocks.

The aim of this study is to monitor the distribution of the geological formations in the study area and to investigate the similarities between these formations and LULC map extracted using Sentinel-2 image. For this purpose, methods of image processing containing different combinations and ratios between the bands of the satellite image were applied and then image classification process was carried out. As a result, the classification results and the distribution of geological map were compared and the similarities between LULC and geological map were revealed visually.

Key words: Geological Formation, Magmatic - Sedimentary and Metamorphic Rocks, Remote Sensing, Sentinel-2, Image Processing, Classification

DETERMINING THE ALTERATION ZONE BY USING INTEGRATION OF ASTER SWIR IMAGES AND SPECTRAL MEASUREMENT DATA IN SPECTRAL CLASSIFICATION, A CASE STUDY: VEIN TYPE DEPOSITS PB-ZN IN TUTAKDAĞI (ŞEBINKARAHISAR-GIRESUN).

ID No: 217

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ABSTRACT

Remote sensing sensors have became an important first step methods in mineral exploration and mapping of the hydrothermal alteration areas earlier than the geological field and laboratory studies. Geologists have used sophistically remote sensors to detect hydrothermal alteration mineral assemblages for especially reconnaissance stages of exploration of porphyry deposits. The study area is Tutakdağı where is located nortwestern of Şebinkarahisar (Giresun) within Eastern Black Sea Region in Turkey where consist of alunite and lead-zinc mining activities highly contribute to the region as economically. Upper Cretaceous volcanics, Tertiary granitoids, Eocene and Pliocene-Quaternary volcanic outcropt in the region. The deposits which are occured as veins in Upper Cretaceous volcanics. This study is aimed to determine the types and locations of alteration areas such as alunization, sericization, silicification with spectral classification using the ASTER satellite SWIR images. The Advanced Spaceborne Thermal Emission and Reflection Radiometer images are subjected to Matched Filtering (MF). As satellite image the ASTER Short Wave Infrared (SWIR) sensor that contains 6 multispectral bands covering the spectral band range from 1600 to 2430 nm was used. The spectroradiometer measurement data was resampled to the spectral range of the ASTER SWIR. Geological map with the scale of 1:100.000 was used to correlate the hydrothermal alteration areas. Remote sensing and geological data were defined in the 37th North zone in WGS 84 (World Geodetic System 1984) datum of the UTM (Universal Transverse Mercator) projection system. XRD-CF analysis for determining the mineral content of the representative samples collected from the test areas were performed. Spectral measurements of the samples were made for spectral classification. Comparing the MF results, Principal Component Analysis, Decorrelation Stretching, Band Ratio and geological map were used.

Key words: Hydrothermal alteration, Spectral classification, Matched Filtering, ASTER

MONITORING CITY GROWTH DYNAMICS USING CLOUD COMPUTING GOOGLE EARTH ENGINE

ID No: 210

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ABSTRACT

Google Earth Engine (GEE) is gaining popularity within the remote sensing of environment community due to its large global imagery database, fast cloud computing time and easy-to- use interface. Many remote sensing applications start to make use of GEE, and urban science is one of the first science to profit of this powerful tool. Understanding the scale and dynamics of urban growth is vital for policymakers. Thus, consistent monitoring of the conditions become urgent for developing countries. This paper provides a methodology to analyse the phenomena of population growth and spatial spread using satellite based measurements. In this case, GEE is particularly helpful since it allows the exploitation of different imaging sensors and their fusion with custom scripts over 30 years. In this study to assess the performance of GEE, temporal night-time light imagery of one representative city from each geographical region of Turkey were selected considering their cultural and socioeconomic differences. Demographical and social statistical (housing, international/national migration, income and poverty and etc.) data for each city were downloaded from the Turkish Statistical Institute. The threshold values of nightlight imagery supplying high correlation between city population varies from region to region depending on the geography and regional policy. The objectives of the work is then to explore optimal threshold selection methodology from night-time light imagery covering entire Turkey.

Key words: Google Earth Engine, Time Series, Nighttime light imagery, Cloud computing, Türkiye

SUPPORTING LANDSLIDE INVENTORY/SUSCEPTIBILITY MAPS USING ADVANCED INSAR SYSTEMS

ID No: 211

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ABSTRACT

The SAR Interferometry (InSAR) application has shown great potential in monitoring of land terrain changes and in detection of land deformations such as landslides, subsidence events and earthquake deformations on the ground surface. In this study, landslide is the main concern to check the reliability of recent field-based maps.

The recent work is focusing into two targets; first to evaluate the applicability of InSAR to promote the susceptibility maps prepared by AFAD, and second to arrange a continuous monitoring system supporting inventory maps of General Directorate of Mineral Research and Exploration (MTA) against sudden changes or accelerations of land mass movements in both settlement and sedimentary basins (non-settlement). Furthermore, this study offers a transfer of knowledge about InSAR technology and methodological aspects of InSAR application towards detection of hazardous terrain and structural movements. Within new satellite systems of high revisit rate as Sentinel-1/2, InSAR has a great potential to provide high reliability and valuable information that can be used to offer detection of dangerous mass movements, their delineation and spatiotemporal description. For the purpose, we selected different areas such as Denizli/Çameli, Babadağ, Honaz and Konya/Taşkent which are also defined as landslide prone areas at both MTA's inventory maps and AFAD's AYDES system. After applying the method onto the areas, we detected accurate amounts of motion at mm/cm in scale that could not be observed during the land proof. The outputs of this research are prepared within a view of practical usage and connection to the risk management associated organizations AFAD. In addition, the result is a kind of a framework of data storage, main processing and post-processing into a final visual conclusion for other specialists.

Key words: Remote sensing, InSAR, Sentinel, susceptibility maps.

MONITORING LAND SUBSIDENCE IN THE GAVUR LAKE WETLAND WITH SENTINEL 1A/1B IMAGES

ID No: 218

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ABSTRACT

Gavur Lake Wetland is located in the graben areas of Antakya-Kahramanmaras has been formed as a result of river capture and fall related to Tertiary faulting. The important part of lake have been dried because of the health issues (malaria) and to obtain new farmlands. However due to the extreme periods of precipitation, tectonic and geomorphological structure of the graben, Gavur Lake has never been fully dried except summer session. Intense agricultural land use and nature of the area (organic soil, variable ground and surface water levels, tectonic structure) have contributed to the different magnitudes of land surface deformation in this region. This study focused on monitoring land subsidence in the study area with C-band Sentinel 1A/1B imagery data and interferometry technique. Accumulative time-series deformation maps have been produced for the years of 2014 to 2017. Some land subsidence regions were verified by field investigations. The spatial pattern of land surface deformation is based on the following reasons. First one is the changes in the groundwater levels due to the intensification of agricultural activities (requiring irrigation of farmlands), second is the distribution and thickness of recent compressible organic deposits.

Key words: Gavur Lake, Sentinel-1A/1B, InSAR

SPECIFICATION OF LAND COVER EFFECT IN GEOTHERMAL FIELD USING REMOTE SENSING METHODS AND GIS

ID No: 219

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ABSTRACT

This study is aimed for detection of regional and potential geothermal branches in an area of 1900 hectares through North-West and South-West of Corum District of Middle-North Anatolia by using remote sensing techniques. In addition, the research is designed to identify the elements such as trees, soils, rocks effected by minerals containing sulphur within geothermal water evaporation.

For this research, ASTER satellite VNIR (Visible and Near Infrared), SWIR (Middle Infrared) , TIR (Thermal Infrared) data and Landsat Thermal infrared data have been used. Usage of thermal channels for the region are evaluated with Land Surface Temperature (LST) analysis. Digital elevation model (DEM) is created to manage ground with GIS.

The study is conducted in order to examine energy differences that can be perceived on the surface, by utilizing band algebra and band ratio to search calcite, quartz, kaolin, clay minerals and NDVI.

The classification processes are applied with Maximum Likelihood and Spectral Angel Mapper (SAM) algorithms, by using SWIR (infrared bands) of ASTER data, and as an outcome accuracy assessment is calculated.

Furthermore, field measurements are completed to investigate potential geothermal entities in the region, comprising of more than 100 ground samples. Field measurements are conducted using GPS devices, including the leaves, soil and rock specimens and are measured using spectroradiometer and evaluated by graphs.

Key words: Geothermal Remote Sensing, GIS , Land Surface Temperature, Band Algebra, NDVI

THE EFFECT OF SHAPE AND COMPACTNESS PARAMETERS ON SEGMENTATION QUALITY: A CASE STUDY

ID No: 223

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ABSTRACT

The increasing availability of very high resolution (VHR) commercial satellites provide new possibilities for object recognition, image classification, or information extraction. In this context, object-based image analysis (OBIA) has drawn considerable solutions in comparison with traditional pixel-based image processing methods. The OBIA basically consist of image segmentation and classification process. Image segmentation, which is the partitioning an image into a number of homogenous image objects (segments) is the fundamental step for OBIA. Inherently, segmentation quality notably influences subsequent classification accuracy. Prior to segmentation evaluation, the most fundamental step is to determine optimal segmentation parameter combinations. By using different segmentation approaches, a wide variety of segmentation results can be obtained through various segmentation parameters. Among them, the multi-resolution segmentation is one of the most important and widely used image segmentation algorithms in the OBIA. In the operation of multi-resolution, three parameters, namely shape, compactness and scale must be set by the expert. In this study, segmentation quality of image objects has analyzed by using several segmentation parameters to detect optimal parameters of eCognition multi-resolution segmentation algorithm. Optimal scale parameter was determined by using ESP-2 tool which based on local variance of image and rate of change values of local variance. Furthermore, ten different combinations of shape/compactness were used to explore the behavior of shape and compactness parameters and optimal setting for all parameters. Assessment of segmentation quality has been analyzed as geometric relationships between reference polygons and corresponding image objects. In this context, 30 buildings were selected as reference objects from Worldview-2 image which covering Bayramoğlu peninsula in Kocaeli, Turkey. Two empirical discrepancy methods, namely Area Fit Index (AFI) and Quality rate (Qr) were evaluated the ability of the segmentation quality on different segmentation parameters. Results showed that the highest segmentation quality metric (Qr) was achieved by setting the shape/compactness criteria to 0.1/0.7.

Key words: Multi-resolution Segmentation, OBIA, Scale, Shape, Compactness, Segmentation Quality

INVESTIGATION OF SURFACE DEFORMATIONS WITH ALOS PALSAR-1, ENVISAT ASAR AND TERRASAR-X IMAGES BY USING SBAS, PS AND DINSAR ANALYSES: A CASE STUDY OF THE NEMRUT VOLCANO AND ITS SURROUNDINGS

ID No: 220

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ABSTRACT

The Nemrut volcano is one of a dozen active volcanoes in our country that are likely to erupt in the future. Our aim in this study is to investigate the surface deformations such as subsidence, uplift and mass flows in the Nemrut caldera and its surroundings by using SAR interferometry (InSAR) with ALOS Palsar-1, Envisat ASAR and TerraSAR-X SAR images. InSAR analyses of SAR images have shown that the Nemrut Caldera has lost the ability to erupt and subside slowly into its magma chamber. In the small scoria cone area around the Kantaşı, where the least eruption in 1443 occurred, SBAS analysis of ALOS Palsar-1 reveals the uplift at a rate up to ~7 cm (generally the line of sight (LOS) displacement values ranging between ~2 cm and ~5 cm) and LOS velocity at a rate up to ~8 mm/year (generally LOS velocity values ranging between ~1.5 mm/year and ~5 mm/year). This probably indicates a hot and viscous magma mass still rising under this scoria cone. ALOS Palsar-1 SBAS analysis also show that the region which is from western of volcano towards Muş plain uplifts. The uplift rate reachs a rate up to ~10 cm (generally LOS displacement values ranging between ~1 cm and ~6.5 cm). The LOS velocity reachs a rate up to ~10 mm/year (generally LOS velocity values ranging between ~1 mm/year and ~5 mm/year). It is observed that the uplift rate in the western slope of the caldera is higher than that of the Muş plain. Even though the middle of the Muş basin have apparently been collaped among the faults limiting the basin, the eastern part of the basin adjacent to the Nemrut volcano uplifts. The reason of uplift may possibly be due to the upwelling/emplacement of a magma mass in the crust at shallow depth. The InSAR results of SAR images indicate that the eruptive center of the Nemrut volcanism may shift westward in the future towards the eastern termination of the Muş plain adjacent to the volcano.

Key words: Nemrut stratovolcano, surface deformation, SAR, ALOS Palsar-1, interferometry, differential interferometry (DInSAR), persistent scatterers (PS), small baseline subset (SBAS), interferometric SAR (InSAR)

DETERMINATION OF SPATIOTEMPORAL COASTLINE CHANGES OF GÖKSU DELTA BY GEOGRAPHICAL INFORMATION SYSTEMS (GIS) AND REMOTE SENSING

ID No: 224

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ABSTRACT

Changes in the coastal regions of the coastal countries are a very important issue for many professional disciplines, especially management and planning. Although determination of coastal changes, forecasts and simulations for the future, planning and precaution studies are all around the world, the measures taken on this issue and the problems in Turkey are extremely inadequate.

This study examines the changes of the Göksu Delta coastline between 1984 and 2011 over the past 27 years and aims to determine the effectiveness of the measures taken to protect the coastline in the region and to investigate the effects of events shown to cause coastal changes between these dates. For this purpose, Landsat 4-5 TM satellite images of 25 June 1984, 16 June 1998, 30 June 2003, 8 July 2006 and 20 June 2011 were obtained. The Shoreline Change Envelope (SCE), End Point Rate (EPR), and Linear Regression Rate (LRR) methods were used to determine shoreline changes.

Analysis of the changes in the shoreline was performed by the use of DSAS (Digital Shoreline Analysis System) software. A total of 814 transects were formed on the main line at intervals of 50 m. As a result of the analysis, in the Göksu Delta coastline, the amount of erosion at the rate of -30.99 m / yr between 1984 and 2011 was determined as 826.85 m in the land direction. Despite the precautionary measures, in order to reverse the ongoing coastal contraction and to protect the ecosystem damaged in the region, the end result is that all works which damages the rivers, especially rivers and deltas, should be abandoned.

Key words: GIS, Remote Sensing, Spatiotemporal changes, coastline

INVESTIGATION OF LANDSLIDE MOVEMENTS AND SURFACE DEFORMATIONS WITH ALOS PALSAR-1 IMAGES BY USING SBAS, PSI AND DINSAR ANALYSIS: A CASE STUDY OF KÜÇÜKÇEKMECE-BÜYÜKÇEKMECE (İSTANBUL) REGION

ID No: 221

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ABSTRACT

In some regions of Turkey, landslides are at the first place of natural disasters causing socio-economic damages such as losses of life and property because of the climate conditions, geological structures, active faults and geomorphological features. Landslides are potentially a great danger and risk because of the geological characteristics of the Küçükçekmece-Büyükçekmece region in Istanbul city where urbanization and population growth are rapid. The purpose of this study is to investigate the landslide movements and surface deformations in Küçükçekmece-Büyükçekmece (Istanbul) region by using small baseline subset (SBAS), persistent scatterers (PS) and differential interferometry (DInSAR) techniques with 20 ALOS Palsar-1 (L-Band) images and to carry out time-series analyse. Interferometric SAR (InSAR) analyses were conducted analysis for landslide movements and surface deformations in the period from December 2006 to January 2011. According to ALOS Palsar-1 SBAS analysis, the highest LOS displacements rate emerge in Avcılar, Esenyurt and Yakuplu landslide areas. Moreover, high values of LOS displacements rate are obtained from SBAS analysis in Çakmaklı, Çukurlar, Firuzköy, Güzelyurt, Kemerdere, Kocatepe, Paşaeli and Pınartepe landslides. In Alkent, Balaban, Ambarlı, Fener, Gölyaka, Kavaklıdere, Kıraç and Pekmez landslides, lower LOS displacement values are seen. Another important result of InSAR analyses is the land subsidence measured in approximately the NW-SE direction along the Haramidere valley in area which is from Kıraçköy towards Marmara Sea. The subsidence area covers a part of landslides of Yakuplu and Güzelyurt. ALOS Palsar-1 SBAS analysis shows that LOS displacement reachs a rate up to approximately -13 cm (generally LOS displacement values ranging between ~ -1 cm and ~ -8 cm) and LOS velocity reachs a rate up to approximately -25 mm/year (generally LOS velocity values ranging between ~ -2 mm/year and ~ -15 mm/year).

Key words: Küçükçekmece-Büyükçekmece (İstanbul), landslide, SAR, ALOS Palsar-1, interferometry, differential interferometry (DInSAR), persistent scatterers (PS), small baseline subset (SBAS), SAR Interferometry (InSAR)

MAPPING PERCENT TREE COVER OF TURKEY USING MODIS DATA AND REGRESSION TREE MODEL

ID No: 313

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ABSTRACT

The aim of this study was to predict percentage tree cover from MODIS imagery with a spatial resolution of 250 m using a regression tree (RT) model. This technique is well suited for percentage tree cover mapping because, as a non-parametric classifier, it requires no prior assumptions about the distribution of the training data. This model also allows for the calibration of the model along the entire continuum of tree cover, avoiding the problems of using only end members for calibration.

The regression tree method for this study consisted of five steps: i) generate reference percentage tree cover data, ii) derive 81 variables from MODIS data, iii) select predictor variables, iv) fit RT model, v) undertake accuracy assessment and produce final model and map. The training data set was derived from a fine spatial resolution land cover classification of FORMOSAT, KOMPSAT and IKONOS images of an area of covering 5000 km2. Specifically, this classification was aggregated to predict percentage tree cover at the MODIS spatial resolution. The predictor variables included 16 days composites of MODIS wavebands including red and near-infrared plus NDVI for 23 different dates (69 images). Additionally, maximum, minimum, standard deviation, and cumulative values of NDVI for 12 months. So, 81 images were used as predictive variables to predict percent tree cover map of Turkey as final output. This final output consisted of spatially distributed estimates of percent tree cover at 250 m spatial resolution and error estimates obtained through validation.

This study showed that MODIS data can be used to predict percentage tree cover with greater spatial detail. This finer-scale depiction should be of great utility for environmental monitoring purposes at the country scale.

Key words: Percent tree cover, MODIS, Regression tree.

WETLAND MAPPING USING SENTINEL-1 SAR DATA

ID No: 295

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ABSTRACT

Mapping and monitoring wetlands is critical for planning ecosystem management and sustainable regional development. Remote Sensing has proven to be a useful application in wetland management over the last few decades. Number of Earth observation satellites is growing with the development of the Remote Sensing. In this paper, the potential of the recently launched Sentinel-1 SAR (Synthetic Aperture Radar) satellite for mapping and monitoring wetlands was investigated. For this purpose, two Sentinel-1 images collected in summer and early spring period for free from the Copernicus Open Access Hub were used. As a study area in this paper, one of the biggest wetlands of Turkey that lies on the Sakarya River, and it is located 30-40 km south of Sivrihisar, Balikdami wetland, has been chosen. After the data have been calibrated, terrain corrected and filtered, supervised classification with different scenarios have been applied in order to estimate the different combination of VV and VH polarizations. For the accuracy assessment high resolution images from Google Earth and field work data have been used. The results show that the combination of the two polarization increase the accuracy against the use of single polarization. The results are significant for the wetland remote sensing since SAR images can be used when meteorological conditions do not allow acquirement of optical data.

Key words: Wetlands, Sentinel-1, Synthetic Aperture Radar

MONITORING LAND SURFACE TEMPERATURE USING LANDSAT 8 SATELLITE IMAGERY: A CASE STUDY OF CANAKKALE - TURKEY

ID No: 48

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ABSTRACT

Land Surface Temperature (LST) is one of the essential parameters in climate change, evapotranspiration, urban climate, vegetation monitoring and other thermal analyses. The new instrument which was called Thermal Infrared Sensor (TIRS) carried on board of the new generation of Landsat 8 captures the temperature of the Earth's surface in two bands, band 10 and band 11 with spatial resolution of 100m. The main objective of this study was to retrieve LST for Canakkale Province, Turkey using Landsat 8 imagery acquired on September 15th 2016. In this study, Radiative Transfer Equation (RTE) method has been employed in ArcGIS Model Builder to calculate LST. It was found that urban area and bare land feature higher temperatures than forested areas.

Key words: ArcGIS, Model Builder, GIS, LST, NDVI

DETERMINATION OF LAND USE AND TEMPORAL CHANGE OF DARDANELLES PROVINCE BY USE GIS AND RS

ID No: 197

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ABSTRACT

Rapid growth of population in urban areas causes them to grow quickly of urban areas. This rapid growth in urban areas makes the rational use of the natural environment difficult and changes the land use patterns. This situation necessitates studies on changes in land use and land use. Because the work of identifying the current state of urban development is crucial to the future planning of cities and the sustainable planning of environmental impacts.

In thıs study; The state of the urban development of the Çanakkale city, which consists of the Çimenlik castle and the first core in 1462 on the eastern bank of the Dardanelles, was investigated by remote sensing techniques. Landsat 8 OLI and Landsat TM satellite images taken in different years were used to determine the urban area and development. Supervised classification technique was applied to determine land classes. CORINE level 1 field classes (artificial surfaces, agricultural areas, forests and semi-natural areas, wet areas, water communities) were used in the study. The accuracy of the generated land class maps was tested by kappa statistical method. All the data obtained was created with ArcGIS 10.2 and Erdas Imagine 14 software.

By examining the obtained maps, it was revealed that urban development in Çanakkale province caused significant changes in land existence. It has been found that the city extends alluvial floor space and it has been observed to spread especially along the southern coast. Suggestions have been made about the land use over the obtained data.

Key words: GIS, Remote Sensing, Land Use, Dardanelles

USE OF SENTINEL-1 DATA IN OIL SPILL SURVEILLANCE AND MODELING

ID No: 215

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ABSTRACT

A consistent surveillance and modeling of oil spills which is taken place from ships, offshore platforms and accidents is very important in terms of public safety and environmental protection. It is also necessary to detect spillage, spread from the source to nearby coastal areas. In this context, Sentinel-1 data was processed for detection and monitoring of oil spills which have received great interest due to wide-area coverage, day and night availability and usage in all weather conditions. In this study, the oil spill incident was investigated at the Ilıca and Paşa ports that are the most of the favorite beaches of Çeşme occurred in December 18, 2016.

A simple and relatively quick approach for oil spill detection has been employed to VV polarized Sentinel-1 imagery before and after the incident. Moreover, the obtained results are discussed taking into account oil spill area. The processing steps for the oil spill detection were carried out using Sentinel Application Platform (SNAP). The results indicate that the Sentinel-1 data can be used efficiently for oil spill detection. In the future study, a semi-automatic or automatic strategy based on the relevant methodology will be developed for detection of oil spill with timely and cost effectively.

Key words: Oil spill detection, Ship incident, Sentinel-1, Image analysis, Band combination.

DISCRIMINATION AND CLASSIFICATION OF THE ROCK-TYPE WITH MULTISPECTRAL SENSING

ID No: 19

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ABSTRACT

This study contains the possibility of separating and classifying remotely-sensed multispectral data from different geological rock-type groups and proposes the use of a low-cost handy sensor, a calibrated multispectral camera. The spectral data was recorded by an ADC II micro multispectral camera mounted on a field-based platform in the spectral range of 520nm to 920nm for the recognition of different geological formations. The software also enables users to convert the green, red and invisible NIR bands captured by the camera as a monochrome image into blue, green and red respectively.

The study area was selected in the southwest of the Biga Peninsula (NW Turkey) to analyze the discrimination potential of this camera for rock types and close-range remote sensing applications. The region consists of Pliocene conglomerates, sandstones and mudstones sediments and Miocene rhyolitic tuffs and ignimbrites intercalated with them. After proper strategy of corrections and data processing, a supervised classification of the multispectral data was performed to distinguish sedimentary and volcanic rocks. The obtained results confirmed that the used multispectral camera can be efficiently exploited to map differences in geological formations.

Key words: Multispectral imagery, Remote sensing, Rock classification, Band combination.

INTEGRATE BETWEEN GIS AND REMOTE SENSING TECHNIQUES IN UPDATE GEOLOGIC AND GEOMORPHOLOGIC MAPPING OF SAND SEA AREA, SOUTHERN LİBYA

ID No: 21

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ABSTRACT

The Sand Sea area occupies 713.43 square kilometers and is situated between latitudes 21° 30`N and 21° 45`N and longitudes 24°15`E and 24° 30`E. A pronounced feature at the mapped area is the presence of the ends of Sand Sea. sand dunes, barchans sand dunes and extensive sand sheets. The dunes are of longitudinal type oriented as streamlines in northeast – southwest trends. Sand dunes are of longitudinal type in Sand Sea area that reaches up to 90 km long and usually up to 20 m. high. This dune occurs at the western part of the mapped area. Most of the undifferentiated Precambrian rocks and the upper member of Carboniferous rocks at the Seif AL Uwaynat area are partially covered by Quaternary deposits.

Ten colors composite images obtained by the superimposition of the data of three Landsat Enhanced Thematic Mapper (ETM) Bands after dynamic enhancement processing (Histogram Gaussian Contrast Stretching) facilitate interpretation of the Seif sand dunes and barchans sand dunes information contained in the original Landsat (ETM 7,4,2) data. New information is obtained from these ten colors composite images even though it is compared with small scale geological data such as the geological map of Sand Sea region. In this regard the map of IRC (2007), scale 1:250,000 and Hunting (1974), scale 1:100,000.

The Landsat ETM of this region reveals a textural, moisture content, patterns and color differentiation with the Quaternary deposits which consist of the Sand Sea (Longitudinal) sand dunes and clay deposit along their troughs. As this differentiation and the result was not observed or mentioned on the geological map of IRC (2007) and Hunting (1974).

Another technique has been accomplished to identify terrain features of Sand Sea region using band ratioing technique. Terrain features of the study area have been identified by band ratioing technique from reflectance bands of Landsat ETM image. Twelve band ratios have been created and each ratio has revealed the terrain features. Single color - composite combinations of three ratios has separated subtle differences between different terrain features uniquely. This study has been on the basis of visual interpretation. Band ratioing technique has been identified terrain feature.

Key words: Landsat Enhanced Thematic Mapper Imagery; Update Geologic and Geomorphologic Mapping Using GIS & Remote Sensing Techniques.

ASSESSMENT OF TRANSPARENCY AND WATER QUALITY IN THE BAY OF BOU-ISMAIL FROM LANDSAT SATELLITE IMAGERY

ID No: 292

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ABSTRACT

This study proposes a performance analysis of Landsat sensors (TM, ETM, and OLI). For this, several images was downloaded since 1984 to 2016 during the different months, in parallel some physicochemical parameters have been in situ measurements in the Bou-Ismail Bay, in stations that presents pollution. Image processing was performed. Correlation analysis allowed us to compare the results of satellite measurements with transparency, field measurements and brightness temperature, treatment models, radiance, reflectance, and ratios were developed. Algorithms and temporal and spatio-temporal models treaties parameters were tested, and the correlative analysis gave a consistent and optimal shape for most processed images showing more or less reliable results.

Key words: Transparency, Water Color, Remote Sensing, GIS, Physicochemical Parameters, Correlation, Modeling

ESTIMATING WETLAND CHANGES WITH REMOTE SENSING TECHNIQUES

ID No: 296

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ABSTRACT

Mapping and monitoring of wetland biomass as one of the world`s most valuable natural resource has gained great importance with the developed of the remote sensing techniques. Wetlands as a transitional between terrestrial and open-water aquatic ecosystems contain a mixture of open water bodies and vegetation. In the past few decades extensive loss of wetlands has occurred all over the world. It is of great importance to map and monitor wetlands up-to-date to prevent further loss of wetlands.

In this study, Normalized Difference Vegetation Index (NDVI) analysis as an important role for vegetation and biomass monitoring and Normalized Difference Water Index (NDWI) have been used. Normalized Difference Water Index has been used for monitoring the open water bodies in the wetland area. As a study area, Eber Lake has been selected. The surroundings of Eber Lake are mostly wetlands, since the average depth of the lake is around 3 or 4 meters.

In this study, Landsat-7 images were used and downloaded free from the USGS webpage. The analyses were made from yearly from May 2000 to May 2016 using twelve Landsat-7 images.

According to the results, the water areas has been lowering ever since 2000 and the wetland and land areas has been growing. The highest NDVI values were observed in 2007. The level of bareland in the study area was noticed to be at his higest in May 2009.

Key words: Wetlands, Remote Sensing, Eber Lake

SECONDARY IRON OXIDE MAPPING OF WESTERN DENIZLI BY LANDSAT 7 ETM+ AND ASTER DATA

ID No: 308

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ABSTRACT

Menderes metamorphic basement of Aegean region of Turkey is widely outcropped in the western Denizli and Aydin Provinces. This unit hosts spare vein type iron mineralization mainly consisting of either magnetite or hematite minerals. Weathering of primary iron minerals caused intensive iron oxide staining in the region. Distribution of this secondary iron oxide formation has been determined in this study using Landsat 7 ETM+ and ASTER images. Two common iron oxide mapping methods were used on the images: Band rationing and principal components analysis (PCA) on the selective bands (Crosta method). Both band ratios of 3 to 1 on Landsat 7 ETM+ and 2 to 1 ASTER images and principal component 4 (PC4) image of Crosta method on Landsat 7 ETM+ images successfully have mapped iron oxide formations. However combination of 3 to 1 band ratio and PC4 image of Crosta method, which we propose in this study, is more powerful method both visual interpretation and supervised classification of iron oxide formation.

Twenty one soil samples were collected in both anomaly fields and non-anomaly fields for XRF analysis. No further chemical analysis was carried out for ferric and ferrous iron discrimination. Iron oxide concentration of samples expressed as Fe_2O_3 range from 4.3% to 9%. Although there isn't systematic variation of Fe_2O_3 of samples with digital number of ratio and PC4 images, it is obvious that samples collected in the anomaly fields have higher Fe_2O_3 content. In addition, hand-size and sand-size iron minerals have been observed in the anomaly fields. The region needs further work to determine a possible iron and associated mineralizations.

Key words: Iron oxide, Iron mineralization, Band rationing, Principal components analysis, Landsat, Aster

UNMANNED AERIAL VEHICLE

COMBINING FIELD SURVEYS AND UNMANNED AERIAL VEHICLE PHOTOGRAMMETRY IN LANDSLIDE DOCUMENTATION

ID No: 251

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ABSTRACT

Management of mountain hazards and risks requires careful hazard and risk analysis and assessment, which are based on the former events. That's why, documentation of mountain hazards/risks is crucial. In this study, a landslide (i.e. slump), located in Fındıklı-Aksu Village (Düzce, Turkey), was documented by combining field surveys and unmanned aerial vehicle (UAV) photogrammetry. About 20 years ago, this slump occurred by causing destruction of one house and one animal shelter, and resulting in death of five cattle. This slump is surrounded with forest and a hazelnut grove is located over the area. A UAV flight was carried out on March 25, 2017. In total, 216 geo-tagged images were taken with resolution of 12 megapixel by using a RGB camera. Structure-from-Motion (SfM) algorithm was used for generating Digital Elevation Model (DEM) and orthophoto, which have spatial resolution of 10 cm. In order for georeferencing the model during SfM process, six ground control points (GCPs) were measured. According to field surveys and UAV data, slump covers 5.3 hectares. Scarps and transverse ridges of the slump can clearly be seen from high-resolution orthophoto. However, existence of vegetation limits UAV-based photogrammetric analysis.

Key words: DEM, Landslide, Orthophoto, Structure from Motion, UAV Photogrammetry

UAV-BASED PRECISE 3D TOPOGRAPHIC MODELLING TO BUILD ENGINEERING STRUCTURES

ID No: 235

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ABSTRACT

Topographical and geological surveys are the main applications for correct positioning and the stability of the engineering structures and have a great impact on decision mechanism of building architecture. In parallel with the developments in geomatics engineering, technological solutions are recently possible for precise three dimensional (3D) topographic estimation. In this study, two-step application was performed in an inclined topography. In the first step, the precise digital terrain model (DTM) was generated utilizing passively collected unmanned air vehicle (UAV) data. For DTM generation, dense point clouds were derived from high resolution aerial photos subsequent to precise matching and the noise was filtered. In the second step, varied size buildings were positioned on generated DTM. The results demonstrated that UAV-based remotely sensed data is reasonable for precise topographic modelling to build engineering structures although encountering challenges in application steps. All of challenges and the solutions were described in detail.

Key words: Unmanned air vehicle (UAV), Digital terrain model, Topographic estimation, Engineering structure

CAMPUS INFORMATION SYSTEM GENERATION UTILIZING PASSIVELY COLLECTED UAV DATA: CASE STUDY BULENT ECEVIT UNIVERSITY

ID No: 73

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ABSTRACT

In last decade, thanks to the great acceleration in airborne remote sensing by unmanned air vehicle (UAV) technology, very high resolution (VHR), low-cost and periodically data became accessible for geographical information systems. Moreover, with the pros of lower altitudes, high ratios of frontal and side overlaps for stereo imaging and multichannel optical cameras, the target objects can be achieved in its original color and three dimensional shape. Although having several advantages, UAV technology has also some imaging limitations like other remote sensing methods depending on various sources. In this study, a Campus information system was established using five-step application. In the first step, VHR aerial photos of Bulent Ecevit University Central Campus area were achieved by a UAV equipped with passive optical devices. In second step, aerial photos were rectified and ortho-photo and digital surface model (DSM) of the area were generated. Third, buildings and roads were digitized from generated ortho-photo and DSM. In fourth-step, databases were established with digitized buildings and roads, elevation and length information were added and attribute tables were obtained. Finally, Campus information system was transferred to the ARGIS server on the web. In the paper, all of application steps and encountered challenges are described in detail

Key words: Unmanned air vehicle (UAV), Digital terrain model, Database, GIS

VOLUMETRIC COMPARISON OF UAV-BASED POINT CLOUDS GENERATED FROM VARIOUS SOFTWARES

ID No: 240

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ABSTRACT

Nowadays, Unmanned Aerial Vehicles (UAVs) are used in areas such as agriculture, forestry, energy, mining, construction, archaeology, architecture and security. UAVs acquire high spatial and temporal resolution imageries with lower cost than conventional photogrammetry method thus it has started to be used in various application fields.

In this study, it was aimed to compare the accuracy of the volumetric dimensions of the objects in the same application area calculated by various softwares which apply automatic photogrammetric methods. The digital surface model (DSM) and the orthophotos of a region within the Istanbul Technical University Campus is generated from low altitude UAV-derived point clouds and integrated digital camera captured aerial photograph. Ground control points collected with Differential Global Positioning System (DGPS) are identified and used for georeferencing. The objects' boundaries were determined on the point clouds and their volumes were calculated.

This study also compares and assesses the accuracy of point clouds generated from various softwares with each other. Similar point cloud production parameters were used in these softwares. In addition, the UAV-derived dense point clouds of objects were compared with each other. The validation of volumetric dimension has been done by the field study. Accordingly, accuracy assessment of volumetric dimensions of the generated point clouds has been done with these terrestrial measurements. In conclusion, the consistency of volumetric dimensions between point clouds has been analysed.

Key words: Unmanned Aerial Vehicle (UAV), accuracy assessment, Point Cloud, volumetric dimension

3D MODELLING OF ITU AYAZAGA CAMPUS

No: 245

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ABSTRACT

The aim of this study is to create a 3 dimensional (3D) virtual reality model of Istanbul Technical University, Ayazaga Campus. The study covers 80 ha of the campus area where campus buildings are located. Unmanned Air Vehicle (UAV) is used in order to capture the aerial photographs to generate 3D point clouds which later on used for Digital Surface Model (DSM) production of the study area and 3D modelling of the buildings. Data collection process is completed based on the flight plan. According to prepared flight plan, study area is divided 11 blocks, which each one cover approximately 10 ha, with 20% side and front overlap between blocks and images are obtained for each block with 80% side and front overlap from 100m flight altitude. In order to create DSM in national coordinate system with 3D point cloud, 37 circular ground control points (GCPs) with 80 cm diameter are homogeneously established on the study area and observed 12 minutes with GPS receivers in static mode. The positional accuracy of GCPs are determined ±3 cm in horizontal, ±4.5cm in vertical direction. 15 of these GCPs are used as check points to evaluate the accuracy of generated DSM. Besides, induvial flights are carried out from 50m above from ground to create better 3D model of the buildings. Generated DSM and 3D models of the buildings are combined in same coordinate system by using GCPs. Lastly, 3D model of the ITU Ayazaga campus is created.

Key words: Unmanned Air Vehicles, Point cloud, Digital Surface Model, Building Modelling

MONITORING AND QUANTIFYING OF HYDROGEOMORPHOLOGICAL CHANGES ON THE FLOOD PLAIN BY UNMANNED AERIAL VEHICLES

ID No: 248

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ABSTRACT

The hydrological regime and the hydrogeomorphological processes are the most important landscape-forming factors in flood plains' evolution. Despite the historical analysis of the flood plain ecosystem is important to recognize the main controlling factors affecting the long-term changes of the floodplain habitats, the assessment of the recent conditions helps to identify the deficiencies of the hydrogeomorphological and ecological processes in the recent situation as well as the development of the fluvial landscape.

Unmanned Aerial Systems (UASs) is widely used for various applications, especially for large scale mapping of flood plains. The Unmanned Aerial Vehicles (UAVs) act as a bridge to fill the gap between the satellite and the field scale, as they provide an alternative to temporal and spatial resolution to the satellite imagery and can be directly linked to the terrestrial measurements. By considering the weather conditions at the desired time, UAVs can provide high resolution images of the region to be worked on and thus provide cost and time benefits compared to conventional measurement methods and satellite systems.

In the study, UAV-visualization is used to create very high resolution surface models based on Structure from Motion (SfM) technique which is applied for the creation of 3-D models from unstructured imagery and frequently used in conjunction with UAVs. Hydrogeomorphological changes in the Bogacay River in Antalya have been evaluated by using fine resolution UAV-derived orthophotos and Digital Surface Models (DSMs) acquired at periodic intervals. The results revealed significant changes in the flood plain representing an overall degradation of river conditions in a short period of time.

Key words: Unmanned Aerial Vehicle, hydrogemorphology, Bogacay, flood plain

TEMPORAL MONITORING OF LANDSLIDE USING IMAGES OBTAINED FROM UAV

ID No: 249

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ABSTRACT

The occurrence of natural disasters is increasing every year in the world. The areas in danger and risk of disaster change and expand according to type of disaster. This subject causes goods and real estate properties' get damaged from natural disasters. Reducing the damages of natural disasters is dependent on the improvement of efficient data collection and analyzing methods which are widely used for disaster management. Temporal disaster inventory is the most basic data source of disaster management and its accuracy is very important. In studies such as creation an inventory, temporal images are required to determine sufficient information such as activity of landslide. In this context, search and rescue, estimation of damage and inventory studies can be performed effectively by evaluating the spontaneous data collection capacity of Unnamed Aerial Vehicle (UAV).

In this study, the availability of UAV for the monitoring, mapping and extracting inventory of landslides has been widely examined. For this purpose, a landslide located in Trabzon province has been selected as study area. The aerial photographs of the study were taken by using UAV and digital photogrammetric software was used for the assessment of the acquired temporal images for the collection of inventory data. To consequently, the basic data source, shape, type, dimension, surface of slope deformation, activity and the affected area etc. are calculated for precise definition of landslides.

Key words: Landslide Inventory, Unmanned Aerial Vehicle (UAV), Digital Photogrammetry, Disaster Management.

PRECISE ENGINEERING APPLICATIONS OF UAVS

ID No: 250

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ABSTRACT

Unmanned aerial vehicles (UAVs) are aircrafts that remotely controlled or self-navigating, have advanced independent control systems, can be controlled by crew without interruption, can fly at low altitudes, can carry small loads and can record images. The UAVs used for various purposes in civil and military fields today, too, have exhibited development as result of developments in aviation, electronics, communications and navigation technologies in parallel with the developments which occurred in the field of science and technology in the 20. Century. These have ensured ease of use and showed a rapid increase in cause, such as the sensor systems becoming smaller, increased in activity and able to fly at lower altitudes. As a result, the use of UAV has become widespread in recent times as it is possible to produce low-cost high-resolution images in a short period of time. The use of UAV tools has become widespread in map production, land survey, landslide and erosion monitoring, archeology, monitoring of agricultural activities, aerial crop surveys, inspection of energy lines and pipelines, forest fire detection and monitoring and discovery and security and monitoring operations.This paper has questioned the appropriateness of the use of UAVs in archeology, mapping, mining, agricultural investigation and land slide investigation applications. It has been used the TM-GEO1 UAV designed and had been produced by GOU Geomatics Engineering Department (GED) and TEKNOMER firm. Aerial photos have been evaluated with PIX4D software. Ground Control Points (GCPs) have been measured with four GNSS dual frequency geodetic GNSS receivers (Trimble, Topcon) by using the static GNSS measurement method. The 2-hour static GNSS measurements have been evaluated in three dimensions (3D) by the Leica LGO V.8.3 software depending on the TUSAGA active system. As a result of the evaluations, RMS's have been obtained for GCPs between ±1,8 cm and ± 5.4 cm, horizontal and vertical position accuracy of object points between ± 3,44 and ± 5,22 cm. At the end of the studies, it can be concluded that when appropriate and sufficient GCPs and flight height have been selected maps can be produced according to the BOHHBUY regulations, CAD restoration plans can be drawn, landslide movements can be monitored and volume of the excavation areas calculations can be done.

Key words: Unmanned Aerial Vehicles (UAV), GNSS, Pix4

INTERPOLATION OF UAV BASED POINT CLOUD WITH RADIAL BASIS FUNCTIONS

ID No: 232

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ABSTRACT

Radial basis functions are an effective interpolation technique for three-dimensional point cloud data, where the points are sparsely scattered in the space. Unmanned aerial vehicle (UAV) imagery acquires large amounts of 3D points that are called point cloud from Earth's surface data. In order to take advantage of the point clouds, we examined the performance of 3D interpolation techniques which allow the successively development of a high-resolution digital terrain model (DTM). Vegetation filtering procedures produce gaps in the data. In addition, dense point clouds obtained from UAV imagery can be simplified using various techniques in order to decrease processing time. Hence, the point clouds include gaps after post-processed data such as classification of non-ground points or removal of redundant points. In this study, we implemented the radial basis interpolation techniques (i.e. spatio-temporal radial basis functions, individual predictions from Gaussian, Exponential, Thin Plate Spline and Inverse Multiquadratic functions) in 3D data then compared their performance with regard to the root-mean-square prediction errors (RMSPE) by means of leave one out cross validation method. The software platform that is used is an open source R-programming package. After the cross-validation, it is seen that the thin plate spline (TPS) method give more reasonable results than the other radial basis functions give.

Key words: UAV, point cloud, DTM, Radial Basis Functions

PHOTOGRAMMETRIC 3D MODELLING AND MAPPING WITH UNMANNED AERIAL VEHICLES (UAV) – SAMPLE OF SILIFKE CASTLE

ID No: 253

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ABSTRACT

Unmanned Aerial Vehicle (UAV) or Unmanned Aerial System (UAS), commonly known as a drone, is an aircraft without a human aboard but remotely controlled by a human. UAVs have been primarily begun to produce and use for military purposes. It has become pretty attractive for photogrammetry in terms of generating Digital Terrain Model (DTM), Orthophoto and mapping with its widespread use in civilian aviation. Aerial surveillance and mapping of large areas in a short time is possible with low-cost UAVs. Surveyors are becoming much more effective in the field and collecting much more data on the objects with these systems.

We present a paper about 3D photogrammetric modelling and mapping with UAVin Silifke Castle and the hill where it has been built on. Silifke Castle is situated to the west of Silifke city centre, its altitude is only 160 metres with respect to sea level and it is dominant over Goksu delta. Although it is in the appearance of a medieval castle, it is dated to earlier ages. The castle is 270 metres long, 84 metres wide and the castle walls are about 10 metres high.

In the field study, Ground Control Points (GCPs) have been established and measured by a Global Navigation Satellite System (GNSS) survey device in TUSAGA-Aktif CORS system to raise the accuracy of the model and map. We created several flight plans before the field study and executed these flight plans with DJI Phantom 3 Standard in the 50 hectares field. The flights have been executed in 100 m above to generate the 3D model of the hill. A few more flight plans have been created to generate 3D Model of the castle in detail and the flights have been executed in several altitude. After the field study photographs and surveys have been processed to generate 3D modelling and mapping.

This study has shown us large areas can be modelled in a short time and a low-cost so it is a pretty efficient way to mapping.

Key words: UAV, Photogrammetry, Mapping, 3D Modelling, Silifke Castle

INVESTIGATION OF THE DETECTABILITY OF DIFFERENT GEOLOGICAL FORMATIONS/IMPURITIES IN OPEN PIT MINE WITH UAV

ID No: 254

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ABSTRACT

The earth is consists of rocks that different ages and characteristics. This rock variety also controls the industrial, metallic and natural stone formations of different features. The detection of some different geological formations/impurities is very important for mining activities. Because they can reduce the economic value of mine. However, the detection of different geological formations/importers is traditionally carried out by a hardly and costly field study. Nowadays, Unmanned Aerial Vehicles (UAVs) can provide high resolution images economically and quickly, and these images are used for many different purposes. In this study, the availability of UAV images was investigated in the detection of different geological formations/impurities in open pit mines. In this context, the flight process was carried out at different heights (25m, 50m, 75m 100m) with DJI Inspire 1 Pro in a marble quarry which is located in Aksaray city and granite marble is produced. Digital surface models (DSM) were produced from the four different elevations and the detection of different geological formations/impurities were made on these models. In order to test the accuracy of the proposed method with respect to different flight heights, the detection values obtained from the DSMs were compared with the results of the classical field study. In addition, time-cost analyzes have been conducted to investigate the performance of the UAV in detecting different geological formations/impurities in open mines.

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Key words: Unmanned Aerial Vehicles, Mining, Digital Surface Model, Geology.

COMPARISON OF THE PRODUCTS OBTAINED FROM THE IİMAGES OBTAINED BY UNMANNED AERIAL VEHICLE AND AIRCRAFTS WITH A DIGITAL AIR CAMERA

ID No: 257

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ABSTRACT

As in many disciplines, rapid production of highly accurate data is an essential requirement in mapping sector. Photogrametry provides many advantages in map production such as very accurate terrain models and redundancy in measurable details. With the help of improving technology, Unmanned Air Vehicles (UAV) have taken an important place in the Photogrametry and Remote Sensing studies. In this platform, no pilot exists and the control is ensured using various remote control methods (Bluetooth, remote connection etc.). Since UAVs are fast, accurate and low-cost to operate particularly in small areas, they are preferred to be used in many applications such as determining illegal housing, locating coastal line, determining village settlements, producing large scale maps and monitoring natural protected areas.

Aerial data acquisition has been made with a digital aerial camera mounted on an airplane in Isparta – Aksu region (GSD = 10 cm). In the same region, data acquisition with UAV has been performed as well (GSD = 5 cm). In this study, comparison of true orthophotos, Digital Surface Models (DSM) and point clouds produced from images taken by two different platforms is done.

Key words: True Orthophoto, Remote Sensing, UAV, Photogrametry.

MONITORING SOIL EROSION USING UAV (UNMANNED AERIAL VEHICLE), RS (REMOTE SENSING) AND GIS (GEOGRAPHICAL INFORMATIONAL SYSTEMS): A CASE STUDY OF THE GANOS MOUNT, TEKIRDAG (NW TURKEY)

ID No: 229

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ABSTRACT

Soil erosion, which has environmental, economic and social consequences, is a global problem. Increasing with each passing day due to the unconscious activities of humans, this problem leads to gully erosion which becomes a key matter in natural resource management over the course of time. This phenomenon, seen as one of the principal agents of geoenvironmental degradation, causes damages in roads, natural resources and agricultural areas at different severities. One of the areas where similar problems can be experienced in the near future as a result of gully erosion is Ganos Mount. In the present study, it is aimed to monitor the actual erosion in the northeastern part of Ganos Mount using UAV (Unmanned aerial vehicle), RS (Remote Sensing), and GIS (Geographical Information Systems) techniques. Within the scope of the present study, the spatial changes in the area where actual gully erosion occurred were monitored and mapped as of 2009. Thus, attempts were made to find out which factor or factors had an effect on the natural changes taking place in the area. The thematic maps of the study carried out based on digital aerial photos taken using Phantom 4 UAV (Vehicle number: TR-IHA0H5909136) and the satellite images taken on different dates were prepared using GIS techniques. In the end, it was determined that a spatial enlargement of about 2000 m² has occurred since 2009, when the erosion was first detected in the area. It was understood that this horizontal spatial enlargement developed by gaining a depth of around 5m vertically. Also, it was found out that erosion occurred at a faster rate especially during the rainy season. Carried out based on the use of UAV in monitoring the actual erosion problem, the present study demonstrated that similar natural environmental problems can be monitored and resolved through the same techniques.

Key words: UAV (Unmanned Aerial Vehicle), RS (Remote Sensing), GIS (Geographical Informational Systems), Soil erosion, Ganos Mount.

UAV-ASSISTED LANDSLIDE ACTIVITY MONITORING: APPLICATIONS AND OPEN ISSUES

ID No: 255

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ABSTRACT

Landslides are natural events that are seen around the world and that have negative economic impacts and result in loss of lives. High slope, lack of stability of the ground, groundwater and human effects are some of the factors that cause landslides. Data can be gathered easily in difficult weather and terrain conditions using digital cameras supported by Unmanned Aerial Vehicle (UAV). The fact that data collection is fast and less costly is an important reason for using this technique.

In this study, the studies the Global Navigation Satellite Systems (GNSS) and UAV techniques were evaluated in the landslide area that took place in 2012 in the Sarıcaeli Village in Çanakkale. The landslide observed over a year and the aerial photographs of the landslide area were at different campaigns. Ground check points were established before taking aerial photographs and the coordinates of the ground control points were measured by the geodetic GNSS receiver. The aerial photographs were processed using photogrammetric techniques in order to create high accurate three dimensional digital models of the landslide.

Using the photogrammetry methods and software along the study, the digital elevation model (DEM), orthomosaic and three dimensional model of the landslide area was successfully created. Moreover, the area, volume and orientation of slip mass for the landslide were determined and its development was monitored. Furthermore, some derives were obtained from digital elevation models such as surface gradient, slope orientation. Finally, the slope direction and accumulation area of the landslide were determined by examining the global cell relationships of the DEMs in the GRID form.

Key words: Landslide; UAV; GPS/GNSS; Photogrammetry; DEM.

USING UNMANNED AERIAL VEHICLE FOR MINING APPLICATIONS: A CASE STUDY ON OPEN PIT COAL MINE IN NORTHWEST TURKEY

ID No: 309

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ABSTRACT

Unmanned aerial vehicles (UAV) are remotely piloted aircraft equipped with digital cameras. Recently, some examples of utility of UAV technology for topographical survey, safety investigation, high frequency data collection and other studies have been reported in the mining industry. UAVs can provide a low-cost method of obtaining highly accurate 3D photogrammetric data and aerial photography. In November 2016, a DJI F550 model multirotor airframe hexacopter was flown at elevations of 40-90 m, and images were acquired using a 12-megapixel GoPro Hero3 digital camera. During the flights, 5000mAh and three-cell LiPo batteries were used and flight time was 10-13 minutes. From UAV images, 3D point cloud, high-resolution orthomosaics (1-5 cm/pixel), and 3D terrain models were created using the SfM method in Agisoft software. The mine waste area was calculated using digitization within the ArcGIS package. This study reports on the use of high-resolution UAV imaging for mining applications (including monitoring volume estimation of mine wastes, and the detection of land surface changes, etc.) at Comakli open-pit coal mine, city of Canakkale, northwest Turkey. Local scale geomorphological characterization of Comakli coal mine could be used to support sustainable environmental planning and reduce the consequences of anthropogenic alterations due to mining.

Key words: Open-pit coal mine, Unmanned aerial vehicle, 3D terrain model, GIS.

COST ANALYSIS / TRANSPORTATION

INVESTIGATION OF WEB BASED PPP GNSS SERVICE MEASUREMENTS IN GIS APPLICATIONS

ID No: 273

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ABSTRACT

In this study, a new application was developed for investigating affects of PPP (Precise Point Positioning) on GIS application taking into speed, cost and accuracy aspects account. It is shown that the real time positioning data obtained from single GNSS (Global Navigation Satellite Systems) that is not connected to any geodetic network can be converted automatically to PPP data rapidly and free of charge using web based services. Moreover, temporal and accuracy performance of this data was investigated in terms of cost on a case study of structural information system.

Web based services such as AUSPOS, OPUS, TRIMBLE, APPS, CSRS - PPP and Magic-GNSS are capable of converting positioning data included in RINEX data to PPP data using global networks. This conversion can be performed in these services rapidly and users can get the related data via e-mail. These services were developed within a few years. The proposed application can derive data which is closer to the data derived by means of expensive commercial software when ease of application and process time factors are considered. Also the proposed application does not require multiple GNSS stations.

For the performance investigation, 1, 4, 8, 12,16 and 20 hours RINEX data acquired from Ankara, Antalya, Izmir, Sinop and Van TUSAGA-ACTIVE CORS-TR stations were used. The acquired data was uploaded to two web based services that are based on Gamit and Bernese. These services converted RINEX data to PPP in a relatively short time. It is observed that positional performance of 1 hour data and 24 hour data are equivalent. Moreover, the PPP data generated by Gamit based service has positional accuracy of 1-1.5cm and Bernese based service has positional accuracy of 2-4cm. The second performance investigation application performed by comparing coordinates of two points that are included in the structure information system using 5,15, 30 and 60 minutes GNSS observations. This investigation resulted in 2-6 cm positional accuracy using Gamit based service with 5 minutes GNSS observation and Bernese based service with 15 minutes GNSS observations. Finally, a structure information system was established using PPP data after creating the spatial data structure.

Key words: GNSS, RINEX, Online GNSS processing, PPP, Structural Information System.

DESIGN AND DEVELOPMENT OF AN SPATIAL ADVERTISEMENT TAX SYSTEM

ID No: 274

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ABSTRACT

The advertising method that is most connected with urbanization is outdoor advertising which involves the publicity of products in various forms such as billboards, posters, screens, totem, zeppelin as well as through the press organs in the city. In addition, advertising elements are considered a part of city furniture. Therefore the design and implementation of outdoor advertisement should be aesthetically, environmentally and culturally aware to preserve the historical and cultural particularities of the areas and prevent pollution. The most important feature that distinguishes the advertising elements from the city furniture is that it is rented by the relevant municipality to obtain advertising revenue. However, there is no standard in advertising revenue collection and archiving systems of related municipalities in Turkey. The geographical locations of the advertising elements are not available in the municipal databases. The problems also arise in the control part of the advertisement elements with the declaration given for getting advertisements. For this purpose, this study aimed to bring a different perspective to archiving the advertisement data and monitoring the advertisement tax. All parameters were found to respond to positional queries and were visualized on the map. Considering all these problems, a database design has been realized in which spatial queries can be made by integrating advertising elements and tax. An interface that works integrated with ArcGIS is designed by Using C # programming language. Through the designed database, it is possible to display in which region the number of the advertisement element is found. Finally, the list of taxpayers with tax debts can be displayed by entering text in any of the fields. The results not only show the tax amount owed by a specific taxpayer, but also give the total tax debt and the number of people that have not paid their tax.

Key words: Advertising Tax, Regulation on Advertising and Promotions, Spatial Analysis, Database

DETERMINING PARAMETERS AFFECTING RESIDENTIAL REAL ESTATE VALUE AND THEIR SIGNIFICANCE LEVEL USING AHP METHOD: THE CASE OF ARTVİN

ID No: 275

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ABSTRACT

It is a fact that real estates have a heterogeneous structure but local conditions also affect the value of a real estate besides many structural and positional characteristics. Therefore, determining both parameters playing important role on the value of residential real estates and their degree of importance have recently constituted the subject of many studies. Examining these studies reveals that there is not a standard in the selection of parameters. The reason for this may be that in addition to structural and spatial aspects of the real estate, local conditions have also a significant impact.

In this study, it is aimed to define parameters affecting residential real estate value and their degree of significance in Artvin city center possessing limited landed property and zoning area because of its steep topographical terrain by using one of the widely used methods, Analytic Hierarchy Process (AHP). In identifying suitable parameters for residential real estates selected as the subject of this study, we utilized the list of parameters already determined for all property types within "Land Valuation" prepared as the 4th component of the Land Registry and Cadastre Modernization Project initiated by the General Directorate of Land Registry and Cadastre in 2008. Out of approximately 80 parameters, 41 of them were chosen for this study and an expert group currently working on real estate and appraisal processes in Artvin was consulted to determine parameters and their degrees of significance. A total of 27 parameters -with 15 structural and 12 spatial- were identified as effective on the value of real estates in Artvin. Then, the weights of these efficient parameters were estimated and applied to the sample residential real estates sold in Artvin city center in 2015. The results of valuation for the sample houses were examined with their actual sale prices.

Key words: Residential real estate, Real estate value, Land valuation, AHP.

MODELING OF URBAN TRANSPORTATION NETWORK BY LINEAR PROGRAMMING

ID No: 128

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ABSTRACT

Geographic Information Systems (GIS) have been used in many different disciplinary applications and studies in recent years. In this study, models were developed to adjust the costs of firm and satisfaction of passengers in urban transportation planning and integrated into GIS. For this purpose, passenger boarding graphics and reports according to stops, line voyage report, elaboratepassenger boarding report, instant vehicle tracking and instant route tracking systems have been studied in detail.Thus, the number of stops in Çanakkale, the distances in the stop intervals, the density of passengers (for each stop), bus routes, fleet size, capacities, bus service frequency, fuel consumption for each bus, the demands of passengers and firm have been evaluated. The obtained data are modeled by the linear programming approaches. While the models were being created, the fuzzy linear programming was used for uncertainties in the system and linear goal programming was employed for simultaneous multi-objective validation. Then the existing situation was evaluated with the created models and the regression analyzes were made.When comparing the results to the current cost and the generated cost function in the last of the models, there is no need for a part of 103 buses of the 21 lines that actively work in the city of Çanakkale and the others can be reduced in the frequency of the bus service. As a result, it is seen that the appropriate bus service times and stop intervals for passengers were determined and the firm increases the gain. Thus, while the transportation plan and the tariff regulations are made so as to meet the demand of the passengers, an effective decision support system is presented to the firms and managers at the same time. As a result of the contribution of GIS, the transfer and evaluation and analysis of these spatial and non-spatial data are carried out easily. Finally, the proposed approach will make public transportation more attractive in terms of passengers.

Key words: Geographic Information Systems, Urban Transportation Network, Linear Programming

DETERMINATION OF PUBLIC TRANSPORTATION ACCESSIBILITY LEVEL FOR VAN METROPOLITAN AREA

ID No: 287

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ABSTRACT

The purpose of the spatial accessibility analysis used in this study is to investigate spatial accessibility level of public transportation infrastructure including "*private public bus", "private public minibus"* and *"municipal bus"* in Van Metropolitan Area. Data set used in the study consist of; road network in line detail, housing in polygon detail vector layers produced from 1/1000 scale topographic map, public transportation routes in line detail vector layer provided from the Van Metropolitan Municipality, the neighborhoods boarders in polygon detail and neighborhoods population data according to the age groups from Turkey Statistical Institute Van Regional Directorate. Method used in this study is based on the examination of accessibility analysis results applied to public transportation routes to define service population and comparison with the international standards. According to the results of the study, it was determined that the public transportation is offered in a very narrow spatial area in the city center and due to the macroform affected by the earthquakes, the service level is very low in terms of population and spatial distribution across the Van City. Analysis results provide important inputs for the determination of the public transportation routes and more importantly setting out the public transportation accessibility situation is needed to reach an applicable Transportation Plan for Van Metropolitan Area.

Key words: Public Transportation, Accessibility, Network Analysis

SPATIAL ANALYSES OF ACCESSIBILITY OF URBAN TRANSPORTATION NETWORK FOR ISTANBUL

ID No: 285

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ABSTRACT

Transportation is one of the most important factors that effects our life in every manner and there are also a lot of factors that effecting transportation. Once these factors are identified, using developed methods and GIS, these factors can be analyzed and problems can be discovered thus solutions could be achieved. In this paper, the robustness of the transport network is analyzed via accessibility indicators. Two case studies are selected namely a)robustness of the network under the risk of possible disruption of the road network due to natural disasters, maintenance or accidents, and b)planning and construction of new routes. Twelve districts from Istanbul is selected as a test area and these are Avcilar, Bagcilar, Bahcelievler, Bakirkoy, Basaksehir, Bayrampasa, Beylikduzu, Esenler, Esenyurt, Gungoren, Kucukcekmece and Zeytinburnu. As the network data, the Open Street Map (OSM) is used, which is open source. Furthermore, population statistics per district is utilized that is received from TUIK. Only the main roads have been selected from OSM for analysis and transportation capacities are defined as equal for each road. The data have been simplified with editing to make each road single link and intersections single node. Using re-edited road data, information about nodes has been derived with setting Arc-Node structure in network analysis. Origin- Destination (OD) matrix is calculated and robustness of the network is determined. The accessibility of road has been tested based on both potential and daily accessibility. As a result of this research, 512km road and 400km2 area in test area have been analyzed and accessibility indicators for both potential and daily accessibility are determined.

Key words: Transportation, Potential and Daily Accessibility, Spatial Analyses, OD Cost Matrix

ESTIMATING TREE HEIGHTS AND CROWNS FROM AN UNMANNED AERIAL VEHICLE WITH CONSUMER-GRADE CAMERA SYSTEMS

ID No: 101

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ABSTRACT

Unmanned aerial vehicles (UAV) are the leading tool of photogrammetric applications that have been used in a variety of fields in the last decade. Specifically in forestry, with different sensors, they have been used to estimate tree heights, crowns etc. with contribution to forest inventories in sight. This approach with a consumer-grade camera onboard system is preferable than UAV-Light Detecting and Ranging (UAV-LiDAR) and also traditional photogrammetric methods because it is more convenient within economic and work time aspects. In this study, UAV based aerial imagery has been reconstructed, processed and filtered to obtain the individual tree heights from a coniferous urban forestry area. A low-cost camera system onboard 96 cm wingspan UAV has enabled the acquisition of high resolution (6.41 cm average ground sampling distance) aerial images resulting in ortho-images, Digital Elevation Models (DEM) and point clouds in a single flight that only took approx. 28 minutes. Canopy Height Models (CHM), obtained by extracting the Digital Surface Model (DSM) from Digital Terrain Model (DTM) are filtered locally based on the pixel related window size using the provided algorithm to estimate tree heights and crowns of the study area. As a result, this method shows, especially with forests that is mostly made of coniferous trees, trees can be easily marked with specific attributes in order to contribute to forest inventories.

Key words: Unmanned Aerial Vehicles; Tree Height Detection; Photogrammetry; Image Processing; Local Maximum Filter; Consumer-grade Cameras

GEOMORPHOLOGY

COMPARISON OF SURFACE MORPHOLOGY DETERMINED WITH TERRESTRIAL LIDAR METHOD AND UNDERGROUND GEOMETRY DETERMINED WITH GPR: KAMARA (DENIZLI/TURKEY) FISSURE RIDGE-TYPE TRAVERTINE

ID No: 20

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ABSTRACT

Fissure-ridge type travertines are an important tectonic element and with surface topography and definition of underground geometry very important for our ability to understand formation of travertines. Extensional fractures developing linked to local extension in the upper crust are structural elements allowing hydrothermal fluids to move within the crust. Hot water reaching the surface through these fractures is rich in calcium carbonate and may cause travertine formation with different morphologies at the surface. Among travertines, the type with clearest morphology is fissure ridge type travertines. The general surface morphology of ridge-type travertines is in the form of a lens. This morphological shape varies in dimension and appearance linked to the formation process and rate. The high resolution 3-dimensional terrestrial scanning device LIDAR can clearly reveal the topography formed by ridge-type travertines at the surface. With the surface shape allowing access to detailed information about travertine structure, the underground situation allows us to access details about formation.This study mapped the Kamara (Denizli) travertine structure determining topographic characteristics with terrestrial LIDAR method in 3-dimensions at the surface and investigated the underground geometry with the GPR (ground penetrating radar) method.By modeling the obtained GPR profiles, the 3-dimensional underground image of the mass of the Kamara travertine was obtained. When this image is investigated, asymmetric thickness variation was observed toward both sides from the central axis of the fracture. The asymmetry observed in surface investigations was in accordance with the underground image. This compliance shows that the geometric shape of the travertine during formation is preserved at the surface.

Key words: Surface morphology, Underground geometry, Terrestrial LIDAR, GPR, Ridge-type travertine.

IMPORTANCE OF DOLINE MORPHOMETRY ON RESEARCH OF SURFACE KARST: CASE STUDIES FROM TAURUS MOUNTAINS

ID No: 23

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ABSTRACT

Circular or semicircular solution dolines are diagnostic landforms of karstic regions, especially on young folded mountains in the mid-latitude zone and Taurus Mountains of Turkey. Tectonic structure, especially fracture intensity and orientation, has a strong effect on doline development, density, orientation and distribution on low-slope high karstic plateaus. For this reason, spatial distribution of the morphometric properties of dolines is commonly used as a quantitative tool in karstic areas. In particular, the spatial distributions of density, elongation ratio, orientation of long axis, and circularity index are the most useful parameters. In this study, morphometric analysis results are explained from different parts of the Taurus Mountains. 1/25000 scale topographic maps were used to determine the distribution of karstic depressions. The uppermost closed contours of dolines, belonging to over 130,000 dolines on ten different parts of the Taurus Mountains, were digitized as polygons in a GIS framework. The long and short axes of dolines were drawn and elongation ratios calculated with the aid of polygons. Additionally, the orientation angles of dolines were determined by the azimuth of the long axis. According to obtained results, all doline orientations are parallel to the general extent of the Taurus Mountains. Doline density reaches maximum on intense extension fractures and faults based on thrust faults. Normal faults and strike-slip faults have minimum effect on doline density.

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Key words: Doline, Morphometry, Orientation, Tectonic, Taurus Mountains.

FRACTAL ANALYSIS IN GEOMORPHOLOGY

ID No: 26

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ABSTRACT

Geomorphology is the science of describing and explaining the landforms and determination of geomorphological characteristics is a base step for many environmental studies. Geomorphological features are irregularly shaped, as in many natural objects on Earth. Therefore, it is not possible to express geomorphological features by Euclidean geometry. The concept of Fractal geometry has emerged for modeling irregular shapes and fractal geometry is more effective than Euclidean geometry in modeling surface features of Earth including geomorphological features. Geomorphological studies have been greatly enriched by the concept of fractal analysis developed over the past few decades. Today, numerous geomorphological studies based on fractal analysis have been carried out in many areas such as river network modeling and coastal morphology. Fractal geometry analyzes the shrinking or growing patterns that are repeating itself forever, parts of the object which are similar to itself. Fractal analysis is a new mathematical and experimental approach derived from Fractal Geometry and fractal property is expressed by fractal dimension. Because of the developments in information technologies and integration with Geographical Information Systems (GIS), fractal analysis can be used effectively in environmental studies. In this study, it is aimed to present the fractal geometry and GIS-based fractal analysis in a theoretical context. Additionally, the use of fractal analysis in geomorphological studies is described in detail.

Key words: Geomorphology, fractal geometry, fractal analysis, GIS

EVALUATION OF THE RELATIVE TECTONIC ACTIVITY OF THE ADIYAMAN FAULT IN EASTERN TURKEY

ID No: 24

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ABSTRACT

The Adıyaman left lateral strike-slip fault in the Eastern Turkey is locating in a zone of the East Anatolian strike slip-fault and is an ideal area to examine the relative tectonic activity. This in turn can be used to help determine the seismic hazards based on the analysis of the entire study area rather than a single valley or mountain front. The Adıyaman fault was examined using geomorphic indices to help evaluate the relative active tectonics along its entire length. Geomorphic indices include mountain-front sinuosity (Smf); valley floor width-to-valley height ratio (Vf); basin asymmetry factor (AF); hypsometric analysis (integral, Hi and curves, Hc); and drainage density (Dd). The average of the morphometric indices values, the index of relative active tectonics (Iat), supports the view that the fault can be divided three categories of relative tectonic activity, which include in our view least active, moderate activity and highly active. We analysis the fault area and suggest that the area tectonically is mostly under intermediate active conditions but also it shows ranges from relative intermediate to high rate of activity in some certain parts. The Adıyaman fault shows different rate of tectonic activity that are affected by the northward-moving of Arabian plate in terms of Anatolian plate that produced a transform type tectonic boundary extension with variable rate of strike-slip features.

Key words: Tectonic Geomorphology, Geomorphic indices, Adıyaman strike-slip fault, Eastern Turkey

DETERMINATION OF TECTONIC EFFECTS İN BULANIK-MALAZGİRT BASİN (MUŞ) BY GEOMORPHOMETRIC METHODS

ID No: 22

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ABSTRACT

Basic operations were made in the science of geomorphometry that is quantitative surface analysis are ıdentification of land surface parameters and objects from SYM (Digital Elevation Model) data. Today, geomorphometric analyzes were made speed and more reliably with Geographic Information Systems (GIS) methods. Bulanık-Malazgirt Basin (Muş) exist in the middle of this section and in the "Upper Murat-Van Department " of Eastern Anatolia Region. Bulanık-Malazgirt Basin (Muş) exist at Anatolide-Taurid border at the eastern of the Taurides tectonically. Inspection site corresponds to a moving scene tectonically and it were interrupted intensively by faults that continue east-northeast of the North Anatolian Fault (NAF) and the Eastern Anatolian Fault (DAF).

In the literature, any geographical work not available related to Bulanık-Malazgirt Basin (Mus). In this study, at the lower basin level of Bulanık-Malazgirt Basin (Muş) determination of tectonic effects were intended with jeomorphometrics methods (hipsometric curvature and integral, Mountain-Front Sinuosity, drainage basin asymmetry and various relief analyzes). Geomorphometric analyzes were applied on the Digital Elevation Model (DEM). Morphometric analyses have been applied on Digital Elevation Model (DEM). DEM has been obtained by digitization of 1/25.000 scale topography maps of the area. This process have been made with ArcGIS10.1 that is Geographic Information System (GIS) software (Spatial Analysis Module). When are evaluated together the hipsometric curve and integral, emerge that Bulanık-Malazgirt Basin (Mus) is at maturity phase. It have been seen that slope values are high at northwest and south sections of basin that have asymmetric structure.

Key words: Bulanık-Malazgirt Basin, Geomorphometry, Tectonics, Geographical Information Systems

EROSIONAL PROCESSES IN THE NALLIHAN (ANKARA) BADLAND AREA BASED ON ULTRA-HIGH RESOLUTION UNMANNED AERIAL VEHICLE (UAV) DTMS

ID No: 324

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ABSTRACT

Badland development and expansion is a major issue in geomorphological research field because it conduces to a variety of land degradation and sediment management problems such as loss of agricultural soil. Commonly observed geomorphic processes in badland areas are rilling, gullying, piping and various type of mass movements. Particularly gully development has the potential to destroy large areas of land surfaces in addition to the agricultural lands. This study aims (1) to analyze erosion processes in Nallıhan Badland area from multi-temporal data and (2) to evaluate the spatial resolutions for the Digital Terrain Models (DTMs) derived from Unmanned Aerial Vehicle (UAV) in gully erosion mapping. A 1,300.000 m^2 badland area in the Nallıhan Region (Ankara) was monitored with an unmanned aerial vehicle (UAV) and terrestrial laser scanning (TLS) over the period of one and two years, respectively. TLS was carried out on one sample slope, whereas the image acquisition of the UAV covered the entire catchment. The investigations were performed in 3 stages; (i) production of the DTMs having 3 cm and 9 cm spatial resolutions by using the orthophoto imagery acquired from the UAV at 97.5 m and 292.4 m altitudes, respectively, (ii) Terrestrial Laser Scanning (TLS) of the experimental site and production of the DTMs derived from the TLS data resampled at 3 cm and 9 cm spatial resolutions, and (iii) spatial and profile comparisons of the derived data. The average altitude differences were obtained on the intervals (-0.1, 0.1) m and (-0.2, 0.2) m for the comparisons between TLS-3cm and UAV-3cm, and TLS-9cm and UAV- cm data, respectively. According to our profile comparison results, we revealed that depending on the decreasing of spatial resolution, the erosion rates calculated from the DTMs increase artificially. Additionally, several erosional processes, such as rill and gully erosion and shallow mass movements has been detected in the two-years monitoring period. Moreover, our DTMs comparison results showed that the differences in the calculated volumes of eroded material rate is more intense in the upper part of the catchment and mobilized sediments are damaging cultivated lands in the downstream section.

Key words: Badlands, erosion, geomorphology, UAV, DTM.

SPATIAL AND TEMPORAL PALEOVEGETATION ANALYSIS WITH FOSSIL POLLEN RECORDS: CASE OF CAPPADOCIA REGION

ID No: 335

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ABSTRACT

This study was carried out in the Cappadocia Region. Erciyes and Hasan Mountains are the most important elements that is shaped the region. Also the most important settlements of owned pre-Asia such as Kültepe and Aşıklı. placed in this area. This study aims to reveal the paleo-vegetation and human influence on its in the Cappadocia Region. For this purpose, fossil pollen records of Engir, Nar Lake, and Eski Acıgöl were used. In this context, we have drawn isopoll maps to provide a new perspective on the fossil pollen records and to show the paleovegetation characteristics of the area at the regional scale in spatial and temporal context. Paleovegetation changes of the Cappadocia region were investigated by using indicator feature of the plant species. In this direction, the Eski Acıgöl, Engir and Nar Lake fossil pollen counts available in the Cappadocia Region were recalculated for 400 years interval (2000-1600-1200-800-400 years) for the last 2000 years using the age depth models. This calculation was made using linear interpolation method in statistical missing value analysis. The plant species used in the study are Pinus, Quercus, Olive and Artemisia that are able to reveal the conditions of paleovegetation, paleooclimate and human influence. The pollen percentages of these species were calculated and interpolated with the Inverse Distance Weighted Method using Geographic Information Systems software. As a result, temporal and spatial distribution of species being introduced with isopollen maps produced, had to make assessments on a regional scale of the field of paleoecology was presented a point of view. Potential paleovegetation distribution maps of the study area were drawn for Pinus, Quercus, Olive and Artemisia species for 1600 years ago (BP) and show area reaches the maximum and the present day has been found to shrink. In this context, spatial and temporal variation of species paleo-environment with the right features are given the opportunity to make the assessments.

This study supported by TÜBİTAK 1001 Programme (No: 114Y578) and Süleyman Demirel University (BAP 4431-YL1-15).

Key words: Cappadocia, Fossil Pollen, Geographic Information Systems, Isopollen, Paleovegetation

GEOMORPHOMETRIC RELATIVE TECTONIC ACTIVITY ASSESSMENT OF THE MENDERES MASSIF, WESTERN ANATOLIA, TURKEY

ID No: 320

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ABSTRACT

Earthquakes have long been recognized as one of the main destructive factor for human life and property across the globe as well as one of the driving engines behind the creation mountainous topography. River channel characteristics, drainage density, drainage network and knickpoints, sinuosity of the mountain range front are generally well geomorphic markers for tectonic records as well as evidence of the presence of active tectonics. In a given region the geomorphic evidence of relative tectonic activity of fault segments provides important data for promoting the estimation capacity of earthquake hazard maps. In this study, we analyze mountain fronts and stream morphology of the different fault segments as a proxy for fault activity degree assessment which may further help to elucidate the earthquake potential and regional seismic hazard. Within this scope, we select the Menderes Massif as a test area which is one of the seismically active regions in the Western Anatolia. The area has many high and low angle active faults that separate from highlands to graben and has experienced many devastating earthquakes from historical periods to present. The devastating earthquakes that occurred in historical periods have left deep traces on important ancient cities such as Ephesus, Miletus and Kaunos on the graben systems where important trade routes providing the connection between Anatolia and the Aegean Sea.

The level of relative activity between fault segments has been determined by segmentation-related activity classification in the Menderes Massif. Morphometric analysis based on fault segments present four activity classes in the study area i.e. low, moderate, high, and very high, according to the rate of tectonic activity in different mountain fronts. Faults bounding Northern and Southern Massif are included low to moderate tectonic activity classes while fault segments bounding Central Menderes Massif has relatively high or very high tectonic activity. Areas with high tectonic activity are likely to cause seismic hazards in the future.

Key words: Tectonic, seismic hazard, geomorphometry, fault, Menderes Massif

MORPHOMETRIC ANALYSIS OF DELIÇAY BASIN (MERSIN) USING GEOGRAPHIC INFORMATION SYSTEM

ID No: 28

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ABSTRACT

Morphometric analysis is a very important tool in terms of understanding dynamics of river basins. Geographic Information System (GIS) technologies provide a great convenience in morphometric analysis of river basins, while providing more efficient and accurate results compared to traditional methods. The primary aim of the current study is to identify dynamics of the Deliçay basin using morphometric analysis in a GIS environment. Created by the Deliçay River (in eastern Mersin), the basin extends along the north-south direction, between the Central Taurides and Mediterranean Sea. Deliçay River has a length of nearly 58 km and total drainage area of 439 km^2, where the elevations range from sea level (0 m) to 2541 m. Creating a digital elevation model (DEM), 3D representation of a terrain's surface, is the first step in morphometric analysis of river basins. In this study, the DEM covering the study area was created by digitizing contour lines and spot heights from 1:25.000-scale toposheets using ArcGIS 9.3.1 software. Subsequently, drainage basin boundary and river network were delineated using ArcHydro tools available in the GIS software. In the final step, the most frequently used morphometric parameters such as drainage density, drainage texture, stream frequency, relief ratio and hypsometric integral were calculated using the aforementioned data layers. According to the results of calculations, values of drainage density, drainage texture, stream frequency, relief ratio and hypsometric integral are 1.84 km/km^2, 6.06, 2.54, 0.03, and 0.33, respectively. Results of this study revealed that the basin is medium-well drained, where surface runoff possibly will occur in a slow fashion, fine drainage texture reflects the presence of low permeability geological units, the basin is composed of low grade slopes and durable basement rocks, and the basin is in the old stage, meaning that the geomorphologic evolution is virtually finished and erosion is almost stopped.

Key words: Morphometric analysis, Geographic Information System (GIS), River basin, Deliçay River, Mersin

INVESTIGATION OF TECTONIC EFFECTS IN YEDISU BASIN BY MORPHOMETRIC ANALYSES

ID No: 27

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ABSTRACT

The aim of this study is to investigate the tectonic effects in Yedisu basin by morphometric analyses. Yedisu basin is a pull-apart type of basin formed due to North Anatolian Fault (NAF) between Erzincan and Karlıova basin. Due to the effect of tectonic lines, fault scarps and fault facets have formed in the basin, and there have been displacements in river valleys. Large landslides have occurred under the effect of lithology on the hillsides with high slope values. In this study, hypsometric curve, hypsometric integral, slope and relative relief have been applied within the scope of investigation of tectonic effects in Yedisu basin. For this reason, Digital Elevation Model (DEM) has been created from digital topographic maps. Sub basins of Peri River draining the basin have been determined using Geographic Information Systems (GIS). Hypsometric curve analysis has been applied to these basins with the help of height-area distribution. Hypsometric integral values of the basins have been determined from the histogram data of DEM. Slope map has been created by DEM, and this map has been reclassified taking the morphology into account. The study area has been divided into unit areas of 1km2, and relative relief analysis has been done obtaining the rise between the lowest and highest points of each unit area. According to the results of the analysis, basins having convex hypsometric curves and high hypsometric integral values have been found to be compatible with tectonic lines. Steep hillsides (slope 10-40%) account for 40%, whereas abrupt hillsides (slope 40%>) account for 52%. In Yedisu basin, where relative relief reaches 716 m, this value is seen to be high in the areas close to the fault lines. These findings show that Yedisu basin has been shaped by tectonic effects.

Key words: Yedisu Basin, Bingöl, North Anatolian Fault (NAF), Morphometric Analysis, Geographic Information Systems (GIS)

EROSION SUSCEPTIBILITY ANALYSIS BY GIS-BASED RUSLE (3D): THE KARA MENDERES RIVER BASIN, ÇANAKKALE

ID No: 290

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ABSTRACT

The Kara Menderes Basin, covering an area of around 1996 km^2, has a great agricultural potential thanks to its topographical, soil and climatic characteristics. However, the basin, especially the areas with damaged vegetation, suffers from erosion. This poses a serious risk to the sustainability of agricultural potential in the basin. The present study aims to determine erosion susceptibility in the Kara Menderes River Basin by RUSLE method using GIS. Annual soil loss is calculated in ton/hectare/year by RUSLE method, a common method to determine erosion susceptibility. The effect of rainfall as an erosive factor, soil's susceptibility to erosion, slope length, vegetation and land use, and soil protection measures are considered to determine the soil loss. Firstly, data concerning the factors considered for the purpose of the study were mapped and layers of each factor were created. These layers were scored and reclassified according to their effects on erosion. Then, they were merged in GIS by weighted overlaying to produce the erosion susceptibility map of the Kara Menderes Basin.

The results revealed a high level of erosion susceptibility in the area. It was found that the level of erosion susceptibility was higher in the areas where the terrain is sloping and the vegetation is sparse. Hence, measures to mitigate erosion in these areas where rainfall creates a rapid surface flow are of great importance for the sustainability of soil resources.

Key words: Erosion, RUSLE (3D) method, GIS, Kara Menderes River Basin, Çanakkale.

PLANAR FAILURE DETERMINATION OF THE SLOPES ALONG THE BAĞARASI-FOCA STATE HIGHWAY WITH THE HELP OF GEOGRAPHICAL INFORMATION SYSTEMS

ID No: 317

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ABSTRACT

Slope stability analysis is critical to investigate the mass movements along the highway road-cuts. Planar and wedge type of failures are commonly observed along the Bağarası-Foça route. The major factors of slope stability include lithology, slope angle, slope aspect and discontinuity orientation. A database is formed by discontinuity orientation data, slope positions and lithology. Lithic and vitric tuff units outcrop along the route. Three discontinuity joint sets are recorded.

MapInfo Professional software was used to prepare digital thematic maps which are;

- Geological map (lithological data)
- Slope map (strike, dip and dip direction data)
- Discontinuity map (covering three discontinuity sets)

Planar-type slope failure hazard map is prepared using the lithology information, slope and discontinuity orientations. GIS-based overlay technique was used while preparing the hazard map.

Taking precautions are important to prevent mass movements which may cause slope failures to the highway. This study will present the potential planar-type mass movement along the Bağarası-Foça state highway and some precautions to prevent further slope failures.

Key words: Slope stability, plane failure, GIS, Bağarası-Foça (İzmir)

USE OF GIS TO EVALUATE THE ORGANOCHLORINE PESTICIDE ACCUMULATIONS IN SOIL OF SEYDİSUYU PLAIN (ESKİŞEHİR, TURKEY)

ID No: 327

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ABSTRACT

Seydisuyu Plain is located in the Central Anatolia Region of Turkey and contains very significant agricultural lands. In this study, the total organochlorine pesticide accumulations in soil of Seydisuyu Plain were investigated by determining Alfa HCH, HCB, Beta HCH, Gama HCH, Aldrin, Cis Heptaclorepoxide, Trans chlordane, Cis chlordane, Dieldrin, 44DDE, Endrin, 44DDD, 44 DDT, Metoxyclor and pesticides with Endosulfan in soil samples and the detected data were evaluated by using the Geographic Information System (GIS) in order to make a visual explanation by presenting distribution map of organochlorine pesticide accumulations in soil of Seydisuyu Plain. For this purpose, soil samples were collected seasonally (Summer 2011 – Summer 2013) from 47 stations selected on the Seydisuyu Plain. According to data observed, the organochlorine pesticide accumulations in soil of Seydisuyu Plain were determined between the ranges of 51 – 276 ppb.

Key words: Slope stability, plane failure, GIS, Bağarası-Foça (İzmir)

GIS BASED GEOMORPHOMETRIC ANALYSIS OF SARIÇAY BASIN

ID No: 331

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ABSTRACT

Developments in computer-based mapping are contributing to the obtaining and evaluation of various data about the land faster, more accurately and reliably. Therefore, GIS is used as an important tool in topographical and geomorphological analyses. In particular, the geomorphological indices applied over the Digital Elevation Model are important in terms of providing spatial information about the geomorphological features of a basin and the processes that are effective in formation and development. In this study, the geomorphology of the Sarıçay (Kocaçay) Basin within the boundaries of the Biga Peninsula of the South Marmara Division and the factors influencing the formation and development of the geomorphological process were investigated with morphometric indices.

Geomorphological indices were computed over the Digital Elevation Model (DEM) obtained by digitizing 1 / 25.000 scale topographic maps of Sarıçay Basin as the base map. After the drainage network of the basin is delineated; Hypsometric Curve (H_c) and Integral (H_i), River Length-Gradient Index (SL), Valley Floor Width-To-Valley Height Ratio (V_f), Basin Shape (R_f), Drainage Density (D_d) and Stream Frequency (F_s) indices are applied in order to describe drainage basin morphology. The effect of lithology and tectonics on basin morphology was evaluated by using geological map. Index results indicate that Sarıçay basin is in transition phase between youth and maturity. The higher parts of the basin are of the youth phase, while the lower areas are of the maturity phase. Particularly in the eastern and southern high parts of the basin, deep erosion in the rivers is prevailed due to the tectonic effect , while lateral erosion become dominant in lower basin and rivers have flat-floored valley feature. In Conclusion, it has been determined that the geomorphologic development of the Sarıçay Basin has a polygenic topography under the control of tectonic and eustatic movements affecting the processes of erosion and deposition.

Key words: Geomorphometric Indices, Sarıçay Basin, GIS, Geomorphology

FROM EUCLIDEAN TO FRACTAL GEOMETRY IN GEOGRAPHY AND GEOSCIENCES

ID No: 25

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ABSTRACT

In Euclidean geometry, objects are visualized as points, lines, circles, triangles, polygons, cones. Until now, Euclidean geometry has been used for visualization of landforms. However, natural objects do not fit exactly with the forms in the Euclidean geometry. Therefore, the concept of fractal geometry has emerged as a new method for visualizing and analyzing of the natural object. Fractal geometry is an approach used to identify, develop models and analyze complex objects in nature. Fractals are infinitely complex patterns that are self-similar across different scales. Fractal geometry and analysis can be applied in many fields of geography and geosciences disciplines, including geomorphology, climatology, urban and regional analysis, cartography, and remote sensing. Fractal geometry is more effective in modeling than Euclidean geometry. With fractal geometry, there is a new concept called fractal dimension is came into use. Instead of integers (0, 1, 2 and 3-dimensional) in the Euclidean geometry, the fractal dimension is represented by the decimal and fractional intermediate values. By calculating the fractal dimension, complexity levels of objects and events in nature can be analyzed quantitatively. Fractal analysis, a new method for modeling and visualizing complex and irregular features, has been integrated with the geographic information system (GIS) in recent years. Thus fractal analysis has begun to be used effectively in many spatial studies on geography and geosciences. This study is aimed to present the characteristics of Euclidean and Fractal geometry, differences and GIS-based fractal analysis in detail.

Key words: Euclidean geometry, fractal geometry, fractal dimension, GIS

HYDROLOGY

FLOOD INUNDATION MAPPING FOR TATLIÇAY (ÇANKIRI)

ID No: 59

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ABSTRACT

The biggest flood natural disaster was took place at Çankırı in 1958. Results of 1958 flood were the death of 18 people in the city center and completely destroyed 300 houses. In this study, flood inundation mapping is made for Tatlıçay which passing through Çankırı city center. ArcGIS, HEC-GeoRAS and HEC-RAS software are used for flood analysis. The part of Tatlıçay that passes through Çankırı city center flows through the open artificial canal. Artificial channel has u-shape geometry. During the study, geometric measurements are taken along the channel. In this way, the digital terrain model is made even more sensitive. Scenario floods are created with HEC-RAS software and flood areas and water heights are calculated. Flood maps are formed with the obtained information. The roads and buildings to be affected by floods in each scenario have also been identified. In this study, an example has been tried to be prepared for disaster management depending on analyzes based on Geographic Information Systems (GIS). The results of this study can be dividing in two main groups. If 200 m^3/s flow rate will be observed, over 467.000 m^2 of area in the city center can be under water. Same result is taken for 400 m^3/s flow rate. In the case of 400 m^3/s flow rate, over 769.000 m^2 of area can be under water.

Key words: Flood Inundation Mapping, Tatlıçay, HEC-RAS

PREDICTING SOIL LOSS AND SEDIMENT YIELD AMOUNTS IN MOUNTAINOUS LARGE WATERSHEDS WITH GEOWEPP MODEL: A CASE STUDY OF GODRAHAV CREEK WATERSHED IN ARTVIN

ID No: 152

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ABSTRACT

As stated by many researchers, the fragile balance between the natural resources of soil, plant and water was damaged and/or broken for the majority of ecosystems in Turkey mostly due to inappropriate and/or over uses. This, in turn, have been causing many environmental problems including accelerated soil loss and associated sedimentation, regarded as the major environmental issues in the country. Therefore, it has been suggested that there is a need to take urgent precautions to slow down the negative effects of these problems but, first, sufficient scientific data regarding the quantities and severity of these issues has to be measured. Recently, measuring amounts of soil erosion and sedimentation has shifted towards using erosion prediction models such as RUSLE, WEPP, SWAT because they are easier and cheaper to apply compared to the field measurements. For this study, the GeoWEPP model, an interface developed by integrating ArcGIS 10.2 and TOPAZ, was chosen in order to figure out soil loss and sediment amounts occurring from Godrahav Creek Watershed (GCW) located in the north-eastern Turkey. Since the watershed has mountainous and steep terrain and covers a relatively large size of about 5298 ha, a subdivision technique was used to divide the study area into small hydrologic units (SHUs) for the purpose of easy run and detailed results. The results showed that about 9854.8 t y^{-1} of sediments out of 18596.8 t of total soil loss generated from the whole GCW was reached to the Borcka Dam Reservoir. In addition, GeoWEPP also predicted that the annual average soil loss and sediment yield were 1.73 t $ha^{-1}y^{-1}$ and 1.86 t $ha^{-1}y^{-1}$, respectively. Moreover, the model estimated a sediment delivery ratio (SDR) of 0.530, meaning that close to half of the soil lost from the watershed was carried away as sediments.

Key words: Soil loss, sediment yield, GeoWEPP model, sediment delivery ratio, mountainous watersheds

COMPARISON OF DIFFERENT REMOTE SENSING WATER INDICES IN FLOOD MAPPING: A CASE STUDY OF SEREM, EDERINE, TURKEY.

ID No: 179

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ABSTRACT

Flood is considered among the most dangerous natural disasters that are occurring more often lately due to climate change. Remote sensing is used to help scientists and experts in identifying inundated regions and gathering valuable information for disaster management and rehabilitation. Water indices are great tools to monitor land cover change due to altering in water level or in moisture content. Among the most common indices in flood detection and damage assessment rise Normalized Difference Water Index (NDWI), Normalized Difference Vegetation Index (NDVI) and Water Index (WI) referred to as Red and Short Wave Infra-Red (RSWIR) or as Green and Short Wave Infra-Red (GSWIR). These indices illustrate different efficiencies in flood propagation delineation. Upon that, this study focuses on illustrating the weakness and strengths of these water indices in this application. The study is applied to determine the effects of the flood occurred in 18 January 2015 in Serem village, Edirne, Turkey as a case study. The study extracts the aforementioned indices using Landsat 8 Operational Land Imager (OLI) satellite images before (25 December 2015), during (19 January 2016) and after (30 March 2016) the flood event. The resulted images from aforementioned indices are compared to a classified image, using a standard supervised maximum likelihood classification, aiming to assess the accuracy of the indices. The classified image is going to be enhanced and edited with a reference image to ensure accurate and dependable comparison. As a result of this paper, the three aforementioned indices are going to be sorted according to their efficiencies in flood mapping applications.

Key words: Climate Change, Flood-Mapping, Remote Sensing, Landsat 8, Water Index

APPLICATION OF REMOTE SENSING AND GIS FOR FLOOD: CASE OF FUJARIAH, UAE

ID No: 180

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ABSTRACT

Remote Sensing and GIS are used at various phases of flood such as estimation of water raindrop/cloud, estimation of flooded areas and generation of flood hazard maps. This research focuses on estimation of rainfall from cloud top temperature images and generation of flood hazard maps. The estimation of rainfall is based on blending of the geostationary Modern Era Retrospective-Analysis for Research and Applications (MERRA) data with the low-earth orbiting passive Tropical Rainfall Measuring Mission (TRMM). The hazard map is based on climatic, topographic, and socio-economic factors. This map will help various departments such as planning, heritage preservation, transportation, emergency, relief, and insurance. Frequent occurrences of floods in UAE such as Al Ain flood in 1982 and 1993, Al Qurayah flood in 1995 and Sharm flood in 1997 and 2009 showed the importance of remote sensing and GIS for flood studies. Records of rainfall and floods indicated that Fujairah Emirates has a high rate. Therefore, it is selected as study area. Estimate of rain from the satellite images is found ranged between 30.680 and 31.697 mm while the average gage reading for March 2014 at Fujariah Airport is 29.1 mm. This resulted in an over estimation of 1.580 to 2.597 mm. Flood hazard map was generated for Fujairah Emirates with five categories and were given numbering from 1 to 5 with highest risk shown by number 5 and internal weight was given for each category. In absence of rain data in areas such mountains or desert as in the case here the results are considered suitable for many applications. Hazard map is important for effective planning of flood defense and the safety of the people living in high risk areas, useful information can be provided using this hazard map.

Key words: Rainfall estimation; remote sensing, GIS, flood, hazard map, UAE

DETERMINATION OF FLOOD RISK AREAS: EXAMPLE OF MERT RIVER AND YILANLIDERE

ID No: 183

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ABSTRACT

Floods are natural occurrences of our country that give the greatest material and spiritual damage after earthquakes, as it is all over the world. But In the case of human interventions such as changing the riverbed, increasing the construction on the riverside, cutting the river in a direction perpendicular, the flood event to the flow direction turns into a disaster. In order to see the damage of floods, flood risk maps are made by determined flood renewal flow.

In this study, Mert River and Yılanlıdere were selected as the study area. To create a flood risk map of the work area, 65 1/1000 current maps and 2 1/5000 zoning maps from Samsun Metropolitan Municipality and from DSİ 7th Regional Directorate 10, 25, 50, 100, 500 and 1000 years of flood renewal flow have been obtained. In addition, the satellite image and the ArcHydro program were used to view the Mert River basin and Drainage network. And then in the Geographical Information System environment by using Hec-GeoRAS and HEC-RAS program flood risk maps according to flood renewal flow have been established.

As a result, in this study, it was determined whether the flood rehabilitation works done was sufficient and suggestions were made.

Key words: Flood, Flood Risk Map, Flood Rehabilitation Works, Hec-GeoRAS, HEC-RAS

PERFORMANCE ANALYSES WITH LIDAR DATA IN FLOOD MODELLING USING REMOTE SENSING AND GIS IN ARTVIN CITY

ID No: 187

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ABSTRACT

The aim of this study is to analyse the performance of Airborne Light Detection and Ranging (LiDAR) in the hydrologic studies intended for flood modelling and to analyse the effects of spatial resolutions and vertical accuracy of Digital Terrain Models (DTMs) acquired with various technics on the resulting flood peak discharge values. Balcı Stream Basin is selected as study area, lying within the boundaries of Borçka district of Artvin city in the northeast of Turkey.

Types of data used in the study are as follows: LiDAR point cloud, GDEM-2 (Global Digital Elevation Model-2) from ASTER and DTED-2 (Digital Terrain Elevation Data-2) from 1/25 000 scale topographic maps, Ground Control Points (GCPs) derived from Global Positioning System (GPS) in the field study and finally LANDSAT 8 satellite image for determination of land use. TerraScan, TerraModeler and TerraPhoto softwares are used in laser point cloud filtering, classification, modelling and accuracy analysis; while ArcGIS, Surfer, Global Mapper and Erdas Imagine softwares are used for integration with Geographic Information System and hydrologic modelling.

Realising the truth that the basic data for flood modelling is a highly accurate DTM; various LiDAR DTMs are created using different parameter combinations to find the best vertical accuracy in order to obtain the best representation of the topography of Balcı Stream Basin, which has a very steep slopped and dense vegetated character. Several comparisons were executed among LiDAR, ASTER GDEM-2 and DTED-2 data and LiDAR came to the forefront with its capacity to produce bare earth model easily, extracting non-gound objects and with a vertical accuracy of 0.1855 m. Later on, in the hydrologic modelling phase; Flood Peak Discharge Values (Q_p) were calculated from these three different data types having different spatial resolutions and vertical accuracies, LiDAR DTM gave the nearest value to the reference. In addition, Q_p could be moved away from the reference value and given exaggerated results as the spatial resolution and vertical accuracies decreased.

Key words: LiDAR, DTM, flood, accuracy

DETERMINATION OF BASIN EŞEN RIVER FLOOD FROM CN (CURVE NUMBER), USING REMOTE SENSING AND GIS

ID No: 156

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ABSTRACT

Natural Resources Conservation Service (NRSC) method is one of the rainfall-runoff method which was developed by United States Department of Agricultural (USDA). In this case NRCS method is used for estimating the flood peak from rainfall data. This rainfall data, between 1967-1986 is obtained by DSI (Devlet Su İşleri - Goverment Water Affairs) and DMI (Devlet Meteoroloji İşleri - Goverment Water Affairs) meteorological gauged stations used as input data in NRCS method and is also available as daily, monthly and yearly. Estimating the flood peak from CN numbers, watershed characteristics will be determined. The CN number is essential to estimate the peak discharge and it is accomplished with using the soil type, land use and antecedent moisture condition (AMC). Determining this physical area characteristics is possible using GIS and remote sensing (RS) technologies. RS and GIS are efficient tools in rainfall and runoff analysis. Land use satellite data can be created by Erdas Imagine software which is a kind of remote sensing technology. Using the multi-temporal Landsat satellite image of the study area is classified with Erdas Imagine. The average value of curve number for all sub-basins were calculated by assigning weights with area of land use classes. Remote sensing technology can provide conventional methods in rainfall-runoff studies. The other characteristics like the area, slope, aspect, flow length data and calculating the drainage network is possible to estimate with using ArcGIS software from topographic map.

Evaluation of the results for this study distinct all of these watershed characteristics, the antecedent moisture condition (AMC) is calculated from 5 day prior rainfall. This parameter effects the flood peak seriously if the soil is under “low”, “average” and “high” condition. These 3 of antecedent moisture condition may affect flood peak variability. In addition to antecedent moisture, such deterministic influences included storm duration, intensity distribution and seasonal variations. An another result of this study, the SCS CN method can be applied to large watersheds with multiple land uses but the smaller or mid-sized catchments are more available to give the favorable values. abstract should be 200 to 300 words long with 12-point font Times Roman and single-spaced. Please use international A4 type paper, use 2.5 cm for top & bottom margins, 3.5 cm for left and 2.5 cm for right margins. The title of the study should be centered on a line located 2.5 cm from the top of the page. The title should be in bold 12-point Times Roman font. Please use this template for your abstracts.

Key words: CN, GIS, Remote sensing, Flood, Water

BASIN MANAGEMENT AND GEOTHERMAL ENERGY VARIATION AT MIHLI CREEK BASIN USING DATA FUSION WITH SATELLITE IMAGES

ID No: 153

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ABSTRACT

Image fusion in remote sensing, it is method that combining high spectral resolution and high geometric resolution images creates result images having both high spectral and geometric resolution. In remote sensing applications, merging high geometric resolution panchromatic image with low geometric resolution, high spectral resolution multispectral image is important in order to achieve high values in accuracy analyses. In this study, panchromatic image from Spot 4 satellite and multispectral image from Landsat 5 TM satellite of Mıhlı Creek Basin were used. While used panchromatic image has 10 m resolution, multispectral image has 30 m resolution. Mıhlı Creek Basin is located in North of Edremit Gulf. Mıhlı Creek Basin which has nearly 79 km^2 develops on Kazdağ Massif. Pansharpening methods, Intensity-Hue-Saturation (IHS), Principial Component Analysis (PCA), Wavelet Transformation, Brovey Transformation, Ehlers Fusion, and Multiplicative Transformation, were applied in this study and result images with high resolution were compared. Erdas Imagine, a GIS software, was utilized. Also, ArcMap was used in order to obtain sub-watershed of Mıhlı Creek. Using result images, unsupervised and supervised classification were applied so as to compare pansharpening methods. Finally, accuracy assesments of pansharpening images were realized and the optimal result was obtained. Additionally, geothermal energy variation was researched using Landsat data with NDVI.

Key words: Geothermal, Mıhlı Creek Basin, Panshapening, Remote Sensing

EXTRACTION OF SURFACE WATER RESOURCES USING REMOTE SENSING INDICES AND LANDSAT 8 DATA

ID No: 67

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ABSTRACT

Water resources consist of surface water, ground water, frozen water, under river flow etc. Surface water refers to water in a river, lake or fresh water wetland. Surface water is naturally replenished by precipitation and naturally lost through discharge to the oceans, evaporation, evapotranspiration and groundwater recharge. Monitoring and management of water resources have been one of the most important environmental issues. Remotely sensed satellite images are widely used for monitoring water resources on a large scale and periodically. Thus, satellite imagery is an effective way for observing temporal changes of surface water resources.

There are different kind of remote sensing indices such as urban indices, water indices and vegetation indices to highlight one land cover type better than the other ones. The aim of this study is to extract surface water resources using remote sensing indices such as Normalized Difference Water Index (NDWI), Modified Normalized Difference Water Index (MNDWI). Landsat 8 satellite images were utilized as material and Zonguldak province was chosen as study area. The study area is a water-reach environment including Black Sea, dams and rivers. Thus, it is important to monitor surface water resources in such regions. The obtained results revealed that Landsat 8 images present satisfying outcomes in extracting surface water bodies when using water indices. By the help of these water indices and satellite images, environmental assessment and management strategies can be conducted adequately by decision makers for sustainable development.

Key words: Surface Water Resources, Landsat 8, Normalized Difference Water Index (NDWI), Modified Normalized Difference Water Index (MNDWI)

WATER MANAGEMENT STRATEGY OF ATIKHISAR BASIN USING BY GIS

ID No: 319

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ABSTRACT

The Atikhisar Dam is located in the city center SE of Canakkale. Atikhisar Dam has 21,65 hm^3 water capacity and 50,6 m sea level. There are many different factors affecting the Atikhisar dam such as major drinking water intake, climate elements, topography, depends on vegetation cover term, land use and irrigation. For this reason, the aim of this project is to determine the watershed management strategy of Atikhisar Dam water supply and irrigation basin source by Geographic Information Systems (GIS). All of these in preparing all these evaluations and analyzes were based on the elevation layers (digital topography maps) raster maps of 1/25000 scale. As the material method were used MapInfo Professional 9.0 and Vertical Mapper 3.1 software. In addition, climate data were analyzed in the study area. As results, it was understood that the existence of many settlements around Atikhisar Basin and the agricultural activities according to the condition of the land had an adverse effect on the uncontrolled and overfeeding dam feeding. Water is drawn from the dam by using water and irrigation for agricultural area. The dam water level of the basin rises in the winter months when there is plenty of rainfall, in the summer months when the water level of the basin increases and the precipitation decreases to the minimum level, the level of the reservoir falls.

Key words: Atikhisar Dam, water management, water reservoir, GIS

MONITORING AND CALCULATING THE SURFACE AREA OF ATIKHISAR DAM LAKE (ÇANAKKALE, TURKEY) USING SATELLITE IMAGES AND GEOGRAPHIC INFORMATION SYSTEM (GIS)

ID No: 52

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ABSTRACT

The aim of the study was to monitor and calculate the surface area of Atikhisar Dam Lake in Çanakkale, Turkey. Geographic Information System (GIS) and Remote Sensing techniques were used to calculate the water surface area. Remotely sensed Landsat satellite images (ETM+, MSS) encompassing Atikhisar Dam Lake for the years of 1975, 1985 and 2001 were used to investigate the changes in the surface area. Water surface area was calculated for better understanding the temporal variation of Atikhisar Dam Lake. The results showed that a decrease of 57% in the surface area of Atikhisar Dam Lake was observed and the area reduced to 1.196 km^2 in 2001 while 2.783 km^2 in 1975. In conclusion, climate change, land use and vegetation, sediment deposition, anthropogenic and agricultural activities are important factors affecting the amount of available water. Water resources managers should determine the appropriate water sharing policy and management strategies specified regionally to mitigate the effects of climate change. Spatial and temporal variations in the water resources which are vital for sustainable management of water resources should be monitored continuously.

Key words: Geographic information system, satellite images, remote sensing, Atikhisar

RAINFALL-RUNOFF MODELLING OF KEÇIDERE BASIN (NW TURKEY) USING ARCSWAT MODEL

ID No: 54

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ABSTRACT

Modelling of the rainfall-runoff relations are crucial for water resources, water management, environment and flood control system in basin studies. There are many models, which is used different hydrological equation and data to obtain runoff from rainfall. The SWAT (Soil and Water Assessment Tool) is one of the most recent models developed jointly by the United States Department of Agriculture (USDA), Agricultural Service and Agricultural Experiment Station in Temple, Texas. ArcSWAT (Arnold, 1998) is a model of SWAT, which is based on physical parameters such as soil, land use and slope with ArcGIS interface. In this study, we have examined Keçidere basin via ArcSWAT tool for rainfall-runoff modelling using Corine Land use (European Environment Agency, 2016), FAO soil map (FAO, 2014) and digital elevation model (DEM), Gönen Meteorological station rainfall data and Keçidere-Dereköy runoff station for validation. Before to construct model, we have converted Corine land use classes to SWAT classes with best optimal options. Firstly, watershed delineation was executed to obtain watershed parameters based on DEM. Then, Hydrological Response Unit (HRU) was constructed using Land use, soil and slope parameters. After HRU, daily meteorological parameters were added with rainfall gauge station and simulation data for SWAT (Fuka et al., 2013). After all, run of model was executed in daily and monthly scale based on Soil Conservation Services Curve Number method (SCS, 1956, 1964, 1971, 1985, 1993). Finally, simulated runoff data was taken from ArcSWAT outputs as daily and monthly scale both millimeter and cubic meter unit for validation and calibration. Dereköy-E02A015 runoff gauge station was used for validation of simulated data. According to results, observed and simulated runoff values have strong determination coefficient such as 0.7. In this context, ArcSWAT is a useful tool for the rainfall-runoff modelling. On the other hand, model interface and data variability of this model make easy to modelling these parameters on the contrary of other rainfall-runoff models.

Key words: GIS, ArcSWAT, rainfall-runoff, Keçidere

EVALUATION OF THE TRACE-ELEMENT IN GOKSU DELTA USING GIS TECHNIQUES

ID No: 56

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ABSTRACT

This study assessment water quality at Goksu Delta where is a major agricultural and wetland area in Turkey. Although delta is composed predominantly of agriculture, ıt has national and international significance. Delta is an ecologically important land as well as agricultural land. Alluvial soil structure provides fertile land for agriculture and is quite noteworthy in natural life. Especially water birds are an important point, delta chosen as the Ramsar field. Such an important area is very important in terms of monitoring of water quality and understaning of anthropogenic activities (especially agricultural) pressures. The purpose of these analyses was to determine the trace element concentratıon and distributıon in the Goksu Delta. A total of 24 water wells were selected, 13 from the Goksu region and 11 from the Silifke region, to represent all the study areas. Water samples from the selected wells were collected on a monthly basis between May 2012 and April 2013. Using inductively coupled plasma-Optical Emission Spectrometry (ICP-OES), the concentratıon of trace element were measured in the Delta. Samples were collected from 24 separate groundwater wells between May 2012 and April 2013, and chemical water quality parameters were examined. Water quality maps of the study area were created using the Geographic Information Systems (GIS). GIS was applied to illustrate the trend of trace element in the Goksu groundwaters. These have been created to comprise the most decisive criteria used for the delineation of groundwater degradation ın terms of agriculture or constructıon.

USE OF GIS (GEOGRAPHIC INFORMATION SYSTEM) TO EVALUATE THE FLUORINE ACCUMULATIONS IN DRINKING WATER OF HAVSA DISTRICT (EDIRNE, TURKEY)

ID No: 58

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ABSTRACT

Fluorine is a naturally occurring, widely distributed element and a member of the halogen family and in drinking water can be either beneficial or harmful depending on its concentration. Havsa District is located in the Thrace Region of Turkey and contains very large and productive agricultural lands. The aim of this study was to determine the fluorine accumulations in drinking water of Havsa District and evaluate the detected data in terms of teeth health of local people by using the Geographic Information System (GIS) in order to make a visual explanation by presenting distribution map of fluorine in drinking water. For this purpose, drinking water samples were collected from 15 stations including almost all the residential areas of the Havsa District in winter season of 2016. Fluorine concentrations of water samples were determined by using a spectrophotometer and also Cluster Analysis (CA) was applied to detected data in order to classify the regions in terms of fluorine contents. According to data observed, the fluorine concentrations in the Havsa District were determined between 0.006 ppm (Bakışlar Village) – 0.567 ppm (Hasköy Village). According to the results of CA, 2 statistically significant clusters were formed as "Updistrict Cluster" with higher fluorine contents and "Downdistrict Cluster" with lower fluorine contents.

Key words: Havsa District, Fluorine, Cluster Analysis, GIS, Teeth health

A GIS-BASED PROTECTION STRATEGY FOR DAM RESERVOIRS USED AS DRINKING WATER SOURCE: A CASE STUDY FROM TURKEY

ID No: 64

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ABSTRACT

Sustainable water resources management should protect the quantity and quality regarding the source. Compared to groundwater, surface water is more vulnerable against pollution. Therefore, more effective and special case-approach is needed for surface water, instead of the distance-based approach, which is does not consider any hydrologic characteristics of the resources. Basin hydrology, soil and vegetation, land use characteristics and basin characteristics were considered in the protection strategy of water resources feeding the Çatalan Dam constructed on Seyhan River to supply drinking water for Adana Province which is located in the Central and Eastern Anatolia of Turkey. The recharge area of this drinking water dam lake's basin is 15400 km^2 and it is approximately % 2 of the total area of Turkey. According to the physiographical structures this basin divided into four different climate region as Mediterranean, Misis-Andirin, Central Anatolia and Plateau. The twenty years long-term daily meteorological data were used which were measured at 18 precipitation and 31 gauging stations. All maps were demonstrated as 1/25000 scale. In order to assess of intrinsic vulnerability of study area, surface runoff is considered and the parameters that influence to unit hydrograph are assumed that influence to pollutant contamination. These parameters are morphologic parameters such as bifurcation ratio, drainage density, time of concentration, rainfall, soil depth and texture, vegetation and geology. The surface runoff is calculated by using SCS-CN, USDA methodology and GIS tools. These parameters were evaluated by using the weighting-rating method. Intrinsic vulnerability of Çatalan Dam Lake Basin against pollution was developed by two approaches. The areas which define very low vulnerable areas against pollution in the study area are in the middle (small areas) and in north (small areas) of study area, low vulnerable areas are in the middle (small areas) and in north (large areas), moderate vulnerable and vulnerable areas are in the middle (large areas) and in north (small areas), very high vulnerable areas are in the south (small areas) and in north (small areas). The areas that very high vulnerable against pollution are far from the Çatalan Dam Lake. And the areas that low vulnerable against pollution are near the lake. This shows that the "distance-based" approach is not adequate approach for water resources. Since the study was related with geographic parameters, it benefited the use of Geographic Information System (GIS).

Key words: Surface water, pollutant contamination, intrinsic vulnerability map, protection strategy SCS - CN, GIS, Çatalan Dam Lake

TERKOS-CANAL ISTANBUL SALTWATER INTRUSION USING HYBRID GEOGRAPHIC INFORMATION SYSTEM-ANALYTICAL SOLUTION

ID No: 68

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ABSTRACT

It is planned to build a massive navigational canal in Istanbul in order to link the Black Sea to the Marmara Sea. Construction of the newly proposed canal may have adverse effect on the nearby fresh water resources by encouraging seepage and salt water intrusion. This canal will built beside Terkos Lake which is one of the most important freshwater sources for Istanbul, (1-2 km) distance in between Canal Istanbul and Terkos Lake. Breaking of a saltwater way could cause a damage and contamination for the aquifer because saline water has a higher mineral content than freshwater, it is denser and has a higher water pressure. As a result, saltwater can push inland beneath the freshwater.

This study focused on the possibility of saltwater intrusion in the aquifer between the canal and the lake in order not to destroy the aquifer; analytical solution were used to simulate Terkos lake- Canal Istanbul intrusion using Ghyben-Herzberg, Glover analysis; A Geographical Information System (GIS) Geodatabase has been built for simulating the saltwater intrusion in case of canal construction.

Water level in Terkos lake is not stable; it is vary from +4.5 to -0.18, the results show there is no any serious problem as long as the lake level above mean sea level, but in case of the water level in the lake fell below mean sea level or equal; the saltwater will enter the aquifer and caused of freshwater pollution.

Key words: Saltwater Intrusion, Canal Istanbul, Terkos Lake, Geographic Information System.

DETERMINATION SPATIAL AND TEMPORAL VARIATION OF GROUNDWATER SALINITY IN THE CUKUROVA PLAIN, TURKEY

ID No: 55

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ABSTRACT

This study was conducted at southern Turkey for a large scale irrigation project (210000 ha). In this project Geographic Information System (GIS) was used for determination of groundwater salinity between years (1969-1999). For this study the data used in GIS was obtained from the 6th Regional Directorate archives of State Hydraulic Works (SHW). All of the data which obtained from SHW were digitized and transferred to GIS database. In Arc View 3.2 software for every ten years intervals groundwater salinity maps were produced. By using GIS techniques spatial and temporal variation of groundwater salinity was determined. For every ten years period (1969-1979-1989 and 1999) each groundwater salinity maps created in Arc View software. As the result of the study produced maps and map query results showed that the groundwater salinity was decreased for this large scaled irrigation project.

Key words: GIS, monitoring, groundwater salinity

IDENTIFICATION OF POTENTIAL SITES FOR STORMWATER HARVESTING IN URFA PROVINCE USING REMOTE SENSING AND GIS

ID No: 57

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ABSTRACT

The identification of potential sites for rainwater harvesting (RWH) is an important step towards maximizing water availability and land productivity in arid and semi- arid regions.

Therefore, it is important to develop any means available to supply water and maintain human habitability in a sustainable manner. Practiced or simply indispensable in many countries around the world, RWH promotes a sustainable and efficient manner of exploiting water resources. To address this challenge, the present study developed a robust Geographic Information System (GIS) based on screening methods for identifying potentially sustainable stormwater harvesting sites and storages in Urfa province as a first step for then more detailed investigations.

Multi criteria evaluation is carried out in GIS to help the decision makers in determining suitable zones for water harvesting structures based on the physical characteristics of the watershed. Different layers taken into account for multi criteria evaluation are: soil texture, slope, rainfall data, land use/cover, geomorphology and drainage network. The resulting map (potential stormwater harvesting and storage zone map) is classified into four classes: Very good, good, moderate and poor.

Key words: Storm water, Remote sensing, GIS

CONCEPTUAL AND NUMERICAL MODELING OF GUZELYURT AQUIFER, TURKISH REPUBLIC OF NORTHERN CYPRUS (TRNC)

ID No: 60

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ABSTRACT

Guzelyurt Aquifer is the most important, at the same time the largest drinking, municipal and irrigation water resource in Turkish Republic of Northern Cyprus (TRNC). However, the aquifer has exceeded its safe yield capacity due to excessive and uncontrolled pumping over the years and the water quality has been seriously degraded due to seawater intrusion. With "TRNC Water Supply Project" implemented recently, about 75 million m^3 of water is being supplied via pipeline under Mediterranean Sea from Turkish Republic to solve the water shortage problem in TRNC. With the water supplied, the deteriorated water budget of the aquifer can be reestablished in the mid- and long-term. Within this framework, the objective of the proposed research is to create a conceptual model which provides a 3-D picture of the aquifer geometry, including recharge, discharge and hydraulic characteristics of the aquifer and to develop numerical simulations. During the model development, geologic, hydrologic and hydrogeological data provided by Geology and Mining Department (G&MD) of TRNC were used, as well as the data, such as the amount of water pumped from wells, water level elevations and water quality parameters, collected by G&MD in field monitoring studies. The model development studies were based on the software called ArcGIS 10.0 and Groundwater Modeling System (GMS 10.2). Regarding the objectives, the surface-subsurface structural framework, areal-vertical extent and the internal-external boundary conditions of the aquifer have been established, and also the aquifer zones affected by excessive water withdrawal and seawater intrusion have been delineated. The 3-D numerical model developed and calibrated using the available field data based on the conceptual model was then used to simulate various water management scenarios regarding artificial recharge applications, defined water pumping scenarios, groundwater level variations related to displacement of pumping areas and improvements in water budget and areal extent of seawater intrusion.

Key words: Seawater intrusion, Groundwater modeling, Guzelyurt Aquifer of North Cyprus, Aquifer Conceptual Model, Geographical Information Systems (GIS), Groundwater Modeling System (GMS)

DETERMINATION OF THE MINERALOGY OF A SHALLOW LAKE BOTTOM BY EO-1 ALI SATELLITE IMAGERY: A CASE STUDY OF LAKE ACIGÖL IN TURKEY

ID No: 66

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ABSTRACT

Lake Acıgöl in Denizli, Turkey is an important area of scientific investigation whose economic value is intertwined with its molecular, ecological and geological cycles. For a lake surface, determination of the distribution of qualities can usually be done by in-situ measurement and detailed laboratory studies throughout the lake. Along with those of lake surface, the geochemical nature of the Lake Acıgöl's bottom and its relation to findings from detailed geochemical laboratory and remote sensing studies were the main objectives of the study. As for the scope of this study, it aimed to discover the mineral distribution of the lake bottom by in situ sampling and detailed laboratory analyses using EO-1 ALI satellite images and remote sensing methods. In order to determine the mineral distribution of the lake bottom, the following operations were performed: a) a field study (sampling and bathymetry works); b) geochemical and mineralogical investigations in the laboratory (XRD analysis); c) bathymetric mapping; d) classification of lake water; e) image pre-processing (geometric, radiometric and atmospheric corrections); f) determination of water-covered areas; g) water column correction; h) derivation of a depth-invariant index of different bottom type; and I) classification of depth-invariant images. The lake bottom mineral map was produced with unsupervised and supervised classification techniques such as Support Vector Machine (SVM) and Spectral Angle Member (SAM) in the lake bottom depth-invariant images. Results indicate that water column correction is necessary for mapping the mineralogy of a clear shallow lake bottom using satellite images and for deriving the relationship between satellite image data and lake bottom mineralogy.

Key words: Lake bottom mineralogy, depth-invariant index, water column correction, Remote Sensing for lake

ANALYZING THE EFFECTS OF DIFFERENT LAND USE DATA SETS ON HYDROLOGICAL COMPONENTS OF THE OMERLİ WATERSHED, TURKEY

ID No: 154

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ABSTRACT

Land use and land cover (LULC) datasets are one of the major key factors effecting the watershed hydrology. Thus, there is a strong requirement for appropriate LULC data especially on the watershed which are used for providing fresh water to the cities. The aim of the study is to analyze hydrological responses to different LULC datasets on hydrological components of a watershed. Omerli Watershed which is among the most important drinking water reservoirs of Istanbul, under the pressure of rapid urbanization with a drainage area of 1612 km^2 located on the Asian side of the city that supplies almost 1/3 of the water demand of the megacity of Istanbul selected as a study area. The Soil and Water Assessment Tool (SWAT) which is physically based, hydrological and public domain model used as hydrological model to evaluate water budget in selected watershed. SWAT model is calibrated with an automatic calibration program (SWAT-CUP) by using SUFI-2 algorithm. Model setup is conducted for two LULC dataset which are CORINE obtained for the year of 2016 and LULC data produced from 2016 dated Landsat satellite image by means of supervised classification. Study reveals that using different land use maps yield different results on water budget of the Omerli Watershed in terms on surface water, potential evapotranspiration and soil moisture.

Key words: Land Use / Land Cover, SWAT, Omerli Watershed, Corine, Landsa

EFFECTIVENESS OF CALIBRATION PROCEDURES IN INTEGRATED HYDROLOGICAL MODELLING

ID No: 314

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ABSTRACT

Traditionally, calibration of hydrological models has been performed manually or automatically. However, the process of manual calibration requires a high degree of expert knowledge and it is very tedious and time-consuming task. Therefore, developing more effective and efficient automatic calibration procedures is a significant issue to provide reliable estimates of the modelling approaches. demonstrating their applicability to hydrological problems

The aim of the study was to reveal the effectiveness of automatic calibration procedures to increase the accuracy and reliability of complex hydrological modelling processes. In this context, a process-based hydrological modelling approach was calibrated and implemented to Goksu Watershed in Turkey. The J2000 modelling was adapted and used to estimate hydrological quantities including basin wide. The model required a spatial and time–series data set including topography, land use, geology, soils, meteorological and gauging data. It represents a comprehensive approach to investigate the performance of a global and a local optimisation technique, respectively, the Shuffled Complex Evolution algorithm. The calibration of the model was conducted in a multi-objective framework where a unique aspect of the model response and the simulated runoff is optimised to observed runoff from available gauging stations. Different aggregated objective functions such as Correlation Coefficient (r^2) and Nash-Sutcliffe Efficiency (NSE) were used to give different weights to the calibration criteria. The results of the calibration procedures were then compared in terms of effectiveness and efficiency and demonstrate the different performance of the methods. Hydrological quantities in a reasonable confidence interval were also demonstrated as main model outputs.

Key words: Calibration, Hydrological Model, Goksu, Nash-Sutcliffe Efficiency, Runoff

STUDY OF THE COASTAL WAVE ENERGY PROPAGATION USING GIS AND HYDRODYNAMIC MODEL

ID No: 298

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ABSTRACT

The Bay of Bou-Ismail extends over a length of 47 km with a wide continental shelf of 11 km; it presents an important economic area that brings various investments in tourism, industry, fisheries and the energetic sector.

A mobile bottom that knows a strong dynamic activity characterizes this Bay. In the shoreline, thirteen protection's infrastructures have been installed, the energy's origin of this dynamic activity is naturel (hydrodynamic energy) and it can be destructive as it can be constructive.

This work presents a methodology that allowed us to classify areas with a high potential energy along the shore, with the development of thematic maps concerning the numeric output data obtained by the hydrodynamic model SWAN.

The objectives of our work consist to develop a SIG to perform a spatial analysis, which allows us to better observe the wave propagation along the Bou-Ismail bay.

A spatial analysis between the different wave characteristic performed by maps, allowed us to carry out a selection of the most dynamic coastal area.

Key words: Hydrodynamics, Modeling, SWAN, SIG, Wave energy, Coastlines.

SPATIAL DISTRIBUTION OF DEEPWATER PINK SHRIMP (*PARAPENAEUS LONGIROSTRIS*) STOCKS IN THE SEA OF MARMARA: A GIS APPROACH

ID No: 39

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ABSTRACT

Geographic Information System has powerful and specially designed functions to integrate, manage and visualize spatio-temporally referenced data; it has become an important tool in fisheries management. The power of GIS lies in its ability to visualize and relate various types of geo-referenced spatial and non-spatial data allowing users to find the hidden patterns and connections between them. The use of GIS in decision making and policy development is growing rapidly in many fields of resource management. Also, GIS can support decision making and effective management of the fisheries sector. In shrimp fishing, a variety of fishing gear is used including beam trawls, otter trawls, traps and gillnets. The shrimp fishing fleet mainly target deepwater pink shrimp, *Parapenaeus longirostris*. The present study was undertaken aimed at preparation of shrimp fisheries Geographic Information System for the Sea of Marmara. In the study area, shrimp is extensively caught in the coastal zone (40–150 m). The survey data were collected monthly by using beam trawl between October 2011-July 2014. Using the geographical information system (GIS) calculated relative biomass of *P. longirostris* based on catch per unit effort (CPUE) in the Sea of Marmara. Spatial maps showed that the biomass of the *P.longirostris* is not uniformly distributed in the study area. Especially north part of the Sea of Marmara has high biomass values. According to the years, the spatial distribution were found similar. *P.longirostris* biomass were determined as 297 kg/km^2 in 2012, 480 kg/km^2 in 2013, and 283 kg/km^2 in 2014, respectively. This study addresses the potential GIS for the sustainable management of shrimp through the analysis of various dataset depicting the criteria of sustainability. GIS is advanced method for the sustainable development and management, particularly in developing countries, which are often more vulnerable to environmental degradation.

Key words: Saros Bay, *Parapenaeus longirostris*, Biomass, CPUE, geographical information system.

SITE SELECTION

DETERMINATION OF SUITABLE FIELDS FOR FISH BREEDING BY USING GIS AND UA TECHNIQUES: THE CASE OF ALMUS DAM LAKE

ID No: 138

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ABSTRACT

Almus Dam Lake It is a lake which is made up of trout farming in floating cages of approximately 4000 tons within 31,30 km² located in Tokat. Pollutants from lake settlements and fish farms cause the lake trophy to rise. Global climate change also causes a remarkable increase in the lake water temperature. Deep, clean and cool in summer, the waters are suitable for trout breeding. In this study, the lake's trophic index status, depth and summer surface temperature were modeled using GIS and remote sensing techniques. The best locations for trout farming were determined.

Key words: Almus Dam Lake, Trout Farming, Trophic index, Dept, Water Temperature, Gis, Remote Sensing.

SELECTION OF SUITABLE SITE FOR RADIOACTIVE WASTE REPOSITORY USING GIS AND FUZZY ANALYTIC HIERARCHY PROCESS (FAHP): AKKUYU/TURKEY

ID No: 141

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ABSTRACT

The use of nuclear fuel to generate electricity and the use of radioactive materials in medicine, research and industry give rise to radioactive wastes, some of which have high levels of radioactivity. These wastes will be threatened the global environmental health. The problem of environmental pollution due to waste disposal can be overcame by selecting suitable sites. Commonly, because of simultaneous effects of social, environmental, and technical parameters on suitability of a repository site, repository site selection is a complex process and depends on several criteria and regulations. The radioactive waste repository site (RWRS) selection process is a complex multi-criteria decision-making problem. This study deals with determination of suitable sites for the disposal of radioactive waste generated from Akkuyu Nuclear Power Plant. In this study, twelve data layers were exploited to detect the most susceptible areas. These factors are as elevation, slope, aspect, lithology, soil map, land use and ground water level, proximity to the settlement areas, roads, rivers, water surfaces and faults. The relative weights of defined criteria and sub-criteria were also determined applying Fuzzy Analytical Hierarchy Process (FAHP) technique. Next, by overlapping these criteria layers, final map was produced. The produced map shows areas that are suitable for RWRS. Based on the analysis several sites identified as highly suitable and finally the best site was chosen. The results showed the efficiency of GIS and multi-criteria decision-making methods.

Key words: Geographic information system (GIS), Multi-criteria decision analysis (MCDA), Fuzzy Analytical Hierarchy Process (FAHP), Radioactive Waste Repository Site (RWRS).

AHP METHOD IN THE PRODUCTIVITY RESEARCH OF SOLAR FIELDS AND GIS INTEGRATION

ID No: 145

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ABSTRACT

Nowadays, the use of sustainable energy sources as well as in the world is of great importance for Turkey. Decreasing energy sources and increasing consumption in the meantime have made sustainable energy sources popular. Electricity generation from solar energy as an alternative energy source is frequently encountered as a preferred method. Solar power generation area in Turkey (Solar fields); large areas obtained electricity from solar energy arises from the need to be created. In the selection of these areas; The choice of location of sun fields by spatial factors is at the beginning of today's popular study topics. However, there are limited studies on energy efficiency relationships with site selection. It is a necessity to investigate the efficiency for the most efficient and efficient use of energy resources.

As a study area; Five cadastral parcels with different locations and regions from Karapinar / Konya district, which is the region that the Ministry of Energy and Natural Resources considers appropriate, were selected. For these selected areas, the duration of insolation, aspect, land structure, road and transformer etc. spatial and non-spatial factors are taken into account. These factors of the weighting process based on their ability to benefit from solar energy, multi-criteria decision analysis methods of the Analytic Hierarchy Process (AHP) was applied. The method results were used in spatial analysis in GIS. According to the working area efficiency value estimation results were obtained five parcels choice availability. It is expected that the results of the study will be a method to contribute to the Turkish economy, national or foreign investors and individual users.

Key words: Solar Field, Productivity Analysis, AHP, GIS

SITE SELECTION OF SOLID WASTE LANDFILL USING GEOGRAPHICAL INFORMATION SYSTEM: A CASE STUDY FOR ARTVIN CITY CENTER

ID No: 146

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ABSTRACT

Solid wastes are one of the environmental problems that arise due to accelerated and unplanned urbanization today. The sum of the stages from the collection to the disposal of solid wastes is called waste management and is generally the responsibility of local governments. Problems such as air, soil, and water pollution arise from the poor management of solid wastes, threatening human health. One of the common methods used for the disposal of solid wastes is regular storage. In regular storage, waste is buried in pre-prepared and environmentally controlled areas in a controlled manner, and the associated environmental and human health hazards are minimized. However, the process of site selection for regular storage of solid wastes is quite troublesome. The site selection criteria include many factors such as proximity to settlement areas, ease of access, distance from historical and cultural sites, wind direction, and topographic conditions. The eastern Black Sea region in Turkey is very complicated in terms of both topography and natural environment. Particularly in Artvin, selected as the study area, it is very difficult to identify locations even for settlement, and this difficulty also negatively affects the identification of areas for depositing solid wastes. For the purpose of this study, a suitability map showing possible landfill sites with a potential life of 20 years was produced for Artvin city center using the ArcGIS 10.2 program. Seven parameters including slope, land use capability classes, distance from settlement areas, distance to roads, distance to rivers and dam lakes, and distance from the national parks were considered in the study. After removing all the forest and pasture areas, the generated suitability map was categorized into five classes ranging from very high to very low. The produced suitability map indicated that there was only one suitable area for solid waste landfill with a moderate degree and this outcome can be associated with the high coverage of forests, very steep terrain and poor connection to existing roads in the study area.

Key words: Solid Waste Management, Landfill, GIS, AHP, Artvin.

A GIS-BASED LANDFILL SITE SELECTION APPROACH USING SPATIAL MULTI-CRITERIA DECISION MAKING METHODS

ID No: 147

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ABSTRACT

Decision-making is a process that starts with the problem of detection and covers activities that are carried out up to the recommendation. All decision-making processes start with the diagnosis and identification of a decision problem. The ability of data storage, management, administration and analysis of Geographical Information Systems (GIS) is a great support in the course of problem definition. The spatial multi-criteria analysis is sharply distinguished from traditional multi-criteria decision-making methods due to its geographical component. Spatial multi-criteria analysis requires not only the values of alternatives but also their geo-references, unlike traditional multi-criteria decision-making methods. Spatial multi-criteria analysis can be considered as the process of reaching the final decision by combining and transforming the geo-data used as input. Data is processed to enable decision making using GIS and multi-criteria decision-making methods. Analytic Hierarchy Process (AHP), which is one of the multi-criteria decision-making methods, is a general measurement theorem. It has been used in broadly in many various decision and planning projects. The rationality of the AHP; to focus on the problem-solving goal, to develop an integrated model of the relationship and effects of the problem, to know and experience those who have dominant and prior influence among the relations in the structure, to reach the best agreement by permitting among the differences. As an example of spatial multi-criteria decision-making methods, the site selection analysis of solid waste landfill site has been carried out using AHP and GIS methods for Istanbul province in Turkey. A total of 11 factors were used in the study, under the two main classification parts like environmental and economic. Environmental factors; land use, geology, settlement areas, surface waters, population density, airports and protected areas. Economic factors are a slope, solid waste transfer stations, land values, and highways. The identified factors are separated by sub-criteria according to the appropriateness of solid waste landfill site, and values are assigned. As a result of the study, using the power of GIS functionality, the digital data sets leading to the decision-makers were created.

Key words: Landfill siting, GIS, Geographical information systems, AHP, Analytic Hierarchy Process, Istanbul

COMPARISON OF METHOD BASED ON EXPERT OPINION (STOCHASTIC) FOR THE SELECTION OF LOCATION OF FUNCTION FIELDS TO DATA CONTROLLED METHODS (DETERMINISTIC); AMASYA CASE

ID No: 151

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ABSTRACT

Designing spatial analysis models for decisions to be made on regional plans and local plans, for the site selection of urban and rural functions with correct inputs and methods and showing results on site selection by considering the analysis results performed is of major importance for the precision, sustainability of plan decisions and most importantly for the protection of human lives.

The two main sources utilized for 'learning' and subsequent 'inference' actions are 'data' and 'expert'. While spatial location selection models are designed, 'database based deterministic' and 'expert based' statistical 'methods can be used for spatial analysis models, depending on the nature of the problem and the uncertainties that arise from the inputs used in the model and their correlations with other inputs.

In this study, topographical, hydrotopographic, hydrological and geological analyzes were carried out on the project site. Landslide susceptibility analysis was established by initially using first derivative analysis in the deterministic model design as input; then the same analysis was carried out with stochastic model design. Accuracy measurements of the resulting spatial analysis; provided by ROC (Receiver Operating Characteristic) curve with reference to previously realized landslides in planning area.

Key words: Deterministic, Stochastic, Site Selection, ROC Analysis

DEVELOPING A SERVICE-BASED DECISION SUPPORT PLATFORM FOR INTEGRATED SOLID WASTE MANAGEMENT SYSTEMS

ID No: 304

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ABSTRACT

The amount of waste production has increased as the population of the world increases from the past to the present. Therefore, the collection, transportation and disposal of wastes have become more important. The stages of collection, transportation, storage and disposal of municipal solid waste poses necessity especially environmental, economic, social, health and sustainability costs to be managed with decision support platform (DESUP). The main purpose of this study is to gain back waste product-oriented with the integration of Geographic Information Systems (GIS) and Spatial- Multi Criteria Decision Methods (S-MCDM) method for minimizing the economic, environmental and social costs and to eliminate waste problems from the country's agenda with more effective and a scientific model solution. First of all, the platform to be constructed will able to determine the most suitable locations for containers according to population density. Then, the most appropriate routes will be established to transport the solid waste collected in the containers to the transfer stations. Besides, the platform will allow the use of sensor technology to create the most appropriate routes. It will be possible to create routes only for containers, which are to be considered full, by using data collected from the sensors placed in the containers at sufficient frequency so that the additional transportation costs incurred for the unfilled containers yet to be removed. The platform will determine the most suitable locations for disposal facilities that can be installed for the disposal of solid wastes such as composting facilities, incineration plants and landfills. In addition, this platform will allow to be determined the most appropriate route from the transfer stations to disposal facilities.

Key words: GIS, Waste Management, MCDM

GEOSTATISTICS ANALYSIS TO DETERMINE THE USER PROFILE OF A SOCIAL MEDIA PLATFORM

ID No: 136

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ABSTRACT

Social media platforms have started to be used in various social and working disciplines. Defining any activity with location in social media means that the distribution of social media users can be analyzed geographically to determine user profiles. This study determines user profiles of social media platforms with the example of an online dating site. Data about active users of this platform was retrieved and analyzed in GIS environment using geostatistics techniques. The distribution and outliers of the data were determined by using exploratory spatial data analysis tools. User profiles were analyzed by examining socio-demographic relationships. Target areas were determined by using cluster analysis, while the relations of the data were analyzed by using regression techniques. Results contribute to the research about social media as a new developing discipline and give a perspective of user profiles in view of education and occupation by using geostatistics approaches.

Key words: Geographic Information Systems (GIS); geostatistics; social media, regression analysis

USAGE OF MACHINE LEARNING BASED DATA MINING TECHNIQUES IN SPATIAL DECISION SUPPORT SYSTEMS

ID No: 140

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ABSTRACT

Numerous decisions are taken at the macro and micro scale in all areas of life. The number of criteria to influence decision increases, the calculation of criteria weight is becoming more complex. Particularly in the decision analysis associated with spatial be more complex because of both data intensive and excess of criteria. For the solution of this problem, lots of methods have been developed based on Geographic Information Systems (GIS) and Decision Support Systems (DSS) methods and named Spatial Decision Support Systems (SDSS). In recent years, SDSS methods are used in many applications by the public, private and academic communities such as selection of site selection, property valuation and landslide susceptibility mapping. In these studies, methods which require expert opinion such as Analytic hierarchy process (AHP), Weighted linear combination (WLC), Ordered weighted averaging (OWA), ELECTRE etc. are preferred and accepted generally. In these methods there is problems such as, different perspectives of experts, subjective evaluation, time and cost overruns. So automate and become widespread of applications become more difficult. In recent years, self-learning techniques which name is Machine Learning (ML) have been developed with the advances in Artificial Intelligence and it is called Data Mining (DM) when these techniques are implemented in a data set. In this study, usage of ML based DM techniques in spatial decision support system is examined and it is seemed that with this techniques, machines can learn and get experience from raw spatial data and be an expert like a human on a subject. Thus, problems that caused by expert based systems can be eliminated.

Key words: Spatial Decision Support Systems (SDSS), Machine Learning (ML), Data Mining (DM), Geographic Information Systems (GIS)

LOCAL LANDSCAPE ORGANIZATION AND SITE SELECTION OF MOBILE PASTORALIST GROUPS

ID No: 143

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ABSTRACT

This study is based on winter pastures and temporal campsites areas in the district of southern Garzan Basin. The survey and field observations and also using GIS data have been made both in their winter pastures and/or campsites for showing differences in the settlement patters. The purpose of the section is to analyse changes in the social organization of contemporary pastoral nomads from past to present by focusing changes or transformations particularly in the style of site selection. Thus the study represents the reconstructing semi-nomadic groups spaces and pre-modern land-use strategies in southeast Turkey. Most of the Ethno-archaeological studies in Anatolia were related to the production processes of similar objects found in archaeological things such as pottery, tools making. On this study does not focus specifically on pastoral nomadic objects such as tools or pottery. It shall be given social structure and their settlement pattern rather than their materials. Within this context, this study distinguishing feature is that the nomadic lifestyle from looking by their architectures and campsites. Therefore, in this study some modelling and mapping for understanding nomadic site selection and their mobility process using Geographic Information Systems (GIS).

In this context, this study for understanding dynamism/circle of temporary sides the relationship between space and time will be examined. The location and position of buildings with each other and frequency of usage will also be explained with a critical perspective. And also my aim to make some general suggestions about different objects of nomadic architecture and settlement process.

Key words: Semi-Nomadic, Landscape, Winter Pasture, Garzan, GIS

THE USE OF GEOGRAPHIC INFORMATION SYSTEMS IN EVALUATING HISTORICAL DATA: INVESTIGATION OF TEMPORAL CHANGES IN GROUNDWATER SALINITY IN IRRIGATION PROJECTS

ID No: 61

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ABSTRACT

Investigation of environmental factors at irrigation facilities is a necessity for sustainable water and land resources management. At operation stages of State Hydraulic Works irrigation projects, within monitoring and assessment studies at an irrigation area, water table depth data and salinity data of water table observation wells are evaluated, water table depth maps and water table control reports are prepared. Water table salinity maps are annually prepared based on Groundwater Monitoring Handbook of State Hydraulic Works for water table control reports in irrigation management works. Geographic information systems (GIS) is successfully applied in engineering fields. GIS provides evaluation of historical data of monitoring activities in irrigation projects. The water table level maps can be drawn easily by using groundwater observation values in irrigation project area. Flow direction of groundwater can be determined in a short time with time-saving features of using GIS in comparison with classical methods. Interpolation methods used in GIS application provides estimation of the groundwater value in unobserved areas. Critical highest depth maps of water table, critical lowest depth maps of water table and water table salinity maps can be easily prepared and results can be evaluated by using GIS models. The aim of this study is to present the importance of using GIS in evaluating spatial and temporal changes in groundwater salinity in irrigation projects in the context of sustainability of irrigation projects.

Key words: Water resources management, irrigation, geographic information systems, irrigation management

INTEGRATING GEOGRAPHIC INFORMATION SYSTEM (GIS) AND REMOTE SENSING FOR MONITORING WATER SURFACE AREA

ID No: 62

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ABSTRACT

Integration of geographic information systems (GIS) and remote sensing (RS) has attracted considerable attention in environmental and hydrologic studies in recent times. Remote sensing is crucial to data acquisition and important tool for better understanding of the changes in water conditions for the efficiently management of natural resources. Remotely sensed satellite images are valuable source data for the development of GIS for applications in environmental monitoring and resource management. Satellite data rapidly provides basic information about the water resources such as the spatial and temporal changes in shorelines and total surface area. GIS provides an efficient tool for analyzing and monitoring these spatial and temporal changes of the water resources. Also, it allows modelling the impacts of climate change, anthropogenic and agricultural activities on water resources, providing quantitative analyses to be used as an input in the process of management decision for decision makers. Recent progresses of RS and GIS technology also help to ensure that processing and analyzing a wide variety of data simultaneously in terms of time and cost efficient. Integration of RS and GIS techniques can help for the resources managers to better adapt to the dynamics of natural resources. The integration supports in designing a management plan specified for a water resource. This integration will provide significant contributions to a better understanding of the spatial and temporal changes in water resources by monitoring of the water surface area. In conclusion, the full potential of RS and GIS in environmental monitoring will be achieved when RS and GIS are fully integrated.

Key words: Geographic information systems, GIS, Remote sensing, Monitoring

EVALUATION OF FLOOD CONTROL ACTIVITIES BY USING GEOGRAPHIC INFORMATION SYSTEMS

ID No: 65

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ABSTRACT

Flood control activities are carried out within the scope of water resources planning, development and management studies. The implementation of flood prevention works has great importance in terms of prevention loss of life and property, protecting settlements and prevention damages to agricultural areas. These studies are carried out with interdisciplinary activities. The establishment of observation stations and the preparation of flood plans before the flood are of great importance in terms of prevention of flood damages. Geographic information systems (GIS) is widely used and successfully implemented in various engineering fields. Engineering studies based on planning and monitoring works can be evaluated by using GIS which is an effective decision support tool. GIS provides to store historical flood data with project locations in a database to be used in flood control activities. The storage of archive records of flood facilities in GIS environment provides contribution to work carried out. GIS models of flood facilities evaluated at river basin and sub-basin scale is a reliable infrastructure for future works. GIS database of projects contributes to preparing flood risk maps, evaluation of flood prevention works and developing climate change scenarios and adaptation strategies. Historical flood data can be accessed by geographical inquiries. In this study, possibilities of using GIS in flood control activities in the context of sustainable water resources management is evaluated and recommendations are presented.

Key words: Geographic Information Systems, Flood Control, Flood Control Activities

CLIMATOLOGY

A STATISTICAL ANALYSIS OF REGIONAL PRECIPITATION IN MAURITIUS

ID No: 41

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ABSTRACT

In a changing climate, there is a need to monitor local climatic changes. The island of Mauritius, located in the western Indian has seen a decrease in the long term mean total annual precipitation, along with warming trends and sea-level rise, which could have serious ecological and agricultural consequences. Despite being a small island, Mauritius experiences some significant localised or microclimatic variations. The aim of this study is to quantify the regional precipitation patterns of Mauritius using total mean annual precipitation of 52 meteorological stations for the period 1981–2010. The significant variables influencing precipitation in Mauritius were examined using Principal Component Analysis (PCA). Then a Cluster Analysis (CA) was used to group the stations according to significant variables identified. Finally, a spatial interpolation of precipitation in Mauritius using the Kriging with External Drift (KED) technique was carried out to examine the spatial distribution of precipitation of the island. Using the Cluster Analysis (CA) and kriging results, regions of precipitation were then determined for the island. The Principal Component Analysis (PCA) results showed that elevation and coastal proximity caused the most variance in the dataset with respect to precipitation. The Cluster Analysis (CA) follows Ward's method and identifies six regions of precipitation in Mauritius: three inland and three coastal regions respectively. A decreasing gradient in precipitation between the south-east and north-west is observed due to South East Trade Winds and the altitudinal difference between the coastal areas and the Central Plateau. The Central Plateau represents a distinct precipitation zone which receives the highest precipitation on the island. The windward-facing south and eastern highlands experience orographic precipitation as a result of adiabatic air expansion and therefore are more humid. On the other hand, the northeast highlands region, together with the north and western coasts which lie in the leeward rainshadow, are notably drier.

Key words: Precipitation, regional precipitation, Principal Component Analysis (PCA), Cluster Analysis (CA), Kriging, Mauritius

TREND ANALYSIS OF THE ZENITH TROPOSPHERIC DELAY (ZTD) TIME SERIES

ID No: 42

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ABSTRACT

Nowadays, climate change is one of the most important environmental problems and there are many scientific studies on adaptation to climate change. Zenith tropospheric delay (ZTD) have a great importance in climate change studies. Because, integrated water vapour (IWV) is one of the main gases that are responsible for the greenhouse effect, which can be calculated through ZTD obtained from GNSS (Global Navigation Satellite System) observations with various transformation models. Analyzes of GNSS observations can be used to obtain the zenith tropospheric delay (ZTD) parameter representing the effect of weather conditions. ZTD parameter consist of two components. One of these is zenith hydrostatic delay (ZHD), other is zenith wet delay (ZWD). The modeling of ZWD is difficult due to the irregular distribution of water vapour. In this study, trend analysis of time series obtained from ZTD data recorded at IGS stations selected from Turkey and Europe are performed. The data used for the study are between 1995-2010. Lineer Regression Model and Mann-Kendall tests were used for trend analysis. The results obtained from these two tests were compared. In this way, evaluations were made on the climatic change that occured in the last 15 years. According to Lineer Regression Model, an increasing trends were observed at the ANKR, EBRE and MAS1 stations, a decreasing trends were observed at the BRUS, GRAS stations. There was no significant trend in other stations. On the other hand, according to Mann-Kendall test, an increasing trends were observed at the ANKR, EBRE and MAS1 stations. There was no significant trend in other stations.

Key words: Climate, GNSS, Zenith Tropospheric Delay, Integrated Water Vapour, Lineer Regression Model, Mann-Kendall Test

LANDSAT 8 DERIVED LAND SURFACE TEMPERATURE (LST) AND ITS RELATION TO LAND USE LAND COVER MAP (LULC)

ID No: 43

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ABSTRACT

Land Surface Temperature (LST) is a key parameter governing the energy balance of the world. Furthermore, it is crucial for climate, hydrology and agriculture related studies. Remote sensing technology is an effective way to observe the changes on Earth and satellite images are widely used in order to evaluate LST over large areas. There are many commonly used algorithms namely split-window algorithm, temperature/emissivity separation method, mono-window algorithm and single channel method to retrieve LST maps by remote sensing technologies.

The aim of this study is to retrieve LST map using one of the new Earth observation satellite Landsat 8 and to reveal the relation between LST and Land Use Land Cover Map (LULC). Landsat 8 is the last generation of Landsat mission and it has eleven spectral bands that contribute to science many advantages. Zonguldak Metropolitan Area and its surrounding were chosen as study area. Mono-window algorithm was applied as LST retrieval algorithm and LULC map was generated using supervised classification method. Besides, in-situ measurements of temperature values were conducted for the accuracy assessment of LST results. The obtained results showed that LST values of urban and bare areas are higher than the rural ones. In addition, forest and vegetated areas have lowest LST values than the other LULC classes. LST maps can be retrieved using Landsat 8 images, and these maps can be used in climate models and Geographic Information Systems (GIS).

Key words: Land Surface Temperature (LST), Landsat 8, Land Use Land Cover (LULC), Zonguldak

APPLICATION OF REMOTE SENSING TECHNIQUES TO QUANTIFY URBAN HEAT ISLAND INTENSITY IN DHAKA CITY, BANGLADESH

ID No: 44

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ABSTRACT

This study assessed the effects of urban heat island in Dhaka city, Bangladesh from 2002 to 2014 using geographical information systems and remote sensing techniques. Land cover changes were characterized over a twelve year period with urban expansion and the resulting impacts created by these changes on the land surface temperatures investigated. The study also compared the land surface temperature and ground station temperature data to validate the surface temperature in Dhaka. Maximum likelihood supervised classification method was employed for the land cover classification process resulting into classification accuracy of 86.5% and 90.7% for 2002 and 2014 respectively. Combined end member selection and linear mixture model techniques were used to estimate the surface emissivity of the land surface properties. The obtained surface emissivity together with the brightness temperatures of the thermal bands were then in turn used to calculate the land surface temperature. Remarkable change in land cover was observed in built-up areas which increased by 12.33% of the total land area from 27.25% in 2002. Similarly, the land surface temperatures increased throughout the study area. Temperature ranges of 28.5°C to 35.4°C in 2002 and 37.9°C to 40.1°C in 2014 were observed. The difference between ground-based temperature and the satellite derived temperatures for the ground weather station were +1.8°C and +2.7°C in 2002 and 2014 respectively. This small margin of difference is attributed to sensor calibration errors. The land surface temperature increased across all land cover types over the twelve year period indicating existence and potential effects of urban heat highland in the Dhaka city. City planners therefore must implement urgent measures to monitor and contain the resulting effects on the city population and infrastructure.

Key words: Urban Heat Island, Remote Sensing, GIS, Dhaka, Bangladesh.

X-RAYING RAINFALL PATTERN IN GOMBE STATE NIGERIA OVER THE LAST THREE DECADES

ID No: 50

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ABSTRACT

The main aim was to analyze monthly and daily rainfall records of 1977-2008 for Gombe station and that of Tumu which covers the period of 1965- 1997 as well as that of the other nine stations across the state with a specific objectives to describe changes in rainfall seasons, duration, number of rain days as well as the amounts of rainfall received per a given rainy season. It was observed from the data analyzed that there was delay in the starts and ends of rainy season in the northern parts of the study area of about 14 to 21 days. In the same vein, the numbers of rainy days as well as the amount of rainfall received in the two parts of the study area vary significantly when correlated. For example, rains lasted for about 36-59 days at Billiri station (lat 09^{o}51′50 ″) with 684.56mm mean annual rainfall in the southern Gombe, while Dukku(10^{o} 36′15″) in the northern part showed 17-55 rainy days with 650.27mean annual within the same period. The average duration of the rainy season in the southern parts of the state (which is influenced by highland) had 6-8 months, while that of the semi-Sahel area by the north was found to be only between 4-6 months. This also indicates that the duration of rainy season steadily decreases with increase in latitude. When the total rainfall was correlated with the number of rainfall days of all the stations using Matrix Laboratory (MATLAB) environment; the results of the correlation coefficient indicated that there was correlation between the rainfall amounts and the number of rainfall days across all the stations in the study area. The correlation coefficients even though with varying degrees of freedom (Table 9 i.e. n-1) are as follows: Gombe 0.1506; Billiri 0.2559; Kumo 0.7053; Talasse 0.0372; Kaltungo 0.6189; Dukku 0.5122; Bajoga 0.6929; Nafada 0.3549; Deba 0.5281 and Tumu 0.1293. The results of the Student t-test is such that the Student's t-test of the five stations out of the ten did not show significant relationships at 1% and 5% levels of confidence. These stations are Billiri, Deba, Gombe, Nafada, Talasse and Tumu. On the other hand, the remaining stations i.e. Bajoga, Dukku, Kaltungo and Kumo did show relationships. Hence, the study confirms that rainfall amounts vary over space and time. It is therefore; recommend that there are needs to further synthesize farmers on the importance of early planting exercise, drought and pest resistant species especially in the northern parts of the state. There is also need for the government and other stakeholders to strengthen institution studying climate issues in the state with the view to have access with up-to date climatic data.

Key words: Rainfall, Pattern, Gombe distribution, Variability

ET CALCULATOR: A SOFTWARE TOOL DEVELOPED IN MODEL BUILDER TO CALCULATE ACTUAL EVAPOTRANSPIRATION USING LANDSAT 8 IMAGERY: A CASE STUDY OF ÇANAKKALE, TURKEY

ID No: 105

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ABSTRACT

Water is the most important constraint facing agriculture in most of the countries, including Turkey. Irrigated lands are extremely vital to the economy of Turkey. Evapotranspiration (ET) can be defined as the loss of water to the atmosphere from the ground, lake, pond, and vegetative surfaces due to vaporization of water. ET is usually the largest hydrological flux through the summer months in Turkey. The ability to accurately estimate the magnitude of this flux is crucial for the water balance and planning the use of available water resources.

The main objective of this study was to develop a software tool to calculate the actual ET using the Surface Energy Balance Algorithm for Land (SEBAL) model from Landsat 8 imagery. ET Calculator was designed in Model Builder, which is a visual programming language for developing geoprocessing tools in ArcGIS.

Landsat 8 imageries are useful resources for estimating ET when high spatial resolution is desired. A landsat 8 scene acquired on August 12, 2015 with path/row 181/32 was downloaded from USGS webpage. Then ET Calculator tool was employed to do the model calculations.

Key words: ArcGIS, Evapotranspiration, GIS, Model Builder, Remote Sensing, SEBAL Model

EVALUATING THE IMPACT OF AGRICULTURAL DROUGHT USING MODIS SENSOR: A CASE OF STUDY OVER THE AEGEAN REGION

ID No: 108

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ABSTRACT

Drought, as the considerable affair brought by global climate change, is one of the most important environmental threat. It can affect large areas and has devastating effects on environmental, social and economic sectors. Remote sensing methods by providing near real-time and accurate data throughout long-term periods is the best option for finding, evaluating and refining convenient drought monitoring methods for especially large areas. Among many human-related sectors, which are adversely affected by drought, agriculture is the first and most vulnerable one. In this study, Aegean Region of Turkey has been determined as a case study of agricultural drought assessment in the time interval 2007 – 2016 in growing seasons (from May to October). For this purpose, 16-day composite 250 m spatial resolution Normalized Difference Vegetation Index (NDVI) and 8-day composite 1 km spatial resolution Land Surface Temperature (LST) data derived from the Moderate Resolution Imaging Spectroradiometer (MODIS) sensor will be compiled and the most common agricultural drought monitoring indexes Vegetation Condition Index (VCI), Temperature Condition Index (TCI) and Vegetation Health index (VHI) will be applied. The result of applying the TCI, VCI and VHI drought areas and periods will be investigated for all months and years one by one in the mentioned region.

Key words: Drought Monitoring, MODIS, NDVI, VCI, TCI, VHI

TEMPERATURE EXTREMES IN SUMMER AND WINTER SEASONS OVER THE MEDITERRANEAN COASTLINES OF TURKEY

ID No: 333

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ABSTRACT

Extreme events are described with the maximum and minimum measurements of atmospheric variables that can be expected to occur at a certain place and time a long period of observations. The extreme events are affected by the measured physical attributes of weather or climatic variables or the vulnerability of social systems.

In this study, we determined extreme temperatures in both summer and winter seasons at the meteorological stations in the Mediterranean coastal areas of Turkey. In the study, the data of 16 meteorological stations for the daily maximum and minimum temperatures of the period from 1966-2015 were used.

In this paper, we examine the variation of regional extreme temperatures (tropical nights, summer days, frost and ice days) that would potentially be due to the heat-cold wave effects in Mediterranean coastlines of Turkey.

Spatial clustering has searched using the Arc-GIS statistical package. The association between station indices has obtained by calculating the Anselin Local Moran's I index. The Cluster and Outlier Analysis (Anselin Local Moran's I) tool describes concentrations of high values, concentrations of low values, and spatial outliers. Furthermore, we also plotted the winter and summer temperature trends during the last five decades. Our results are interpreted on the basis of frequency and intensity of extreme hot events increases while cold extremes decrease during the past ten years.

Key words: Extreme temperatures, climate change, Mediterranean, Turkey

COMPARISON OF AREAL PRECIPITATION ESTIMATION METHODS IN AKARCAY BASIN, TURKEY

ID No: 45

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ABSTRACT

In this study, it is aimed to model spatial distribution of annual precipitation in Akarcay Basin by using GIS techniques. In this context, pointed precipitation data of meteorological observation stations in and around Akarcay Basin is used for spatial interpolation. As areal precipitation estimation methods, various deterministic and geostatistical methods are applied. Thiessen, inverse distance weighted (IDW), natural neighbor, spline, radial basis functions, local-global polynomial interpolation and Kriging methods are practiced in this paper. Then, spatial interpolation techniques are compared each other and optimal method for Akarcay Basin is determined in terms of model performance test by performing cross validation. In this way, annual precipitation prediction in ungauged areas can be made, water potential of basin can be determined and similar subbasins in terms of precipitation can be identified. Performing spatial analysis of precipitation is crucial for decision makers in water resources planning and management works as reservoir operating, irrigation, water supply system, hydroelectric power generation, flood and drought forecasting.

Key words: Areal Precipitation, GIS, Spatial Interpolation.

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