ICGoES 2022

International Conference on Geological Engineering and Geosciences

Program & Abtracts Book

UNIVERSITAS GADJAH MADA
FAKULTAS TEKNIK
DEPARTEMEN TEKNIK GEOLOGI

Dean of Faculty of Engineering UGM

Distinguish guests, colleagues, professors, lecturers, researchers, ladies, and gentlemen. On behalf of the Faculty of Engineering Universitas Gadjah Mada, I would like to express my sincere gratitude and welcome you to the International Conference on Geological Engineering and Geosciences (ICGoES 2022). Moreover, I honorably welcome our keynote speakers.

First of all, may I thank each of our keynotes and speakers for taking part in this international conference. This is the second conference that we are holding our major annual event in a hybrid manner and this year we are focusing on 'Multidisciplinary Approach in Geological Engineering' as the main conference theme. I also want to thank all of the online participants for connecting to this conference, and I hope you are looking forward to the discussions as much as I am.

I hope through this conference we can share, discuss, and exchange ideas, experiences as well as good practices associated with the field of geological engineering and geosciences among researchers, academics, practitioners, policymakers, and related communities. We are now living in a connected world that contributes to the increasing complexity of the issues faced by geologists. Big data, the internet of things, artificial intelligence, and machine learning are terms that are now is going to familiar in all fields. Technology is also progressing at a very fast pace, which currently is weighing heavily on the earth's bounty of natural resources and causing serious damage to the environment.

Geohazard and natural disasters are other examples of complex problems that require multidisciplinary research that spans the natural and social sciences if we're to acquire the kind of predictive ability that could inform decision-makers. Now, more than ever, there is an urgent need for professionals from all sectors of engineering and science to come together and work together to find sustainable solutions to sustain economic growth without harming the environment in any way whatsoever.

ICGoES 2022 also provides opportunities to all participants in expanding their network, as an important step to achieving a coordinated approach and multidisciplinary collaboration at the regional and international level in the field of geological engineering and geosciences.

Last but not least, my deepest gratitude goes to the organizing committee, international scientific committee, companies, and volunteers who have directly and indirectly supported the success of this conference. The committee has organized a vibrant scientific program and is working hard to present highly respected and internationally notorious speakers to lead it. Although we try our finest to be professional, please accept our sincere apologies should there be inconveniences that occur before, during, or after the event.

I wish you a very productive conference with exciting and encouraging discussions and exchange of knowledge so that together we can anticipate a future of groundbreaking knowledge, research, and technology for humanities. Ladies and gentlemen, let me once again thank our fantastic speakers for giving their time and insight today. And I hope all of you watching enjoy the conference.

Best regards,

Prof. Ir. Selo, S.T., M.T., M.Sc, Ph.D., IPU.

Dean of Faculty of Engineering Universitas Gadjah Mada

Head of Geological Engineering Department Faculty of Engineering UGM

International Conference on Geological Engineering and Geosciences (ICGoES 2022) presents 'Multidisciplinary Approach in Geological Engineering' as the main conference theme. This conference provides a forum for international researchers, academics, practitioners, policymakers and related communities to discuss, share and exchange their latest research and experience progress associated with the field of geological engineering and geosciences. In addition, this conference also aimed to address a common issue of georesources sustainability, renewable energy sources and climate change-related geohazard and disasters in the development of urban areas. Certainly, those issues require an integrated approach and collaborative efforts in particular to build and enhance resilient cities in the respective countries.

ICGoES 2022 provides opportunities to all participants in expanding their network, as an important step to achieve a coordinated approach and interdisciplinary collaboration at the regional and international level in the field of geological engineering and geosciences. We invited research papers on the topic of Empowering STEM in Geological Engineering, Humanitarian Engineering and Georesources and Geohazard Management and Applied Geology to Support SDGs

The ICGoES 2022 is held on hybrid from 21 to 23 September 2022 as well as onsite will be held at the Prof. Rooseeno Soerjohadikoesoemo building, the new Smart and Green Learning Center (SGLC) of The Faculty of Engineering, Universitas Gadjah Mada Yogyakarta, Indonesia.

This international conference invites reputable researchers from all over the world such as Japan, Germany, Vietnam, Thailand, Myanmar, Malaysia, Laos, Nepal, UK, as our scientific committee and reviewers. As the call of full paper will announced after this conference has attracted more than 40 papers and posters submitted to the EasyChair Submission System.

During the plenary session of the conference, we will pleased to welcome four distinguished experts to share their experience and present their insightful keynote speech, that is:

- Prof. Juliana Sutanto, from Management Science Department Management School, University of Lancaster, UK, with presentation title "Operation Research in Geohazard Management"
- Dr. Ernst Niederleithinger from Bundesanstalt für Materialforschung und -prüfung (BAM) Germany, with presentation title "3G-Geophysical Methods Delivering Input to Geostatistical Methods for Geotechnical Site Characterization"
- Pri Utami, PhD, from Department of Geological Engineering, Universitas Gadjah Mada, Indonesia, with presentation title "Cultural Approach in The Conservation of Geothermal Environment: an Example from Dieng Plateau"
- And we will have a Special Lecture by Prof. Subagyo Pramumijoyo Department of Geological Engineering Universitas Gadjah Mada, Indonesia with presentation title "Geologi Gempa Bumi Indonesia"

We would like to acknowledge all of those who supported the ICGoES 2022. We would like to express our sincere gratitude to all scientific committees who made in-depth reviews of full papers, to sponsors who give their support, and to each individual and institutional help that is

very important for the success of this conference. Thank you to all the organizing committee and related parties who built this virtual conference feasible and comfortable.

We are hopeful that the proceedings will serve as important references which will lead not only to scientific research and academic purposes but also in practical, industry and policy aspects associated with the field of geological engineering and geosciences.

Best regards,

Dr.Eng. Ir. Agung Setianto, S.T., M.Si., IPM.

Head of Department of Geological Engineering

Faculty of Engineering, Universitas Gadjah Mada

GENERAL PROGRAM SCHEDULE

DAY 1: WEDNESDAY, 21 SEPTEMBER 2022

TIME (WIB)	PROGRAM	
08:00 – 09:00	Registration & Morning Coffee	
09:00 – 10:00	**Welcoming Remarks** *Head of Geological Engineering Department, Faculty of Engineering UGM* Dr. Eng. Ir. Agung Setianto, S.T., M.Si., IPM.	
	Opening Speech *Dean of Faculty of Engineering UGM* Prof. Ir. Selo, S.T., M.T., M.Sc, Ph.D., IPU.	
	TECHNICAL SESSION	
	Room 1	**Room 2**
10:00 – 12:00	**TS-1: Hydrogeology, Environmental Geology and Engineering Geology** Paper ID: 8, 23, 25, 31, 33, 34, 45, 46	**TS-2: Georesources and Geotechnical Engineering** Paper ID: 5, 7, 35, 36, 41, 48, 1, 44
12:00 – 13:30	Break	
13:30 – 14:30	**Keynote Speech 1** Prof. Juliana Sutanto, Ph.D *Management School, University of Lancaster, UK* "Community Resilience Management System"	
14:30 – 15:00	Break	
	TECHNICAL SESSION	
	Room 1	**Room 2**
15:00 – 16:00	**TS-3: Geothermal, Petroleum and Coal Geology and Technology (I)** Paper ID: 4, 20, 26, 54	**TS-4: Mineralogy, Petrology and Economic Mineral Resources (I)** Paper ID: 10, 22, 32, 52

Remarks:
WIB: Western Indonesian Standard Time
(GMT+7)

GENERAL PROGRAM SCHEDULE

DAY 2: THURSDAY, 22 SEPTEMBER 2022

TIME (WIB)	PROGRAM	
08:00 – 09:00	Registration & Morning Coffee	
	TECHNICAL SESSION	
	Room 1	**Room 2**
09:00 – 10:30	**TS-5: Georesources and Geohazard Management** Paper ID: 2, 9, 19, 37, 28, 14	**TS-6: Geophysics, Computation in Geological Engineering and Geoheritage** Paper ID: 6, 30, 47, 12, 40
10:30 – 12:00	**Special Lecture** Prof. Dr. Ir. Subagyo Pramumijoyo, DEA, IPU. *Department of Geological Engineering, Universitas Gadjah Mada, Indonesia* "Geologi Gempa Bumi Indonesia"	
12:00 – 13:30	Break	
13:30 – 14:30	**Keynote Speech 2** Dr. Ernst Niederleithinger *Bundesanstalt für Materialforschung und -prüfung (BAM), Germany* "3G-Geophysical Methods Delivering Input to Geostatistical Methods for Geotechnical Site Characterization"	
14:30 – 15:30	**Keynote Speech 3** Prof. Dr. Andreas Busch *The Lyell Centre, Heriot-Watt University, Edinburgh, UK* "The Use of the Geological Subsurface for Carbon and Energy Storage: Perspectives, Challenges and Outlook"	
15:30 – 16:00	Afternoon Coffee	

Remarks:
WIB: Western Indonesian Standard Time
(GMT+7)

GENERAL PROGRAM SCHEDULE

DAY 3: FRIDAY, 23 SEPTEMBER 2022

TIME (WIB)	PROGRAM	
08:00 – 09:00	Registration & Morning Coffee	
	TECHNICAL SESSION	
	Room 1	**Room 2**
09:00 – 11:30	**TS-7: Geothermal, Petroleum and Coal Geology and Technology (II)** Paper ID: 3, 16, 21, 27, 29, 53	**TS-8: Mineralogy, Petrology and Economic Mineral Resources (II)** Paper ID: 13, 15, 11, 38, 39, 49, 51, 50
11:30 – 13:30	Break	
13:30 – 14:30	**Keynote Speech 4** Ir. Pri Utami, M.Sc., Ph.D, IPM. *Department of Geological Engineering, Universitas Gadjah Mada, Indonesia* "Cultural Approach in The Conservation of Geothermal Environment: an Example from Dieng Plateau"	
14:30 – 15:00	Break	
15:00 – 16:00	ICGoES Closing ceremony Geoweek 2022 Awarding ceremony	

Remarks:
WIB: Western Indonesian Standard Time
(GMT+7)

TECHNICAL SESSION SCHEDULE

Technical Session Day 1, Wednesday, 21 September 2022, 10:00 – 12:00 WIB

TS-1 : Hydrogeology, Environmental Geology and Engineering Geology (ROOM 1) Chair/Moderator : Dr.rer.nat. Ir. Doni Prakasa Eka Putra, S.T., M.T., IPM.		
Time (WIB)	ID	Title
10:00 – 10:15	8	**Groundwater Well Rehabilitation Using Hydropuls Method: A Case Study in Wonosobo Groundwater Well** *S. Aryawicaksona, A. S. Muhammad*
10:15 – 10:30	23	**Hydrogeological Assessment of Groundwater Potential and Quality in Jabung Village and Its Surroundings, Jabung Sub-District, Malang Regency** *Faridha Aprilia, Wiyono, Didik Yudianto, Falza Nurrahman*
10:30 – 10:45	25	**Groundwater Balance Estimation And Quality For Irrigation in The Food Estate Area, Central Sumba Regency, East Nusa Tenggara, Indonesia** *D A Dayani, W Wilopo, I Azwartika*
10:45 – 11:00	31	**Groundwater-River Interaction Along Paneki River, Central Sulawesi, Indonesia** *A A Pratama, H Hendrayana, F Pawenrusi*
11:00 – 11:15	33	**Identification of Shallow Groundwater Facies and Flow Patterns in Batang Regency, Central Java, Indonesia** *Arifin Rizky Brillyanto, Muhammad Rifky Wibisana, Theo Rifaldi Siregar, Wahyu Wilopo*
11:15 – 11:30	34	**Nitrate Spatial Distribution and Origin in Shallow Groundwater: A Case Study of Batang Regency, Central Java, Indonesia** *Muhammad Rifky Wibisana, Arifin Rizky Brillyanto, Theo Rifaldi Siregar, Wahyu Wilopo*
11:30 – 11:45	45	**Preliminary Conceptual Model of Hydrogeological System in Pekalongan City, West Java, Indonesia** *M. F. Hasani, H. Hendrayana, A. Taufiq*
11:45 – 12:00	46	**Preliminary Conceptual Model of Hydrogeological System in The Pandanduri Dam and its Surrounding Area on the Lombok Island** *D Mararis, H Hendrayana, P A Pranantya*

TS-2 : Georesources and Geotechnical Engineering (ROOM 2) Chair/Moderator : Ir. Gayatri Indah Marliyani, S.T., M.Sc., Ph.D.		
Time (WIB)	ID	Title
10:00 – 10:15	5	**Structure Analysis Gunung Benau Karst Area by Using mSTA and FFD, North Kalimantan, Indonesia** *Heriyanto, E Haryono, Mahajana, P G Sabrain, H Magdalena, M D Balfas, Y Hidayatullah, M F Habibah*
10:15 – 10:30	7	**Betung Field Development Based On Petrophical Integration Analysis and Radius Drainase** *Aisyah Irmaya, Basuki Rahmad, Deddy Kristanto, Aris Buntoro*
10:30 – 10:45	35	**Discontinuity Measurement for Slope Failure Analysis with Strucutre from Moton Method Using Drone on A Slope in Hargowilis, Kokap District, Kulon Progo Regency, D.I. Yogyakarta Province** *Pieter Chandra Alfadec Waruwu, Agung Setianto, I Gde Budi Budi Indrawan*

10:45 – 11:00	36	**Liquefaction Potential Analysis Based on CPT and SPT Data at 57 Promenade Apartment Construction Project, Tanah Abang, Central Jakarta** *Richo Fahreza Cannigia, Urwatul Wusqa, Rezky Aditiyo*
11:00 – 11:15	41	**Correlation between Schmidt Hammer Rebound Test and Uniaxial Compressive Strength of Breccia in Kebobutak Formation at Bener Diversion Tunnel, Purworejo, Central Java, Indonesia** *E R Triristanto, H Setiawan, S Husein*
11:15 – 11:30	48	**Seroja Tropical Cyclone Destruction Case Study : Permanent Slope Protection Evaluation at Downstream of Rotiklot Dam Nomenclature Building, East Nusa Tenggara, Indonesia** *MSH Danuartha, T T Putranto*
11:30 – 11:45	1	**Rock Mass Characterization and Slope Stability Analysis Inlet Portal of Jragung Dam Diversion Tunnel, Indonesia** *A. Anggoro Bagyo Mulyo, B. I Gde Budi Indrawan, C. Ferian Anggara*
11:45 – 12:00	44	**The Sabu Formation as a Collision Deposit of Woyla Arc and West Sumatra Terrane** *Angga Jati Widiatama, Rezki Naufan Hendrawan, Happy Christin Natalia, Rikza Nur Faqih An Nahar, Evan Rosyadi Ogara, Indra Sanjaya, Lauti Dwita Santy, Vallery Inggrid Evitayanti*

Technical Session Day 1, Wednesday, 21 September 2022, 15:00 – 16:00 WIB

TS-3 : Geothermal, Petroleum and Coal Geology and Technology (I) (ROOM 1) Chair/Moderator : Dr. Ir. Ferian Anggara, S.T., M.Eng., IPM.		
Time (WIB)	ID	Title
15:00 – 15:15	4	**Low Rank Coal Upgrading to Optimize its Utilization as Fuel** *Datin Fatia Umar, Suganal, Zulfahmi, Nendaryono Madi Utomo, Ika Monika, Liston Setiawan*
15:15 – 15:30	20	**Comparation Method to Reveal A Low Resistivity Reservoir Potential in Gumai Formation, South Sumatra Basin** *Dhea Adisty Pratami, Sarju Winardi, Sugeng Sapto Surjono, Widi Atmoko*
15:30 – 15:45	26	**Characteristics and Potential of Coal for Coking Coal in Meliat and Tabul Formation, Tarakan Basin, Nunukan, North Kalimantan** *Mohamad Kurniadi, Ferian Anggara*
15:45 – 16:00	54	**Structural Kinematics of Indosinian Orogeny in Suphanburi, Thailand** *Muhammad Rozalli, Niti Mankhemthong, Christopher K Morley*

TS-4 : Mineralogy, Petrology and Economic Mineral Resources (I) (ROOM 2) Chair/Moderator : Ir. Esti Handini, S.T., M.Eng., D.Sc.		
Time (WIB)	ID	Title
15:00 – 15:15	10	**Porosity Modification, A Key to the Carbonate Diagenetic Environments. Case Study: Reefal Limestone, Marah Formation, East Borneo, Indonesia** *D. Rahmawati, M. D. Balfas, P. I. Rindawati, K. Sasmito, H. F. Rahman, A. F. Rojabi*
15:15 – 15:30	22	**Potential of Manganese Ore Deposit in Sukaagung Village, Tanggamus Regency, Lampung** *H.C., Natalia, A.J., Widiyatama, R.N., Hendrawan, R.N., Fakih*

15:30 – 15:45	32	**Mineralogical Characteristics of the Mekarbakti Low Sulphidation Epithermal Gold Prospect at Garut Regency, West Java, Indonesia** *Lismadhana Imawan, Anastasia Dewi Titisari, Arifudin Idrus*
15:45 – 16:00	52	**Mineralogical and Physical Characteristics of Ampo, Traditional Food Made from Clay in the Cirebon Region** *M Mahanani, I W Warmada, E Retnaningrum*

Remarks:
WIB: Western Indonesian Standard Time
(GMT+7)

Technical Session Day 2, Thursday, 22 September 2022, 09:00 – 10:30 WIB

TS-5 : Georesources and Geohazard Management (ROOM 1) Chair/Moderator : Dr.Eng. Ir. Lucas Donny Setijadji, S.T., M.Sc., IPU.		
Time (WIB)	ID	Title
09:00 – 10:15	2	**A Multi-Parameter Approach to Determining the Cause of Flood in Luwu North South Sulawesi** *Heru Hendrayana, Indra Agus Riyanto, Azmin Nuha, Ruslisan*
09:15 – 09:30	9	**Sinkholes Mapping in Tanjungsari, Gunung Kidul Regency, Yogyakarta: A Preliminary Data for the Assessment of Sinkhole's Subsidence Susceptibility** *Sokvireak Say, Doni Prakasa Eka Putra, Matsushima Kakuya*
09:30 – 09:45	19	**Integration of Fuzzy Sets, AHP, and Topsis Methods for Estimation of Liquefaction Potential Zones in Wates Groundwater Basin, Kulon Progo, Special Region of Yogyakarta** *Muhamad Iham, Doni Prakasa Eka Putra*
09:45 – 10:00	37	**Detection and Mechanical Interpretation of Surface Displacement Caused by Volcanic and anthropogenic Interactions around the Bandung Basin, Indonesia through Multi Temporal Interferometric SAR (MT-InSAR) Technique** *P G Sabrian, A Saepuloh, M R Septyandy, Heriyanto*
10:00 – 10:15	28	**Assessment of Physical, Social, and Economic Vulnerability to Landslides Disaster in The Karangsambung Karangbolong National Geopark, Indonesia** *Dimas Aryo Wibowo, Puguh Dwi Raharjo, Eko Puswanto, Unggul Handoko, Mohammad Al' Afif, Muhammad Anggri S.*
10:15 – 10:30	14	**Study of Weathering and Rock Mass Quality Using the Gological Strength Index (GSI) Method on the Tuntun Mine Road, Banggai Regency, Central Sulawesi Province** *Hendra Pachri, Safruddim, Muh.Fajrin*

TS-6 : Geophysics, Computation in Geological Engineering and Geoheritage (ROOM 2) Chair/Moderator : Ir. I Gde Budi Indrawan, S.T., M.Eng., Ph.D., IPM.		
Time (WIB)	ID	Title
09:00 – 10:15	6	**Artificial Intelligence-Based Landslide Studies in Indonesia: A Systematic Review in Recent Years** *T. H. W. Kristyanto, U. Wusqa, T. Y. R. Destyanto*
09:15 – 09:30	30	**The Dawn of Spatial Geoscience Big Data in Indonesia and Challenges for its Adaptation in Geological Engineering Higher Education** *Lucas Donny Setijadji*
09:30 – 09:45	47	**Aquifer Mapping Using Geo-Electrical Resistivity Survey for Seepage Mitigation in Kuwil Kawangkoan Dam, North Minahasa, North Sulawesi, Indonesia** *Rizal Setiawan, Wahyu Wilopo, Pulung Arya Pranantya*
09:45 – 10:00	12	**Geothermal Prospecting with Geological Structure Interpretation Using Gravity and Geomagnetic Modeling: Way Selabung Potential Area, South Ogan Komering Ulu, South Sumatera, Indonesia** *Nugroho Prasetyo, Irfan Prasetyo, Patria Ufaira Aprina, Meschac T. Silalahi*
10:00 – 10:15	40	**A Preliminary Study of Past Geological Disasters In The Trowulan Majapahit Cultural Heritage Area, Mojokerto Regency, East Java** *Bagaskara Wahyu Purnomo Putra, Didit Hadi Barianto, Agung Setianto*

Technical Session Day 3, Friday, 23 September 2022, 09:00 – 11:30 WIB

TS-7 : Geothermal, Petroleum and Coal Geology and Technology (II) (ROOM 1) Chair/Moderator : Rahmadi Hidayat, S.T., M.Eng.		
Time (WIB)	ID	Title
09:00 – 10:15	3	**Facies Controls on the Fracability in Shale Hydrocarbon Development Based on Geomechanical Analysis from Well Log and Mineralogy Analysis from Drill Cuttings: A Case Study of the Lower Baong Fm and Belumai Fm of Well NSB-001 in the North Sumatra Basin, Indonesia** *Aris Buntoro, Basuki Rahmad, M. Nurcholis, Erlangga Septama, Allen Haryanto Lukmana, Edo Anuraga*
09:15 – 09:30	16	**Analysis of Top Overpressure and its Generating Mechanism in The Offshore "Tyas" Block, Lower Kutai Basin, East Kalimantan** *Fatima Azzahra Ayuningtyas, Jarot Setyowiyoto, Moch Rushatmanto*
09:30 – 09:45	21	**Source Rock Quality and 1D Maturity Model in Pendalian Sub-Basin, Central Sumatra Basin** *Putri Dwi Afifah, Donatus Hendra Amijaya, Sarju Winardi, Widi Atmoko*
09:45 – 10:00	27	**Enrichment of Rare Earth Elements and Yttrium (REY) in Meliat and Tabul Formation Coal, Tarakan Sub-Basin, North Kalimantan Province** *Muhammad Abdul Aziz Amira, Ferian Anggara*
10:00 – 10:15	29	**Geochemical and Petrographic Characteristics of Coal in Potential of Critical Elements Susubang-Uko and Roto Samurangau, Pasir Regency, East Kalimantan** *Rara Fajrina M, Ferian Anggara*
10:15 – 10:30	53	**Siliciclastic Reservoir Geo-modeling using TGS-SIS hybrid algorithm of the Upper Cibulakan Formation, Offshore Northwest Jawa Basin** *Harlan Renaldi, Sugeng S Surjono, Sarju Winardi, P. K. Dani Setiawan*

TS-8 : Mineralogy, Petrology and Economic Mineral Resources (II) (ROOM 2) Chair/Moderator : Ir. Anastasia Dewi Titisari, M.T., Ph.D., IPU.		
Time (WIB)	ID	Title
09:00 – 10:15	13	**Preliminary Study of The Phyllite Rock from the Luk Ulo Melange Complex, Central Java, Indonesia** *Isyqi, Nugroho Imam Setiawan, Ferian Anggara*
09:15 – 09:30	15	**Characteristics of Pyrophyllite and Hydrothermal Alteration at Argotirto Area, Malang Regency, East Java, Indonesia** *Vanadia Martadiastuti, Tri Winarno, Rinal Khaidar Ali, Eva Cintia Purba*
09:30 – 09:45	11	**Geological Structure Analysis Approach to Control the Distribution of Manganese in Gunungkasih Area, Tanggamus District, Lampung Province** *Rezki Naufan Hendrawan, Angga Jati Widiatama, Muhammad Irsyad, Ahmad Dennil Zainuddin, Aditya Gunawan, Rikza Nur Faqih An Nahar, Happy Christin Natalia, Evan Rosyadi Ogara*
09:45 – 10:00	38	**Hydrothermal Mineralogy Characteristic at the Bakan Gold District, Northern Sulawesi, Indonesia: Field Mapping, SWIR Spectroscopy, and Petrographic-Ore Microscopy** *Aditya Pratama, Arifudin Idrus, I Wayan Warmada, Johan Arif, Atmasari Rura*
10:00 – 10:15	39	**Control of Lithology, Structures, and Breccia to the Gold Mineralization in the Bakan Gold District, Northern Sulawesi, Indonesia** *Aditya Pratama, Arifudin Idrus, I Wayan Warmada, Johan Arif*

10:15 – 10:30	49	**Nickel as a Strategic Mineral and its Potential Resources in X-Field, North Konawe, Southeast Sulawesi, Indonesia** *Fatimah, D.Y., Her Krissanto, J.Y., Nugroho, R.P., Pamunga, M.A.*
10:30 – 10:45	51	**Volume Estimation of the Thickest Scoriaceous Tephra-Fall Deposit on the South-Southwestern Flank of Mt. Raung** *Agung Harijoko, Sherinna Mega Cahyani, Mradipta Lintang Alifcanta Moktikanana, Haryo Edi Wibowo*
10:45 – 11:00	50	**Porosity and Hydraulic Conductivity of Volcanic Rocks on the Northern Slope of Bromo-Tengger Volcano Complex** *Aisyah Salsabilla Rositha, Doni Prakasa Eka Putra, Lucas Donny Setijadji, Heru Hendrayana*

Remarks:

WIB: Western Indonesian Standard Time
(GMT+7)

POSTER PRESENTATION

ID	TITLE
17	**Wallrock Alteration Characteristics and Gold Mineralization of the Mount Muro Low Sulphidation Epithermal Deposit, Murung Raya Regency, Central Kalimantan Province, Indonesia** *Subhan Nur Syaban, Arifudin Idrus, Lucas Donny Setijadji*
18	**Groundwater Potential Zone Mapping in Northern Gunung Kidul Regency, Yogyakarta Special Region** *Aliakbar Hashaemi Rafsanjani*
24	**Geology and Fe-Skarn Mineralization in Lolo Prospect, Solok, West Sumatra, Indonesia** *P.D. Ananke, A. Idrus, A.D. Titisari*
43	**Mineralogy and Ore Characteristics of Pb-Zn Skarn Deposit at Kujang Prospect, Sukabumi Regency, West Java** *Eka Harris Suryawan, Arifudin Idrus, Imam Suyanto, Ilham Ilmawan, M. Dzulfikar Faruqi*

Table of Contents

Abstract Number: 8

GROUNDWATER WELL REHABILITATION USING HYDROPULS METHOD: A CASE STUDY IN WONOSOBO GROUNDWATER WELL

S. Aryawicaksona1*, A. S. Muhammad 1

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Hydropuls is one of the groundwater well rehabilitation techniques that involves pulsing highly compressed nitrogen gas through screen pipes at an adjustable interval. Nitrogen gas was chosen because of its colorless, odorless, and inert properties. This well has confined aquifer with the lithology sand, gravel and silty clay – laharic deposit (member of Sundoro Volcanics; Qsu) as its aquifer. The following methods were used in this well rehabilitation: step tests before, borehole camera before, airlifting, borehole camera after and step test after well rehabilitation. According to airlifting results, the material clogging this well is sand-clay sediment. Thin section analysis shows that sediment mostly consists of lithic fragments and plagioclase. The results of the polished section analysis reveal that the majority of the metallic mineral are magnetite and hematite. The XRF results show that the sediment mostly consists of silicon oxide (SiO2). According to the XRD results, the sediment is mostly albite. After well rehabilitation, specific capacity of the well increased by 168% compared to prior condition, more discharge with the same drawdown and the pumping water level was shallower with the same flow rate before and after well rehabilitation. Borehole camera imaging confirmed that none of screen pipes was damaged during the hydropuls process and gravel positioning is more compact.

References

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Abstract Number: 23

HYDROGEOLOGICAL ASSESSMENT OF GROUNDWATER POTENTIAL AND QUALITY IN JABUNG VILLAGE AND ITS SURROUNDINGS, JABUNG SUB-DISTRICT, MALANG REGENCY

Faridha Aprilia1*, Wiyono1, Didik Yudianto1, Falza Nurrahman1

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Jabung Village is located in Jabung Sub-District, Malang Regency, East Java. The groundwater potential of this area varies, there are areas with good groundwater potential (Krajan and Boro Kidul), but others have poor groundwater potential. In addition, an Integrated Waste Shelter (IWS) exists which has the potential to pollute groundwater. The purpose of this research is to analyze controlling factors for differences in groundwater potential by mapping groundwater flow patterns and lithology. Moreover, a groundwater quality assessment is performed to mitigate groundwater pollution. The collection of groundwater data, including groundwater levels and quality (TDS, pH, and temperature), was carried out at 49 points. Geological data were collected at 29 points, then analyzed and presented on a geological map. Meanwhile, water table data is processed into an equipotential contour map and their flow direction. Groundwater quality data are presented on a map to obtain the distribution of values and trends. The groundwater flows from northeast to southwest. Based on the groundwater flow patterns, areas with good groundwater potential are in the discharge zone, while other sites that have poor groundwater potential are in the recharge and transition zone. The groundwater quality measured: TDS values are <400 mg/L, the temperature is 24.5 to 27.7 °C, and the pH ranges from 5.95 to 7.67. The results of geological mapping show that the study area is composed of andesite lava, tuff, sandy tuff-1, and sandy tuff-2. Locations with good groundwater potential consist of sandy tuff-1 and sandy tuff-2, while areas with poor groundwater potential consist of tuff and andesite lava. The groundwater quality was examined against the regulation of Permenkes No. 32 of 2017, and it was found that some of the pH values did not meet the water quality standards for sanitation hygiene. The results of this study did not show any indication of groundwater contamination due to IWS. Differences in groundwater potential are thought to occur due to groundwater flow patterns and lithological types. Furthermore, it is necessary to periodically monitor groundwater quality, especially in the outflow zone of IWS.

Keywords: flow patterns, hydrogeological assessment, Jabung Village.

Abstract Number: 25

GROUNDWATER BALANCE ESTIMATION AND QUALITY FOR IRRIGATION IN THE FOOD ESTATE AREA, CENTRAL SUMBA REGENCY, EAST NUSA TENGGARA, INDONESIA

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Food estate in Central Sumba Regency is one of Indonesia's Nasional Strategic Projects that aim to increase the national food supply. Groundwater has been the main water supply by residents around the food estate area in Central Sumba Regency. Groundwater exploitation in the research area uses dug wells, bore wells, and springs. They mostly use groundwater for domestic use and irrigation purposes. Aquifer depletion and declining groundwater levels can occur as groundwater is exploited too much due to the growing need for groundwater. Hence, determining the groundwater budget is required to ensure the basin's sustainability. This study aims to determine groundwater quality for irrigation in the food estate and estimate the groundwater budget. In this study, the meteorological water budget method (MWB) was used to estimate the groundwater budget in the research area. Besides, water quality is also an important feature of groundwater, and it expresses how sufficient the water is for various needs, each having its requirements represented as water quality standards. Groundwater samples were taken from various areas in the research area, and groundwater's physical-chemical properties, such as TDS, EC, temperature, and pH, were measured in the field and compared with Government Regulation no. 22, 2021 and FAO for irrigation water quality standards. The MWB method analysis results show that the research area has a low to medium groundwater potential. The result of physical-chemical properties measurement: TDS value is 183 mg/L on average, EC value is 366 µS/cm on average, the temperature value is 25.5°C on average, and pH value is 7.3 on average. It can be concluded that all of the samples met the standards.

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Abstract Number: 31

GROUNDWATER-RIVER INTERACTION ALONG PANEKI RIVER, CENTRAL SULAWESI, INDONESIA

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Abstract. The river water system is an essential component in the groundwater system and conversely. Depending on geological conditions, river water can be connected to shallow or deep groundwater. The Paneki River is an intermittent river that passes through the liquefaction area in the village of Jono Oge. Paneki River has water in the upstream and downstream segments, but the middle segment is arid, which is clear evidence of exchange between river water and shallow groundwater. The interaction between the Paneki river and groundwater is needed in developing the type of Jono Oge liquefaction mitigation, which has a concept of dewatering technique. We have collected data through field investigation and analysis of sub-surface data to determine geological conditions and measured elevation water table from 58 shallow groundwater wells located up to a radius of 2 km from the river to determine groundwater flow patterns in the area around the river. Electrical conductivity (EC) is measured to create a physical parameter profile map. Measure vertical hydraulic gradient (VHG) to determine the interaction between groundwater and rivers. Stream discharge measurements at specific segments were carried out to validate the VHG value. The results showed that the geology of the study area is dominated by alluvium, especially below the riverbed. There is also sandstone lithology and liquefaction debris in the study area. The VHG values obtained varied from positive values indicating upwelling (effluent), negative values indicating downwelling (influent), and 0 indicating no exchange. The value of the stream discharge ranges from 0.04 to 1.7 m^3/s, which increases or decreases, similar to the value of VHG. EC in river water and shallow groundwater in the vicinity shows a value of 350-750 µS/cm. The EC profile map shows similar values between river water and shallow groundwater wells, indicating connectivity. Alluvium lithology, which is dominated by sand, allows the exchange to occur. At a certain point, there is no exchange because the riverbed is clay, and the river walls have been covered with concrete. Through VHG analysis and stream discharge, three types of interactions between rivers and groundwater can be identified: influent from STA 0+200 to STA 6+400 and from STA 9+000 to STA 11+200, effluent from STA 6+400 to STA 8+100, and no exchange at STA 8+400 to STA 9+000. The form of river and groundwater interaction is illustrated by a cross-section of the river and a map of the river-groundwater interaction. In conclusion, the interaction between the Paneki River and groundwater can be either effluent or influent influenced by the elevation of the surrounding water table. The condition of no exchange at a certain point can occur due to river engineering.

Keyword: Groundwater-river interaction, Vertical Hydraulic Gradient, Shallow groundwater, Alluvial river, Paneki River

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Abstract Number: 33

IDENTIFICATION OF SHALLOW GROUNDWATER FACIES AND FLOW PATTERNS IN BATANG REGENCY, CENTRAL JAVA, INDONESIA

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Population growth as a result of a subsequent increase in the economic center and industrial complex construction has also proven to influence the shallow groundwater occurrence in Batang Regency, Central Java, Indonesia, as the region had a minimum amount of observation and literature, especially regarding the issue namely groundwater flow pattern and facies distribution. This research discussed hydrogeological assessment through systematic mapping to investigate shallow groundwater occurrence, including 90 observation & measurement points consisting of 89 dug well and one water spring. Based on purposive random sampling with upstream-downstream consideration, 72 of 90 samples were analyzed in the laboratory to determine groundwater hydrochemistry. The results indicated that the shallow groundwater pattern in Batang Regency generally flows from south to north with a dominant southwest-northeast pattern. Based on the trilinear piper diagram, shallow groundwater facies in the study area are characterized by calcium bicarbonate, alkali chloride, alkali bicarbonate, and mixed types. Distribution-wise, calcium bicarbonate facies are widely spread in the southern part of the study area. In contrast, alkali bicarbonate is mainly found between the coastline and hilly in the south. On the other hand, alkali chloride is distributed evenly along the coastal area. Intermixing of different groundwater facies is expected due to its positive correlation between TDI and major ions plot in the composition diagram.

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Abstract Number: 34

NITRATE SPATIAL DISTRIBUTION AND ORIGIN IN SHALLOW GROUNDWATER: A CASE STUDY OF BATANG REGENCY, CENTRAL JAVA, INDONESIA

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Rapid expansion of the rural agricultural areas would substitute the crop-producing land into industrial complex even housing estate thus affecting groundwater quality especially in Batang Regency, Central Java, a region situated on the northern coastal area of Java with a numerous of site-construction, and had a limited studies and investigations regarding on groundwater contamination issue, specifically nitrate contamination. This research determines potential of nitrate contamination and its primary source. 72 samples were analyzed laboratory to determine nitrate concentrations in each sample. These samples recapitulated and summarized into spatial distribution map. Nitrate concentration in study area relatively medium – high with some areas exceeding the WHO standard drinking water quality threshold. In the other hand, Cl/NO_3^- and Cl/Br methods was used to determine source of nitrate contamination in study area. The results of Cl/Br method showed primary source of nitrate contamination in shallow groundwater mostly came from septic effluent and animal waste. According to Cl vs Cl/NO_3^- graph, most of the samples lied within the nitrate anthropogenic contamination zone. Land-use consideration is also put to use, as the distribution of a specific land-use would conclude the kind of factor influencing the shallow groundwater system.

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Abstract Number: 45

PRELIMINARY CONCEPTUAL MODEL OF HYDROGEOLOGICAL SYSTEM IN PEKALONGAN CITY, WEST JAVA, INDONESIA

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Pekalongan City and its surroundings experienced rapid development and population growth that increased the amount of groundwater utilization. The exploitation of groundwater that is relatively large and not balanced with the recharge rate causes a decline in groundwater level. This study aims to determine the hydrogeological system in the Pekalongan area and its surroundings to find the proper management to prevent groundwater drawdown. Hydrogeological systems are determined by geological conditions, geomorphology, groundwater flow patterns, and subsurface lithologies. Geological and geomorphological conditions are known by conducting field observations. Groundwater flow patterns are learned by observing and measuring groundwater levels at 101 locations of dug wells. Subsurface lithology is known by geophysics surveys at 8 locations and correlated with existing log bore data. The results showed that the geology consisted of alluvium units widely spread from the northern part to the middle and occupied about 60% of the study area. Gravel sand units spread from the central region to the southern part, and volcanic breccia in the western part of the research area and the eastern part locally. There are two types of aquifers in the study area: unconfined aquifers consist of clay sand lithologies and confined aquifers with gravel sand lithologies and volcanic breccia. The groundwater flow pattern indicates groundwater movement from south to north. Aquifers are scattered in the flat morphology that dominates most of the study areas as groundwater accumulation areas because several large rivers that supply surrounding shallow groundwater or influent rivers.

Keywords: hydrogeological system, Pekalongan, aquifers.

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Abstract Number: 46

PRELIMINARY CONCEPTUAL MODEL OF HYDROGEOLOGICAL SYSTEM IN THE PANDANDURI DAM AND ITS SURROUNDING AREA ON THE LOMBOK ISLAND

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Abstract. the availability of water resources is increasingly limited and even tends to be increasingly scarce; an in-depth study of geological-hydrogeological analysis of springs and groundwater is needed to support various community activities. This study aims to determine the hydrogeological system in the Pandanduri Dam area and its surroundings. The hydrogeological system is determined by geological conditions, geomorphology, and groundwater flow patterns. Geological conditions were obtained by conducting field investigations, and groundwater level data was obtained by measuring dug wells from 36 points and measuring 13 points of spring locations. Volcanic sedimentary rocks and volcanic breccia dominate the study area. Three (3) rock units can be distinguished, namely (1) the sandy volcanic breccia unit is located in the southern part of the study area, precisely in the reservoir area, and (2) the andesite volcanic breccia unit dominates located in the southern part of the study area. The study area's eastern, western, and northern parts and (3) alluvial deposit units located in the study area covered the andesite volcanic breccia. The aquifer consists of volcanic sedimentary rock and volcanic breccia with a sandy bottom. The 2D interpretation of the dam area shows that the sandy volcanic breccia unit has a resistivity value between 5 ohms - 25 ohms in the form of lapilli tuff sand interspersed with fine tuff, located at a depth of 8 meters below the surface. The groundwater flow pattern shows that the groundwater movement follows the topography that flows from the hilly area west-northwest of Santong Village to the southeastern river valley of Pandanduri Village; geological and geomorphological conditions influence this.

Keywords: hydrogeological system, 2D resistivity method, groundwater flow, Pandanduri Dam

Abstract Number: 18

GROUNDWATER POTENTIAL ZONE MAPPING IN NORTHERN GUNUNG KIDUL REGENCY, YOGYAKARTA SPECIAL REGION

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According to some reports, the Northern Part of Gunung Kidul Regency area has the courage to experience drought in the dry season. Water reservoirs such as ponds and wells will dry up. The northern part of Gunung Kidul Regency on the Regional Hydrogeological Map SheetIX Yogyakarta is included in the area of non-exploitable groundwater. This study aims to determine the zone of groundwater potential in the area. The determination of the groundwater potential zone was carried out using a multi-criteria analysis method, the Analytical Hierarchy Process (AHP). The parameters used as a determining factor for groundwater potential zones are the level of lithological weathering, fracture density, slope, drainage density, and rainfall. The five parameters are weighted based on their level of influence on groundwater potential. The fifth parameter is then superimposed using ArcGIS to generate areas with groundwater potential index values. The groundwater potential index value is divided into 5 potential zones, namely very high, medium, low, and very low. Verification of the groundwater potential zone is carried out using data on the ratio of the emergence of springs to the groundwater potential zone. Sensitivity analysis was carried out to determine the suitability of the parameters of the groundwater potential with the conditions of the study area. The results showed that groundwater potential zones were very high, high, medium, low, and very low with an area of 12.8 km2, 46.8 km2, 69.7 km2, 35.8 km2, and 8.6 km2, respectively. The groundwater potential zone as a result of this research can be used asa policy basis for stakeholders in groundwater exploration and exploitation activities in Northern Part of Gunung Kidul Regency.

Keywords: Groundwater Potential Zone, AHP, Northern Part of Gunung Kidul

Abstract Number: 2

A MULTI-PARAMETER APPROACH TO DETERMINING THE CAUSE OF FLOOD IN LUWU NORTH SOUTH SULAWESI

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Floods and flash floods occur every year in North Luwu. The exact cause of the flooding is not known. The purpose of this study was to find the main factors causing flooding in North Luwu using a multi-parameter approach. The methods used are hydrological analysis, flood susceptibility analysis, and land use change analysis. The return period and intensity duration frequency of rain (1983-2021) was used for hydrological analysis. Flood susceptibility is obtained from the processing of slope, elevation, rainfall, stream density, soil type, and land use parameters. The results of flood susceptibility will be validated with flood events data. Land use change was analyzed using the Climate Change Initiative and Land Cover (CCI LC) data in 2000 and 2015. The results of the 1-year rainfall return period in North Luwu were relatively high, namely 83 mm/day, the 2-year return period of 119 mm/day, 5 years 142 mm/day, 10 years 155 mm/day, and 100 years 184 mm/day. The results of the IDF analysis obtained that the early rainy hours showed an intensity of 41-46 mm/hour with a total of 259 mm/day, which was considered extreme. There is a match between the results of the correlation of flood events in 2021 with recorded rainfall of 64-153 mm/day. Flood susceptibility analysis shows the dominant high vulnerability in the downstream area of 101,337 Ha. Meanwhile, the medium vulnerability (208,545 Ha) is in the middle and upstream, and the low vulnerability of 57,719 Ha in upstream. The high flood susceptibility map results followed the flood events distribution from 2017-2021. The land use change analysis did not show significant land use changes. Forest land is reduced by 803 Ha, heterogeneous agriculture by 1,619 Ha, and shrubs by 1,619 Ha. These results confirm that the high rainfall factor and the vulnerability of the physical condition of the North Luwu region are the main factors causing flooding.

Keywords: Return period, IDF, Flood Susceptibility, Land Use Change

Abstract Number: 9

SINKHOLES MAPPING IN TANJUNGSARI, GUNUNG KIDUL REGENCY, YOGYAKARTA: A PRELIMINARY DATA FOR THE ASSESSMENT OF SINKHOLE'S SUBSIDENCE SUSCEPTIBILITY

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Abstract: Tanjungsari district is located in Gunung Kidul Regency, Yogyakarta, Indonesia, known as the karst region where the dissolution process has taken place that might case sinkhole occurrence. There are some reports from the community about the subsidence occurrence and some sinkholes are found in this area. However, there is no any study that carry out the characteristic and the specific number of sinkholes presence in this area yet. Therefore, this preliminary study aims to create a sinkhole map in the study area with the observation of its physical characteristics. In order to achieve this goal, some important data such as lithological data, geomorphological feature, geological structure and the existed sinkhole location as well as its physical characteristic were collected by conducting the field observation and the secondary data evaluation. The collected data were analysed and used to create a sinkhole map in the study area by using GIS. As the results, the study area consists of many hills that mostly form as conical shape. Limestone is the only lithology type was found in the study area and it is likely to be influence by the dissolution process. Furthermore, there are more than 20 sinkholes were found and observed. Most of them are vertical with vary in diameter sizes from approximate 1m to 50m and the depth from a few meters onward. Sinkhole are found with similar number that associate with both lower area with soil cover and on the hill where there is no soil cover. The results from the study will serve as important information for further detail study such as sinkhole's susceptibility mapping.

Abstract Number: 19

INTEGRATION OF FUZZY SETS, AHP, AND TOPSIS METHODS FOR ESTIMATION OF LIQUEFACTION POTENTIAL ZONES IN WATES GROUNDWATER BASIN, KULON PROGO, SPECIAL REGION OF YOGYAKARTA

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In the regional development planning, geological, environmental, and socio-economic conditions must be considered. Among the crucial things is the potential for disasters in the region. The Wates Groundwater Basin area has great regional development potential, starting from the establishment of the New Yogyakarta International Airport (NYIA) to the Southern Causeway (JJLS) construction. Various developments are predicted to continue to grow along with the development of areas targeted by the government for this area, so that the mapping of potential disasters is absolutely necessary as a means of achieving sustainable development goals (SDGs). One of the potential disasters in CAT Wates is liquefaction disaster, which is supported by geological, hydrogeological, and seismic data in this area which is prone to liquefaction. To confirm this potential, this research was conducted using geological and hydrogeological data from previous studies. The result of this research is a more detailed and objective zoning map of the potential for liquefaction even though it uses minimal data. This is done by integrating the Fuzzy Sets, AHP, and TOPSIS methods. The results show that the eastern and southern regions of the basin which are composed of river deposits and coastal deposits, respectively, have a high to very high relative vulnerability to liquefaction, while the central region of the basin has a low to moderate relative vulnerability, and the northern region of the basin tends to have relatively very low vulnerability. It is hoped that these results can be developed for a more accurate liquefaction assessment as well as a reference for land use planning in the Wates Groundwater Basin area.

Abstract Number: 37

DETECTION AND MECHANICAL INTERPRETATION OF SURFACE DISPLACEMENT CAUSED BY VOLCANIC AND ANTHROPOGENIC INTERACTIONS AROUND THE BANDUNG BASIN, INDONESIA THROUGH MULTI TEMPORAL INTERFEROMETRIC SAR (MT-INSAR) TECHNIQUE

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Abstract. This study aims to evaluate capability of MT-InSAR (Multi Temporal interferometric synthetic aperture radar) technique for measuring the surface displacement caused by tectonic movement, volcanic, and anthropogenic activity around the Bandung basin, West Java, Indonesia. For this, persistent scatterer (PS), small baseline subset (SBAS), and combined PS and SBAS techniques are adopted. The results reveal different displacement patterns with the location, which are anthropogenic-caused subsidence in the middle urban area and geothermal production field, while uplift in the northern parts around the Tangkuban Parahu volcano caused by the volcanic activity of the volcano. In addition, the different tehnique show different patterns spatial resolution of InSAR. Another significant pattern is that, around the Wayang Windu geothermal field, large displacements occur around injection and production wells and also around the zones with high radon concentration in soil gas and micro-earthquake density. Those displacement patterns detected may contribute to mitigate geological hazards and advance geothermal production.

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Abstract Number: 28

ASSESSMENT OF PHYSICAL, SOCIAL, AND ECONOMIC VULNERABILITY TO LANDSLIDES DISASTER IN THE KARANGSAMBUNG KARANGBOLONG NATIONAL GEOPARK, INDONESIA

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ABSTRACT

The Karangsambung-Karangbolong National Geopark (GNKK) is administratively located in Kebumen Regency, Central Java Province, Indonesia. The GNKK area has an area of 543,599 km^2 which includes 12 sub-districts with 117 villages. The morphology of the GNKK area consists of hills, valleys, plains to the coast. The morphology of hills and mountains is an area that is prone to landslides. Assessment of physical, social, and economic vulnerability needs to be carried out so that disaster risk analysis and disaster mitigation can be carried out in the future. The aims of this study are 1. To determine the spatial distribution of physical, social, and economic vulnerabilities in the Karangsambung Karangbolong National Geopark Area, 2. To analyze the level of physical, social, and economic vulnerability to landslides in the Karangsambung Karangbolong National Geopark Area. Assessment of physical, social, and economic vulnerability using the Spatial Multi-Criteria Evaluation (SMCE) method. The results of the main study of the GNKK area have high physical, social, and economic vulnerability classes to landslide disasters. Socio-community conditions in each village are very influential on areas prone to frequent landslides. Landslide disaster mitigation strategy efforts are increasing disaster knowledge human resources with disaster mitigation training and the use of infrastructure such as installing landslide-prone signs and triggering paths.

Key word: The Karangsambung Karangbolong National Geopark, Landslide disasters, Physical vulnerability, Social vulnerability, Economic vulnerability.

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Abstract Number: 3

FACIES CONTROLS ON THE FRACABILITY IN SHALE HYDROCARBON DEVELOPMENT BASED ON GEOMECHANICAL ANALYSIS FROM WELL LOG AND MINERALOGY ANALYSIS FROM DRILL CUTTINGS: A CASE STUDY OF THE LOWER BAONG FM AND BELUMAI FM OF WELL NSB-001 IN THE NORTH SUMATRA BASIN, INDONESIA

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Abstract

The North Sumatra Basin, Indonesia has a very large shale hydrocarbon potential, especially from the Lower Baong Formation and the Belumai Formation. The sediment deposition of Belumai Fm and Lower Baong Fm developed in intra-cratonic settings starting from the Oligocene - Miocene through a transgression cycle phase in the Early Rift - Late Rift tectonic event. These conditions greatly affect the facies and diagenetic changes of quartz, smectite and kaolinite minerals on fracability in the development of shale hydrocarbons. The main problem in producing shale hydrocarbon is the very low permeability of shale, so in the production stage of shale hydrocarbon, a fracability model is needed based on an in-depth analysis of the mechanism that regulates hydraulic fracking, to open natural fractures, so that the fractures are connected to allow maximum hydrocarbon fluid flow. From the results of previous studies, it was shown that the shale hydrocarbon fracability value was controlled by lithofacies, and correlated with rock brittleness, brittle mineral content, clay content, and compressive strength. In the development of shale hydrocarbons, it is necessary to characterize shale-facies to determine shale properties. The shale-facies characterization in this study aims to determine the effect of facies on the fracable zone interval as a candidate for hydraulic fracking by using geomechanical analysis from well log and mineralogy analysis form drill cuttings of well NSB-001, so that from the correlation of the results of the analysis it can be determined the sweetspot fracable window (fracable zone interval) which correlates with the presence of the fracture barrier.

Key-words: facies, fracability, shale hydrocarbon, geomechanics, mineralogy, North Sumatra Basin

Abstract Number: 4

LOW RANK COAL UPGRADING TO OPTIMIZE ITS UTILIZATION AS FUEL

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Abstract
Indonesia's coal resources reach 143.7 billion tons with a total reserve of 38.84 billion tons, most of them are characterized as lignite and sub-bituminous coals which are referred to as low-rank coal. Most of the low-rank coal belongs to the Young Tertiary age, ranging in age from Pliocene to Miocene. Because of their Young Tertiary age, most Indonesian low-rank coals have high moisture content, low heating value, high propensity to low-temperature oxidation and spontaneous combustion, making them difficult to transport over long distances. To increase the utilization of the low-rank coals, an upgrading process was carried out by heating the coal at a temperature of 160°C and a pressure of 3.5 Bar. Two low-rank coal samples come from South Sumatera (A coal) and South Kalimantan (B coal), were used in this research. The results of the process show that the moisture content of the A coal decreased from 17.09% to 1.88 % (degree of dewatering of 89.00%) while the B Coal moisture content from 29.47% decreased to 1.32% (degree of dewatering of 95,5%) so that the calorific value in air dried basis (adb) of the A coal increased from 5,441 kal/g to 6,919 kkal/g (increased by 27.16%) and the B coal from 4,873 kal/g to be 6,854 kal/g (increased by 40.65%). The combustion characteristics obtained from the differential thermal analysis-Thermo gravimetry (DTA-TG) show that the A and B upgraded coals have better combustion characteristics than the raw coals. The initial temperature (Tig) and the temperature maximum of Tmax of the upgraded coals were higher than that of the raw coals. It means that the upgraded coals have a lower tendency for spontaneous combustion compared with the raw coals.

Keywords: low rank coal, moisture, calorific value, spontaneous combustion

Abstract Number: 16

ANALYSIS OF TOP OVERPRESSURE AND ITS GENERATING MECHANISM IN THE OFFSHORE "TYAS" BLOCK, LOWER KUTAI BASIN, EAST KALIMANTAN

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The Lower Kutai Basin is one of oldest tertiary basins producing hydrocarbon in Indonesia. The Kutai Basin is one part of the Regional III oil and gas field work contract. Subsurface pressure analysis is important in exploration activity, one of them to avoid drilling problems such as kick, blowout, stuck pipe, lost circulation and collapse pressure. This study aims to analyze overpressure conditions (determining the depth of top overpressure and the mechanism of overpressure) in the offshore "TYAS" Block, Lower Kutai Basin, East Kalimantan. Eaton Method (1975) used in this study to estimate pore pressure. The data that used in this study is well log data, pressure test data, LOT data, drilling report data, and mudlog data from four well (well T, well Y, well A, and well S). The top overpressure in each well has different depths. The depth of top overpressure at ±3050 mTVDSS (True Vertical Depth Subsea) in well T, at ±2830 mTVDSS (True Vertical Depth Subsea) in well Y, at ±2770 mTVDSS (True Vertical Depth Subsea) in well A, and at ±2600 mTVDSS (True Vertical Depth Subsea) in well S. The distribution of top overpressure in general of study area has been silted towards the east (towards the contour silting) where shale lithology has dominated. The overpressure generating mechanism in the study area is caused by the loading mechanism (disequilibrium compaction) and caused by the unloading mechanism (clay diagenesis). Based on subsurface pressure data in the study area, there was a centroid effects phenomenon (sandstone lenses between claystones) caused by a rapid sedimentation event. The centroid effect causes the value of pore pressure at top reservoir to be higher than shale at the same depth. That situation can trigger an overpressure condition. The rapid sedimentation event in the study area caused by structural control (normal fault) during the saging phase of the Kutai Basin (Late Eocene- Late Oligocene) which occurred in the deep sea.

Abstract Number: 20

COMPARATION METHOD TO REVEAL A LOW RESISTIVITY RESERVOIR POTENTIAL IN GUMAI FORMATION, SOUTH SUMATRA BASIN

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Reservoirs are potentially to produce hydrocarbons commonly have resistivity values more than 10-ohm meter (Palacky,1987). In some certain cases, there are reservoirs containing hydrocarbons with low resistivity value and called reservoirs low resistivity low contrast (LRLC). Resistivity logs in LRLC zones will have resistivity values with ranges of 0.5 – 5-ohm (Boyd et al,1995). Low contrast pay zone indicates the lack of resistivity contrast between pay zone and wet zones. The case of reservoir LRLC was identified on research area in Gumai Formation. Gumai formation in SN-3 well at DAP-1 interval has a low resistivity value ranging from 2 to 5-ohm and its DST show 82 BOPD of hydrocarbon oil with a gas rate of 0.42 MMSCFD without water. Core data illustrate that value of the Swirr is around 30%. Further identification is needed to determine a more accurate Saturation Water (Sw) calculation. Some of Sw calculation method are exercised in this study, they are the Sw conventional (Archie) and Sw based on CEC (Waxman Smits, Dual Water, and Juhasz). So this study are objected to identify the causes of LRLC reservoir in Gumai Formation and find a suitable Sw calculation method. The approaches are integrated with the several data such as well log, well report, core data, and petrography analysis (XRD or SEM). It will be used to calculate the petrophysical analyses such as Rw calculation, Vsh, Phie, Sw and would be validated by drill stem test data analysis in Gumai Formation. Based on the Pickett Plot method with a salinity 14.400 ppm and temperature of 80˚F, the result of Rw value is 18-ohm. The analysed show that the main causes of LRLC zones are the presence of fine grain reservoir, and clay minerals. The clay mineral type dominantly consists of mixed layers (Illite and Smectite) as a conductive mineral where smectite could be attribute to their high cation exchange capacity (CEC) with the value 70 (meq/100g). The presence of this high CEC mineral can reduce the resistivity value and increase the conductivity. Based on lumping the results of Sw calculation with CEC method have a range value from 38% Sw of Waxman Smits, 93% for Sw Dual Water, 81% for Sw Juhasz, and 93% for Sw Archie method. So, it can be concluded that the more optimistic calculation of Sw for the LRLC zone in this research area is Sw from Waxman Smits (CEC method) because it has a close matching with Swirr.

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Abstract Number: 21

SOURCE ROCK QUALITY AND 1D MATURITY MODEL IN PENDALIAN SUB-BASIN, CENTRAL SUMATRA BASIN

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Pematang Formation is well known as the main source rock in the Central Sumatra Basin (Mazied et al, 2008). The formation which acts as source rock has been studied thoroughly in the central and eastern parts of the basin, but research regarding source rock in the western part of the basin, which is the study area, is very limited. Three available wells have been analyzed to evaluate their role as source rock in the geochemical view through the determination of the quantity of organic content based on the Total Organic Carbon (TOC) data, determining the type of kerogen, and thermal maturity of the source rock according to the values of Tmax and Vitrinite Reflectance (%Ro). Burial history and thermal maturity models (1D basin modeling) were also constructed to understand the timing of hydrocarbon generation. The results show that Pematang Formation among Sihapas and Telisa Formation has good organic content with TOC ranging from 0.2 to 42.48 wt%, and the maturity parameters (%Ro and Tmax) indicate that the Pematang Formation has reached the mature stage. Both formations are dominated by Type II kerogen. Sihapas Formation has poor TOC content while Telisa Formation has fair to good organic content, but these two formations are thermally immature. SHT-1 well is located in the west part of the study area, while SMB-1 well and GT-1 well are located in the southwest and northwest. 1D modeling on the SHT-1 well shows that the Pematang Formation is currently in the oil maturity window starting from early oil (0.55-0.70 %Ro) to main oil at 20.61 Ma (0.70-1.00 %Ro), but the model of SMB-1 and GT-1 well has not reached the oil maturity window. Tectonic activity is estimated to have a significant effect on this difference when the uplift activity of Bukit Barisan in the Middle Miocene increased the maturity in the northwest, but the inversion that occurred in the Late Miocene resulted in uplift and erosion of young sediments, thus lowering the temperature in some area. The depth position of the SHT-1 well which has touched the main oil is at the deepest depth compared to other wells. The maturity of the SHT-1 well can be additional information that the Pematang formation that less-explored in the western part of Central Sumatra Basin can also produce hydrocarbon.

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Abstract Number: 26

CHARACTERISTICS AND POTENTIAL OF COAL FOR COKING COAL IN MELIAT AND TABUL FORMATION, TARAKAN BASIN, NUNUKAN, NORTH KALIMANTAN

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Coking coal is coal that melts, expands, then reconsolidates during carbonization and can produce coke as an iron refining agent in blast furnaces. Characterization of the potential of coking coal in Indonesia is still being developed. One of these potentials is in the Tarakan Basin (Meliat-Tabul Formation) taking into account the presence of high calorific value. The purpose of this study was to determine the characteristics and potential of coking coal from coal has been mined at PT. Duta Tambang Rekayasa and it was included in the Meliat-Tabul Formation. The samples analyzed were 4 units and it was a blend of coal has been mined from the E, F, and G seams. Coal characteristics based on proximate analysis show that coal contains ash about 11.14 – 31.21 adb (%), total moisture is 5.87 – 6.83 adb (%), volatile matter is 31.49 – 35.86 adb (%), and fixed carbon is 31.41 – 46.17 adb (%), while based on ultimate analysis it contains C is 66.92 – 79.86 daf (%), H is 5.57 – 6.20 daf (%) , O is 11.22 – 16.57 daf (%), N is 1.36 – 1.76 daf (%), total sulfur is 1.30 – 9.57 daf (%). The organic petrographic characteristics of coal are composed of vitrinite maceral at 69.82% - 87.64%, with liptinite content 8.00 % - 22.73% and inertinite content 2.91 %- 4.36%. The average reflectance of vitrinite in the research area is 0.42 - 0.45 (% Rv random) and belongs to the subbituminous B. The caking and coking ability of coal in the study area is low based on the analysis of the crucible swelling number showing a value of 1 - 1.5 and the value of gray king coke type is B – C, so that it is included in non-coking coal because it does not have good plastic properties. The coal characteristics of all samples based on the classification of Laver and Laverick (1978), Rance (1975), and Miller (2005) are included in non-coking coal and can not produce the good quality of coke.

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Abstract Number: 27

ENRICHMENT OF RARE EARTH ELEMENTS AND YTTRIUM (REY) IN MELIAT AND TABUL FORMATION COAL, TARAKAN SUB-BASIN, NORTH KALIMANTAN PROVINCE

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REY has experienced a significant increase in demand, mainly used in the manufacture of high-tech and environmentally friendly tools. Currently, REY production is still limited in China, which is able to control world REY production. One alternative source of REY can be found in coal and coal ash resulting from coal combustion. Tarakan sub-basin is one of the coal-producing basins in Indonesia who has geological criteria that can enrich REY in coal. The purpose of this study was to determine the petrographic and proximate characteristics, type and concentration of REY, and the process of enrichment of REY on coal at the research site. The sample comes from the coal mining site of PT. Duta Tambang Rekayasa (DTR), coal and non-coal sampling used system ply by ply. The samples were then prepared for petrographic, proximate, and Inductively Coupled Plasma-Mass Spectrometry/Atomic Emission Spectrometry (ICP-MS/AES) analysis.

The petrographic characteristics of coal in the study area are composed of maceral groups of vitrinite 47,27 – 78,36 (% vol), liptinite 5,27 – 44,91 (% vol), inertinite 1,09 – 9,64 (% vol), and minerals matter 0,55 – 16,36 (% vol), while the ash yield value is 5,88 – 53,57 (%wt, adb), moisture 4,05 – 9,05 (%wt, adb), volatile matter 22,.37 – 46,59 (%wt, adb), and fixed carbon 17,39-44,98 (%wt, adb). There are two samples with a total REY concentration value of more than 68,5 ppm. REY enrichment through terrigenous, infiltrational, and hydrothermal type mechanisms in Tarakan Sub-basin coal. The terrigenous process occurs due to the uplift of the basin boundary and opens the path for clastic sediment deposition. Infiltrational and hydrothermal processes occur because the dominating HREY indicates the spread of water enriched with REY circulating in the coal basin. The seawater infiltration process causes the mire to always be flooded, creating a reductive condition, so that REY can be bound by organic materials in the form of ion adsorption clay, as well as the influence of hydrothermal acid solution due to the period of coal deposition along with volcanic and magmatic activity in the Tarakan Basin.

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Abstract Number: 29

GEOCHEMICAL AND PETROGRAPHIC CHARACTERISTICS OF COAL IN POTENTIAL OF CRITICAL ELEMENTS SUSUBANG-UKO AND ROTO SAMURANGAU, PASIR REGENCY, EAST KALIMANTAN

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Rare Earth Elements and Yttrium (REY) is one of the strategic minerals included in the "critical elements" that currently plays a role in developing advanced technology-based industries. The critical elements include Al, Sb, As, Be, Bi, Cs, Cr, Co, Cu, Ga, Ge, Hf, Ni, In, Fe, Li, Mg, Mn, Mo, Nb, K, Re, Rb, Sc, Si, Sr, Ta, Te, Sn, Ti, W, U, V, Zn, REE, and PGE. The production of critical elements in the last few decades has increased significantly from 2016 to 2017. Indonesia is one of the largest coal-producing countries in the world and one of the producing regions is Kalimantan. One of the locations considered to be potential is in the PKP2B area of PT Kideco Jaya which is located in Susubang-Uko and Roto Samurangau, Pasir Regency, East Kalimantan. The purpose of this study was to explore coal sampling to determine the characterization of coal consisting of geochemical and petrographic compositions to determine the content of critical elements that might potentially provide resources in the research area. This study used proximate analysis, Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES), Inductively Coupled Plasma Mass Spectrometry (ICP-MS), and organic petrography.

Coal from the research area did not experience enrichment, with a REY concentration range of 6.38 – 49.82 ppm. The geochemical composition of coal which is dominated by major elements is SiO2 6.23% (Seluyus), Al2O3 2.65% (Seluyus), Fe2O3 0.75 – 2.34% (Uko), and CaO 1.25% (Seluyus). With trace elements and REY dominated by Ba 65.57 ppm (Roto South), Sr 64.80 ppm (Roto North), and V 19.17 ppm (Seluyus), and Zr 21.50 ppm (Seluyus). Coal characteristics based on proximate analysis have moisture 14.95 – 26.95 %wt adb, volatile matter 36.95 – 45.34 %wt adb, ash 0.96 – 5.62%, total sulfur 0.11 – 3.22 %wt adb and fixed carbon 28.56 – 43.37 %wt adb. The characteristics of coal based on ultimate analysis have a carbon content of 69.39 – 76.74 %wt daf, Hydrogen 4.98 – 5.91 %wt daf, Nitrogen 0.82 – 1.30 %wt daf, Oxygen 16.28 – 23.23 % wt daf, and coal calorific value 4508 – 6133 cal/gr including sub-bituminous rank. The petrographic characteristics of the research area consist of vitrinite, inertinite, and liptinite. So that the potential critical elements in the research area are Sr 64.80 ppm and V 19.17 ppm.

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Abstract Number: 53

SILICICLASTIC RESERVOIR GEO-MODELING USING TGS-SIS HYBRID ALGORITHM OF THE UPPER CIBULAKAN FORMATION, OFFSHORE NORTHWEST JAWA BASIN

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The Upper Cibulakan is the primary hydrocarbon-producing formation in the Offshore Northwest Jawa area, operated by PHE ONWJ (Pertamina Hulu Energy Offshore Northwest Jawa). The productive interval in this formation comprises alternating sandstone and shale up to 45 feet of thick. Geologically, this interval is a shallow marine deposit with strong influence of tidal in the Ardjuna Sub-Basin, offshore part of Northwest Jawa Basin. The good quality reservoir layer is associated with Tidal Sand Ridges (TSR) facies characterized by lenticular sedimentary structures and the occurrence of shale intercalation in sandstone. The occurrence of shale, regarding its facies association package, varies greatly and significantly determines the quality of the reservoir.

The geometry and quantity of facies distribution and association will significantly affect the calculation of hydrocarbon reserves during the modelling processes. Considering this, the selection of modeling methods and algorithms must be carried out appropriately. The use of the SIS (Sequential Indicator Simulation) algorithm in describing the TSR facies distribution still has shortcomings in randomness. Correspondingly, it requires to be combined with the TGS (Truncated Gaussian Simulation) method as it plays a great impact in calculating the distribution of sandstone and reservoir geometry. Meanwhile, SIS defines shale intercalation within TSR facies.

Combining these two methods produces a more precise model of TSR facies associations. Besides, the concept of reservoir deposition is easier to explain based on the outcome result from the combined methods.

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Abstract Number: 54

STRUCTURAL KINEMATICS OF INDOSINIAN OROGENY IN SUPHANBURI, THAILAND

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The closing of Palaeo-Tethys Ocean during Permian-Jurassic is related to the subduction and collision of Sibumasu along with Sukhothai and Indochina Blocks, however the detailed kinematics of the closure remain remained enigmatic, particularly the structural evolution and transport directions associated with collision. Previous studies have largely tried to construct the tectonic events in the absence of detailed structural analysis. To understand the deformation associated with the Indosinian Orogeny basic structural measurement and observations were made from outcrops in Suphanburi Province. Palaeozoic to Mesozoic strata exposed in outcrops and quarries were investigated in the U-Thong area. Structures were recorded to understand their kinematics, relative timing, and changing of rock character (veins, cleavage, metamorphism) due to different deformation phases. Lithologies in the research area comprise marble, schist, calc-silicate, and igneous intrusion. Bedding, foliations and cleavage have various direction but most commonly the strike-directions are N/NE-S/SW and E-W. Deformation is interpreted as having undergone an early, dominantly west-vergent contractional phase that is overprinted by top to the east to NE extensional structures. The extension is inferred to be a result of progressive extensional collapse of over-thickened crust during the Indosinian Orogeny. The evolution of structures started with recumbent folds, development of crenulation cleavage, S-C structure, anastomose shear, and low angle sub-horizontal shear zones. Those early structures are cross-cut by boudinage formation in a N-S direction. Formation of extensional collapse is probably related to the slab delamination and exhumation of lower crustal rocks. The extensional structures largely post-date c. 215 Ma intrusions of pegmatites.

Abstract Number: 5

STRUCTURE ANALYSIS GUNUNG BENAU KARST AREA BY USING mSTA AND FFD, NORTH KALIMANTAN, INDONESIA

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Abstract. The formation of Gunung Benau is associated to the geological structural process. This study uses remote sensing using DEMNAS data resampled at 10 meters. The DEMNAS data will be modeled using the modified Segment Tracing Algorithm (mSTA) and Fault Fracture Density (FFD) approaches. Surface geological mapping methods involve observations, descriptions, direct measurements, and field data recording of data appearances and geological conditions on the Gunung Benau. The structure which found in Gunung Benau is a shear joint with syncline and anticline folds and nine faults identified. The mSTA's main lineament directions, Northeast-Southwest and Southeast-Northwest, are consistent with the area's geological structure. The FFD shows that the highest density values occur in the central region of Gunung Benau, where faults are extensively exposed.

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Abstract Number: 7

BETUNG FIELD DEVELOPMENT BASED ON PETROPHICAL INTEGRATION ANALYSIS AND RADIUS DRAINASE

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The target of this research is the Betung Field with a productive reservoir of sandstone layers of the Air Benakat Formation. This productive layer is separated into 4 sandstone layers, namely L-2, L-3, L-4, and L-5. Based on the calculation of reserves, the potential in Layer 5 (L-5) in 2017 is still quite large with Original Oil In Place (OOIP) of 16,531.05 MSTB. It is still possible for further development to be carried out by determining potential locations for the addition of development wells in the Betung field where one strategy is to integrate petrophysical properties, especially porosity and permeability with a bubble map of the L wells. -5.

This study uses a petrophysical data processing methodology obtained from well logs and production data using Petrel Petrophysical and Oil Field Manager software. The output of Petrophysical Petrel is in the form of a petrophysical property model, which in this study used a map of the distribution of porosity and permeability. The output of the Oil Field Manager is a bubble map model to determine the drain radius and cumulative production of a well. The petrophysical property model is then integrated with the bubble map model to find locations for additional potential development wells.

Based on the results of the petrophysical overlay and bubble map, the South-East-South area is quite potential for the development of subsequent infill wells, this can be seen where the AI-209, AI-211, and AI-222 wells can be used as reference wells because they have porosity and permeability values. which is quite large with a large cumulative and draining radius too. The porosity value for AI-209 is 23% with a permeability of 13.37 mD, a drain radius of 155.11 meters with cumulative production of 37184 barrels. The AI-211 well has a porosity value of 25% with a permeability of 36.33 mD, a drain radius of 310 meters with cumulative production of 66488 Barrels. AI-222 well has a porosity value of 31% with a permeability of 139.56 mD, a drain radius of 45.58 meters with cumulative production of 3513 barrels.

Keywords: Petrophical, Radius drainage, Porosity, Permeability, Bubble map

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Abstract Number: 35

DISCONTINUITY MEASUREMENT FOR SLOPE FAILURE ANALYSIS WITH STRUCUTRE FROM MOTON METHOD USING DRONE ON A SLOPE IN HARGOWILIS, KOKAP DISTRICT, KULON PROGO REGENCY, D.I. YOGYAKARTA PROVINCE

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The measurement of the discontinuity area is one of the important data to determine the slope failure kinematics. Discontinuity measurement can be done by geological compass measurements, but only limited to areas that can be reached and safe. Methods that can help measure the discontinuity plane is Structure from Motion techniques. This method uses raw data in the form of outcrop photos that are processed into point clouds to be processed into a 3-dimensional model. This model is used to measuring the position of the discontinuity plane digitally with a plug-in Compass and FACETS in CloudCompare software. Compass measurements plug-in are carried out by visual tracing of the discontinuity generate 511 measurements. The discontinuity plane is N220o E/31o and N190o E/28o. While FACETS performs measurements automatically with the Kd-Nearest algorithm generate 435 measurements and has a discontinuity position on N220o E/30o and N188o E/27o. The discontinuity field measurement from data model is validated with field measurements at several easily accessible points. Measurement results discontinuity is carried out to determine the slope failure model at the location of research and potential models for slope failure, namely the wedge sliding type or collapse wedge with a percentage of 22.03% based on the Compass plug-in and 23.36% based on FACETS plug-ins.

Keywords : *Structure from Motion, discontinuity, slope stability, point cloud, drone*

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Abstract Number: 36

LIQUEFACTION POTENTIAL ANALYSIS BASED ON CPT AND SPT DATA AT 57 PROMENADE APARTMENT CONSTRUCTION PROJECT, TANAH ABANG, CENTRAL JAKARTA

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57 Promenade Project is an apartment construction project that took place in Tanah Abang District, Central Jakarta City. A building specifically residence must have potential hazard study. One of the hazards that may happen is liquefaction. Liquefaction happens when granular soil that contains water changes form into liquid because of the earthquake. This event causes a change in cyclic stress, which causes soil changes to form from solid. According to regional information, deposits in the research area are included in Alluvial Fan Deposits. Deposits that were found in the research area are products of weathered rocks in the form of soil that sized clay, silt, and sand. A building specifically a residence must have a study of hazards that may occur. One of the hazards is liquefaction. The liquefaction potential evaluation method is carried out by calculation of CSR, CRR, FS, and LPI. Analysis implemented on 11 SPT points and 11 CPT points at a maximal depth of 15 m and 6, 6.5, and 7 earthquake magnitude. Based on the calculations, it is known that liquefaction potential is detected in CPT points, while SPT points don't have any liquefaction potential. CPT points that have liquefaction potential are S-3, S-9, S-12, S-18, S-19, S-20, and S-23. The differences in output occurred because of the difference in data acquisition methods between CPT and SPT. In detail, liquefied layers in the CPT data analysis are included in the range of layers that have low FS values in the SPT data analysis. Therefore, integration between two types of data is needed. The liquefaction potential index in the research area ranges from low-very high.

Abstract Number: 41

CORRELATION BETWEEN SCHMIDT HAMMER REBOUND TEST AND UNIAXIAL COMPRESSIVE STRENGTH OF BRECCIA IN KEBOBUTAK FORMATION AT BENER DIVERSION TUNNEL, PURWOREJO, CENTRAL JAVA, INDONESIA

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Abstract. This study presents an empirical relationship between Schmidt rebound hummer (*N*) and Uniaxial Compressive Strength (UCS) of Breccia in Kebobutak Formation at Bener Diversion Tunnel, Purworejo Regency, Central Java Province, Indonesia. Schmidt rebound hammer is considered as the most effective and easiest approach to determine UCS value. The UCS value is one of the five parameters used to determine the Rock Mass Rating (RMR) in the tunnel. The sampling method was taken from 10 Schmidt rebound hammer and Uniaxial Compressive Strength (UCS) tested samples. The test was carried out on the rock matrix horizontally perpendicular to the vertical face tunnel excavation by 10 strokes in each Schmidt rebound hammer test. Empirical correlation is described by UCS = 1,3761(N) + 5,7799

Keyword: Uniaxial Compressive Test, Schmidt Hammer, Bener DAM, Diversion Tunnel, Rock Mass Rating

Abstract Number: 48

SEROJA TROPICAL CYCLONE DESTRUCTION CASE STUDY : PERMANENT SLOPE PROTECTION EVALUATION AT DOWNSTREAM OF ROTIKLOT DAM NOMENCLATURE BUILDING, EAST NUSA TENGGARA, INDONESIA

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Rotiklot Dam was one of some infrastructures which was affected by Seroja Tropical Cyclone in East Nusa Tenggara Indonesia on April 2021. There are several landslides at the downstream of the dam that can threaten the safety of the dam, especially at the downstream of the nomenclature building. The right design of permanent slope protection must be determined in a limited time. Geotechnical investigations such as boring, resistivity survey, standard penetration test, and water pressure test were conducted in a short time. Back analysis method was carried out to find extreme soil parameters conditions. The slope protection must meet the national standard minimum safety factor or greater than 1.5. Safety factors of slope protections are evaluated by a finite element method to get the safety factor and maximum total displacements. Every stage of slope protection can give the optimal safety factor values which are required or greater than 1.5, however backfill material will give more load and decrease the safety factor value.

Keywords : Tropical cyclone, Rotiklot Dam, back analysis, slope protection, safety factor

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Abstract Number: 1

ROCK MASS CHARACTERIZATION AND SLOPE STABILITY ANALYSIS INLET PORTAL OF JRAGUNG DAM DIVERSION TUNNEL , INDONESIA

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Abstract. Slope stability is a severe issue that researchers are continuing to investigate in relation to human safety, equipment, and structures around the slope. Failure on slopes occurs as a result of various reasons, including physical and mechanical characteristics of rocks, discontinuity factors, slope geometry, and external variables like as rainfall and seismic activity. The goal of this research was to examine the impact of rock mass characterisation on slope stability using an empirical and numerical method. Characterization of rock mass using the RMR (Rock mass rating) method, and slope stability assessment using the SMR (Slope mass rating) method. The numerical slope stability assessments were done with the assistance of Phase2 (Rocscience, Inc.). The results indicated that the slope at the inlet portal was class IV (bad), and the slope was determined to be unstable using the SMR approach. According to numerical analysis showed that even after reinforcing, the initial design cut slopes with a 510 inclination were found to be unstable. It was advised that the slope geometry and support measures be modified further. After the slope inclinations were changed from 51° to 27° and shotcrete and rock bolt reinforcement were applied, modified cut slopes were determined to be stable.

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Abstract Number: 44

THE SABU FORMATION AS A COLLISION DEPOSIT OF THE WOYLA AND WEST SUMATRA TERRANE

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Abstract

The geology of the Lampung region still has relatively lack of geological information, especially regarding sedimentary rock formations. One of the sedimentary rock formations in Lampung is the Sabu Formation composed of polymix conglomerates, sandstones, and claystones of Paleocene to Oligocene age which have not been studied for their provenance characteristics. This study aims to determine variations in the types of sedimentary tectonic provinces of the Sabu Formation using the modal composition method with the point counting method. The Sabu Formation at the study site can be divided into three segments, the lower segment has provenance from recycled orogeny tectonic provinces, the middle segment has dissected arc tectonic provinces to basement uplifts, the upper segment has provenance from dissected arc in the form of plutonic magmatic arc. The collision between Woyla volcanic arc and the West Sumatra terrain This variation in tectonic provinces is caused by the condition of the sediment source originating from the mountains resulting from the collision between the Woyla volcanic arc and the terrain of West Sumatra which is the source of sediment for the recycled orogen and magmatic arc tectonic provinces. While the diachronous collision between Woyla volcanic arc and the West Sumatra terrain also triggers formation of major strike slip which lead granite exhumation as the source of the basement uplift to the plutonic magmatic arc province's. The Sabu Formation is interpreted deposited in a pull apart basin formed from a strike slip system in Paleogen.

Keywords: *Provenance; Sabu Formation; Lampung, Woyla arc-West Sumatra suture*

Abstract Number: 14

STUDY OF WEATHERING AND ROCK MASS QUALITY USING THE GOLOGICAL STRENGTH INDEX (GSI) METHOD ON THE TUNTUN MINE ROAD, BANGGAI REGENCY, CENTRAL SULAWESI PROVINCE

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Abstract. The mining road in the Tuntun area of Banggai Regency, Central Sulawesi Province has experienced a landslide. The mining road mitigation engineering is a concern for the sustainability of road use. The study area is composed of peridotite rocks which are included in the Ophiolite (Ku) rock formation, where these rocks undergo a very strong deformation process by showing the fractured rock conditions. The Study of Weathering and Rock Mass Quality Using the Geological Strength Index (GSI) Method on this mine road is the focus of this research. The Geological Strength Index (GSI) is a rock mass classification system developed to assist the inaccurate Rock Mass Rating System (RMR) in determining the quality of rock masses that have very poor conditions or have undergone very strong rock deformation. using the GSI value by using two quantitative parameters, namely the condition of the discontinuity plane and the density of the discontinuity plane. The value of the Geological Strength Index (GSI) at location points 1, 2, 3, 4 and 5 is 32,17,12,2, 33.4 and 23. The rock mass value indicates that the rock mass quality in the study area has poor rock mass quality. to very bad. The results of this investigation become a reference in the method of handling slopes on mining roads.

Keywords: Weathering, Rock Mass Quality (Q), Peridotite, Mining roads

Abstract Number: 6

ARTIFICIAL INTELLIGENCE-BASED LANDSLIDE STUDIES IN INDONESIA: A SYSTEMATIC REVIEW IN RECENT YEARS

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Landslide is still a hot topic in geological hazard discussion, including in Indonesia. Many approaches related with landslide in Indonesia were conducted by many researchers. Various methods, including diverse Artificial Intelligence (AI), are used to do research development in landslide topics. Therefore, this paper aims to present a comprehensive review on AI-based landslide studies that focused on specific application area, feature engineering method, and Digital Elevation Method (DEM) sources that were used in the studies. This research used qualitative method with systematic review approach toward recent landslide studies (2012-2022) that catalogued and investigated systematically in a synthesis. The explore resulted in 26 papers, from national and international indexed journal or proceedings, that filtered into 13 articles which discuss or mention the specific application area, feature engineering method, and DEM sources. According to the analysis, it shows that AI applications in landslide studies are dominated for landslide susceptibility mapping or modelling and still a few applications for landslide monitoring, early warning system development, and landslide effective factor selection. The results also show that almost all AI-based landslide studies chose SRTM as the source of DEM data that followed by DEMNAS as the second favourite one. In the aspect of feature engineering method, only fives articles that discussed about important landslide factor selection. There are four feature engineering methods that used in those studies, i.e.: variable deduction, certainty factor model, C.45 algorithm, and random forest variable importance method. From the deep analysis toward those 13 articles, it can be concluded that AI based landslide studies in Indonesia is still needed to be developed instead of focus only in landslide susceptibility mapping. Studies in AI application in enhancing landslide prediction by finding effective landslide factors also can be new opportunities for landslide experts. Comparison of various DEM resources in application of AI based landslide studies also can be done to find the most optimum sources for building powerful landslide models.

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Abstract Number: 30

THE DAWN OF SPATIAL GEOSCIENCE BIG DATA IN INDONESIA AND CHALLENGES FOR ITS ADAPTATION IN GEOLOGICAL ENGINEERING HIGHER EDUCATION

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Big data era in geoscience has just arrived in Indonesia by the inaguration of the national One Map policy and the public release of many digital maps through single website portal hosted by the Ministry of Energy and Mineral Resources, Republic Indonesia. Through this development, dramatic shift in now happening in term of abundant, easy access on various geoscience datasets. This rapid change must be anticipated in the geological engineering higher education through adaptive curriculum that support the building of basic knowledge and skills for undergraduate students to use Geographic Information System (GIS) as standard platform to manage, visualize, and conduct spatial operations on various datasets since the early stage of higher education. Case study for the readiness of Indonesian geological engineering higher education curriculum is discussed here for our undergraduate program in geological engineering at Universitas Gadjah Mada. Here only one basic GIS course is given at the second academic year, namely Geoinformation and Data Management, in which students learn basic concepts of GIS as a system as well as science. This knowledge and skills are then used for supporting the individual geological mapping project during the third academic year. Year 2022 is the first real case for us to be able to evaluate the readiness of our students to use effectively the national-scale geology data at 1:50,000 scale, in order to produce a more detailed geological maps at scale 1:25,000. Current evaluation demonstrates the needs to improve our curriculum contents on both basic geoscience as well as skills to work with enterprise-level geospatial datasets.

Abstract Number: 10

POROSITY MODIFICATION, A KEY TO THE CARBONATE DIAGENETIC ENVIRONMENTS. CASE STUDY: REEFAL LIMESTONE, MARAH FORMATION, EAST BORNEO, INDONESIA

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Through the Eocene-Oligocene transition, localised carbonate shoal formed the northern part of Kutai basin. Miau Baru is a small village located in Kongbeng sub-district, East Kutai, NE Borneo which has a relatively narrow area with complex geological features. This relatively thick the carbonate successions of Marah Formation previously have less attention from diagenetic perspective. To achieve the objective in this diagenetic study of the reefal limestone of Priabonian-Rupelian Marah Formation, limestone samples were collected and sectioned. A total of 35 samples were selected, 25 from Goa Indah section and 10 from Kongbeng section. This paper compiles current knowledge on the sedimentology aspects of this Kongbeng complex region and includes the first attempt to synthesise petrographic data onto carbonate diagenetic environment and history in Miau Baru Area. Reconstruction of carbonate diagenetic environment helped to identify the porosity modification and its application in expecting a petroleum reservoir for the region, thereby highlighting areas where further geological research is required.

Keyword : Carbonate, Limestone, Diagenesis, Porosity, Marah Formation, Borneo

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Abstract Number: 13

PRELIMINARY STUDY OF THE PHYLLITE ROCK FROM THE LUK ULO MELANGE COMPLEX, CENTRAL JAVA, INDONESIA

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Graphite and lithium are elements used as cathodes and anodes in lithium-ion batteries. The need for these two elements continues to increase along with the use of battery electric vehicles. Graphite minerals are generally found in metamorphic rocks with fine sedimentary rock protoliths rich in organic material. A study shows that metamorphic rocks containing graphite also contain lithium. Another study showed that the purity of graphite contained in metamorphic rocks could be increased to 99.4% through flotation and alkali roasting stages to meet the qualifications used as battery electrodes. Thus, the identification of graphite and lithium in metamorphic rocks needs to be done because they can be an alternative source of reserves. Phyllite rocks containing graphite minerals are exposed at the Luk Ulo Melange Complex (LUMC), Central Java, Indonesia. This study aims to determine the petrographic and geochemical characteristics of the phyllite rocks of the Luk Ulo Melange Complex as a preliminary study to identify the graphite and lithium content in these rocks. The method used in this research consists of field observation and laboratory analysis, including petrographic and geochemical analysis using ICP AES/MS. Field observations were carried out in six locations, namely in the Karangsambung, Totogan, Duren, Kebondalem, Kebutuhjurang, and Pesangkalan villages. The phyllites are present as blocks in LUMC with 2 m to > 10 m dimension and are associated with other metamorphic rocks such as greenschist, quartzite, and marble. LUMC phyllite rock has a fresh grey-black colour, phylitic foliated structure, and lepidoblastic texture and has an intensive deformation as evidenced by fractures and folds in outcrops. The foliations of the LUMC phyllite are variated, in Karangsambung they are N 230°E/58 and N 55°/30°, in Totogan N 243° E/45°, in Duren N 330° E/30°, in Kebondalem N 340° E/45° and N 130° E/80°, in Kebutuhjurang N 270°E/50°, and in Pesangkalan N 30° E/50°. Based on the petrographic analysis, the main minerals that make up LUMC phyllite are graphite, muscovite, quartz, and chlorite. Whole rock geochemical analysis was carried out on a phyllite sample from the Karangsambung area and showed that the main elements that dominated were SiO2 at 69% wt, Al2O3 at 13% wt, and Fe2O3 at 5.78% wt. The lithium content in the sample is 30 ppm, while the high trace element content (above 100 ppm) includes elements of Ba 244 ppm, V 120 ppm, and Zr 139 ppm.

Keywords: phyllite, graphite, lithium, Luk Ulo Melange Complex

Abstract Number: 15

CHARACTERISTICS OF PYROPHYLLITE AND HYDROTHERMAL ALTERATION AT ARGOTIRTO AREA, MALANG REGENCY, EAST JAVA, INDONESIA

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Argotirto area located in South Malang, East Java province, has abundant non-metallic mineral resources, e.g., pyrophyllite. The presence of pyrophyllite indicates that the area has undergone hydrothermal alteration processes. This research aims to determine characteristics of pyrophyllite and hydrothermal alteration at Argotirto and its surrounding area. The methods used in this research comprises geological and hydrothermal alteration mapping, thin section and X-ray diffraction (XRD) analyses from rock samples. There are five lithological units from the oldest to the youngest, namely basalt lava, andesite breccia, dacitic tuff breccia, dacite intrusion, and limestone units. In hand specimen, pyrophyllite has white to tan colour, massive and waxy/soapy textures. Furthermore, in thin section, pyrophyllite selectively replaces feldspar phenocrysts or it is disseminated in the matrix and intergrown with quartz. In the research area, there are four alteration zones, such as pyrophyllite-cristobalite-sericite-illite-smectite, pyrophyllite-halloysite-sericite-illite, pyrophyllite-vermiculite-alunite-tridymite, and pyrophyllite-dickite-sericite-illite zones. According to hydrothermal alteration mineral assemblages, it can be interpreted that those minerals are formed at low pH (4-5) and relatively low temperatures (>200-250°C).

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Abstract Number: 22

POTENTIAL OF MANGANESE ORE DEPOSIT IN SUKAAGUNG VILLAGE, TANGGAMUS REGENCY, LAMPUNG

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Manganese ore deposits are one of the most widely used metal alloys in everyday life. Generally, manganese ore deposits are present as residual deposits along with iron ore at certain pH and Eh conditions. These deposits can come from the chemical weathering of crystalline schist, limestone and dolomite rocks, or from earlier manganese deposits. In Lampung, the presence of manganese ore can be found in Sukaagung Village, Tanggamus Regency, but little research has been done to determine the distribution and potential of manganese ore in this area. Therefore, the purpose of this study was to determine the distribution and origin of manganese ore in the study area using field data and petrography.

In general, manganese ore deposits in Sukaagung Village are present as veins that fill fractures and nodules. Manganese ore deposits that were present as fracture fillers were found intersecting marble and crystalline phyllite of the Gunungkasih Unseparable Formation, marine sedimentary rocks in the Menanga Formation, tuffaceous siltstone of the Sabu Formation, and the tuff of the Hulusimpang Formation. These deposits are present in manganese as botryoidal and dendritic forms in rock fractures. Meanwhile, manganese ore deposits in the form of nodules are present in marine sedimentary rocks in the Menanga Formation.

The presence of manganese ore deposits in the study area is thought to be the result of leaching of manganese elements from Paleozoic marble and crystalline phyllite rocks. The acidic fluid dissolves other elements and leaves manganese ore as an economical mineral. Manganese ore is then carried by subsurface fluids and fills fractures in Paleozoic-Tertiary rocks. Even though the distribution of manganese ore in Sukaagung Village is quite wide, further research is needed to determine the potential and reserves of manganese ore in the study area.

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Abstract Number: 11

GEOLOGICAL STRUCTURE ANALYSIS APPROACH TO CONTROL THE DISTRIBUTION OF MANGANESE IN GUNUNGKASIH AREA, TANGGAMUS DISTRICT, LAMPUNG PROVINCE

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Gunungkasih area has several lithologies that are generated by different processes. Based on The Geological Map of Kotaagung by Amin et. al. (1993) the oldest lithologies are composed of schist, phyllite, and marble from Paleozoic followed by shale, sandstone, chert from Menanga Formation (Km) and andesitic lava, tuff from Hulusimpang Formation (Tomh) with some complicated geological history. Variation of geological product triggered the possibility of the presence of a lot of natural resources, including manganese.

Manganese had been exploited around 2003-2004 by two local companies, but because the manganese deposits ha\d not been explored yet and for a few reasons the project had been discontinued. The structural analysis will be important to find out the presence of manganese because most manganese fills in fractures, so the pattern of these deposits would be solved by structural mapping and also treated by stereonet and rosette diagrams.

The fracture planes have been found in more than 500 planes and showed several types of fractures such as shear fractures, joints, quartz veins, and manganese that fill fractures which have a few directions both fault and joint directions. The most dominant fractures that are filled by manganese have been found at 115 - 135 degrees, parallel with major fault and lineament directions. The direction could be parameters and help for continued exploration further.

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Abstract Number: 32

MINERALOGICAL CHARACTERISTICS OF THE MEKARBAKTI LOW SULPHIDATION EPITHERMAL GOLD PROSPECT AT GARUT REGENCY, WEST JAVA, INDONESIA

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Mekarbakti prospect is situated in the western sector of Java Island which tectonically lies within the W-E trending Sunda-Banda magmatic arc. This arc hosts numerous prospects for ore mineralization with various types of mineral deposits, one of which is epithermal type that found in the study area. The Mekarbakti prospect is located close to the Arinem prospect, about 8 km to the east, which is confirmed as a low sulphidation epithermal deposit type. Arinem is proven to be economical to mine, thus it becomes interesting to conduct study on the Mekarbakti prospect, to elucidate its characteristics and prospectivity. This paper is dealing with the characteristics of wallrock hydrothermal alteration using thin section and X-Ray Diffraction (XRD) to identify the hydrothermal alteration minerals and using ore microscopy to identify the type of ore minerals, texture, and paragenesis. The geological condition of the study area is composed of lapilli, andesite lava, tuff, andesite breccia, and andesite intrusion. The dominant hydrothermal alteration develops in andesite, tuff, and lapilli and it was controlled by NE-SW trending sinistral strike-slip fault. Alteration types based on mineral assemblages include propylitic, argillic, and silicification. Propylitic alteration is characterized by chlorite+epidote+smectite+illite±chlorite/montmorillonite±calcite. Argillic alteration is marked by the presence of clay minerals such as kaolinite+illite+smectite+quartz. Silicification alteration is typified by quartz±kaolinite±illite±smectite. Ore mineralization in the study area is associated with massive, massive-brecciated, and stockwork vein textures. Ore and metalliferous minerals are found as pyrite, hematite, goethite, chalcopyrite, sphalerite, galena, pyrrhotite, covellite, bornite, native gold, and native silver.

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Abstract Number: 38

HYDROTHERMAL MINERALOGY CHARACTERISTIC AT THE BAKAN GOLD DISTRICT, NORTHERN SULAWESI, INDONESIA: FIELD MAPPING, SWIR SPECTROSCOPY, AND PETROGRAPHIC-ORE MICROSCOPY

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This study applies the combination of field mapping, SWIR spectroscopy, and petrographic microscopy to characterize the hydrothermal mineralogy at the Bakan Gold District, Northern Sulawesi, Indonesia. The Bakan district allows to figure out the comprehensive hydrothermal mineralogy characterization of epithermal to porphyry transition within the lithocap system since the presence of porphyry-type signature and high Au grade of ISE-related vein type mineralization within the prominent HSE complex.

The Bakan district can be subdivided by three mineralization complexes based on mineralization occurrences: Main Ridge complex, Villa complex, and Osela complex within NW-SE mineralization corridor. Main Ridge complex is characterized by (1) concealed porphyry-style (A-B veins, chlorite – sericite ± secondary biotite, pyrite - magnetite ± chalcopyrite) which was gradually emplaced by (2) sericite - chlorite ± quartz, pyrite - enargite, (3) massive quartz - pyrophyllite - sericite ± alunite, hematite ± pyrite ± enargite), and (4) vuggy quartz – alunite ± dickite, hematite ± pyrite. Villa complex is featured by (1) massive ± vuggy quartz – alunite - hematite which enclosed by (2) sericite – smectite. Whereas, Osela complex is defined by (1) ISE-style of sheeted chalcedony-massive quartz veins, pyrite – galena - tennantite which accompanied by (2) later halos quartz – dickite – kaolinite ± alunite, (3) sericite, and (4) sericite – smectite - chlorite.

Main Ridge complex is considered as the centre of the hydrothermal system in the Bakan district since the broad lithocap footprint zone with more Na-alunite and higher white mica and kaolin crystallinity, which also accompanied by the presence of high temperature clay (topaz, tourmaline, and diaspore). Porphyry mineralization signature lies below the Main Ridge complex. Osela complex is interpreted as the peripheral of the Bakan district hydrothermal system as the more ISE-mineralization style with lower temperature and higher acidity clay as represent as dickite-kaolinite. According to mineralogy characterization from this study, the Bakan district has potential for further exploration target in deep target porphyry system.

Keywords: hydrothermal mineralogy characteristic, field mapping, SWIR spectroscopy, porphyry to epithermal transition, Bakan district

Abstract Number: 39

CONTROL OF LITHOLOGY, STRUCTURES, AND BRECCIA TO THE GOLD MINERALIZATION IN THE BAKAN GOLD DISTRICT, NORTHERN SULAWESI, INDONESIA

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The Bakan gold district is located in the North arm of Sulawesi arc. Exploration in this district was initially started from 1989 and then successfully commencing mining project in 2013 which produces about 100KOz Au annually within 1.5MOz Au resources. Bakan district is characterized by high sulfidation epithermal-style mineralization. Several geologic features are important controlling the occurrences of the mineralization. NW-SE structure becomes the mineralization corridor which develop relatively NE-SW pathways for quartz ledge deposition within this corridor. The oldest rock observed in this district is relatively unmineralized hornblende diorite (IDO-1) which encompassing this district. Several late intrusive stocks were concealed below the current topographic as mentioned as the finer diorite (IDO-2) and crowded texture quartz diorite (IDO-3) where the latest one exhibits yet insignificant of windows porphyry-style mineralization. Those intrusive units were then covered by volcanic tuff sequence with two magmatic differentiation which are andesitic fine ash tuff (TFVAN) and dacitic crystal tuff (TFVDA). TFVDA is more favourable unit compared to TFVAN which shown by bedding control mineralized zone in more peripheral mineralization area. Breccia i.e., diatreme breccia (BD) and hydrothermal (BHX) lately cut all lithologic units which becomes the most favourable host rock for the mineralization. The comprehension on lithology, structures, and breccia becomes crucial since the deposit will be more concealed and peripheral.

Keywords: lithology, structures, breccia, mineralization control, Bakan district

Abstract Number: 49

NICKEL AS A STRATEGIC MINERAL AND ITS POTENTIAL RESOURCES IN X-FIELD, NORTH KONAWE, SOUTHEAST SULAWESI, INDONESIA

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Indonesia is the world largest producer of Nickel laterite deposit. By the regulation of UU No. 3 2020, due to its utility as main component of battery on electric vehicle (EV), nickel is one of metal mineral that play important role in energy transition issues. It will drive the increasing demand of Nickel and Indonesia needs a massive exploration and specific regulation especially for this deposit. The focus of this research is to discuss how important Ni as strategic mineral and its potential resources in North Konawe, Southeast Sulawesi. The methods are based on field data analysis and references study.

X-Field located in Lasolo Island, North Konawe, Southeast Sulawesi. This area has potential resources of Ni-laterite deposit. The lithological condition consists of massive ultramafic igneous rock complex. The host rock has already enriched by serpentinization process. The geochemical analysis shows range 0.87-2.43% Ni (Her Krissanto, 2021).

By this day, the government regulation of Ni in specific way as critical mineral is still not present. The lack of data transparency (supply chain) and policy synchronization urgently need to be solved.

Keyword: Nickel, critical mineral, battery, Northern Konawe, Sulawesi

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Abstract Number: 51

VOLUME ESTIMATION OF THE THICKEST SCORIACEOUS TEPHRA-FALL DEPOSIT ON THE SOUTH-SOUTHWESTERN FLANK OF MT. RAUNG.

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Thick scoriaceous tephra-fall deposits are widely distributed in the south to the southeast flank of Mt. Raung, indicating the existence of past large explosive eruptions. The deposits are relatively young as the deposits are situated near the surface. Scoriaceous tephra-fall deposits can be divided into 4 layers from bottom to top, Scoria Fall 1, Scoria Fall 2, Scoria Fall 3, and Scoria Fall 4. There is no time gap between these layers as evidenced by the deposits not being separated by any weathered layer or soil. This suggested that the deposits represent an eruptive product of a single active period. We estimated the volume of the deposits using isopach maps. We limited the estimation only to Scoria Fall 2 and Scoria Fall 3 deposits which were consistently exposed on 15 and 11 observation points, respectively. The volume of Scoria Fall 2 is ~40.5 km3 and Scoria Fall 3 is ~21.9 km3 making the total volume of 62.4 km3 (VEI 5).

Abstract Number: 50

POROSITY AND HYDRAULIC CONDUCTIVITY OF VOLCANIC ROCKS ON THE NORTHERN SLOPE OF BROMO-TENGGER VOLCANO COMPLEX

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One of the potential raw water in Java with a large capacity is the Umbulan Spring with a capacity of 4,000-5,000 L/second which is located in Winongan District, Pasuruan Regency. Based on previous research, the groundwater recharge area of Umbulan Spring is known to be in the Bromo-Tengger Volcano Complex area. This recharge area is dominated by volcanic rocks, therefore this study aims to determine the hydraulic characteristics, specifically porosity and hydraulic conductivity of volcanic rocks in the study area. Field geological observations and sampling of volcanic rock outcrops in the study area were carried out for petrological analysis, petrography, porosity test, constant-head permeameter test, falling-head permeameter test, and gas permeameter test. Pyroclastic rocks found in the research area consist of tuff, crystal tuff, crystal-vitric tuff, lithic tuff, lapilli tuff, and lapilli stone. From the test results, the porosity values of the tuff samples ranged from 42.67%, welded tuff 17.33% - 17.47%, crystal-vitric tuff 53.33%, lithic tuff 37.48% - 41%, lapilli tuff 7.33%-64.67%, and lapilli stone 49.33% - 56.67%. Meanwhile, the hydraulic conductivity values of tuff samples ranged from 65.5 m/day, welded tuff 2.42 x 10^{-1} m/day - 2.44 x 10^{-1} m/day, crystal-vitric tuff 96.5 m/day, lithic tuff 16.2 m/day - 37.4 m/day, lapilli tuff 16.7 m/day - 109 m/day, and lapilli stone 18.3 m/day – 31.5 m/day. The results of this research show that naturally, the pyroclastic rocks in the groundwater recharge area of the Umbulan Spring do have good hydraulic characteristics so that they allow the infiltration and percolation of rainwater into the groundwater system very well.

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Abstract Number: 52

MINERALOGICAL AND PHYSICAL CHARACTERISTICS OF AMPO, TRADITIONAL FOOD MADE FROM CLAY IN THE CIREBON REGION

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Ampo is a traditional product made from pure clay which is widely consumed in the Cirebon area. This food is usually consumed as a snack, digestive medicine, bitter taste reliever, treat cravings, and complement the needs of offerings. One of the famous ampo producers in the Cirebon area can be found in Jamblang Village, Jamblang District, Cirebon Regency, West Java. The raw material for making this ampo is red clay taken from rice fields when it is not the planting season or after the harvest season. Geophagy is the habit of consuming clay or soil material intentionally. Clay is all fine-grained material (<2 m) which has plastic properties after hydration but becomes hard after being burned or dried. The purpose of this study was to determine the mineralogical characteristics and physical properties of clay found around Jamblang Village. The methods that will be used in this research include X-ray diffraction analysis, granulometric analysis, and plasticity test (Atterberg Limit). Based on its mineralogy characteristics, the clay of Jamblang Village is composed of kaolinite, smectite, quartz, cristobalite, albite, and K-feldspar minerals. Physically, this clay belongs to the type of clay sand soil that is well graded and has a variety of soil textures, namely sandy loam, loamy sand, sand, and sandy clay loam. Furthermore, Jamblang Village clay has low plasticity with a plasticity index range of 3.56–6.54%, moderate plasticity with a plasticity index of 9.75–12.65%, high plasticity with a plasticity index of 18.32–23.02%, and non-plastic. However, the clay used as raw material for making ampo has moderate plasticity with a plasticity index value of 10.39%.

Abstract Number: 17

WALLROCK ALTERATION CHARACTERISTICS AND GOLD MINERALIZATION OF THE MOUNT MURO LOW SULPHIDATION EPITHERMAL DEPOSIT, MURUNG RAYA REGENCY, CENTRAL KALIMANTAN PROVINCE, INDONESIA

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Mount Muro is a low sulphidation epithermal gold deposit, which is located in Central Kalimantan Province, Indonesia. In order to optimize the production yield of the Mount Muro mine, it is important to understand the characteristics of the ores along with their mineral associations. This paper is dealing with characteristics of wallrock hydrothermal alteration using thin section and X-Ray Diffraction (XRD) to identify the hydrothermal alteration minerals and ore microscopy to identify the type of ore minerals. The host lithology unit are affected by four alteration types based on their mineral assemblages, namely argillic, propylitic, silicification, and phyllic. Argillic alteration is characterized by clay minerals such as kaolinite + mixed illite smectite ± illite. Propylitic alteration is characterized by chlorite + calcite ± epidote. Silicification is characterized by quartz ± kaolinite ± chalcedony quartz. Phillic alteration is characterized by sericite ± chlorite. Gold mineralization is associated with brecciated, comb, massive, and banded quartz vein texture. Metalliferous and ore minerals are found as pyrite, hematite, sphalerite, galena, chalcopyrite, tetrahedrite, tennantite, electrum, and native silver.

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Abstract Number: 24

GEOLOGY AND FE-SKARN MINERALIZATION IN LOLO PROSPECT, SOLOK, WEST SUMATRA, INDONESIA

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Abstract

The study area is situated in Lolo village, Pantai Cermin district, Solok regency, West Sumatra province, Indonesia. Several mining companies have been operated for skarn-related iron ore type in this area and its vicinity. Although the study area has been explored, but the detailed geology and Fe skarn characteristics remain unclear. This paper, therefore, is dealing with geological framework and characteristics of skarn mineralogy by means of some laboratory analyses such petrography, ore microscopy, X-Ray Diffraction (XRD) and micro-X Ray Fluorescence (μ-XRF). Geological framework of the prospect was defined by a surface geological mapping and observation. Skarn alteration of limestone host-rock is typified by the presence of prograde minerals such as garnet, clinopyroxene, wollastonite and tremolite. Retrograde mineral assemblage is peculiarly not found in the limestone wall-rock, but recognized in the altered causative intrusion i.e. granodiorite. The altered granodiorite is composed of some key propylitic minerals such as chlorite, epidote and few clay minerals. Fe skarn mineralization is represented by magnetite and hematite, which are associated with several sulphide minerals such as pyrite and chalcopyrite. Ore mineralization and skarn alteration is strongly controlled by NW-NE and NW-SE trending faults and distribution of limestone. Follow-up subsurface exploration is absolutely needed to define the Fe skarn orebody.

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Abstract Number: 43

MINERALOGY AND ORE CHARACTERISTICS OF PB-ZN SKARN DEPOSIT AT KUJANG PROSPECT, SUKABUMI REGENCY, WEST JAVA

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The Kujang Pb-Zn skarn deposit is known to be the newest skarn deposit found in the Sunda-Banda magmatic arc. The skarn orebodies are mostly hosted by limestone which might be the part of the Jampang Formation where dacite porphyry is interpreted to be the ore causative intrusion. Orebodies can mostly be found at the contact between marbleized limestone and volcanic rocks and are controlled by NW-SE-trending strike-slip faults. The fault acts as the pathway for the hydrothermal fluids to form the ore. Previous research on the mineralogy and ore characteristics of the Kujang Prospect deposit was limited to a preliminary study. Using petrography, ore microscopy and assay data from core samples, this study is aimed to characterize the mineralogy and ore of the deposit. The alteration of the Kujang Prospect skarn can be divided into 2 phases of alteration i.e. prograde and retrograde. The prograde alteration is characterized by the occurrence of garnet, clinopyroxene and wollastonite, whereas the retrograde alteration is typified by epidote, chlorite and actinolite. Metalliferous and ore minerals consist of sphalerite, galena, pyrrhotite, chalcopyrite and pyrite. All of the ore minerals are formed at the early retrograde stage. From assay data, the deposit's average grade is 2.55% Pb, 5.95% Zn, and 1.46% of Cu.

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Abstract Number: 47

AQUIFER MAPPING USING GEO-ELECTRICAL RESISTIVITY SURVEY FOR SEEPAGE MITIGATION IN KUWIL KAWANGKOAN DAM, NORTH MINAHASA, NORTH SULAWESI, INDONESIA

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The dam built in the area with a productive aquifer system has potential seepage, which is influenced by groundwater presence. Seepage can cause instability in the main dams or slopes around the dam. Kuwil Kawangkoan Dam is located in the Manado groundwater basin with a high groundwater potential. An initial assessment of subsurface geological conditions needs to be carried out to identify groundwater potential as information in mitigating seepage potential in the dam. The method used in this research is the 2D electrical resistivity method with Wenner configuration. Geoelectric data was acquired on 12 lines spread across the dam area. The measurement results show a resistivity value of less than 100 Ωm, which indicates material of unconsolidated pyroclastic sediments in the form of sand – gravel. This layer has a depth of around 20 m from the surface. The lithology found is dominated by tuff lapilli with pumice fragments that have potential as an aquiclude.

Keywords: geo-electrical resistivity, seepage, groundwater, Kuwil Kawangkoan Dam

Abstract Number: 12

GEOTHERMAL PROSPECTING WITH GEOLOGICAL STRUCTURE INTERPRETATION USING GRAVITY AND GEOMAGNETIC MODELING: WAY SELABUNG POTENTIAL AREA, SOUTH OGAN KOMERING ULU, SOUTH SUMATERA, INDONESIA

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Way Selabung, South Ogan Komering Ulu, South Sumatera Province has a complex geological setting for instance fault and the volcanic mechanisms that are generated by tectonic propagation. The hot spring and mineral alteration as geothermal manifestations distributed in Makakau Ilir is unique hence geoscience studies are needed to discover the lineaments that lead to subsurface heat source carried by gravity and magnetic anomaly. The gravity method is utilized for identifying geological features such as lithological edge, fault, and fracture using Complete Bouguer Anomaly (CBA) data. Spatial analysis such as signal analysis, first horizontal gradient, second vertical derivative, residual anomaly separation with spectral analysis (bandpass filter), and 3D inversion modeling, were applied to the CBA distribution map. Low susceptibility of 3D geomagnetic inversion verified the exact position of the geothermal resource caused by demagnetization (Curie temperature). Both methods can be representing the geological features based on characteristics of anomaly responses. This area is dominated by the NW-SE fault which is associated with geothermal manifestations that were figured out on the surface, it appears in the gravity and geomagnetic subsurface models. Nevertheless, the geological structure is the major driver of the mechanism of geothermal manifestation existences. This structure indicates the potential area that is perhaps to be used as additional information for resource development and consideration for advanced research reference in the future.

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Abstract Number: 40

A PRELIMINARY STUDY OF PAST GEOLOGICAL DISASTERS IN THE TROWULAN MAJAPAHIT CULTURAL HERITAGE AREA, MOJOKERTO REGENCY, EAST JAVA

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Numerous sites found buried in the Trowulan Cultural Conservation Area makes the area suspected of being the capital of the Majapahit Kingdom (13-15th century). The condition of the buried site raises an assumption of a past catastrophic event that hit and buried part of Trowulan area, causing the downfall of the Majapahit Kingdom. This assumption is supported by the existence of several books and inscriptions from the Majapahit Kingdom period that record events interpreted as geological disasters. Although there is a lot of evidence, however, what kind of geological disaster that hit the Trowulan area is not known for certain. This study aims to identify what kind geological disasters that buried the Trowulan Capital area based on previous studies and GIS analysis. The results inferred that flash floods and volcanic eruptions contributed to the burial of Trowulan Capital Region, which is supported by the geographical conditions of the capital city of Trowulan where the northern part is a flood plain and the southern part is part of the Jatirejo alluvial fan. Stratigraphic data collection needs to be carried out in the future as supporting evidence to know the detailed sequence of disaster events and the direction of the disaster flow.

Keywords: Trowulan Cultural Heritage Area, Past Disasters, Buried, GIS Analysis.