# ABSTRACT BOOK

## GEOICON 2024
### THE 9th GEOMATICS INTERNATIONAL CONFERENCE

**Geospatial Technology for Mapping the Future**
Insights and Solutions for Sustainable Land Development

Cadastral Mapping – Geodesy and Geodynamics – Geology and Geophysics – Spatial Data Infrastructure – Geography and Urban Environment – Marine Environment – Mining and Energy – Agriculture and Forestry

SUPPORTED BY

# PREFACE

The 9th Geomatics International Conference (GEOICON) 2024 is an annual scientific meeting in the field of geomatics engineering held by Department of Geomatics Engineering, Institut Teknologi Sepuluh Nopember (ITS), Surabaya, Indonesia. The conference aims to be a forum for sharing knowledge and experience, and promote ideas between researchers, academicians, government, and professionals in future research of geospatial science and technology. This year, the 9th GEOICON 2024 explores the theme "Geospatial Technology for Mapping the Future: Insights and Solutions for Sustainable Land Development". The theme is chosen along with our belief that integrating advanced geospatial technologies is essential for addressing the pressing challenges of sustainable land development. By leveraging these technologies, we can enhance our understanding of spatial dynamics, improve decision-making processes, and develop innovative solutions that ensure the responsible use and management of land resources. The conference will be held on July 24th 2024 in Surabaya. The speakers of the event come 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 109 scientific papers from many fields of study and countries which the authors consist of researchers, students, government staff, professionals, and societies. They come from Australia, Bulgaria, China, Indonesia, England, Iran, Japan, Malaysia, Nigeria, Russia, Taiwan, and Vietnam. These researches will be presented within the conference and should provide opportunities for comprehensive discussion. The abstracts are divided into eight main conference tracks, i.e. (A) Geodesy and Geodynamics, (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 substantial input of papers, preparing the conference, and encouraging participants from many fields. We also acknowledge all the authors, as without their expert input there would have been no conference. We would also like to express our gratitude to all contributing sponsors for their many ways of assistance, especially for the funding. We also acknowledge the important contributions of the Rector of ITS and Head of the Department of Geomatics Engineering ITS. The success of the 9th GEOICON 2024 will be a catalyst for our confidence to organize the next event in 2025.


Dr. Muhammad Aldila Syariz, S.T., M.S., Ph.D.
The 9th GeoICON 2024
Chairman

# TABLE OF CONTENTS

# THE COMMITTEE

1. **Technical Program Committee**

   | | |
   |---|---|
   | Chairman | : Dr. Muhammad Aldila Syariz, S.T., M.S., Ph.D. |
   | Member | : Prof. Dr. Ir. Bangun Muljo Sukojo, DEA, DESS |
   | | Dr-Ing. Ir. Teguh Hariyanto, M.Sc. |
   | | Hepi Hapsari Handayani, S.T., M.Sc., Ph.D. |
   | | Assoc. Prof. Sr Ts Dr Saiful Aman Sulaiman |
   | | Assoc. Prof. Sr Gs Ts Dr Khairul Nizam Tahar |
   | | Ts Dr.-Ing. Hendy Fitrian Suhandri |
   | | Sr. Dr. Muhammad Abdul Hakim Muhammad |
   | | Dr. Lau Chong Luh |
   | | Sr. Mohammad Hezri Razali |

2. **Organizing Committee**

   | | |
   |---|---|
   | Secretary | : Nafisatus Sania Irbah, S.T., M.T. |
   | | Nurwatik, S.T., M.Sc. |
   | Exchequer | : Dr-Ing. Noorlaila Hayati, S.T., M.T. |
   | | Udiana Wahyu Deviantari, S.T., M.T. |
   | | Yunita Hari Listyowati |
   | Paper | : Ira Mutiara Anjasmara, S.T., M.Phil., Ph.D. |
   | | Prof. Lalu Muhamad J., S.T., M.Sc., Ph.D |
   | | Candida Aulia De Silva N., S.T., M.T. |
   | Event and Session | : Dr. Filsa Bioresita, S.T., M.T. |
   | | Irena Hana Hariyanto, S.T., M.T. |
   | | Moh. Hamsah, A.Md. |
   | Sponsorship | : Prof. Mokhamad Nur Cahyadi, S.T., M.Sc., Ph.D. |
   | | Khomsin, S.T., M.T. |
   | | Eko Yuli Handoko, S.T., M.T., Ph.D. |
   | Website, Publication, & Documentation | : Agung Budi Cahyono, S.T., M.Sc., DEA |
   | | Putra Maulida, S.T., M.T., Ph.D. |
   | Accomodation & Transportation | : Yanto Budisusanto, S.T., M.Eng. |
   | | Widyo Admojo Hutomo |
   | Equipment | : Akbar Kurniawan, S.T., M.T. |
   | | Husnul Hidayat, S.T., M.T. |

# CONTACT

GeoICON 2024

Dr. Muhammad Aldila Syariz, S.T., M.S., Ph.D.

Geomatics Engineering, Building 3rd Floor

Institut Teknologi Sepuluh Nopember (ITS) Sukolilo, Surabaya 60111, Indonesia

Telp: (031)5929486

Fax: (031)5929487

Email: geoicon@its.ac.id

# INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS)
## SURABAYA, INDONESIA

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 is 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 the 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 number of departments 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 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 for 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 to community work. In 2005, ITS contributed to the 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 settlement for the victims of Sidoarjo Mud Volcano, East Java since 2008. The collaboration resulted in a widened impact area as officially claimed for the mud volcano which is very helpful for the victim to get 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 undegraduate 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 in- formation 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 2006 the Department of Geodetic Engineering was renamed to Department of Geomatics Engineering.

Currently, the Department of Geomatics Engineering has five laboratories i.e Geospatial, Geodetic and Surveying, Geomarine, Geodynamic & Environment, and Cadastre and Land Policy. 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.

# THE VENUE
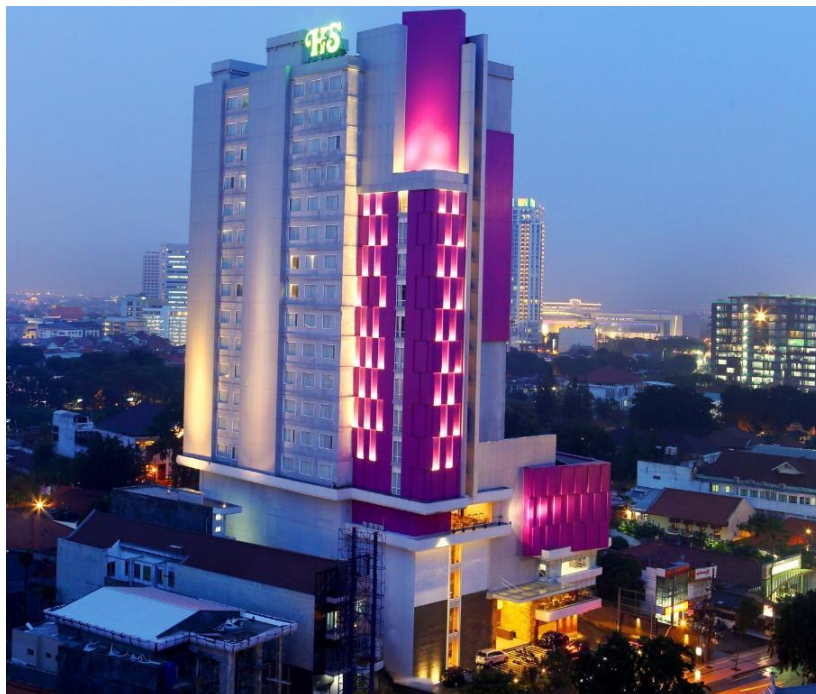


**Hotel Santika Premiere Gubeng, Surabaya**

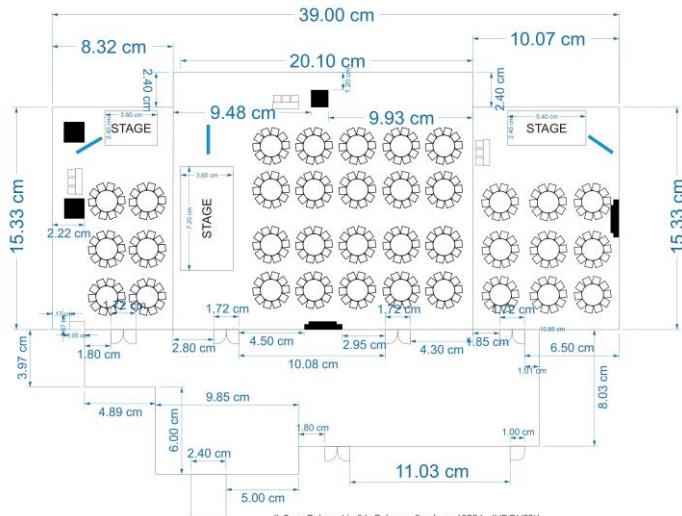Jl. Raya Gubeng No.54, Gubeng, Kecamatan Gubeng,
Kota Surabaya, Jawa Timur 60281
Phone : +62-31 5053636
Email : gubengpremiere@reservation.santika.com
https://www.mysantika.com/

# ROOM LEVEL INDOOR

## 5th Floor plan



Jl. Raya Gubeng No 54, Gubeng - Surabaya 60284 - INDONESIA
Ph. (62-31) 505 3636, Fax (62-31) 505 6688
E-Mail: sales@surabayapremiere.santika.com
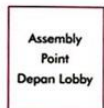www.santika.com

ROUND TABLE
SETTING

SKALA 1 : 100

## 6th Floor plan

Jl. Raya Gubeng No 54, Gubeng - Surabaya 60284 - INDONESIA
Ph. (62-31) 505 3636, Fax (62-31) 505 6688
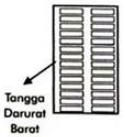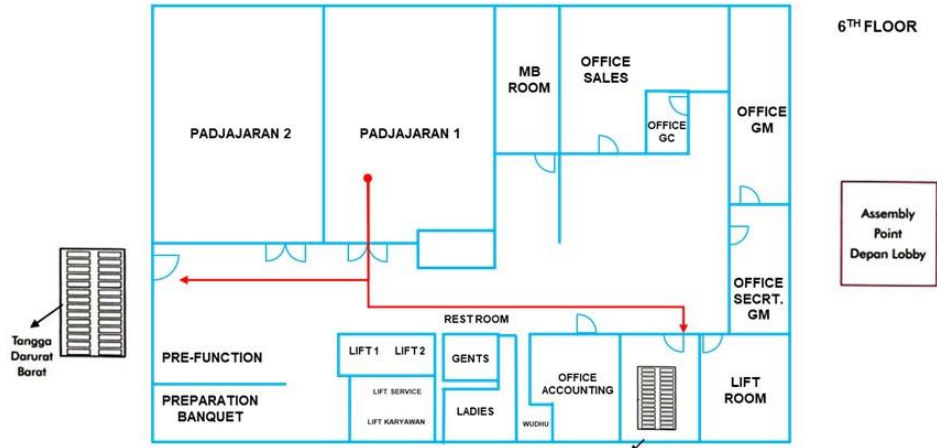E-Mail: sales@surabayapremiere.santika.com
www.santika.com



**Arah Evakuasi**
Dalam keadaan Darurat, ikuti tanda panah untuk
menuju tangga darurat.
Jika ada kebakaran, jangan menggunakan Lift

**Emergency Evacuation Route**
Proceed to nearest available exit stairway and once inthe
stairway, continue to ground floor / street. On evidence of fire or
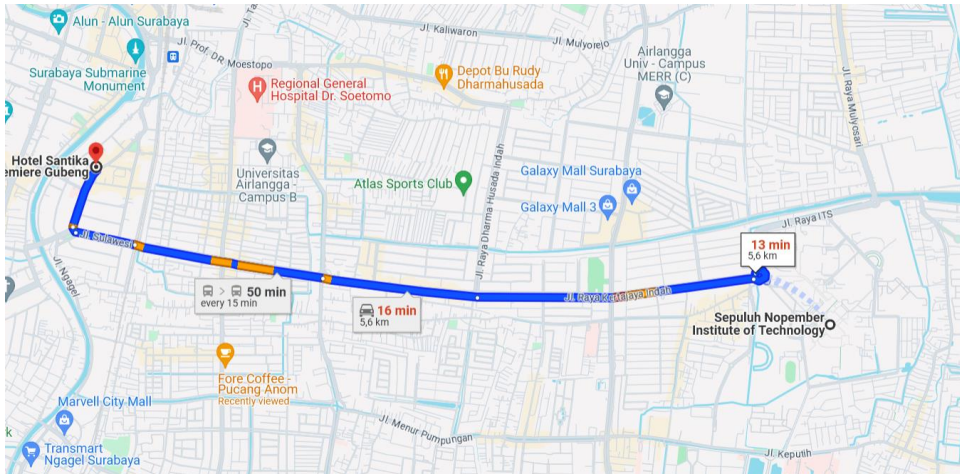other emergency, do not use elevator.

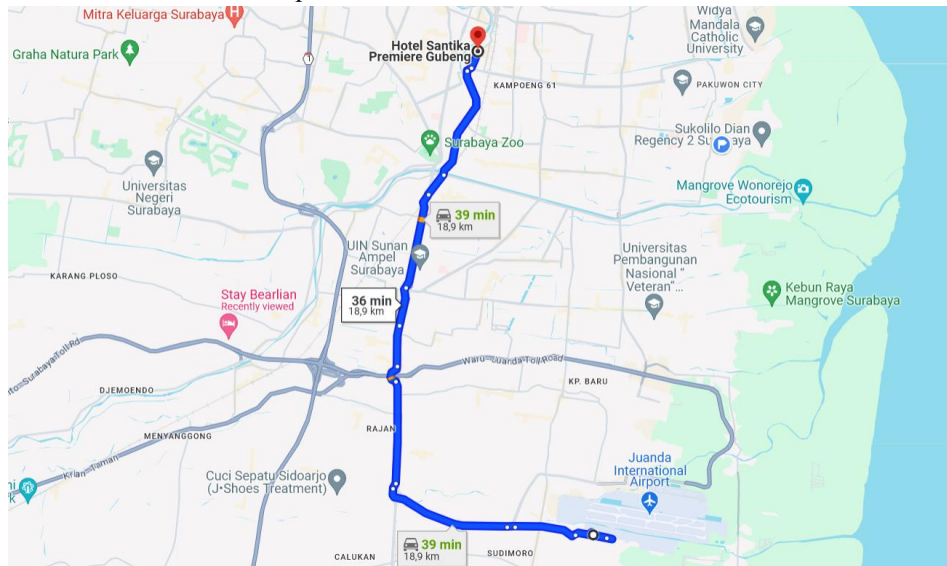# LOCATION MAP

Google Maps link: its.id/venuegeoicon2024

QRCode:



## From Institut Teknologi Sepuluh Nopember (ITS)



## From Juanda International Airport

# PROGRAM SCHEDULE

| Time | Activity | Detailed Activity | | | | |
|---|---|---|---|---|---|---|
| 07.00 - 07.45 | Registration | Registration | | | | |
| 07.45 - 08.30 | Opening Ceremony | Opening by MC | | | | |
| | | National Anthem "Indonesia Raya" | | | | |
| | | Traditional Dance | | | | |
| | | Speech by Chairman of GEOICON 2024 | | | | |
| | | Opening Speech by the Rector of ITS | | | | |
| 08.30 – 09.10 | Keynote Speaker | Agus Harimurti Yudhoyono, M.Sc., M.P.A., MA* | | | | |
| | | Minister of Agrarian Affairs and Spatial Planning/National Land Agency (ATR/BPN) | | | | |
| 09.10 – 10.15 | Invited Speaker | Prof. Lachezar Filchev (Bulgarian Academic of Science, Bulgaria) | | | | |
| | | Prof. Chung-Yen Kuo (National Cheng Kung University, Taiwan) | | | | |
| | | QnA | | | | |
| 10.15 - 10.35 | Coffee Break / Poster Presentation | Coffee Break / Poster Presentation | | | | |
| 10.35 - 12.05 | Invited Speaker | Prof. Timo Balz (Wuhan University, China) | | | | |
| | | Prof. Lalu Muhamad Jaelani (Institut Teknologi Sepuluh Nopember, Indonesia) | | | | |
| | | Assoc. Prof. Sr. Saiful Aman Bin Hj Sulaiman (Universiti Teknologi Mara, Malaysia) | | | | |
| | | QnA | | | | |
| 12.05 - 12.45 | Lunch | Lunch | | | | |
| 12.45 - 14.30 | Parallel Session I | Parallel Session<br>For Each Paper,<br>Presentation and QnA: 15 minutes | | | | |
| | | Room A | Room B | Room C | Room D | Room E |
| 14.30 - 14.45 | Coffee Break / Poster Presentation | Coffee Break / Poster Presentation | | | | |
| 14.45 - 16.45 | Parallel Session II | Parallel Session<br>For Each Paper,<br>Presentation and QnA: 15 minutes | | | | |
| | | Room A | Room B | Room C | Room D | Room E |
| 16.45 - 17.00 | Closing Ceremony | Announcement of best presenter | | | | |
| | | Closing by Head of Geomatics Engineering Department | | | | |

# SCHEDULE FOR ORAL PRESENTATIONS

| Room A | | | | |
|---|---|---|---|---|
| **Time (UTC+7)** | **ID** | **Author** | **Title** | **Session** |
| 12.45 – 13.00 | 006 | Taufik Iqbal Ramdhani | Predictive Modeling of Soil Nutrient Content Using Spectrum Data and Machine Learning Techniques in Indonesian Provinces | Agriculture and Forestry |
| 13.00 – 13.15 | 010 | Karunika Diwyacitta, Ika Siwi Supriyani, Olivia Maftukhaturrizqoh, Bayu Satya Adhitama, Fauzan Al-Ayyubi, Syarif Budhiman, Dony Kushardono, Dede Dirgahayu Domiri, Dedi Irawadi | Study on Phenology of Cannabis Plantation using Remote Sensing Satellite Data in Sumatera, Indonesia | Agriculture and Forestry |
| 13.15 – 13.30 | 046 | Karina Rizqika Ayu, Bangun Muljo Sukojo | Correlation Analysis of Vegetation Index Impact on Rice Paddy Productivity Estimation Using Landsat-8 and Sentinel-2A Images (Case Study: Blitar District) | Agriculture and Forestry |
| 13.30 – 13.45 | 061 | Hari Agung Adriant, Auriza Rahmad Akbar, Imas Sukaesih Sitanggang, Shelvie Nidya Neyman, Muhammad Fauzan Azim | DIVA – Interactive Dashboard for Visualization and Analysis of Land Change and Land/Forest Fire | Agriculture and Forestry |
| 13.45 – 14.00 | 065 | Le Thi Huong, Nguyen Thi Luong, Nguyen Quoc Chien, Ngo Thi Hai Yen, Do Thi My Hoa, Nguyen Van Manh | A 30-year mangrove change detections in Dong Rui commune using Landsat-series satellite images and GIS application | Agriculture and Forestry |
| 14.00 – 14.15 | 107 | Isnaini Dairina, Sigit Heru Murti, Rika Harini | Comparing Pixel-based and Object-based Classification for Mapping Smallholders Rice Field | Agriculture and Forestry |

| | | | **Room A** | |
|---|---|---|---|---|
| | | | Types Using Planetscope Imagery in Sekampung District, East Lampung, Indonesia | |
| 14.15 – 14.30 | 044 | Nurul Fitri Alya, Hepi Hapsari Handayani, Reza Fuad Rachmadi, Anisa Nabila Rizki Ramadhani, Muhammad Ihsan, Mikael Mangopo | Palm Oil Tree Canopy Identification Using Deep Learning Approach (Case Study: Tanjung Gusta District, North Sumatera) | Agriculture and Forestry |
| | | | *Coffee Break* | |
| 14.45 – 15.00 | 087 | Luki Adi Triawan, Mokhamad Nur Cahyadi, Agus Budi Raharjo, Dian Saptarini | Analysis Of 3D Modeling Using Lidar Velodyne for Tree Inventory Using the Liosam Method | Agriculture and Forestry |
| 15.00 – 15.15 | 036 | Fariidah Ramadhani, Filsa Bioresita | The Use of Sentinel-1 C-Band Dual Polarimetric and SAR Polarimetry Method for Peatland Analysis in South Kalimantan Indonesia | Agriculture and Forestry |
| 15.15 – 15.30 | 017 | Olivia Stefani, Lalu Muhamad Jaelani, Lena Sumargana | Phenological and Spectral Unmixing-Based Identification of Corn Cultivars in Tuban Regency, Indonesia: An Analysis of Sentinel-2 and MODIS Data | Agriculture and Forestry |
| 15.30 – 15.45 | 021 | Widodo Eko Prasetyo, Hepi Hapsari Handayani, Agus Budi Raharjo, Dian Septarini | Advancing Carbon Stock Estimation and 3D Tree Modeling: Harnessing the Potential of Backpack LiDAR Technology | Agriculture and Forestry |
| 15.45 – 16.00 | 037 | Cut Sahda Nabila, Muhammad Taufik | Towards Water Hyacinth Identification using Index Vegetation from Sentinel-1 and Sentinel-2 in Selorejo Dam. | Agriculture and Forestry |
| 16.00 – 16.15 | 055 | Pradipta Adi Nugraha, Noorlaila Hayati | The Use of Sentinel-1 Imagery for Degraded Peatland Analysis in South Kalimantan Area With the | Agriculture and Forestry |

| Room A | | | | |
|---|---|---|---|---|
| | | | Help of SSM Algorithm and InSAR Data | |
| 16.15 – 16.30 | 092 | Rizqi Aulia,Irwan Gumilar, Brian Bramanto | Vertical Accuracy Assessment in Mining Area from Multi-Geodetic Sensors | Mining and Energy |

| Room B | | | | |
|---|---|---|---|---|
| Time (UTC+7) | ID | Author | Title | Session |
| 12.45 – 13.00 | 012 | Solomon O. Faruna, Dudy D. Wijaya, Bambang Setyadji, Irwan Melano, Aditya K. Utama, Brian Bramanto, Yusuf D. Opaluwa, Daniel Okoh | Estimation of high-resolution GNSS-based ionospheric VTEC over Nigeria using orthogonal transformation | Geodesy and Geodynamics |
| 13.00 – 13.15 | 047 | Raihan Fajar Adiwijaya, Teguh Purnama Sidiq, Estu Kriswati | Pre-eruption deformation peior to 2018 of Anak Krakatau Volcano | Geodesy and Geodynamics |
| 13.15 – 13.30 | 050 | Dina Anggreni Sarsito, Susilo, Heri Andreas, Dhota Pradipta | Surface Deformation Patterns Comparison Derived from Deterministic and Stochastic Estimation Methods for Areas with Various Density Distribution Types of Geodetic Observation Stations | Geodesy and Geodynamics |
| 13.30 – 13.45 | 059 | Muhammad Isyraf Daniel Mohd Sidik, Amir Sharifuddin Ab Latip, Abdul Rauf Abdul Rasam, Ami Hassan Md Din | Analysis of Diurnal Cycles on Zenith Tropospheric Delay (ZTD) in Equatorial Region Using MyRTKNet Stations | Geodesy and Geodynamics |
| 13.45 – 14.00 | 062 | Dadan Ramdani, Arsauna Pahlevi, Rina Muthia Harahap | Optimal Global Gravity Field Model for Calculation of | Geodesy and Geodynamics |

| Room B | | | | |
|---|---|---|---|---|
| | | | local Gravity and Geoid in Indonesia | |
| 14.00 – 14.15 | 063 | Achmad Rusdiana, Irwan Meilano, Rio Raharja | Preliminary Investigation on Local Solid Earth Tide Variations in Sumatra Island Using INACORS GNSS Network | Geodesy and Geodynamics |
| 14.15 – 14.30 | 039 | Rizka Amelia Dwi Safira, Ira Mutiara Anjasmara, Joseph L. Awange, Jielong Wang | Understanding the terrestrial water storage changes over Java and Kalimantan basins from downscaled GRACE/GRACE-FO products | Geodesy and Geodynamics |
| *Coffee Break* | | | | |
| 14.45 – 15.00 | 040 | Dhea Pratama Novian Putra, Ira Mutiara Anjasmara, Widya Utama, Daniel Sahat Rezeki Hutagalung, Muhammad Himam Awali | Analyzing Surface Physical Properties Change for Geothermal Extraction Monitoring using Satellite Gravity and Satellite Imagery in Patuha Geothermal Field, Indonesia | Geodesy and Geodynamics |
| 15.00 – 15. 15 | 042 | Annisa Rahmawati Timur, Ira Mutiara Anjasmara | Ground Deformation Assessment Over Pasuruan Regency using Timeseries-InSAR with Unwrapping Error Correction | Geodesy and Geodynamics |
| 15.15 – 15.30 | 074 | Isnaini Annuriah Mundakir, Fanny Zafira Mukti, Andika Mauradhia, Wilma Fitri, Sidik Tri Wibowo | Ina-CORS Growth Story | Geodesy and Geodynamics |
| 15.30 – 15.45 | 085 | Teguh P. Sidiq, Heri Purwanto, Irwan | Localities of ID-74 to DGN95 | Geodesy and Geodynamics |

| | | Room B | | |
|---|---|---|---|---|
| | | Gumilar, Atik Retno, Kosasih Prijatna, Dzun Nurwinas, Hudaya Hibatul Wafi | Coordinate Transformation Parameters | |
| 15.45 – 16.00 | 086 | Widy Putra, Bagas Triarahmadhana, Nurrohmat Widjajanti, Leni S. Heliani | "Comparison of Free-Air Gravity Anomaly Values from Multi-Epoch Gravity Data Case Study: Gravity Data of the D.I. Yogyakarta Region in 2013 and 2019" | Geodesy and Geodynamics |
| 16.00 – 16.15 | 094 | Bagas Triarahmadhana, Dwi Noviyanto, Harka Amrosalma, Widy Putra | The Terrestrial Gravity Campaign Around Ibu Kota Nusantara (IKN) Area, Indonesia | Geodesy and Geodynamics |
| 16.15 – 16.30 | 101 | Yudo Prasetyo, Nurhadi Bashit, Wira Maulana Ashar | Deformation Study on the Surface Structure of Selogriyo Temple Based on Multitemporal 3D Modeling Using Terrestrial Laser Scanning (TLS) Technology | Geodesy and Geodynamics |
| 16.30 – 16.45 | 106 | Febrylian Fahmi Chabibi, Nabila Sofia Eryan Putri, Dudy Darmawan Wijaya | Tropical Cyclone Intensity Prediction Using BP-RNN from GPS-Derived Precipitable Water Vapor and Surface Meteorological Data | Geodesy and Geodynamics |

| | | Room C | | |
|---|---|---|---|---|
| Time (UTC+7) | ID | Author | Title | Session |
| 12.45 – 13.00 | 002 | Henyningtyas Suhel, Arif Eko Wibawanto | The Influence of Physical Geography Parameters on | Geography and Urban Environment |

| Room C | | | | |
|---|---|---|---|---|
| | | | Hydrometeorological Disasters (Case Study: Banjarmasin City) | |
| 13.00 – 13.15 | 007 | Arwan Putra Wijaya, Rizky Novrizal Ramadhani, Daffa Syadayagra Arwanto, Yasser Wahyuddin | Mapping The Dynamics of Settlement Areas around the tourism areas by Using Geographic Information Systems (Case Study: Prambanan and Kalasan District) | Geography and Urban Environment |
| 13.15 – 13.30 | 011 | Muhammad Dzun Nurwinas Saepudin, Teguh Purnama Sidiq, Irwan Gumilar, Trizky Dirgaputera, Haekal Ibrahim Hakiem | Waste Volume Estimation by Surface Changes of Sarimukti Dumpsite 2010 – 2023 | Geography and Urban Environment |
| 13.30 – 13.45 | 020 | Mohamad Rifai, Harintaka | Integration of Cloud Score+ with Sentinel-2 Harmonized for land use and land cover classification using machine learning algorithms. | Geography and Urban Environment |
| 13.45 – 14.00 | 024 | Shofiyatul Qoyimah, Hana Sugiastu Firdaus | A Study of Gaussian Splatting Technique in Rendering a 3D Model of Textureless Object | Geography and Urban Environment |
| 14.00 – 14.15 | 029 | Syachril Warasambi Mispaki, Muhammad Harun Ar Rosyid, Pangi Pangi, Mitha Asyita Rahmawaty | Optimization of SAR Data Utilization for Spatial Planning in the Northern Coastal Area of Central Java | Geography and Urban Environment |
| 14.15 – 14.30 | 038 | Nabilah Amanina, Teguh Hariyanto | Comparative Analysis of Sample Quantity and Size in Area-Based and | Spatial Data Infrastructure |

| | | | **Room C** | |
|---|---|---|---|---|
| | | | Feature-Based Image Matching Methods for Improved Aerial Orthophoto Generation | |
| *Coffee Break* | | | | |
| 14.45 – 15.00 | 089 | Nurya Ramadhania, Mokhamad Nur Cahyadi, Tahiyatul Asfihani, Hendy Fitrian Suhandri | Integration of the Velodyne LiDAR Sensor and Pixhawk IMU for Indoor 3D Mapping | Geodesy and Geodynamics |
| 15.00 – 15.15 | 034 | Iwan Satriawan, Jaja Sutarja, Anita Fatmawaty Effendi, G. Haryuatmanto | 3D Modelling of Sarinah Relief Using Close-Range Photogrammetry | Geography and Urban Environment |
| 15.15 – 15.30 | 003 | Annisa R. Varhana, Widya Utama, Chakimoelmal Jasjkur, Muhammad Hafiizh Imaaduddiin, Rista Fitri Indriani | Developing Flow Coefficient Model: Random Forest for Micro-Hydro Power Planning in Blado, Central Java | Geography and Urban Environment |
| 15.30 – 15.45 | 108 | Muhammad Iqbal, Bowo Susilo, Dyah Rahmawati Hizbaron | Examining The Impact of The Transportation, Manufacturing, and Energy Sectors on Air Quality in Jakarta Using Spatial Regression | Geography and Urban Environment |
| 15.45 – 16.00 | 064 | Nguyen Van Manh, Do Thi My Hoa, Nguyen Quoc Chien, Duong Thi Loi, Nguyen Thi Thu Ha, Nguyen Van Khanh, Gabriel Yedaya Immanuel Ryadi, Erlangga Candra Pramoedya, Chao-Hung Lin | The Retrieval of Chlorophyll-A Concentration in Eutrophic Polluted Lake In Hanoi City Using Landsat-8 Satellite Imagery | Geography and Urban Environment |
| 16.00 – 16.15 | 070 | D.A. Safitri, A.N. Alina, L.A. Bespalova | The Influence of Population Density, Land Cover, and | Geography and Urban Environment |

| Room C | | | | |
|---|---|---|---|---|
| | | | Spatial Patterns on the Geoecological Evaluation of the Surabaya Coast | |
| 16.15 – 16.30 | 077 | Budi Ismanto, Taufiiqulhakim Rifqi Hawaari, Adindha Surya Anugraha, Ghifari Juliendra, Hana Alifiyanti, Heza Pratama Erdiza, Pavita Raudina Sari, Darmawan Apriyadi | Discovering Hidden Pattern in COVID-19 Prevention through Exit-Entry Permit Letter (SIKM) System using Geospatial Analysis | Geography and Urban Environment |

| Room D | | | | |
|---|---|---|---|---|
| Time (UTC+7) | ID | Author | Title | Session |
| 12.45 – 13.00 | 014 | Muh Arif Suhattanto, Asih Retno Dewi, Senthot Sudirman | Land Parcel-Based Land Valuation System Development Strategy in Indonesia with The Concept of Multi-Purpose Cadastre | Cadastral Mapping |
| 13.00 – 13.15 | 026 | Nabil Amirul Haq, Hepi Hapsari Handayani, Dwi Budi Martono | Accuracy Suitability Analisys of Photogrammetric and GNSS RTK Based Land Parcels Mapping and Measurement on Area with Dense Vegetation and Varied Topography | Cadastral Mapping |
| 13.15 – 13.30 | 018 | Fajar Buyung Permadi, Nurrohmat Widjajanti | Orthophotos Spatial Quality from Integrated Physical Data Collection 2023 In Samarinda City | Cadastral Mapping |
| 13.30 – 13.45 | 025 | Rizka Dita Samsudin Al Chodiq, I Made Andi Arsana | Feasibility Study of Land Data Utilization in Land Policy Making at the State Border on Sebatik Island | Cadastral Mapping |
| 13.45 – 14.00 | 028 | Jatiar Firdaus Wibowo, Mitha Asyita Rahmawaty, | LSD Location Recommendations by Integrating Land | Cadastral Mapping |

| Room D | | | | |
|---|---|---|---|---|
| **Time (UTC+7)** | **ID** | **Author** | **Title** | **Session** |
| | | Aldea Noor Alina, Oktavianto Gustin, Syachril Warasambi Mispaki | Documentation and Spatial Planning in Cepu District | |
| 14.00 – 14.15 | 052 | Adinda Karina Raihanadya M, Arwan Putra Wijaya, Bandi Sasmito, Fauzan Murdapa1 | Accuracy Analysis of Village Boundaries on Complete Village Map Based on Permendagri No 45 of 2016 Using Real Time Kinematic (RTK) Method | Cadastral Mapping |
| 14.15 – 14.30 | 043 | Ausa Ramadhan Agustawjaya, Ira Mutiara Anjasmara, Sten Claessens | Hydrological Loading Variability Assessment over Java and Kalimantan from GNSS Data | Geodesy and Geodynamics |
| *Coffee Break* | | | | |
| 14.45 – 15.00 | 088 | Surya Alief Ramadhan, Danar Guruh Pratomo | Unveiling Gas Seeps: A Dive into Water Column Data Analysis | Marine Environment |
| 15.00 – 15.15 | 027 | Alia Saskia Puspitasari, Nanda Ridki Permana, Belista Gunawan, Ayu Alvita Primastika | Detection of Laterite Nickel Layer Distribution Based on Correlation of Multispectral Remote Sensing Data and Geomagnetic Satellite in North Konawe Region, Southeast Sulawesi | Geology and Geophysics |
| 15.15 – 15.30 | 049 | Fauzan Murdapa, Erlan Sumanjaya, Darmawan Ikhlas Fadli, Nanda Ridki Permana, Atika Sari, Aulia Purqan | Optimization of GGMplus Gravity Data to Identify Sumatran Faults Segments in Kaba Stratovolcano, Bengkulu, Revealed by FHD and SVD Techniques | Geology and Geophysics |
| 15.30 – 15.45 | 001 | Moh. Singgih Purwanto, Adi Susilo, Agus Naba, Ayi Syaeful Bahri, Chafidha Rachma, Cherie Bhekti Pribadi | Analysis and Mapping of the Distribution of Groundwater Recharge Areas Using the Scoring Method (Case Study: Singgahan District and Montong District, Tuban Regency) | Geology and Geophysics |

| | | **Room D** | | |
|---|---|---|---|---|
| **Time (UTC+7)** | **ID** | **Author** | **Title** | **Session** |
| 15.45 – 16.00 | 008 | Ardelia Khadar Kinasih, Yuniar Ramadhani, Vicka Winda Avrilla, Siti Navisa, Fathan Ayu Nuridhiani | Application of Density Lineament Mapping as An Indication of Cbm Potential in Tanjung Agung, Muara Enim, South Sumatra | Geology and Geophysics |
| 16.00 – 16.15 | 066 | M. Haris Miftakhul Fajar, Eko Budi Santoso, Faqih Ulumuddin, Helda Kusuma Rahayu, Mahendra Wirayudhatama, Marsha Khairia Alfany, Muhammad Erfand Dzulfiqar Rafi, Syabibah Zakiyya Zukhrufah | Evaluation of Widodaren Spring at Bromo-Tengger Volcano as a Geosite from the Perspective of Geopark Management | Geology and Geophysics |
| 16.15 – 16.30 | 090 | Safirotul Huda, M. Samsu Rosyid | Identification of Geological Structures in the Jabodetabek Area Based on Gravity Data Analysis | Geology and Geophysics |

| | | **Room E** | | |
|---|---|---|---|---|
| **Time (UTC+7)** | **ID** | **Author** | **Title** | **Session** |
| 12.45 – 13.00 | 004 | Megivareza Putri Hanansyah, Eko Yuli Handoko, Muhammad Aldila Syariz, Mukhammad Muryono | Spatio-temporal Variation of Chlorophyll-a around the Flores Sea, Java, and Makassar Strait and its Relationship with Temperature and Salinity | Marine Environment |
| 13.00 – 13.15 | 056 | Dyah Ayu Retno Mukti, Bangun Muljo Sukojo, Inggit Lolita Sari | Analysis of Shoreline Dynamics Using Remote Sensing Data on The Sidoarjo - Pasuruan Coastal Areas | Marine Environment |
| 13.15 – 13.30 | 057 | Ayu Isnania Zahra, Danar Guruh Pratomo | Three-Dimensional Hydrodynamic Modeling | Marine Environment |

| Time (UTC+7) | ID | Author | Title | Session |
|---|---|---|---|---|
| | | | to Estimate Sediment Rate in Lamong Bay | |
| 13.30 – 13.45 | 031 | Nadhira Srikandi, Hepi Hapsari Handayani, Mahendra Andiek Maulana | 3D City Modeling for Flood Inundation Analysis at Mayjen Sungkono Street, Surabaya | Geography and Urban Environment |
| 13.45 – 14.00 | 045 | Luthfia Azizah, Bangun Muljo Sukojo, Filsa Bioresita | Flood Innundation Distribution in Lamongan Regency Using Sentinel-1 SAR Data and Automatic Water-S1 Method | Geography and Urban Environment |
| 14.00 – 14.15 | 048 | Izzah Aryana K, Hepi Hapsari H, I Gusti Ngurah A, Zenda Mergita F | Three-Dimensional City Modeling for Microweather Simulation of Urban Areas | Geography and Urban Environment |
| 14.15 – 14.30 | 058 | Devika Rahma Damayanti Yusuf, Bangun Muljo Sukojo, Inggit Lolita Sari | Developing WebGIS Using Google Earth Engine for Carbon Monoxide Spatial Monitoring in Surabaya Using Sentinel-5P Time Series | Geography and Urban Environment |
| *Coffee Break* | | | | |
| 14.45 – 15.00 | 030 | Sima Neyrizi, Lalu Muhamad Jaelani, Noorlaila Hayati, Ramin Saadi | NO2 Mapping of Perth Bushfire Using Sentinel-5P Tropomi | Spatial Data Infrastructure |
| 15.00 – 15.15 | 083 | Dwi Sri Lestari, Mokhamad Nur Cahyadi, Candida Aulia De Silva Nusantara, Ihsan Naufal Muafiry, Buldan Muslim, Nurrohmat Widjajanti, Deni Kusumawardani | Analysis of Ionospheric Disturbances Due to Cyclones in Geraldton City Of Australia | Geodesy and Geodynamics |
| 15.15 – 15.30 | 054 | Sasfina Aditiya, Bangun Muljo Sukojo, Inggit Lolita Sari | Analysis of the Spatial Carbon Monoxide Increases Correlate To Industry In Bekasi From 2019 To 2022 | Geography and Urban Environment |

| Room E | | | | |
|---|---|---|---|---|
| **Time (UTC+7)** | **ID** | **Author** | **Title** | **Session** |
| 15.30 – 15.45 | 082 | Lachezar Filchev, Maria Dimitrova, Plamen Trenchev, Milen Chanev, Georgi Jelev | From Space to Health: The Impact of SRTI-BAS Research on the Smart4COV19 Telemedicine project | Geography and Urban Environment |
| 15.45 – 16.00 | 105 | Agus Wachid, Perdana Rian Juniarta, Anita Fatmawaty Effendi, Daniel Gunawan, Tossan Aditya Azhar, Sidik Permana Ramdan, Asep Karsidi | Heritage Building Information Modelling: Lidar and Photogrammetry for Digital Twin of Keraton Sumedang Larang | Geography and Urban Environment |
| 16.00 – 16.15 | 009 | Galih Yudha Wahyu Saputra, Ali Amirrudin Ahmad, Yosevel Lyhardo Sidabutar, Agnes Shelvira Herwieany | Integration of WebODM Platform as Photogrammetry Cloud Processing and GeoNode as Corporate Spatial Data Infrastructure to support the acceleration of geospatial data communication flow in PT. Waskita Karya Tbk. | Spatial Data Infrastructure |
| 16.15 – 16.30 | 033 | Caesaryo Arif Wibowo, I Dewa Made Frendika Septanaya | Evaluation of Fire Station Provision in Serving High-Rise Buildings Based on Response Time Standards and Shortest Route in Surabaya City | Spatial Data Infrastructure |
| 16.30 – 16.45 | 060 | Intan Muning Harjanti, Pangi, Lilin Budiati, Bivansyah Wiranata | Distribution of Active Urban Park Visits Based on Range of Services in Semarang | Spatial Data Infrastructure |

# SCHEDULE FOR POSTER PRESENTATIONS

| First Round | | | |
|---|---|---|---|
| **07.00 – 11.30 (UTC+7)** | | | |
| **ID** | **Author** | **Title** | **Session** |
| 032 | Farida Nuraini Fathimah, Yanto Budisusanto, | Study of Mangrove Area Utilization Using the Consept Of RRR (Right, Restriction, Responsibility) (Case Study: Mangrove Ecotourism Gunung Anyar and Medokan Sawah) | Cadastral Mapping |
| 076 | Muhammad Ardiansyah, Nafisatus Sania Irbah | Volume Calculation Analysis Using T-test Based on Photogrammetric and Terrestrial Data (Case Study: Meninting Dam) | Mining and Energy |
| 091 | Hilda Salshabila, Yanto Budisusanto | Study Of Boundaries Determination Using Cartometric and Participatory Methods (Case Study: Pehserut Village, Sukomoro Sub-District, Nganjuk Regency, East Java) | Cadastral Mapping |
| 096 | Husnul Hidayat | Assessment of Geometric Accuracy of Indoor Mapping using Low-cost Spherical Panoramic Camera | Cadastral Mapping |
| 041 | Rizka Dita Samsudin Al Chodiq, I Made Andi Arsana | Study on the Quality of Land Data Utulised in Land Policy Making Around the International Borders in Sebatik Island | Cadastral Mapping |
| 015 | Wisdom Hidayat Agung Nugroho, Nurwatik Nurwatik | Groundwater Potential Mapping Using Random Forest Algorithm (Case Study: Kediri Regency, Indonesia) | Geography and Urban Environment |
| 035 | M Bagus Kirmandi, M Aldila Syariz, Dewinta Heriza, Manh Van Nguyen | Spatio-Temporal Analysis of Total Suspended Solids Concentration in The Porong Estuary Area In 2023 Using Sentinel-2 Satellite Imagery | Marine Environment |
| 067 | Farida Nur Febriani, Candida Aulia De Silva Nusantara | Sedimentation Rate Analysis in Royoq Harbor Using Hydrodynamic Modeling | Marine Environment |
| 068 | Shafira Amanda, Irena Hana Hariyanto | Comprehend analysis of surface and subsurface sediment distribution using underwater acoustic instruments | Marine Environment |
| 069 | Syalsabila Eka Adriyanti, Irena Hana Hariyanto | Advanced Detection of Underwater Gas Seep Sites Through Multibeam Echosounder Water Column Data and Numerical Analysis | Marine Environment |
| 080 | Husnul Hidayat, Reyhan Dhihan Irawan, Firmansyah Maulana Azhali | Building Footprint Extraction from Fixed-Wing UAV Imagery using Mask R-CNN and Object-based Image Analysis Methods (Case Study: Banturejo Village, Malang Regency) | Geography and Urban Environment |

| | | **First Round** | | |
|---|---|---|---|---|
| 084 | Chelsea Alfarelia Putri Taslyanto, Udiana Wahyu Deviantari, Cherie Bhekti Pribadi | Spatial-Based Flood Susceptibility Mapping Using Analytical Hierarchy Process Techniques (Case Study: Gresik Regency) | Geography and Urban Environment |
| 051 | P. Pangi, Izzatur Lan Bagja, Lilin Budiati, Dian Prasetyaning Sukmawati | The evaluation of Spatial Planning for Flood Disasters using Sentinel-1 Satellite Imagery (Case Study: Central Java Province) | Geography and Urban Environment |
| 013 | Al Hilal Hilmi, Siti Nurlaela | BRT Spatial Integration and Its Impact on Surabaya City Residents' Mode Shift | Geography and Urban Environment |
| 019 | Alfrida Ista Anindya, Siti Nurlaela, Cahyono Susetyo | Analyzing the Influence of Built Environment on Modal Choice Probability: Potential Insights for Bus Rapid Transit (BRT) Deployment in Surabaya | Geography and Urban Environment |
| 109 | Mohammad Qasim Mohammadi, Moh. Arif Rohman | Barriers to Social Sustainability in Afghan Residential Building Construction | Geography and Urban Environment |
| 053 | Irwan Meilano, Riantini Virtriana, Ratri Widyastuti, Zidane Lutfi Salim, Hanna Racita Lunardia, Fatharani Sekar Arum, Karina Auliya Maharani, Nazhel Diva Lendra | Assessing Multi-Hazard Risk through Spatial Analysis: A Geographic Information Systems Approach for Susceptibility Mapping in Java Island, Indonesia | Geography and Urban Environment |
| 022 | Arry Prasetya Nugraha, Teguh Hariyanto | Evaluation of Vegetation Health in the PT X Reclamation Area Using the NDVI Method Based on Unmanned Aerial Vehicle (UAV) Multispectral Orthophoto Data. | Agriculture and Forestry |
| 023 | Qoriatu Zahro, Daichi Ito, Joko Widodo, Yuta Izumi | SBAS InSAR Based Displacement Monitoring for Peatland Restoration Evaluation in Indonesia | Agriculture and Forestry |

| | **Second Round** | | |
|---|---|---|---|
| | **12.00 – 16.30 (UTC+7)** | | |
| **ID** | **Author** | **Title** | **Session** |
| 071 | Ikhsan Nuradi, Khomsin | Comparison Of Multitemporal Multifrequency Multibeam Echosounder Norbit iWBMS: Depth and Sedimentation Rate Analysis of Selorejo Reservoir 2022-2023 | Marine Environment |

| | | **Second Round** | |
|---|---|---|---|
| 072 | Muhammad Rafly Rahardian, Candida Aulia De Silva Nusantara | Determining The Location of Coastal Protection Buildings in Dealing with Sedimentation Problems Using Hydrodynamic Modeling | Marine Environment |
| 073 | Rifky Maulana Akbar, Muhammad Aldila Syariz | Sub-bottom Profiler Data Processing to Identifying the Type and Seabed Sediment Layer of Surabaya West Shipping Channel Waters | Marine Environment |
| 078 | Khomsin, Muhammad Iqbal Humaidi | 3D Modeling and Identification of Post-Dredging Sediment Layer Types Using Hydroacoustic Instruments at PT. Gresik Jasatama | Marine Environment |
| 097 | Safanata Azza Laksono, Putra Maulida, Muhammad Taufik | Analysis of Deformation Along the Flores Back-Arc Thrust Using CORS GPS Observation Data | Marine Environment |
| 081 | Ilham Yuki Tamim Bayoumi, Putra Maulida, Nia Haerani | Analysis of Deformation Semeru Volcano Using GPS Data 2015-2023 | Geodesy and Geodynamics |
| 005 | Iwan Qodar Himawan, Nurrohmat Widjajanti, Listiyo Fitri, Iqbal Hanun Azizi | Pipeline Modeling Using UAV LiDAR Technology | Geodesy and Geodynamics |
| 075 | Wanda Nurlaily Charea, Nafisatus Sania Irbah | Analysis of Surface to Surface Method for Volume Calculation | Mining and Energy |
| 100 | Juan Pandu Gya Nur Rochman, Agnis Triahadini, Muhammad Zidan Naufal, Faiz Maulana Achsan, Calvin Ashari Dwiska, Muhamad Erick Asyari, Maulida Krisna Dewi | A Study of Lineament Density and Correlation with Geothermal Manifestations and Residual Gravity Anomalies in Mount Pandan, East Java | Geology and Geophysics |
| 102 | Eki Komara, Muhammad Rafi, Muhammad Faiz Nugraha, Wien Lestari | Lithology Prediction Using K-Nearest Neighbors (KNN) Algorithm Study Case in Upper Cibulakan Formation | Geology and Geophysics |
| 103 | Muhammad Faiz Nugraha, Beryl Zaidan Mahastra, Faried Abdillah Santoso, Singgih Purwanto | Investigation of Earthquake Disaster Risk Using ArcGis Satellite Imagery Case Study of North Tapanuli Regency | Geology and Geophysics |
| 104 | Siti Asmayanti Tuasamu, Wien Lestari | Earthquake Hypocenter Relocation Using the Double-Difference Method | Geology and Geophysics |
| 099 | Helmy Mukti Wijaya, Hepi Hapsari Handayani | The Role of Close-Range Photogrammetry in Modernizing Automated Storage and Retrieval Systems | Spatial Data Infrastructure |
| 093 | Juan Pandu Gya Nur Rochman, Wahyu Nurdiansyah | Comparison of Airbonre Magnetic and Ground Magnetic for Identification of Sub-surface Condition Study Case: | Geology and Geophysics |

| | Second Round | | |
|---|---|---|---|
| | Buwonokeling, M. Haris Miftahul Fajar, Anik Hilyah, Dwa Desa Warnana, Wien Lestari, Eki Komara, Nita Ariyanti, Moh. Singih Purwanto, Firmansyah Maulana Azhali | Sand Caldera of Bromo-Tengger Volcanic Complex | |
| 095 | M. Haris Miftakhul Fajar, Mahendra Wirayudhatama, Muhammad Erfand Dzulfiqar Rafi, Helda Kusuma Rahayu, Faqih Ulumuddin, Syabibah Zakiyya Zukhrufah, Marsha Khairia Alfany, Farah Aziz, Rozaan Haiban Rizqulloh | Hydrochemical Analysis of Kedungjambe Hot Spring, Tuban | Geology and Geophysics |
| 016 | Surya Dharma Ali Maheswara, Nurwatik Nurwatik | Using Sentinel-2 Imagery and Machine Learning Algorithms to Estimate Deforestation (Case Study: A District in Malang Regency) | Agriculture and Forestry |
| 079 | Sulthan Hafizh Ristawan, Agung Budi Cahyono | Palm Oil Tree Counting Analysis Using Palm Oil Template Matching Algorithm and Deep Learning Faster R-CNN (Case Study: Kab. Tanjung Jabung Timur, Jambi Province) | Agriculture and Forestry |
| 098 | Eko Yuli Handoko, Achmad Fahriza, Mukhammad Muryono | Integrating Remote Sensing and GIS for Precision Agriculture: Leveraging Google Earth Engine for Enhanced Agricultural Management | Agriculture and Forestry |

# TABLE OF ABSTRACTS

xl

# ANALYSIS AND MAPPING OF THE DISTRIBUTION OF GROUNDWATER RECHARGE AREAS USING THE SCORING METHOD (CASE STUDY: SINGGAHAN DISTRICT AND MONTONG DISTRICT, TUBAN REGENCY)

Moh. Singgih Purwanto1,2*; Adi Susilo2; Agus Naba2; Ayi Syaeful Bahri1; Chafidha Rachma3; Cherie Bhekti Pribadi3

1. Department of Geophysics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia; 2. Department of Physics, Faculty of Mathematics and Natural Sciences, Universitas Brawijaya, Indonesia; 3. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia.
Email: singgih@geofisika.its.ac.id

## Abstract

*The district of Tuban has the potential to experience a serious water supply crisis. Geographically, Tuban is located in the northern part of the East Java basin, with the Java Sea to the north and the flow of the Bengawan Solo River, Sarang River, Lohgung River, and several other small rivers. There are also many limestone hills or karst in Tuban, especially in the Singgahan and Montong areas. The abundant river flow and the presence of limestone hills or karst suggest that the area may be a groundwater recharge area in the Singgahan and Montong sub-districts. A recharge area is where groundwater flows vertically downwards, influenced by gravity or the slope of the aquifer. Therefore, it is important to analyze and identify the recharge areas in Tuban, especially in the Singgahan and Montong sub-districts, to conserve and sustainably manage the groundwater potential. The parameters used in the identification of recharge areas include rainfall, soil type, land cover, and slope gradient. The scoring method was employed in this study. In the scoring method, each parameter is assigned a certain weight, where the slope gradient has a weight of 20%, soil type 35%, rainfall 15%, and land cover 30%. Based on the data processing, the land cover analysis revealed that plantations covered an area of 6840.63 hectares in August and 6761.88 hectares in October. The slope gradient in the Singgahan sub-district was dominated by a flat slope with an area of 8417.68 hectares. Both the Singgahan and Montong sub-districts have relatively low rainfall levels, accounting for 57% of the area with an extent of 12670.89 hectares. The most prevalent soil type is cambisol, covering 33% of the area, equivalent to 7463.46 hectares. Using the scoring method, the Singgahan and Montong sub-districts exhibit high potential recharge areas in August, covering an area of 1314.70 hectares, and moderate potential recharge areas covering 18498.78 hectares. In October, the high potential recharge area covers an area of 3499.20 hectares, and the moderate potential recharge area covers 16942.45 hectares.*

# Paper ID: 002

## THE INFLUENCE OF PHYSICAL GEOGRAPHY PARAMETERS ON HYDROMETEOROLOGICAL DISASTERS (CASE STUDY: BANJARMASIN CITY)

Henyningtyas Suhel1; Arif Eko Wibawanto1*

1. Bachelor of Applied Geomatics and Survey Engineering Technology Study Program, Department of Civil Engineering and Earth Sciences, Banjarmasin State Polytechnic, Indonesia
Email: arifeko@poliban.ac.id

## Abstract

*According to data from the National Disaster Management Agency (BNPB) 2022, from January to April 26 there were 1.381 incidents and the most were flood disasters, namely 536 incidents. In 2021, the biggest flood occurred at the beginning of the year in South Kalimantan, which is estimated to reach losses of around IDR 1,2 trillion. Apart from that, the BNPB of South Kalimantan Province stated that the city of Banjarmasin was still inundated with floods with a water level of ± 50 cm – 1,5 m with the number of victims affected reaching 108.524 people and 35.138 houses affected. Fordealing with disaster risks hydrometeorology (floods) in Banjarmasin City, this research analyzes the most influential parameters forming flood disasters using spatial statistical analysis Geographically Weighted Regression (GWR). The parameters used include rainfall, topography, land use, soil type, and population density. After carrying out the GWR spatial statistical test, recommendations are then madewhich can later be followed up in the form of a disaster management policy study hydrometeorology and its strategic issues.*

# Paper ID: 003

## DEVELOPING FLOW COEFFICIENT MODEL: RANDOM FOREST FOR MICRO-HYDRO POWER PLANNING IN BLADO, CENTRAL JAVA

Annisa R. Varhana1;Widya Utama1*;Chakimoelmal Jasjkur2; Muhammad Hafiizh Imaaduddiin3;Rista Fitri Indriani4

1.Department of Geophysics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia; 2.Department of Mechanical Engineering, Faculty of Mechanical and Aerospace Engineering, Institut Teknologi Bandung, Indonesia; 3.Department of Civil Infrastructure Engineering, Faculty of Vocational, Institut Teknologi Sepuluh Nopember, Indonesia;

4.Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia.
Email: widya@geofisika.its.ac.id

## Abstract

*This research focuses on developing a flow coefficient model for micro-hydro power planning in Blado, Batang Regency, Central Java. Utilizing DEMNAS data and Landsat 8 satellite imagery, the model incorporates parameters such as slope, land use, and NDVI, trained on flow coefficient data influenced by rock infiltration with a 70:30 ratio. Employing the Random Forest method, the model's validity was assessed using a confusion matrix, achieving a kappa value of 0.9 and an overall accuracy of 0.92. These results indicate excellent agreement between model predictions and actual classifications, highlighting its practical application in critical accuracy scenarios. The model's robustness across various conditions emphasizes its potential for hydrological engineering, enhancing micro-hydro power development, and contributing to Sustainable Development Goals, particularly SDG 6 (Clean Water and Sanitation) and SDG 7 (Affordable and Clean Energy). This study serves as a foundation for improving water flow management, particularly in surface water control and land use optimization for hydropower development in the region.*

**Paper ID: 004**

## SPATIO-TEMPORAL VARIATION OF CHLOROPHYLL-A AROUND THE FLORES SEA, JAVA, AND MAKASSAR STRAIT AND ITS RELATIONSHIP WITH TEMPERATURE AND SALINITY

Megivareza Putri Hanansyah1; Eko Yuli Handoko1*; Muhammad Aldila Syariz1; Mukhammad Muryono2

1. Department of Geomatics Engineering, Faculty of Civil,Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia; 2. Department of Biology, Faculty of Science and Data Analitics, Institut Teknologi Sepuluh Nopember, Indonesia
Email: ekoyh@its.ac.id

## Abstract

*The Flores Sea, Java, and Makassar Strait are areas where water masses meet and are one of the entry points for the Indonesian Through Flow. Freshwater mass from the Pacific Ocean enters Indonesian waters through the Makassar Strait. As a result, the characteristics of the water mass supply will mix with the stratification of Indonesian waters. Not only that, Indonesia's maritime region is influenced by the Asian-Australian Monsoon, which also causes seasonal changes in temperature and salinity. This phenomenon affects primary productivity in Indonesian waters as indicated by variations in chlorophyll-a concentrations in surface waters. Therefore, it is important to study the dynamics of chlorophyll-a in time series to understand better the ecosystem and the phenomena that occur. This study aimed to analyze the spatio-temporal variation of chlorophyll-a in the waters around the Flores Sea, Java, and Makassar Strait, and its relationship with temperature and salinity. This study uses chlorophyll-a data collected from the Ocean and Land Color Instrument sensor carried by the Sentinel-3 satellite. The chlorophyll-a data used is Ocean Color 4 for MERIS data for case-1 water. The Mann-Kendall test was used in this study to analyze chlorophyll-a trends from 2016 to 2023 monthly. Pearson correlation was used to determine the relationship of chlorophyll-a with temperature and salinity parameters. This research is expected to increase knowledge of chlorophyll-a variability in the waters of the Flores Sea, Java, and Makassar Strait and its relation to marine ecosystem phenomena that occur.*

**Paper ID: 005**

## PIPELINE MODELING USING UAV LIDAR TECHNOLOGY

Iwan Qodar Himawan1; Nurrohmat Widjajanti1*; Listiyo Fitri2; Iqbal Hanun Azizi1

1. Department of Geodesy Engineering, Faculty of Engineering, Universitas Gadjah Mada, Indonesia; 2. PT Terra Data Persada
Email: nwidjajanti@ugm.ac.id

## Abstract

*Pipelines play an important role in operations in energy supply companies, whether geothermal, gas, or petroleum. Pipeline damage, such as corrosion, dents, and leaks caused by natural or human factors, must be detected. Problems with pipeline assets will indirectly impact high production prices. Pipeline asset mapping must be carried out precisely, quickly, and quietly, considering that the existence of pipelines often causes social unrest. This research analyzed the capabilities of UAV LiDAR for mapping pipelines and support in a three km-long pipeline area. The UAV LiDAR point cloud, with its rapid data acquisition, is used for pipeline and support location detection. In addition, the point cloud density is used to detect pipeline conditions such*

*as color, humidity, and vegetation cover. Next, the point cloud data is used for 3D pipeline modeling and support with accuracy in centimeter fractions.*

## Paper ID: 006

## PREDICTIVE MODELING OF SOIL NUTRIENT CONTENT USING SPECTRUM DATA AND MACHINE LEARNING TECHNIQUES IN INDONESIAN PROVINCES

Taufik Iqbal Ramdhani1*

1. Research Center for Artificial Intelligence and Cyber Security, Research Organization for Electronics and Informatics, National Research and Innovation Agency, Indonesia
Email: tauf022@brin.go.id

## Abstract

*This study investigates the application of machine learning techniques to analyze soil nutrient content using spectrum data ranging from 750 to 2499 nm. Soil samples were collected from diverse locations across Indonesian provinces, including East Java, West Java, Central Java, and Jogjakarta, to capture a comprehensive spectrum of soil variability. Spectral data analysis identified unique patterns in soil nutrients within this wavelength range, allowing the identification and quantification of essential elements like nitrogen (N), phosphorus (P), and potassium (K). Machine learning models were constructed using linear regression and deep neural networks (DNN), both utilizing spectral data to predict soil nutrient levels. The accuracy of these models was measured using the mean absolute error (MAE). For the linear regression model, the MAE was 87.4 for nitrogen, 393.31 for phosphorus, and 234.67 for potassium. The DNN model demonstrated improved accuracy with MAE values of 0.053 for nitrogen, 180.84 for phosphorus, and 154.47 for potassium. These models were designed to rapidly identify soil types offering higher nutrient availability, providing a non-invasive and efficient assessment method that reduces the need for labor-intensive soil testing. In summary, this research illustrates that machine learning techniques, particularly deep neural networks, effectively uncover hidden patterns in soil spectral data, enabling rapid and accurate nutrient assessment. This promotes agricultural productivity and sustainability across diverse regions in Indonesia, offering a promising pathway for precision agriculture and sustainable soil management practices.*

## Paper ID: 007

## MAPPING THE DYNAMICS OF SETTLEMENT AREAS AROUND THE TOURISM AREAS BY USING GEOGRAPHIC INFORMATION SYSTEMS (CASE STUDY: PRAMBANAN AND KALASAN DISTRICT)

Arwan Putra Wijaya1*; Rizky Novrizal Ramadhani1; Daffa Syadayagra Arwanto1; Yasser Wahyuddin1

1. Department of Geodetic Engineering, Faculty of Engineering, Diponegoro University, Semarang, Indonesia
Email: arwanputrawijaya@lecturer.undip.ac.id

## Abstract

*The construction of National tourism strategic area (KSPN) Prambanan - Kalasan is planned to begin in 2016 through the Master Plan and Detail Plan of KSPN Prambanan - Kalasan and its surroundings for the 2016 fiscal year. The development of tourist areas can have an impact on increasing the land value around tourist areas, and also cause the development of residential areas. Therefore, this research was conducted to analyze changes in land values around the KSPN development and also analyze changes in residential areas and the suitability of residential areas for land values in Prambanan and Kalasan Districts. The results of the suitability of residential areas were then superimposed on the analysis with the RDTR of Prambanan and Kalasan Regencies. The results show that in 2017-2024 there was an increase in residential land area by 67 hectares in Prambanan District and 73 hectares in Kalasan Regency and the highest significant increase in land value was in zone 50, namely Jl. Raya Solo-Yogyakarta for IDR. 6,597,200 and the lowest increase in land value was in zone 49 amounting to IDR. 158,500 to the north of Tamanmartani Village, Kalasan District. The relatively small increase in residential area in the highest land value zone and a large increase in residential area in the lowest land value zone. The suitability of the dominant residential area is very suitable in the highest land value zone and the suitability of the dominant residential area is less suitable in the lowest land value zone.*

**Paper ID: 008**

## APPLICATION OF DENSITY LINEAMENT MAPPING AS AN INDICATION OF CBM POTENTIAL IN TANJUNG AGUNG, MUARA ENIM, SOUTH SUMATRA

Ardelia Khadar Kinasih1*; Yuniar Ramadhani1; Vicka Winda Avrilla1; Siti Navisa1; Fathan Ayu Nuridhiani1

1. Department of Geophysics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: ardelia.khadar26@gmail.com

## Abstract

*Coal Bed Methane (CBM) gas is formed and trapped within coal seams, offering significant economic potential as it can be converted into electricity or transported through pipelines for various purposes. Indonesia is estimated to have approximately*

*574 trillion cubic feet (TCF) of CBM gas reserves, capable of meeting domestic energy needs. South Sumatra is classified as a province with the largest coal reserves in Indonesia, indicating abundant potential for CBM gas resources. This research aims to identify potential CBM indicators based on structural lineament interpretation using DEMNAS data. Field research was conducted to gather necessary data, and the findings from the study indicate that the surveyed area has high potential for Coal Bed Methane (CBM) due to the high lineament density, ranging from 567.96/km² to 709.98/km², indicating high permeability that supports the well development of CBM gas. Optimal permeability can enhance the quantity of trapped Coal Bed Methane (CBM) gas, given the available space for the gas.*

## INTEGRATION OF WEBODM PLATFORM AS PHOTOGRAMMETRY CLOUD PROCESSING AND GEONODE AS CORPORATE SPATIAL DATA INFRASTRUCTURE TO SUPPORT THE ACCELERATION OF GEOSPATIAL DATA COMMUNICATION FLOW IN PT. WASKITA KARYA TBK.

Galih Yudha Wahyu Saputra1*; Ali Amirrudin Ahmad1; Yosevel Lyhardo Sidabutar1; Agnes Shelvira Herwieany1

1. PT Waskita Karya Tbk., Indonesia
Email: galih.yudha@waskita.co.id

**Abstract**

*This research explores the integration of two platforms, namely WebODM and GeoNode, with Geoserver as its connecting platform. This platform integration is a solution to support the acceleration of geospatial data communication flow in PT. Waskita Karya Tbk. The main objective of the research is to combine the advantages of Photogrammetry Cloud Processing owned by WebODM with the Spatial Data Infrastructure features owned by GeoNode, thus creating an efficient and integrated system for processing and storing geospatial data. The research methodology involves user needs analysis, system integration development, as well as testing and performance evaluation of the implemented system. The research results indicate that the integration of WebODM and GeoNode has successfully created an environment that allows users to easily perform cloud-based photogrammetry processes and efficiently store and share geospatial data. With this system, PT. Waskita Karya can improve its operational performance in terms of geospatial data processing and distribution, as well as accelerate communication flow between various involved units. The implication of this research is that platform integration like this can be an effective solution for companies managing geospatial data on a large scale.*

# STUDY ON PHENOLOGY OF CANNABIS PLANTATION USING REMOTE SENSING SATELLITE DATA IN SUMATERA, INDONESIA

Karunika Diwyacitta1*; Ika Siwi Supriyani1; Olivia Maftukhaturrizqoh1; Bayu Satya Adhitama1; Fauzan Al-Ayyubi1; Syarif Budhiman1; Dony Kushardono1; Dede Dirgahayu Domiri1; Dedi Irawadi2

1. Research Center for Geoinformatics, Research Organization for Electronics and Informatics, National Research and Innovation Agency, Indonesia; 2. Research Center for Satellite Technology, Research Organization for Aeronautics and Space, National Research and Innovation Agency, Indonesia
Email: karu001@brin.go.id

## Abstract

*Cannabis plantation is illicit crops which included as class 1 according to Narcotics Law No. 35 of 2009. One of the most crucial variables in covering cannabis plant growing is its location of hills and dense forests that are difficult to access. In this paper, we propose a comprehensive study on cannabis plantation utilizing two different spatial remote sensing satellite data in order to explore cannabis crops phenology. For initial research, based on field operation done by National Narcotics Board, we choose Aceh Besar and Aceh Utara which has been known as the place having the greatest quantity of cannabis plantation in Sumatera Island, Indonesia. We observe the location of cannabis plantation from space and extract some specifics variable which can be used for further analysis and research. It can be concluded that maximum EVI of cannabis plantation reached up to 0.546 and it generally takes 4 until 6 months until the crop is ready to harvest. From 2 years monitoring, we found that the area showed three planting cycles with minimum EVI is 0.205. The growth of cannabis is expectedly faster in rainy season area around October until December while January could be the right time for authorities to investigate the certain area and to abolish the cannabis distribution. This specific characterization of cannabis plantation can be used as a statistical training dataset, which can then be applied to machine learning methods to detect further cannabis fields.*

## WASTE VOLUME ESTIMATION BY SURFACE CHANGES OF SARIMUKTI DUMPSITE 2010 – 2023

Muhammad Dzun Nurwinas Saepudin1*; Teguh Purnama Sidiq1; Irwan Gumilar1; Trizky Dirgaputera2; Haekal Ibrahim Hakiem1

1. Department of Geodesy and Geomatics Engineering, Faculty of Earth Science and Technology, Institut Teknologi Bandung, Indonesia; 2. Bumi Kala Charta, Bandung, Indonesia
Email: dzunok@gmail.com

## Abstract

*Sarimukti dumpsite was established in 2006 and is located in Sarimukti Village, which is 45 km away from Bandung City. This dumpsite handles trash dumping from nearby areas such as Bandung City, Cimahi City, and West Bandung Regency. In 2010, this dumpsite underwent a rehabilitation project to optimize its trash handling capability. Several months ago, the Sarimukti dumpsite experienced a fire crisis which was successfully handled by the local government. After the crisis, speculations emerged regarding the rehabilitation of the dumpsite once again. In response to that idea, this research will explore several pieces of information that are required for the dumpsite to undergo another rehabilitation. Two of them are the latest topographic conditions and the latest waste volume. The latest topographic surface is determined by aerial photogrammetry, utilizing a multi-rotor UAV. The output will be used to estimate the waste volume by differentiating the latest topographic surface data with the 2010 topographic surface data, which was acquired from the previous rehabilitation project. Unfortunately, the 2010 data comes with an unknown coordinate system, so these two surfaces cannot be perfectly overlayed. Thus, the 2D coordinate transformation has to be performed. The transformation parameters, derived from multiple common points, exhibit an accuracy of 30 cm. Following this transformation, volumetric calculations reveal that several areas have a total volume increase of 2.3 million m3. Contrary to that, the remaining areas have a total volume decrease of 23,742 m3.*

**Paper ID: 012**

## ESTIMATION OF HIGH-RESOLUTION GNSS-BASED IONOSPHERIC VTEC OVER NIGERIA USING ORTHOGONAL TRANSFORMATION

Solomon O. Faruna1,2*; Dudy D. Wijaya1; Bambang Setyadji1; Irwan Melano1; Aditya K. Utama1; Brian Bramanto1; Yusuf D. Opaluwa2; Daniel Okoh3

1. Department of Geodesy and Geomatics Engineering, Faculty of Earth Science and Technology, Institut Teknologi Bandung, Indonesia; 2. Department of Surveying and Geoinformatics, Federal University of Technology (FUT), Minna, Nigeria; 3. United Nations African Regional Centre for Space Science and Technology, Ile-Ife, Nigeria
Email: s.faruna@futminna.edu.ng

## Abstract

*The Vertical Total Electron Content (VTEC) is a critical parameter of the ionosphere that affects the propagation of radio signals. Accurate estimation of TEC is essential*

*for many applications such as satellite communication, navigation, and space weather forecasting. However, the spatial and temporal resolution of Global Ionospheric Maps (GIM) provided by the International GNSS Service (IGS), and the International Reference Ionosphere (IRI) are limited in regions with a sparse network of receivers. Additionally, the receiver Differential Code Bias (DCB) for receivers not belonging to the IGS network is not available from the GIM. To address these limitations, we have developed a multi-GNSS-based model for estimating high-resolution VTEC, satellite, and receiver DCB over Nigeria. The VTEC model is based on spherical harmonic expansions and orthogonal transformation, enabling accurate, independent, and efficient estimation. We utilized a total of 9 GNSS receivers in this study, achieving a temporal resolution of 10 minutes. We compared our results with estimates from the IGS, CODE, and IRI-2020 models to validate our model. Our model demonstrated strong agreement with the other models. Notably, the new model aligned more closely with CODE and IGS than the IRI model. The model's performance for both quiet and disturbed days of geomagnetic activity showed a strong positive correlation with the other models. In conclusion, the new model offers a significant improvement in VTEC temporal resolution, making it a promising tool for precise studies of local ionospheric phenomena, precise positioning, satellite communication, and space weather forecasting.*

**Paper ID: 013**

## BRT SPATIAL INTEGRATION AND ITS IMPACT ON SURABAYA CITY RESIDENTS' MODE SHIFT

Al Hilal Hilmi1*; Siti Nurlaela1

1. Department of Urban and Regional Planning, Faculty of Civil, Planning, and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: alhilalhilmi@gmail.com

### Abstract

*One of the main contributors to emissions is the transportation sector. Urban transportation emission production is mainly influenced by mode choice. To reduce emissions, sustainable public transportation must be developed, as well as policies that encourage changes in travel behaviour and mode choice. BRT (Bus Rapid Transit) is a public transportation that has proven effective in reducing emissions, congestion, and travel costs in many cities across the world. Literature has found that the spatial integration of BRT services influences people's collective mode choices. Amidst the progress of Surabaya BRT development plan, it is critical to encourage shifts in travel behaviour and mode choices that are influenced by the spatial integration of BRT services. This research examines the impact of the level of integration of the Surabaya City BRT plan on the Surabaya residents' mode choice. Spatial assessment-based*

*integration calculations use graph theory analysis to incorporate routes, demographic, and spatial calculation/simulation data. This research is based on the analysis and simulation of Surabaya BRT feasibility study, with the findings of home-based survey interviews. The value of this integration level was further explored in terms of its impact on Surabaya residents' mode choice and travel behaviour towards sustainable transit.*

## Paper ID: 014

# LAND PARCEL-BASED LAND VALUATION SYSTEM DEVELOPMENT STRATEGY IN INDONESIA WITH THE CONCEPT OF MULTI-PURPOSE CADASTRE

Muh Arif Suhattanto1*; Asih Retno Dewi1; Senthot Sudirman1

1. Sekolah Tinggi Pertanahan Nasional, Indonesia
Email: suhatt@stpn.ac.id

## Abstract

*Based on Article 3 of Presidential Regulation Number 20 of 2015, one of the functions of the National Land Agency is the formulation and implementation of land valuation policies at the central, provincial, and district / city levels throughout the territory of the Republic of Indonesia. At present, the Land Value Zone (ZNT) Map is used to provide information about land values. The main problem with the use of Land Value Zones is that there is no difference in the value of land parcels in one zone even though they have different locations and access. This causes the value of land obtained from Land Value Zones does not reflect the real conditions in the field so that it is often not used by related institutions, especially in tax collection. This problem can be overcome if the land value zone is made based on land parcel data so that a more accurate value per plot of land is obtained and reflects the principle of justice in the community. This study aims to formulate an effective Land Valuation policy approach in accordance with the objectives of land valuation in Indonesia. To find out the situation that is being carried out in the land valuation system in Indonesia, a SWOT analysis is used. The strategies generated through SWOT analysis can then be grouped into 3 categories, namely: policies related to aspects of spatial data and attributes; policies related to legal aspects; and institutional policies.*

## Paper ID: 015

# GROUNDWATER POTENTIAL MAPPING USING RANDOM FOREST AND EXTREME GRADIENT BOOSTING ALGORITHMS

Wisdom Hidayat Agung Nugroho1; Nurwatik Nurwatik1*; Liadira Kusuma Widya2

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia

2 Department of Science Education, Kangwon National University, 1
Gangwondaehak-gil, Chuncheon-si, Gangwon-do, 24341, Republic of Korea
Email: nurwatik@its.ac.id

## Abstract

*The availability of groundwater is a crucial solution to ensure the sustainability of water resources, including providing clean water. Therefore, efforts to map groundwater potential are required to enhance the efficiency of groundwater utilization and support achieving one of the Sustainable Development Goals (SDGs), particularly clean water and sanitation. This research aims to identify the distribution of the groundwater potential in Kediri Regency using the random forest (RF) and extreme gradient boosting (XGB) algorithms. This research utilizes 13 parameters, including elevation, slope, aspect, drainage density, river density, distance from rivers, lineament density, Topographic Wetness Index (TWI), Normalized Difference Vegetation Index (NDVI), land cover, soil type, lithology, and band 3 from Sentinel-2A satellite imagery. The coordinates of groundwater wells are used as training and testing data with ratios of 80:20, 70:30, and 60:40. Through the evaluation of each model's performance using a confusion matrix, it is revealed that the best model is the RF 70:30 ratio model with Accuracy (Acc), Specificity (Spe), Sensitivity (Sen), Positive Predictive Value (PPV) values of 0.978, Cohen's Kappa (CK) and Matthew's Correlation Coefficient (MCC) of 0.956, and Area Under Curve (AUC) of 0.994. In this model, the elevation has the highest influence on the model, with a significance level equal to 100.*

**Paper ID: 016**

## USING SENTINEL-2 IMAGERY AND MACHINE LEARNING ALGORITHMS TO ESTIMATE DEFORESTATION (CASE STUDY: A DISTRICT IN MALANG REGENCY)

Surya Dharma Ali Maheswara1; Nurwatik Nurwatik1*

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: nurwatik@its.ac.id

## Abstract

*In 2019, Sumbermanjing Wetan District, Malang Regency, experienced a reduction in protected forest land of approximately 200 Ha. Therefore, this research aims to analyze deforestation related to the speed of forest land reduction and the prediction of forest land reduction from 2023 to 2028. This research uses Sentinel-2 satellite imagery classification from 2019 to 2023 to identify the forest reduction. To perform the classification, this research implements Support Vector Machine (SVM) and Random Forest machine learning algorithm with a dataset of point coordinates that belong to*

*the forest and non-forest categories. The dataset is split into training and testing data with a ratio of 70:30. Furthermore, this research plots the forest area based on the year to obtain the forest land reduction speed and the forest land area prediction from 2023 to 2028 using polynomial regression. The results show that the best algorithm to classify the forest area of Sumbermanjing Wetan District is the Random Forest algorithm with 0.954 average accuracy. The forest area from classification using the Random Forest algorithm for the period of 2019 to 2023 respectively are 14770.74 Ha, 14619.26 Ha, 14185.6 Ha, 15007.68 Ha, and 15122.4 Ha. The prediction analysis shows that forestland in Sumbermanjing Wetan District has no deforestation occurs with 101.626 Ha/year average rate of addition of forest land and the estimated forestland in Sumbermanjing Wetan District for the period of 2023 to 2028 respectively are 15042.626 Ha, 15144.251 Ha, 15245.877 Ha, 15347.503 Ha, and 15449.129 Ha.*

**Paper ID: 017**

# PHENOLOGICAL AND SPECTRAL UNMIXING-BASED IDENTIFICATION OF CORN CULTIVARS IN TUBAN REGENCY, INDONESIA: AN ANALYSIS OF SENTINEL-2 AND MODIS DATA

Olivia Stefani1; Lalu Muhamad Jaelani1*; Lena Sumargana2,3

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo-Engineering, Institut Teknologi Sepuluh Nopember, Keputih, Sukolilo, Surabaya 60111, East Java, Indonesia; 2. Department of Civil Engineering, Faculty of Civil, Planning and Geo-Engineering, Institut Teknologi Sepuluh Nopember, Keputih, Sukolilo, Surabaya 60111, East Java, Indonesia; 3. National Research and Innovation Agency. Jl. M.H. Thamrin No. 8, Central Jakarta 10340, Jakarta, Indonesia
Email: lmjaelani@its.ac.id

## Abstract

*In Indonesia, monitoring and mapping corn growth are crucial to promote the implementation of the Government Corn Reserve (CJP) as an alternative for improving national corn management. East Java is the highest corn producer in Indonesia, with Tuban Regency leading the production. According to data from the Central Bureau of Statistics (BPS) in 2024, corn production reached 788,477 tons by 2023. The advancement of technology in the food sector has led to the production of various corn cultivars, such as NK-6172, NK-212, and NK-7328, each with different traits and yields. Therefore, information on corn cultivars is important for predicting the harvest area of corn. Until now, the monitoring of the area and growth of corn in Indonesia has been conventional, requiring considerable time and high costs. Remote sensing technology can be utilized to monitor corn growth and distribution. Linear Spectral Unmixing can identify the distribution of corn areas for each cultivar, where phenology data are used for the date selection of Sentinel-2 satellite images. The results obtained*

*from this study include the corn field area, corn growth phenology, endmember fraction of corn cultivars, and the area of dominant corn cultivars in the research area. The percentages of the dominant cultivars obtained were as follows: NK-6172 at 73.17%, NK-7328 at 18.60%, NK-212 at 2.75%, and other cultivars at 5.49%.*

**Paper ID: 018**

## ORTOPHOTOS SPATIAL QUALITY FROM INTEGRATED PHYSICAL DATA COLLECTION 2023 IN SAMARIDA CITY

Fajar Buyung Permadi1; Nurrohmat Widjajanti2*

1. Department of Geodetic Engineering, Faculty of Engineering, Universitas Gadjah Mada & Samarinda City Land Office, Indonesia; 2. Department of Geodetic Engineering, Faculty of Engineering, Universitas Gadjah Mada
Email: nwidjajanti@ugm.ac.id

### Abstract

*Integrated physical data collection as an up-to-date and comprehensive mapping instrument and a base map at the Ministry of Agrarian Affairs and Spatial Planning has been implemented on a massive scale throughout Indonesia. Field observations indicate that the spatial quality of the resulting orthophotos has yet to reach its maximum potential. In Samarinda City, this activity's subdistrict was indicated to have a geometric accuracy of above 0.5 m. This condition does not meet the accuracy tolerances stated in the Service Level Agreement (SLA). Therefore, alternative solutions are needed to improve the quality of orthophotos related to economic value. This paper examines the spatial quality of orthophotos resulting from integrated physical data collection. Data consist of orthophotos and Ground Control Point (GCP) coordinates for 2023. The method approach is to add GCP points in the orthophotos reprocessing. The study area is a terrain characterized by flatlands and hills. The analysis uses geometric (horizontal and vertical) and semantic accuracy tests. Before reprocessing, the geometric accuracy tests had CE90 and LE90 values of 2.237 m and 1.523 m, exceeding the tolerance limit. The semantic accuracy test has a National Imagery Interpretability Rating Scale (NIIRS) level 7, which means that orthophotos can facilitate detailed interpretation of geographic objects. Reprocessing with the GCP addition on hilly terrain can increase geometric accuracy with CE90 and LE90 values of 0.893 m and 0.935 m, respectively. At the same time, on flatland, it has geometric accuracy with CE90 and LE90 values of 0.730 m and 0.890 m. The orthophotos quality before and after reprocessing is relatively different. Adding GPC to reprocessing can be an alternative solution to improve the quality of orthophotos at a relatively small cost.*

**Paper ID: 019**

# ANALYZING THE INFLUENCE OF BUILT ENVIRONMENT ON MODAL CHOICE PROBABILITY: POTENTIAL INSIGHTS FOR BUS RAPID TRANSIT (BRT) DEPLOYMENT IN SURABAYA

Alfrida Ista Anindya1*; Siti Nurlaela1; Cahyono Susetyo1

1. Department of Urban and Regional Planning, aculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: alfridaista@gmail.com

## Abstract

*The implementation of public transportation using the Bus Rapid Transit (BRT) system is currently widely employed to promote sustainable transportation development. Surabaya is currently in the process of developing a BRT system as part of efforts to decrease emissions from the transportation sector. However, in the development of public transportation, it is imperative to be accompanied by a shift in travel mode choice behavior, which is influenced by various non-physical and built environment factors. Therefore, as Surabaya is currently in the process of BRT development, further investigation is needed to determine whether the surrounding built environment conditions around the planned Surabaya BRT stations have influenced the probability of residents choosing the BRT. It is hoped that this research will provide insights and considerations for development plans and policies supporting the Surabaya BRT. In this study, the identification of built environment conditions based on characteristics such as density, diversity, design, destination accessibility, and distance to transit is conducted using tabular and spatial data. Subsequently, multinomial logistic regression analysis is performed to determine the probability of mode choice after BRT development, and which built environment factors influence it. Based on the analysis results, it is found that besides the increasing travel time, travel cost, and age, the diversity characteristic of the built environment, represented by the land use mix index, influences increasing the probability of choosing the BRT. Therefore, attention to the diversity characteristics in the built environment conditions is needed to encourage the choice of BRT in Surabaya.*

**Paper ID: 020**

# INTEGRATION OF CLOUD SCORE+ WITH SENTINEL-2 HARMONIZED FOR LAND USE AND LAND COVER CLASSIFICATION USING MACHINE LEARNING ALGORITHMS.

Mohamad Rifai1*; Harintaka1

1. Department of Geomatics Engineering, Faculty of Technic, Universitas Gadjah Mada, Indonesia

Email: mohamadrifai@mail.ugm.ac.id

## Abstract

*West Kalimantan, Indonesia, has exotic nature reserves, with the Danau Sentarum National Park as its icon. Being in an equatorial region often results in persistent cloud cover throughout the year, greatly reducing the number of usable observations from satellite imagery. Undetected clouds can produce inaccurate analysis results. Cloud cover filters are used in almost all optical remote sensing data access portals, but the results are often less than satisfactory. This study shows how the Cloud Score+ Sentinel-2 Harmonized Google Earth Engine (GEE) platform product can monitor image clarity in Danau Sentarum National Park and process it using machine learning to produce reliable Land Use Land Cover (LULC) maps. Cloud Score+ output can be used to find relatively clear pixels and remove clouds and cloud shadows from L1C (top-of-atmosphere) or L2A (surface reflection) images. Using the RF algorithm, we utilized the cloud platform in this study to conduct LULC research in Danau Sentarum National Park and produce precise results for five different LULC classes, namely water bodies, agricultural, forest, barren land, and urban. Sentinel-2 data for 2022–2023 is the basis for mapping because of anomalies that occurred in both years. To identify the study area, three satellite indices were used: Normalized Difference Vegetation Index, Modified Normalized Difference Water Index, and Normalized Difference Building Index. Overall, the final results of the research in 2022 and 2023 produced an overall accuracy of 94.52% and 93.05% and a kappa index of 92.21% and 90.28%.*

**Paper ID: 021**

## ADVANCING CARBON STOCK ESTIMATION AND 3D TREE MODELING: HARNESSING THE POTENTIAL OF BACKPACK LIDAR TECHNOLOGY

Widodo Eko Prasetyo1*; Hepi Hapsari Handayani1; Agus Budi Raharjo1; Dian Septarini1

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: widodoekogeo@gmail.com

## Abstract

*Global warming poses an unresolved environmental challenge in this modern era, primarily due to the increasing concentration of greenhouse gases in the atmosphere. An effective solution lies in carbon sequestration technology, wherein plants play a crucial role in absorbing carbon through photosynthesis. Measuring the stored carbon in plants, known as Carbon Stock, is key to understanding the amount of CO2 absorbed by ecosystems. Carbon stock can be estimated when the carbon mass of a tree is known.*

*Carbon mass can be measured using traditional methods such as AGB (aboveground carbon biomass). However, these methods suffer from time inefficiency and field data consistency. These limitations can be overcome by employing LiDAR technology. Backpack LiDAR, which integrates laser scanners, inertial measurement units (IMU), and global navigation satellite system (GNSS) trackers into a single unit, enables fast and accurate data acquisition without mobility constraints. One of the main advantages of using Backpack LiDAR is its ability to acquire high-resolution data at the individual tree scale. By scanning from low to high positions, Backpack LiDAR can penetrate dense forest canopies and generate detailed data on tree structure, including stem diameter, tree height, and branches. Furthermore, Backpack LiDAR technology also allows for detailed three-dimensional reconstruction of individual trees. This modeling can be accomplished using Parameter-Optimized Quantitative Structural Models (AdQSM). This method can accurately reconstruct tree structures, including details of branches and stems. This enables accurate estimation of tree volume, which is a key parameter in calculating biomass and estimating Carbon Stock.*

**Paper ID: 022**

# EVALUATION OF VEGETATION HEALTH IN THE PT X RECLAMATION AREA USING THE NDVI METHOD BASED ON UNMANNED AERIAL VEHICLE (UAV) MULTISPECTRAL ORTHOPHOTO DATA.

Arry Prasetya Nugraha1*; Teguh  Hariyanto1

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: 6016202003@student.its.ac.id

**Abstract**

*According to the International Energy Agency (IEA) in 2023, Indonesia became the third-largest coal producing country globally after China and India. Indonesia's coal production amounted to 775.2 million tons in 2023, and around 27% was used for domestic needs. Coal mining in Indonesia generally uses an open-pit mining system, which impacts changes in land cover, landscape form, and the loss of flora and fauna. To dismiss this stigma, good mining practices must be applied in every process to ensure the balance of post-mining land's natural and social functions. One effort to restore the condition of post-mining land is revegetation. Revegetation activities on ex-mining land require much time, money, and energy, so the planted vegetation must be monitored and evaluated. The problem often encountered when using Landsat and Sentinel satellite image data is that clouds cover many areas because the island of Kalimantan has a tropical climate with high rainfall, humidity, and temperature throughout the year. Then, using multispectral aerial photography data is one solution for monitoring plant health. With the advancement of photogrammetric technology*

using multispectral cameras, it is possible to analyze the health of reclaimed plants using the Normalized Difference Vegetation Index (NDVI) method. The results of the NDVI analysis on reclaimed plants produced the highest index value of 0.877 and the lowest value of 0.013. With very healthy plant criteria covering 12.47 ha (71.5%), healthy plant criteria covering 4.95 ha (28.4%), and unhealthy criteria covering 0.02 ha (0.1%).

## Paper ID: 023

## SBAS INSAR BASED DISPLACEMENT MONITORING FOR PEATLAND RESTORATION EVALUATION IN INDONESIA

Qoriatu Zahro1*; Daichi Ito1; Joko Widodo2; Yuta Izumi1

1. Department of Engineering. Muroran Institute of Technology, Hokkaido, Japan;
2. Geoinformatics Research Center, National Agency for Research and Innovation (BRIN)
Email: qoriatu.zahro@brin.go.id

## Abstract

*Following the 2015 catastrophic peatland fire event, Indonesia has begun its first phase peatland restoration activities. Since then, replanting, rewetting, and revitalization activities have restored 835,288 hectares of peatland. Under the Government Regulation number 57/2016, these efforts aimed to maintain groundwater level not more than 40cm. However, due to the large area of peatland, conducting a comprehensive evaluation of peatland through groundwater level measurements is difficult and expensive. Therefore, displacement observation approach to estimate the groundwater level is necessary. According to the Wosten Model annual subsidence rate is equal to 0.04 times to ground water level.*

*InSAR, to date, is the only solution for obtaining valid peatland displacement over a large area. InSAR can measure displacement to millimeter-level accuracy in 250x250 km area at once. This paper aimed to utilize SBAS InSAR algorithm with inputs from 26 SLCs of C-Band SAR image acquired consecutively 3 years after the first-phase restoration to carry out displacement measurements at the Kahayan-Sebangau in Kalimantan. The result of this processing shows that the displacement across Kahayan and Sebangau is vary up to -39 mm in line of sight direction. This result highlighting the reliability of InSAR as an instrument for assessing and evaluating peatland restoration.*

## Paper ID: 024

## A STUDY OF GAUSSIAN SPLATTING TECHNIQUE IN RENDERING A 3D MODEL OF TEXTURELESS OBJECT

Shofiyatul Qoyimah1*; Hana Sugiastu Firdaus1

1. Department of Geodetic Engineering, The Faculty of Engineering, Diponegoro University, Indonesia
Email: shofiyatulqoyimah@lecturer.undip.ac.id

## Abstract

*Nowadays, a high detail of digital 3D model is widely used for urban planning purposes. It is generated through a rendering process of point clouds obtained from objects photos. Photogrammetry, as a commonly used method, builds a digital 3D model from a mesh-surface based on the camera position of each photo taken. One of photogrammetry limitation in creating a digital 3D model is whether the object has no texture (textureless). Gaussian Splatting is a sophisticated rendering technique that can be applied to a textureless object to create a digital 3D model with higher detail. It provides a continuous visualization effect on each projecting point (splat) of the point clouds. This effect is obtained from the Gaussian function which describes the position, covariance, color and transparency information of each point cloud. To reveal its advantages, a comparison study was carried out through the performance of these two techniques in rendering 3D models on textureless objects. Sets of photo were captured from wooden (2D), aluminium (3D) and paving blocks (3D) objects, which represent the level of roughness. Photogrammetry and Gaussian splatting-based software were used to perform rendering stages, using the same photo for each type of object. The result accuracy is assessed using the RMSE to calculate the error of pre-mark position within the model and oject. At last, the interpretation keys and levels of detail (LOD) were utilized to analyze the model visualization.*

**Paper ID: 025**

## FEASIBILITY STUDY OF LAND DATA UTILIZATION IN LAND POLICY MAKING AT THE STATE BORDER ON SEBATIK ISLAND

Rizka Dita Samsudin Al Chodiq1*; I Made Andi Arsana1

1. Department of Geomatics Engineering, Faculty of Civil, Gadjah Mada University
Email: rizkaalchodiq@gmail.com

## Abstract

*Indonesia's borders still leave several segments unresolved, one of which is the border between Indonesia and Malaysia on Sebatik Island. The settlement process has been carried out by installing new State Boundary stakes which resulted in land parcels entering Malaysian territory and vice versa. The Ministry of ATR / BPN is given the task of providing Land Administration data on affected areas in order to handle potential problems that may occur. This study aims to determine the feasibility of data stored in the Land Administration System of the Ministry of ATR / BPN as a spatial-*

based policy making material. This research was conducted by evaluating the quality of registered land parcel data referring to ISO 19157:2013 on Data Quality using the completeness and the consistency element. Evaluation with the completeness element is carried out on registered land parcels and attribute data that describes the land administration function. While the evaluation with the consistency element is carried out on the topology of the land parcel and on the consistency sub-element of the attribute data structure format. The results of the evaluation using the completeness element show that registered land parcels and attributes that show the land administration function are not fully recorded because there are land parcels that cannot be identified during Land Registration. While the evaluation using the logical consistency element shows that there are still gaps and overlaps in registered land parcels, while the attribute data shows good data quality.

**Paper ID: 026**

## ACCURACY SUITABILITY ANALISYS OF PHOTOGRAMMETRIC AND GNSS RTK BASED LAND PARCELS MAPPING AND MEASUREMENT ON AREA WITH DENSE VEGETATION AND VARIED TOPOGRAPHY

Nabil Amirul Haq[1,2]*; Hepi Hapsari Handayani[1]; Dwi Budi Martono[2]

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia; 2. Ministry of Agrarian Affairs and Spatial Planning/National Land Agency
Email: haqnabilamirul@gmail.com

**Abstract**

*To speed up the land registration process, Ministry of ATR/BPN of Indonesia instructed to use the photogrammetric method in the Pendaftaran Tanah Sistematis Lengkap (PTSL) started in 2023, stated in the PTSL technical instructions (JUKNIS) 2023 and 2024. In JUKNIS, mapping of land parcels on PTSL carried out by digitizing orthophoto by community participation with additional measurements of land parcels that cannot be identified on orthophoto using GNSS RTK method, which is an efficient measurement method that can measures high quantity coordinates within centimeter accuracy in a short duration. Banjarnegara Land Office, an office under ATR/BPN which in 2023 carried out PTSL project in accordance with JUKNIS, on the Kemiri and Karangmangu villages, Sigaluh District. The villages located next to each other, have varied topographic with tall and dense vegetation which can greatly influences the process and accuracy of land parcels mapping with photogrammetric method and measurements using the RTK method. In this research, an analysis will be carried out to determine the accuracy suitability of land parcel mapping and measurement based on JUKNIS in the area with varied topography and dense vegetation. The result of this research indicate that the accuracy of land parcels mapping and measurement*

*according to JUKNIS and other regulations in Karangmangu and Kemiri villages is appropriate, the orthophoto map produced has an accuracy 0.281 meters of CE90 and 0.673 meters of LE90, 100% of the digitized land parcel samples met planimetric accuracy tolerances, and RTK accuracy are also not too influenced by vegetation and topography.*

**Paper ID: 027**

# DETECTION OF LATERITE NICKEL LAYER DISTRIBUTION BASED ON CORRELATION OF MULTISPECTRAL REMOTE SENSING DATA AND GEOMAGNETIC SATELLITE IN NORTH KONAWE REGION, SOUTHEAST SULAWESI

Alia Saskia Puspitasari1*; Nanda Ridki Permana2; Belista Gunawan3; Ayu Alvita Primastika3

1. Departement of Civil Engineering, Faculty of Engineering, Suryakancana University, Pasirgede Raya Street, Bojongherang, West Java, 43216, Indonesia; 2. PT Minelog Services Indonesia, Bumi Serpong Damai (BSD), Industrial Estate and Warehouse Techno Park Block G1 Number 10, Sektor 11 Street, Setu, South Tangerang, Banten, 15220, Indonesia; 3. GeoXplore Indonesia, Kincir Air Street, Pondok Manggis Block B7, Bojong Baru, Bojonggede, Bogor, West Java, Indonesia. Email: alia@unsur.ac.id

## Abstract

*The demand for nickel continues to rise as an essential raw material for the production of stainless steel and other metal alloys that can be used in the manufacture of kitchen equipment, medical devices, and construction. Nickel deposits are abundant in Sulawesi Island due to their close association with tectonic plate movements. Therefore, this research aims to detect the distribution of laterite nickel layers based on the correlation of multispectral remote sensing data and satellite geomagnetic methods in area X located in North Konawe, Southeast Sulawesi. The Remote Sensing satellite used in this research is the Landsat 8 Satellite with the combination of a 6/5 band ratio to identify iron (Fe) content as the research target and a 4/7 band ratio for layers containing quartz. Meanwhile, magnetic satellite data was obtained from The National Oceanic and Atmospheric Administration (NOAA) website with a total of 314 data. Based on the research results, there is a correlation between the two methods where the iron (Fe) content in the limonite zone is dominant in the northern and western parts of the study area. In multispectral remote sensing, the iron (Fe) content in the limonite zone is marked by red colour on the map. In the Reduce to Pole (RTP) map results, the distribution of magnetic anomalies ranges from -0.282 to 0.222 nT, where high magnetic anomalies with values of -0.012 to 0.222 nT are suspected to be*

*composed of layers containing iron (Fe) in the limonite zone as the target of this research.*

**Paper ID: 028**

## LSD LOCATION RECOMMENDATIONS BY INTEGRATING LAND DOCUMENTATION AND SPATIAL PLANNING IN CEPU DISTRICT

Jatiar Firdaus Wibowo1; Mitha Asyita Rahmawaty1*; Aldea Noor Alina2; Oktavianto Gustin3; Syachril Warasambi Mispaki1

1. Spatial Planning and Land Management, Vocational School, Universitas Diponegoro, Indonesia; 2. Geomatics Engineering, Universitas Dr. Soetomo, Indonesia; 3. Geomatics Technology, Politeknik Negeri Batam, Indonesia
Email: mithaasyitara@lecturer.undip.ac.id

### Abstract

*The conversion of agricultural land to non-agricultural use poses a significant challenge in various regions of Indonesia, including the Cepu District. This trend jeopardizes the long-term food security of the local populace, necessitating vigilant government intervention to sustainably manage the agricultural sector. Effective planning is imperative to counter development pressures that spur this conversion, ensuring alignment with regulatory frameworks and safeguarding national food security. The government's commitment to mitigate agricultural land conversion is evident in its efforts to expedite the establishment of Protected Rice Land (LSD. This research endeavors to identify and analyze discrepancies between rice fields, land governance data, and spatial dynamics. By employing spatial analysis techniques, particularly overlay methods using Geographic Information Systems (GIS), and quantitative research methodologies, including data collection, processing, and numerical analysis, this study aims to offer insights into the drivers of land conversion and provide recommendations for LSD location-allocation. Findings underscore that the utilization of non-built land exceeding indicative LSD thresholds significantly influences the conversion of protected rice fields. Consequently, the research proposes targeted recommendations for LSD site selection to counterbalance shifting land uses. Through a combination of data requests, document reviews, and field observations, the study provides a comprehensive understanding of the spatial dynamics driving agricultural land conversion. In conclusion, this research underscores the imperative for proactive measures to mitigate agricultural land conversion in the Cepu District. This research offers actionable insights and recommendations to inform policy-making and uphold agricultural sustainability and food security at both local and national levels.*

# OPTIMIZATION OF SAR DATA UTILIZATION FOR SPATIAL PLANNING IN THE NORTHERN COASTAL AREA OF CENTRAL JAVA

Syachril Warasambi Mispaki1*; Muhammad Harun Ar Rosyid1; Pangi Pangi1; Mitha Asyita Rahmawaty1

1. Spatial Planning and Land Administration, Department of civil and planning, Faculty of Vocational School, Universitas Diponegoro
Email: syachrilwarasambim@lecturer.undip.ac.id

## Abstract

*Central Java province, located on the northern coast of Java Island, holds a strategic position as a busy land transportation route, connecting cities in southern Central Java and East Java with the capital city. The growth of industrial centers and industrial zones along the northern coast of Central Java is a positive effect of this position. However, the subsidence of land along the northern coast of Central Java is its negative impact. This can be detrimental to industrial areas and settlements along the northern coast of Central Java. Therefore, spatial planning must consider this land subsidence. The utilization of SAR data to periodically monitor land subsidence is crucial in formulating spatial arrangements that can accommodate the impact of land subsidence. Through observations using Sentinel 1 and Alos Palsar 1 data with the InSAR method, it was found that land subsidence in the coastal areas of northern Central Java ranges from 0 to 25 cm per year. This data on land subsidence serves as an important basis for policymakers, planners, and stakeholders to develop more effective adaptation and mitigation strategies in spatial planning in the coastal areas of northern Central Java.*

## NO2 MAPPING OF PERTH BUSHFIRE USING SENTINEL-5P TROPOMI

Sima Neyrizi1*; Lalu Muhamad Jaelani1; Noorlaila Hayati1; Ramin Saadi2

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia; 2. School of Surveying and Geospatial Engineering, College of Engineering, University of Tehran, Iran
Email: lm.jaelani@its.ac.id

## Abstract

*Recent bushfire events, such as the catastrophic Wooroloo bushfire in the Greater Perth area, Western Australia, have underscored the critical impact of wildfires on various facets of human life and the environment. These uncontrolled conflagrations, often*

*fueled by dry conditions and exacerbated by climate change, not only pose immediate threats to lives and properties but also have far-reaching consequences on air quality and public health. The occurrence of bushfires, such as the Wooroloo event on February 1, 2021, leads to the release of toxic fumes and pollutants, including nitrogen dioxide (NO2), into the atmosphere. As such, understanding the impact of bushfires on air quality is paramount for effective environmental monitoring, public health management, and disaster preparedness efforts in the affected regions. Leveraging advanced remote sensing technologies, including Sentinel-5P, Sentinel-2, and Landsat-8 satellite imagery, coupled with ground data of NO2, this research seeks to comprehensively analyze the repercussions of the Wooroloo bushfire on air quality in the Greater Perth area. Through the development of a robust model for estimating near-ground NO2 levels and the assessment of its accuracy, this study aims to provide valuable insights into the immediate and long-term effects of bushfires on air quality. By elucidating the relationship between bushfire events and air pollution, this research contributes to enhancing environmental monitoring strategies, informing public health interventions, and bolstering disaster resilience in bushfire-prone regions like the Greater Perth area.*

**Paper ID: 031**

## 3D CITY MODELING FOR FLOOD INUNDATION ANALYSIS AT MAYJEN SUNGKONO STREET, SURABAYA

Nadhira Srikandi1*; Hepi Hapsari Handayani1; Mahendra Andiek Maulana2

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia; 2. Department of Civil Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: nadhirasrikandidalimunthe@gmail.com

### Abstract

*Floods in urban areas are mostly caused by high rainfall with inadequate drainage systems, inappropriate changes in land use and lack of mitigation against these floods. Surabaya is classified as a seasonal zone with periodic rain. Flood inundation in Surabaya is due to the function of water storage land and an inadequate drainage system. 3D city models are a representation of the urban environment with three-dimensional geometry of objects and general urban structures. And this 3D modeling can clarify flood heights that impact surrounding buildings and infrastructure, as well as estimate the impact on drainage capacity and catchment areas for long-term planning. In this research, 3D modeling of flood inundation was carried out using LiDAR data and aerial photography which was integrated with other GIS data. Flood inundation simulation was carried out using HEC-RAS and 3D modeling was carried*

*out using 3D-based GIS software using semi-automatic methods. The results of 3D modeling of flood inundation produce visualization of areas affected by flooding.*

**Paper ID: 032**

## STUDY OF MANGROVE AREA UTILIZATION USING THE CONSEPT OF RRR (RIGHT, RESTRICTION, RESPONSIBILITY) (CASE STUDY: MANGROVE ECOTOURISM GUNUNG ANYAR AND MEDOKAN SAWAH)

Farida Nuraini Fathimah1; Yanto Budisusanto1*

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: yanto_b@geodesy.its.ac.id

**Abstract**

*Mangroves are an important habitat as a life support system and play an important role in protecting coastal areas. As an ecosystem that has high productivity and diverse benefits, mangroves must be managed properly and continuous monitoring is required. As a form of protection, the Surabaya City Government in the Surabaya City Regional Regulation Document Number 12 of 2014 concerning the Surabaya City Spatial Plan 2014-2034 establishes mangroves as a protected area in the form of ecotourism activities. The form of preservation of protected areas as a mangrove tourism area is the Surabaya Mangrove Botanical Garden (KRM) which was built in 2018. Activities such as the construction of supporting facilities can cause changes in the area so that it can threaten an environmental system in the conservation area if not managed properly. Therefore, the development of the KRM Surabaya area as a conservation area needs to be identified related to the utilization of the area to be managed properly in a sustainability. This research used photogrammetric for acquisition data and OBIA (Object-Based Image Analysis) image classification to map area utilization and determine changes in area in 2016 and 2024. The problem was analyzed using the concept of RRR (Right, Restriction, and Responsibility) to identify the utilization of KRM Surabaya area. The result of this research is the utilization map of KRM Surabaya area in 2016 and 2024 which is analyzed using the concept of RRR (Right, Restriction, and Responsibility).*

**Paper ID: 033**

## EVALUATION OF FIRE STATION PROVISION IN SERVING HIGH-RISE BUILDINGS BASED ON RESPONSE TIME STANDARDS AND SHORTEST ROUTE IN SURABAYA CITY

Caesaryo Arif Wibowo1*; I Dewa Made Frendika Septanaya1

1. Department of Urban and Regional Planning, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: caesaryoarifwibowo@gmail.com

## Abstract

*High-rise buildings in Surabaya City present substantial fire safety challenges, necessitating specialized management strategies and equipment for optimal emergency responses. This study specifically focuses on evaluating the distribution of existing fire stations in relation to their capacity to serve high-rise buildings based on response times and the shortest possible routes. Using service area and closest facility analysis, our research identifies critical gaps in the current emergency response capabilities of Surabaya's fire stations. The objective is to assess whether the existing infrastructure can effectively manage fire emergencies in high-rises by analyzing how quickly and efficiently fire services can reach these buildings. The study's relevance is highlighted by the significant number of high-rise buildings in Surabaya and their rapid growth, which emphasizes the need for a strategic review and potential reconfiguration of fire station locations to enhance safety. The goal is to ensure that all high-rise buildings are within optimal reach of fire emergency services, thereby enhancing the overall effectiveness of fire safety management in the city and minimizing potential risks and damages from fire incidents.*

**Paper ID: 034**

## 3D MODELLING OF SARINAH RELIEF USING CLOSE-RANGE PHOTOGRAMMETRY

Iwan Satriawan1; Jaja Sutarja1; Anita Fatmawaty Effendi1*; G. Haryuatmanto1

1. PT Waindo SpecTerra, Jl. Pejaten Raya No.7-8, West Pejaten, South Jakarta, Indonesia
Email: anita@waindo.co.id

## Abstract

*Sarinah building is one of Soekarno's lighthouse projects along the National Monument, Hotel Indonesia, and Gelora Bung Karno Stadium (GBK). In the construction of Soekarno's projects, Soekarno often ordered statues and reliefs to show Indonesian elements in a building. Sarinah Building has typical Indonesian reliefs depicting the figures of farmers, fishermen, sailboats, and livestock. Sarinah reliefs have been on the ground floor of the Sarinah building since 1966. But over time, the relief Sarinah was covered by fast food restaurant outlets in the 1980s. The Sarinah relief was rediscovered during the renovation of the Sarinah building in 2020. The cultural heritage of the Soekarno era in the form of reliefs made by famous artists of his time deserves good appreciation. The purpose of this research was to inventory the*

*Sarinah relief in a 3D model to minimize the existence loss of the Sarinah relief before the relief is damaged and facilitate 3D reconstruction for damaged relief. The method used for the 3D modeling of Sarinah reliefs was close-range photogrammetry. One spot was taken with at least a forward overlap of 60%-80% and a side overlap of 30%-40%. Close-range photogrammetry can capture small details and low cost in operations. The results of the 3D modeling of Sarinah reliefs can be used as digital inventory and 3D reconstruction solutions in case of relief damage. Based on the success of the Sarinah relief study case, 3D modeling using close-range photogrammetry can be implemented into other Indonesian historical heritage.*

**Paper ID: 035**

# SPATIO-TEMPORAL ANALYSIS OF TOTAL SUSPENDED SOLIDS CONCENTRATION IN THE PORONG ESTUARY AREA IN 2023 USING SENTINEL-2 SATELLITE IMAGERY

M Bagus Kirmandi1*; M Aldila Syariz1; Dewinta Heriza2; Manh Van Nguyen3

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia ; 2. Department of Geomatics, National Cheng Kung University, Taiwan ; 3. Department of Geomatics, Hanoi National University of Education, Vietnam
Email: 5016201049@student.its.ac.id

## Abstract

*The Sidoarjo Mudflow is a disaster that occurred on May 29, 2006 in Renokenongo village, Porong sub-district, Sidoarjo district. Because the mudflow did not end, at the end of September 2006 the government made a policy to drain all parts of the mud into the Porong River. The disposal of the mud caused a new problem, namely the contamination of waters by substances contained in the mud and the accumulation of mud sediment. One of the parameters of water quality pollution is suspended solids or Total Suspended Solids (TSS). Therefore, a final project research was conducted related to monitoring the concentration of Total Suspended Solids in the Porong river estuary area. The final project research was conducted using Sentinel-2 image data for each month in 2023 and one image in 2024 downloaded and calculated using three different algorithms, namely the Gantari Algorithm, Wirasatriya, and Mubarok. The results of image calculations using three algorithms were then tested for validation with the results of laboratory processing of in-situ data using the NMAE (Normalized Mean Absolute Error) method. After that, the validation test resulted in a selected algorithm which was then developed and applied to create a spatio-temporal map of the distribution of Total Suspended Solids in the Porong River Estuary area.*

# THE USE OF SENTINEL-1 C-BAND DUAL POLARIMETRIC AND SAR POLARIMETRY METHOD FOR PEATLAND ANALYSIS IN SOUTH KALIMANTAN INDONESIA

Fariidah Ramadhani1; Filsa Bioresita1*

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo-Engineering, Institut Teknologi Sepuluh Nopember, Keputih, Sukolilo, Surabaya 60111, East Java, Indonesia
Email: filsa.bioresita@its.ac.id

## Abstract

*Peatlands are a critical element in assessing environmental quality due to their ability to store significant carbon stocks. In particular, tropical peatlands are one of the largest terrestrial carbon stores on Earth, contributing to climate change mitigation. Despite only accounting for 11% of the total global peatland area, tropical peatlands are capable of storing up to 19% of the total global carbon. In addition to being carbon buffers, peatlands also provide valuable ecological benefits to the environment and the populations that inhabit them. However, in Indonesia, peat swamp forests face serious challenges such as deforestation, drainage, and rapid land change, emphasizing the need for sustainable management. The use of Synthetic Aperture Radar (SAR) technology, particularly the Polarimetric SAR method, has attracted attention as an effective tool for identifying peatlands. This research emphasizes the importance of peatland identification on the island of Borneo, especially in South Kalimantan, using Sentinel-1 SAR imagery and Polarimetric SAR techniques. The results showed that the method was able to achieve a high level of accuracy, with 14 out of 17 peatland sample points correctly identified. This shows that the predictive analysis of this study achieved an accuracy of 82% of the actual values in the sample areas. This research provides a strong foundation for the use of Polarimetric SAR in peatland monitoring and management in the future.*

## TOWARDS WATER HYACINTH IDENTIFICATION USING INDEX VEGETATION FROM SENTINEL-1 AND SENTINEL-2 IN SELOREJO DAM.

Cut Sahda Nabila1*; Muhammad Taufik1

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: 6016231006@student.its.ac.id

## Abstract

*Water hyacinths have become quite a problem at the Selorejo Dam in recent years. Its invasive nature and the dam's location surrounded by rice fields are enough reasons why the growth of water hyacinth in the Selorejo Dam is difficult to predict. Several studies apply passive remote sensing satellite technology, such as Sentinel 2A/B to observe water hyacinth growth as a substitute for in-situ observations which are limited by time and area coverage. However, seeing that rainfall can reach 3000 mm/year in the Selorejo Dam area, it is felt that the use of passive satellites is not able to accommodate the need for comprehensive water hyacinth monitoring. The first research using Sentinel-1 for monitoring water hyacinth was first successfully carried out in 2021 at Vembanad Lake, India. This research addresses the shortcomings of passive satellites in identifying water hyacinth due to weather. This research integrates passive satellite data, Sentinel-2 and active satellite data, Sentinel-1 to identify water hyacinth in the Selorejo Dam more completely. The results of this research show that both Sentinel-1 and Sentinel-2 can separate vegetation and water area using NRPB, RVI, mRVI for Sentinel-1 with overall accuracy 0.773 and NDAVI, NDVI for Sentinel-2 with overall accuracy 0.867. These results are the first step in the process of identifying water hyacinth in the Selorejo Dam.*

**Paper ID: 038**

## COMPARATIVE ANALYSIS OF SAMPLE QUANTITY AND SIZE IN AREA-BASED AND FEATURE-BASED IMAGE MATCHING METHODS FOR IMPROVED AERIAL ORTHOPHOTO GENERATION

Nabilah Amanina1*; Teguh Hariyanto1

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: nabamanina@gmail.com

### Abstract

*Aerial photography is one of the sources of geospatial data. Aerial photography data can capture images that are difficult to see when photographed from the ground. Aerial photogrammetry can be used to produce aerial photographs and digital elevation models. Geometrically, aerial photographs have yet to be corrected, while the corrected results of aerial photographs are called orthophotos. The process of orthophoto creation is the identification of the same object between image 1 and image 2. The process is called image matching, which has several methods. Each method produces a stereo image of a different quality. Area-based and feature-based methods are used in image matching. The method requires an equation to identify the same object between overlapping images 1 and 2. The Maximum Product Moment Cross-correlation equation is used in the identification process. The number of samples and the sample size for each image matching method were compared. Each image matching*

*method used 4, 6, and 9 samples. A large number of samples produces better quality orthophotos than a small number of samples. In addition, the sample size is also considered in the image matching results, in this case, odd sample sizes are used, namely 3x3, 5x5, and 9x9 pixel sizes. The larger the sample size, the better the orthophoto result. The main result is an orthophoto where the aerial photo is geometrically corrected to be perpendicular.*

**Paper ID: 039**

## UNDERSTANDING THE TERRESTRIAL WATER STORAGE CHANGES OVER JAVA AND KALIMANTAN BASINS FROM DOWNSCALED GRACE/GRACE-FO PRODUCTS

Rizka Amelia Dwi Safira1*; Ira Mutiara Anjasmara1; Joseph L. Awange2; Jielong Wang3.

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo-Engineering, Institut Teknologi Sepuluh Nopember, Indonesia; 2. School of Earth and Planetary Sciences, Spatial Sciences Discipline, Curtin University, Perth, WA, Australia; 3. College of Surveying and Geo-informatics, Tongji University, Shanghai 200092, PR China
Email: 6016231011@student.its.ac.id

**Abstract**
*Terrestrial water storage (TWS) change has been a robust indicator in predicting and monitoring hydrometeorological hazards and sustainable water resources management to comprehend the water dynamics on Earth. The Gravity Recovery and Climate Experiment (GRACE) satellite identifies this change by heeding the Earth's mass anomalies since 2002. Due to its coarse spatial resolution, the practice of GRACE for a local-scale investigation, especially for an archipelago state like Indonesia, has been relatively under-researched. This study employed an extreme gradient boosting (XGBoost) algorithm to downscale GRACE's TWS anomaly from 0.5° to 0.25° by integrating the hydroclimatic variables from Noah surface models throughout ~20 years of exploration. Three statistical metrics evaluated the testing set, resulting in a correlation coefficient (CC) of 0.920, Nash–Sutcliffe efficiency (NSE) of 0.844, and scaled root-mean-square error (RMSE) of 0.395 (97% (CC ≥ 0.7), 86.1% (NSE ≥ 0.7), and 84.7% (RMSE ≤ 0.6) of the total pixels considered as good performances for the grid-scale evaluation). The downscaled TWS anomaly captured the ascending annual rates for six examined basins: +1.11 cm/year, +0.87 cm/year, +0.63 cm/year, +0.43 cm/year, +0.29 cm/year, and +0.13 cm/year, for Java, Northern Kalimantan, Mahakam, Kapuas, Barito, and Southern Kalimantan basins, respectively. The temporal series of the downscaled TWS anomaly exhibited a reasonable correlation*

*and pattern with the standardized precipitation evaporation index (SPEI) and hence is feasible to acquire the drought and flood hazards potential.*

**Paper ID: 040**

# ANALYZING SURFACE PHYSICAL PROPERTIES CHANGE FOR GEOTHERMAL EXTRACTION MONITORING USING SATELLITE GRAVITY AND SATELLITE IMAGERY IN PATUHA GEOTHERMAL FIELD, INDONESIA

Dhea Pratama Novian Putra1*; Ira Mutiara Anjasmara1; Widya Utama2; Daniel Sahat Rezeki Hutagalung2; Muhammad Himam Awali2

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia; 2. Department of Geophysics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: dheapratama13@gmail.com

## Abstract

*Surface physical properties such as rock density, land surface temperature (LST), and composite band ratio interpretation are related to dynamic features and structures in the geothermal fields. These dynamic processes represent environmental changes, which strongly influence the geological aspects of geothermal power plant extraction sustainability. Patuha Geothermal Field, which has been operational since 2014, requires a specific monitoring process as part of environmental preservation to ensure the geothermal extraction sustainability. This research aims to address the monitoring problem by analyzing surface physical properties changes in the Patuha Geothermal Field, Indonesia, using satellite gravity models and satellite imagery data. Global Gravity Model Plus (GGMPlus) satellite gravity model is the primary model for determining the surface rock density distribution, as well as fundamental delineation of geological fault planes. Surface rock density distribution is integrated with additional data in the form of surface lithological interpretation based on composite band ratio and LST imagery from Landsat-8 satellite image processing. From 2013 to 2017, notable changes included rock density decrease (-0.19 to -0.05 gr/cm3), LST decrease (-25 to -2 °C), and changes in surface material detected by differences in composite band ratios related to the material activity of Mount Patuha and the surrounding volcanic area, as well as weathering processes indicating dynamics in surface lithology. These changes in surface physical properties explain environmental support decrease for the geothermal power plant after extraction has been carried out. Increasing environmental support, such as preserving groundwater recharge areas, limiting land-use changes, and reforesting, can be alternative solutions.*

31

# STUDY ON THE QUALITY OF LAND DATA UTULISED IN LAND POLICY MAKING AROUND THE INTERNATIONAL BORDERS IN SEBATIK ISLAND

Rizka Dita Samsudin Al Chodiq1; I Made Andi Arsana1*

1. Department of Gemoatics, Faculty of Civil, Gadjah Mada University
Email: rizkaditasamsudinalchodiq@mail.ugm.ac.id

## Abstract

*There remain unresolved segments of land borders between Indonesia and its neighbors, one of which is the border segment between Indonesia and Malaysia in Sebatik Island. Interestingly, even though border agreement has yet to be settled, there has been a de facto border line between the two countries. In practice, such line divides areas between Indonesia and Malaysia marking land parcels that fall within the territory or Malaysia and Indonesia. Such line has been used as a reference by people residing around the border when it comes to land utilization.*

*After a long process, the two countries have eventually come up with agreement on certain segment. In 2019, new pillars were installed along the border segment line. The new line causes a new division of land parcels along the border area, which is different from the de facto border line. Consequently, there are changes of land parcels ownership. Some of the land parcels that were previously within Malaysian territory now fall within Indonesia's and vice versa. The Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (ATR/BPN) is given the task of providing Land Administration data on affected areas in order to handle potential problems that may occur. Given its importance, the quality of land administration data does matter. This study aims to determine the quality of data stored in the Land Administration System of the Ministry of ATR/BPN, given their roles in a spatial-based policy making. This study evaluates the quality of registered land parcel data based on the ISO 19157:2013 on Data Quality using the completeness and the consistency element. The evaluation using the completeness element was carried out on registered land parcels and attribute data that describe the land administration function. While the evaluation using the consistency element was carried out on the topology of the land parcels and on the consistency of sub-element of the format of the attribute data structure. The evaluation using the completeness element shows that the registered land parcels and attributes showing the land administration function are not completely recorded due to difficulties in identifying land parcels during Land Registration process. Similarly, the evaluation using the logical consistency element shows that there remain gaps and overlaps in the registered land parcels. Meanwhile, the attribute data shows good data quality. These results will be used to justify whether or not the quality of land administration data stored in the Land Administration System of the Ministry of*

*ATR/BPN is sufficient to address issues due to the newly established border line between Indonesia and Malaysia in Sebatik Island.*

## Paper ID: 042

## GROUND DEFORMATION ASSESSMENT OVER PASURUAN REGENCY USING TIMESERIES-INSAR WITH UNWRAPPING ERROR CORRECTION

Annisa Rahmawati Timur1*; Ira Mutiara Anjasmara1

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: anisageomatics@gmail.com

### Abstract

*Interferometric Synthetic Aperture Radar (InSAR) is commonly used in geodetic study with accuracy of the ground deformation map can reach a millimetric level. Timeseries-InSAR can reduce the decorrelation effect of conventional InSAR techniques by using dense satellite data with high revisit frequency such as Sentinel-1 constellation. However, InSAR is still limited by interferometric phase noise resulting from a low coherence. Coherence commonly decreases in areas with dense vegetation, causing changes in the characteristics of scattering properties and potentially lead unwrapping errors. While phase unwrapping is a crucial step in the exploitation of SAR interferograms, so the correction is necessary for noise reduction. In this study, the ground deformation identification will be caried out using the Small Baseline Subset technique in the Timeseries-InSAR with unwrapping errors correction based on phase closure algorithm. This approach has been tested on Sentinel-1 datasets from 2017-2022 in Pasuruan Regency and has efficiently decreased the number of unwrapping errors. The deformation velocity value resulting from applying the unwrapping correction is better compared to without the unwrapping correction. The most significant effect of unwrapping correction is the area around the Bromo area, which are dominated by high elevation and dense vegetation. The results of the mean LOS velocity represent the occurrence of land subsidence with values ranging from 3.0 mm/yr to 15.0 mm/yr.*

## Paper ID: 043

## HYDROLOGICAL LOADING VARIABILITY ASSESSMENT OVER JAVA AND KALIMANTAN FROM GNSS DATA

Ausa Ramadhan Agustawjaya1*; Ira Mutiara Anjasmara1; Sten Claessens2

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia; 2. School of Earth and

Planetary Sciences (EPS), Faculty of Science and Engineering, Curtin University, Australia
Email: ausaramadhan@gmail.com

## Abstract

*Global climate change has brought about significant shifts in water availability across various regions, Indonesia included. This study employs GNSS CORS (Continuously Operating Station) data to measure vertical displacements in land surface resulting from hydrological loading. The objective is to analyze the influence of terrestrial water storage (TWS) by isolating and eliminating surface loading sources detected in GNSS data while mitigating uncertainties, noise, and outliers. We observed that vertical displacement can explain the character of variations influenced by the hydrological cycle, thereby impacting the water storage dynamics. Along with the GPS data, we utilized rain GLDAS NOAH hydrological data to examine both the spatial and temporal changes in vertical displacement, aiming to reinforce the hypothesis of elastic response to fluctuations in water mass loading.*

**Paper ID: 044**

## PALM OIL TREE CANOPY IDENTIFICATION USING DEEP LEARNING APPROACH (CASE STUDY: TANJUNG GUSTA DISTRICT, NORTH SUMATERA)

Nurul Fitri Alya1*; Hepi Hapsari Handayani1; Reza Fuad Rachmadi2 ; Anisa Nabila Rizki Ramadhani3; Muhammad Ihsan3; Mikael Mangopo4

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia; 2. Department of Computer Engineering, Faculty of Intelligent Electrical and Informatics Technology, Institut Institut Teknologi Sepuluh Nopember, Indonesia; 3. Department of Geographic Information Science, Universitas Pendidikan Indonesia, Indonesia; 4. PT.Geovaruna Teknologi Indonesia, Bandung, Indonesia.
Email: alyanurulfitri@gmail.com

## Abstract

*The palm oil plantation industry in Indonesia has growing rapidly as demand for palm oil increases globally. This needs to be supported by technological innovation to increase palm oil production. One of them is to integrate the power of artificial intelligence technology. This research aims to develop a robust and accurate method for segmenting oil palm trees in plantation areas. Leveraging deep learning algorithms techniques, the research explores the potential of CNN and SAM in accurately delineating individual oil palm trees derived from aerial imagery and LiDAR data. The*

*study also involves the development of a comprehensive and versatile labeled dataset to support the training and validation of the deep learning models for oil palm tree counting and segmentation. The performance of the proposed approach is evaluated and compared within the two algorithms and demonstrates the potential of deep learning algorithms for large-scale mapping and accurate counting of oil palm trees in plantation areas. The author hopes that the result and analysis of this research will give insight and improvement in detecting oil palm trees using automatic method.*

**Paper ID: 045**

# FLOOD INNUNDATION DISTRIBUTION IN LAMONGAN REGENCY USING SENTINEL-1 SAR DATA AND AUTOMATIC WATER-S1 METHOD

Luthfia Azizah1; Bangun Muljo Sukojo1; Filsa Bioresita1*

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: filsa.bioresita@its.ac.id

## Abstract

*The study of SAR data in mapping distribution flood inundation has yielded relevant results. The ease of obtaining data has made development application of Sentinel-1 SAR, for flood mapping. A common method used in flood mapping is thresholding, mainly by determining the threshold generated through visual observation that presented color contrast histograms. However, surface conditions of surrounding terrain can create misinformation due to increased surface roughness, like double bounce on vegetation make it more challenging. Moreover, manual threshold methods are less-time effective in trial error process from visual image interpretation. The results tend to be subjective because distribution mapping heavily relies on the operator's visual interpretation of threshold value. To address this challenge, distribution of flood inundation will be mapped with an automatic threshold method, called Water-S1 and expected to provide more objective results. The images divided into tiles with 10 km size, each selected tiles will be modeled with data probability parameters. Distribution modeling then iterated get probability model distribution that represents each selected tile. The result is probability map of the water surface during and after flood, then subtracts to get the distribution area of flood inundation. In this research the method was applied to Lamongan Regency. The result show that the method can identify flood inundation quite satisfactory. The spatial distribution of flood innundation are detected clustered in paddy fields center of Lamongan Regency with flood area around 20 hectares.*

# Paper ID: 046

## CORRELATION ANALYSIS OF VEGETATION INDEX IMPACT ON RICE PADDY PRODUCTIVITY ESTIMATION USING LANDSAT-8 AND SENTINEL-2A IMAGES (CASE STUDY: BLITAR DISTRICT)

Karina Rizqika Ayu1; Bangun Muljo Sukojo1*

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: bangun_ms@geodesy.its.ac.id

**Abstract**

*Rice is a crucial staple in Indonesia, consumed by a majority of the population. Its growth cycle encompasses three main phases: vegetative, reproductive, and generative. The generative phase, being the final stage, yields raw grains processed into rice, constituting rice production. This study employs the Normalized Difference Vegetation Index (NDVI) and Optimized Soil-Adjusted Vegetation Index (OSAVI) to estimate rice paddy productivity, resulting in linear regression equations to estimate rice paddy productivity in March 2023. These equations enable the determination of estimated productivity (y) by calculating the vegetation indices. The choice of vegetation index significantly influences productivity estimation, as it correlates with the rice paddy area in the generative phase. By analyzing NDVI and OSAVI correlation with rice production, it's evident that Sentinel-2A exhibits a strong correlation with NDVI (R = 0.627) and moderate correlation with OSAVI (R = 0.517). However, Landsat-8 shows a moderate correlation with NDVI (R = 0.542) and weak correlation with OSAVI (R = 0.32). The average estimated rice productivity per acre in March 2023 using Sentinel-2A is 8299.53 kg/acre for NDVI and 3487.96 kg/acre for OSAVI. Conversely, Landsat-8 estimates an average productivity of 1189.03 kg/acre for NDVI and 3479.9812 kg/acre for OSAVI. The correlation coefficient given by the Sentinel-2A calculation is higher than the correlation value from the Landsat-8 calculation. Therefore, image selection also affects the calculation of rice productivity estimation.*

# Paper ID: 047

## PRE-ERUPTION DEFORMATION PEIOR TO 2018 OF ANAK KRAKATAU VOLCANO

Raihan Fajar Adiwijaya1*; Teguh Purnama Sidiq1; Estu Kriswati2

1. Department of Geodesy and Geomatics Engineering, Institut Teknologi Bandung, Indonesia; 2. Research Center for Geological Disaster, National Research and Innovation Agency, Indonesia
Email: raihangeodesi17@gmail.com

## Abstract

*Anak Krakatau is a volcano located in the Sunda Strait. Historically, Anak Krakatau appeared from the ocean in 1920s, formed above the caldera of the former Krakatau eruption of 1883. After this rising, Anak Krakatau growth rapidly with the highest peak of 338 m in 2018. Through this period, numerous eruptions happened, with the recent eruptions happened in 2007 and 2018 where the 2018 eruption collapsing its western edifice. These sunken edifices created tsunami that spread across the Sunda Strait to Lampung and Banten Province. After the eruption of 2018 however, the activity of the Anak Krakatau did not signs any decline. To observe the unrest of Anak Krakatau prior and after the eruption, we're using radar satellite imagery from Sentinel 1 from European Space Agency in period of 2019 with temporal baseline every 12 days with total of 60 images being used. These images then processed using differential Interferometric Synthetic Aperture Radar (DInSAR) method and then being analysed the ups and downs patterns between 12-day-pairs. From our observation, deformation signals appeared in some interferogram pairs prior to eruption in December 2018. We also find that the activity of Anak Krakatau still rising after the eruption of 2018. The graph analysed from InSAR pairs also show that there is a pattern of inflation and subsidence that shows the activity of Anak Krakatau. We conclude that the activity of Anak Krakatau was detected prior the eruption and still not decline and will going to be active in some more time.*

**Paper ID: 048**

## THREE-DIMENSIONAL CITY MODELING FOR MICROWEATHER SIMULATION OF URBAN AREAS

Izzah Aryana K1*; Hepi Hapsari H1; I Gusti Ngurah A1; Zenda Mergita F1

1. Departement of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: izzaharyana91@gmail.com

## Abstract

*Increasing urbanization and building density can trigger an increase in environmental temperature, thereby influencing urban climate change. Urban management that is responsive to climate change is urgently needed, requiring a smarter urban design approach than before. As geospatial science and technology develops, conventional two-dimensional methods are changing to more complex three-dimensional spatial modeling. This carries greater potential in supporting climate change responsive decision making in urban environments. This research uses three-dimensional city modeling at LOD 2.0 level for micro weather simulation. The research was conducted in the Central Business District (CBD) Mayjend Sungkono, Surabaya which has special urban characteristics related to the urban climate, such as variations in the use*

*of building functions such as residential, village, commercial, apartment or hotel areas, as well as unique types of roofs in the area. The parameters used for the simulation are air temperature (0C), relative humidity (%), wind speed (m/s), and wind direction. Three-dimensional city modeling was carried out using a semi-automatic method using LiDAR data and aerial photos. The simulation was carried out using the integration of three-dimensional city modeling with visualization of micro weather parameters in Envi-Met with pattern indicators from building facades. Apart from that, a vegetation scenario was also carried out as a solution to reduce temperature. Also analyzed is the comparison between existing conditions and the scenarios that have been created.*

**Paper ID: 049**

## OPTIMIZATION OF GGMPLUS GRAVITY DATA TO IDENTIFY SUMATRAN FAULTS SEGMENTS IN KABA STRATOVOLCANO, BENGKULU, REVEALED BY FHD AND SVD TECHNIQUES

Fauzan Murdapa1; Erlan Sumanjaya1*; Darmawan Ikhlas Fadli2; Nanda Ridki Permana3; Atika Sari1; Aulia Purqan4

1. Department of Geodesy and Geomatics Engineering, Faculty of Engineering, Universitas Lampung, Indonesia; 2. Department of Geophysics, Faculty of Mathematics and Natural Sciences, Universitas Bengkulu, Indonesia; 3. PT Minelog Services Indonesia, Bumi Serpong Damai (BSD), Industrial Estate and Warehouse Techno Park, Indonesia; 4. Department of Project, Cargill Indonesia, Palembang-Jambi Highway Street, Teluk Kemang, Sungai Lilin, Musi Banyuasin. South Sumatra, Indonesia
Email: erlan.sumanjaya@eng.unila.ac.id

### Abstract

*Kaba volcano is a perilous and currently active volcanic site located near the Sumatran fault, specifically within the Kepahiyang region of Bengkulu. Given the intricate nature of its location, it is crucial to monitor the local fault zone activity in the vicinity of the Kaba volcano. meanwhile, these fault zones are typically associated with high permeability areas and are characterized by high-density contrasts. Therefore, we applied First Horizontal Derivative (FHD) and Second Vertical Derivative (SVD) methods to identify the presence of the Musi Kepahiyang segment in Bengkulu, using GGMplus high resolution gravity data. Based on the results of the FHD analysis, clear gravity anomalies are observed along the northwest (NW) and southeast (SE) regions of Kepahiyang, with Bouguer anomaly values reaching 800 mGal. The discernible patterns unveiled through FHD analysis distinctly delineate the Musi fault (NW), Kepahiyang fault (SW), and Garba fault, unveiling a rich tapestry of tectonic activity surrounding the Kepahiyang area in Bengkulu. Complementing these findings, SVD analysis reveals a consistent anomaly distribution, albeit with marginally diminished*

*Bouguer anomaly values, affirming the robustness of the detected features. Through the fusion of FHD and SVD methodologies, our study offers an understanding of the structural complexities pervading the segment in Kaba Stratovolcano, shedding light on its dynamic geological evolution, and fortifying our comprehension of fault dynamics in the Sumatra region.*

## Paper ID: 050

## SURFACE DEFORMATION PATTERNS COMPARISON DERIVED FROM DETERMINISTIC AND STOCHASTIC ESTIMATION METHODS FOR AREAS WITH VARIOUS DENSITY DISTRIBUTION TYPES OF GEODETIC OBSERVATION STATIONS

Dina Anggreni Sarsito 1*; Susilo 2; Heri Andreas 1; Dhota Pradipta 1

1. Geodetic Science, Engineering and Innovation Research Group, Institut Teknologi Bandung, Indonesia; 2. Research Center for Geological Disaster, National Research and Innovation Agency, Indonesia
Email: dina.sarsito@gmail.com

## Abstract

*Deformation monitoring using geodetic methods based on point positioning diplacement has higher level accuracy than surface-based deformation. To find out deformation rate or pattern in area outside the observation point, this method need interpolation/ extrapolation estimation strategy since the deformation pattern are tight influenced by surrounding tectonic conditions. With the density distribution development of the geodetic observation station that currently exists in Indonesia, this research tries to be carried out a comparison of interpolation results using deterministic (Inverse Distance Weighted/IDW) and stochastic (Kriging) estimation methods by only geometrically information data from velocity rate from each geodetic observation station. Tests were carried out in two zones in the Sulawesi region with different types of density distribution of observation data and by comparing with a priori recent tectonic information in the related region as qualitative validation. The results obtained show that the IDW method provides interpolation results that are closer to the tectonic pattern than the Kriging method for areas with a dense station distribution, and the vice-versa pattern is shown for areas with a dense station distribution.*

## Paper ID: 051

## THE EVALUATION OF SPATIAL PLANNING FOR FLOOD DISASTERS USING SENTINEL-1 SATELLITE IMAGERY (CASE STUDY: CENTRAL JAVA PROVINCE)

P. Pangi1*; Izzatur Lan Bagja1; Lilin Budiati1; Dian Prasetyaning Sukmawati2

1. Department of Civil and Planning Engineering, Vocational College, Universitas Diponegoro, Indonesia; 2. Department of Urban and Regional Planning, Sumatera Institute of Technology (ITERA), Indonesia
Email: pangi@pwk.undip.ac.id

## Abstract

*Flood disasters are an aspect of spatial planning. The current flood data is in the form of tabular data and point locations. Meanwhile, spatial data in the form of maps of inundation or flood areas is not widely available. Sentinel-1 satellite imagery for flood mapping can be used as reference data for spatial planning (Huang & Jin, 2020; Alawiyah & Harintaka, 2021; Pangi et al., 2023). The results of analysis from previous research show that flood data from Sentinel-1 image processing can depict flood inundation areas in a region. This research aims to evaluate spatial planning in Central Java Province against flood disasters. The location of this research is focused on the north coast of Central Java province (PANTURA). The method used to map floods using Sentinel-1 imagery is the Change Detection and Thresholding (CDAT) method. The method for evaluating spatial planning with flood disasters is the map overlay method. The results of the Sentinel-1 Image analysis showed that the flood areas in the study locations were Pati, Jepara, Demak, Semarang City, Kendal, Batang, Pekalongan, Pemalang, Tegal, and Brebes. The area of the flood area resulting from Sentinel-1 Image processing is 10 Km2. The results of overlaying spatial planning maps with flood disasters show that 20% of spatial planning in Central Java Province in the study location is threatened by flooding. So, this research concludes that it is necessary to evaluate the spatial planning on the north coast of Central Java Province.*

**Paper ID: 052**

## ACCURACY ANALYSIS OF VILLAGE BOUNDARIES ON COMPLETE VILLAGE MAP BASED ON PERMENDAGRI NO 45 OF 2016 USING REAL TIME KINEMATIC (RTK) METHOD

Adinda Karina Raihanadya M1*; Arwan Putra Wijaya1; Bandi Sasmito1; Fauzan Murdapa1

1. Department of Geodetic Engineering, Faculty of Engineering, Diponegoro University, Indonesia
Email: adindakarina1001@gmail.com

## Abstract

*Village boundaries are dividing marks that function as government administrative boundaries between villages in the form of a collection of coordinate points on the surface of the earth with the aim of creating governance that provides legal certainty*

*and clarity of village territorial boundaries in accordance with technical considerations. This research was conducted in the North Gadingrejo Village area, Gading Rejo District, Pringsewu Regency with the aim of testing how accurate the coordinates of village boundaries are on complete village maps according to Permendagri No. 45 of 2016 concerning guidelines for determining and confirming village boundaries which are carried out using two methods, namely the cartometric method. and direct measurement methods in the field using GNSS RTK survey measuring instruments. The reference used is the Complete Village Map made by the ATR/BPN District Land Office. Pringsewu which contains complete mapping of land parcels that have been registered andcertified. From the research carried out, it was found that there were differences in the coordinate values of village boundaries with an average value of 2,422 meters with the largest coordinate difference being 4,833 meters and the smallest being 0,363 meters. The Complete Village Map of North Gadingrejo Village has an RMSE value of 2.718714436 m, and a horizontal accuracy(CE90) of 4.125649156 m against direct measurements using RTK Radio. So it can be concluded that the Complete Village Map meets the requirements for standard deviation value accuracy and is in accordance with the classification in Perka BIG No.6 of 2018 and can be used as a base map in making the North Gadingrejo Village Boundary Map with a scale of 1: 5,000 which has horizontal accuracy class of 3.*

**Paper ID: 053**

## ASSESSING MULTI-HAZARD RISK THROUGH SPATIAL ANALYSIS: A GEOGRAPHIC INFORMATION SYSTEMS APPROACH FOR SUSCEPTIBILITY MAPPING IN JAVA ISLAND, INDONESIA

Irwan Meilano1; Riantini Virtriana1; Ratri Widyastuti1; Zidane Lutfi Salim1*; Hanna Racita Lunardia1; Fatharani Sekar Arum1; Karina Auliya Maharani1; Nazhel Diva Lendra1

1. Geodesy and Geomatics Engineering Study Programme, Faculty of Earth Sciences and Technology, Institut Teknologi Bandung, Indonesia
Email: zidanelutfisalim@gmail.com

**Abstract**

*The geographic location and population make Java Island a disaster-prone area with various threats, including earthquakes, floods, landslides, and volcanic eruptions. Based on historical data, these four types of disasters caused a total of US\$24,303,159,688 in economic losses in the last 50 years. In regards to the big loss, it is considered important to identify potential disaster risks to avoid more sustainable economic losses in the future. By utilizing developments in Geographic Information Systems (GIS) technology, potential disaster risk mapping could be carried out. The process begins with preparing a map of the potential risk of earthquakes, floods,*

landslides, and volcanic eruptions by referring to the regulatory document of the head of the National Disaster Management Agency (BNPB) Number 2 of 2012. Afterwards, the potential risk map for each type of disaster will be combined to determine the risk level of each disaster in 1 square kilometer-sized pixels. The merging process uses annual economic loss data over a period of 50 years as a weighting factor. Based on the data, the results show that 64.70% (84,755 square kilometers) of the area of Java Island falls into the high risk class, 35.09% (45,969 square kilometers) into the medium risk class, and 0.20% (265 square kilometers) into the low risk class. The resulting multi-disaster potential map could be further used for various specific purposes, such as creating an early warning system or estimating direct losses due to disasters.

## Paper ID: 054

## ANALYSIS OF THE SPATIAL CARBON MONOXIDE INCREASES CORRELATE TO INDUSTRY IN BEKASI FROM 2019 TO 2022

Sasfina Aditiya1; Bangun Muljo Sukojo1*; Inggit Lolita Sari2

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Sepuluh Nopember Institute of Technology, Indonesia; 2. Research Center for Remote Sensing, National Research and Innovation Agency, Jakarta, Indonesia
Email: bangun_ms@geodesy.its.ac.id

## Abstract

*Carbon monoxide is a colorless, odorless, and poisonous gas. For several decades, industry as the main contributor for the increase of high concentration of carbon monoxide in the atmosphere. Bekasi has the largest number of industries in West Java and is continuously increasing. This contribute to the carbon monoxide concentration increases in the city. This current study analyses the carbon monoxide concentration increase spatially in each region in the city due to industry. The carbon monoxide time series data were observed from Sentinel-5P downloaded from google earth engine. Furthermore, this study found wind direction had been contribute spatially the degree of carbon monoxide concentration in the city. The results shows the increases of the carbon monoxide has a strong correlation with the industry spatially approximately 0.993.*

## Paper ID: 055

## THE USE OF SENTINEL-1 IMAGERY FOR DEGRADED PEATLAND ANALYSIS IN SOUTH KALIMANTAN AREA WITH THE HELP OF SSM ALGORITHM AND INSAR DATA

Pradipta Adi Nugraha1; Noorlaila Hayati1*

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: noorlaila@geodesy.its.ac.id

**Abstract**

*Indonesia has about 12% of its total land area, or about 14.9 million hectares, classified as peatland. Much of this land is distributed on the island of Kalimantan, around 6.5 million hectares, on the island of Sumatra around 7.1 million hectares, and the rest is in the Papua region. Peatlands have a vital role as a source of food and habitat for various types of living things. Ecologically, these lands function as global climate change control and flood control. However, anthropogenic human activities such as drainage, deforestation, land burning, and land conversion for agriculture have caused peatlands to degraded. This has caused peatlands to become dry, oxidized, susceptible to fire, and prone to subsidence. As a result of creating degraded peatlands, terrestrial carbon trapped in peatlands will be released into the atmosphere, resulting in a greenhouse effect that contributes to global warming. In this research, Sentinel-1 SAR imagery data can identify degraded peatland using Surface Soil Moisture (SSM) algorithm and with the help of InSAR Time-Series data. The result show identification of degraded peatland quite satisfactory. The InSAR Time-Series data can produce land subsidence information which is one of degraded peatland characteristic.*

**Paper ID: 056**

## ANALYSIS OF SHORELINE DYNAMICS USING REMOTE SENSING DATA ON THE SIDOARJO - PASURUAN COASTAL AREAS

Dyah Ayu Retno Mukti1; Bangun Muljo Sukojo1*; Inggit Lolita Sari2

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo-Engineering, Institut Teknologi Sepuluh Nopember, Indonesia; 2. Research Center for Remote Sensing, National Research and Innovation Agency, Jakarta, Indonesia
Email: bangun_ms@geodesy.its.ac.id

**Abstract**

*Coastal areas as a transition area between land and water that the ecosystems directly affected by surrounding activites, either from natural changes or human activities. This event can cause coastline dynamics. Various coastal activities occured in the estuary area of Porong's River (Kali Porong) in Sidoarjo Regency. Porong's River has been the main river for discharging hot mud for aniticipating the Lapindo Mud Embankment remaining stable since 2006 in response the drilling incident by PT Lapindo Brantas. The presence of mud sediment carried in the Porong's River impacted the coastline dynamics at the river mouth, one of which caused the appearance of Lusi Island covering an area of 94 hectares in 2013. Through this research, analysis was carried*

*out using remote sensing methods and Digital Shoreline Analysis System (DSAS) to determine the value of changes (dynamics) of coastlines that occur in the Sidoarjo - Pasuruan coastal area. Through DSAS, it was obtained that the highest accretion value occurred in 2016 - 2019 with a change of 729.809 meters and the highest abrasion value occurred in 2013 - 2016 with a change of 449.778 meters. Thus, the rate of coastline dynamics occurred on the Sidoarjo - Pasuruan coast in 2013 - 2022 was 11.9 meters per year. Shoreline dynamics have physical impacts such as formation of new islands which can be used as conservation areas and help the community economy.*

**Paper ID: 057**

# THREE-DIMENSIONAL HYDRODYNAMIC MODELING TO ESTIMATE SEDIMENT RATE IN LAMONG BAY

Ayu Isnania Zahra1*; Danar Guruh Pratomo1

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: ayuisnaniaz@gmail.com

**Abstract**

*Teluk Lamong Port, which is part of the Tanjung Perak Port in Surabaya, functions as a container terminal. The port in the Surabaya area causes high ship traffic activity in the waters of Lamong Bay and it is possible that sediment will be carried away from rivers heading towards the sea. The presence of sediment in the waters will affect the physical condition of the topography of the waters. The sedimentation process in waters can cause problems because it can cause shallowing of the waters, so it is necessary to maintain and monitor the depth of shipping lanes to maintain the safety of sea traffic. One of approach to face the shallowing is by carrying out dredging the sediments that are precipitated in the area. Therefore, in order for the dredging process and evaluation of the impact of sediment on the port area to be effective, knowledge of the hydrodynamics of sea water and sediment transport in the water area is required. In this research, the approach taken to determine current patterns and sediment distribution is through the application of a numerical model with three-dimensional baroclinic hydrodynamic equations. The numerical modeling study in this research uses tidal data, river discharge, sediment samples, salinity and temperature to determine current patterns and the rate of distribution of sediment material periodically and continuously as an evaluation of Teluk Lamong and can be used as a reference in planning dredging to maintain the depth of the waters of the Teluk Lamong.*

# DEVELOPING WEBGIS USING GOOGLE EARTH ENGINE FOR CARBON MONOXIDE SPATIAL MONITORING IN SURABAYA USING SENTINEL-5P TIME SERIES

Devika Rahma Damayanti Yusuf1; Bangun Muljo Sukojo1*; Inggit Lolita Sari2

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia; 2. Research Center for Remote Sensing National Research and Innovation Agency, Jakarta, Indonesia
Email: bangun_ms@geodesy.its.ac.id

## Abstract

*Geospatial information has been widely applied for spatial monitoring of the gas pollutant. Carbon Monoxide (CO) is one of the pollutants that causes an adverse impact and is harmful to the environment and human health. Geospatial information helps with decision making for mitigating the increase of CO in wide areas and up to date on a regular basis. CO concentrations are higher in big cities compared to villages. This research was conducted in Surabaya City, as the second largest cities in Indonesia comprises of a high population density and urban activities. Based on central statistics agency of East Java data, the population density value in 2023 in Surabaya City is 8,698 per km. Sentinel-5P imageries were processed through Google Earth Engine (GEE) platform to produce geospatial information of CO distribution in Surabaya City. GEE provides WebGIS starting from data processing stage to visualization of the final output, allowing the results to be accessed publicly. Sentinel-5P imageries in 2018 up to present are used as the primary data. The WebGIS results of CO spatial monitoring are shown at https://ee-devikarahma28.projects.earthengine.app/view/co-distribution-of-surabaya.
Distribution of CO showed the highest was frequently in the Central Surabaya, while the lowest CO concentration is in the East Surabaya.  The highest CO concentration in Surabaya City was in 2018, with a range of 0.294 - 0.331mol/m2. While the lowest CO is in 2022 which ranges from 0.0261 - 0.0298 mol/m2.*

# ANALYSIS OF DIURNAL CYCLES ON ZENITH TROPOSPHERIC DELAY (ZTD) IN EQUATORIAL REGION USING MYRTKNET STATIONS

Muhammad Isyraf Daniel Mohd Sidik1; Amir Sharifuddin Ab Latip1*; Abdul Rauf Abdul Rasam1; Ami Hassan Md Din2

1. School of Geomatics Science and Natural Resources, College of Built Environment, Universiti Teknologi MARA, Shah Alam, Malaysia; 2. Geospatial

Imaging and Information Research Group (GI2RG), Faculty of Built Environment and Surveying, Universiti Teknologi Malaysia, Malaysia
Email: amirsharifuddin@uitm.edu.my

## Abstract

*The tropospheric activity in equatorial regions, such as Malaysia, exhibits unique variations due to the region's specific geographical and climatic conditions. These variations have a significant impact on the diurnal cycles of ZTD. In regions of lower latitude, the activity within the troposphere is more vigorous due to the direct influence of intense surface heat, including the high level of activity in water vapor changes in the low-latitude southern region. Hence, the aim of this study is to analyze the diurnal cycle impact based on ZTD from IGS and the Malaysia Real-Time Kinematic GNSS Network (MyRTKNet) between hourly variations. The objectives include estimating the ZTD using MyRTKNet and IGS reference stations, validating the estimated ZTD based on ZTD from the IGS CDDIS, and analyzing the hourly time-series of ZTD of the MyRTKNet. The data adopted in this study is 5-month observation from MyRTKNet (BANT, MERU, SBKB, SEKI and UPMS) and IGS stations (BAKO, DGAR and HKSL) processed to estimate ZTD. The resulting hourly variations indicated by the average standard deviation minimum of 14.8mm to a maximum of 18.0mm at UPMS and SBKB, respectively. The diurnal cycle generally follows the same patterns of slight increment in ZTD from local time (UTC+8) hour 0800 until 1100, followed by slight drops during 1300 to 1800, except for UPMS, which shows a steady incline from hour 1300 until it reaches peak 0000 of the next day, while other stations generally show an increment in ZTD values from hour 1800 until it peaked during midnight.*

**Paper ID: 060**

# DISTRIBUTION OF ACTIVE URBAN PARK VISITS BASED ON RANGE OF SERVICES IN SEMARANG

Intan Muning Harjanti1*; Pangi; Lilin Budiati1; Bivansyah Wiranata1

1. Spatial Planning and Land Planning Program, Department of Civil and Planning, Vocational School, Diponegoro University, Indonesia
Email: intanmuning@live.undip.ac.id

## Abstract

*Green open space is a one of green infrastructure type, while active urban parks are a form of green open space designed for activities and social interaction in urban communities. The phenomenon that often occurs specifically many active urban parks in urban areas are not distributed evenly, including in Semarang. The aim of this research is to determine the distribution of active urban parks visits based on the range of services in Semarang. Primary data collection was carried out by observation and*

*interviews, while secondary data was carried out by document review. The research method used descriptive qualitative with spatial analysis techniques. Meanwhile, the analysis tools used are buffer and network analysis. The analysis stage begins with a description of the results of the data analysis, classified based on their function, so the service radius for each active urban park in Semarang was obtained, then the direction for visiting active urban parks will be known based on the distance and accessibility. Directions for visiting this park illustrate that the distribution of active urban parks is not completely even. The results of this research is map of distribution of active urban parks based on the range of services, which can be used as spatial data related to urban green infrastructure.*

**Paper ID: 061**

## DIVA – INTERACTIVE DASHBOARD FOR VISUALIZATION AND ANALYSIS OF LAND CHANGE AND LAND/FOREST FIRE

Hari Agung Adrianto1*; Auriza Rahmad Akbar1; Imas Sukaesih Sitanggang1; Shelvie Nidya Neyman1; Muhammad Fauzan Azim1

1. Department of Computer Science, Faculty of Mathematics and Natural Sciences, IPB University
Email: agung@apps.ipb.ac.id

**Abstract**

*Forest and land fires cause a lot of health, environmental and economic losses. Apart from being influenced by climatic conditions, this incident is also related to human activities such as changes in land cover and land use. Even though many studies show the relationship between the two, visualization and analysis systems that show spatial and temporal relationships are still limited. Therefore, this research will develop a web-based dashboard based on R Shiny which is able to show the relationship between the level of forest fires and the transition of land cover changes within a certain time span. Because it is a web application, users only need a browser so they do not need powerful computing resources to easily repeat an analysis, apply it to another study area, or use different parameters. The study area for this research is Riau Province, which is an area with quite high forest fire intensity in Indonesia. The data used are the MCD14ML Global Monthly Fire Location Product Collection 6 dataset, tree cover loss from Global Forest Change, land cover maps from the Ministry of Environment and Forestry and land use maps from Global Forest Watch. The dashboard that has been deployed can be accessed at the link https://divaplkh.web.id/. The dashboard graphic is able to display 1) changes in existing land use for each type of land / land use, 2) land use transitions in detail and 3) changes in land use within the time period selected by the user.*

# OPTIMAL GLOBAL GRAVITY FIELD MODEL FOR CALCULATION OF LOCAL GRAVITY AND GEOID IN INDONESIA

Dadan Ramdani1,3*; Arsauna Pahlevi 2; Rina Muthia Harahap3

1. Research Organization for Electronics and Informatics, National Research and Innovation Agency, Indonesial; 2.Center for Geodetic Control Network and Geodynamics, Geospatial Information Agency of Indonesia (BIG), Cibinong, Indonesial; 3. Universitas Pakuan
Email: dadanramdani67@gmail.com

## Abstract

*In the Decree of the Head of BIG regarding the Indonesian Geospatial Reference System, the height datum used is the geoid, but this reference must be adapted to Jakarta conditions and also independent of changes. To calculate this geoid, a global gravity field model (GGM) is needed which is best used in Indonesia. Apart from that, GGM is also used to calculate gravity anomalies which can later be used for other purposes. The GGM selection strategy is to compare the calculated results from the GGM compared to the results from measurements. In this research, GNSS/Leveling measurement data is used for geoid comparisons and gravity measurement data for gravity anomaly comparisons. GGM data is taken from ICGEM from 2017, 2018, 2019, 2020, 2022 and 2023 and EGM2008, in all there are 16 GGMs. From the two comparisons of Geoid and Gravity of the 16 GGMs, it was found that based on the standard deviation, EGM2008 was the best with a difference of 0.142 m and SGG-UGM-2 with a gravity difference of 16,211 mGal.*

# PRELIMINARY INVESTIGATION ON LOCAL SOLID EARTH TIDE VARIATIONS IN SUMATRA ISLAND USING INACORS GNSS NETWORK

Achmad Rusdiana1*; Irwan Meilano1; Rio Raharja1

1. Department of Geodesy and Geomatics Engineering, Faculty of Earth Sciences and Technology, Institute of Technology Bandung, Indonesia
Email: achmad.rusdi123@gmail.com

## Abstract

*Solid earth tide refers to the periodic movement of the Earth's crust caused by gravitational forces from the Sun and the Moon. In precise geodetic measurements, solid earth tide represents one of the error components that must be eliminated to achieve high accuracy. This study aims to observe variations in local solid earth tide*

*during two significant time periods: when the Earth is at its closest point to the Sun (Perihelion) and at its farthest point (Aphelion). We employ Multi-day Kinematic Precise Point Positioning (PPP) to process kinematic data, effectively removing discontinuities at day boundaries. Additionally, harmonic analysis with the least square method is applied to extract tidal generation coefficients in three movement directions. These coefficients are then compared with the theoretical model of solid earth tides, particularly focusing on the largest tidal generation coefficients for amplitude and phase values to identify local variations. Our findings reveal that lunar semidiurnal coefficient (M2) is the primary tide generator, exhibiting the highest energy percentage. Notably, we observe discrepancies in the coefficient values when compared to the theoretical model provided by the International Earth Rotation and Reference Systems Service (IERS) at several observation points. These discrepancies suggest that local factors significantly affect Earth tides in different locations. Furthermore, our results show no significant differences in tidal ranges at the 95 percent confidence level during the Aphelion and Perihelion periods, indicating that the Sun's influence on these tidal variations is minimal.*

**Paper ID: 064**

## THE RETRIEVAL OF CHLOROPHYLL-A CONCENTRATION IN EUTROPHIC POLLUTED LAKE IN HANOI CITY USING LANDSAT-8 SATELLITE IMAGERY

Nguyen Van Manh1*; Do Thi My Hoa1; Nguyen Quoc Chien1; Duong Thi Loi1; Nguyen Thi Thu Ha2; Nguyen Van Khanh1; Gabriel Yedaya Immanuel Ryadi3; Erlangga Candra Pramoedya4; Chao-Hung Lin3

1. Faculty of Geography, Hanoi National University of Education; 2. Faculty of Geology, Hanoi University of Science; 3. Department of Geomatics, National Cheng-Kung University; 4. Department of Geomatics Engineering, Sepuluh Nopember Institute of Technology (ITS), Indonesia
Email: manh.ig239@gmail.com

**Abstract**

*Chlorophyll-a (Chl-a) is a crucial pigment found in algae and phytoplankton. High concentrations of Chl-a in water often signal eutrophication, which decreases oxygen levels in the water, severely impacting fish and other aquatic life. Ho Tay, the largest lake in Hanoi, frequently experiences significant algal blooms. These blooms create unsightly conditions and foul odors, adversely affecting recreational uses of the lake and posing health risks to surrounding communities. Therefore, monitoring the Chl-a concentration, a critical water quality indicator, is essential to prevent the future environmental incidents in Ho Tay. The conventional approach involves collecting water samples from limited locations at specific times and analyzing them in the*

*laboratory to determine Chl-a concentrations. This traditional method, while precise, is costly, labor-intensive, and time-consuming, and lacks the spatial-temporal distribution of Chl-a across the entire lake surface. In this study, we aims to utilize Landsat-8 Level-2 satellite imagery to quantify Chl-a concentrations by establishing an exponential regression model between the green-blue band ratios and the in-situ Chl-a concentrations collected in the fields in 2016 and 2019. A dataset of 21 Chl-a concentrations, ranging from 74,16 µg/L to 300 µg/L , was collected to calibrate and test the model. The results showed a coefficient of determination ($R^2$) of 0.3923 in the testing dataset. The spatial distribution map of Chl-a indicated that the concentrations significantly increased over a 10-year period, reaching high values particularly during the summer months.*

**Paper ID: 065**

## A 30-YEAR MANGROVE CHANGE DETECTIONS IN DONG RUI COMMUNE USING LANDSAT-SERIES SATELLITE IMAGES AND GIS APPLICATION

Le Thi Huong1; Nguyen Thi Luong1; Nguyen Quoc Chien1; Ngo Thi Hai Yen1; Do Thi My Hoa1; Nguyen Van Manh1*

1. Faculty of Geography, Hanoi National University of Education, Vietnam
Email: manh.ig239@gmail.com

**Abstract**

*The coastal mangrove forest in Dong Rui commune represents the largest area in Quang Ninh province, Vietnam. Despite its crucial role in the ecosystem, climate conditioning, and carbon absorption, this area has experienced notable fluctuations over the recent decades. This study aims to utilizes Landsat-5/8 as well as to validate the usage of Landsat-9 imagery to monitor the 30-year spatial distribution of mangroves, starting in 1993 by employing the Maximum Likelihood Classification supervised algorithm on Landsat imageries. The inputs included spectral bands from Landsat imagery with several supportive indices such as the Normalized Difference Vegetation Index (NDVI), Normalized Difference Built-up Index (NDBI), and Modified Normalized Difference Water Index (MNDWI). This methodology achieved high classification accuracy, exceeding 89%. The results indicated a decrease of 288 hectares (19.87%) from 1,449.27 hectares in 1991 to 1,161.27 hectares in 2013, followed by an increase of 162 hectares (13%) from 1,161.27 hectares in 2013 to 1,323.27 hectares in 2023. The results of this study provide a basis for proposing effective methodology to monitor the coastal mangrove forests in Dong Rui commune, Tien Yen district, Quang Ninh province.*

# EVALUATION OF WIDODAREN SPRING AT BROMO-TENGGER VOLCANO AS A GEOSITE FROM THE PERSPECTIVE OF GEOPARK MANAGEMENT

M. Haris Miftakhul Fajar1*; Eko Budi Santoso2; Faqih Ulumuddin1; Helda Kusuma Rahayu1; Mahendra Wirayudhatama1; Marsha Khairia Alfany1; Muhammad Erfand Dzulfiqar Rafi1; Syabibah Zakiyya Zukhrufah1

1. Department of Geophysical Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia; 2. Department of Urban and Regional Planning, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: mharismf@geofisika.its.ac.id

## Abstract

*The burgeoning field of geotourism has expanded tourism offerings through the development of geoparks that require both high-quality management and prominent geological attractions (geosites). Mount Bromo-Tengger in Indonesia boasts exceptional natural beauty, attracts domestic and international recognition, and holds potential for a UNESCO Geopark designation. This study focuses on Widodaren Spring, a significant location within the Sea of Sand Caldera, and evaluates its suitability as a geosite from a geopark management perspective. The objective was to assess Widodaren Spring using five criteria: scientific value, educational value, tourism value, and risk of degradation. This evaluation aims to provide a comprehensive understanding of the geotourism potential of the Widodaren Spring. The results indicate that Widodaren Spring satisfies the criteria for scientific and educational value, serving as a valuable location for research and learning about volcanic deposit products, volcanic groundwater systems, aquifers, water tracing, etc. However, improvement is necessary regarding tourism values, particularly in terms of supporting facilities such as information boards, restrooms, and designated dining areas. The risk of degradation was assessed as relatively low because of the spring's significance as a sacred or heritage site revered by the local community, offering inherent protection against vandalism or damage. This study contributes to the development of geoparks by providing a data-driven approach to geosite evaluation that considers both scientific merit and visitor experience. By addressing the identified gaps in tourist infrastructure, Widodaren Spring can be strategically incorporated into the Bromo-Tengger Geopark to promote geotourism while ensuring long-term sustainability.*

# SEDIMENTATION RATE ANALYSIS IN ROYOQ HARBOR USING HYDRODYNAMIC MODELING

Farida Nur Febriani1; Candida Aulia De Silva Nusantara1*

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: candida.nusantara@its.ac.id

## Abstract

*Sedimentation in port areas can have a significant impact on port operations and shipping safety. The buildup of sedimentary material in the harbor area can cause a decrease in depth, limiting the size of vessels that can enter the harbor. Sedimentation control can be done in various ways, such as dredging and removal of sediment and debris, as well as regulating land use practices around the area to minimize the amount of sediment entering the port. In addition, regular studies and monitoring of sedimentation in the harbor area are necessary to identify problems and find appropriate solutions early. Among the study methods that can be carried out to determine the pattern and rate of sedimentation in the port area are hydrodynamic and sediment transport modeling methods. Hydrodynamics and sediment transport models are able to simulate the complex interactions between water flow, sediment, and environmental boundary conditions. This research will analyze the sedimentation rate in Royoq Harbor using the Delft3D hydrodynamic model. Using a hydrodynamic model, researchers can study how sedimentation rates are influenced by river current patterns and sediment characteristics in the Royoq Harbor area.*

# COMPREHEND ANALYSIS OF SURFACE AND SUBSURFACE SEDIMENT DISTRIBUTION USING UNDERWATER ACOUSTIC INSTRUMENTS

Shafira Amanda1; Irena Hana Hariyanto1*

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: irena@its.ac.id

## Abstract

*Ports play an important role in shipping and transporting while its fundamental challenge is sedimentation that occurs continuously at a location. A management system is required to respond to this siltation problem by dredging the underwater sediments parallel with Sustainable Development Goals 11 about sustainable cities and*

*communities. Therefore, analyzing the area's sediment types and distribution is necessary, especially using acoustic instruments. In this research, the dredging plan shows the relative depth distribution is around three to 18 meters with deep sloping topography on the north side. Furthermore, the overall result of the backscatter value of the multibeam echosounder ranges from -45.86 dB to -55.73 dB. According to the Angular Response Analysis, the sediment type of the seabed surface is clay with depths ranging up to 5.40 metres. The result of the sub-bottom profiler processing discovers step or bowl-like features where the curvature seems to have an unequal height. It considers the difference in sediment height around the area while the intensity is relatively low. Through volume processing and acoustic analysis, it can provide information on bathymetry and dredging volume as well as information related to sediment types in surface and subsurface areas.*

**Paper ID: 069**

## ADVANCED DETECTION OF UNDERWATER GAS SEEP SITES THROUGH MULTIBEAM ECHOSOUNDER WATER COLUMN DATA AND NUMERICAL ANALYSIS

Syalsabila Eka Adriyanti1; Irena Hana Hariyanto1*

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: irena@its.ac.id

**Abstract**

*In hydrographic surveys, multibeam echosounders contribute to seabed mapping as well as developing three-dimensional captures of objects within the water column. These data could demonstrate previously undetected characteristics on the water's surface and seabed which are related to Sustainable Development Goal 14 about life below water. This research examines seabed gas emission bubble volumes using water column data from a multibeam echosounder in the Adriatic Sea, Italy. The survey area includes 1.5 square kilometers and surrounds a four-legged gas platform at a depth of 77 meters. This research is imperative because it challenges Marine Carbon Capture and Storage (CCS) methods by releasing carbon back into the ocean. The survey consisted of ten evenly spaced parallel transects, each approximately 1.5 kilometers long, performed at speeds ranging from 2 to 2.6 m/s (4 to 5 knots) and 100 meters apart to achieve a 50% overlap. This research project combines bathymetric and water column data to investigate and quantify the volume of seafloor gas bubbles. Acoustic wave reflection intensities differ among objects recorded in the water column. Using a threshold determination method, these objects can be identified. The results will pinpoint the positions of gas bubbles. The multibeam echosounder's water column data system proves to be an effective tool for investigating seabed gas emissions. This*

*approach will help identify emission sources, quantify the gas volumes, and understand the depth distribution of the emissions, contributing valuable data to marine CCS assessments.*

**Paper ID: 070**

# THE INFLUENCE OF POPULATION DENSITY, LAND COVER, AND SPATIAL PATTERNS ON THE GEOECOLOGICAL EVALUATION OF THE SURABAYA COAST

D.A. Safitri1*; A.N. Alina2; L.A. Bespalova3

1. Department of Civil Engineering, Faculty of Engineering, Universitas 17 Agustus 1945, Surabaya, Indonesia; 2. Department of Geomatics Engineering, Faculty of Engineering, Universitas Dr. Soetomo, Surabaya, Indonesia; 3. Institute for Earth Sciences of the Southern Federal University, Rostov-on-Don, Russian Federation. Email: dika-ayu@untag-sby.ac.id

**Abstract**

*Coastal areas are vulnerable to the influence of geomorphological processes from activities in the waters, so that the condition of coastal ecosystems will always change according to the dynamics that occur on the coast, both changes could be occured in shorelines and land cover. Geoecology is the spatial interaction between natural phenomena and their relationship to phenomena in a particular ecosystem. Surabaya is a coastal city that frequently experiences changes in land cover. The construction of new settlements and changes in land use have a significant impact on the coastal environment of Surabaya. This research aims to determine the influence of population density, land cover and spatial plan on the geoecological evaluation of Surabaya's coast using remote sensing data. The data used in the research is Landsat satellite image data from 1994, 2003 and 2018 (maximum likelihood classification method). The dynamics of changes in shorelines on the coast of Surabaya are caused by three phenomena, namely erosion, accretion and anthropogenic. Each phenomenon has a different value for land cover class, population density and spatial plan. The research results show that geoecological evaluation is closely related to phenomena that occur on the Surabaya coast (value range 1-3). The geoecological evaluation value due to the erosion phenomenon is low (30%) and medium (70%). The geoecological evaluation value due to the accretion phenomenon is low (100%). Meanwhile, the geoecological evaluation value due to anthropogenic phenomena is low (25%) and medium (75%). Geoecological evaluation of Surabaya's coast shows that it is in a "safe" condition, but there is requirement for shoreline management. Where the coastal area planning process is carried out by identifying the dynamics of coastal areas and potential risks and consequences related to decisions that produce different future scenarios.*

# COMPARISON OF MULTITEMPORAL MULTIFREQUENCY MULTIBEAM ECHOSOUNDER NORBIT IWBMS: DEPTH AND SEDIMENTATION RATE ANALYSIS OF SELOREJO RESERVOIR 2022-2023

Ikhsan Nuradi1*; Khomsin1

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: 5016201007@student.its.ac.id

**Abstract**

*Selorejo Reservoir is a reservoir constructed and located in Pandansari Village, Ngantang District, Malang Regency, East Java. This reservoir was built to accommodate the water flow from several rivers, including Kali Konto, Lahar Kletak, Kali Kwayangan, and several other small rivers. The main challenge faced by a reservoir where its primary water source comes directly from rivers is sedimentation caused by the accumulation of sediments at the bottom of the water. Given this reality, there is a need for serious and continuous control in the reservoir area to prevent damage, overflow, and ensure the safety of the community activities in the Selorejo Reservoir area. Bathymetric surveys are one of the essential methods that can be conducted, playing a crucial role in obtaining information closely related to the maritime field, especially depth values with spatial references. In the use of multibeam echosounders, there are several considerations regarding the specifications of the equipment before data acquisition, one of which is the frequency used. Different frequencies will result in different penetration capabilities and data quality. Therefore, this research will calculate the sedimentation rate in Selorejo Reservoir using multi-temporal data and investigate the effects of multifrequency usage on the obtained depth measurements. With this research, it is expected to provide an overview of the current conditions of Selorejo Reservoir, serving as a tool and reference for relevant authorities in the management of Selorejo Reservoir regarding policy formulation, maintenance steps, and future development of Selorejo Reservoir.*

# DETERMINING THE LOCATION OF COASTAL PROTECTION BUILDINGS IN DEALING WITH SEDIMENTATION PROBLEMS USING HYDRODYNAMIC MODELING

Muhammad Rafly Rahardian1; Candida Aulia De Silva Nusantara1*

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia.
Email: candida.nusantara@its.ac.id

**Abstract**

*Lamong Bay is a water area overhangs the land located between the coasts of Gresik and Surabaya. The geographical condition which is the estuary of several rivers makes this bay area face sedimentation problems. This sedimentation factor is caused by the topography of the coastline of the coastal area along the channel has a slope of 0-3 degrees and the number of rivers that drain into the channel area. The sediment movement process is divided into 3 types; Bed Load, Suspended Load, and Wash Load. The existence of coastal protection buildings is considered very effective in dealing with sedimentation problems in coastal areas. This study aims to determine the type and location of coastal protection buildings in reducing the rate of sediment transport in the study area. The method used is numerical modeling using Delft3D software to determine sediment transport influenced by hydrodynamic movements, then the analysis is carried out in determining the location and type of appropriate protective buildings. The results of this study will show how sediment transport in the study area and can determine the type and location of suitable protective buildings in reducing the rate of sediment transport.*

**Paper ID: 073**

## SUB-BOTTOM PROFILER DATA PROCESSING TO IDENTIFYING THE TYPE AND SEABED SEDIMENT LAYER OF SURABAYA WEST SHIPPING CHANNEL WATERS

Rifky Maulana Akbar1; Muhammad Aldila Syariz1*

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: aldilasyariz@its.ac.id

**Abstract**

*Many sectors of development in Indonesia are now being carried out to support the Golden Indonesia 2045. One of the development sectors that is currently still being developed is the water sector. The sea toll program is one of the developments in the water sector that has a major influence on the areas through which it passes. Sea toll as organizers of sea transportation carried out regularly and permanently connecting ports in the territory of Indonesia. The sea highway will also increase activity in the port area which will also increase the risk of shipping safety. This encourages periodic mapping and identification to reduce shipping safety risks that can occur. One of the activities to conduct mapping and identification by hydrographic survey. There are many instruments that can be used for mapping the bottom of the water, in this study a Sub-bottom Profiler is used which produces seismic data to identify the bottom layer of the water. Side Scan Sonar is also used to analyze sediment types using seafloor*

*imaging and backscatter values obtained. The expected result is to know the type and thickness of the sediment layer in the Surabaya West Shipping Channel area which is useful for maintaining the port area.*

## Paper ID: 074

### INA-CORS GROWTH STORY

Isnaini Annuriah Mundakir1*; Fanny Zafira Mukti1; Andika Mauradhia1; Wilma Fitri1; Sidik Tri Wibowo1

1. Center for Geodetic Control Network and Geodynamics, Geospatial Information Agency of Indonesia (BIG), Cibinong, Indonesia
Email: isnaini.annuriah@big.go.id

### Abstract

*Geospatial information (IG) in Indonesia use a single reference system namely the Indonesian Geospatial Reference System 2013 (SRGI2013) to make a uniform spatial data and information reference. An accurate horizontal geospatial reference framework that is spread evenly over Indonesia is needed to make it easier for the community to use SRGI2013. One of the reference frameworks in Indonesia is Ina-CORS which is managed by BIG. Ina-CORS development began in 1996 with 3 stations. The development has been carried out regularly almost every year since 2007. Massive construction began in 2010 in Java and continued in 2018 until now for other islands. Currently, the number of Ina-CORS stations that have been developed is 433 stations. However, it is still unknown whether the number of existing stations meets the needs of national mapping reference services. Thus analysis using geospatial information system is done to evaluate the coverage of Ina-CORS in Indonesia. The coverage of Ina-CORS in 2015 has only reached 15.82% of Indonesia's total land area. Moreover the geospatial information system analysis resulted that in the end of 2023, Ina-CORS has been served mapping and surveys in 75.96% of Indonesia's urban and rural area. The islands of Java and Bali have been completely served. The islands of Sumatra, Nusa Tenggara, Maluku and Sulawesi are almost completely served. Meanwhile the islands of Papua and Kalimantan still have not been optimally served.*

## Paper ID: 075

### ANALYSIS OF SURFACE TO SURFACE METHOD FOR VOLUME CALCULATION

Wanda Nurlaily Charea1; Nafisatus Sania Irbah1*

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia

Email: nafisatussaniairbah@its.ac.id

**Abstract**

*The cement industry is currently experiencing quite rapid development with an average consumption of 10% per year. According to the Director General of the Manufacturing Industry Base of the Industry Ministry in July 2023, cement production data in 2023 reached 29.3 million tonnes with national cement demand of 28 million tonnes. With this potential, good mine planning is needed in a cement industry project. Calculating the volume of excavation is generally a major and complex problem in a project in an industry because accuracy in calculating the volume can have an influence on the size of the project budget that will be submitted to the project provider. One important aspect in planning a mine is calculating the excavation volume. This is because it is used as a reference for achieving production targets both in terms of technical success and profit. To overcome this problem, a method or technique is needed to calculate the excavation volume that can provide accurate calculation results. In this research, volume calculations were carried out using the Borrow Pit and Surface to Surface method in the Clay 134 quarry area owned by PT Solusi Bangunan Indonesia Tbk. The results of the volume calculations were carried out for accuracy analysis based on tolerances from ASTM (American Standard Testing and Material) to compare the percentage values from the results of the two methods. In this way, excavation volume results will be obtained that are close to the forecast study reference values and ASTM tolerances. It is hoped that this research can become an innovation and new alternative in volume calculations, especially in the resource use efficiency to achieve a sustainable industrialisation.*

**Paper ID: 076**

# VOLUME CALCULATION ANALYSIS USING T-TEST BASED ON PHOTOGRAMMETRIC AND TERRESTRIAL DATA (CASE STUDY: MENINTING DAM)

Muhammad Ardiansyah1*; Nafisatus Sania Irbah1

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: nafisatussaniairbah@its.ac.id

**Abstract**

*Meninting Dam is a construction included in National Strategic Project (PSN) to support food and water security, especially in Eastern Indonesia, and also serves as a construction project for a dam located on Lombok Island. Before construction work begins, earthwork becomes a very important initial work. In earthworks, it is necessary to calculate the volume to monitor the progress of the work. Volume calculation can be*

*done after survey measurement. The method often used in volume measurement surveys is using TS (Total Station) and RTK GPS (Real-Time Kinematic GPS) instruments. In addition, photogrammetry can also be used for volume calculation measurements using drones, The volume results will be compared to ASTM (American Society for Testing and Materials) standards which can provide information regarding the accuracy of terrestrial and photogrammetric method measurement data. It is hoped that the results of this research can be used to support SDGs activities in infrastructure development and water resources management.*

**Paper ID: 077**

## DISCOVERING HIDDEN PATTERN IN COVID-19 PREVENTION THROUGH EXIT-ENTRY PERMIT LETTER (SIKM) SYSTEM USING GEOSPATIAL ANALYSIS

Budi Ismanto*; Taufiiqulhakim Rifqi Hawaari; Adindha Surya Anugraha; Ghifari Juliendra; Hana Alifiyanti; Heza Pratama Erdiza; Pavita Raudina Sari; Darmawan Apriyadi


1. Department of Investment and Integrated One Stop Services, Jakarta Provincial Government, Indonesia; 2. Trisakti Institute of Transportation and Logistics, Indonesia
Email: ismantobudi1071@gmail.com

**Abstract**

*COVID-19 was declared as a global pandemic in 2020, and described as a highly contagious virus that spreads through direct contact. Almost all countries affected by COVID-19 implement various steps to prevent its spread, one of which is lockdown, described as a prohibition of human movement outside the home. Jakarta, the capital city of Indonesia with a population of 10,609,681, implements restrictions on human movement entering and leaving of the city using the Exit-Entry Permit Letter (SIKM) system to prevent the spread of COVID-19. Lockdown does not chosen as option to prevent the spread of COVID-19 in Jakarta due to the consideration of its large population, which could have significant economic impacts on the community. Meanwhile, the SIKM system is designed to restrict the mobility of people entering and leaving Jakarta in order to control the spread of COVID-19, with the hope of minimizing significant impacts on the community's economy. The aim of this research is to discover hidden patterns in human movement entering Jakarta through the SIKM system, utilizing geospatial analysis with Geographic Information System (GIS). The results of this research indicate that the central business district, known as the 'Golden Triangle' of Jakarta, emerges as the area with an economic activity zone with the densest hotspot as the primary destination for people during the implementation of the*

*SIKM system. Therefore, with the geospatial analysis, hidden patterns of human movement during COVID-19 through the SIKM system can be identified for decision support system for Jakarta Government.*

# 3D MODELING AND IDENTIFICATION OF POST-DREDGING SEDIMENT LAYER TYPES USING HYDROACOUSTIC INSTRUMENTS AT PT. GRESIK JASATAMA

Khomsin; Muhammad Iqbal Humaidi

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: khomsin@geodesy.its.ac.id.

## Abstract

*Sedimentation at the PT Gresik Jasatama Terminal is one of the fundamental issues that needs to be solve. In order to reduce shipping safety risks, the dredging be carried out in the port area in 2023. In this research, the author carried out an analysis of the depth before and after the dredging and analyzed it visually using Side Scan Sonar and Backscatter imagery to determine differences in sediment depth due to the dredging. The acoustic methods used in this research are Multibeam Echosounder, Echologger, Side Scan Sonar, and Sub-bottom Profiler. The supporting data needed includes tidal data, Sound Velocity Profiler data and soil investigation data. Based on processing, the difference in sediment depth between bathymetric data before and after dredging was obtained with a difference of around 5-6 meters. Apart from that, the relationship between Echologger penetration using low frequency and high frequency was obtained with a depth difference that was not too significant around 0 - 2 meters. In the same area, Side Scan Sonar image analysis was also carried out used Qualitative interpretation method. Qualitative interpretation used in order to get an idea of the type of seabed sediment. The results obtained indicate that most of the study area is a type of hard sediment. In addition, backscatter processing was carried out using the angular response analysis (ARA) method to obtain basic water characteristics based on color.*

# PALM OIL TREE COUNTING ANALYSIS USING PALM OIL TEMPLATE MATCHING ALGORITHM AND DEEP LEARNING FASTER R-CNN (CASE STUDY: KAB. TANJUNG JABUNG TIMUR, JAMBI PROVINCE)

Sulthan Hafizh Ristawan1; Agung Budi Cahyono1*

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: agungbc@its.ac.id

## Abstract

*Indonesia is one of the largest producers and exporters of palm oil in the world. According to the Badan Pusat Statistik (BPS) in 2022 palm oil production increased to 46.82 million tons. Palm oil has great potential, so technology is needed to analyze its productivity. Therefore, palm oil tree counting is an important aspect of land monitoring, plant maintenance, and efficient production planning. However, manual palm tree counting is time-consuming, labor-intensive, and tends to be less efficient in large plantations. In addition, the lack of accuracy in estimating the number of trees and the age of the crop can affect land planning and management. The development of an automatic palm tree counting algorithm through image processing and deep learning techniques is expected to provide an efficient and accurate solution. Therefore, this study aims to identify and count oil palm trees using aerial photography by utilizing template matching and deep learning algorithms with the Faster R-CNN model architecture while analyzing the accuracy of the two methods. The result of this research is the calculation of the number of trees and the comparison between the results of tree counting using the template matching method and deep learning Faster R-CNN in the CV. Robet oil palm plantation, East Tanjung Jabung Regency, Jambi Province.*

# BUILDING FOOTPRINT EXTRACTION FROM FIXED-WING UAV IMAGERY USING MASK R-CNN AND OBJECT-BASED IMAGE ANALYSIS METHODS (CASE STUDY: BANTUREJO VILLAGE, MALANG REGENCY)

Husnul Hidayat1*; Reyhan Dhihan Irawan1; Firmansyah Maulana Azhali2

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia; 2. Terra Drone Indonesia
Email: hidayat.h@its.ac.id

## Abstract

*As a developing area in Malang Regency, Banturejo Village has many potencies since its location near the tourism area of Selorejo Dam. To maximally harness the potencies while maintaining efficient land use, mapping the built area in large scale should be carried out. The use of fixed-wing UAV becomes the avant-garde of high resolution imagery acquisition at unprecedented rate. But the problem arises in interpreting these imagery into meaningful cartographic representation which often requires cautious manual digitization in much slower rate that its acquisition. In this research the automatic image analysis method for building footprint extraction using Mask R-CNN algorithm and Object-Based Image Analysis was performed. The fixed-wing UAV imagery was captured in 2023 and the Structure-from-Motion algorithm was employed for photogrammetric processing which produced 10-cm resolution orthophoto. Manually digitized building polygons from the same imagery serve as the gold-standard for accuracy analysis, and small proportion of the data were employed as training sample for the algorithm. The results shows that 1447 buildings with total area of 180,595 m2 was generated with the Mask R-CNN algorithm, while OBIA-Mask R-CNN produced 572 buildings with total area of 201,932 m2. The confusion matrices reveal precision value of 77.94%, recall 51.54%, F1 Score 62.02% by Mask R-CNN method, and precision value of 35.95%, recall 9.21%, F1 Score 14.66% by OBIA-Mask RCNN method. Mask R-CNN method generated slightly lower accuracy of total building area, but in terms of precision the OBIA-Mask RCNN method produces lower number of building polygons.*

**Paper ID: 081**

## ANALYSIS OF DEFORMATION SEMERU VOLCANO USING GPS DATA 2015-2023

Ilham Yuki Tamim Bayoumi1*; Putra Maulida1; Nia Haerani2

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia; 2. Center for Volcanology and Geological Hazard Mitigation, Indonesia
Email: ilhamyuki31@gmail.com

## Abstract

*Indonesia is a country that is traversed by many volcanoes that stretch along the Indonesian archipelago. Tectonically, Indonesia is located between four tectonic plates, causing the formation of volcanoes in Indonesia. Semeru volcano, the highest volcano in Java and is one of the active volcanoes in Indonesia. As what happened in December 2021, Semeru Volcano produced eruption material which resulted in casualties and environmental damage around Semeru Volcano. This study will analyze the deformation pre-, during, and post- eruption using a combination of static GPS*

*with GAMIT/GLOBK and we used TRACK software part of the GAMIT/GLOBK to see the short-term deformation during the eruption. We use long-term deformation to determine the ground deformation for pre- and post-eruption. The horizontal displacement after the reduction of Sunda Block in the pre- and post-eruption phases has the same trend, which is towards northeast was observed in the south and southeast part of the volcano, with range of 6.11 mm/year to 8.79 mm/year. Horizontal displacement on every station increased after the eruption phase in Desember 2021.*

## Paper ID: 082

## FROM SPACE TO HEALTH: THE IMPACT OF SRTI-BAS RESEARCH ON THE SMART4COV19 TELEMEDICINE PROJECT

Lachezar Filchev1*; Maria Dimitrova1; Plamen Trenchev1; Milen Chanev1; Georgi Jelev1

1. Space Research and Technology Institute – Bulgarian Academy of Sciences, Sofia, Bulgaria
Email: lachezarhf@space.bas.bg

### Abstract

*This presentation illustrates the path from space research to healthcare, emphasizing the pivotal role of SRTI-BAS in shaping the Smart4COV19 telemedicine project. We dissect the wealth of knowledge encapsulated in SRTI-BAS's publications, revealing the groundbreaking space technologies that have been repurposed for telemedicine.*

## Paper ID: 083

## ANALYSIS OF IONOSPHERIC DISTURBANCES DUE TO CYCLONES IN GERALDTON CITY OF AUSTRALIA

Dwi Sri Lestari1; Mokhamad Nur Cahyadi1*; Candida Aulia De Silva Nusantara1; Ihsan Naufal Muafiry2;Buldan Muslim2; Nurrohmat Widjajanti3; Deni Kusumawardani4

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia; 2. Research Center for Geospatial, National Research and Innovation Agency (BRIN); 3. Geodetic Engineering, Universitas Gadjah Mada; 4. Economic Development, Universitas Airlangga
Email: cahyadi@geodesy.its.ac.id

### Abstract

*Typhoon is a natural disaster that has the potential to cause damage and cause loss of life. On April 2 2021, the tropical cyclone Seroja formed, reaching typhoon class*

*category 3, which was characterized by a maximum wind speed of 140 km/s on April 11 2021. Tropical cyclones reached typhoon class when the wind speed exceeded 119 km/h. Typhoon can generate Acoustic Gravity Waves which can cause Concentric Traveling Ionosphere Disturbances (CTIDs). One effort that can be made to mitigate typhoon disasters is to analyze the time when ionospheric disturbances are detected which can be observed through changes in TEC values by utilizing GNSS technology. The propagation of the GNSS signal from the satellite to the receiver experiences a delay when passing through the ionosphere layer which can be used to obtain the Total Electron Content (TEC) value. TEC is the number of electrons in a cylindrical vertical column with a cross-section of 1 m^2 along the line of sight. CTIDs due to typhoon Seroja were detected at 09:00 UTC by GPS 9 at ~0.2 TECU. Interestingly, the CTIDs caused by typhoon Seroja were detected before the typhoon landed in Australia. It is hoped that additional information and variables regarding the comparison of the characteristics of ionospheric disturbances due to typhoons and earthquakes can be used in the development of a disaster early warning system in the future.*

**Paper ID: 084**

## SPATIAL-BASED FLOOD SUSCEPTIBILITY MAPPING USING ANALYTICAL HIERARCHY PROCESS TECHNIQUES (CASE STUDY: GRESIK REGENCY)

Chelsea Alfarelia Putri Taslyanto1; Udiana Wahyu Deviantari1*

1. Geomatics Engineering Department, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia
Email: udianadeviantari@its.ac.id

**Abstract**

*Over the past four years, Gresik Regency has frequently been hit by floods. In 2019, there were 17 occurrences, followed by 13 occurrences in 2020, 19 occurrences in 2021, and a rise to 33 occurrences in 2022. The high frequency of floods in Gresik Regency indicates the need for information about flood-prone areas. This study analyzes flood-prone regions of the Gresik Regency using the Analytical Hierarchy Process (AHP) and weighted overlay methods to provide information to the community and agencies to be used as a reference in disaster mitigation. The data utilized include the Digital Elevation Model, river network data, Sentinel image data, soil type data, rainfall data, and questionnaire results. The criteria used in this research are land elevation, slope, land cover, river distance, soil type, rainfall, and flood extent. Results show that rainfall criteria have the highest weight at 25%, followed by elevation at 17%, flood extent at 17%, land cover at 15%, river distance at 10%, slope at 9%, and soil type at 7%. The area of Gresik Regency classified as low vulnerability is 8.79 km2 or 0.82% of the total area, the medium vulnerability category is 936.13 km2 or 87.60%*

*of the total area, and the high vulnerability category is 123.66 km2 or 11.57% of the total area. The most flood-prone sub-districts are Driyorejo with 28.46 km2 of highly vulnerable flood-prone area, followed by Wringinanom with 13.17 km2, and Benjeng with 12.50 km2.*

**Paper ID: 085**

## LOCALITIES OF ID-74 TO DGN95 COORDINATE TRANSFORMATION PARAMETERS

Teguh P. Sidiq1*; Heri Purwanto2; Irwan Gumilar1; Atik Retno2; Kosasih Prijatna1; Dzun Nurwinas1; Hudaya Hibatul Wafi1

1. Department of Geodesy and Geomatics Engineering, Faculty of Earth Sciences and Technology, Institute of Technology Bandung, Indonesia; 2. PetroChina International Jabung Ltd.
Email: tpsidiq@itb.ac.id

**Abstract**

*As can be referred to almost all regulation in Ministry of Energy and Mineral Resources, all spatial information used in the oil and gas industry in Indonesia, should be referenced to DGN95. While it seems that the datum is now deprecated, the use of DGN95 in many data, especially seismic data collected in 1970 to 1990 are still used and maintain in many companies to avoid huge data transformation work if it is applied nationwide. Some work in finding coordinate transformation has been done since early 2000, but it produces a different set of parameters. In this paper, we collect some published ID74 to DGN95 coordinate transformation parameters and compare to our own results. We measure 20 common points on oil and gas fields using the GNSS method. However, only three points were found consistent and suitable to be the common points. Using the Molodensky-Badekas method, we generate a set of coordinate transformation parameters to be used in the fields. There are 10 parameters to be estimated, three translations, three rotations, one scale and coordinate of center of rotation parameters. Again, there are discrepancies between our results and other published parameters. This shows that the transformation parameters are usually exclusive to the field or region. Our study suggests that coordinate transformation parameters are best to calculate for each specific concession area.*

# COMPARISON OF FREE-AIR GRAVITY ANOMALY VALUES FROM MULTI-EPOCH GRAVITY DATA

## CASE STUDY: GRAVITY DATA OF THE D.I. YOGYAKARTA REGION IN 2013 AND 2019

Widy Putra1*; Bagas Triarahmadhana1; Nurrohmat Widjajanti2; Leni S. Heliani2

1. Center for Geodetic Control Network and Geodynamics, Geospatial Information Agency of Indonesia (BIG), Cibinong, Indonesia; 2. Department of Geodesy Engineering, Faculty of Engineering, Universitas Gadjah Mada, Indonesia
Email: widyputra@gmail.com

## Abstract

*The Geospatial Information Agency of Indonesia (BIG) conducted a terrestrial gravity survey campaign in D.I. Yogyakarta in 2019. Additionally, data resulting from a gravity survey conducted in 2013 by the Department of Geodesy, Universitas Gadjah Mada, was available at the location. The availability of multi-epoch data prompted an evaluation to ascertain whether gravity changes had occurred. This evaluation involved comparing the free-air gravity anomaly from the gravity datasets of 2013 and 2019. Gravity data processing was executed using the Gravity Adjustment software developed by the Technical University of Denmark. The results indicated that the datasets from 2013 and 2019 generated residual root mean square (RMS) values of approximately 0.039 mGal and 0.044 mGal, respectively. A statistical test using the T-student method with a 95% confidence level, conducted at 17 points, revealed significant differences between the 2013 and 2019 data. This test implies that the free-air gravity anomaly generated from the gravity datasets of 2013 and 2019 differed. Thus, a more comprehensive study is necessary to investigate the impact of gravity datum on absolute gravity data and other influencing factors such as earthquakes and changes in seismic conditions on the differences observed in multi-epoch gravity data.*

# ANALYSIS OF 3D MODELING USING LIDAR VELODYNE FOR TREE INVENTORY USING THE LIOSAM METHOD

Luki Adi Triawan1; Mokhamad Nur Cahyadi1*; Agus Budi Raharjo2; Dian Saptarini3

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia; 2. Department of Informatics Engineering, Faculty of Intelligent Electrical and Informatics Technology,

Institut Teknologi Sepuluh Nopember, Indonesia; 3. Department of Biology, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Indonesia
Email: cahyadi@geodesy.its.ac.id

## Abstract

*LiDAR technology has becoming increasingly popular for tree inventory, particularly when combined with techniques like LiDAR Inertial Odometry and Mapping, or LIO-SAM. The LIO-SAM method of 3D modeling analysis for tree inventory using LiDAR is the main topic of this study. Planting trees is one way to lower the amount of carbon in the atmosphere, but doing so requires precise assessments of the trees' architecture. LiDAR technology overcomes the spatial resolution constraints of satellite photography to enable very accurate three-dimensional modeling of real things. Since tiny LiDAR devices like TLS and Backpack are quite costly, this method was created as a workaround. The Ublox F9R GNSS receiver, Pixhawk orange IMU sensor, and Velodyne vlp 16 LiDAR sensor are the sensors that are used. Accurate point cloud creation is achieved via the LIO-SAM technique, which is subsequently converted into a 3D model of the trees. The precise measurement of tree dimensions required for numerous environmental and forest management applications is made possible by this research's use of LiDAR. The outcomes demonstrate that the LIO-SAM approach offers excellent 3D modeling accuracy with a minimal average point cloud alignment error. The findings of georeferencing have an RMSE of less than one meter. Furthermore, a robust association has been shown between groundtruth data and 3D modeling outcomes obtained using this approach. The findings of this study can help with efforts to mitigate climate change and improve the management of forests.*

**Paper ID: 088**

## UNVEILING GAS SEEPS: A DIVE INTO WATER COLUMN DATA ANALYSIS

Surya Alief Ramadhan1*; Danar Guruh Pratomo1

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: suryaalieframadhan@gmail.com

## Abstract

*The gas bubbles on the seafloor offer insights into the ocean's ecological conditions, geochemistry, and potential as an energy resource. Detecting these bubbles is crucial for enhancing marine ecosystem management aligned with sustainable development systems. Seafloor gas bubble detection involves recording acoustic waves using multibeam rchosounder (MBES) equipment. This research develops a method for detecting and quantifying gas seeps from MBES water column data. Collected MBES*

*data undergoes processing and analysis to identify anomalies indicative of gas seeps. The results facilitate quantitative modeling, estimating gas volume and contributing to the efficient development of MBES technology. This work establishes a foundation for further research on the environmental impact and energy potential of gas seeps.*

**Paper ID: 089**

## INTEGRATION OF THE VELODYNE LIDAR SENSOR AND PIXHAWK IMU FOR INDOOR 3D MAPPING

Nurya Ramadhania1; Mokhamad Nur Cahyadi1,2* Tahiyatul Asfihani3; Hendy Fitrian Suhandri4

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia; 2. Research Center of Marine and Earth Science Technology, Directorate of Research and Community Service, Institut Teknologi Sepuluh Nopember, Indonesia; 3. Department of Mathematics, Faculty of Science and Data Analytics Institut Teknologi Sepuluh Nopember, Indonesia; 4. Centre of Studies for Surveying Science & Geomatics, Universiti Teknologi Mara (UiTM), Malaysia
Email: cahyadi@geodesy.its.ac.id

**Abstract**

*The importance of indoor mapping has surged across various applications, encompassing human navigation, indoor exploration, and hazardous site mapping. With satellite positioning systems ineffective indoors, alternative navigational sensors and methods, such as inertial measurement units (IMU) and simultaneous localization and mapping algorithms (SLAM), have been harnessed to furnish precise indoor positioning for mapping endeavors. Leveraging LiDAR-based SLAM, sensitive to environmental textures and various pose configurations, address these challenges. This study integrates the Velodyne VLP-16 3D-LiDAR sensor and the Pixhawk orange featuring 9 DOF (3 accelerometers, 3 gyroscopes, and 3 magnetometers) IMU sensor travels around the environment to collect measurements. to attain robust and accurate indoor 3D mapping. The research outcomes reveal that the resultant 3D indoor mapping exhibits commendable visualization and high geometric accuracy. The alignment of point cloud data achieved an RMSE value of 0.1243 meters through the Velodyne LiDAR sensor and the Pixhawk IMU integration. The validation of the 3D model using a roll meter to measure dimensional accuracy yielded an RMSE value of 0.622 meters. Such a low RMSE indicates the considerable accuracy of the produced 3D modeling results, substantiating their reliability for diverse applications. These findings underscore the effectiveness of integrating the Velodyne LiDAR sensor and Pixhawk IMU in achieving precise indoor 3D mapping, thereby advancing applications in fields like architecture, robotics, and facility management.*

**Paper ID: 090**

# IDENTIFICATION OF GEOLOGICAL STRUCTURES IN THE JABODETABEK AREA BASED ON GRAVITY DATA ANALYSIS

Safirotul Huda1,2*; M. Samsu Rosyid1

1. Departemen Fisika, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Indonesia, Depok, Jawa Barat; 2. Badan Informasi Geospasial, Jl. Raya Jakarta – Bogor Km 46, Cibinong, Jawa Barat
Email: safirotul.huda@ui.ac.id

**Abstract**

*The Jabodetabek region serves as Indonesia's hub for government, culture, education, and economic activities. Based on Peraturan Pemerintah (PP) No. 54 of 2008, the Jabodetabek area is designated as a metropolitan zone. According to BPS data in 2020, the population in the Jabodetabek metropolitan area is 31.24 million, making it the largest metropolitan area in Indonesia. As a metropolitan area, the aspect of natural disaster mitigation becomes important to be considered, including earthquake disasters. One source of earthquakes is the presence of an active geological structures such as faults. Faults can be detected through the gravity survey method. Terrestrial gravity measurements taken between 2018 and 2021 provide the gravity data for the Jabodetabek area. This data is then corrected and processed to obtain the Complete Bouguer Anomaly/CBA. CBA data is further processed using the upward continuation filter and FHD (first horizontal derivative) and SVD (second vertical derivative) analysis. The results of the FHD and SVD analysis can show the positions of faults and identify the direction of these faults. Based on the FHD and SVD analysis, geological features such as faults in the Jabodetabek metropolitan area were identified with specific characteristic.*

**Paper ID: 091**

# STUDY OF BOUNDARIES DETERMINATION USING CARTOMETRIC AND PARTICIPATORY METHODS (CASE STUDY: PEHSERUT VILLAGE, SUKOMORO SUB-DISTRICT, NGANJUK REGENCY, EAST JAVA)

Hilda Salshabila1; Yanto Budisusanto1*

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: yanto_b@geodesy.its.ac.id

## Abstract

*Boundary mapping has a very important role in Indonesia in the fields of administration, policy, and security of a region. Boundary mapping with accurate mapping creates legal clarity so that the government and the community can know exactly what the legal boundaries are. This is important to avoid disputes or conflicts related to territorial claims. This mapping was conducted using cartometric and participatory methods. The cartometric method is the tracing or drawing of boundary lines on a working map and measuring or calculating the position of points, lines, distances and area coverage using base maps and other geospatial information as support. Participatory mapping is an approach to mapping an area that involves the active participation and contribution of local communities in the process of data collection, analysis, and decision-making related to mapping. There are four stages of mapping: problem identification and literature study, cartometric and participatory boundary determination, data processing and evaluation, boundary map production, and result analysis. In this research, we will analyze the comparison of boundary segments and the comparison of village area in RBI data with the results of determining village boundaries with a case study of Pehserut Village, Sukomoro District, Nganjuk Regency, East Java. This research was conducted to determine the village boundaries, comparison of boundary segment lengths, comparison of village area, cartometric points of village boundaries, and recommendation map of Pehserut Village boundaries.*

**Paper ID: 092**

## VERTICAL ACCURACY ASSESSMENT IN MINING AREA FROM MULTI-GEODETIC SENSORS

Rizqi Aulia1*; Irwan Gumilar2; Brian Bramanto2

1. Department of Geomatics Engineering, Faculty of Regional and Infrastructure Technology, Institut Teknologi Sumatera, Indonesia; 2. Geodetic Science, Engineering, and Innovation Research Group, Institut Teknologi Bandung, Indonesia. Email: rizqi.aulia@gt.itera.ac.id

## Abstract

*Mapping Survey activity has an important role in mining sectors. The development of Mapping technology has increased rapidly in recent times enabling mining businesses to increase productivity in mining. The use of the terrestrial methods (e.g., terrestrial mapping using an Electronic Total Station (ETS) or Terrestrial Laser Scanner (TLS)) that have been used so far has several disadvantages, including the aspect of work safety and the length of processing time. This study, aims to analyze the vertical accuracy of the Unmanned Aerial Vehicle Light Detection and Ranging (UAV LiDAR) and UAV Photogrammetry methods that enable us to improve work safety and increase productivity. This study, focuses on assessing the vertical accuracy of each sensor used.*

*The reference data used in this research is Terrestrial Laser Scanner (TLS) point cloud data. Based on the comparisons, the Root Mean Square (RMS) of differences for LiDAR-TLS and photogrammetry-TLS was estimated to be 5 cm and 2 cm, respectively. Thus, both UAV LiDAR and UAV photogrammetry comply with the accuracy standards for measuring Mining Pit situations and ASPRS standards (American Society for Photogrammetry and Remote Sensing (ASPRS) in 2014.*

**Paper ID: 093**

## COMPARISON OF AIRBONRE MAGNETIC AND GROUND MAGNETIC FOR IDENTIFICATION OF SUB-SURFACE CONDITION STUDY CASE : SAND CALDERA OF BROMO-TENGGER VOLCANIC COMPLEX

Juan Pandu Gya Nur Rochman1*; Wahyu Nurdiansyah Buwonokeling1; M. Haris Miftahul Fajar1; Anik Hilyah1; Dwa Desa Warnana1; Wien Lestari1; Eki Komara1; Nita Ariyanti1; Moh. Singih Purwanto1; Firmansyah Maulana Azhali2

1. Department of Geophysics Engineering, Faculty of Civil, Planning and Geo Engineering, Institute Teknologi Sepuluh Nopember, Indonesia; 2. PT Terra Drone Indonesia
Email: djuan.rochman@gmail.com

**Abstract**

*The Bromo-Tengger Volcano Complex is a popular geotourism destination characterized by volcanic activity also unique geological and geomorphology settings. However, limited geophysical investigations have been conducted in this area, particularly using magnetic methods, to understand the subsurface conditions. Thus, this study aims to compare geophysical methods which are airborne and ground magnetic survey methods to identify the sub-surface conditions of Bromo-Tengger Volcano Complex. Airborne magnetic measurements were conducted using a Geotron Proton Precision Magnetometer G5 as the base and a Sensys Magdrone R3 with a DJI M600 drone as the rover with 5 ms of spacing, providing rapid coverage of large areas and minimizing interference. Ground magnetic measurements were taken using only a Geotron Proton Precision Magnetometer G5 for base and rover with 200 meters of spacing. Ground magnetic measurements serve as a comparison to assess resolution and potential data loss caused by factors such as flight altitude and data sampling rate. Combining both magnetic survey measurements enables a comprehensive understanding of the magnetic properties of the surveyed area. The airborne magnetic survey produced 2,097,134 data points in just two days, while the ground magnetic survey produced only 174 points in ten days. Although the airborne magnetic survey is less detailed, it can effectively interpret the subsurface conditions. On the other hand, the ground magnetic survey provides high-resolution results but is affected by local noise and temporal changes. Both surveys identified high anomalies in the southern*

and northeastern regions, which were interpreted as basalt lava flows. Medium anomalies are believed to be early pyroclastic fall deposits, while low anomalies indicate subsurface volcanic activity. Overall, the results of the airborne magnetic survey correlate well with the ground magnetic survey, making it a viable and time-saving alternative to large-scale magnetic measurements.

## Paper ID: 094

## THE TERRESTRIAL GRAVITY CAMPAIGN AROUND IBU KOTA NUSANTARA (IKN) AREA, INDONESIA

Bagas Triarahmadhana1*; Dwi Noviyanto2; Harka Amrosalma2; Widy Putra1

1. Center for Geodetic Control Network and Geodynamics, Geospatial Information Agency of Indonesia (BIG), Cibinong, Indonesia; 2. Staff at PT. Halliburton Indonesia
Email: bagas.triarahmadhana@big.go.id

### Abstract

*A couple of years ago, the Geospatial Information Agency of Indonesia (BIG) conducted a terrestrial gravity campaign surrounding the Regency of Penajam Paser Utara (PPU), currently known as the Ibu Kota Nusantara (IKN) area. The campaign is aimed to fulfill the areas with primary gravity data to combine with the airborne gravity as main data for geoid modeling. The campaign was equipped with the CG-5 Scintrex gravimeter. Every sporadic point at the interval of 2,5 km was measured for 10 mins with 1Hz repeated measurement. The precise position was acquired from Global Navigation Satellite System (GNSS) observation and corrected from the nearest Continuously Operating Reference Station (CORS). All the data collected were post-proceded by using Gravity Adjustment (Gradj) software. The gravity was tied to the absolute gravity value 978039.87967 ± 0.00767 mGal. The result gained gravity value for all points with uncertainty value less than 0.01000 mGal.*

## Paper ID: 095

## HYDROCHEMICAL ANALYSIS OF KEDUNGJAMBE HOT SPRING, TUBAN

M. Haris Miftakhul Fajar1*; Mahendra Wirayudhatama1; Muhammad Erfand Dzulfiqar Rafi1; Helda Kusuma Rahayu1; Faqih Ulumuddin1; Syabibah Zakiyya Zukhrufah1; Marsha Khairia Alfany1; Farah Aziz1; Rozaan Haiban Rizqulloh1

1 Department of Geophysical Engineering, Faculty of Civil, Planning and Geoengineering, Sepuluh Nopember Institute of Technology
Email: mharismf@geofisika.its.ac.id

**Abstract**

*Indonesia boasts abundant hot springs due to its numerous volcanoes. However, some are situated in the back-arc region, away from the volcanic arc. In Java, Indonesia, these back-arc hot springs are often overlooked for their geothermal potential but hold promise as geotourism destinations. One such spring is Kedungjambe Hot Spring in Tuban Regency, which the local community utilizes for geotourism and medicinal purposes. However, scientific knowledge about the formation of these hot springs remains limited. This study aims to characterize the hydro-facies of Kedungjambe hot spring through hydrochemical analysis. By employing hydrogeochemical tools, we aim to determine the type of spring and understand its genesis. Our methods include the Piper diagram, Cl-HCO3-SO4 diagram, K-Na-Mg diagram, and the Giggenbach geothermometer. The findings reveal that Kedungjambe Hot Spring possesses a water temperature of 47.7°C, a pH of 6.85, a CaMgHCO3 water type, immature water characteristics, and a peripheral location. The Giggenbach geothermometer estimates the reservoir temperature to be around 108°C.*

**Paper ID: 096**

**ASSESSMENT OF GEOMETRIC ACCURACY OF INDOOR MAPPING USING LOW-COST SPHERICAL PANORAMIC CAMERA**

Husnul Hidayat1*

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: hidayat.h@its.ac.id

**Abstract**

*Increasing world population multiplies the demand of living space which triggers the development of vertical settlement as the most feasible solution in major cities. Therefore the concept of 3D cadastre is now developing and mainly relies on the availability of indoor 3D data. We explore the potential of low cost spherical panoramic camera for creating 3D indoor data. This type of camera allows user to capture indoor scene into an immersive image, which provides more spatial information compared to ordinary camera. This research aims to create indoor 3D model and test the geometric accuracy of 3D positioning and measurement based on current standard of cadastral mapping in Indonesia. For the georeferencing, the ground control points were established by GPS and terrestrial surveying method. Some line segments were also measured to compare lengh measurement based on panoramic images. The results show that the best achieved accuracy has mean absolute error 0.010m, 0.020 m, and 0.022 m in X, Y, and Z direction respectively, while the mean abslute error in line segments is 0.028 m. The Root Mean Square Error of 3D*

73

positioning are 0.014 m, 0.015, and 0.004 m in X, Y, and Z direction respectively. This best accuracy corresponds to 0.031 m horizontal accuracy according to CE 90 criterion in Peraturan Kepala BIG No. 15 Tahun 2014. Moreover, this method allows user to generate up to 1:103th scale map according to the techinical guide of systematic land surveying and registration by Indonesian Ministry of Agrarian and Land Planning.

**Paper ID: 097**

## ANALYSIS OF DEFORMATION ALONG THE FLORES BACK-ARC THRUST USING CORS GPS OBSERVATION DATA

Safanata Azza Laksono1*; Putra Maulida1; Muhammad Taufik1

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: safanatalaksono@gmail.com

**Abstract**

*Indonesia consists of several layers of large plates and has many active mountains, especially in the Lesser Sunda region of Bali, West Nusa Tenggara, and East Nusa Tenggara. The collision between the constituent plates causes a fracture which is commonly referred to as a fault. One of the faults found in Indonesia is the fault along the Back Arc Thrust of Flores. The fault is thought to cause various disasters, one of which is an earthquake that occurred approximately 9,000 times throughout 2022 in the Bali and Nusa Tenggara areas. The high activity of these earthquakes encourages the need for monitoring of the conditions that occur along the Back Arc of Flores. Therefore, monitoring is necessary, one of which is deformation monitoring. This monitoring uses GPS observation data from BIG CORS in the Bali and Nusa Tenggara area totaling 49 stations. The GPS data is processed using GAMIT/GLOBK software to obtain the velocity and direction of displacement values. The value is then processed by removing Sunda Block effects and the results are analyzed for strains and compared with tectonic phenomena that occur in the area. In addition, the results are also used as a reference for decision making by the government, reference to development, and mitigation of disasters that may occur.*

**Paper ID: 098**

## INTEGRATING REMOTE SENSING AND GIS FOR PRECISION AGRICULTURE: LEVERAGING GOOGLE EARTH ENGINE FOR ENHANCED AGRICULTURAL MANAGEMENT

Eko Yuli Handoko1*; Achmad Fahriza1; Mukhammad Muryono2

1. Department of Geomatics Engineering, Faculty of Civil, planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia; 2. Department of Biology, aculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Indonesia
Email: ekoyh@its.ac.id

## Abstract

*The convergence of remote sensing technologies and Geographic Information Systems (GIS) offers transformative potential for precision agriculture. This study explores the application of these technologies, with a specific focus on the capabilities of Google Earth Engine (GEE), to enhance agricultural management practices. By leveraging the extensive computational power and data accessibility of GEE, we analyze satellite imagery and geospatial data to monitor crop health, predict yields, and optimize resource use. The integration of remote sensing and GIS through GEE not only improves the accuracy and efficiency of agricultural assessments but also supports sustainable farming practices by enabling real-time decision-making and proactive management. This research underscores the critical role of advanced geospatial tools in modern agriculture, providing a robust framework for addressing the challenges of food security and environmental sustainability.*

**Paper ID: 099**

## THE ROLE OF CLOSE-RANGE PHOTOGRAMMETRY IN MODERNIZING AUTOMATED STORAGE AND RETRIEVAL SYSTEMS

Helmy Mukti Wijaya1*; Hepi Hapsari Handayani1

1. Department of Geomatics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: helmy.mukti.wijaya@gmail.com

## Abstract

*Close-range photogrammetry has found significant applications in a variety of fields, and its potential in Automated Storage and Retrieval Systems (ASRS) is increasingly being recognized. This paper explores the use of close-range photogrammetry for enhancing ASRS performance, focusing on its capabilities for accurate, non-contact measurement and monitoring. The integration of close-range photogrammetry in ASRS can improve system precision, efficiency, and reliability by providing detailed geometric data essential for the optimal functioning of storage and retrieval operations. Case studies are presented to demonstrate the successful application of this technique in ASRS environments, highlighting improvements in inventory accuracy, system diagnostics, and maintenance. The advantages of close-range photogrammetry, such as its high-resolution data capture, ease of implementation with existing digital*

*systems, and ability to operate in various industrial conditions, make it a valuable tool for advancing the effectiveness of ASRS technology.*

**Paper ID: 100**

# A STUDY OF LINEAMENT DENSITY AND CORRELATION WITH GEOTHERMAL MANIFESTATIONS AND RESIDUAL GRAVITY ANOMALIES IN MOUNT PANDAN, EAST JAVA

Juan Pandu Gya Nur Rochman*; Agnis Triahadini; Muhammad Zidan Naufal; Faiz Maulana Achsan; Calvin Ashari Dwiska; Muhamad Erick Asyari; Maulida Krisna Dewi

1. Department of Geophysics Engineering, Faculty of Civil, Planning and Geo Engineering, Institute Teknologi Sepuluh Nopember, Indonesia
Email: djuan.rochman@gmail.com

## Abstract

*Mount Pandan, one of the mountains in East Java which located in the back arc of the mountains with several faults around it. The mountain exhibits geothermal potential, as evidenced by sub-magmatic activities such as hot springs and steaming ground. Geothermal manifestations are closely related to geological structures because they can be zones of fluid flowing beneath the surface. Geological structures can be identified through lineament density analysis method to ascertain the pattern of lineaments and their correlation with geological structures. Studies regarding lineament density on Mount Pandan are still limited to date. This research analyzes the relationship between lineament density, geothermal manifestations, and residual gravity anomalies. Data for lineament density comes from DEMNAS, with a research area of 14 x 32 km. Hillshade will be divided into four types based on azimuth and elevation. The gravity data used GGMplus satellite data. Analysis shows that the lineament pattern on Mount Pandan has a dominant orientation of E-W. It indicates a connection with the geological structure of the research area, including the anticlinorium and the Kendeng fault. A minor pattern, also seen with an NE-SW orientation, may be related to the Pacul Fault. However, geothermal manifestations lie in lineament densities ranging from 5.6 to 1.89, classified as medium-low density. Low gravity anomaly in the area indicates the presence of rocks that have low density or geological structures that influence the gravity anomaly. Zones with high lineament density are associated with the distribution of geological structures in the research area.*

# DEFORMATION STUDY ON THE SURFACE STRUCTURE OF SELOGRIYO TEMPLE BASED ON MULTITEMPORAL 3D MODELING USING TERRESTRIAL LASER SCANNING (TLS) TECHNOLOGY

Yudo Prasetyo1*; Nurhadi Bashit1; Wira Maulana Ashar1

1.Photogrammetry and Remote Sensing Lab, Department of Geodetic Engineering, Faculty of Engineering, Diponegoro University, Indonesia
Email: yudo.prasetyo@ft.undip.ac.id

## Abstract

*Historic buildings are an important part of human cultural heritage. There are many historical buildings in Indonesia, one of which is the Selogriyo Temple. Selogriyo Temple as building historical location located on a Sukorini Hills, Magelang City, Central Java often vulnerable to various risk like change environment, shocks seismic, change load, and aging naturally possible result happen deformation in the structure of Selogriyo Temple. The aim of this study is the aim of this research is to obtain deformation measurement results from multi-temporal 3D modeling of the Selogriyo Temple building structure. Using a technology Terrestrial Laser Scanner (TLS) in this research which will produce analysis multi-temporal 3-dimensional deformation using the surface-to-surface method. A multi-temporal 3- dimensional model will be tied with coordinate results GNSS measurements using tool Reflectorless Total Station (X and Y) and spirit level (Z). Apart from that, this research also includes development techniques for more measurements accurate and efficient, as well as promoting understanding about modern TLS technology. In addition, this study can contribute to understanding about protection and preservation inheritance culture. The result of this research is a 3-dimensional model of Selogriyo Temple building second epoch and surface to surface method deformation model. Calculation accuracy results measurement of the 3-dimensional model of Selogriyo Temple second epoch obtained distance RSME value of 0.010 m, the RMSE of the X coordinate is 0.012, the RMSE of Y is 0.010, and the RMSE of Z is 0.005 m. Analysis deformation multitemporal using the surface to surface method , a significance test was carried out with level 95 percent confidence in the test point taken in a way random from results of the surface to surface method deformation model .The results of the significance test show that the test points taken from the 3D deformation model using the surface to surface technique have no differences in results (indication of insignificant deformation) except at test points U1 and U2 which are indicated to have experienced significant deformation (T value <1.96).*

**Paper ID: 102**

# LITHOLOGY PREDICTION USING K-NEAREST NEIGHBORS (KNN) ALGORITHM STUDY CASE IN UPPER CIBULAKAN FORMATION

Eki Komara1*; Muhammad Rafi1; Muhammad Faiz Nugraha1; Wien Lestari1

1. Geophysics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia;
Email: komara@its.ac.id

## Abstract

*This study focuses on lithology predictions using log data input by applying one of the machine learning algorithms, namely K-Nearest Neighbors (KNN). The Hyperparameter K value is determined based on the number of nearest neighbors calculated using the Euclidean distance principle. The K value in KNN needs to be optimized in order to find out the best K value to get high accuracy. The KNN parameter used in data training were n_neighbors, leaf_size, n_jobs and p. The accuracy value of the model is obtained by comparing the results of the actual qualitative interpretation of lithology with the prediction results of lithology with KNN resulting precision, recall and F1 as representative of model accuracy. In the data train wells KP-24, KP-54 and KP-57 as well as test data, namely the KP-34 well, the value of k = 5 has the highest accuracy value of 89.9%. With the dominance of lithology in the predicted results, namely limestone, according to the information on the well data area, namely the Cibulakan Formation above and into the well, it reaches the Baturaja Formation. These results indicate that the lithology predicted by the KNN algorithm from the train data is already representative of the actual lithology data. Comparison of the results of qualitative interpretation with the results of machine learning predictions on the KP-34 well can predict thin or small layers and data labels in a relatively short time. The results of this machine learning algorithm accelerate performance so that it is more efficient and effective.*

**Paper ID: 103**

# INVESTIGATION OF EARTHQUAKE DISASTER RISK USING ARCGIS SATELLITE IMAGERY CASE STUDY OF NORTH TAPANULI REGENCY

Muhammad Faiz Nugraha; Beryl Zaidan Mahastra; Faried Abdillah Santoso; Singgih Purwanto*

1. Geophysics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: singgih@geofisika.its.ac.id

## Abstract

*Earthquakes are natural phenomena that occur unexpectedly without any warning signs or symptoms that humans can perceive, often resulting in significant panic. Earthquakes caused by tectonic activities, such as faults, have a value known as Peak Ground Acceleration (PGA), which helps determine the potential impact and risk associated with these faults. North Tapanuli Regency is one of the regions in Indonesia traversed by two faults, namely the Renun and Toru faults. To assess earthquake disaster risk in this area, ArcGIS-based data processing is utilized to analyze station data for calculating PGA, MMax, and Tmax values. The analysis reveals that the maximum magnitude (MMax) for the Toru segment is 7.374159, and for the Renun segment, it is 7.696116. The maximum earthquake recurrence period (Tmax) for the Toru segment is 429 years, while the Renun segment has a recurrence period of 1013 years. Additionally, a disaster mitigation map is produced using PGA values as the parameter, indicating that areas with higher PGA values (represented in red) are at greater risk of earthquake impacts.*

**Paper ID: 104**

# EARTHQUAKE HYPOCENTER RELOCATION USING THE DOUBLE-DIFFERENCE METHOD

Siti Asmayanti Tuasamu1*; Wien Lestari1

1. Department of Geophysics Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: 5017201001@student.its.ac.id

## Abstract

*South Java is a region that is prone to earthquake activity due to its location along the subduction zone between the Indo-Australian Plate and the Eurasian Plate in the Indian Ocean. In order to mitigate earthquake risks, it is important to have accurate data on the relocation of hypocenters, which can help in better understanding the earthquake source, hazard assessment, early warning systems, and seismic activity monitoring in the South Java Region. The method used to relocate earthquake hypocenters is the double-difference method, which utilizes the residual time from observed travel time and the computed result between pairs of neighboring events. An amount of 195 earthquake events underwent a two-stage relocation process with the first stage utilizing the ph2dt program and the second stage using the hypoDD program. As a result of the relocation, the number of earthquake events was reduced to 170. The relocated events provided coordinates for the epicenters at before and after relocation, showing the observed shifts, which were then plotted on a map. Additionally, this paper presented validation results in the form of histogram depicting*

*the residual values, which exhibited a reduction in magnitude. Furthermore, this study displayed the direction of shifts through a rose diagram.*

**Paper ID: 105**

# HERITAGE BUILDING INFORMATION MODELLING: LIDAR AND PHOTOGRAMMETRY FOR DIGITAL TWIN OF KERATON SUMEDANG LARANG

Agus Wachid2; Perdana Rian Juniarta3; Anita Fatmawaty Effendi3; Daniel Gunawan4; Tossan Aditya Azhar3; Sidik Permana Ramdan5; Asep Karsidi1

1. Pusat Penelitian Geografi Terapan (PPGT), Universitas Indonesia; 2. PT. ID Survey, Jakarta, Indonesia; 3. PT. Geomatik Teknologi Reka Cipta (GTRC), Jakarta, Indonesia; 4. PT. Geoprima Solusi Tbk, Jakarta, Indonesia; 5. PT. Digital Survey Nusantara, Jakarta, Indonesia
Email: digitaltwin321@gmail.com

**Abstract**

*Keraton Sumedang Larang or Sri Manganti was built in 1950 at the former residence of King Kusumadinata II or Prabu Geusan Ulun. Keraton Sumedang Larang is located in the complex of Gedung Negara Sumedang Regency, West Java, Indonesia. Currently, Indonesian people still lack insight regarding the existence of the Keraton Sumedang Larang as a historical and cultural heritage. This building has made various efforts to maintain its existence as a cultural heritage in Indonesia, one of which is by making this building as the Prabu Geusan Ulun Museum and creating a virtual tour by the Sumedang Regency Government. Therefore, this virtual tour needs to be developed to make it more interesting. The use of 3D digital technology through BIM (Building Information Modeling) has been widely applied to help manage cultural heritage in various places in the world. Digitization programs are used to better maintain, protect, and record the information of historical buildings. This research is expected to produce digital twin results for the Keraton Sumedang Larang by implementing the concept of digital heritage, namely the use of computational methods or digital devices to provide a real picture and be able to present users as if they see and feel it in real life. It is hoped this concept can be applied to cultural heritage management in Indonesia, which is mandated to identify, protect, care for, present, and transmit the values of cultural heritage to future generations.*

# TROPICAL CYCLONE INTENSITY PREDICTION USING BP-RNN FROM GPS-DERIVED PRECIPITABLE WATER VAPOR AND SURFACE METEOROLOGICAL DATA

Febrylian Fahmi Chabibi1*; Nabila Sofia Eryan Putri2; Dudy Darmawan Wijaya2

1. Center for Geodetic Control Network and Geodynamics, Geospatial Information Agency of Indonesia (BIG), Cibinong, Indonesia; 2.Bandung Institute of Technology
Email: febrylian.fahmi@big.go.id

**Abstract**

*Tropical cyclones frequently threaten tropical coastal areas, making accurate prediction vital. While cyclone track forecasting has improved, predicting cyclone intensity remains challenging. This study uses precipitable water vapor (PWV) and other surface meteorological data to predict wind intensity during tropical cyclone Seroja in southern Indonesia. Data was derived from two GPS stations, CKUP and CRTE, near the cyclone paths. We employed neural network (NN) algorithms to model nonlinear relationships between variables, utilizing backpropagation to minimize error. The NN was fed with time series data across various window sizes (0 h, 6 h, 9 h, and 12 h), assuming that parameters at one time point influence subsequent values. Independent variables included PWV, ZTD, partial pressure of water vapor, temperature, and air pressure, with additional attributes implemented in multiple scenarios. Two years of data (2019-2020) were used to train the model, and wind velocities were estimated during cyclone Seroja. At CKUP, scenario 1 with a 9-hour window size achieved a probability of detection (POD) of 89% and a critical success index (CSI) of 84%. At CRTE, scenario 4 with a 6-hour window size achieved a POD of 73% and a CSI of 55%. The root mean square error for predicted wind speed was 1.32 m/s at CKUP and 2.08 m/s at CRTE. This model, leveraging GPS and meteorological sensor data, shows great potential for detecting extreme events during tropical cyclones.*

**Paper ID: 107**

# COMPARING PIXEL-BASED AND OBJECT-BASED CLASSIFICATION FOR MAPPING SMALLHOLDERS RICE FIELD TYPES USING PLANETSCOPE IMAGERY IN SEKAMPUNG DISTRICT, EAST LAMPUNG, INDONESIA

Isnaini Dairina1*; Sigit Heru Murti1; Rika Harini1

1. Faculty of Geography, Universitas Gadjah Mada, Yogyakarta, Indonesia
Email: isnainidairina@mail.ugm.ac.id

## Abstract

*It is essential to obtain precise and up-to-date information on the area of rice fields, as the yield of rice is a fundamental indicator of national food security. The mapping of rice fields based on water supply is still limited, particularly in Indonesia, which is characterised by ecological diversity and rice fields. The launch of Planetscope imagery, which offers high temporal and spatial resolution, provides the opportunity to map the types of rice fields occupied by people. The objective of this study is to compare the accuracy of land use mapping using pixel-based (maximum likelihood) and object-based (SNIC segmentation and random forest classification) in order to generate a rice field map. The results of the object-based classification demonstrated a total accuracy of 92.8% and a kappa coefficient of 0.82. In contrast, the pixel-based maximum likelihood classification showed an accuracy of 74.34% and a low kappa coefficient of 0.43. The mapping of rice field types based on irrigation relies on remote sensing data and field interview data, with an accuracy of 88.05% and 91.09% in planting season 1 and planting season 2, respectively based on Agricultural Centre in Sekampung District*

Paper ID: 108

# EXAMINING THE IMPACT OF THE TRANSPORTATION, MANUFACTURING, AND ENERGY SECTORS ON AIR QUALITY IN JAKARTA USING SPATIAL REGRESSION

Muhammad Iqbal1; Bowo Susilo1*; Dyah Rahmawati Hizbaron2

1. Department of Science and Information Geography, Faculty of Geography, Universitas Gadjah Mada; 2. Department of Environmental Geography, Faculty of Geography, Universitas Gadjah Mada
Email: bowosusilo@ugm.ac.id

## Abstract

*This study employs Geographically Weighted Regression (GWR) to analyze the spatial distribution of air pollutants $NO_2$, $SO_2$, and CO in Jakarta and its surrounding areas, focusing on variations between dry and wet months in 2023. The analysis utilizes pollution data from Sentinel-5P images, processed using Google Earth Engine and ArcGIS/QGIS software. The study area, encompassing Jakarta and a 100 km radius, includes industrial and energy sector data to understand pollution source contributions. The GWR models explored three scenarios with different predictor variables in the pixel based: network density, number of intersections, and industrial proportion. The results reveal significant spatial heterogeneity in pollutant concentrations, with higher emissions during dry months. Scenario 1, which includes all predictor variables, shows the highest LocalR2 values in highly industrialized*

*zones. Scenario 2, excluding the energy sector variable, demonstrates broader model applicability, while Scenario 3, with only transportation-related variables, offers the widest coverage but reduced specificity. These findings provide critical insights for policymakers to formulate targeted strategies for air quality management, aiming to mitigate the adverse effects of air pollution on the population.*

**Paper ID: 109**

# BARRIERS TO SOCIAL SUSTAINABILITY IN AFGHAN RESIDENTIAL BUILDING CONSTRUCTION

Mohammad Qasim Mohammadi1; Moh. Arif Rohman1*

1. Department of Civil Engineering, Faculty of Civil, Planning and Geo Engineering, Institut Teknologi Sepuluh Nopember, Indonesia
Email: arif@ce.its.ac.id

## Abstract
*Although socially sustainable building is becoming increasingly popular worldwide, past studies indicate that when policymakers support sustainable building development, the social dimension is often given insufficient attention or entirely disregarded. There are not many studies that focus on the problems of socially sustainable buildings in Afghanistan. This research investigates the factors that may hinder social sustainability implementation in residential building construction. The study will gather data from construction professionals by purposive sampling and employ Exploratory Factor Analysis (EFA) and Varimax for analysis. The results will undergo rigorous examination and thorough discussion. The expected results in this research will analyze the underlying barrier structure (factors) that hinder social sustainability, and each of these factors will represent a set of observed variables. In addition, the factor loadings show which barriers pose the greatest challenges. The primary goal of this study is to provide valuable insights into the impediment factors of social sustainability within the residential building environment, aiming to inform decision-making in the industry and encourage the adoption of more socially sustainable construction practices.*