



ABSTRACT BOOK

 TELECONFERENCE 

GEOICON 2021

**Geospatial Technology for Mapping The Future:
Solutions for Hazard and Disaster Management**

Flood Modelling - Earthquake - Extreme Weather and Climate Change
- Tsunami Simulation - Mass Movement - Capacity strengthening -
Fallen Tree Mitigation Technology - Temporary Shelter Model -
Landslide - Sea Level Rise

 July 27th, 2021 

PREFACE

The 6th Geomatics International Conference (GEOICON) 2021 is an annual scientific meeting in the field of geomatics engineering held by Department of Geomatics Engineering, Institut Teknologi Sepuluh Nopember (ITS), Surabaya. The conference aims to be a forum for sharing the knowledge and experience, and promote ideas between researchers, academicians, government, and professionals in future research of geospatial science and technology. This year The 6th GEOICON 2021 explores the theme “Geospatial Technology for Mapping The Future: Solutions for Hazard and Disaster Mitigation”. The theme is chosen along with our belief that the geospatial technology will contribute significantly in shaping the future of hazard and disaster mitigation. In addition, geospatial technology can be used as a solution in that aspect. Due to COVID-19 pandemic, this year, the conference will be held as a virtual event or teleconference on July 27th, 2021, hosted by Department of Geomatics Engineering ITS Surabaya. The speakers of the event comes from many backgrounds such as government, industry, and academics. These various backgrounds are expected to be suitable for discussing the main topics from many perspectives and aspects. There are scientific papers comes from many fields of study and countries which the authors consist of researcher, students, government staffs, professionals, and societies. They come from India, Egypt, Taiwan, and Indonesia. These abstract will be presented within the conference and should provide opportunity for comprehensive discussion. The abstracts are divided into eight main conference tracks, i.e. (A) Geodesy and Geomatics, (B) Geology and Geophysics, (C) Spatial Data Infrastructure, (D) Geography and Urban Environment, (E) Agriculture and Forestry, (F) Mining and Energy, (G) Cadastral Mapping, (H) Marine Environment. The successfully selected paper will be published in IOP Proceeding. Finally, we would like to appreciate the fellow members of the Technical Organizing Committee, Steering Committee and Organizing Committee for their hard work in securing a substantial input of papers, preparing the conference, and encouraging participants from many different fields. We also acknowledge all the authors, as without their expert input there would have been no conference. We would also like to extent our gratitude to all contributing sponsors for their many ways of assistance especially for the funding. We also acknowledge the important contributions of Rector of ITS and Head of Department of Geomatics Engineering ITS. The success of the 6th GEOICON 2021 will be a catalyst for our confidence to organize the next event in 2022.

Dr. Eko Yuli Handoko, ST, MT
The 6th GEOINCON 2021
Chairman

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INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS) SURABAYA

The name of Institut Teknologi Sepuluh Nopember (ITS) is taken from the historical background of where it is located, Surabaya. On sepuluh or ten November 1945, Bung Tomo as the iconic hero of Surabaya struggled to defend Indonesia's freedom. Since then, 10 November has been celebrated as heroes' day and Surabaya commonly known as heroes' city. Founded in 1960, ITS has become one of the best technological universities in Indonesia. It currently has 10 faculties namely Faculty of Industrial Technology, Faculty of Marine Technology, Faculty of Electrical Technology, Faculty of Civil, Environmental and Geo Engineering, Faculty of Information and Communication Technology, Faculty of Architecture, Design, and Planning, Faculty of Science, Faculty of Mathematics, Computation, and Data Science, Faculty of Vocational Studies and Faculty of Business and Technology Management. The total of department is 39.

Being the only well-known state institute of technology in East Java, Institute Teknologi Sepuluh Nopember (ITS) vision is to be a world-class university with an international recognition in science, technology and art. Meanwhile, ITS mission is to contribute the development of science, technology, and art for the welfare of the community through educational activities, research, community service, and management systems based on Information on and Communication Technology (ICT).

Since 2011, ITS has started to be an Eco Campus. ITS as Eco Campus cares and conducts systematic and sustainable environmental management. It is the reflection of the involvement of the entire academic community in order to always pay attention to aspect of health and the environment around it. ITS has many contributions for community works. In 2005, ITS contributed to recovery Tsunami Victim by creating houses for the victims. Moreover, ITS has collaborated with *Tim Kajian Kelayakan Pemukiman (KKP)* to do research on the feasibility of sealement for the victims of Sidoarjo Mud Volcano, East Java since 2008. The collaboration resulted in widened impact area as officially claimed for the mud volcano which is very helpful for the victim to get the compensation from the government.

DEPARTMENT OF GEOMATICS ENGINEERING ITS

Department of Geomatics Engineering is one of many departments in Institut Teknologi Sepuluh Nopember (ITS) Surabaya that deals with education and reasearch in Geospatial Science. The Department was established in 1998 and firstly named the Department of Geodetic Engineering. In 1999, the first batch of undergraduate degree students were admitted to the Department.

In the 1960's, the science and technology in surveying and mapping and geodesy grown drastically due to the development of data processing and mapping systems using automatic or computer technology. This encouraged the emergence of discourse geodetic into science and technology called "Geo-Informatics". Thus, the current geodetic science is not just talking about the shape and size of the Earth but also in geospatial information technology. General target field of Geo-Informatics is the availability of basic data and basic maps of various scale, supported by integrated infrastructure and facilities field of surveying and mapping as well as the management and presentation of geospatial data using information technology. Consequently, in the 2006 the Department of Geodetic Engineering was renamed to Department of Geomatics Engineering.

Currently, Department of Geomatics Engineering has five laboratories i.e Geospatial, Geodetic and Geodynamics, Geomarine, Geoinformatics, and Surveying and Cadastre. In 2009, the Department extended the education program by opening Posgraduate course in Geomatics. The Postgraduate program has four main courses i.e. Geomatics, Geophysics, Geology and Geography.

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PROGRAM SCHEDULE

TIME	ACTIVITY			
07.00 - 08.00	Registration			
08.00 - 08.30	Opening Ceremony 1. Hymne ITS and Indonesia Raya song 2. Speech by Chairman of GEOICON 2021 3. Opening Speech by Rector of ITS			
08.30 – 09.20	Keynote Speaker Prof. Ir. Dwikorita Karnawati, M.Sc. Ph.D			
09.20 - 09.25	Short break			
09.25 – 10.30	Invited Speaker Dr. Craig Roberts (15 minutes) Prof. Takashi Oguchi (15 minutes) Dr. Kuo En Ching (15 minutes) QA (20 minutes)			
10.30 - 11.50	Invited Speaker Dr. Peeranan Towashiraporn (15 minutes) Erick MAS, Ph.D. (15 minutes) Dr. Eko Yuli Handoko (15 minutes) Main Sponsorship (15 minutes) QA (20 minutes)			
11.50 - 12.30	Long break			
12.30 - 14.30	Parallel Session (Zoom 1, Zoom 2, Zoom 3) 15 minutes / person (presentation and Q&A)			
	Zoom 1	Zoom 2	Zoom 3	Zoom 4
14.30 – 14.35	Short break			
14.35 - 16.20	Parallel Session (Zoom 1, Zoom 2, Zoom 3) 15 minutes / person (presentation and Q&A)			
	Zoom 1	Zoom 2	Zoom 3	
16.20 – 16.35	Closing by Head of Geomatics Engineering Department			

SCHEDULE FOR ORAL PRESENTATIONS

Zoom 1			
Topics: Geodesy and Geomatics			
Time	ID	Title	Author(s)
12.30 - 12.45	3	Study of Volume Calculations from Different Topographic Data Densities	Yuwono Yuwono, Akbar Kurniawan and Muhammad Ubayu Rizqi Rohmat Tulloh
12.45 - 13.00	6	Tank Modeling and Its Condition Assessment using Terrestrial Laser Scanner	Irwan Gumilar, Samuel Van Livtrik Lumban Gao, Brian Bramanto, Made Munarda and Agus Lukmanul Hakim
13.00 - 13.15	26	Crustal Deformation of the Kendeng Fault Branches Area from GNSS and InSAR Data in Surabaya City, Indonesia	Raudlah Hawin Ayani, Kuo-En Ching, Ira Mutiara Anjasmara and Yunung Nina Lin
13.15 - 13.30	30	Comparative Analysis of DTM Results Hydro Enforcement LiDAR Data Method with Interferometric Synthetic Aperture Radar (InSAR) from Radar Satellite Imagery (Case Study of Kebumen Regency)	Bangun Muljo Sukojo, Noorlaila Hayati and Baisus Saadatul Usriyah
13.30 - 13.45	31	Web-Based Online Post-Processing GNSS Service InaCORS BIG for Mapping Control Point Positioning for Channel or Road Design	Muchammad Masykur, Eko Yuli Handoko and Susilo Susilo
13.45 - 14.00	34	3-Dimensional Topographic Modeling of LiDAR Data Using Open-Source GIS	Agung Budi Cahyono, Yanto Budisusanto and Husnul Hidayat
14.00 - 14.15	37	Geoid Modelling of Kalimantan Island using Airborne Gravity Data and Global Geoid Model (EGM2008)	Zahroh Arsy Udama, Ira Mutiara Anjasmara and Arisauna Maulidyan Pahlevi
14.15 - 14.30	39	InaCORS-BIG Service for Practice Survey	Surya A. Ramadhan, Akbar Kurniawan and Imam S. Yudha
14.30 - 14.35	<i>Short Break</i>		
Topics: Geodesy and Geomatics; Geography and Urban Environment			
14.35 - 14.50	43	Atmospheric phase delay correction of PS-InSAR to Monitor Land Subsidence in Surabaya	Toifatul Ulma, Ira Mutiara Anjasmara and Noorlaila Hayati

14.50 - 15.05	44	Global Geopotential Model Evaluations and Local Geoid in Indonesia: A Review	Hamidatul Aminah and Ira Mutiara Anjasmara
15.05 - 15.20	46	Assessment of the Reference and Recent Goce/Grace-based GGMS over Sudan based on the GNSS/leveling stations	Anas Sharafeldin Mohamed Osman, Ira Mutiara Anjasmara, Abdelrahim Ruby and Zahroh Udama Arsy
15.20 - 15.35	53	Displacement Velocity and Strain Analysis of Opak Fault Monitoring Stations	Nurrohmat Widjajanti, Bayu Nata and Parseno Parseno
15.35 - 15.50	25	Konstanta 12 dan reflektivitas 472319 hahslm pada geografi bentuk bumi di era ekonomi covid	R Mochamad A
15.50 - 16.05	38	Monitoring of Land Use Suitability Based on Detail Urban Spatial Plan Data 2018-2038 (Case study: Gayungan District, Surabaya City)	Cherie Bhukti Pribadi, Teguh Hariyanto, Kevin Surya Kusuma

Zoom 2

Topics: Geospatial Science and Technology

Time	ID	Title	Author(s)
12.30 - 12.45	5	Drought Monitoring in Gresik Regency East Java using Satellite Image Time Series and Google Earth Engine	Bangun Muljo Sukojo, Filsa Bioresita and Rosmalisa Dwiyaniek
12.45 - 13.00	8	Aerosol Monitoring over Surabaya Before and During COVID-19 Period using SARA high-resolution AOD Retrieval Algorithm	Rizki Hari Kurniawan, Bangun Muljo Sukojo and Filsa Bioresita
13.00 - 13.15	9	Network analysis to determine the optimal route for firefighters in Makassar City	Bimo Aji Widyantoro and Purnama Budi Santosa
13.15 - 13.30	10	Estimation of Total Suspended Sediment Solid in Porong River Waters Using Multitemporal Satellite Imagery	Zhulfikha Nurma Ghuvita Hadi, Teguh Hariyanto and Noorlaila Hayati
13.30 - 13.45	12	Analysis of the Suitability of Land Use and Building from BIM to Spatial Detail Plan Case Study: North Gandaria Village	Bangun Muljo Sukojo and Kania Hana Rahmani

13.45 - 14.00	13	Identification of Land Criticality with the Application of Deep Learning in West Lahat District Using Sentinel-2A Imagery	Bangun Muljo Sukojo and Atika Izzaty
14.00 - 14.15	16	Analysis of outdoor thermal comfort using three-dimensional microclimate modelling in Surabaya	Zenda Mergita Firdaus and Hepi Hapsari Handayani
14.15 - 14.30	28	Oil Pattern Identification Analysis Using Semantic Deep Learning Method from Pleiades-1b Satellite Imagery with ArcGIS Pro Software (Case Study: Desa "A")	Novi Anita, Bangun Muljo Sukojo, SONDY Hardian Meisajiwa and Muhammad Alfian Romadhon
14.30 - 14.35	<i>Short Break</i>		
Topics: Geospatial Science and Technology; Marine Science, Technology, and Environment; Agriculture and Forestry			
14.35 - 14.50	15	Monitoring Seawater Quality in the Kali Porong Estuary as an Area for Lapindo Mud Disposal leveraging Google Earth Engine	Filsa Bioresita, Muhammad Hidayatul Ummah, Mega Wulansari and Nabilla Aprillia Putri
14.50 - 15.05	11	Determination of the relevant multibeam echosounder frequency to estimate the suspended sediment concentrations for environmental damage monitoring of mass movement	Irena Hariyanto, Danar Pratomo and Mahendra Maulana
15.05 - 15.20	36	Analysis of accuracy comparison tidal global (FES2014, TPX09) and regional (BIG Prediction) models to the existing tides in Surabaya and surrounding waters	Khomsin, Danar G. Pratomo and Carina N. Rohmawati
15.20 - 15.35	45	Spatial Distribution of Squid Habitat in the Waters of West Nusa Tenggara	Cherie Bhekti Pribadi, Danar G. Pratomo, Salsha Afra Kamilah
15.35 - 15.50	4	Forest Fire Mapping using Normalized Burned Ratio and Cloud Computing to Calculate the Losses Incurred in Mount Lawu, Magetan Regency	Bangun Muljo Sukojo and Adinda Sitaresmi Putri Arimurti
15.50 - 16.05	14	Web-Based Geographic Information System Development of Hotspots Distribution for Monitoring Forest and Land Fires Using Leaflet JavaScript Library	Bangun Muljo Sukojo and Diya Rochima Lisakiyanto

		(Case Study: Ogan Komering Ilir Regency, South Sumatera)	
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Zoom 3			
Topics: Disaster Mitigation and Climate Change			
Time	ID	Title	Author(s)
12.30 - 12.45	1	Precipitation Water Vapour Variation in the East Java Region	Eko Handoko, Akbar Kurniawan, Putra Maulida and Norma Cemara
12.45 - 13.00	7	Spatial Pattern of Tsunami Inundation in Lampung, Indonesia	Dita Wahyu Primastuti
13.00 - 13.15	17	Analysis of Tsunami Wave Height, Run-up, and Inundation in The Coastal of Blitar and Malang Regency	Haryo D. Armono, Adryanto R. Putra and Citrosiswoyo Wahyudi
13.15 - 13.30	19	Assessment of Perception on Disaster Proneness of Lembang Fault in District of Cisarua, West Java Indonesia	Alfita Puspa Handayani, Rizqi Abdulharis, Astyka Pamumpuni, Irwan Meilano, S Hendriatiningsih, Andri Hernandi, Bambang Edhi Leksono, Asep Yusup Saptari and Ratri Widyastuti
13.30 - 13.45	20	Preliminary Study of Landslide Susceptibility Modeling with Random Forest Algorithm Using R (Case Study: The Cisangkuy Sub-watershed)	Sukristiyanti Sukristiyanti, Ketut Wikantika, Imam A. Sadisun, Lissa F. Yayusman and Eko Soebowo
13.45 - 14.00	22	Disaster and Risk Mitigation at The Toll Road Planning Stage	Halim Wiranata, Iwan Hermawan, Audita Widya, Idwan Suhendra, Ragil Wahyu Karim, Billy Silaen and Darmawan Eka Wicaksono
14.00 - 14.15	23	Drought Hazard Modelling of Klaten Regency Central Java Using AHP And TOPSIS Method	Meiga Nugrahani and Purnama Budi Santosa
14.15 - 14.30	27	Land Subsidence Study Using Geodetic GPS (Case Study: Banjarasri Village and Kedungbanteng Village,	Kevin Ryanda, Eko Handoko and Putra Maulida

		Tanggulangin District, Sidoarjo Regency)	
14.30 - 14.35	<i>Short Break</i>		
Topics: Disaster Mitigation and Climate Change; Geology, Geophysics, Mining and Energy			
14.35 - 14.50	29	Three-dimensional Tomography of Coseismic Ionospheric Disturbances from the 2016 West Sumatera Earthquake	Ririn Wuri Rahayu, Mokhammad Nur Cahyadi, Buldan Muslim, Ira Mutiara Anjasmara, Eko Yuli Handoko and Ihsan Naufal Muafiry
14.50 - 15.05	18	Prediction of Compaction Parameters of Soil using GA and PSO Optimized Relevance Vector Machine	Jitendra Khatti and Prof Grover
15.05 - 15.20	21	Determination Of Geoelectrical Strike To Investigate The Geological Structures In Surabaya And Surrounding Areas	Wien Lestari, Amien Widodo, Dwa Desa Warnana, Firman Syaifuddin, Juan Pandu Gya Nur Rochman, Rusba Saputra Rivensky, Roby Zidni Ilmawan and Thufeil Amr Adayu
15.20 - 15.35	24	Correlation Of Residual Anomaly and Isoseismal Map by Using Power Spectral Density Method in Palu City Region	Nahari Rasif, Benedictus Dicky Pradnya Agung Pramudhita, Alfin Alamsyah Ilman, Mohammad Singgih Purwanto and Amien Widodo
15.35 - 15.50	32	Preliminary Study of Probolinggo Active Fault in East Java Based on Gravity Method	Juan Pandu Gya Nur Rochman, M.Singgih Purwanto, Anik Hilyah, M. Haris Miftakhul Fajar, Mohamad Setyo Ari Nuswantara and Syafiatun Nuriyah
15.50 - 16.05	33	Microzonation of Probolinggo Fault Using Microtremor as an Effort for Earthquake Disaster Mitigation	Juan Pandu Gya Nur Rochman, Amien Widodo, Dwa Desa Warnana, Wien Lestari, Nita Ariyanti, Mariyanto Mariyanto and Jeremy Reviel Karo Karo
16.05 - 16.20	41	Regional Physiographic Study for the Hydrology of the Kali Kali Lamong Watershed	Rista Fitri and Widya Utama

Zoom 4**Topics: Geospatial Science and Technology**

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12.45 - 13.00	40	IDENTIFICATION OF RECHARGE AREA IN GEOTHERMAL FIELD “X” USING REMOTE SENSING (SATELLITE SENTINEL 2A)	Mohammad Akbar Agang, Teguh Haryanto and Widya Utama
13.00 - 13.15	47	Integrating GIS and Analytical Hierarchy Process to Determine Flood Vulnerability Level in Surabaya, Indonesia	Nurwatik, Agung Budi Cahyono and Amalia Okta Rachmandafitri
13.15 - 13.30	48	Correlation analysis of Land Surface Temperature (LST) measurement using DJI Mavic Enterprise Dual Thermal and Landsat 8 Satellite Imagery (case study: Surabaya City)	Rasendriya Ramanda Darettamarlan, Husnul Hidayat and Mohammad Rohmaneo Darminto
13.30 - 13.45	49	Spatial and Temporal Analysis of NDVI Changes in Java Island Using Google Earth Engine in 2005 until 2020 Period	Benedict Benedict and Lalu Muhamad Jaelani
13.45 - 14.00	50	Effect of Greenness Index on Case Fatality Rate (CFR) of Covid-19 Using Landsat-8 Image (Case Study: DKI Jakarta)	Aqiyasa Adiba and Lalu Muhamad Jaelani
14.00 - 14.15	51	Development of Google Earth Engine Fire Weather Index Calculator for Indonesian Fire Danger Rating System	Josef Stevanus Matondang, Hartanto Sanjaya and Robby Arifandri
14.15 - 14.30	52	Determining Suitable Locations for Regional Waste Final Processing Site Using Simple Additive Weighting (SAW) (Case Study: Malang City and Malang Regency)	Nur Watik, Yanto Budisusanto and Dani Ilham Zhaqdavyan

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ABSTRACTS

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PRECIPITATION WATER VAPOUR VARIATION IN THE EAST JAVA REGION

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Abstract

Global Navigation Satellite System is being developed as an atmospheric remote sensing system through the calculation of Zenith Total Delay. The development of the Continous Operating Reference Station encourages research investigations about Zenith Tropospheric Delay with continuous data and good spatial resolution. This research studies about characteristics of spatial and temporal variations from Zenith Wet Delay in East Jawa. The case study in East Jawa Province Using 16 the Continous Operating Reference Stations. Meteorological data from the Badan Meteorologi, Klimatologi & Geofisika stations are used as comparison data. Zenith Total Delay and Zenith Wet Delay value from the Continous Operating Reference Station data are calculated using GIPSY 6.4 Software. The Zenith Wet Delay values are gridded using the kriging method with the size of the grids is $0,25 \times 0,25$. ZWD value comparison from the Continous Operating Reference Station and meteorology data have a strong correlation with a coefficient value is 0,712. The mean of Zenith Wet Delay's trend is increasing by about 0,712 mm/yr. Characteristics of spatial and temporal variations of the ZWD value are influenced by monsoon Asia-Australian which causes dry and rainy seasons, global phenomena such as El Nino and La Nina, rainfall, local meteorological conditions such as temperature and humidity, weather, and topography of the stations.

Paper ID: 3

STUDY OF VOLUME CALCULATIONS FROM DIFFERENT TOPOGRAPHIC DATA DENSITIES

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Abstract

Calculation of the cut and fill volume requires good topographic data. The density of topographic data from measurements in the field often faces obstacles in the form of measuring points that are not evenly distributed in size. To produce uniform point data, interpolation and gridding processes are needed from the topographic data. Some current software provides

convenience in the process. The difference in gridding results is expected to give the volume calculation results that are not much different. This study aims to determine the difference in the volume calculation results from gridding data with different point densities. The calculation method used is the Borrow Pit method, so that the effect of the difference in point density on the volume calculation from the results of topographic data gridding can be seen. From this study, it was found that the largest difference in volume calculation is 4.571% for 15 meters data density and the smallest difference is 0.408% for 5 meters data density. From these data, it can be seen that the denser the topographic data, the better the volume calculation results..

Paper ID: 4

**FOREST FIRE MAPPING USING NORMALIZED BURNED RATIO
AND CLOUD COMPUTING TO CALCULATE THE LOSSES
INCURRED IN MOUNT LAWU, MAGETAN**

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Abstract

Forest and land fires in Indonesia are one of the most common disasters. Over time, Indonesia's forests have experienced a decline, one of which is the result of forest and land fires. Forest and land fires can occur due to temperatures in the dry season that continue to increase. Utilization of remote sensing technology can be used for mapping forest and fire areas, and can also be used as a reference for the government to carry out reforestation or reforestation processes in fire areas. The use of Multispectral Sensors in Sentinel 2 satellite imagery can be used to produce this research. This research takes a case study on Mount Lawu, Magetan Regency. Mount Lawu is one of the climbing tourist destinations that almost every year experiences forest and land fires. And the use of the Google Earth Engine platform that supports cloud computing to facilitate this research in accessing high data sources to process large geospatial data sets. For processing satellite images using the Normalized Burned Ratio (NBR) vegetation index processing algorithm. This research was conducted in 2018 and 2019. By using the Random Forest method, which is one of the applications of Machine Learning, it will produce several accurate results from the calculation results. The results of the calculation of the area of fire in 2018 were 284.88 hectares with a total loss of Rp 42,732,000.00 and in 2019 it was 146.03 hectares with a total loss of Rp 21,904,500. The results of this study are displayed on GEE Apps so that users can directly access the resulting data.

Paper ID: 5

**DROUGHT MONITORING IN GRESIK REGENCY EAST JAVA
USING SATELLITE IMAGE TIME SERIES AND GOOGLE EARTH
ENGINE**

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Abstract

Gresik is one of the areas with severe drought levels in East Java. Natural disasters caused by low rainfall and the average land surface temperature in an area. These two factors are currently difficult to predict due to uncertain climate change, this is also related to the global warming that is happening. This disaster cannot be completely avoided but can be minimized. This research was conducted to periodically check or time series of droughts by utilizing the Google Earth Engine platform. Drought identification obtained from multitemporal Landsat 8 satellite imagery with the TVDI (Temperature Vegetation Dryness Index) algorithm and field data retrieval in the form of aerial photos using a thermal camera from the DJI Mavic Enterprise Dual Thermal and infrared camera from Mapir Survey 3. From this study, it can be identified that the distribution of drought in the 2015-2020 period in Gresik Regency occurred in 9 subdistricts, there are Wringinanom, Driyorejo, Kedamean, Balongpanggang, Benjeng, Menganti sub-districts as well as several areas in Dudusampeyan, Cerme and Panceng sub-districts. The identification of dry land also correlates well with the rainfall that occurs, namely <100 mm/month, which has low rainfall during drought events.

Paper ID: 6

**TANK MODELING AND ITS CONDITION ASSESMENT USING
TERRESTRIAL LASER SCANNER**

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Abstract

Condition assessment of the tank must be carried out since it is related to Health, Safety, and Environment (HSE). Assessment is carried out by referring to the applicable standards. This study aims to create a 3D (Dimension) model and assess the tank using Terrestrial Laser Scanner technology. This includes planning, data acquisition, data processing, and data visualization. The data processing process starts with the registration stage with the cloud-tocloud method, georeferencing, 3D modeling using point cloud, and tank

assessment filtered point cloud data. Assessment includes analysis of volume, verticality/slope (in terms of the difference between upper and lower tank), and roundness calculations. The 3D model of the tank was generated with a registration error of less than 1 cm. The volume of tank I and tank II were calculated to 134.108 m³ and 134.067 m³, respectively. The difference between the upper and lower radius for each tank ranges from 2 to 10 mm. Considering the results and recalling the API 650 standard (American Petroleum Institute), each tank is considered reliable and in a good condition.

Keywords: Verticality, volume, API 650, point clouds, roundness

Paper ID: 7

SPATIAL PATTERN OF TSUNAMI INUNDATION IN LAMPUNG, INDONESIA

Abstract

Tsunami waves can be generated by the fault mechanism earthquake. Various levels of earthquake can cause the height of tsunami wave is getting higher. Because the location of the South Lampung Regency which is quite close to Anak Krakatoa Volcano makes the coastal area vulnerable to the tsunami disaster. So, it is necessary to study the tsunami inundation area in the coastal area. The built-in fault model is able to model the transient process of rupturing along a fault with variable slip in an earthquake event, which is particularly helpful in evaluating tsunami impacts in nearby coastal areas. This study was conducted using Geographical Information System (GIS) to obtain tsunami inundation areas in the coastal areas of Lampung. Based on the results of the study, it is known that the height of tsunami waves, which are 13 meters, 26 meters, and 38 meters with an average time of arrival of tsunami waves on the shoreline is 58 minutes. Where there are seven sub-districts submerged by the tsunami with a distance of about 160 meters to 1.5 kilometers.

Paper ID: 8

AEROSOL MONITORING OVER SURABAYA BEFORE AND DURING COVID-19 PERIOD USING SARA HIGH-RESOLUTION AOD RETRIEVAL ALGORITHM

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Abstract

Restrictions on human activities were implemented in Surabaya to cope with the outbreak of the Coronavirus Disease 2019 (COVID-19), providing an opportunity to investigate the impacts of anthropogenic emissions on air

quality. The measured variable to understand the impact of Large-Scale Social Restrictions is Aerosol Optical Depth (AOD). In this study, Moderate Resolution Imaging Spectroradiometer (MODIS) data were used to develop a Simplified Aerosol Retrieval Algorithm (SARA) at 500 m spatial resolution. This SARA algorithm does not require a comprehensive look up table and thus it is more efficient in AOD retrieval and can be operated on both bright and dark surfaces. The derived AOD images were validated with MCD19A2 AOD as well as ground-based PM10 from Air Quality Monitoring Stations in Surabaya. The SARA AOD showed a good match with MCD19A2 AOD, with average correlation coefficient, RMSE, and MAE are ~0.602, ~0.047, and ~0.031, respectively. By correlating with ground-based PM10 concentrations, the MCD19A2 AOD outperforms the correlation ($r = \sim 0.602$) than PM10 ($r = \sim 0.306$). The temporal trends of aerosol load over Surabaya before and during COVID-19 shows that 2020 has higher aerosol value than 2019, but the overall aerosol value in 2020 decrease every month indicating that there is an emission loss event. The results demonstrate that SARA is better able to show aerosol images over urban area such as Surabaya and SARA is able to depict the aerosol decreasing event in 2020 during COVID-19 period.

Paper ID: 9

NETWORK ANALYSIS TO DETERMINE THE OPTIMAL ROUTE FOR FIREFIGHTERS IN MAKASSAR CITY

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Abstract

Makassar city experiences many residential fire disasters during the last years. One of the causes of fires is difficult to overcome due to the firefighters' late response. The number of fires occurred due to the ineffectiveness of the fire fighting road, obstructed by traffic conditions, in its operation. To overcome this problem, the development of a geospatial route analysis can help firefighters find the best route to a fire point quickly. Geospatial route analysis is currently a key role in emergency responses for urban fire disasters. A routing system can provide network analysis that allows users to navigate between source and destination points. In this case, the system can help firefighters to arrive as quickly as possible. On complicated road networks, some impedance factors would slow down drivers on a particular road. This study aims to provide firefighters from the base stations to residential fire disaster locations. The method used in the studies is Dijkstra's algorithm to calculate weights of the impedance factors to optimal routing based on length of the road, speed drive, and traffic conditions. Implementation of routing analysis using open source geospatial software, PostgreSQL as database management system with PostGIS, and pgrouting as extensions. The modeling results show that the optimal route selection with

speed parameters based on road classification has a low weight value. Therefore, it can be used as a reference for selecting a firefighter's routing.

Keywords: fires, PostgreSQL, disaster, network analysis, Makassar City

Paper ID: 10

**ESTIMATION OF TOTAL SUSPENDED SEDIMENT SOLID IN
PORONG RIVER WATERS USING MULTITEMPORAL
SATELLITE IMAGERY**

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Abstract

Monitoring the concentration of Total Suspended Solid (TSS) is one method to determine water quality, because a high TSS value indicates a high level of pollution. Remote sensing data can be used effectively in generating suspended sediment concentrations. Nowadays, Google Earth Engine platform has provided a large collection of remote sensing data. Therefore, this study uses Google Earth Engine which is processed for free and aims to calculate the TSS value in the Kali Porong area. This research was conducted multitemporal in the last ten years, namely from 2013-2021 using multitemporal satellite imagery landsat-8 and sentinel-2 by applying empirical algorithms for calculating TSS. The results of this study are the value of TSS concentration at each sample point and a multitemporal TSS concentration distribution map. The year 2016, 2017, and 2021, the distribution of TSS concentration values was higher than in other years. At the sample point, the lowest TSS concentration value was 16.55 mg/L in 2013. Meanwhile, the highest TSS concentration value of 266.33 mg/L occurred in 2014 precisely in the Porong River estuary area which is the border area between land and water. the sea so that a lot of TSS material is concentrated in the area due to waves and ocean currents.

Paper ID: 11

**DETERMINATION OF THE RELEVANT MULTIBEAM
ECHOSOUNDER FREQUENCY TO ESTIMATE THE SUSPENDED
SEDIMENT CONCENTRATIONS FOR ENVIRONMENTAL
DAMAGE MONITORING OF MASS MOVEMENT**

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Abstract

The problem of environmental damages in the river area can transform the morphology and threaten the ecosystem in it with one of the causes being

natural factors such as suspended sediment. Retracing the medium form is fluid, the common instrument to determine the condition of the area is a sound wave-based instrument such as a multibeam echosounder. Considering the improvement of multibeam echosounder which is able to acquire areas using many frequencies at one time, noted as multi-frequency multibeam echosounder, now its application can reach various fields including environmental monitoring. Factors that can be considered in its practice include time efficiency, cost, and notably the accuracy of the data result. By converting the results of the acquisition into an estimate of the concentration of suspended sediment and integrating the results from several frequencies, it will be established the applicable frequency usage. It was concluded that a multibeam echosounder with a frequency of 450 kHz was recommended in a case study to determine the concentration of suspended sediment. This is supported by a correlation value of 89.18% or very high correlation..

Paper ID: 12

ANALYSIS OF THE SUITABILITY OF LAND USE AND BUILDING FROM BIM TO SPATIAL DETAIL PLAN CASE STUDY : NORTH GANDARIA VILLAGE

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Abstract

The development in urban areas will continue to occur, such as the construction of settlements, offices, shops, educational and health facilities, and other supporting facilities. With the development that will always continue to occur in a nation, it will also increase the productivity in its city. The rapid development of urban activities will also followed by high demand for land. This can lead to land conversion. Therefore, it is necessary to use the land to its optimal capacity and manage it wisely in order to produce a quality space that is maintained for its sustainability. Rules and regulations are compiled into a plan consisting of structures and patterns in a. North Gandaria Urban Village, South Jakarta City is divided into three neighbourhoods, namely densely populated residential areas, middle to upper settlements, offices and shops which base on geometrical aspects have various building forms from large and small ratios which have diverse land and building usages. In this study, land use suitability was identified by manual and digital classification, namely by interpreting images and classifying using the Object Based Image Analysis (OBIA) method on SPOT-7 images which were then superimposed to produce land use maps. In addition, this study utilizes altitude data from LiDAR to complement building spatial data and is processed to BIM. From this research resulted suitability of land use and buildings. Based on the results of the analysis, it was found that the suitability of land use was 76% classified according to spatial detail plan. To determine the suitability of the building in this study, it was seen from the activities of the building and the height of the building. Based on

building activities, 12.25% of building activities that are not permitted and another 87.75% are classified as conditionally permitted buildings, permitted, limited permitted and limited and conditional. Meanwhile, based on the height of the building, there are 82% of buildings that comply with the spatial detail plan.

Paper ID: 13

**IDENTIFICATION OF LAND CRITICALLY WITH THE
APPLICATION OF DEEP LEARNING IN WEST LAHAT DISTRICT
USING SENTINEL 2-A IMAGERY**

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Abstract

Land is an important factor in human life. In addition of land use that continue to increase every year. Land use is an element of meeting needs. This situation often makes the condition of the land around it questionable the content and level of land productivity. Land whose productivity level is lost can cause critical land to occur. Coupled with the occurrence of uncontrolled development, land productivity has decreased. By using the application of remote sensing, it is able to monitor land conditions, one of which is by using Sentinel-2A data. Sentinel-2A image data was selected to identify the condition or distribution of critical land and critical land parameters that has the most influence on criticality level of the land with Sentinel-2A imagery with a spatial resolution of 10 meters for Red, Green, Blue, and Near-Infrared canals to perform NDVI classification processing, closely related to vegetation. Based on the Regulation of the Director General of Watershed Management and Social Forestry Number: P.4/V-SET/2013 concerning the Technical Guidelines for the Preparation of Spatial Data for Critical Lands, there are 5 parameters for determining the criticality of the processed land as indicators, including the level of erosion distribution, productivity land, land management, slope, and vegetation density. Based on the results of the study, the researchers found that the distribution of critical land in Lahat Regency was 19 hectares or 0.56%, the critical class was 36,090 hectares or 10.1%, the critical potential class was 142,140 hectares or 42.1%, the class which was slightly critical is 156,860 hectares or 46.5%, and non critical class is 3 hectares or 0.074%. for very critical class. These results can be seen with the parameter that most affects the criticality of the land is vegetation density.

Paper ID: 14

**WEB-BASED GEOGRAPHIC INFORMATION SYSTEM
DEVELOPMENT OF HOTSPOTS DISTRIBUTION FOR
MONITORING FOREST AND LAND FIRES USING LEAFLET
JAVASCRIPT LIBRARY (CASE STUDY: OGAN KOMERING ILIR
REGENCY, SOUTH SUMATERA)**

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Abstract

Forest and land fires are a disaster that occurs almost every year on Sumatra Island. Ogan Komering Ilir is one of the regencies in South Sumatra Province with a high number of hotspots causing forest and land fires every year. Prevention efforts are important to reduce the impact caused by forest and land fires on various aspects of life. One of them is by building a web-based Geographic Information System (WebGIS) for the distribution of hotspots as a form of early warning and detection system by utilizing VIIRS Nightfire (VNF) data from the remote sensing technology of the Suomi-NPP satellite which has Visible Infrared Imaging Radiometer Suite (VIIRS) active sensors which have been processed with the Nightfire algorithm. The Leaflet JavaScript library plays an important role in adding to the functionality of WebGIS with a wide selection of available plugins and easy-to-read source code to make web-based spatial information more interactive. The prototype of WebGIS with the name OKIApi has been successfully developed and has several key features such as displaying information on the distribution of hotspots; the priority level of firefighting areas and the vulnerability level of flammable areas based on the type of land cover; route to the hotspot or the fire department locations; a chart of the estimated burned area from the source footprint of hotspot; and a chart of the number of hotspots per day that have been classified by temperature. The percentage value of the web feasibility for the functionality test is 100% with a very good predicate. The usability test is 91.5% with a very good predicate, and the portability test is 100% with a very good predicate.

Paper ID: 15

**MONITORING SEAWATER QUALITY IN THE KALI PORONG
ESTUARY AS AN AREA FOR LAPINDO MUD DISPOSAL
LEVERAGING GOOGLE EARTH ENGINE**

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Abstract

Sidoarjo mud disaster requires a large storage space to accommodate the mudflow. In order to overcome the continuous mud flow which cannot be accommodated by the embankment, Indonesian government throw mud materials into the Porong River. This causes water quality changes in the Porong River estuary. The purpose of this study was to monitor water quality in the Porong River estuary using Sentinel 2 multi-temporal data. The water quality monitoring have been performed using Total Suspended Solid (TSS) and chlorophyll-a analysis. Nowadays, those analysis can be carried out using cloud computing technology, for example Google Earth Engine (GEE). In this platform, there is a database for storing satellite image data, one of which is Sentinel-2. In addition to storing remote sensing data, GEE can process images quickly using the Java scripting language. In this study, Sentinel-2 MSI level 2A images were used. Therefore, the data in the GEE is called in the span of one month, then averaged. Monitoring was carried out in February until May 2021. The results show that the water quality in the Porong River estuary is included in eutrophic class. It means the water has been polluted. In addition, the polluted area tends to increase from February to May 2021.

Keywords: TSS, Chlorophyll-a, Porong River Estuary, Sentinel-2, GEE, Multi-temporal.

Paper ID: 16

ANALYSIS OF OUTDOOR THERMAL COMFORT USING THREE-DIMENSIONAL MICROCLIMATE MODELLING IN SURABAYA

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Abstract

Surabaya is one of the metropolitan cities in Indonesia. The large population in Surabaya causes a lot of development and land conversion. This situation can affect the temperature in Surabaya to be higher than the surrounding area, thus affecting the comfort of people for outdoor activities. The level of comfort can be known when the microclimate conditions in the area have been identified. This paper aims to analyze outdoor thermal conditions using temperature, humidity, wind, and land use data which will be visualized in three dimensions to get a more comprehensive understanding. This research is located in Pakuwon Trade Center (PTC). Data acquisition was carried out on four different types of land cover, namely local residential, apartments, main parking lots, and real estate area. The results show that apartments have the lowest comfort index followed by real estate, local residential, and main parking lots. However, the four areas have comfort from warm to hot with a predicted percentage of the discomfort of around 75% – 100%. This number shows that mitigation that can reduce extreme heat and increase outdoor comfort in PTC is needed.

Paper ID: 17

**ANALYSIS OF TSUNAMI WAVE HEIGHT, RUN-UP, AND
INUNDATION IN THE COASTAL OF BLITAR AND MALANG
REGENCY**

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Abstract

Indonesia is an archipelago located at the meeting point of 3 tectonic plates which constantly collide over time, the energy due to the collision will accumulate and be able to cause large earthquakes that can generate tsunamis. The island of Java is in the subduction zone of these plates, which causes the southern part of Java to have a high earthquake potential. On April 10, 2021, an earthquake measuring M 6.1 occurred in the south of Blitar and Malang. This earthquake was felt by most of the people of East Java. If the earthquake is large enough, it can cause a tsunami on the southern coast of East Java. Therefore, modeling was carried out using the FLOW module of Delft3D software while using earthquake parameters with a strength of M 9.1 which is the worst possible scenario on the southern coast of East Java. The results of this study indicate the fastest tsunami arrival time is 21 minutes, the highest maximum tsunami height is 20 meters, the highest run-up reaches 17,5 meters, and the furthest inundation reaches 765 meters along the southern coast of Blitar and Malang Regency.

Keywords: Tsunami, run-up, inundation, numerical modeling, Delft3D

Paper ID: 18

**PREDICTION OF COMPACTION PARAMETERS OF SOIL USING
GA AND PSO OPTIMIZED RELEVANCE VECTOR MACHINE**

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Abstract

In this technical paper, the compaction parameters of soil are predicted using GA and PSO optimized single relevance vector machine and hybrid relevance vector machine models. The RVM is an advanced approach to SVM. A total of 28 RVM models are developed using MATLAB R2020a. The present study is carried out by studying the results and performance of relevance vector machine models. Furthermore, the performance of the models is tried to improve by upgrading the model single RVM (sRVM) to hybrid (HRVM). Based on the performance of the RVM model, the best architecture and optimum performance models are identified. The GAU_SGA_OMC,

LIN_SPSO_OMC, LAP_SGA_MDD, and LAP_SPSO_MDD sRVM models are recognised as the best architecture sRVM models having performance 0.9883, 0.9470, 0.9847, and 0.9545, respectively. The performance of the best architecture RVM models shows that the GA optimized models have a better performance compared to PSO optimized models. The different combinations of kernels (Gaussian, Linear, Polynomial, and Laplacian) are implemented in the best architecture of the sRVM models. The GAU_SGA_OMC and LAP_SGA_MDD sRVM models are upgraded to GAU+LAP_HGA_OMC and LAP+GAU_HGA_MDD. The performance of GAU+LAP_HGA_OMC and LAP+GAU_HGA_MDD is 0.9936 and 0.9877, which is comparatively better than GAU_SGA_OMC and LAP_SGA_MDD sRVM models. The study of the performance of sRVM models shows that the performance of the sRVM models is improved when it is upgraded to the HRVM model. The study concludes that the sRVM and HRVM models show a better correlation between predicted and actual soil properties. Hence, the proposed models may be used to predict the compaction parameters of soil.

Paper ID: 19

**ASSESSMENT OF PERCEPTION ON DISASTER PRONENESS OF
LEMBANG FAULT IN DISTRICT OF CISARUA, WEST JAVA
INDONESIA**

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Abstract

The Lembang Fault is a major fault located at the northern Bandung. This fault has a high disaster risk, including ground shaking, surface rupture, and possible landslides or liquefaction. This fault can cause earthquakes with a magnitude of 6.5-7, making 8 million people in four Regencies and Cities around West Bandung Regency, Cimahi City, Bandung City and Bandung Regency exposed to major disaster risk. This research focuses on assessing the Perception of Disaster Proneness of the Lembang Fault in the District of Cisarua, West Java, Indonesia. This research conducted using a case study and deductive-qualitative approach. In addition, this research carried out by combining engineering and social research methodologies. The survey location point is determined based on hazard data (Peak Ground Acceleration data), vulnerability data (covering building density, slope, curvature, soil character, distance from faults, etc.) and population density data. This study indicates that the public's perception of the disaster in the Lembang Fault is very subjective. How they act is based on experience or based on their beliefs. An important part of this research is assessing and measuring the community's perception of the Lembang Fault towards disasters that may arise. The government must make serious efforts to convey that the disaster that may occur in the Lembang fault is much bigger and can

happen at any time. Therefore, building resilient communities that genuinely understand the dangers of living in disaster-prone areas is essential.

Keywords: social perception, disaster risk reduction, lembang fault, community participation

Paper ID: 20

**PRELIMINARY STUDY OF LANDSLIDE SUSCEPTIBILITY
MODELING WITH RANDOM FOREST ALGORITHM USING R
(CASE STUDY: THE CISANGKUY SUB-WATERSHED)**

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Abstract

Landslide susceptibility mapping is an initial measure in the landslide hazard mitigation. This study aims to evaluate landslide susceptibility in the Cisangkuy Sub-watershed, a part of Bandung Basin. Twenty-seven landslide variables were involved in this modeling derived from various data sources. As a target, polygon-based landslide inventory data obtained through a visual interpretation of Google Earth timeseries imageries and a field survey, were used. All spatial data were prepared in the same cell size referring to the highest spatial resolution of data involved in this modeling, i.e. 8.34 m. Fifty-eight landslide polygons covering an area of 0.87 Ha are equivalent to 1,040 cells in the raster format. In total, 2040 data points consisting of landslides and non-landslides with the same ratio, were trained using random forest algorithm. Non-landslides were sampled randomly from landslide-free cells. This modeling was executed using R environment. In this study, the result was two labels, susceptible and non-susceptible. This model provided an excellent performance, its accuracy reached 98.56%. This research needs an improvement to provide a probability that has a range of 0 to 1 to show the level of landslide susceptibility.

Paper ID: 21

**DETERMINATION OF GEOELECTRICAL STRIKE TO
INVESTIGATE THE GEOLOGICAL STRUCTURES IN
SURABAYA AND GRESIK AREAS**

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Abstract

Due to the measurement of magnetotelluric data is carried out with a certain coordinate system orientation, thus the possibility of the field measurement data would be not proper with the geological strike direction. Therefore, the information of geoelectrical strike is needed to enhance the quality of interpretation Magnetotelluric data with checking the similar direction with the geological strike direction thus it will be properly sufficient with the actual subsurface condition. A magnetotelluric study was conducted to analyze the direction of the geoelectrical strike in the magnetotelluric modeling that are correlated with the geological structures in the Surabaya and Gresik areas. Polar diagram analysis using phase tensor data can provide information about the direction of the geoelectrical strike, however the geoelectrical strike analysis using the phase tensor has an ambiguity of $+90^\circ$ therefore additional analysis is carried out using tipper data. The results showed the geoelectrical strike direction is $N315^\circ E$ and it is slightly similar with the strike trend of geological structures anomaly. Meanwhile, the geological structures is generally characterized by low to medium value of resistivity contrasts around 30-500 ohm.m consisting of the Surabaya Kendeng Fault, Kendeng Kedung Waru Fault, anticline, and other expected faults.

Paper ID: 22

DISASTER AND RISK MITIGATION AT THE TOLL ROAD PLANNING STAGE

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Abstract

PT. Hutama Karya (Persero), according to Presidential Regulation No. 100 of 2014 and No. 117 of 2015, obtained an assignment to construct and operate 24 sections of Trans Sumatera Toll Road along 2,770 km, including Padang – Pekanbaru Toll Road, where almost all of the segments are located in fault areas and in areas with diverse rock formation. In terms of the number of fault locations, the toll road has a greater risk of earthquakes. Whereas in terms of varying rock formations, construction planning and improper structure determination will cause a highly cost-enhancing effect. In the planning stage, the selection of route is one of the mitigations to minimize the risks and impacts of the earthquake disaster. Toll road trajectories are designed optimally by considering the movement of the earth's plates based on fault data on these locations and data on rock formations for the construction and structure plan of the Toll Road. Input data needed is Geological Secondary Data and Topographic Data containing information on fault areas and rock formations. Therefore, planning with Quantm Trimble software is the right solution. Determining the route with Quantm Trimble software is one of the effective and efficient methods. The

main key in determining routes by Quantm Trimble is the software algorithm which can determine the route quickly by considering the main constraints such as avoiding fault areas, avoiding an area with certain rock formations also determining the construction methods on certain rock formation areas. Quantm Trimble software is able to generate several alternative routes based on user-defined constraints, including accommodating the automatic selected smoothing process according to the specified road geometry standard. The software greatly accommodates the determination of the plan by considering risk and disaster management, as well as being able to manage costs well by determining the construction method plan quickly and accurately.

Paper ID: 23

**DROUGHT HAZARD MODELLING OF KLATEN REGENCY
CENTRAL JAVA USING AHP AND TOPSIS METHOD**

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Abstract

The 2016-2020 Central Java disaster risk assessment provides information on areas at high risk of drought. Klaten Regency is in the top ten at high risk of drought in Central Java. Drought is an annual disaster in this region, which usually occurs during the dry season. The impact of the drought has caused some areas to experience a lack of clean water. The Local Disaster Prevention Agency (BPBD) of Klaten Regency annually allocates funds for the preparation of dropping clean water in areas experiencing drought. Careful preparation or mitigation in anticipating drought disasters can prevent disaster losses. Therefore, it is necessary to analyze the level of drought with a decision-making system by comparing two methods, namely the AHP with TOPSIS. Both methods are decision-making methods that are composed of various criteria to obtain an alternative sequence of choices. These criteria are in accordance with the geographical conditions of the Klaten Regency area. The AHP stages include a questionnaire survey, making a pairwise comparison matrix, calculating the vector eigenvalues, normalizing the vector eigenvalues, calculating the consistency value and producing the weighted criteria. The steps in the TOPSIS method starts by building a decision matrix, normalize matrix, make weighted normalization matrix, determine the ideal positive and negative solution matrix, calculate the separation and rank the alternatives. Both the AHP and TOPSIS methods produces weight values and a positive ideal solution value, respectively. These are used as input data in the mapping of drought vulnerability analysis with Geographical Information Systems (GIS). The results of the analysis are visualized with a map that shows the level of drought vulnerability. AHP and TOPSIS method decision making generates the order of the drought class in predicting the distribution of areas experiencing drought. As validation, the authors compare the results of the analysis of drought vulnerability of the two methods with drought data from BPBD and DPUPR (Public Works and

Public Housing Department). Based on this comparison, the drought distribution of AHP method is better than TOPSIS.

Keywords: Drought levels, AHP, TOPSIS, Mapping

Paper ID: 24

**CORRELATION OF RESIDUAL ANOMALY AND ISOSEISMAL
MAP BY USING POWER SPECTRAL DENSITY METHOD IN
PALU CITY REGION**

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Abstract

This research was conducted to see the correlation between residual anomaly map, geological map, and isoseismal map and how they contribute to the determination of earthquakeprone areas. Moreover, the area studied is an area that is difficult to obtain geophysical data such as urban areas. The residual anomaly is obtained by calculating the bouguer anomaly from elevation data and free-air correction satellite, which then through the FFT process changes the spatial domain to the frequency domain in MATLAB. Thus, it can separate regional anomaly maps with residuals. Using the overlaying technique on two maps, namely residual anomaly maps with isoseismal, a clear correlation was found between the residual anomaly value and the impact of the earthquake as well as the validation of the geological map in the area.

Paper ID: 25

**KONSTANTA 12 DAN REFLEKSIVITAS 472319 HAHS LM PADA
GEOGRAFI BENTUK BUMI DI ERA EKONOMI COVID**

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Abstract

Tujuan riset ini adalah untuk menganalisis geografis bentuk muka bumi bumi dengan pola 472319 Hahslm dalam geomorfologi sesuai Quran 13.31 di era ekonomi Covid. Bumi mengalami proses pembentukan air dan tanah sehingga menjadi benua dan kepulauan. Komposisi laut dan darat yaitu 7:3. Obyek studi ini adalah bentuk laut dan darat di bumi serta Quran 13.31. Riset ini dilakukan dengan studi literatur dari buku, jurnal, media elektronik dan globe bumi serta atlas dunia. Metodologi yang dipakai adalah deskriptif analitis. Metode yang digunakan adalah reflektivitas, similaritas dan dynivitas dengan formula 472319 Hahslm. Hasil yang diperoleh adalah

proses perubahan bentuk muka bumi menuju pada pola ibadah sesuai dengan makna kitab suci berupa dipotongnya bumi sesuai makna Quran. Formula Quran 13.31 membentuk susunan 444 berupa nomor surat 13 yaitu $1+3=4$ dan dari 31 yaitu $3+1=4$. Pola 4 ketiga diperoleh dari jumlah huruf hijaiyah dalam kata atas dipotongnya bumi sebanyak 13 huruf berarti $1+3=4$. Refleksivitas geomorfologi bumi menyerupai pola 444. Dengan komposisi lautan dan daratan sebesar 7:3 yang memiliki selisih empat dari $7-3=4$. Dalam rumus 472319 Hahslm turunan daru Quran 15.87 bermakna Quran berupa 6438 ayat. Makna 4 yang kedua diperoleh dari perkalian 7 dan 2 yaitu $7 \times 2 = 14$ dengan mengambil kata pertama empat dari frasa empat belas. Dan makna 4 yang ketiga dari penjumlahan yaitu $3+1+9=13$ dimana akar digit 13 yaitu $1+3=4$. Geografi bumi yang kedua pada angka 4 dari geomorfologi benua Asia, Afrika, Eropa dan Australia yang membentuk pola tangan 319. Dengan ujung jari-jari kecil berada di bagian negara yang memiliki pulau yang berada di Benua Asia bagian timur sampai dengan tenggara seperti sebgai Rusia, Jepang, Korea, Cina, dan Filipina. Sedangkan Kawasan Asia Tenggara membentuk jari telunjuk atau pola 1 memiliki similaritas dengan bentuk kepulauan Indonesia dengan ujung besarnya pada Australia dan New Zealand. Jari besar jempol atau pola 9 memiliki similaritas dengan bentuk daratan India, Pakistan, Banglades di Asia Selatan. Sedangkan benua Amerika memiliki similaritas dengan pola 7 atau V untuk Amerika Selatan dan pola 2 untuk Amerika Utara. Perairan dan kepulauan diperlukan dalam pandemic yang berefek ekonomi. Simpulan adalah geografi bumi membentuk 472319 sesuai dengan Quran untuk menunjukkan bumi beribadah walaupun du era ekonomi Covid.

Paper ID: 26

**CRUSTAL DEFORMATION OF THE KENDENG FAULT
BRANCHES AREA FROM GNSS AND INSAR DATA IN
SURABAYA CITY, INDONESIA**

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Abstract

Slip rates on active faults derived from the interseismic velocity field are critical to understanding seismic hazards in metropolitan cities. This study integrated the data from the Global Navigation Satellite System (GNSS) and Interferometric Synthetic Aperture Radar (InSAR) to evaluate the interseismic velocities in the second-largest city in Indonesia, Surabaya, where branches of the Kendeng fault (the Surabaya fault and the Waru fault) pass through. Data from 16 campaign-mode GNSS stations collected between 2017 and 2020 from previous research are reprocessed to estimate the velocity field. Horizontal velocities under the ITRF frame range between -23.8 mm/yr and 47.9 mm/yr toward the southeast. Vertical velocities generally range between -1.3 mm/yr and -112.2 mm/yr. Sentinel-1A SAR data

of both ascending and descending tracks acquired between November 2014 and July 2020 were used to generate the interferograms with the InSAR Scientific Computing Environment (ISCE) software. Furthermore, cumulative displacement time series were constructed using the Small Baseline Subset (SBAS) technique within the Generic InSAR Analysis Toolbox (GIAnt). This study also carried out the detection of outlier SAR epochs to improve the precision of Line-of-sight (LOS) velocity estimates. The LOS velocities range from -14.8 to 10.8 mm/yr in the ascending track and from -12.7 to 9.5 mm/yr in the descending track. These results will facilitate the detection of coupling behaviors on the Kendeng fault branches, which can improve our understanding of seismic risks in the Surabaya area.

Paper ID: 27

LAND SUBSIDENCE STUDY USING GEODETIC GPS (CASE STUDY : BANJARASRI VILLAGE AND KEDUNGBANTENG VILLAGE, TANGGULANGIN DISTRICT, SIDOARJO REGENCY)

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Abstract

Floods are one of the natural disasters that always occur in various regions in the Republic of Indonesia. Several flood points were recorded in Banjarasri Village and Kedungbanteng Village, Tanggulangin District, Sidoarjo Regency. There is an allegation that one of the factors causing the flooding in the two villages was caused by land subsidence. Therefore, it is necessary to conduct a study to monitor the magnitude of land subsidence in the area. In this study, the Global Positioning System (GPS) observation method was used. The research was carried out by collecting data from six points which were carried out over three periods of time, namely on 22 – 27 October 2020, 24 – 29 November 2020, and 24 – 29 March 2021. Based on the results of processing and analyzing GPS data, the observed values for shift and motion vectors are obtained. There were five points of land subsidence statistically which included BM02, BM03, BM04, BM05, and BM06 with values respectively are 3.6 cm, 7.3 cm, 5.9 cm, 4.8 cm, and 5.2 cm. The horizontal position vector moves in various ways, where BM01 and BM04 move to the southwest as far as 2.5 cm and 1.9 cm, BM05 moves to the southeast with a shift of 3.3 cm, and BM06 moves to the northeast with a shift of 4.2 cm.

Paper ID: 28

OIL PATTERN IDENTIFICATION ANALYSIS USING SEMANTIC DEEP LEARNING METHOD FROM PLEIADES-1B SATELLITE IMAGERY WITH ARCGIS PRO SOFTWARE (Case Study: Desa “A”)

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Abstract

There are many petroleum mining activities scattered in developing countries, such as Indonesia. Indonesia is one of the largest oil-producing countries in Southeast Asia with the 23rd ranking. Since the Dutch era, Indonesia has produced a very large amount of petroleum. One of the oil producing areas is “A” Village. There is an old well that produces petroleum oil which is still active with an age of more than 100 years, for now the oil well is still used by the local community as the main source of livelihood. With this activity, resulting in an oil pattern around the old oil refinery, which over time will absorb into the ground. This study aims to analyze and identify the oil pattern around the old oil refinery in the “A” area. The data used is in the form of High-Resolution Satellite Imagery (CSRT), namely Pleiades-1B with a spatial resolution of 1.5 meters. Data were identified using the Deep Learning Semantic method. For the limitation of this research is the administrative limit of Bojonegoro Regency with a scale of 1: 25,000 as supporting data when cutting the image. The method used is the Deep Learning Convolutional Neural Network series. This research is based on how to wait for the method of the former oil spill which is the consideration of the consideration used. This study produces a presentation of the CNN method using the confusion matrix method. Based on the above references, research will be carried out on the analysis of CSRT image data (Pleiades-1B) to examine former oil spills. This research using the CNN method. With this research, it is hoped that it can be seen from the area of land affected and the unaffected by the oil spill.

Paper ID: 29

THREE-DIMENSIONAL TOMOGRAPHY OF COSEISMIC IONOSPHERIC DISTURBANCES FROM THE 2016 WEST SUMATERA EARTHQUAKE

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Abstract

Global Navigation Satellite System (GNSS) is a navigation system that uses satellite signals to determine its position, which consists of several satellites arranged in a constellation system. GNSS transmits signals to receivers on Earth. The GNSS receiver determines the user's position, speed, and time by processing the signals transmitted by the satellites. The initial purpose of launching the GNSS was for navigation purposes, but along with its development, GNSS can be used for the purposes of observing deformation of the earth's crust and in studying the atmosphere. The delayed wave data when passing through the ionosphere can be used to obtain Total Electron Content (TEC) values which then used to study ionospheric disturbances. Ionospheric disturbances are caused by various phenomena, the most common one is the ionospheric disturbances caused by the induction of acoustic and gravitational waves excited by co seismic crustal motions from large earthquakes. Ionospheric disturbances that happened before an earthquake are called Pre-seismic Ionospheric Disturbances and those that occur after an earthquake are called Co-seismic Ionospheric Disturbances (CID). Most studies of ionospheric disturbances still provide information on the timing and value of TEC anomalies in 2D form. Therefore, in this study, a 3D ionosphere profile modelling using computed 3D tomography will be carried out. The 3D information provided is in the form of time, ionosphere altitude and TEC anomaly value by utilizing GNSS data. The TEC anomaly value is obtained from the calculation of linear combination of the ionosphere. This study aims to obtain a spatial and temporal analysis of the CID caused by the West Sumatra Earthquake on March 2, 2016.

Paper ID: 30

COMPARATIVE ANALYSIS OF DTM RESULTS HYDRO ENFORCEMENT LIDAR DATA METHOD WITH INTERFEROMETRIC SYNTHETIC APERTURE RADAR (INSAR) FROM RADAR SATELLITE IMAGERY (CASE STUDY OF KEBUMEN REGENCY)

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Abstract

The earth's surface has an inhomogeneous shape. The shape of the earth is an ellipsoid with an irregular surface with various topography. This results in differences in altitude in each place that can affect human activities such as development planning, spatial planning, disaster mitigation planning, and base map creations, etc. Therefore, we need a source of information about the elevation and shape of the earth's surface that can be represented in three-dimensional models such as the Digital Elevation Model (DEM). There are two types of DEM, including the Digital Surface Model (DSM) and the Digital Terrain Model (DTM). For creating topographic maps and base maps, DTM is generally used as the main data source to provide information

related to the elevation of the earth's surface (ground). Remote sensing technology is considered as an effective and efficient method for the formation of DTM with a wide area coverage and in a relatively short time. These technologies can be done, among others, by the use of LiDAR (Light Detection and Ranging) and InSAR (Interferometric Synthetic Aperture Radar) Satellite Radar. In this study, a comparison will be made between LiDAR DTM using the Hydro Enforcement method with InSAR from radar satellites. Based on the results of the LE90 vertical accuracy test against the RBI 1 25,000 altitude data, the DEM sequence from the highest to the lowest accuracy is the RBI Assimilation InSAR DTM with RMSE_z values of 1.59 m and LE90 2.62 m, LiDAR assimilation InSAR DTM with RMSE_z value of 2.69 m and LE90 4.44 m, LiDAR DTM with RMSE_z value of 2.91 m and LE90 4.81 m. DEMNAS with RMSE_z values of 3.48 m and LE90 5.74 m, DTM InSAR with values of RMSE_z 5.830 m and LE90 9.62 m, as well as DTM InSAR breakline with values of RMSE_z 5.86 m and LE90 9.66 m.

Keywords: Digital Terrain Model (DTM), Hydro Enforcement, Interferometric Synthetic Aperture Radar (InSAR), Light Distance and Ranging (LiDAR), Sentinel-1

Paper ID: 31

**WEB-BASED ONLINE POST-PROCESSING GNSS SERVICE
INACORS BIG FOR MAPPING CONTROL POINT POSITIONING
FOR CHANNEL OR ROAD DESIGN**

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Abstract

One of the stages in the topographical mapping work is the measurement of the horizontal control framework, which is currently almost all done using GNSS satellite technology. Online post-processing services provided by the Indonesia Geospatial Information Agency (BIG) is s called xpos-InaCORS. Using this service, measurements are possible using only 1 GNSS receiver can be used for measurement and obtained of the mapping control framework. This research was conducted to determine the accuracy of the online post-processing method by xpos-InaCORS BIG when used as a control point for the mapping of the route the channel or road which tends to be elongated with an of 3rd orde (SNI 19-6724-2002). The coordinates of the results of the online processing calculation are compared with the results static differential method which is calculated using commercial software (Leica infinity). The results showed that at this location, observations for 15 minutes on each Benchmark, were able to produce an accuracy of the centimeter level and to comply with the qualifications of order 3rd SNI, observations must be a minimum duration of 75 minutes. The cost of observation on the online post-processing method requires is 60% of the

static differential. Observation at 75 minutes resulted in an average accuracy of northing (N) = 15mm and easting(E) = 8mm.

Paper ID: 32

PRELIMINARY STUDY OF PROBOLINGGO ACTIVE FAULT IN EAST JAVA BASED ON GRAVITY METHOD

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Abstract

The Gravity Method based on TOPEX Satellite Data is a geophysical method which uses gravity data from satellite observations. The gravity method investigates the gravitational field from one to another observation point. The principle of this method has the ability to distinguish the mass material density from its environment, so that the subsurface structure can be identified. In this research, this method is used to identify subsurface structures that are suspected of Probolinggo Fault and identify the rock lithology. The method used after got free air anomaly data from TOPEX, is correcting gravity data using Microsoft Excel software. Then, in the Oasis Montaj, the interpolation using the kriging method is carried out, and the data is filtered using the butterworth filter, so regional and residual anomaly map is generated. Based on the regional anomaly map, the value of high gravitational acceleration is 0.076 – 19.74 mGal indicating compact rocks. Meanwhile, based on the residual anomaly map, the value of smaller gravitational acceleration is -0.92 – 0.9 mGal indicates lower compacting rocks with smaller mass. Then the density contrast on the residual anomaly, on the north side (0.12 mGal to 0.45 mGal) and on the south side (-0.92 mGal to -0.043 mGal), is interpreted as an active fault. Furthermore, 3D modeling performed on Grablox software resulted density value range of 2.00–2.50 g / cm³ interpreted as sandstone and a density value of 2.4–2.5 g / cm³ interpreted as andesite, and from the 3D imaging can be interpreted of oblique fault.

Keywords: Topex; Gravity;3D modelling, Probolinggo Fault

Paper ID: 33

MICROZONATION OF PROBOLINGGO FAULT USING MICROTREMOR AS AN EFFORT FOR EARTHQUAKE DISASTER MITIGATION

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Abstract

Earthquake can be caused by several things, one of which is due to an active fault. To mitigate earthquake disasters that can be caused by the Probolinggo Fault, measurement of the microtremor geophysical method is carried out to analyze seismic vulnerability. In this study, the microtremor measurements were carried out on 30 measurement points. The data obtained from measurements are then processed using Easy HVSr software to obtain natural frequency (f_0) and natural amplification (A_0) values. This value is then used to create a microtremor microzonation map, which is seismic vulnerability index, based on natural frequency and amplification. It founded that low natural frequency mostly founded on eastern of measurement area, caused by thick sedimentary from Lamongan volcanic. High amplification mostly founded from middle to western area, and high seismic vulnerability index founded on western of measurement area, include Maron and Krucil Sub-district. It means seismic wave can very destructive on those area.

Keywords: Microtremor, microzonation, earthquake, Probolinggo Fault

Paper ID: 34

3-DIMENSIONAL TOPOGRAPHIC MODELING OF LIDAR DATA USING OPEN SOURCE GIS

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Abstract

*The term 3D topographic modeling is an overlay depiction of information scanned through sensors processed by a computer. Furthermore, the information obtained is presented to the media so that it looks like the real world. This system is applied for physical 3D terrain modeling through the media, which is scanned through sensors to a computer and used to analyze the environment with various effects and graphic simulations. This model was generated using a 3-dimensional printer, Creality 10S with Polylactic Acid material, commonly known as PLA, one of the most popular materials used in desktop 3D printing. It is the default filament of choice for most extrusion-based 3D printers because it can be printed at low temperatures and does not require a heated base. From this model, the topography from aerial photography and DEM from LiDAR has a map with size 250*250*100 mm, the scale of 1:2500, and a spatial resolution of up to 0.4 meters which shows physical processes such as contour lines and water flow and sediment transport well visualized. 3-dimensional representations have been used in various material, virtual, and geovisual models of the earth's surface to improve spatial thinking skills. Physical models such as relief maps have been shown to enhance understanding of topographic maps, helping to understand the relationship between 2D representations and 3D objects. Virtual models can support spatial learning, for example, by looking at goals*

from multiple angles, by providing an environmental context. This model allows combining the interactive benefits of physical models with the flexibility and diversity of virtual tools.

Paper ID: 35

**GROUNDWATER RECHARGE ASSESSMENT USING
GEOGRAPHIC INFORMATION SYSTEM APLIS METHOD IN
DONOROJO KARST AREA, PACITAN**

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Abstract

Karst aquifers can be a source of water supply, especially for the community in Donorojo District, which is one of the areas with the worst drought crisis in Pacitan Regency and requires a sustainable solution to the problem of water needs. Therefore, the study and management of karst formations are very important because of their abundance and potential in forming subsurface aquifer karst aquifers. The recharge rate is one of the basic parameters in the management of the consumption and maintenance of this resource. In addition, the distribution of aquifer locations, aquifer characteristics, and the quality of groundwater forming the aquifer need to be known. This study aims to assess aquifers in the Karst area of Donorojo, Pacitan based on recharge rate and spatial distribution. The APLIS method can estimate surface recharge rates and present the results as a map of the spatial distribution of aquifer recharge rates by utilizing a Geographical Information System (GIS). The results of the analysis using the APLIS method, the groundwater recharge rate in the Donorojo Pacitan karst area is divided into 4 classes, namely very low, low, moderate, and high. Almost the entire Donorojo karst area has a high groundwater recharge rate, this means that the area needs to be used as a groundwater protection zone and it is important to carry out good groundwater management, especially to overcome the problem of drought.

Paper ID: 36

**ANALYSIS OF ACCURACY COMPARISON TIDAL GLOBAL
(FES2014, TPX09) AND REGIONAL (BIG PREDICTION) MODELS
TO THE EXISTING TIDES IN SURABAYA AND SURROUNDING
WATERS**

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Abstract

Tidal data has a significant role in various fields in hydrographic surveys and navigation, port planning, and other coastal management. The number of fixed tide stations in Indonesia is minimal compared to the vast territorial

waters in Indonesia. So that for areas that are not covered by tidal fixed stations, direct tidal observation with a certain length of observation is necessary, and of course, this requires quite expensive costs. Fortunately, there are regional and global tidal data predictions that can be used to determine tidal conditions in Indonesian waters. In this study, the regional (BIG) and the global (FES2014 and TPX09) tidal data prediction models were validated with direct observation in the five locations such as Surabaya, Gresik1, Gresik2, Bangkalan, and Giligenting for 39 hours. The root means square error (rmse) calculation results show that in the five locations, the BIG tidal prediction has the smallest rmse value in three tidal stations at Gresik 1, Gresik 2, and Gili Genting with 0.303 m, 0.050 m, and 0.155 m respectively. At the same time, the TPX09 tidal model shows the biggest rmse at Gresik 1, Gresik 2, and Bangkalan with 0.420 m, 0.195 m, and 0.630 m, respectively.

Paper ID: 37

**GEOID MODELLING OF KALIMANTAN ISLAND USING
AIRBORNE GRAVITY DATA AND GLOBAL GEOID MODEL
(EGM2008)**

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Abstract

The availability of geoids, especially in survey and mapping activities, is useful for transforming the geometric heights obtained from observations of the Global Navigation Satellite System (GNSS) into orthometric heights that have real physical meanings such as those obtained from waterpass measurements. If a geoid is available, the orthometric heights of points on earth can be determined using the GNSS heighting method. The use of modern survey and mapping instruments based on satellite observations such as GNSS is more efficient in terms of time, effort, and cost compared to the accurate waterpass method. According to the Indonesian Geospatial Information Agency (BIG) it is stated that the application of geoid as a national Vertical Geospatial Reference System has an adequate and ideal category if the accuracy is higher than 15 cm. Recent studies have shown that it is possible to generate local geoid models with centimetre accuracy by utilizing airborne gravity data. We calculate free-air gravity anomaly data is calculated by processing airborne gravity and GNSS data using the Least Square Collocation (LSC) method on AGR software. Next a geoid model is created by calculating the contribution of three components, namely the long wave component represented by the EGM2008 global geoid data model, the shortwave component represented by the Shuttle Radar Topography Mission (SRTM) data and the medium wave component represented by the free-air gravity anomaly data. The geoid model validation was carried out using the geoid fitting method for geoid accuracy by calculating the difference between

the gravimetric geoid and the geometric geoid and comparing it with the global geoid model EGM2008 degrees 2190. As a result, the total geoid model accuracy value was determined to be 49.4 m on gravimetric geoid undulations with a standard deviation of 7.1 cm. Meanwhile, the results of the EGM2008 geoid undulation accuracy test at 2190 degrees resulted in an accuracy of 51.9 m with a standard deviation of 9.9 cm. These results indicate that the local geoid model from airborne gravity measurement data produces a geoid model with a higher accuracy than the global geoid model EGM2008 degrees 2190. However, the accuracy of the resulting data is still below the BIG standard of 15 cm, so further research is needed to produce a geoid model which conforms to the standard.

Key words : EGM2008, Airborne Gravity, Least Square Collocation, Geoid Modeling

Paper ID: 38

**MONITORING OF LAND USE SUITABILITY BASED ON DETAIL
URBAN SPATIAL PLAN DATA 2018-2038 (CASE STUDY:
GAYUNGAN DISTRICT, SURABAYA CITY)**

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Abstract

Land use planning in an area will refer to the regulations that have been established by the City Planning Office of each region. This is because each region has the authority to plan spatial plans in their respective regions. The border area is an area whose land use can be influenced by two different regional regulations. This is because the border area is a special area located on the border between two regions, each of which has spatial planning regulations. Gayungan District is one of the sub-districts included in the Border Area between Surabaya City and Sidoarjo Regency. To prevent overlapping spatial regulations that may occur in Gayungan District, it is necessary to monitor the suitability of land use using geographic information system technology and remote sensing. The data used in this study are the 2019 Gayungan District RDTRK Map and very high resolution satellite imagery of Pleiades Surabaya City 2019. The method used is the Object Based Image Analysis (OBIA) method. The result of this research is the suitability of land use in Gayungan District. A land use can be said to be suitable if the existing land use is in accordance with the land use in the plan. Meanwhile, land use is said to be inappropriate if the existing land use is different from the planned spatial use. All land use classes in Gayungan District in 2019 had a higher percentage of unsuitable land than the percentage of suitable land. Each percentage of land is not suitable for each land use class, namely: water body class by 92.593%, road class by 78.035%, industrial class by 77.838%, defense class by 76.706%, green open space class by 69.736%, and residential class by 52,27%. So it can be said that the

land use in Gayungan District in 2019 was not in accordance with the plans in the City Spatial Detail Plan (RDTRK) map for 2018-2038, but the land use could be appropriate in its designation for the future, because there is a possibility of development for residential class, industrial class, and defense class on open land that is still widely available.

Keyword : Land Use Change, Land Use Planning, Spatial Planning

Paper ID: 39

INACORS-BIG SERVICE FOR PRACTICE SURVEY

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Abstract

Badan Informasi Geospasial (BIG) is a government agency engaged in the field of Geospatial Information (IG). BIG provides several services that can be accessed by the general public and related to IG. One of the services provided by BIG is the Indonesia Continuously Operating Reference System (InaCORS). InaCORS is divided into various services, as Rinex data services, Online Post-Processing, RTK NTrip, and Mobile InaCORS. This study aims to determine the effectiveness and accuracy of InaCORS services for GNSS surveys using the Rapid Static method and Network RTK. The rapid static survey data is processed using online post-processing services and Network RTK (iMax, Max, and Nearest) will use InaCORS points as a base reference. This study also uses the results of the Total Station tool as comparison data. The results showed that the average value of the difference between the rapid static coordinates and the TS observations was $dN = 0.471$ m $dE = 0.200$ m and $dZ = 0.224$ m, while the Network RTK and TS coordinates were $dN = 0.577$ m $dE = 0.236$ m and $dZ = 0.176$ m.

Paper ID: 40

IDENTIFICATION OF RECHARGE AREA IN GEOTHERMAL FIELD "X" USING REMOTE SENSING (SATELLITE SENTINEL 2A)

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Abstract

Indonesia's geographical strategic position in the world's tectonic distribution is closely related to Indonesia's geothermal energy potential which reaches 27 GigaWatt electrical (GWe) which is spread following the path of volcanic formation that stretches from Sumatra, Java, Nusa Tenggara, Sulawesi to Maluku. Indonesia has a confluence of three active plates that have geothermal potential from depths that are transferred to the

surface through a fracture system. The case study of this research was taken from one of the geothermal areas in West Java Province. The purpose of this study is to find out the application of remote sensing to analyze the recharge area, then identify the recharge area. The data used in this study is raster data in the form of Sentinel 2A and DEMNAS (National Digital Elevation Model) satellite images, while vector data is in the form of RBI Map data (Rupabumi Indonesia) obtained from the Geospatial Information Agency (BIG) with a spatial resolution of 8.1 meters. This study carried out two processing stages, starting from Sentinel 2A image data, carried out several stages, at the geometric correction stage, Normalized Difference Vegetation Index (NDVI) maps and Land surface temperature (LST) maps were obtained. After that, the land cover classification was continued using the Maximum Likelihood Classification (MLC) method. The output of this stage is in the form of a land cover map. The second process is processing DEMNAS (National Digital Elevation Model) to produce slope maps and topographic processing to obtain contour maps. Based on the map output obtained, then overlay all maps. The recharge area map is obtained from the entire process.

Paper ID: 41

REGIONAL PHYSIOGRAPHIC STUDY FOR THE HYDROLOGY OF THE KALI KALI LAMONG WATERSHED

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Abstract

This study aims to determine the effect of physiography based on slope and land cover for water control in the Kali Lamong watershed. The data used in this research are DEM data and Landsat 8 imagery data. The process of processing slope data is through conversion coordinates system, DEM clip, create slope, reclassify, dissolve shp, and slope classification analysis. Landsat 8 data processing goes through a process through conversion coordinates system, composite band, crop composite, extent shp, sharpen band, unsupervised classification, and land cover classification analysis. Slope classification maps and land cover classification maps are used for flow coefficient classification for physiographic analysis based on slope and land cover for water control in the Kali Lamong watershed. On the land cover classification map, five land classifications were obtained, namely agriculture (158413000 m²), settlements (72701400 m²), industrial land (11571600 m²), plantations (46017800 m²), and waters (15268500 m²). On the slope classification map obtained 5 classifications, as flat with a slope of 0-8% (288469544 m²), as slope with a slope of 8-15% (7656738 m²), as rather steep with a slope of 15-25% (1905360 m²), as steep with a slope of 25-45 (526614 m²), and as very steep with a slope of more than 45% (32148 m²). From the combination of Landsat 8 image data and slope data, flow coefficient analysis was carried out. The flow coefficient is influenced by land

cover and slope. From this research, the classification of low flow coefficient is less than 0.25, medium flow coefficient is 0.25-0.5, and high flow coefficient is more than 0.75. The average flow coefficient of the Kali Lamong watershed is 0.49 with a moderate flow coefficient classification value. This shows that 49% of the runoff water is in the Kali Lamong watershed. The higher the flow coefficient value, the water runs off the surface. So that it can be used as an initial study for the technical planning of the Kali Lamong hydrology and the development, improvement, utilization, and control of water flow in Kali Lamong.

Keywords: control, flow coefficient, hydrology, land use, slope.

Paper ID: 43

**ATMOSPHERIC PHASE DELAY CORRECTION OF PS-INSAR TO
MONITOR LAND SUBSIDENCE IN SURABAYA**

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Abstract

Atmospheric phase delay is one of the most significant errors limiting the accuracy of InSAR results. In this research, we used the Generic Atmospheric Correction Online Service for InSAR (GACOS) data to correct the tropospheric delay modeling from the persistent scatterers' InSAR monitoring. For these cases, this paper used 81 Sentinel-1A images and tropospheric delay maps obtained from GACOS to monitor the land subsidence in Surabaya city during 2017-2019. InSAR processing was carried out using the GMTSAR software and continued with StaMPS which is integrated with the MATLAB codes which are used to correct the tropospheric delay of PS-InSAR-derived deformation measurements. In the main subsidence area, the results before and after the atmospheric phase delay correction using GACOS were confirmed and analyzed. The findings of the experiments reveal that the atmospheric phase affects the mean LOS velocity results to some extent. After the correction, the mean square error decreased from 0.34 cm/year to 0.31 cm/year monitoring. The accuracy after applying that correction was increased by about 23%. Furthermore, GACOS correction may increase the error at some points, which could be due to its turbulence data's low accuracy.

Paper ID: 44

**GLOBAL GEOPOTENTIAL MODEL EVALUATIONS AND LOCAL
GEOID IN INDONESIA: A REVIEW**

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Abstract

Geoid model was chosen as vertical reference in Indonesia based on the Head of the Geospatial Information Agency Regulation (Perka BIG) No. 15 of 2013 concerning the Indonesian Geospatial Reference System (SRGI2013). Therefore, the development of local geoid models continues to be carried out to obtain good accuracy. Geoid is formed through three main components, namely long wave, short wave, and medium wave components. One of the long wave components is global geopotential model obtained from topographic, terrestrial, altimetry, and gravity satellite data. Along with the development of technology and gravity observation methods, the global model has many variations, so it is necessary to determine the global model that is most suitable for the geographical conditions in Indonesia. EGM2008 is often used in local geoid modeling in Indonesia based on research that compares several global models, but it does not rule out the possibility of a new global model that is more suitable for Indonesia.

Key words: Global Geopotential Model, Local Geoid, Reference system

Paper ID: 45

SPATIAL DISTRIBUTION OF SQUID HABITAT IN THE WATERS OF WEST NUSA TENGGARA

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Abstract

*Alas Strait is a potential fishing area in West Nusa Tenggara, especially for fishermen. Fishing in the Alas Strait area is dominated by demersal fish and squid. With the squid fishing area dominated by several species, especially *Loligo edulis*. According to [2], from the results of observations obtained 7 types of squid dominated by tarusan squid (*Loligo edulis*) by 50%. Parameters that affect fishing grounds include depth, availability of food, season, salinity, temperature, and sediment [3]. In this study, the parameters that will be used are salinity, seawater temperature, bathymetry and currents as supporting parameters. The time limit in this study is divided into two, namely the east monsoon season (April to September) and the west monsoon season (October to March) in 2020. The data used is processed with Kriging tools in ArcGIS software. From the processing results, it was found that the salinity level in the east monsoon season was in the range of 32.2 – 33.1 psu. Meanwhile, in what season the west monsoon is in the range of 33.2 – 34.5 psu. Both salinity values are included in the habitat preferences of squid which are in the range of 27-37 psu. For temperature, it was found that the temperature level in the east monsoon season is in the range of 26.8° – 27.5°C as shown in Figure 8. Meanwhile, in the west monsoon season it is in the range of 29.1° – 30.5 °C. as in Figure 9. Only the east monsoon season with the seawater temperature value is included in the squid habitat preference which is in the range of 15° – 28° C. Meanwhile, the west monsoon season is*

not included in the habitat preference. squid. From this study, it can be concluded that squid catching is more likely to be carried out during the east monsoon season because it is in accordance with its habitat preferences, which is April to September.

Paper ID: 46

**ASSESSMENT OF THE REFERENCE AND RECENT
GOCE/GRACE-BASED GGMS OVER SUDAN BASED ON THE
GNSS/LEVELING STATIONS**

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Abstract

Abstract. This paper focuses to present the evaluation of reference and recent Goce/grace-based Global Geopotential models over Sudan, we have been selected 6 GGMs have been released in 2020, 2019, 2014, 2008 as is shown on the ICGEM website. The evaluation of the latest GGMs can indicate which GGMs have higher precision with the local GNSS/leveling data that we have used in this research. The system of leveling observations in Sudan is mean tide and we have considered that in our evaluations computations. The results of this article indicate that the average values of the standard deviation for all our results are approximately 70 cm due to the differences between the radius of the ellipsoid of the local data and the radius of the ellipsoid of the GGMs, we have done to calculate the determinant of the zero-degree term in order to reduce the differences between the residuals values of the GGMs and the local GNSS/leveling data over Sudan.

Keywords: Ellipsoidal and Geoidal heights, Geoid Undulation, Global geopotential model, GOCE, GRACE, GNSS/leveling, height anomaly

Paper ID: 47

**INTEGRATING GIS AND ANALYTICAL HIERARCHY PROCESS
TO DETERMINE FLOOD VULNERABILITY LEVEL IN
SURABAYA, INDONESIA**

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Abstract

Flood is one of the hydrometeorological disasters that occur in Surabaya, especially during the rainy season. The occurrence of floods brings a huge

impact on the economy, the environment, and humans' losses. Based on the National Disaster Management Agency in Indonesia (BNPB) records, the flood inundation height in Surabaya reach about 10 -70 cm for 6 hours. Some anticipation efforts are required to minimize the impact. Therefore, this study aims to provide a flood vulnerability level assessment using the GIS and Analytical Hierarchy Process (AHP) method as a priority recommendation in increasing capacity. This research uses 4 criteria in the assessment including social, economic, physical, and environmental. Each criterion is divided into several classes with adjusted scoring values. The results of the AHP rank the social criteria as the highest weighted value of 0.42321. Furthermore, the results of the flood vulnerability assessment yield some areas that have the highest vulnerability value including Trenggildimejoyo District, Wonocolo District, Dukuhpakis District, Sukolilo District, Krembangan District, Semampir District, and Benowo District.

Keywords: AHP, GIS, flood vulnerability

Paper ID: 48

CORRELATION ANALYSIS OF LAND SURFACE TEMPERATURE (LST) MEASUREMENT USING DJI MAVIC ENTERPRISE DUAL THERMAL AND LANDSAT 8 SATELLITE IMAGERY (CASE STUDY: SURABAYA CITY)

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Abstract

Landsat 8 Satellite Imagery (Landsat Data Continuity Mission, LDCM) is a satellite product made by Orbital Science Corporation, which launched with the latest features, namely Operational Land Imager (OLI) and Thermal Infrared Sensor (TIRS) instruments. One of the Thermal Infrared Sensor (TIRS) instruments carried Band 10 and Band 11, which can provide temperature information on the earth's surface that has a positive relationship with existing land cover temperature based on researches. Comparing the airborne thermal sensor by using the DJI Mavic Enterprise Dual Thermal and actual temperature from satellite measurement on the earth's surface on sample data of particular objects categories that included urban areas, waters, vegetation, open land, settlements, and industrial factories. The data processing carried out that both of the data have a positive correlation as the relationship, which have a Pearson correlation value of 0.892 and sig. (2-tailed) at the number 0.000000068. However, because the satellite imagery contains a lot of cloud cover, the temperature obtained lower in the Landsat 8 satellite image rather than the actual temperature on the earth's surface.

Paper ID: 49

**SPATIAL AND TEMPORAL ANALYSIS OF NDVI CHANGES IN
JAVA ISLAND USING GOOGLE EARTH ENGINE IN 2005 UNTIL
2020 PERIOD**

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Abstract

Java is the most populated island in Indonesia and the world. The increase in population on the island of Java causes the forest area and other vegetation cover to decrease. Reduced vegetation cover causes disasters such as landslides, floods, and others. In addition, the reduced forest and vegetation cover can cause the extinction of flora and fauna. The monitoring of the vegetation cover can be monitored using the Normalized Difference Vegetation Index (NDVI). This study analyzes changes in the NDVI value from 2005 to 2020 using Terra and Aqua MODIS image data processed using Google Earth Engine. Processing is carried out in stages starting from downsetting, performing NDVI processing, calculating monthly average NDVI, calculating annual average NDVI, and analyzing. From the results of the study, the NDVI value of Terra and Aqua MODIS data has a very strong but imperfect correlation coefficient due to differences in orbital time which causes differences in solar zenith angle, sensor viewing angle, and azimuth angle. Then from this study, it was found that overall, changes in vegetation density cover on the island of Java decreased, which was indicated by the NDVI decline rate of -0.00047 / year. The most extensive decrease in NDVI value occurred in the period 2015 – 2016 with an area of 13994.630 km^2 and the widest increase in NDVI occurred in the period 2010 – 2011 with an area of 2256.101 km^2 .

Paper ID: 50

**EFFECT OF GREENNESS INDEX ON CASE FATALITY RATE
(CFR) OF COVID-19 USING LANDSAT-8 IMAGE (CASE STUDY:
DKI JAKARTA)**

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Abstract

COVID-19 is spreading into Indonesia and has reached tens of thousands of cases as of September 30, 2020. It is recommended by the American Public Health Association and the Centers for Disease Control and Prevention to remain physically active during COVID-19 quarantine by regularly visiting parks and green spaces as it can protect the body against the consequences of quarantine impacting physical and mental health. To obtain the distribution of green space, it can be calculated using the Greenness Index from Landsat-8 Surface Reflectance Tier 1 satellite imagery processed through the Google Earth Engine platform. This study was conducted to

determine the value of Greenness Index, Case Fatality Rate (CFR) value due to COVID-19, and how the correlation between the two variables in each sub-district in DKI Jakarta April-September 2020. Four sub-districts showed negative correlation values. This explains that a lot of green space in an area affects the lower CFR value. But other sub-districts showed a positive correlation. Population density, mobility between cities/countries, and new clusters are formed into several factors that can affect the value of CFR. Landsat-8 image data that has a temporal resolution of 16 days affects the limited choice of images with erratic cloud cover can result in a small Greenness Index value.

Paper ID: 51

DEVELOPMENT OF GOOGLE EARTH ENGINE FIRE WEATHER INDEX CALCULATOR FOR INDONESIAN FIRE DANGER RATING SYSTEM

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Abstract

Tropical peatlands make up almost ten percent of the land surface in Indonesia, making peat fires detrimental not only for global atmospheric carbon levels, but also to public health and socioeconomic activities in the region. Indonesian Fire Danger Rating System (FDRS) was developed based on the Canadian Forest Fire Weather Index System (CFFWIS), using three different fuel codes and three indices representing fire behaviour. Daily Fire Weather Index (FWI) calculation is done by the Meteorological Climatological and Geophysical Agency (BMKG) with data from its synoptic weather stations network. Distribution of such weather stations are sparse, therefore this paper reports on the development of Fire Weather Index calculator on Google Earth Engine, using high resolution weather data, provided by weather model and remote-sensing open datasets. The resulting application is capable of generating daily maps of FWI components to be used by the Indonesian Fire Danger Rating System.

Paper ID: 52

DETERMINING SUITABLE LOCATIONS FOR REGIONAL WASTE FINAL PROCESSING SITE USING SIMPLE ADDITIVE WEIGHTING (SAW) (CASE STUDY: MALANG CITY AND MALANG REGENCY)

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Abstract

Garbage or waste is a residual material resulting from human activities and natural processes that have no economic value anymore. The volume of waste in Malang City and Malang Regency every year always increases, so the existing waste final processing site will no longer be able to accommodate the pile of garbage. Therefore, the Malang City Government plans to collaborate with the Malang Regency Government in making an integrated regional waste landfill and processing site. In this study, an analysis of the determination of the suitable location for regional waste final processing (WFP) for Malang City and Malang Regency was carried out using the Simple Additive Weighting (SAW) method. The SAW method is a weighted summation method, which can make a more precise assessment, based on the predetermined criteria and preference weights. Preference weights were determined by the pairwise comparison method. The criteria used are geological hazardous areas, distance from drinking water sources, land slope level, distance from settlements, protected areas, and distance from airports. The final result in this study is a map of the appropriate location for a regional waste final processing site and an analysis of the location for the best regional final processing site. The location map is classified into three, namely: not feasible with a total area of 54,774.33 ha, less feasible with a total area of 170,846.49 ha, and feasible with a total area of 130,096.63 ha.

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DISPLACEMENT VELOCITY AND STRAIN ANALYSIS OF OPAK FAULT MONITORING STATIONS

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Abstract

The Opak Fault is an active fault which can potentially cause earthquakes in Yogyakarta. Periodic monitoring of the Opak Fault activity was previously used more GNSS observation data from the measurement campaign by the GGGF Laboratory Team, Geodetic Engineering Department, Faculty of Engineering, Universitas Gadjah Mada. However, there are several CORS BIG stations located in Yogyakarta. The CORS BIG data is used to increase the precision of the Opak Fault monitoring station. Therefore, the addition of the CORS were evaluated to obtain a displacement in the monitoring station. The computation of the displacement velocity value of the Opak Fault monitoring station have been done before using the Linear Least Square Collocation and grid search methods. Another method namely the kriging method needs to be evaluated whether it can produce a more precise

displacement velocity value. The research data includes GNSS campaign and CORS BIG data for six years, 2013 to 2020. The CORS stations around DIY are JOGS and CBTL. The GNSS data were processed to determine the solution for the daily coordinate, displacement, and its standard deviation values for each Opak Fault monitoring station. The value of the displacement velocity was generated by the Linear Least Square method which was then reduced from the influence of the Sunda Block. The velocity value is used in the estimation of the strain value around the Opak Fault area at each station using the kriging method combined with the gaussian sequential simulation technique. The estimated velocity and strain values were tested for statistical significance compared to the research of Adam (2019) and Pinasti (2019). This research generates the value of the displacement velocity in the East and North components of 12.39 to 30.99 mm/year and 1.96 to -14.11 mm/year, respectively. The displacement direction of all monitoring stations is dominant to the southeast. The displacement velocity which has been reduced by the Sunda Block in the East component is -2.32 to 2.28 mm/year while the North component is -0.52 to 4.2 mm/year. The displacement direction reduced by the Sunda Block towards to the northwest. The strain estimation using the kriging method combined with the gaussian sequential simulation technique obtained an average strain value of 0.05 micro strain/year. Result of the data processing at each station have different arrow lengths, meaning that each location has a different strain value.