GEOPHYSICAL ENGINEERING

PORTOFOLIO

Presented by:

Jeremia Kelvin Sihotang

About me

I am a fresh graduate in Geophysical Engineering from the University of Lampung with a GPA of 3.45, specializing in GIS, geophysics, and geological data modeling. My academic experience has provided me with practical skills in processing and interpreting spatial and subsurface data, which I applied in various field studies, internships, and research projects.

With expertise in software such as ArcGIS, Global Mapper, and geophysical tools for gravity, geoelectrical, and geomagnetic methods. Motivated by curiosity and a dedication to environmental sustainability, I am eager to apply my analytical skills across different industries, contributing to projects that integrate geophysical data with cutting-edge technology for effective decision-making and long-term solutions.

Introduction

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Geophysics is the study of Earth's physical properties and the processes that shape its structure. It integrates principles of physics, mathematics, and geology to analyze the Earth's subsurface using techniques such as seismic, gravitational, electrical, and magnetic methods. Geophysicists explore natural resources, monitor environmental conditions, and assess geological hazards, providing essential data for industries such as oil and gas, mining, and environmental management.

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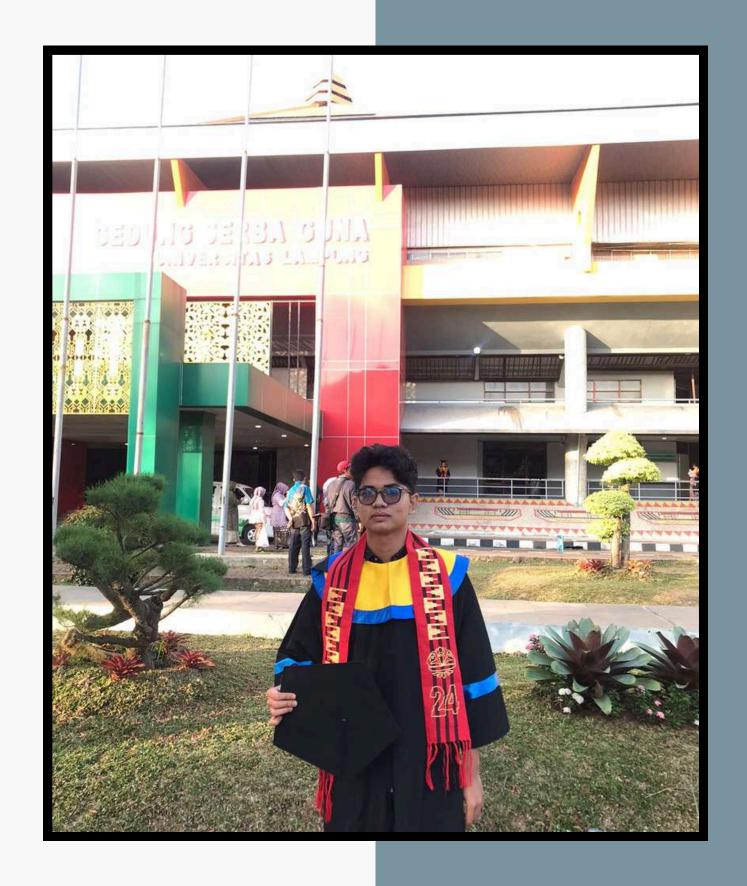# *Education Background*

- **S1 Geophysical Engineering**

University of Lampung - 2020 to 2024

GPA : 3.45 From 4.00
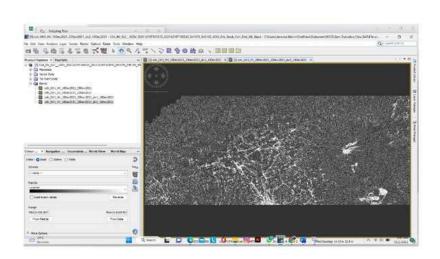
- **High School**

SMAN 1 Tarutung - 2017 to 2020

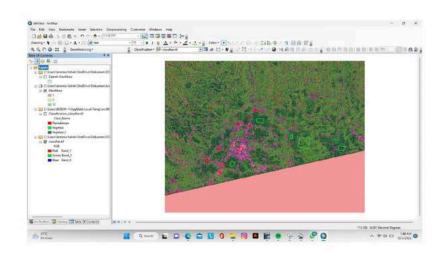GPA : 90.10 From 100
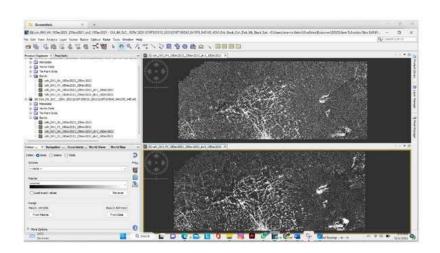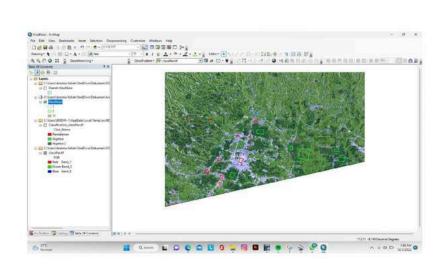
PROJECT GEOPHYSICS

Polarimetric Analysis of South East Java Region

Project Overview: This project focused on polarimetric analysis using Synthetic Aperture Radar (SAR) data to classify land cover types, particularly differentiating between residential areas and adjacent vegetation in the southern region of East Java, near Mount Semeru. The analysis provided insights into land-use patterns and environmental monitoring in this mixed terrain.

Processing Steps: Preprocessing in SNAP: Data split Orbit update Coregistration (Backgeocoding) Multilooking Speckle filtering Range Doppler terrain correction Data Processing in ArcMap 10.8: Image classification using *tiff data for land cover differentiation.
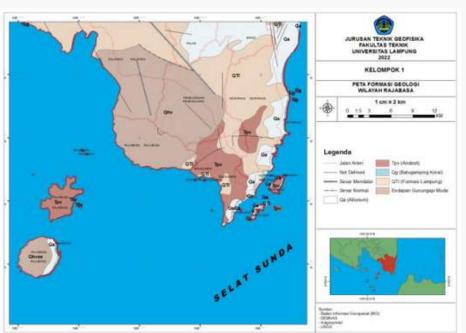
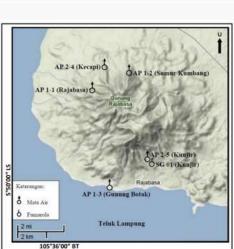**Tools and Software:** SNAP (Sentinel Application Platform) ArcMap 10.8.

Results: Successfully classified and visualized land cover types, highlighting the boundaries between residential areas and vegetation in South East Java.

PROJECT GEOPHYSICS

Preliminary Exploration of the Geothermal System at Mount Rajabasa, Lampung

Project Overview: This project involved the preliminary exploration of the geothermal system at Mount Rajabasa, Lampung. The main objective was to identify and coordinate geothermal manifestations in the area, providing foundational information for understanding the geothermal potential of the region.

Objectives: Identify geothermal manifestations, such as hot springs, fumaroles, and surface thermal anomalies. Coordinate the locations of these manifestations for further analysis and potential development.
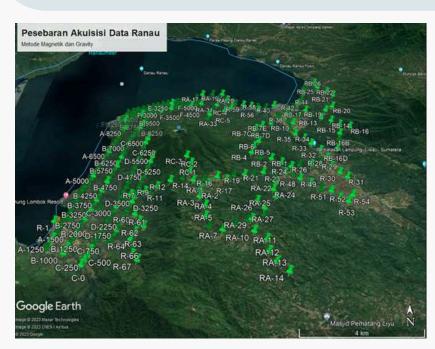
Tools and Software: GPS, ArcMap 10.8.
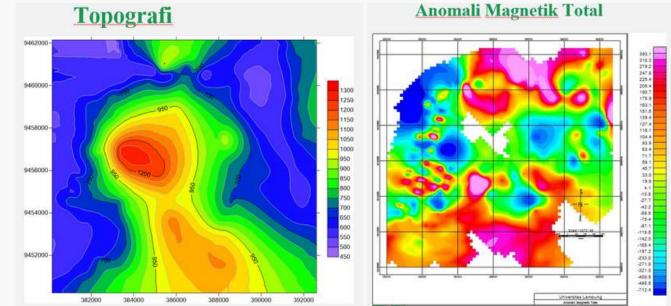
Results: Successfully identified and documented several geothermal manifestations within the Mount Rajabasa area. Coordinated their geographic locations, contributing to a preliminary understanding of the geothermal potential in the region.
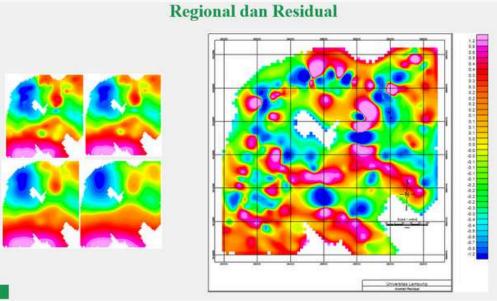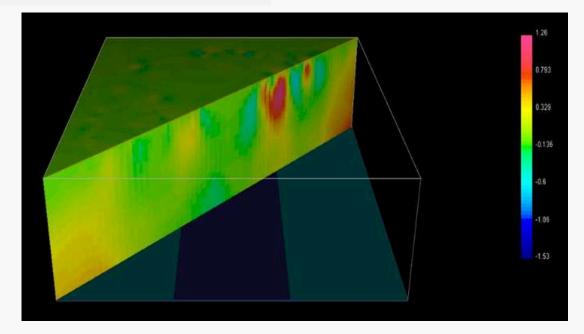
PROJECT GEOPHYSICS

Processing of Gravity Data from Mount Gatakan to Generate Residual Anomalies

Project Overview: This project focused on processing gravity data collected from Mount Gatakan to produce residual anomalies. The goal was to enhance the understanding of subsurface geological features and provide insights into potential mineral deposits and structural geology.

Objectives: Process gravity survey data to identify and analyze residual gravity anomalies. Interpret the anomalies to infer subsurface geological structures.
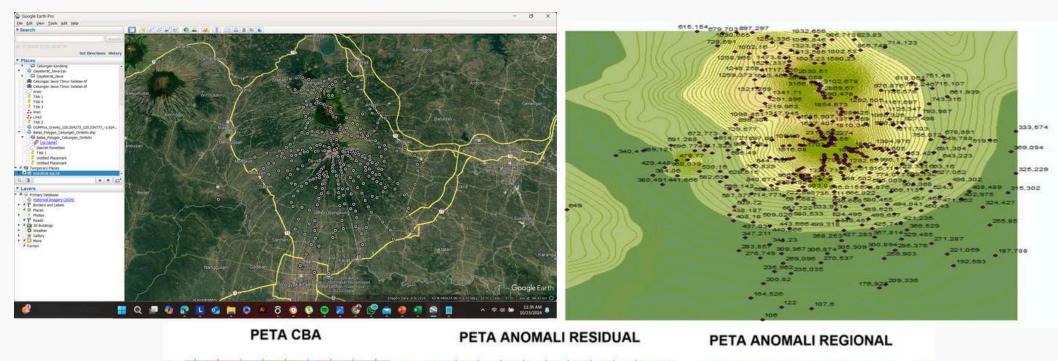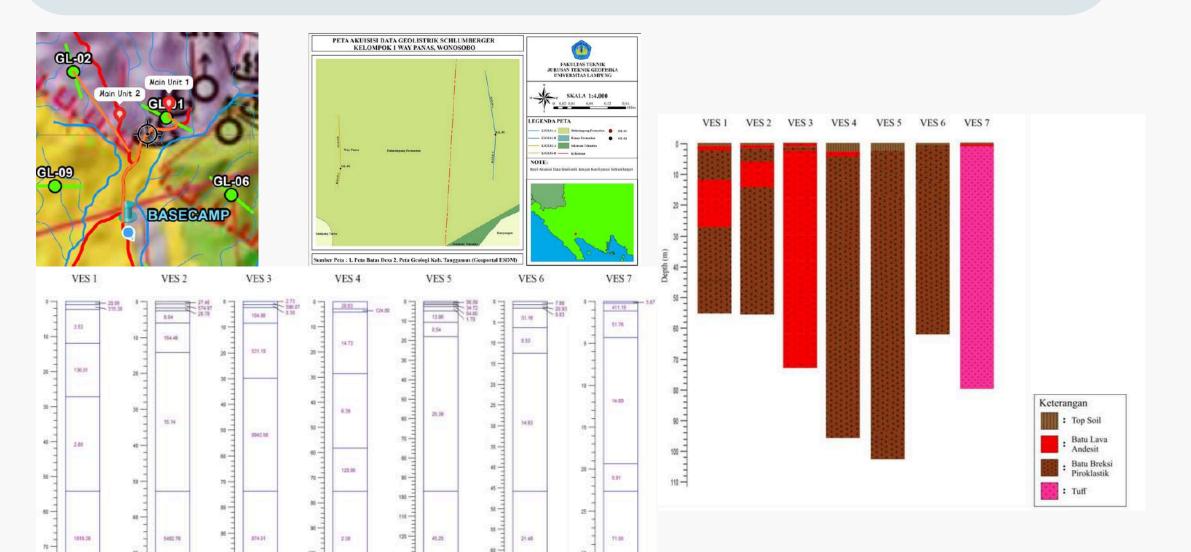
Tools and Software: Geosoft (Oasis Montaj) for magnetic data processing and modeling. ArcMap for spatial analysis and visualization.

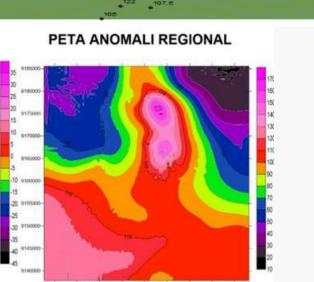**Results:** Successfully produced residual gravity anomaly maps for Mount Gatakan. Identified areas that may warrant further exploration based on the interpretation of the residual anomalies.

PETA CBA   PETA ANOMALI RESIDUAL   PETA ANOMALI REGIONAL

PROJECT GEOPHYSICS

Geoelectric Survey with Schlumberger Configuration to Identify Subsurface Layers in Way Panas.

Project Overview: This project aims to conduct a geoelectric survey using the Schlumberger configuration in the Way Panas area of Tanggamus. The main objective is to identify and map the subsurface layers and their geological characteristics, which can provide important information for geothermal exploration.

Objectives: To conduct a geoelectric survey to map the subsurface layers in the study area. To produce resistivity data to aid in understanding the geological structure and geothermal resource potential in the region.

Tools and Software: ARES Resistivity, IP2Win, ArcMap for spatial analysis and visualization.
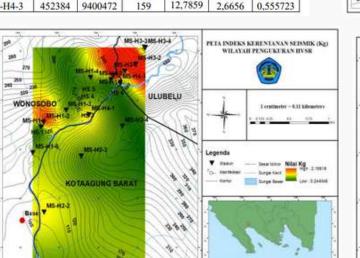
Results: This project produced seven measurement lines with a maximum current cable length of 600 m (30 m in each direction) and a potential cable length of 50 m (25 m in each direction).

PROJECT GEOPHYSICS
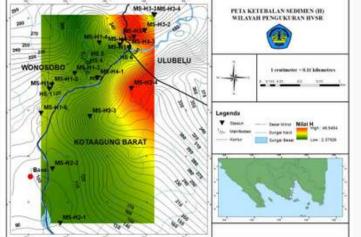
Microtremor Data Acquisition and Seismic Vulnerability Assessment in Way Panas, Tanggamus.
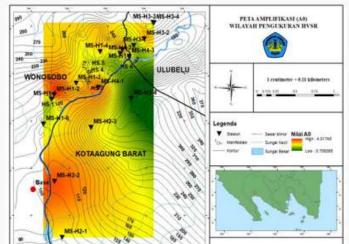
Project Overview: This project involves the acquisition and analysis of microtremor data to assess the seismic vulnerability of the Way Panas area, located in Wonosobo District, Tanggamus Regency, Lampung. The study aims to determine the thickness of sedimentary layers and evaluate the seismic vulnerability index based on the dominant frequency and amplification values derived from microtremor data.

Objectives: To acquire microtremor data in the Way Panas area and evaluate the seismic characteristics of the region. To determine the dominant frequency, amplification values, sediment thickness, and seismic vulnerability index for earthquake hazard assessment.

Tools and Software: Amadu Seismometer Logic, Geopsy, ArcMap for spatial analysis and visualization.

Results: The study provides valuable data for earthquake hazard planning and can be used to inform future infrastructure developments in the region.

Stasiun	UTM X	UTM Y	Elevasi	F0	A0	Kg
MS-H1-1	451383	9399958	143	11,4217	2,24234	0,440222
MS-H1-2	451416	9400010	146	11,3337	3,91567	1,352821
MS-H1-3	451700	9400150	175	16,3697	2,89991	0,513722
MS-H1-4	452008	9400529	195	16,3301	2,78215	0,473993
MS-H1-5	452296	9400554	163	5,10841	3,19008	1,992129
MS-H1-6	451279	9399658	128	8,90848	2,3147	0,601431
MS-H2-1	451520	9398296	90	16,9403	2,56838	0,389401
MS-H2-2	451421	9398971	101	16,4561	3,78869	0,872271
MS-H2-3	451892	9399619	237	16,9647	2,77352	0,453436
MS-H2-4	452413	9399965	312	3,46165	1,08952	0,342916
MS-H3-1	452444	9400603	205	3,47809	2,0795	1,243303
MS-H3-2	452576	9400685	222	4,37451	3,04787	2,123555
MS-H3-3	452691	9400879	268	14,1086	2,50539	0,444904
MS-H3-4	452702	9400876	249	16,0855	1,76696	0,194097
MS-H4-1	451990	9400100	150	13,0275	3,47199	0,925328
MS-H4-2	452265	9400505	184	17,0952	2,36065	0,325979
MS-H4-3	452384	9400472	159	12,7859	2,6656	0,555723

Work and Internship Experience

Data Science Intern | Startup Campus

South Jakarta, Jakarta | August 2022 – December 2022

- Engaged in a 6-month data science bootcamp, specializing in data analysis, visualization, and generating business insights for clients.
- Developed proficiency in Python and SQL for data manipulation, along with Power BI for advanced visualizations.
- Analyzed large datasets to identify trends, provide actionable insights, and contribute to business strategy recommendations.
- Collaborated with cross-functional teams to deliver data-driven reports that optimized decision-making processes.

Work and Internship Experience
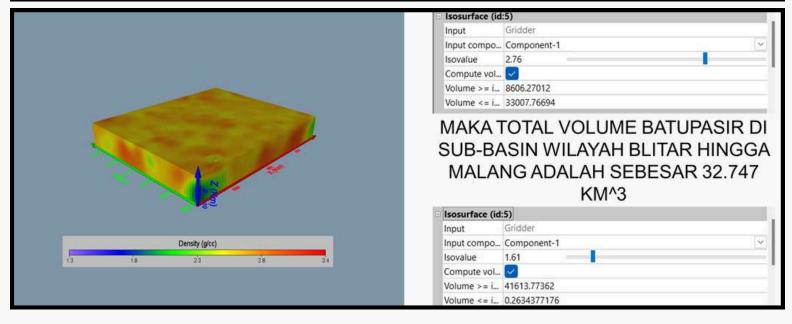
Geophysicist Intern | Pusat Survei Geologi (PSG)

Bandung, West Java | November 2023 – June 2024

- Engaged in fundamental reservoir modeling tasks, gaining hands-on experience with reservoir simulation tools and software.
- Assisted in the analysis and modeling of subsurface reservoirs, working with geological and geophysical data to predict reservoir behavior.
- Contributed to creating 3D reservoir models and applied key concepts such as porosity, permeability, and fluid dynamics in modeling exercises.
- Collaborated with senior reservoir engineers to validate models and ensure accuracy in predicting fluid flow and reservoir performance.
- Developed reports summarizing reservoir modeling outcomes, supporting the team in decision-making for project development.

Work and Internship Experience

Coordinator Assistant Lecturer of Exploration Geothermal | University of Lampung (Geophysical Engineering)

Bandar Lampung, Lampung | January 2024 – June 2024

- Assisted in leading the Exploration Geothermal Practicum, supporting students in hands-on geothermal energy exploration activities.
- Facilitated field projects involving resistivity, seismic, and magnetotelluric methods to acquire geophysical data.
- Supported students in analyzing field data and utilizing geophysical software to interpret subsurface conditions for geothermal potential.
- Organized lectures, lab sessions, and field activities, ensuring the successful completion of practicum objectives.
- Coordinated student groups, helping them conduct feasibility studies and present findings on potential geothermal reservoirs.
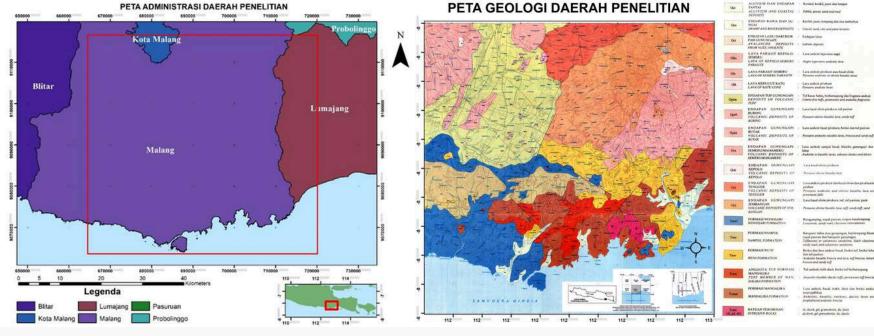
Work and Internship Experience

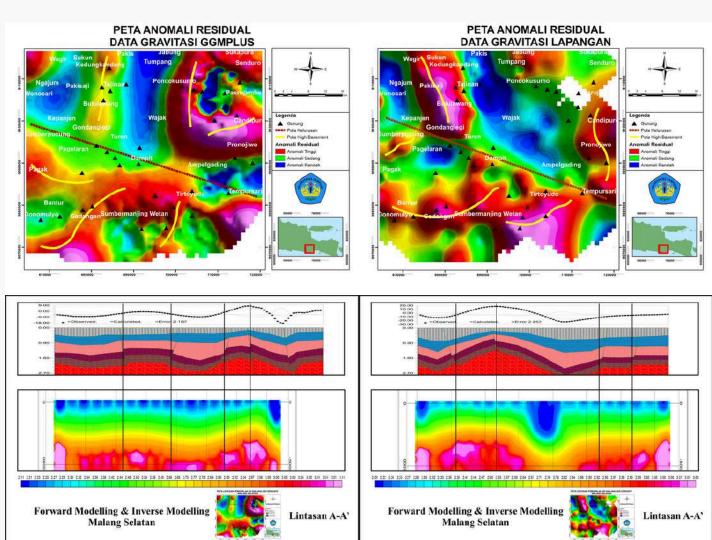## Reservoir Modeling Fundamentals Intern | Reservoir Solutions

Remote | July 2024 – August 2024

- Gained hands-on experience in reservoir modeling, working with geological and geophysical data to predict reservoir performance.
- Created and analyzed 3D reservoir models using simulation software, incorporating key parameters like porosity, permeability, and fluid flow dynamics.
- Collaborated with senior reservoir engineers to validate models and ensure the accuracy of subsurface predictions.
- Developed and presented reports summarizing reservoir simulation results, supporting strategic decisions in project planning.
- Enhanced understanding of reservoir behavior, fluid dynamics, and the fundamental principles of reservoir engineering.

RESERVOIR SOLUTIONS

Internship Certificate

This Internship Program Is Proudly Awarded To

Jeremia Kelvin Sihotang

For Completion and Successful Exam Passing of
" RESERVOIR MODELING FUNDAMENTALS INTERNSHIP "
Held on August 2024

Mr.Mansour Khosravi	Dr. Ahmed Saeed
Instructor	Instructor
Eng.Mohamed Ameen	Prof. Cesar Petter
Instructor	Instructor

Eng. Faisal Al-Jenaibi
Instructor

Mr.Abdullah AbdelRahman

Date: 25/08/2024   Training Manager

Certificate ID: RES-Intern-24-180

Final Project/Thesis

Delineasi Sub-Cekungan dan Konfigurasi Basement Menggunakan Data Gravitasi GGMPlus dan Data Gravitasi Lapangan Berdasarkan Pemodelan 2D dan 3D pada Sub-Cekungan Malang Selatan

April 2024 – July 2024

Objectives:

1. Determine the depth zones of regional anomalies and residual anomalies in the South Malang region.
2. Delineate the sub-basin based on residual anomalies and elevation patterns.
3. Analyze fault structures using residual anomaly data, employing First Horizontal Derivative (FHD) and Second Vertical Derivative (SVD) methods.
4. Establish the boundary between sediment and the basement high in the sub-basin area using 2D forward modeling and 3D inverse modeling techniques.

- Conducted an in-depth study titled "Delineasi Sub-Cekungan dan Konfigurasi Basement Menggunakan Data Gravitasi GGMPlus dan Data Gravitasi Lapangan Berdasarkan Pemodelan 2D dan 3D pada Sub-Cekungan Malang Selatan."
- Integrated GGMPlus satellite gravity data and field gravity data to analyze and model the subsurface structure of the South Malang Sub-Basin.
- Developed both 2D and 3D models to interpret the basement configuration and delineate the sub-basin's boundaries.
- Utilized advanced geophysical software for data processing and modeling, ensuring high accuracy in subsurface mapping.
- Presented the findings, illustrating the geological configuration and potential exploration areas, which contributed to the understanding of the region's geological structure.
- Enhanced skills in gravity data interpretation, subsurface modeling, and geological analysis through this project.

Conclusion

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This portfolio encapsulates my journey as a fresh graduate in Geophysical Engineering, highlighting my academic background, practical experiences, and diverse skill set in geophysics and data analysis. Through various projects, internships, and my thesis, I have developed a solid foundation in geophysical methods, GIS applications, and data processing techniques. My experiences, ranging from internships in data science and geophysics to assisting in academic lectures, have equipped me with the necessary tools to analyze and interpret spatial and subsurface data effectively. The culmination of my academic efforts is showcased in my thesis, which involved advanced modeling techniques to delineate sub-basins and analyze geological structures. I am eager to apply my skills and knowledge to contribute to innovative and sustainable solutions in the geoscience industry. I look forward to the opportunities ahead that will allow me to further develop my expertise and make a meaningful impact in the field.

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Thank you

MY CONTACT

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