GEOSPECTRUM

2025

Annual Bulletin
Geophysics 2025

Universiti Sains Malaysia

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Haziq Syamil Bin Johar

"Geophysics advances not through instruments alone, but through people united by curiosity, purpose, and collaboration."

DEAN'S MESSAGE

I am delighted to note that the Geophysics Programme has taken another significant step forward with the publication of its annual bulletin, now rebranded as GeoSpectrum. This initiative reflects a proactive effort to promote the programme and to share meaningful information with stakeholders across the geophysics and geoscience fields.

GeoSpectrum serves as an important platform to bring together the wider geoscience community, encompassing industry professionals, researchers, academics, and students across various sectors and levels. By fostering communication and engagement, this platform has the potential to propel the advancement of geophysics through collaboration, knowledge exchange, and shared vision.

The School of Physics remains fully committed to supporting its academic programmes, including Geophysics, to ensure strong and sustained engagement with key industry players. Such engagement is essential in maintaining programme relevance, strengthening talent development, and aligning academic outcomes with real-world needs.

Looking back at the history of Universiti Sains Malaysia, which was established in 1969, the School of Physics has been one of the pioneers since the early days of the University. The Geophysics Programme has long been a core part of the Physics discipline, playing an important role in shaping geoscience education and expertise over the years, especially in Malaysia. Today, many of our alumni have grown into respected and influential professionals in the industry, and it is heartening to see their continued interest and pride in the programme's progress. We are deeply appreciative of our alumni who have generously contributed back, supporting the ongoing growth and development of the Geophysics Programme.

I am confident that initiatives such as GeoSpectrum will further strengthen our geophysics community, keep stakeholders informed, and open new opportunities for collaboration at both national and international levels. I wish this bulletin every success and look forward to witnessing its positive impact in the near future.

Assoc. Prof. Dr. Azhar Bin Abdul Rahman
Dean, School of Physics
Universiti Sains Malaysia

DEPUTY DEAN ACADEMIC'S MESSAGE

The Geophysics Programme at the School of Physics, Universiti Sains Malaysia remains firmly committed to upholding academic excellence while ensuring the continued relevance of its curriculum in a rapidly evolving geoscience landscape. Through continuous syllabus review and close alignment with industry standards, the programme is designed to equip students with strong foundational knowledge, practical expertise, and essential professional competencies.

This commitment is reflected in our continuous efforts to nurture and develop the next generation of geophysics talents. By integrating applied learning approaches, meaningful industry engagement, and outcome-based education, we prepare graduates who are adaptable, future-ready, and capable of contributing effectively to industry advancement and societal well-being.

Assoc. Prof. Dr. Mohd Mahadi Halim
Deputy Dean (Academic, Career & International)
School of Physics, Universiti Sains Malaysia

DEPUTY DEAN RESEARCH'S MESSAGE

Geophysics is a central extension of the importance of physics. The School of Physics, Universiti Sains Malaysia, showcases a broad spectrum of applications ranging from seismic and field exploration to atmospheric analysis for understanding weather changes, and even to profiling stars millions of miles away from our planet. This unique blend of knowledge of the Earth and the skies defines our very existence and lays the foundation for sustainability.

Our commitment to learning strategies is not confined to the boundaries of the classroom. Over the years, it has extended to various segments of society, including schools and matriculation, colleges and universities, industries, and government agencies, as well as the general public, with the intention of spreading the benefits of geophysics knowledge and practices.

GeoSpectrum magazine is an expression of this commitment. We envision this academic platform as a means to establish ourselves as a central reference for academic activities, industrial engagement, and policy development in Malaysia and the greater region.

Assoc. Prof. Dr. Ahmad Fairuz Omar
Deputy Dean (Research, Innovation & Industry-Community Engagement)
School of Physics, Universiti Sains Malaysia

GEOPHYSICS CHAIRPERSON'S MESSAGE

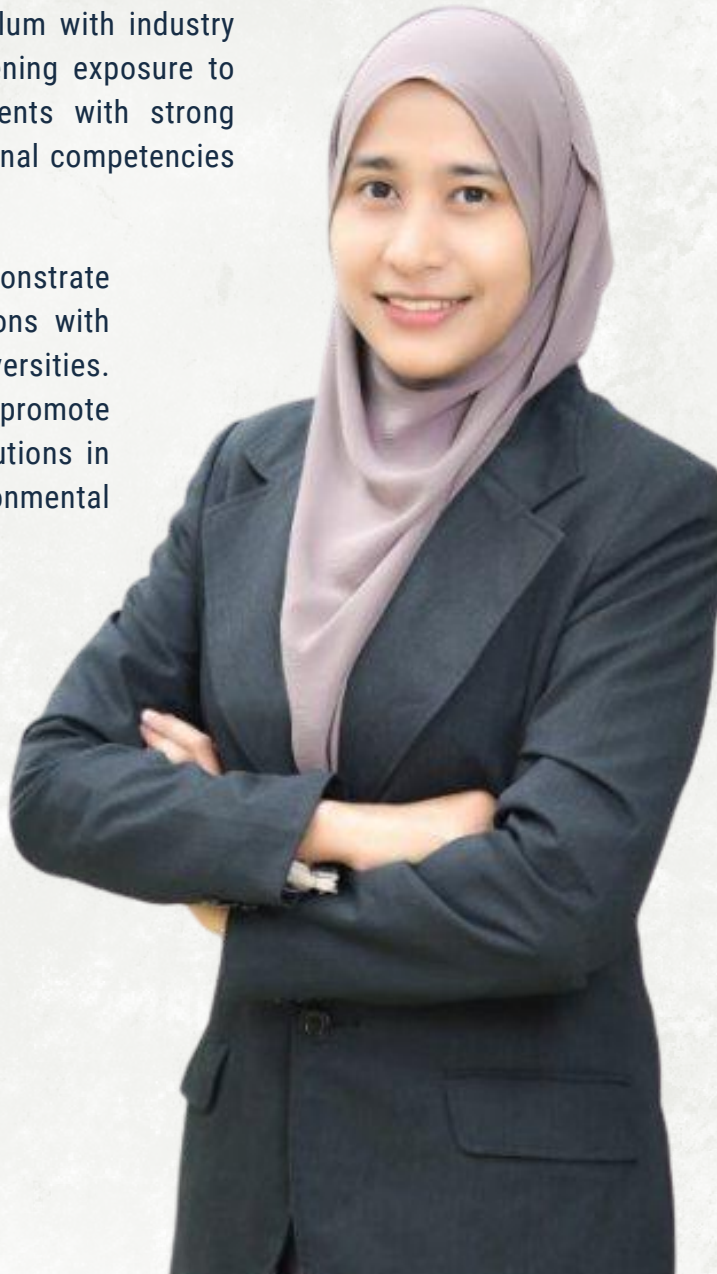
It is with great pleasure that I present the Geophysics Programme Annual Bulletin, now rebranded as GeoSpectrum. This rebranding marks an important milestone for our programme, reflecting our strategic effort to strengthen visibility, enhance engagement, and provide a dedicated platform to highlight developments in geophysics and geoscience more broadly.

GeoSpectrum showcases our continued commitment to promoting the geophysics discipline through active engagement with industry players, research agencies, and academic partners at both national and international levels. Through this platform, we aim to foster meaningful dialogue, share research outcomes, and strengthen collaborative networks that bridge academia, industry, and society. These efforts are essential in ensuring that geophysics remains relevant, impactful, and responsive to evolving scientific and societal needs.

At the programme level, we remain firmly committed to expanding collaboration and engagement across multiple sectors. Equally important is our responsibility to prepare geophysics graduates who are competent, adaptable, and industry-ready. By aligning our curriculum with industry standards, integrating applied learning, and strengthening exposure to real-world challenges, we strive to equip our students with strong fundamental knowledge, technical skills, and professional competencies required by the geoscience workforce.

In parallel, our research activities continue to demonstrate high quality and relevance, supported by collaborations with international agencies, research institutions, and universities. These partnerships enhance research excellence, promote knowledge exchange, and contribute to impactful solutions in areas such as subsurface exploration, environmental management, and Earth system science.

Looking ahead, I am confident that the Geophysics Programme at Universiti Sains Malaysia will continue to grow as a key player in advancing geophysics and geoscience within the region and beyond. Through sustained collaboration, strategic engagement, and a strong focus on talent development, we remain committed to contributing meaningfully to the future of geophysics.



Dr. Nur Azwin Ismail
Programme Chairperson - Geophysics
School of Physics, Universiti Sains Malaysia

PROF DR. ROSLI SAAD

"It is a privilege to collaborate with dedicated researchers and high-potential geophysics talents from the Geophysics Programme, School of Physics, USM. The discipline serves as a centre of expertise supporting engineering development, environmental management, and resource assessment, while consistently producing highly skilled geophysics graduates. With a strong focus on applied physics and industry-relevant research, the programme offers meaningful opportunities for collaboration, knowledge exchange, and the delivery of practical, impactful solutions."

Prof. Dr. Rosli Saad
Founder / Director
Global GeoExperts Sdn Bhd

P.GEOL. JUZAILI AZMI

"As the seismic processing and geophysics industry continues to evolve, sustained collaboration with academia becomes increasingly critical. The Geophysics Programme at Universiti Sains Malaysia exemplifies this approach through continuous industry engagement and the development of graduates with strong fundamental knowledge and data-processing competencies. These attributes are essential for addressing the growing complexity of subsurface interpretation and data-driven decision-making. We anticipate further collaboration to jointly advance geophysical innovation, strengthen talent pipelines, and address future challenges, while fostering solutions that are both technically robust and industry-relevant."

P.Geol. Juzaili Azmi
Chief Operating Officer
UGEO Solutions Sdn Bhd

"Transforming vision into impact through strategic action."

Table of Content

"Building capacity today to embrace the geoscience challenges of tomorrow."

Corporate Information

01

SCHOOL OF PHYSICS

OVERVIEW

The School of Physics, which occupies Buildings G06, G06A, and G05, was one of the three Schools established when the University was founded in 1969. Since its establishment, the School has grown and evolved into one of the leading Schools in Universiti Sains Malaysia, gaining national recognition in X-ray Crystallography and Nano-Optical research, Photonics and Semi-Conduction, while also establishing strong expertise in Geophysics and Earth system studies. This diversification is reflected through the formation of specialised research groups, namely Condensed Matter Physics and X-ray Crystallography; Applied and Engineering Physics; Energy Studies; Geophysics, Astronomy and Atmospheric Science; Theoretical and Computational Physics; and Medical Physics and Radiation Science, supporting both fundamental and applied research across physical and Earth sciences.

The School of Physics offers three major undergraduate academic programmes, namely Pure Physics, Medical Physics, and Geophysics. Among these, the Geophysics programme provides specialised training in Earth exploration and monitoring, integrating physics principles with geological and environmental applications.

The main objective of the School of Physics is to produce Physics and Applied Physics graduates who are academically strong, versatile, and equipped with both scientific and non-technical competencies relevant to national needs. Through the study of Physics and Geophysics, students develop a wide range of skills, including problem-solving, analytical reasoning, numeracy, hands-on practical abilities, effective communication, and proficiency in information and communication technology (ICT).

SCHOOL OF PHYSICS ADMINISTRATIVE

Dean
Assoc. Prof. Dr. Azhar Bin Abdul Rahman

Deputy Dean
(Academic, Career & International)
Assoc. Prof. Dr. Mohd Mahadi Halim

Deputy Dean
(Research, Innovation & Industry-Community Engagement)
Assoc. Prof. Dr. Ahmad Fairuz Omar

PROGRAMME'S CHAIRPERSON

Physics
Assoc. Prof. Dr. Quah Ching Kheng

Geophysics
Dr. Nur Azwin Ismail

Applied Physics
Dr. Mohd Marzaini Mohd Rashid

Medical Physics
Dr. Ramzun Maizan Ramli

GEOPHYSICS ADMINISTRATIVE

Geophysics Programme Chairperson

Dr. Nur Azwin Ismail

Geophysics Research Leader

Dr. Teoh Ying Jia

Chief Science Officer

Mr. Hajjaj Juharullah Jaafar

LABORATORY STAFF

Science Officer

Ms. Nur Awanis Sirat

Assistant Science Officer

Mr. Zulkeflee Ismail

Assistant Science Officer

Mr. Mohd Rizal Mohamad Rodin

Senior Lab Assistant

Mr. Shahil Ahmad Khosaini

GEOPHYSICS LECTURER

Assoc. Prof. Dr. Lim Hwee San
hslim@usm.my

- Geophysics
- Remote Sensing
- Digital Image Processing
- Atmospheric Science

Assoc. Prof. Dr. Nordiana Mohd Muztaza
mmnordiana@usm.my

- Groundwater
- Mineral Exploration
- Archeology
- Engineering & Environment

Dr. Nur Azwin Ismail
nurazwin@usm.my

- Geotechnical & Engineering Geophysics
- Environmental Geophysics
- Archeological Geophysics
- Shallow Subsurface Imaging

Dr. Ismail Ahmad Abir
iahmadabir@usm.my

- Structural Geology & Active Tectonics
- Applied Geophysics
- Geohazard Studies
- Interferometry Remote Sensing

Dr. Sya'rawi Muhammad Husni Mohd Sharoni
syarawi@usm.my

- Physical Oceanography
- Ocean-Atmosphere Interactions
- Data Processing & Machine Learning
- Microwave Remote Sensing

Dr. Norhaslinda Mohamed Tahrin
haslinda@usm.my

- Atmospheric Science
- Meteorology
- Statistics
- Mathematics

Dr. Teoh Ying Jia
tyj@usm.my

- Applied Geology
- Sedimentology & Stratigraphy
- Petroleum Geoscience
- Geological Formation Evaluation

Assoc. Prof. Dr. Andy Anderson Anak Bery
andersonbery@usm.my

- Applied Geophysics
- Geostatistics
- Soil Physics
- Engineering Geophysics

Dr. Joseph A/L Gnapragasan
joseph.gnapragasan@usm.my

- Seismic Interpretation (2D & 3D)
- Seismic Data Processing
- Seismic Attribute Analysis
- Seismic Exploration Studies

UNIVERSITI SAINS MALAYSIA

USM IN NUMBERS

QS WORLD UNIVERSITY RANKINGS
#134
GLOBAL 2026

QS UNIVERSITY RANKINGS ASIA
#34
ASIA 2026

SUSTAINABLE DEVELOPMENT GOALS
#1
SDGS IN THE WORLD

6
CAMPUSES

26
SCHOOLS

14
CENTRES

1,773
ACADEMIC STAFF

39,663
STUDENT ENROLLMENT

8,960
STUDENT GRADUATED IN 2024

2,410
ACTIVE GRANT

3,794
INDEXED JOURNAL IN SCOPUS/WOS

249
ACTIVE MOU/MOA

128
MOOC@USM COURSES

181
MICRO-CREDENTIAL (MC) COURSES

We Lead
"Transforming Higher Education for a Sustainable Tomorrow"

INTRODUCTION

Geophysics is dedicated to studying the Earth's structure and motion. The main thrust in the programme includes atmospheric science, environmental geophysics, oceanography, rocks and minerals such as petroleum and natural gas. It involves the application of physical laws and principles to a study of the Earth and other astronomical bodies. Geophysical studies employ physical measurements and mathematical models to explore and analyze the structure and dynamics of the solid earth and similar bodies, and their fluid content. During the course, students are required to work as a team in a one-week field camp, aiming for intensive training on various geophysical techniques.

MISSION

Towards global excellence in transdisciplinary research and education in Physics.

VISION

To provide academic, research, educational and social programs for development of human capital knowledge, and technology for sustainable nation.

ACADEMIC PROGRAMMES

- Bachelor of Applied Science in Geophysics with Honours
- Master of Science in Applied Geophysics - Mixed Mode
- Master of Science in Physics: Exploration Geophysics - Research Mode
- PhD in Physics: Exploration Geophysics - Research Mode

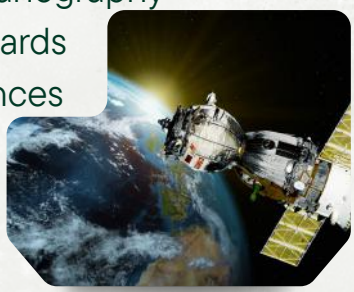
RESEARCH FIELDS

Near Surface Geophysics

- Engineering & Environmental Geophysics
- Geothermal Resources
- Mineral Exploration
- Groundwater
- Archaeology
- Geohazards

Remote Sensing Applications

- Atmospheric & Weather
- Physical Oceanography
- Land Geohazards
- Climate Sciences
- Meteorology



Geology

- Structural Mapping
- Lithological Mapping
- Sedimentology

Petroleum

- Seismic Processing
- Seismic Interpretation
- Basin Analysis

GEOPHYSICS UNDERGRADUATE PROGRAMME

YEAR 1

Basic Physics including Mechanics, Electricity and Magnetism, Modern Physics, Calculus, Linear Algebra and Vector Analysis, Vibrations, Waves and Optics, Geology, Physics and Geology Practical, English, and Bahasa Melayu.

YEAR 2

Solid Earth Geophysics, Exploration Geophysics, Meteorology, and Geophysics Practical. Students are also required to work as a team in a one-week field camp.

YEAR 3

Remote Sensing, Oceanography, and Elective Courses that include Meteorology, Advanced Geology, Engineering and Environmental Geophysics. Students are also required to complete a project during their 3rd year.

YEAR 4

Seismic Data Processing, Potential Field Interpretation, Physical and Geological Oceanography. Students are advised to undergo one semester of industrial training, or they may choose from other elective courses offered.

PROGRAM CONTENT

PROGRAM EDUCATION OBJECTIVES (PEO)

PEO 1	• Attaining trained manpower in various aspects in the field of Geophysics.
PEO 2	• Establishing skilful and knowledgeable graduates in the industrial fields, including oil and gas industries as well as higher institutions to fulfil the needs of the country.
PEO 3	• Producing human resources that are able to apply logical, critical and analytical concepts/ideas/thinking to exploit, develop and manage the knowledge-based resources.
PEO 4	• Developing graduates who can appreciate cultural diversity, professionalism and are able to contribute and lead effectively.

PROGRAM LEARNING OUTCOMES (PLO)

PLO 1	Knowledge & Understanding	• Comprehend the basic concepts and theories of geophysical methods
PLO 2	Cognitive Skills	• Reach a decision by applying logical consideration and critical thinking
PLO 3	Practical Skills	• Identify and solve various geophysical problems, carry out experiments, perform analysis and interpret data
PLO 4	Interpersonal Skills	• Appreciate culture and cultural diversity, and contribute and lead effectively as a team member to achieve maximum results
PLO 5	Communication Skills	• Attain communication skills
PLO 6	Digital Skills	• Perform data analysis using appropriate software to achieve advance technical skills
PLO 7	Numerical Skills	• Analyse geophysical data using mathematical operator
PLO 8	Leadership, Autonomy and Responsibility	• Demonstrate the ability to be a skilled and innovative leader
PLO 9	Personal Skills	• Locate, assess and exploit resources independently
PLO 10	Entrepreneurial Skills	• Develop and administer knowledge to achieve specific work
PLO 11	Ethics and Professionalism	• Perform tasks professionally

PROGRAM CONTENT

PROGRAM STRUCTURE

Course Categories	Credit Unit Requirement
Core (T)	72
[A] Elective (E) or [B] Minor (M) and Elective (E)	30 or (M) (16 or 20) and (E) (14 or 10)
University (U)	18
Total Units	120

OPEN ELECTIVES & INDUSTRIAL TRAINING

Open Electives

Students may choose 16 units of open electives courses from Physics programme and the remaining 14 from the elective courses listed in this programme. Students from the School of Physics can take the open elective courses offered by other Schools, subject to the requirements imposed by the provided School. Other Schools are offering 20 units of the elective courses.

No.	Course Code	Title	Pre-requisite	Sem
1.	ZCE 275/4	Introduction to Astronomy		1
2.	ZCE 277/4	Structure of the Universe		2
3.	ZCE 376/4	Astronomy Principles and Practices		1
4.	ZCE 378/4	Introduction to Radio Astronomy		2

Open Elective Courses (E) - in the School of Physics

Industrial Training

1. It is OPTIONAL, but highly encouraged.
2. Duration is 24 weeks, to be taken during Semester 2 of 4th year of study.
3. Purpose is to strengthen the relationship between the University and the private and public sectors and provide exposure to working-life for students nearing their completion of undergraduate study.
4. Students in the final year to serve as trainees with various employers in industries, hospitals, or institutions relevant to their fields of study through the School of Physics.
5. Evaluation is based on the reports from the industrial and field supervisors, reports by the students themselves, and the student's presentation.
6. Students may opt out Industrial Training provided substitute courses are taken with total unit equivalent to 12 of courses at 400 level (see list of elective courses).

PROGRAM CONTENT

LIST OF CORE COURSES

BACHELOR OF APPLIED SCIENCE IN GEOPHYSICS WITH HONOURS

CORE COURSES (T) – 72 UNITS; COMPULSORY (21 COURSES)

No.	Course Code	Title	Pre-requisite	Sem
1	ZCA 101/4	Mechanics		1
2	ZCA 102/4	Electricity and Magnetism I	(S) ZCA 101/4	2
3	ZCT 103/3	Vibrations, Waves and Optics		1
4	ZCT 104/3	Modern Physics		2
5	ZCA 110/4	Calculus		1
6	ZCT 112/3	Linear Algebra and Vector Analysis	(S) ZCA 110/4 or (S) MAA 101/4	2
7	ZGT 171/3	Physical Geology and Hydrogeology	(C) ZCA 101/4	1
8	ZGT 172/3	Sedimentology and Stratigraphy	(S) ZGT 171/3	2
9	ZGT 190/2	Geology Practical	(S) ZGT 171/3	2
10	ZCT 191/2	Physics Practical I		1
11	ZCT 210/4	Complex Analysis and Differential Equations	(S) ZCA 110/4 or (S) MAA 101/4	1
12	ZGT 271/3	Geophysical Data Analysis	(S) ZCT 210/4	2
13	ZGT 276/3	Solid Earth Geophysics	(S) ZGT 172/3	1
14	ZGT 278/3	Seismic Exploration Geophysics	(C) ZGT 276/3	1
15	ZGT 279/3	Potential Field Exploration Geophysics	(C) ZGT 287/3	2
16	ZGT 285/3	Introduction to Meteorology	(C) ZGT 276/3	1
17	ZGT 287/3	Solar System and Earth Geophysics	(S) ZGT 172/3	2
18	ZGT 295/4	Geophysics Practical (two semesters)	(S) ZGT 190/2	
19	ZGT 372/3	Introduction to Oceanography	(S) ZCA 101/4 and (S) ZGT 172/3	1
20	ZGT 374/4	Remote Sensing	(S) ZCA 102/4 and (S) ZCT 103/3	1
21	ZGT 395/8	Geophysics Project (two semesters)	(S) ZGT 295/4	

PROGRAM CONTENT

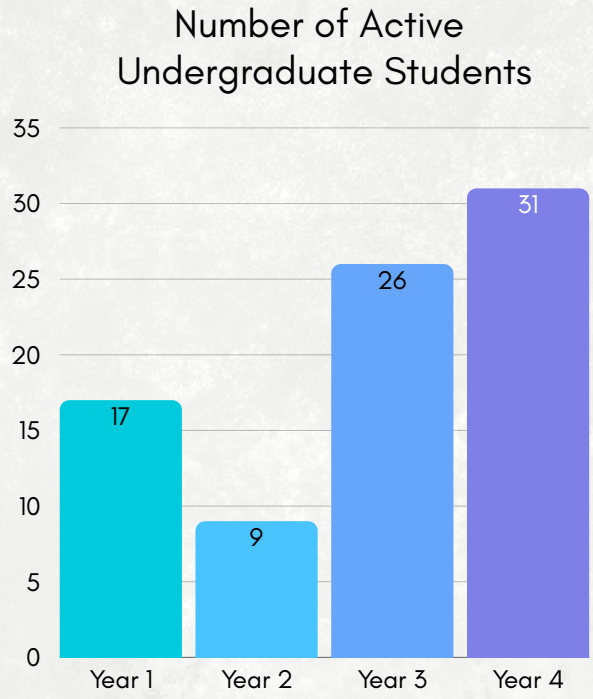
LIST OF ELECTIVE COURSES

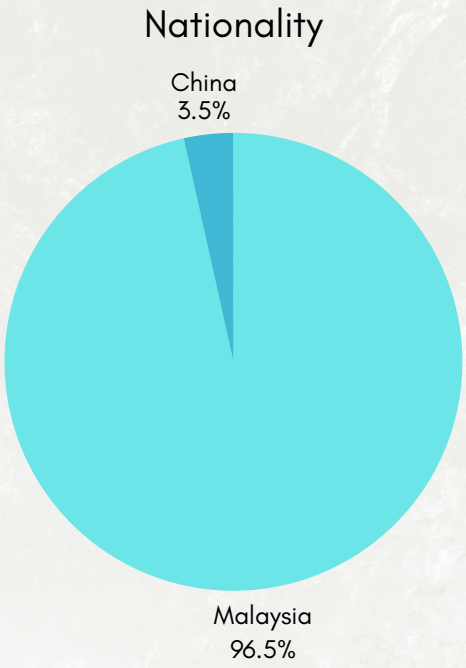
Elective courses (E) – Select 30 units

No.	Course Code	Title	Pre-requisite	Sem
1	ZCE 111/4	Computational Approach in Physics Learning		2
2	ZCE 275/4	Introduction to Astronomy		1
3	ZCE 277/4	Structure of the Universe		2
4	ZCE 321/3	The Engineer in Society		1
5	ZCE 341/4	Energy Studies	(S) ZCA 101/4 and (S) ZCA 102/4	2
6	ZGE 364/3	Tropical Meteorology and Forecasting	(S) ZGT 285/3	2
7	ZCE 376/4	Astronomy Principles and Practices		1
8	ZCE 378/4	Introduction to Radio Astronomy		2
9	ZGE 471/3	Potential Field Interpretation	(S) ZGT 279/3	1
10	ZGE 473/4	Seismic Data Processing	(S) ZGT 278/3 and (S) ZGT 271/3	1
11	ZGE 475/3	Engineering and Environmental Geophysics	(S) ZGT 278/3	1
12	ZGE 480/4	Synoptic Meteorology	(S) ZGT 285/3 and (S) ZGT 271/3	2
13	ZGE 481/3	Petroleum Geology	(S) ZGT 172/3	2
14	ZGE 487/4	Physical and Geological Oceanography	(S) ZGT 372/3	1
15	ZCE 499/12	Industrial Training	(S) ZCT 398/8 or (S) ZMT 397/8 or (S) ZGT 395/8	2

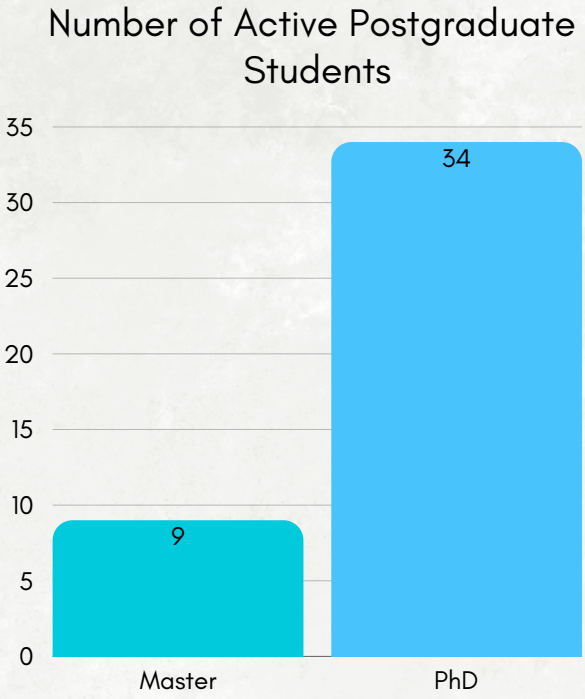
STUDENTS

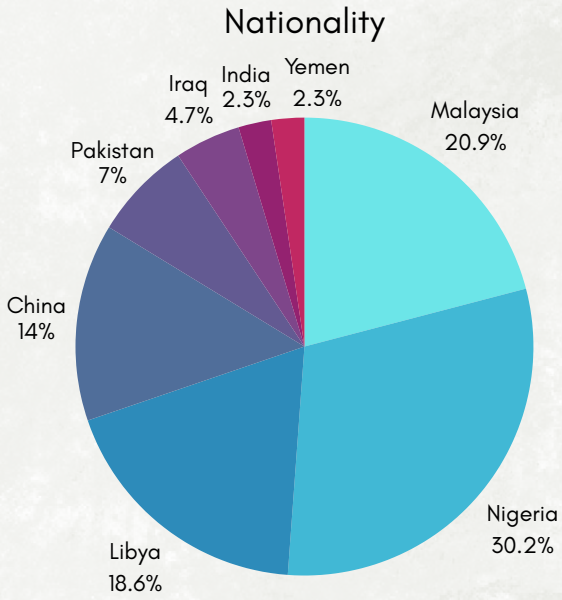
UNDERGRADUATES





POSTGRADUATES





LICENSED SOFTWARES

Petrel
Oasis montaj
SeisImager
RES2DINV
ArcGIS
The Kingdom Software
PALEOSCAN™
MATLAB
SeisOpt@2D

INSTRUMENTS

Seismic Terraloc MK8

ABEM Terrameter SAS 400

CG-5 Autograv Scintrex (Gravimeter)

ABEM Selector 10-64C

Magnetometer

Ground Penetrating Radar

Specimen Cutting Machine

Sieves Analysis and Mechanical Shaker

Aquarea AP-800

Polarizing Microscope

Aandreaa Seaguard Currentmeter

DJI Phantom Drone

SOCIAL MEDIA PAGES

At the beginning of 2025, the Geophysics Group launched its official social media presence across YouTube, Facebook, Instagram, and TikTok as part of a strategic effort to expand public engagement for geoscience and geophysics community. This platform focuses on producing edutainment content, to make geophysical concepts more accessible and engaging to a wider audience.

Beyond outreach, the platform also serves as a digital hub to showcase Geophysics Programme activities, including student initiatives, research highlights, academic–industry collaborations, and engagements with government agencies and key stakeholders. Through consistent and creative content, we aim to raise awareness of the role of geophysics in society while inspiring interest among prospective students and future geoscientists.

In 2026, the initiative was further strengthened with the establishment of a dedicated LinkedIn account, reinforcing our commitment to professional networking, industry visibility, and continuous updates on academic and research activities. Through these combined efforts, we hope to build a strong, visible, and connected geophysics community while attracting new talent into the geoscience and geophysics fields.

FACEBOOK

INSTAGRAM

YOUTUBE

TIKTOK

LINKEDIN

SOCIAL MEDIA ENGAGEMENTS (2025)

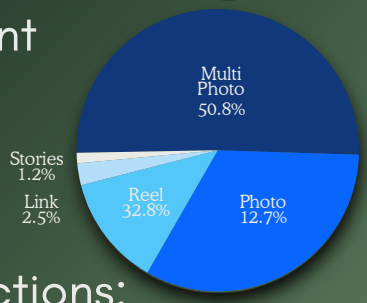
FACEBOOK

Views: **47,313**

Total number of times that content was played or displayed

Content Types:

Percentage of number of times that content was played or displayed

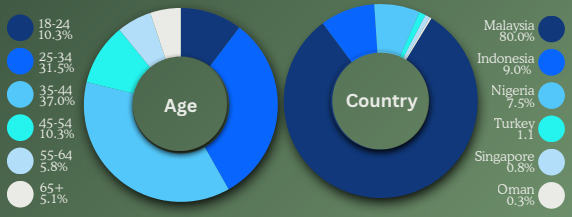


Interactions: **2,389**

The number of reactions, saves, comments, shares and replies on content

Total Post: **55**

Total Followers: **282**



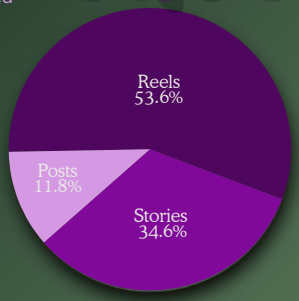
INSTAGRAM

Views: **59,340**

Total number of times that content was played or displayed

Content Types:

Percentage of number of times that content was played or displayed



Interactions: **2,199**

The number of likes, saves, comments and shares of reels and posts minus the number of unlikes, unsaves and deleted comments.

Percentage of interactions by content types

Percentage

Reels - 87.1%

Posts - 9.8%

Stories - 3.1%

Total Post: **34**

Total Followers: **161**

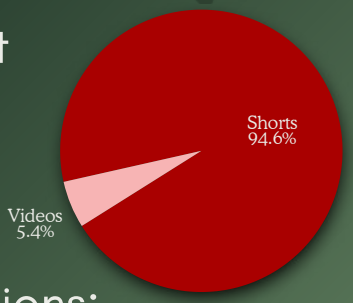
YOUTUBE

Views: **6,219**

Total views for the selected date range, region and other filters.

Content Types:

Percentage of number of times that content was played or displayed

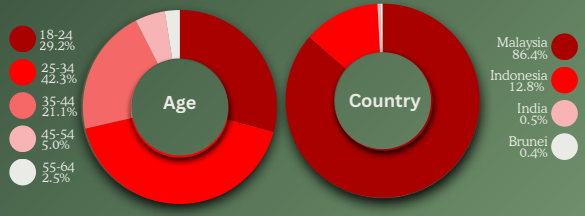


Interactions: **179**

The number of likes, shares and comments

Total Post: **21**

Total Subscribers: **37**



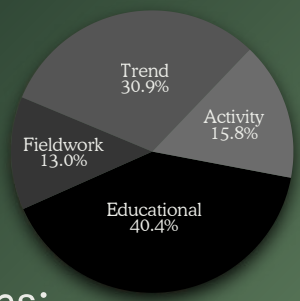
TIKTOK

Views: **57,127**

Total views for the selected date range, region and other filters.

Content Types:

Percentage of number of times that content was played or displayed



Interactions: **3751**

The number of likes, shares and comments

Total Post: **38**

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Traffic Source

Shows the places where viewers discover all posts

Search - 69.2%

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"Empowering students with skills for the future 'brain' of the nation."

PROGRAM & ACTIVITY

02

GSM STUDENT CHAPTER

CONTRIBUTION

The Geology Society Malaysia (GSM) - USM STUDENT CHAPTER is an active student organization that aims to enhance learning beyond the classroom by connecting students with industry professionals, organizing talks, workshops, and field visits, and providing career guidance.

INVOLVEMENT

- Organized and managed a booth during STEM events to promote the Geophysics course to the public.
- Coordinated industrial visits to organizations such as MET Malaysia and UGeo Solutions to provide industry exposure for students.
- Organized technical talks featuring professionals to share knowledge and current practices in geophysics.
- Enhanced students' understanding of real-world applications and career pathways in geophysics.

SEG STUDENT CHAPTER

CONTRIBUTION

Society of Exploration Geophysicsts (SEG)- USM STUDENT CHAPTER is a university level group affiliated with the Society of Exploration Geophysicists (SEG). These chapters bring together students with an interest in geophysics and related Earth science fields to learn, network and participate in technical and professional activities.

INVOLVEMENT

- Technical presentations and seminars with industry and academic speakers.
- Workshops and skill-building events (e.g., software training).
- Field trips and community outreach.
- Networking and professional development with alumni and SEG professionals.

GEOLOGICAL FIELD TRIP AT PERLIS

BUKIT TUNGKU
LEMBU, PERLIS
10 JANUARY 2025
30 PARTICIPANTS

ACTIVITY

- The annual first-year geological field trip involved examining outcrops to study stratigraphy, lateral continuity, and fault structures using fundamental geological principles such as original horizontality, superposition, and uniformitarianism to interpret Earth's geological history.

OUTCOME

- Students developed practical skills in field observation and geological interpretation, strengthened their understanding of structural and stratigraphic concepts, and gained early exposure to critical thinking in geoscience through real-world geological examples.

OCEANOGRAPHY FIELD TRIP 2025

PANTAI KERACHUT, PENANG
11 JANUARY 2025
35 PARTICIPANTS

ACTIVITY

- Students conducted field observations of water characteristics in a meromictic lake, examined sediment distribution along the estuary and adjacent beach, and measured beach profile variations.

OUTCOME

- The field trip provided hands-on experience in analyzing water properties, understanding sediment transport, and interpreting key coastal and estuarine processes.

IPTC 2025 ENERGY EDUCATION UNIVERSITY STUDENT PROGRAMME

KUALA LUMPUR
18-20 FEBRUARY 2025
1 PARTICIPANT

ACTIVITY

- Thong Li Xuan from the Geophysics Programme represented Universiti Sains Malaysia in the IPTC 2025 University Student Programme. The programme, organised by AAPG, EAGE, SEG, and SPE, featured technical sessions, mock interviews, and group presentations on themes such as CCUS, AI and digitalisation, and the energy transition.

OUTCOME

- Participation provided advanced exposure to the global energy industry, enhanced understanding of emerging energy technologies and trends, and offered valuable international networking opportunities with students from across 16 countries, supporting future career development in the energy sector.

UNDERGRADUATE RESEARCH IN ACEH

BANDA ACEH,
INDONESIA
22 - 24 FEBRUARY 2025
12 PARTICPANTS

ACTIVITY

* An undergraduate research collaboration with Universitas Syiah Kuala (USK), Aceh involving field investigations using the Horizontal-to-Vertical Spectral Ratio (HVSR) and Multichannel Analysis of Surface Waves (MASW) methods.

OUTCOME

* The study provided insights into soil types and seismic susceptibility in Banda Aceh, and enabled the identification of fault structures through the integration of geophysical measurements with remote sensing data.

GEOSYMPOSIUM 2025

DEWAN KULIAH A,B,C,
USM
12 APRIL 2025
10 PARTICIPANTS

ACTIVITY

- The GSM booth competed with other exhibitors and delivered outreach sessions to secondary, pre-university, and USM students, highlighting the fundamentals, significance, and career prospects of a geophysics degree.

OUTCOME

- The GSM booth was awarded First Place for the exhibition category.

GEO X RAYA

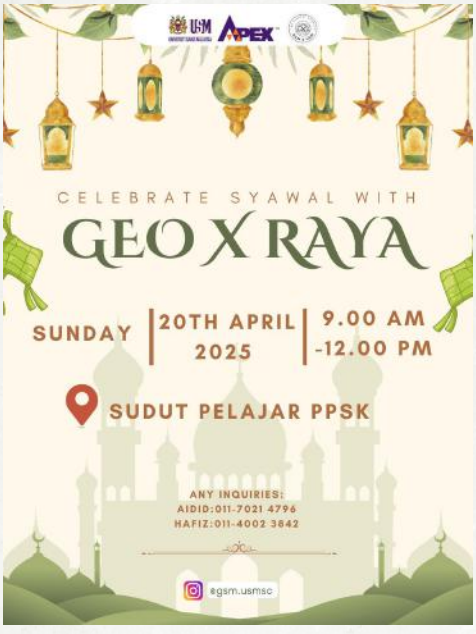
USM
20 APRIL 2025
45 STUDENTS

ACTIVITY

- Geophysics students and lecturers gathered to celebrate Hari Raya, strengthening friendship and interpersonal connections within the programme.

OUTCOME

- The event fostered stronger relationships, built a sense of community, and enhanced teamwork among students in the geophysics programme.



VISIT TO METMALAYSIA OFFICE

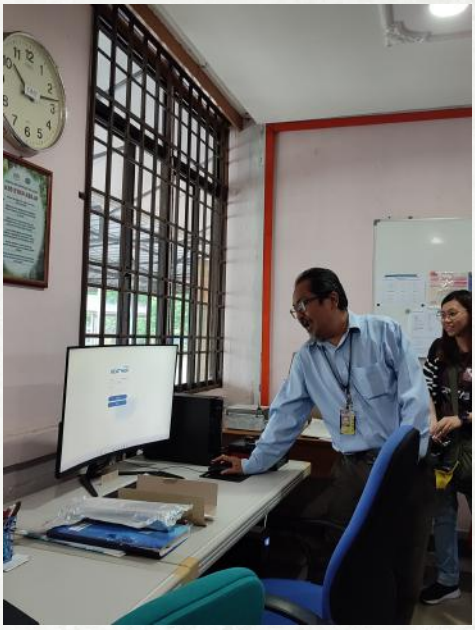
METMALAYSIA,
BAYAN LEPAS
21 MAY 2025
35 PARTICIPANTS

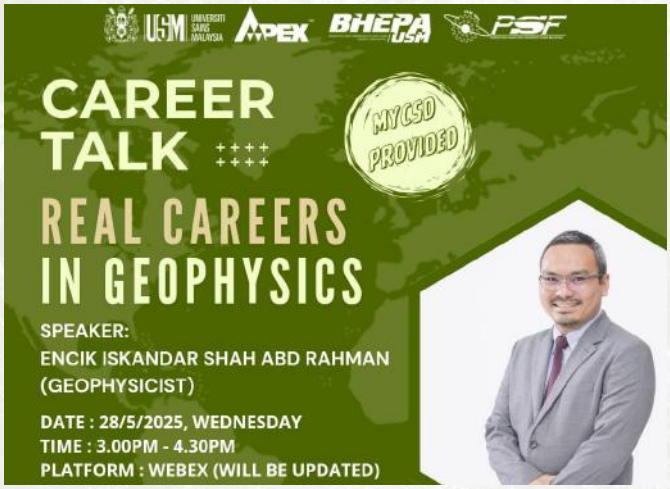
ACTIVITY

- A study tour to the Meteorological Office in Bayan Lepas, Pulau Pinang, organised for second-year Geophysics students to enhance their exposure to professional meteorological practices.

OUTCOME

- The visit provided students with practical insight into real-world meteorological operations, including the collection and analysis of weather data to support forecasting and applications such as disaster management.





CAREER TALK: REAL CAREERS IN GEOPHYSICS

SCHOOL OF PHYSICS + ONLINE (WEBEX)
28 MAY 2025
45 PARTICIPANTS

ACTIVITY:

Students attended a career talk featuring industry professionals who shared insights into geophysics job roles, career pathways, and industry expectations.

OUTCOME:

The session enhanced students' understanding of career opportunities in geophysics, the skills and qualifications required, and provided guidance for future academic and career planning.

PHYSICS COFFEE TALK: LIFE CYCLE OF AN OIL & GAS FIELD

ONLINE (WEBEX)
19 DECEMBER 2025
150 PARTICIPANTS

ACTIVITY:

An industry sharing session delivered by Ts. Hijreen Ismail, discussing the full life cycle of an oil and gas field from exploration to decommissioning.

OUTCOME:

Students gained clearer insight into oil and gas industry workflows and career relevance of their physics and geophysics studies.

THINKGEO 1: MET-OCEAN IN INDUSTRY

ONLINE (MICROSOFT TEAMS)
30 MAY 2025
55 PARTICIPANTS

ACTIVITY:

Guest speakers from PETRONAS MET-Ocean department shared insights into their job scope, the importance of MET-Ocean services, and professional experiences in the industry.

OUTCOME:

The session enhanced students' understanding of the MET-Ocean field, clarified industry roles and responsibilities, and provided guidance on potential career pathways within geophysics-related sectors.

THINKGEO 2: RIG LIFE & ROCK SCIENCE

ONLINE (MICROSOFT TEAMS)
20 JUNE 2025
45 PARTICIPANTS

ACTIVITY:

Pn. Ezan Shaizzah Binti Sah Nuddin from PETRONAS shared her career journey as a geologist, discussing professional challenges and key lessons learned. The session also featured an interactive Kahoot quiz and a Q&A segment.

OUTCOME:

Students gained insight into a geologist's career roles and responsibilities, and developed a better understanding of the challenges associated with rock science and field-based work.

GSM IDEA FAIR 2025

DEWAN BESAR UITM
PERMATANG PAUH
24 JUNE 2025
8 PARTICIPANTS

ACTIVITY

- The team engaged young students through interactive displays using mineral samples, mini puzzles, and selected geophysical equipment from the laboratory, providing hands-on exposure to geophysics concepts.

OUTCOME

- The activity increased awareness among students and teachers about geophysics and highlighted potential educational and career pathways in the field.

UGEOS VENTURE: FROM CORE TO CAREER

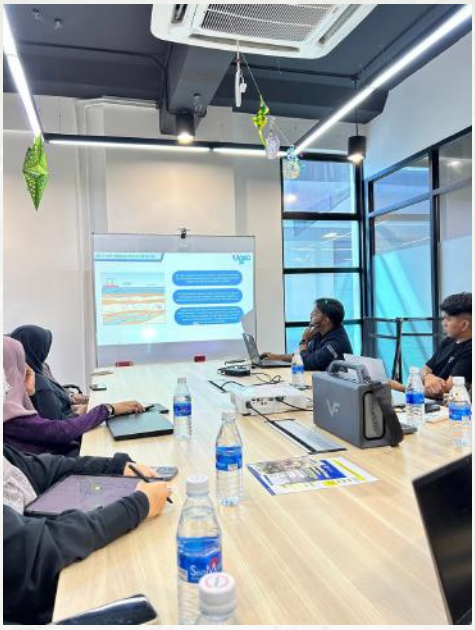
UGEO SOLUTION SDN BHD, KAJANG, SELANGOR
20 & 21 JUN 2025
15 PARTICIPANTS

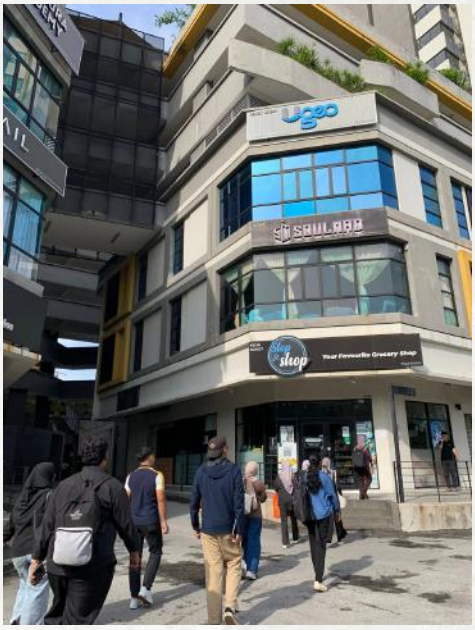
ACTIVITY

- Students visited UGEOS Venture and attended presentations on the company's geophysical software, as well as their activity and engagement in the industry.

OUTCOME

- The visit enhanced students' practical understanding of geophysical software and demonstrated how industry knowledge is applied in real-world projects.





GEOPHYSICS FIELD CAMP 2025

BUKIT JAWA, LENGGONG, PERAK.
22-26 JUNE 2025
45 PARTICIPANTS

ACTIVITY

- The Geophysics Field Camp 2025 involved 26 students, supported by lecturers, postgraduate researchers, laboratory staff, external university students, and industry partners. The fieldwork was conducted in groups using Ground Penetrating Radar (GPR), Electrical Resistivity, and Seismic Refraction methods for site investigation.

OUTCOME

- Students gained hands-on experience with geophysical equipment and field survey techniques, enabling them to map and interpret subsurface features such as ancient river channels and gravel layers. The activity also enhanced their skills in data processing and geophysical interpretation.

USM GEOPHYSICS INDUSTRIAL TRAINING VISITS 2025

INTERNSHIP'S OFFICE
AUGUST 2025
50 PARTICPANTS

ACTIVITY

- Geophysics lecturers conducted monitoring visits to the industrial training placements of final-year Geophysics undergraduate students. Students were placed across various sectors, including energy, research institutions, marine geophysics, subsurface geophysics, and related fields. The visits also facilitated academic–industry engagement, professional discussions and knowledge exchange.

OUTCOME

- The visits ensured the effective progress and quality of students' industrial training while strengthening collaboration between the university and industry partners. This engagement supports the development of work-ready Geophysics graduates equipped to meet real-world professional challenges.

USM GEOPHYSICS INDUSTRIAL TRAINING 2025

The Geophysics Group, School of Physics, Universiti Sains Malaysia, extends its sincere appreciation to all industry partners and organisations that hosted and mentored our final-year Geophysics students during their industrial training. Your commitment to providing meaningful training, professional guidance, and real-world exposure has been instrumental in shaping competent and industry-ready graduates.

NORTHERN GEO SOLUTIONS

DEEP ROCKS SDN BHD

GLOBAL GEOEXPERTS SDN BHD

GEOVENTURE SOLUTIONS SDN BHD

JABATAN MINERAL DAN GEOSAINS MALAYSIA

GEOMAPPING TECHNOLOGY SDN BHD

INSTITUTE OF OCEAN & EARTH SCIENCES UNIVERSITY OF MALAYA

UGEO SOLUTIONS SDN BHD

ENVIROS SURVEY & CONSULTANCY SDN BHD

VIRIDIEN (CGG SERVICES MALAYSIA SDN BHD)

FUGRO MALAYSIA MARINE SDN BHD

PETROLEUM NASIONAL BERHAD (PETRONAS)

CENTRE FOR SUBSURFACE IMAGING & HYDROCARBON PREDICTION (CSI), UNIVERSITI TEKNOLOGI PETRONAS

GEOPHYSICS UNDERGRADUATE PROJECT VIVA PRESENTATION

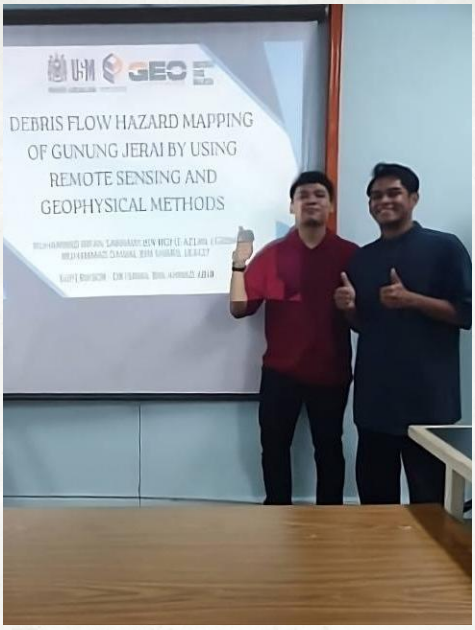
SCHOOL OF PHYSICS, USM
JULY 2025
30 PARTICPANTS

ACTIVITY

- Third-year Geophysics students successfully conducted their undergraduate project viva presentations as a key academic assessment milestone.

OUTCOME

- The viva sessions demonstrated students' ability to communicate research findings, defend their methodologies, and showcase their readiness for advanced study and professional practice in geophysics.



PALEO PURSUIT: A GEOLOGICAL SCAVANGE

UNIVERSITI MALAYSIA TERENGGANU
11-13 OCT 2025
15 PARTICPANTS

ACTIVITY

- Final-year students participated in hands-on geological field activities involving fossil exploration and observation, working collaboratively to study fossil plants and related sedimentary features.

OUTCOME

- The activities improved understanding of fossil preservation and geological processes, while enhancing practical fieldwork skills, teamwork, and knowledge of paleontology and sedimentary geology.

GEOPHYSICS AT USM CONVOCATION CEREMONY 2025

USM
25-26 NOVEMBER 2025
40 PARTICPANTS

ACTIVITY

* The Geophysics Programme, School of Physics, USM, participated in the 63rd USM Convocation Ceremony held from 25 November to 2 December 2025. The ceremony celebrated the graduation of Geophysics students, with the PhD session conducted on 26 November and the Master's and Undergraduate session on 27 November.

OUTCOME

* A total of 6 PhD graduates, 1 Master's graduate, and 25 Bachelor of Applied Science (Geophysics) graduates successfully. The convocation marked a significant academic milestone, recognising the students' achievements and readiness to contribute professionally to the fields of geophysics and earth sciences disciplines.

ACADEMIC EXCELLENCE CEREMONY - ACADEMIC SESSION 2024/2025

USM
10 DECEMBER 2025
70 PARTICPANTS

ACTIVITY

- The School of Physics held the Academic Excellence Ceremony to recognise outstanding undergraduate and postgraduate achievements. Awards presented included the Dean's List, Best Undergraduate and Postgraduate Thesis Awards, Three-Minute Thesis (3MT) Prize, and Best Student awards for each academic programme.

OUTCOME

- The ceremony celebrated academic excellence, motivated students to strive for high achievement, and reinforced the School's commitment to fostering a culture of academic quality and recognition.

SCIMATECH INTERNATIONAL DISCOVERY CAMP 2025

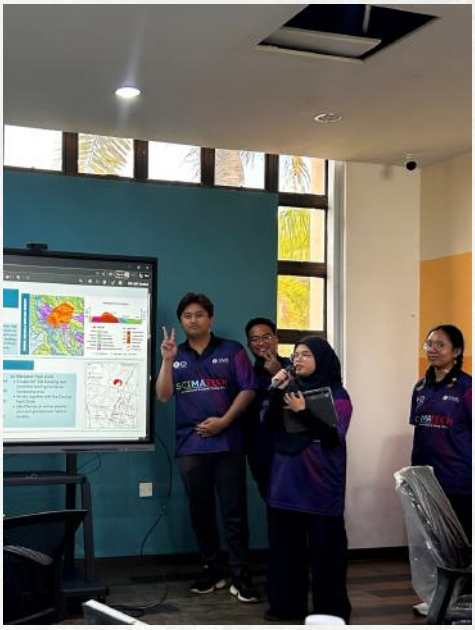
UNIVERSITI MALAYSIA SABAH
15 -20 DECEMBER 2025
40 PARTICPANTS

ACTIVITY

* Final-year students in the SCIMATECH International Discovery Camp 2025. The programme featured academic seminars, campus tours, group projects, and geo-exploration activities. Cultural visits and student buddy activities further enriched the learning experience.

OUTCOME

* The programme fostered growth, confidence, and collaboration. Students formed lasting friendships across universities. The experience strengthened both personal and academic development



"Investing in people to build the future of geophysics."

"Driving excellence through collaboration and innovation."

COLLABORATION & ENGAGEMENT

03

COLLABORATIVE GRAVITY AND MAGNETIC SURVEY PROJECT

ULU SLIM, PERAK
1-31 JAN 2025
15 PARTICIPANTS

ACTIVITY

- A collaborative research project involving the Geophysics Group (USM), the Department of Earth Sciences and Environment (UKM), Geo Technology Resources Sdn. Bhd. (GTR), and Geothermal Resources Sdn. Bhd. (GRSB), focusing on the acquisition of gravity and magnetic survey data.

OUTCOME

- The collaboration strengthened academic–industry partnerships, facilitated hands-on involvement of staff and students in applied geophysical surveys, and ensured successful data acquisition through strong support from local communities, contributing to the effective execution of the project and future collaborative opportunities.

MINERAL EXPLORATION PROJECT: GEOPHYSICS USM–GGE COLLABORATION

KELANTAN
19-28 JAN 2025
10 PARTICIPANTS

ACTIVITY

- A mineral exploration project was conducted by the Geophysics Group, USM, in collaboration with Global GeoExperts (GGE). The project involved magnetic surveys at multiple sites, each presenting distinct geological conditions and operational challenges.

OUTCOME

- The project provided valuable field experience and technical exposure for staff and students, enhanced understanding of magnetic methods for mineral exploration, and laid the foundation for continued industry collaboration in future exploration initiatives.

MAGNETOTELLURICS TALK WITH DR. NAZRIN RAHMAN

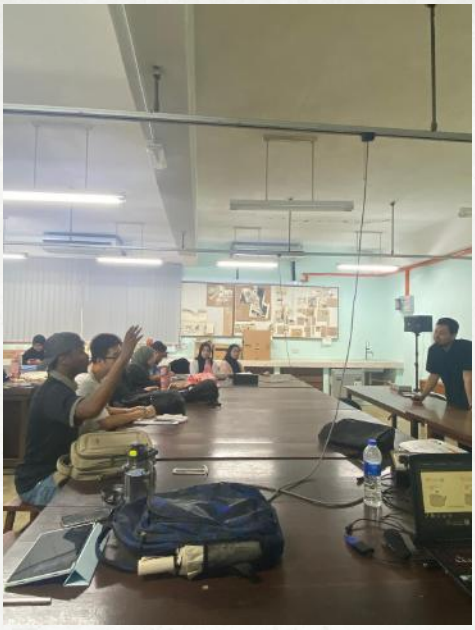
SCHOOL OF PHYSICS, USM
22 JAN 2025
40 PARTICIPANTS

ACTIVITY

* A technical talk on Magnetotelluric (MT) surveys was delivered by Dr. Nazrin Rahman from Global GeoExperts Sdn. Bhd. (GGE) to 4th-year Geophysics and MSc students as part of the academic enrichment programme.

OUTCOME

* The session enhanced students' understanding of MT considering this method is still new in Malaysia, and strengthened academic–industry engagement, supporting future collaborative activities between Geophysics USM and industry.



UGEOS TALK & INTERVIEW PROGRAMME

SCHOOL OF PHYSICS, USM
23-24 JANUARY 2025
50 PARTICIPANTS

ACTIVITY

- Geophysics students from all academic years attended an industry-focused talk by UGEOS on 23 January 2025, followed by an interview session for final-year students on 24 January 2025, providing exposure to professional practices and recruitment processes.

OUTCOME

- The programme enhanced students' understanding of industry expectations, improved professional and interview readiness among final-year students, and strengthened collaboration between the School of Physics and the geophysics industry.

MEETING AND DISCUSSION WITH KUALA LUMPUR CITY HALL (DBKL)

DBKL, KUALA LUMPUR
14 APRIL 2025
1 PARTICIPANT

ACTIVITY

- A meeting and discussion were held with Kuala Lumpur City Hall (DBKL) to promote geophysics services and research, explore collaboration opportunities with GEOTROPIK UTM, and introduce the Geophysics academic programme.

OUTCOME

- The engagement strengthened institutional networking, opened avenues for collaborative research and professional services, and increased awareness of geophysics expertise and educational programmes.

USM–UKM UNIVERSITY COLLABORATION IN SCIENTIFIC BOOK WRITING

BANGI RESORT HOTEL, SELANGOR
16 APRIL 2025
2 PARTICIPANTS

ACTIVITY

- The Geophysics Group participated in an invited Technocrat Book Writing Workshop at Universiti Kebangsaan Malaysia, focusing on collaborative book writing. The programme included guidance on academic book writing, preparation of a book chapter in Bahasa Melayu, and on-site completion of the assigned chapter.

OUTCOME

- The collaboration enhanced academic writing skills, resulted in the completion of a book chapter, and strengthened inter-university collaboration between USM and UKM in science and technology scholarship.

STEM OUTREACH PROGRAMME AT SMK BUKIT GAMBIR

SMK BUKIT GAMBIR, PENANG
30 APRIL 2025
20 PARTICIPANTS

ACTIVITY

- The Geophysics team, under the School of Physics, conducted a STEM outreach programme at SMK Bukit Gambir, introducing students to basic geoscience concepts through interactive activities and demonstrations.

OUTCOME

- The programme increased students' interest in STEM and enhanced awareness of Earth's science as a potential field of study and career pathway.

GEOPHYSICS WORKSHOP WITH JKR

JKR CREATE,
MELAKA
26-28 MAY 2025
24 PARTICIPANT

ACTIVITY

- The Geophysics Group from Universiti Sains Malaysia conducted a three-day short course at JKR CREaTE, Melaka, covering 2-D Electrical Resistivity Imaging, Seismic Refraction, and Ground Penetrating Radar, including theory, field survey design, hands-on data acquisition, and practical applications.

OUTCOME

- The workshop enhanced technical understanding and practical geophysical surveying skills among JKR participants, strengthened collaboration between USM and JKR, and opened opportunities for continued partnership in geophysics, geology, and geotechnical projects.

GEOPHYSICS USM–UITM GEOMATICS RESEARCH COLLABORATION

LEMBANGAN LANGAT, SELANGOR
1-3 JUNE 2025
5 PARTICIPANTS

ACTIVITY

- A collaborative research project between the Geophysics Group, USM, and the Geomatics programme, UiTM, involving a 2-D electrical resistivity survey in the Langat Basin, Selangor, with support from Global GeoExperts Sdn. Bhd. The programme included groundwater investigation, joint fieldwork with lecturers and students, and a 2-D resistivity data processing workshop for UiTM students.

OUTCOME

- The collaboration advanced groundwater research, enhanced students' technical skills in geophysical data acquisition and processing, strengthened inter-university and industry partnerships, and increased visibility of the Geophysics programme.

ICAP ENGAGEMENT SESSION 2025

SAINS@USM
4 JUNE 2025
3 PARTICIPANTS

ACTIVITY

* The Industry-Community Advisory Panel (ICAP) 2025 engagement session was successfully held at SAINS@USM, bringing together more than 70 ICAP panel members and senior university leaders to strengthen strategic collaboration between industry, community, and USM. The session was officiated by the Vice-Chancellor and attended by key members of the university's leadership.

OUTCOME

* The engagement strengthened university–industry–community partnerships, supported talent development initiatives, and reinforced efforts to enhance graduate employability and global competitiveness across diverse sectors.

SLB TALK & INTERVIEW SESSION

SCHOOL OF PHYSICS, USM
27-28 JUNE 2025
60 PARTICIPANTS

ACTIVITY

- SLB conducted a two-day engagement at the School of Physics, USM, on 27–28 June 2025, featuring company introduction, career and technical talks, group interviews, and individual interview sessions for shortlisted students seeking internship and employment opportunities.

OUTCOME

- Students gained insight into SLB's operations, geophysics career pathways, and emerging areas such as CCS and energy technologies, while developing interview experience and potential pathways toward internships and future employment.

GROUND PENETRATING RADAR (GPR) PROJECT: GGE-USM COLLABORATION

KUALA LUMPUR
16-18 JULY 2025
2 PARTICIPANTS

ACTIVITY

- A Ground Penetrating Radar (GPR) survey was conducted in collaboration with Global GeoExperts (GGE) for a Tenaga Nasional Berhad (TNB) project, focusing on mapping the depth and dimensions of pile caps.

OUTCOME

- The project provided accurate subsurface information to support engineering design and construction planning, strengthened industry–university collaboration, and offered practical field experience for USM geophysics personnel and students.

INTERNATIONAL GEO-ENGINEERING CONFERENCE (GEOFIESTA) 2025

GENTING HIGHLANDS, PAHANG
13-14 AUGUST 2025
12 PARTICIPANTS

ACTIVITY

- Students and lecturers from the Geophysics Department made their mark at GeoFiesta 2025, contributing as both speakers and presenters by sharing impactful research and strengthening our presence in the geoengineering community.

OUTCOME

- This event gained deeper insights into advanced geoengineering topics directly relevant to modern geophysical work, and several participants from USM were proudly announced as Best Presenters at GeoFiesta 2025.

SEISMIC REFRACTION SURVEY FOR SHALLOW SUBSURFACE MAPPING

KUALA TERENGGANU
9-11 SEPTEMBER 2025
5 PARTICIPANTS

ACTIVITY

* A night-time geophysical survey was conducted to minimise traffic disturbance and ensure high-quality data acquisition, aimed at identifying rockhead levels for a pipe-jacking project. The session also introduced geophysical methods and their applications to the client.

OUTCOME

* The survey successfully supported subsurface characterisation for engineering works, enhanced client awareness of geophysical solutions, and created internship opportunities for Universiti Sains Malaysia students.

NATIONAL GEOSCIENCE CONFERENCE 2025

TAWAU , SABAH
18-19 SEPTEMBER 2025
6 PARTICIPANTS

ACTIVITY

- Five Geophysics students and one lecturer from USM participated in the National Geoscience Conference (NGC) 2025 held in Tawau, Sabah, on 18–19 September 2025, presenting their research and engaging with geoscience experts nationwide. Their participation reflects USM's active role in advancing geoscience knowledge and supporting student involvement in national conferences.

OUTCOME

- USM participants gained valuable insights into current geoscience developments, expanded their professional connections and strengthened their capacity to contribute to national geoscience initiatives.

MALAYSIA OCEAN RESEARCH ALLIANCE (MORA) AT ISOCEEN 2025

SURABAYA, INDONESIA
18-20 SEPTEMBER 2025
1 PARTICIPANT

ACTIVITY

- A delegation from the Malaysia Ocean Research Alliance (MORA), comprising researchers from USM, UMT, and UTHM, participated in the 13th International Seminar on Ocean and Coastal Engineering, Environmental and Natural Disaster Management (ISOCEEN 2025), held at Institut Teknologi Sepuluh Nopember (ITS), Surabaya, Indonesia, from 18–20 September 2025.

OUTCOME

- The participation strengthened international research collaboration and knowledge exchange in ocean and coastal engineering. The USM Geophysics research team received the Best Paper Award, reflecting international recognition of research excellence and contributing to the global visibility of Malaysian ocean research initiatives.

INBOUND RESEARCHER MOBILITY PROGRAMME AT ITS, SURABAYA

SURABAYA, INDONESIA
21-26 SEPTEMBER 2025
2 PARTICIPANTS

ACTIVITY

* Assoc. Prof. Dr. Lim Hwee San and Assoc. Prof. Dr. Andy Anderson Bery participated in the Inbound Researcher Mobility programme at the Department of Geophysical Engineering, Institut Teknologi Sepuluh Nopember (ITS), Indonesia, from 21–26 September 2025. The programme facilitated academic visits focused on knowledge sharing, idea exchange, and discussions on potential collaborations in teaching and research.

OUTCOME

* The initiative strengthened international institutional partnerships, expanded collaborative research and teaching networks, and enhanced the global visibility of the Geophysics programme as a key academic discipline.

STEM WORKSHOP AT INTERNATIONAL GEOTHERMAL WEEK MALAYSIA 2025

ULU SLIM, PERAK
7 OCT 2025
50 PARTICIPANTS

ACTIVITY

* A STEM workshop was conducted during International Geothermal Week Malaysia 2025 through collaboration between the Geophysics USM, Geology programmes from UKM and UM, and industry partners GTRSB, GRSB, and Northern Geo Solutions. The workshop also served as a continuation of the Gravity and Magnetic project awarded to the Geophysics Group in the 2024/2025 cycle.

OUTCOME

* The workshop provided exposure to geophysical methods for geology students from UKM and the general public, strengthened academic–industry collaboration, and reinforced ongoing partnerships with GTRSB and GRSB in geothermal and geoscience-related initiatives.

DOWNHOLE SURVEY AT SEKOLAH KEBANGSAAN SERI LAGENDA

SK SERI LAGENDA, LANGKAWI
MAY & NOVEMBER 2025
6 PARTICIPANTS

ACTIVITY

- A downhole geophysical survey was conducted at Sekolah Kebangsaan Seri Lagenda with the involvement of two Geophysics internship students placed at Global GeoExperts (GGE), together with several undergraduate final year students. The activity included professional engagement with representatives from JKR.

OUTCOME

- The survey provided practical field exposure for Geophysics internship students, strengthened inter-agency and industry networking, and enhanced students' understanding of applied downhole geophysical methods.

SCIENCE CARNIVAL & GEMINIDS METEOR SHOWER 2025

POKOK SENA, KEDAH
13-15 DECEMBER 2025
15 PARTICIPANTS

ACTIVITY

- A public science outreach programme held at Sekolah Menengah Sains Pokok Sena (SAINA) from 13–15 December 2025, featuring star gazing and the Geminids meteor shower, geoscience and technology exhibitions, science camps, astronomy talks, water rocket demonstrations, and astronomy quiz competitions.

OUTCOME

- The programme promoted public engagement in science and astronomy, increased interest in geoscience and space science, and provided an enjoyable learning platform for students, families, and science enthusiasts.

SUBSURFACE MAPPING IN WEST COAST PENINSULAR MALAYSIA USING INTEGRATED GEOPHYSICAL METHODS

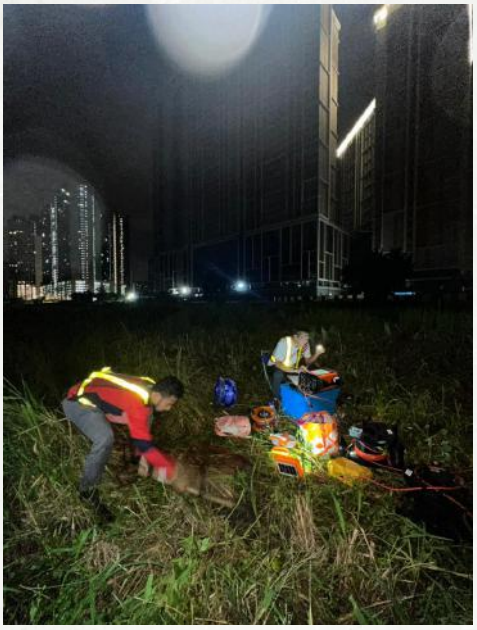
JALAN MASJID INDIA,
KUALA LUMPUR
18-22 DEC 2025
3 PARTICIPANTS

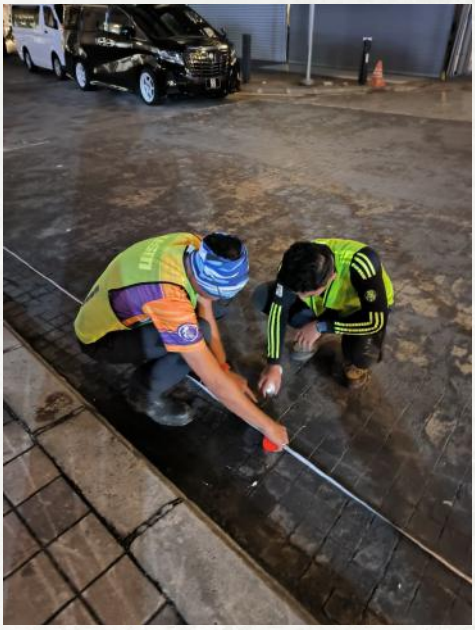
ACTIVITY

- An industry-funded project awarded by Global GeoExperts Sdn. Bhd. to Dr. Teoh Ying Jia, focusing on subsurface mapping using 2-D electrical resistivity and seismic refraction methods to characterise ground conditions.

OUTCOME

- The study identified subsurface features such as loose soils, voids, and weak zones, providing critical information for geotechnical assessment and strengthening industry–university collaboration in applied geophysics.





USM-UM LANDSCAPE GEOSCIENCE COLLABORATION

KUALA PILAH, NEGERI SEMBILAN
19 JUNE-31 DEC 2025
1 PARTICIPANT

ACTIVITY

* A collaborative landscape project involving the Geophysics USM and the Geology Programme UM, in partnership with Majlis Daerah Kuala Pilah and Jabatan Landskap Negara. The project, awarded by Hijaureka to Assoc. Prof. Dr. Nordiana Mohd Muztaza (USM) and Dr. Muhammad Hatta Roselee (UM), focused on applying geoscience knowledge to landscape planning and development.

OUTCOME

* The project enhanced understanding of how geology and geophysics support landscape design, strengthened collaboration between universities, government agencies, and the private sector, and expanded professional networking across multidisciplinary stakeholders.

POLYGON SYNERGY VENTURES SDN. BHD.: STRATEGIC COLLABORATION DISCUSSION

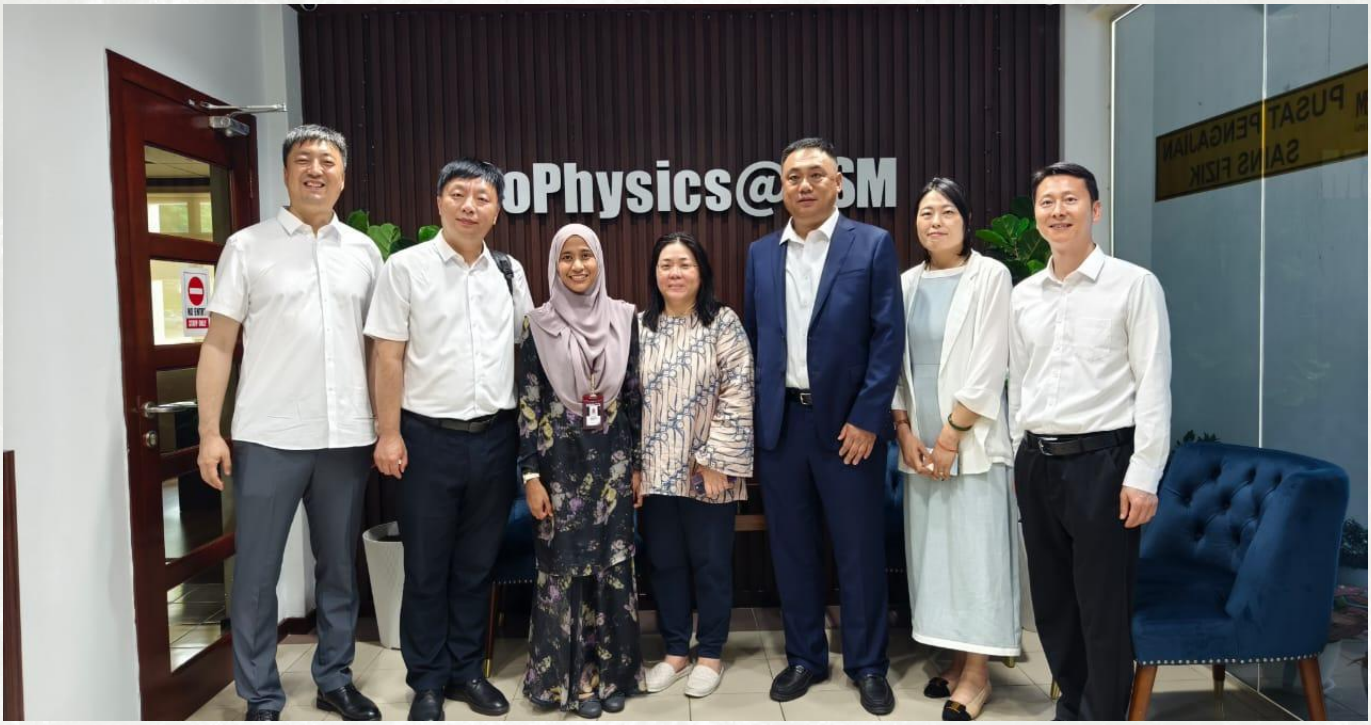
SCHOOL OF PHYSICS, USM
19 MAY 2025
9 PARTICIPANTS

ACTIVITY

- Discussions focused on potential collaboration in research partnerships, student internships, equipment servicing and maintenance, and access to third-party laboratory services, leveraging Polygon Synergy Ventures Sdn. Bhd.'s technical capabilities to support the School's objectives.

OUTCOME

- The engagement established a foundation for potential collaboration, strengthened industry–academic linkages, and identified opportunities to support student development, research activities, and technical services through shared expertise and resources.



HEBEI GEO UNIVERSITY – USM: MOU SIGNING AND LABORATORY VISIT

SCHOOL OF PHYSICS, USM
20 MAY 2025
9 PARTICIPANTS

ACTIVITY

- An MoU signing ceremony was held between Hebei GEO University and Universiti Sains Malaysia, followed by discussions on potential academic collaboration, including the potential establishment of a dual degree programme and joint academic initiatives.

OUTCOME

- The engagement formalised strategic academic collaboration, strengthened institutional ties, and established a clear pathway for future cooperation in potential dual degree development, academic exchange, and collaborative research.

STEM OUTREACH PROGRAMME AT SMK SUNGAI ARA

SMK SUNGAI ARA, PENANG
9 JULY 2025
200 PARTICIPANTS

ACTIVITY

- The Geophysics Programme conducted a STEM outreach session introducing students to basic concepts of geophysics and Earth science through interactive talks, demonstrations, and hands-on activities designed to promote scientific curiosity.

OUTCOME

- The programme enhanced students' awareness of geophysics and STEM pathways, fostered early interest in Earth science, and strengthened engagement between the university and the local school community.

ACADEMIC VISIT FROM SEKOLAH BERASRAMA PENUH INTEGRASI KUBANG PASU

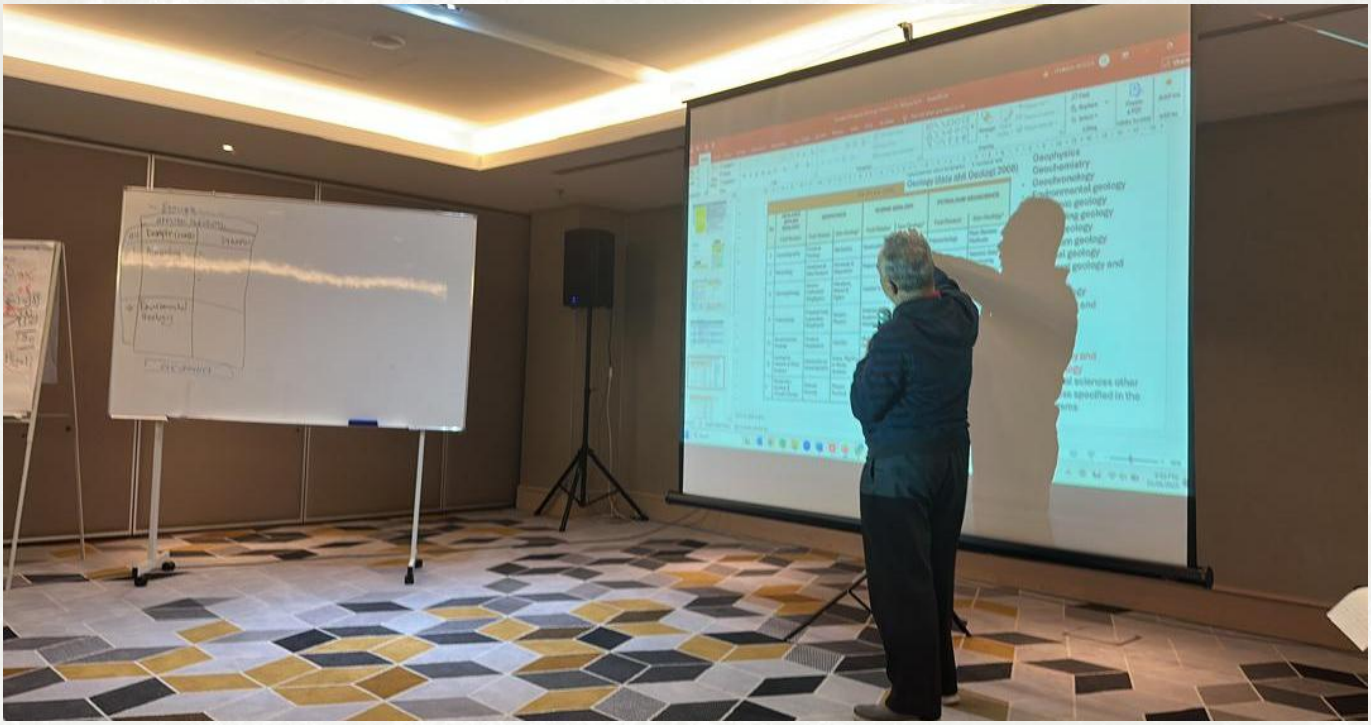
SCHOOL OF PHYSIC, USM
17 JULY 2025
45 PARTICIPANTS

ACTIVITY

- High-achieving students from Sekolah Berasrama Penuh Integrasi Kubang Pasu participated in an academic visit featuring introductory sessions on geophysics and astronomy, including guided discussions and exposure to university-level scientific learning environments.

OUTCOME

- The visit broadened students' understanding of geophysics and astronomy, inspired interest in advanced STEM fields, and strengthened early academic engagement between secondary education and the university.



GEOLOGY PROGRAMME STANDARD DEVELOPMENT WORKSHOP 2.0

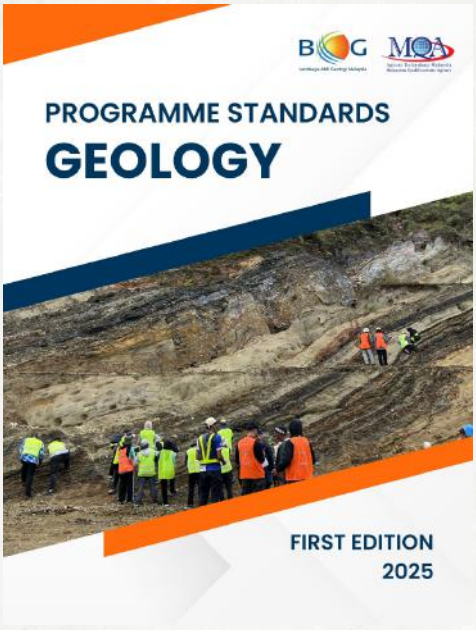
DORSETT HOTEL, PUTRAJAYA
25- 26 AUGUST 2025
20 PARTICIPANTS

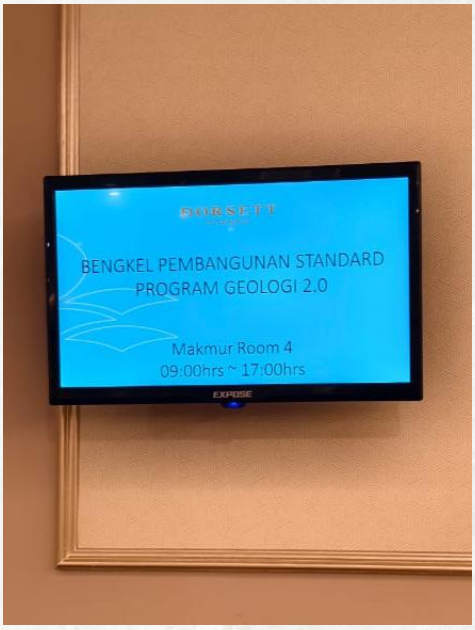
ACTIVITY

* A dedicated workshop was conducted to develop and refine programme standards for geology, focusing on curriculum alignment with the five major themes outlined in the recognised Body of Knowledge framework.

OUTCOME

* The workshop strengthened curriculum coherence, ensured alignment with academic and industry expectations, and established a robust foundation for delivering a comprehensive and future-ready geology programme.





INDUSTRY–ACADEMIA COLLABORATION MEETING WITH PROMISING GEOPHYSICS AND UKM

SCHOOL OF PHYSICS, USM
13 OCTOBER 2025
8 PARTICIPANTS

ACTIVITY

- The meeting focused on exploring strategic collaboration opportunities, including joint research and development initiatives, talent development through internships, mentorship and recruitment programmes, consultancy and knowledge transfer activities, joint research grant applications, and pathways for commercialisation and start-up development based on academic intellectual property.

OUTCOME

- The engagement strengthened industry–academia linkages, identified priority areas for collaborative research and talent development, and established a foundation for future joint initiatives, funding applications, and technology commercialisation efforts.

ACADEMIC AND COLLABORATIVE VISIT FROM UNIVERSITAS BRAWIJAYA, INDONESIA

SCHOOL OF PHYSICS, USM
30 SEPTEMBER 2025
8 PARTICIPANTS

ACTIVITY

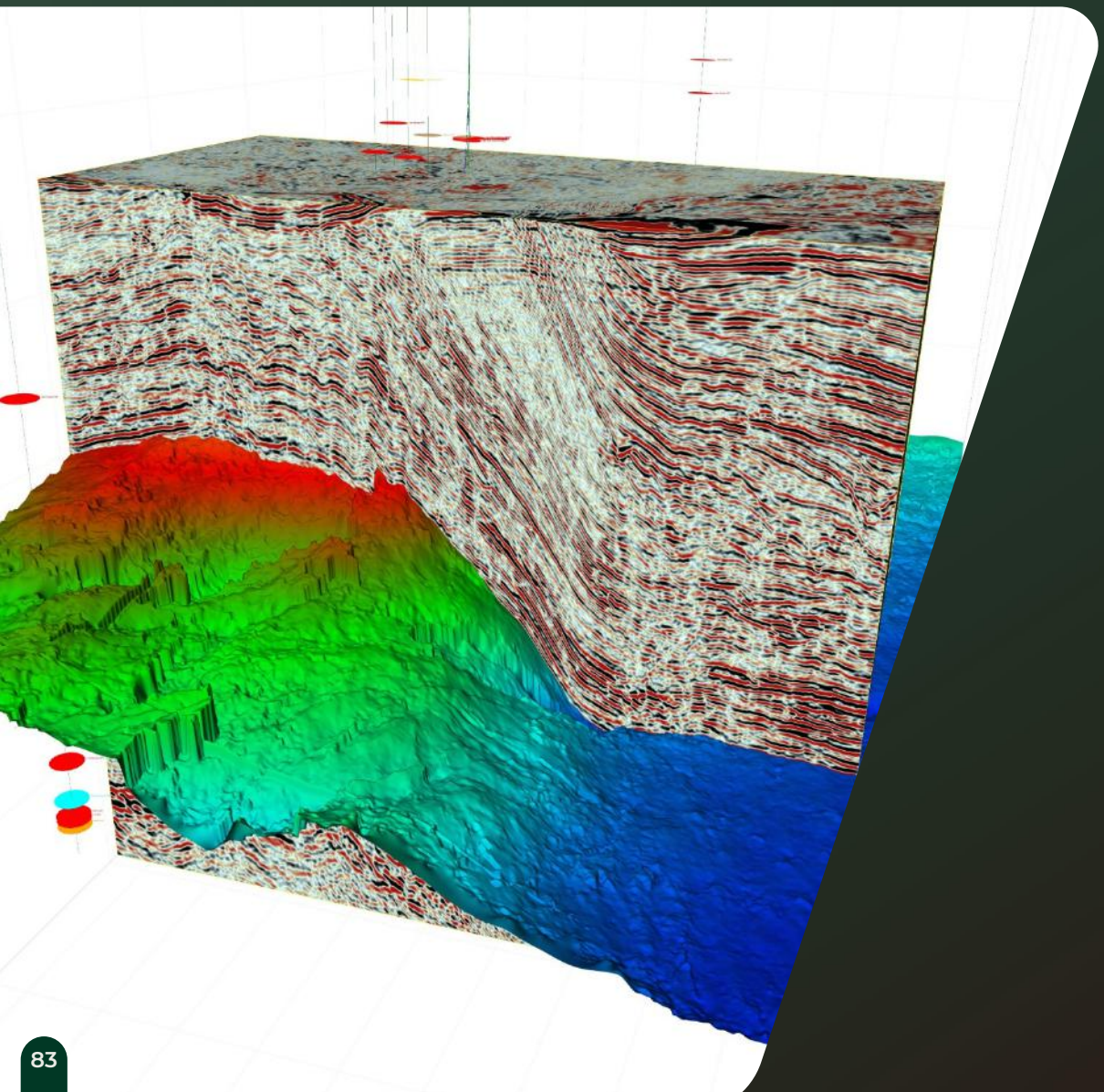
- The visit included academic and research programme sharing between both universities, discussions on the implementation of collaborative research initiatives leading to the signing of an implementation agreement, and a campus tour to showcase teaching and research facilities.

OUTCOME

- The engagement strengthened institutional ties, formalised research collaboration, and enhanced mutual understanding of academic and research capabilities, paving the way for sustained international cooperation.

"Empowering quality education for a sustainable Earth."

"Connecting expertise with real-world applications to deliver meaningful outcomes."



RESEARCH HIGHLIGHTS

04

GEOPHYSICS ENGINEERING

Strong Foundations Begin with Smart Science

How geophysics and smart algorithms work together to spot hidden weak layers before we build.

Watching a building rise from the ground can make it seem like the most important work happens above the soil. In reality, the story starts underground. Before foundations are laid, engineers need to know exactly what lies beneath—strong rock, weak clay, hidden fractures, or dangerous voids. But traditional drilling is slow, expensive, and only samples a few points. What if we could "see" the underground the way doctors use x-ray or MRI to see inside the body?

That's exactly what a research team at USM set out to do. Led by Mr. Mbuotidem Dick, with Assoc. Prof. Dr. Andy Anderson Bery, and their colleagues from Geophysics Group, the team explored how machine learning can combine multiple geophysical methods to build a clearer picture of Penang's granitic subsurface.

Working in Minden as a study case, the team collected four types of underground "signals": Electrical resistivity – how easily the ground conducts electricity; Induced polarization – how soil stores electrical charge; Seismic waves – how fast energy travels through the ground; and SPT-N values from boreholes – a direct measure of soil hardness.

Instead of treating each method separately (which often leads to mixed or confusing results), the researchers fed all these datasets into several machine learning models such as K-Nearest Neighbors (KNN), Simple Linear Regression, Principal Component Analysis (PCA), and K-means clustering.

"The result? A smarter, more complete underground map."

The ML models were able to distinguish three major layers with surprising accuracy: 1) Soft topsoil and weathered clay/silt – weak and unsuitable for building; 2) Weathered and fractured rock – partly strong but inconsistent; 3) Partially weathered to hard granite bedrock – the safest foundation layer

What makes this exciting is that the models didn't just classify layers — they predicted soil strength, identified hidden fractures, and even detected manmade features, such as buried concrete structures.

"Many problems begin underground. If we understand the layers early, we prevent costly mistakes later."

Photo by Ivan Bandura on Unsplash

As Dr. Bery noted, "Machine learning didn't replace geology—it revealed what we could not see by eye." To add, in the words of Mr. Mbuotidem Dick, "When we teach machines to read the ground, we make construction safer, faster, and far more reliable."

This approach can help engineers avoid unstable ground, reduce drilling costs, and design foundations with confidence. Beyond Penang, the method can be applied to any region with complex geology—especially fast-growing cities where safe construction is critical.

Mr. Mbuotidem Dick is a Lecturer in the Department of Science Laboratory Technology at Akwa Ibom State Polytechnic and a PhD candidate in Exploration Geophysics at Universiti Sains Malaysia. His research combines seismic refraction, electrical resistivity, and geotechnical data to model complex subsurface soil–rock conditions.

Assoc. Prof. Dr. Andy Anderson Bery , Senior Lecturer in Geophysics Programme at USM, specializes in applied geophysics. His research focuses on exploration geophysics, and machine learning for subsurface characterization.

HIGHLIGHTS

- Machine learning helps merge seismic, electrical, and borehole data into one integrated subsurface model.
- Three clear underground layers were identified, including hidden weak zones and stable bedrock.
- This approach reduces guesswork in foundation design and improves safety, especially in granitic terrains.

REFERENCE

Dick, Mbuotidem, et al. "Integrated Machine Learning Modeling of Seismic, Electrical Resistivity, Induced Polarization, and SPT-N Data for Subsurface Integrity Assessment in Granitic Terrain." Earth Systems and Environment (2025): 1-26.

GEOENGINEERING

Tapping the Hidden Wells Beneath USM

New study maps groundwater potential on Penang Island.

Penang has long depended on a single lifeline—the Muda River—for nearly all its raw water. When El Niño hit in recent years and rainfall dwindled, dam levels dropped dangerously low. For USM, a campus that uses more than 417 million litres of treated water every month, the warning was clear: relying on a single water source is no longer sustainable.

If river levels drop or demand keeps rising, what's the backup? One answer may be right under our feet: hardrock groundwater stored in fractured granite beneath the campus.

A team from USM set out to map subsurface structures and locate potential groundwater zones beneath the USM main campus in Gelugor, Penang Island.

"If droughts hit harder in the future, groundwater could be the quiet hero that keeps USM running."

They used a geophysical technique called 2-D electrical resistivity imaging – basically, injecting a small electric current into the ground and measuring how easily it flows. Different materials (wet soil, dry sand, weathered rock, solid granite) conduct electricity differently, so their "resistivity" reveals what's below.

"So much of Penang's water comes from one shared river," said Dr. Nordiana. "If we want long-term security, we must understand the resources hidden beneath our feet."

Eight survey lines—some stretching up to 400 metres—were laid across the campus, from the lakes near the hostels to the Bukit Gambir main entrance. Using an ABEM Terrameter, electrodes, and advanced processing software, the team generated detailed underground "slices" showing layers of soil, weathered material, fractures, and granite.

The results paint a clear geological picture: i) Shallow water-saturated zones appear within 10–20 metres of the surface. ii) Weathered sandy and silty layers—highly porous and capable of storing water—sit above deeper granite. iii) Fresh granitic bedrock, extremely resistant and dry, lies at depths of 7–30 metres depending on the location. iv) Most importantly, fracture zones cutting through the granite were detected—pathways that allow groundwater to collect and flow.

The study shows that USM's granitic setting is not a groundwater desert – it hosts fractured, water-bearing zones that could be tapped as an alternative or supplementary water source.

Photo by Anees Ur Rehman on Unsplash

"Water security isn't just planning for today; it's securing tomorrow. Groundwater exploration is the next frontier for Penang."

By blending advance geophysical techniques with detailed geological interpretation, the researchers have created one of the most comprehensive groundwater assessments ever carried out on Penang Island.

Ms. Norshidah Yunus is a Master student in Exploration Geophysics at Universiti Sains Malaysia. Her research focusing on exploring ground water using various geophysics technique.

Assoc. Prof. Dr. Nordiana Mohd Muztaza is a Senior Lecturer in School of Physics at Universiti Sains Malaysia. Her expertise lies in near surface geophysics, groundwater and mineral exploration, archeology and application of geophysics in engineering and environment.

HIGHLIGHTS

- Penang is water-vulnerable; USM is exploring groundwater beneath its own campus as a backup.
- 2-D electrical resistivity imaging reveals four main subsurface units, including shallow saturated zones and deeper weathered granite.
- The work lays the foundation for sustainable hardrock groundwater development in Penang and other granitic terrains in Malaysia.

REFERENCE

YUNUS, NORSHIDAH, et al. "ASSESSMENT OF SUBSURFACE FEATURES AND POTENTIAL OF GROUNDWATER DELINEATION USING 2-DIMENSIONAL ELECTRICAL RESISTIVITY IMAGING METHOD." Journal of Sustainability Science and Management 20.6 (2025): 1122-1139.

MINERAL EXPLORATION

Hunting Hidden Minerals in Kogi West, Nigeria

How airborne geophysics maps Nigeria's next mining hotspot.

Western Kogi State may soon become one of Nigeria's most exciting mineral frontiers. Recent findings from the Nigerian Geological Survey Agency (NGSA) reported new occurrences of gold, tantalite, and lepidolite — minerals vital for electronics, clean energy, and modern technology. But with dense forests, rugged terrain, and limited drilling, one question remained:

"Where exactly are the most promising zones?"

A new study led by researchers from Universiti Sains Malaysia and Confluence University of Science and Technology, Nigeria, takes a smarter, data-driven approach. Instead of relying on scattered field observations, the team used airborne magnetic and radiometric surveys — geophysical methods flown at low altitude — to "scan" the ground from above. These datasets, captured at extremely high resolution, reveal clues about the rocks and structures beneath the surface.

To make sense of this complex information, the team turned to a decision-making tool called the Analytical Hierarchy Process (AHP). This method helps scientists compare different indicators, weigh their importance, and combine them into a single, easy-to-read mineral potential map.

From the magnetic data, one key attribute stood out: the analytic signal (Asig), which highlights strong magnetic contrasts often linked to intrusive rocks, faults, and veins where minerals accumulate. The researchers also mapped lineament density, showing where fractures and geological structures are most concentrated — important pathways for mineralising fluids.

On the radiometric side, the team analysed natural gamma-ray emissions from potassium (K), thorium (Th), and uranium (U). They found that many mineralised areas showed potassium depletion andthorium enrichment, making the Th/K ratio a powerful indicator of hydrothermal alteration and weathered mineral zones.
These three layers — Asig, lineament density, and Th/K ratio — were combined using AHP and GIS weighted overlay techniques. The result is a detailed mineral potential map with three classes: high, intermediate, and low potential.

The outcome is impressive. Ninety percent of all known mineral occurrences in Kogi West fall within the high-potential zones on the map, confirming the accuracy of the approach. Depth estimates from magnetic modelling also show that many targets are shallow (21–87 m), making them attractive for future exploration.

Photo by Matthew de Livera on Unsplash

"High-potential zones are not just bright colours on a map — they guide where Nigeria should focus its next phase of mineral discovery," Dr. Ismail Ahmad Abir.

This integrated geophysical workflow provides a practical roadmap for identifying new mineral resources in Nigeria. While field verification is still essential, the study offers a powerful starting point for guiding exploration, investment, and sustainable mineral development in Kogi West and beyond.

Mr Abubakar Fahad is a PhD student in the Geophysics Group at Universiti Sains Malaysia. He specialises in geophysics and remote sensing, with research focused on mineral exploration using integrated geophysical and remote sensing datasets.

Dr. Ismail Ahmad Abir is a Senior Lecturer in School of Physics at Universiti Sains Malaysia. His expertise lies in applying remote sensing, GIS and geophysics for active tectonic monitoring, geohazard assessment and natural resource exploration.

HIGHLIGHTS

- Airborne magnetic and radiometric surveys, combined with AHP, produced a mineral potential map that aligns with 90% of known mineral occurrences in Kogi West.
- Most potential mineralisation zones are structurally controlled and occur at shallow depths, making them attractive exploration targets.
- The workflow provides a practical template for prioritising ground-truthing, adding other geophysical methods, and expanding mineral exploration across similar terrains in Nigeria and beyond.

REFERENCE

Abubakar, Fahad, Ismail Ahmad Abir, and Abdulrasheed Adamu Hassan. "Kogi west geophysical mineralisation appraisal using Analytical Hierarchy Process (AHP)." Journal of African Earth Sciences 224 (2025): 105532.

PETROLEUM GEOPHYSICS

From Blurry Seismic to Sharp Reservoir Pictures

Smarter porosity prediction in a tricky fluvial–deltaic gas field.

On a seismic screen, a gas reservoir can look smooth and continuous. In reality, fluvial–deltaic rocks are messy: channels cut across each other, sands pinch out, and porosity can change rapidly over just a few metres. When wells are few and far between, guessing what lies between them becomes a high-stakes game for field development and future CO_2 storage.

This study tackles that problem by training seismic data to behave a bit more like an experienced reservoir engineer.

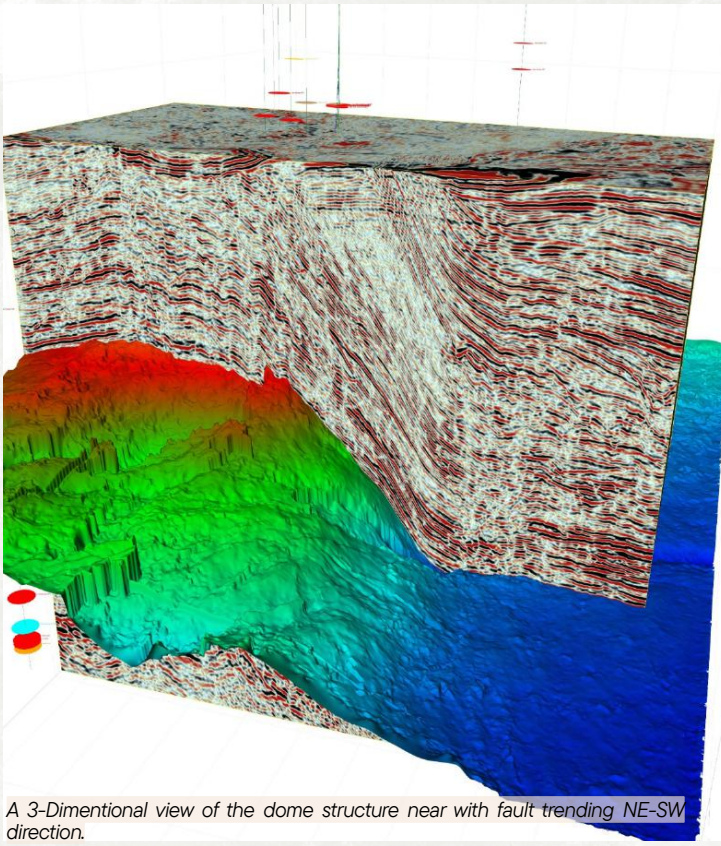
Working in the Poseidon 3D survey area of the Browse Basin, offshore north-west Australia, the team combined data from eight wells with a rich 3D seismic dataset to predict porosity (how much empty space is inside the rock) in a key gas-bearing unit called the Plover Formation, a complex fluvial–deltaic reservoir.

Traditionally, many workflows rely mostly on acoustic impedance (a rock property derived from seismic inversion) and a simple mathematical relationship with porosity. It works reasonably well, but often smooths out important details and has to be redone when new wells are added.
Here, the authors went further. They analysed 12 different seismic attributes – for example, measures related to amplitude strength, frequency content, relative geological time and inversion-based properties. Instead of trusting just one attribute, they used a Multi-Seismic Attribute Transformation (MSAT) to find the best combination and transformation of attributes that line up with the porosity seen in the wells.

> "When the reservoir gets complicated, that's exactly when our tools must become smarter."

Then they fed those "best" attributes into a Probabilistic Neural Network (PNN) – a type of machine-learning model that doesn't just give a single answer but also accounts for uncertainty. After careful data conditioning and well–seismic tying, they trained and tested the model using a well drop-out (blind well) strategy.

The numbers are striking: i) Using seismic attributes alone, the MSAT step reached a correlation of about 0.65 with porosity. ii) When the PNN was tuned and focused on a 10 ms window around the Plover reservoir, porosity prediction accuracy jumped to about 89% in that zone. iii) Across blind-well tests, the approach achieved around 73% success, clearly outperforming more conventional porosity-from-impedance methods.



A 3-Dimentional view of the dome structure near with fault trending NE-SW direction.

Crucially, the PNN-based porosity cubes show sharper, more realistic sand bodies than the smoother, "washed-out" view from standard inversion-plus-regression.
That means geoscientists can see where high-porosity channels and lobes are more clearly, and where the rock is tight or water-bearing.

As lead author Dr. Muhammad Khan puts it: "Instead of asking one blurry seismic picture to tell us everything, we let a whole family of seismic views vote on what the rock really looks like." And for field decisions, that extra clarity matters: "Every bit of confidence we gain in porosity prediction is risk we take away from the next well."

Dr. Muhammad Khan is a Exploration Systems Specialist at Saudi Aramco, specializes in advanced quantitative seismic interpretation, machine learning, and digital geoscience workflows. His research focuses on machine learning–driven fault detection and reservoir property prediction.

Assoc. Prof. Dr. Andy Anderson Bery , Senior Lecturer in Geophysics Programme at USM, specializes in applied geophysics. His research focuses on exploration geophysics, and machine learning for subsurface characterization.

HIGHLIGHTS

- Instead of relying only on acoustic impedance, the study uses multiple seismic attributes plus machine learning to capture complex porosity patterns.
- In the Plover Formation, the method better resolves high-porosity sand bodies and weak zones than conventional approaches.
- A tuned Probabilistic Neural Network boosts porosity prediction accuracy up to ~89% within the main reservoir window and about 73% in blind-well tests.

REFERENCE

Khan, Muhammad, et al. "Optimizing petrophysical property prediction in fluvial-deltaic reservoirs: a multi-seismic attribute transformation and probabilistic neural network approach." Journal of Petroleum Exploration and Production Technology 15.2 (2025): 29.

GEOHAZARDS

Mapping Hidden Landslide Risks in Kampung Iboi

How satellites, maps and underground scanning are helping protect a Malaysian village from future disasters.

On 4 July 2022, a deadly chain of landslides and debris flows tore through Kampung Iboi, near Gunung Inas, Baling, Kedah. Three people were killed, homes were destroyed, and losses reached nearly RM 25.9 million. For residents, one urgent question remained:

"- could this happen again — and where?"

In a new study, a team from Universiti Sains Malaysia combines satellite data, GIS mapping, and underground electrical surveys to produce one of the most detailed landslide susceptibility assessments yet for the Muda River Basin (MRB), with a special focus on Kampung Iboi.

"When rainfall, steep slopes, and weakened ground combine, the hillside has no choice but to let go."

Using a digital elevation model, Landsat imagery and WorldClim rainfall data, the team analysed 10 key factors linked to slope failure, including slope angle, precipitation, elevation, drainage density, land use, vegetation cover (NDVI), rainfall erosivity, geology, and fracture density (lineaments). Each factor was weighted based on expert judgement and previous research; slope and rainfall were given the highest influence (20% each), followed by land use and geology (15% each).

These layers were combined using a weighted overlay in GIS to create a landslide susceptibility map of the basin. The results show the MRB divided into five classes: very low (20%), low (20%), moderate (22%), high (20%) and very high (18%) susceptibility. The southeastern highlands around Kampung Iboi clearly stand out in the high and very high categories, reflecting steep terrain, high rainfall, and extensive land cover change.

But the team didn't stop at the surface. To understand what's happening underground, they carried out 2D electrical resistivity surveys on the slopes above Kampung Iboi. The images reveal a worrying subsurface picture: i) Water-saturated zones with very low resistivity (0–100 Ωm), ii) Residual soils (100–1300 Ωm) sitting on steep slopes, and iii) Granitic boulders and fractured rock (>1300 Ωm) perched above weak, saturated layers.

This combination makes the hillsides highly unstable during heavy rain. Once the residual soil becomes saturated, it can fail suddenly, mobilising boulders and debris into destructive flows—just as seen in 2022.

Highland view over Gunung Inas, Baling, Kedah. Photo courtesy of FB 'Environment and Sustainability' & Prof. Emeritus Ibrahim Komoo.

"By combining satellites, GIS and geophysics, we're no longer guessing. We now know which slopes are stable, and which ones are waiting for the next heavy rain."

The study's integrated approach offers more than just a scientific explanation; it provides a practical planning tool. Authorities can now pinpoint where to restrict development, reinforce slopes, restore vegetation, and install monitoring systems.

Dr. Sirajo Abubakar is a Senior Lecturer in the Department of Physics at Sokoto State University, Sokoto, Nigeria. His expertise lies in remote sensing and GIS, with a research focus on natural disaster management through the integration of satellite observations and ground-based data.

Dr. Ismail Ahmad Abir is a Senior Lecturer in School of Physics at Universiti Sains Malaysia. His expertise lies in applying remote sensing, GIS and geophysics for active tectonic monitoring, geohazard assessment and natural resource exploration.

HIGHLIGHTS

- Kampung Iboi is one of the most landslide-prone areas in the Muda River Basin, driven by steep granite slopes, heavy rain, and deforestation.
- 2D resistivity imaging reveals subsurface triggers: water-saturated zones, residual soils, fractures, and granitic boulders poised for failure.
- The integrated approach offers a practical tool for disaster risk reduction, helping authorities prioritise monitoring, engineering works, and land-use control in Kampung Iboi and similar mountain villages.

REFERENCE

Abubakar, Sirajo, et al. "Landslide Susceptibility Analysis of The Kampung Iboi, Muda River Basin, Kedah, Malaysia Using Remote Sensing, 2D-Resistivity and GIS." Advances in Space Research (2025).

GEOLOGY & GEOPHYSICS

Uncovering Langkawi's Hidden Rock Stories with Geophysics

USM researchers blend seismic waves, electrical signals, and lab analyses to unravel the true nature of Langkawi's ancient Singa Formation.

Langkawi's beauty is well known above ground—its limestone hills, river valleys, and rugged coastlines draw scientists and tourists alike. But beneath its forested slopes and weathered cliffs lies an even richer story, one that has been buried for hundreds of millions of years. A team from Universiti Sains Malaysia has now brought that hidden world into view using the power of modern geophysics.

Their mission: to understand the true nature of Langkawi's sedimentary outcrops, particularly those at Sungai Itau and Taman Helang Perdana, both part of the ancient Singa Formation—a geological archive of sandstone, mudstone, shale, and conglomerate formed during dramatic shifts in ancient seas.

Traditional field mapping gives clues about what rocks look like on the surface, but it rarely reveals what lies below. To bridge that gap, the researchers applied 2-D Seismic Refraction—a method that sends controlled vibrations into the ground—and 2-D Electrical Resistivity Imaging (ERI), which measures how well the subsurface conducts electricity. Together, these tools act like medical scans, creating "X-ray" style images of the underground.

At Sungai Itau, the seismic waves painted a clear picture: i) mudstone, the softer layer, showed slow seismic velocities of 500–2600 m/s, and, ii) sandstone, denser and more rigid, produced much faster velocities of 2000–4500 m/s. ERI results matched the pattern. Sandstone registered strong resistivity values (1000–6000 Ωm), due to its quartz-rich, compact structure. Mudstone showed low resistivity (20–120 Ωm), reflecting its clay content and higher water retention.

At Taman Helang Perdana, a similar contrast emerged—thin mudstone layers near the surface, underlain by more massive sandstone units with resistivity values of up to 3000 Ωm.

"Every measurement uncovers another chapter of Langkawi's history."

Rock samples taken from both sites underwent thin-section petrography and XRD mineral analysis, offering a microscopic view of the formations. Sandstone samples were dominated by quartz, microcline, and dolomite, confirming their high resistivity and strong geophysical signatures.

These results tie the subsurface findings back to the Singa Formation's geological history, shaped by ancient marine environments, periodic sea-level changes, and tectonic activity.

Kilim Geoforest Park, Langkawi. Photo courtesy of Naturally Langkawi

"Outcrops only tell half the story. Geophysics reveals the chapters buried beneath our feet."

By combining field observations with geophysics and mineralogy, the study delivers one of the most detailed characterizations of Langkawi's outcrops to date. This integrated approach strengthens geological maps, helps engineers assess ground conditions for construction, and deepens our understanding of the island's environmental evolution.

HIGHLIGHTS

- Integrated seismic refraction and electrical resistivity imaging successfully mapped sandstone, mudstone, and shale units of the Singa Formation—providing a clear picture of Langkawi's buried geological structures.
- Thin-section and XRD results confirmed quartz-rich sandstone and clay-bearing mudstone, validating the geophysical findings and offering a complete understanding of the region's sedimentary architecture.

REFERENCE

Saharom, Nur Alya Sabrina Mohd, et al. "INVESTIGATION OF SEDIMENTARY OUTCROPS USING GEOPHYSICAL METHODS IN LANGKAWI, KEDAH, MALAYSIA." Acta Geodynamica et Geomaterialia 22.3 (2025): 367-380.


Ms. Alya Sabrina is an undergraduate student in Geophysics program, School of Physics, USM. Her project involving integrating geophysical techniques for geological analysis.


Ms. Nurul Fatin Hanani is an undergraduate student in Geophysics program, School of Physics, USM. Her project involving integrating geophysical techniques for geological analysis.


Assoc. Prof. Dr. Nordiana Mohd Muztaza is a Senior Lecturer in School of Physics at Universiti Sains Malaysia. Her expertise lies in near surface geophysics, groundwater and mineral exploration, archeology and application of geophysics in engineering and environment.

PETROLEUM GEOPHYSICS

The Science Behind Finding Hydrocarbon in a Complex Setting

Spectral decomposition and instantaneous phase team up to illuminate Maari's intricate reservoir network.

Far offshore South Taranaki, waves roll over one of New Zealand's established oil producers: the Maari field. But deep below the seafloor, the reservoir isn't a neat, uniform tank of oil. Instead, it's a tangled patchwork of ancient river channels, delta sands, and shallow-marine deposits – exactly the kind of complexity that keeps geoscientists awake at night.

A new study from Universiti Sains Malaysia shows how multi-attribute seismic analysis can untangle that complexity and sharpen our view of hidden hydrocarbon traps. By blending advanced seismic "colours" with subtle phase information, the team managed to better outline where Maari's sands are thick, where they thin, and how far they actually stretch.

The Maari field sits in the Taranaki Basin, a tectonically active region where the subsurface has been stretched, faulted and folded over millions of years.

The main reservoirs here – especially the Moki Formation (Mid-Miocene) – were deposited in a mix of fluvial, deltaic and shallow marine environments. That means: i) Sand bodies change rapidly sideways, ii) Faults break up the structure, iii) Gas "leakage" and processing effects degrade seismic quality, especially over anticlines.

For field development, however, one simple question matters a lot:

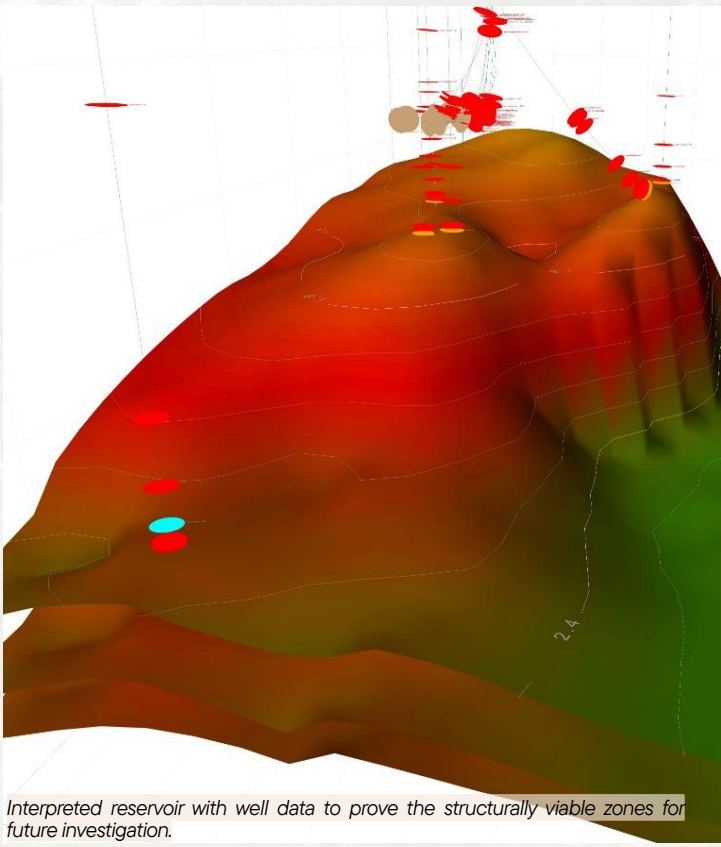
"Are these reservoir sands continuous enough to act as reliable traps – and where do they thin out or terminate?"

Traditional seismic amplitude alone struggles in Maari. Gas leakage near the crest of anticlines and processing artefacts blur reflections, making it hard to judge how continuous the reservoir really is. That continuity – how far the sands extend sideways – is crucial for estimating recoverable volumes and planning new wells.

To tackle this, the researchers combined two powerful seismic attributes: spectral decomposition and instantaneous phase. When the team co-blended the RGB spectral image with the instantaneous phase, the result was an integrated view that captured both reservoir geometry and lateral continuity.

The study shows that mapping the complex Maari Field works best when spectral decomposition and instantaneous phase are combined, giving clearer insight into reservoir thickness, boundaries, and connectivity. This integrated approach helps classify traps more accurately, improve well placement, and build better geological models. Future work will add more advanced attributes and tie them closely to well and rock-physics data for a fully integrated reservoir workflow.

For operators, this kind of multi-attribute workflow means smarter well placement, better trap definition, and fewer surprises in complex fields like Maari. More broadly, it underlines a growing reality in exploration geophysics: in heterogeneous reservoirs, no single attribute is enough – but the right combination can turn a fuzzy seismic picture into a far more reliable subsurface map.



Interpreted reservoir with well data to prove the structurally viable zones for future investigation.

HIGHLIGHTS

- Multi-attribute analysis (spectral + phase) gives a clearer picture of complex reservoirs than amplitude alone.
- Spectral decomposition at selected frequencies acts as a "thickness lens" for different reservoir scales.
- Instantaneous phase is a powerful tool to track reflectors and boundaries where seismic amplitude is degraded.
- In the Maari field, this combined approach helped classify two main reservoirs and map their 5–6 km lateral continuity with improved confidence.

REFERENCE

Gnapragasan, Joseph, and Andy Anderson Bery. "MULTI-ATTRIBUTE ANALYSIS IN DELINEATING LATERAL CONTINUITY OF HYDROCARBON TRAPS IN THE MAARI FIELD, NEW ZEALAND." Acta Geodynamica et Geomaterialia 22.1 (2025).

Dr. Joseph Gnapragasan, Senior Lecturer in Geophysics Group at USM, seismic interpretation and data processing. His research focuses on investigating seismic attribute analysis for exploration studies.

Assoc. Prof. Dr. Andy Anderson Bery , Senior Lecturer in Geophysics Programme at USM, specializes in applied geophysics. His research focuses on exploration geophysics, and machine learning for subsurface characterization.

GEOPHYSICS

Gravity from Space Reveals Deep Faults Beneath Libya's Desert Frontier

USM-led team uses satellite gravity data to uncover major fault systems and basement depths in Jabal Nafusah, offering new clues for regional tectonics and resource exploration.

Beneath the rugged desert terrain of northwestern Libya lies a hidden world of deep-cutting faults, buried basins, and ancient tectonic scars—features long suspected but rarely mapped in detail. Now, a team of researchers from Universiti Sains Malaysia, in collaboration with Libyan partners, has unveiled the most refined picture yet of the southern Jabal Nafusah region using only one remarkable source: gravity data collected from space.

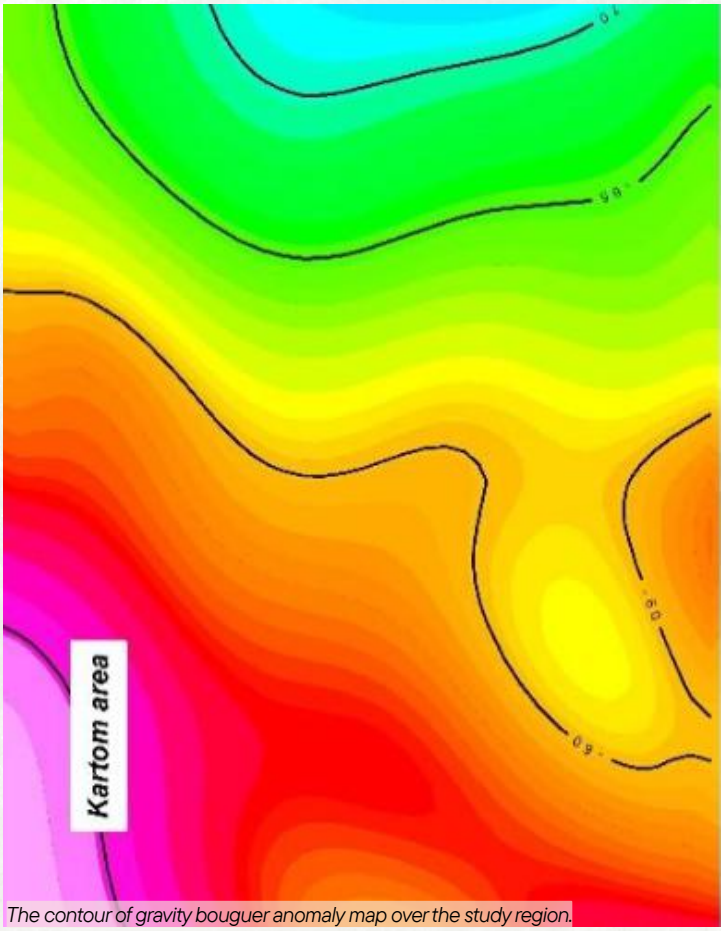
The EIGEN-6C4 satellite gravity model, typically used for large-scale Earth studies, was pushed to its limits to detect subtle variations in the Earth's gravitational field. These variations, when processed with advanced geophysical filters, reveal how density changes underground—an invaluable tool for imaging structures in remote or inaccessible regions.

What the team discovered is a complex network of major faults trending NE–SW and NW–SE, consistent with tectonic forces that shaped North Africa over hundreds of millions of years. These structures were brought into view using analytical tools such as Tilt Derivative, Total Horizontal Gradient, and Euler Deconvolution, each enhancing different aspects of subsurface geometry. The resulting maps show fault systems dipping deep into the crust, with estimated source depths ranging from 1.2 km to nearly 5.8 km.

The researchers then modelled three cross-sections of the study area, using 2-D gravity forward modelling to estimate how thick the sediments are above the basement rocks. The results show basement depths between 1.2 and 3.53 km, with the thickest sediments—up to 2.8 km—accumulating toward the eastern part of the study area. These deeper sections may represent promising zones for future hydrocarbon exploration.

"From hundreds of kilometres above Earth, gravity helps us see the faults our eyes could never find."

Beyond resource implications, the findings help fill major knowledge gaps about the region's tectonic evolution, which has been shaped by events such as the Pan-African, Caledonian, and Hercynian orogenies. Despite more than 55 years of petroleum exploration, much of the southern Jabal Nafusah's structural framework has remained poorly understood.



The contour of gravity bouguer anomaly map over the study region.

"These faults aren't just lines on a map—they're the scars of Libya's deep geological past."

As one researcher reflected, "Gravity doesn't lie. Even from far above the Earth, it reveals geological stories hidden for millions of years."

This study not only showcases the power of satellite gravity data but also sets a new benchmark for exploring geologically complex and under-studied regions across North Africa.

Mr. Fouzie Trepil is a PhD student in Exploration Geophysics at Universiti Sains Malaysia. His research focusing on exploring geophysical products with satellite remote sensing.

Assoc. Prof. Dr. Nordiana Mohd Muztaza is a Senior Lecturer in School of Physics at Universiti Sains Malaysia. Her expertise lies in near surface geophysics, groundwater and mineral exploration, archeology and application of geophysics in engineering and environment.

HIGHLIGHTS

- Satellite gravity mapping reveals major NE–SW and NW–SE fault trends beneath southern Jabal Nafusah, indicating long-term tectonic reactivation.
- Basement depths range from 1.2 to 3.53 km, with the thickest sediments (~2.8 km) concentrated in the east.
- Integrated gravity filters sharpen basin imaging, improving structural interpretation and exploration potential in this under-studied region of Libya.

REFERENCE

Trepil, Fouzie, et al. "THE INTERPRETATION OF EIGEN-6C4 SATELLITE GRAVITY DATA DETECTS THE MAJOR STRUCTURAL FAULTS AND BASEMENT DEPTH IN THE SOUTHERN PART OF JABAL NAFUSAH, NORTHWESTERN LIBYA." Acta Geodynamica et Geomaterialia 22.3 (2025).

OCEAN-ATMOSPHERE INTERACTIONS

AI Teaches Satellites to Read Stronger Storms

USM and UTM researchers use artificial intelligence to make satellite winds more reliable during tropical cyclones.

High above the ocean, satellites watch storms swirl across the planet. But when a tropical cyclone (locally known as typhoon) is at its most dangerous—violent winds, huge waves, and curtains of rain—our space "eyes" often get confused. The signals bounce off choppy seas, get disturbed by raindrops, and the final wind estimates can be wrong just when people most need accurate warnings.

That's the problem a team led by Dr. Syarawi M. H. Sharoni from Universiti Sains Malaysia (USM) set out to fix. Working together with colleagues from Universiti Teknologi Malaysia (UTM), they asked a simple question:

"What if we let AI help the satellite make sense of the chaos inside a cyclone?"

Normally, one type of satellite instrument using radar microwave estimates wind from how signal pulses reflect off the sea surface. This works well in normal weather, but in a cyclone the sea becomes wild and messy. Traditional algorithms start to underestimate strong winds, especially above about 15 m/s (around 55 km/h).

Instead of relying on just one or two measurements, Dr. Syarawi's team decided to use everything the satellite already sees: how strongly the radar signal bounces back, how high the waves are, how much moisture and rain are in the air, and differences upon various radar frequencies.

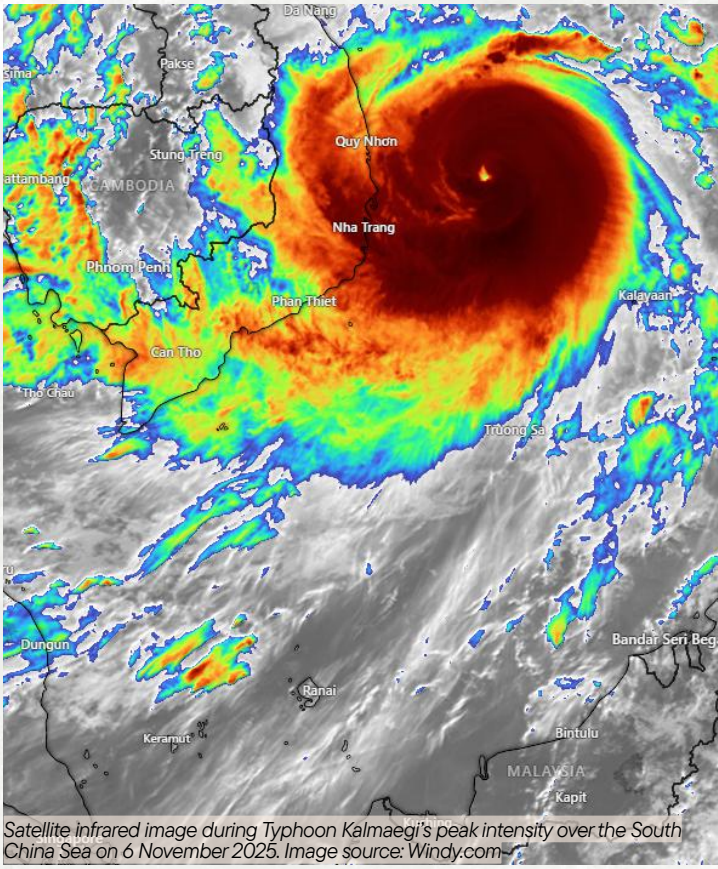
They then trained artificial intelligence models on thousands of real storm cases from around the world, matching the microwave satellite data to trusted and established wind measurements from another satellite system.

The result? The smartest AI model could estimate wind speeds up to about 40 m/s (over 145 km/h) much more accurately than the standard method—even in heavy rain near the storm centre.

"In simple terms, we are teaching the satellite to recognise the 'fingerprints' of a cyclone," said Dr. Syarawi. "Instead of panicking when the sea is chaos, the AI learns what that messy signal really means for the wind."

This matters because better wind estimates feed directly into stronger early-warning systems, more realistic storm-intensity analyses, and improved understanding of how cyclones might change in a warming climate.

For years, altimeters were treated mainly as wave-height instruments. This study shows they can also become powerful storm tools



Satellite infrared image during Typhoon Kalmaegi's peak intensity over the South China Sea on 6 November 2025. Image source: Windy.com

"We're teaching satellites to think. Even in the eye of the typhoon, machine learning brings clarity where chaos once ruled."

—if we let AI unlock the extra information hidden in their measurements.

"As the climate warms, tropical cyclones may become more intense," Dr. Lim Hwee San added. "If the storms are getting stronger, then our satellites must get smarter. AI is one way to make sure our monitoring keeps up with nature."

Dr. Sya'rawi Sharoni, Senior Lecturer in Geophysics Group at USM, specializes in ocean-atmosphere interaction and satellite remote sensing. His research focuses on extreme weather and climate patterns across the South China Sea and wider tropical region.

Assoc. Prof. Dr. Lim Hwee San, Senior Lecturer in Geophysics Group at USM, specializes in remote sensing and atmosphere. His research focuses on analyzing atmospheric components using satellites and ground-based data.

HIGHLIGHTS

- Researchers used artificial intelligence to help satellites estimate cyclone wind speeds more accurately.
- The new approach uses many satellite signals at once (waves, radar strength, moisture) instead of just one.
- The best AI model gives reliable wind estimates up to ~40 m/s, even in rainy, chaotic storm conditions.
- Smarter satellite winds can support better cyclone warnings and improve our understanding of extreme weather in a changing climate.

REFERENCE

Sharoni, Syarawi MH, Mohd Nadzri Md Reba, and Hwee San Lim. "Improved tropical cyclone wind speed estimation for microwave altimeter using machine learning." Remote Sensing of Environment 301 (2024): 113961.

GEOLOGY

Satellite Band Ratios Bring Langkawi's Lithology into Focus

How Landsat 9 helped untangle Southern Langkawi's rock puzzle.

Southern Langkawi is geologically rich—but not always easy to read on the ground. Dense vegetation, rugged terrain, and scattered outcrops can make traditional mapping slow, patchy, and expensive. This study takes a pragmatic approach: instead of forcing more fieldwork into difficult terrain, the authors use Landsat 9 (30 m resolution) and a classic remote-sensing trick—band ratios—to sharpen the spectral "fingerprints" of rock units across Dayang Bunting and Tuba Islands.

"In Southern Langkawi, the rocks don't always show themselves—so we let the satellites do the first reading."

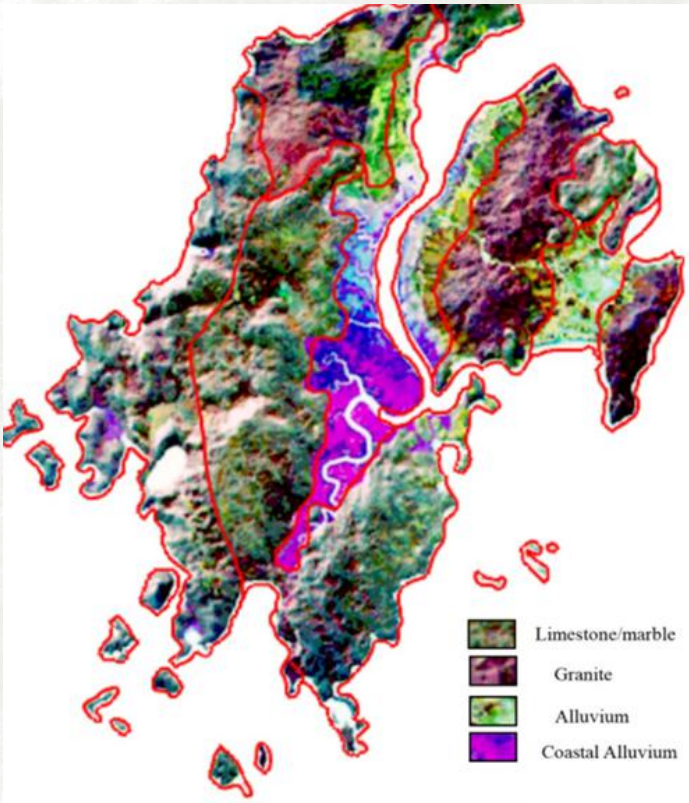
The workflow is deliberately field-friendly. The team preprocesses Landsat 9 imagery in ENVI, applies radiometric and atmospheric correction (FLAASH), mosaics scenes, and focuses the analysis on the area of interest to reduce processing noise. They then test dozens of band ratio permutations—and crucially, they do not stop at "what looks nice." They compare results against the existing geological map and previous field observations, looking for combinations that best separate key lithologies in the local stratigraphy.

After extensive testing, four band ratio RGB composites stand out for lithological discrimination:
RGB (2/3, 2/5, 2/6), (4/3, 4/6, 4/7), (2/4, 2/6, 2/7), and (5/2, 5/6, 5/7).

"Band ratios act like a contrast dial for geology, turning subtle spectral differences into mappable boundaries."

Across these composites, the islands' major rock units emerge with clearer boundaries—particularly limestone, marble, granite, and alluvial deposits. Granite bodies are most consistently recognizable, while limestone and marble can still appear spectrally similar in certain combinations, reflecting a real-world limitation: some lithologies naturally overlap in spectral behavior, especially under vegetation and moderate spatial resolution. Still, the method strengthens "macro-scale" interpretation: it clarifies where formations likely change, where alluvium dominates near drainage and lowlands, and where granite intrusions correlate with marble occurrences.

"We tested dozens of combinations until the islands' lithologies began to separate into distinct, interpretable patterns" said Dr. Teoh Ying Jia.



One of the several band ratios image investigated in this study.

"This is not a replacement for field geology—it is a smarter starting point for where to look, what to sample, and how to map."

The study's value is practical: it demonstrates how a relatively accessible dataset (Landsat 9) and an interpretable method (band ratios) can support geological mapping in complex tropical landscapes—as long as users remain aware of known constraints such as atmospheric variability, vegetation masking, and the resolution ceiling of 30 m.

Du Yaokai, is a PhD student in Geology within Exploration Geophysics group at Universiti Sains Malaysia. His research focusing on analysing geological and lithology classification using satellite remote sensing.

Dr. Teoh Ying Jia, Senior Lecturer in Geophysics Group at USM, specializes in geology field. Her research focuses on the aspect of applied geology, sedimentology & stratigraphy, petroleum geoscience, and geological formation evaluation,

HIGHLIGHTS

- Systematic band-ratio screening (32+ tests) identified four RGB ratio composites that most effectively separate Langkawi's key lithologies (limestone, marble, granite, alluvium).
- Granite and alluvial boundaries were consistently clearer, improving the readability of formation contacts on Dayang Bunting and Tuba Islands.
- Validation against geological maps and prior field observations increased confidence that the "spectral boundaries" reflect real stratigraphy—not just image artifacts.

REFERENCE

Du, Yaokai, et al. "Lithological distribution using band ratio technique in Southern Langkawi, Kedah, Malaysia." Environmental Science and Pollution Research (2025): 1-13.

ATMOSPHERIC PHYSICS

Where the Atmospheric Pollution Came From?

Trajectory Tracing of Aerosol Episodes in Penang and Singapore.

Some days, the sky looks clear but the atmosphere tells a different story. Over the last decade, researchers tracked how aerosol optical depth (AOD)—a measure of how much sunlight particles block—and precipitable water vapour (PWV)—the total moisture in an air column—rise and fall together across Penang (USM) and Singapore, revealing when pollution "breathes in" moisture and when rain helps scrub the air.

Using AERONET (ground-based sun photometer observations), the team examined AOD and PWV across multiple wavelengths and seasons, then used MATLAB for time-series analysis and NOAA's HYSPLIT model to trace where polluted air masses likely came from. What emerged was a nuanced picture: Penang and Singapore often share regional aerosol episodes (especially during haze seasons), but their AOD–PWV relationship can differ sharply by location and year.

"We found that the same pollution can look very different depending on how much moisture is in the air." said Assoc. Prof. Dr. Lim Hwee San.

The standout finding was wavelength sensitivity. Across the spectrum, 500 nm repeatedly surfaced as the most informative "sweet spot" for detecting AOD–PWV interactions—important because this wavelength is widely used for consistent aerosol monitoring and radiative forcing work. In Penang, one year (2020) delivered an unusually strong AOD–PWV connection, suggesting the dominance of moisture-absorbing (hygroscopic) aerosols under specific meteorological conditions. At the same time, 2020 also captured a broader atmospheric "experiment": aerosol loading fell during COVID-19 restrictions, reinforcing the role of anthropogenic activity in shaping air quality.

HYSPLIT back-trajectories linked pollution episodes to both local and regional sources, consistent with Southeast Asia's reality: urban/industrial emissions mix with marine air, while seasonal transport can bring in smoke and other aerosols across borders. The result is a decade-long narrative of two neighboring coastal environments—sometimes synchronized, sometimes divergent—where moisture, monsoons, and human activity jointly shape what we breathe and what satellites see.

Beyond, the study tells a broader story about how human activity, climate, and atmospheric physics intersect. The dramatic drop in aerosol levels during 2020 offered a rare, real-world experiment—showing how quickly the atmosphere can respond when emissions are reduced. At the same time, the research reveals that pollution is not just about how much is emitted, but how it interacts with moisture, seasons, and regional air movement. By linking long-term observations with air-mass trajectory analysis, the study underscores a key message for Southeast Asia: managing air quality requires both local action and regional cooperation, guided by continuous, science-based information of the sky.

Photo by David Kristianto on Unsplash

"Cleaner air in 2020 wasn't accidental — it was a direct response to reduced activity."

Mr. Amaechi Onele Azi is a student in Geophysics Group at USM, specializes in remote sensing and atmosphere. His research focuses on analyzing the interaction of atmosphere to aerosol optical depth using satellites and ground-based data.

Assoc. Prof. Dr. Lim Hwee San, Senior Lecturer in Geophysics Group at USM, specializes in remote sensing and atmosphere. His research focuses on analyzing atmospheric components using satellites and ground-based data.

HIGHLIGHTS

- AOD and PWV showed meaningful correlations, consistent with hygroscopic aerosols influencing light scattering.
- The study identified 500 nm as the most sensitive band for AOD–PWV interaction analysis relevant to radiative forcing.
- Aerosol loading declined during activity restrictions, underscoring the impact of anthropogenic sources.

REFERENCE

Azi, Amaechi O., and Lim H. San. "Variability of aerosol optical depth with precipitable water vapour at different wavelengths in the recent decade." Science of The Total Environment 1004 (2025): 180754.

NEAR SURFACE GEOPHYSICS

Hidden Weakness Beneath the Road

Scientists Map Landslide Risk in Aceh Using Seismic Waves

Landslides along mountain roads often strike without warning, cutting off communities and damaging vital infrastructure. Now, an international research team has uncovered what lies beneath one of Aceh's most vulnerable road corridors — and their findings could help prevent future disasters.

Focusing on the Seulawah Agam road section, a steep and rainfall-prone stretch in Aceh Province, researchers from Universitas Syiah Kuala (USK), USM, and Universiti Malaya combined seismic imaging with geotechnical data to identify underground layers that control landslide behaviour.

The area gained attention after severe landslides between December 2021 and January 2022 disrupted access between Aceh and North Sumatra, affecting economic activities and daily life. Determined to understand why this section is so unstable, the team turned to a technique called Multichannel Analysis of Surface Waves (MASW), which uses vibrations from controlled impacts to "see" beneath the ground.

"Geophysical understanding and characterization of the subsurface has a major significance in landslide hazard evaluation," said lead author Zul Fadhli, explaining why the team chose seismic methods over traditional point-based investigations.

Their surveys revealed a critical underground contrast. Near the surface lie weak layers of clay and sandy gravel, which show very low stiffness and strength. These materials were identified by slow shear-wave velocities (below 200 m/s), low N-SPT values, and poor soil bearing capacity — often less than 200 kN/m².

Beneath this fragile zone, however, sits a much harder layer of volcanic tuff. While strong on its own, this dense layer acts like a slippery base when heavy rain saturates the softer soils above it.

In simple terms, rainwater seeps easily into the upper layers but struggles to penetrate the harder layer below. Water then accumulates, weakening the soil and allowing the overlying mass to slide downslope.

"High rainfall intensity causes water to accumulate in the soil layers, making them saturated and unstable," Dr. Nur Azwin explained. "Once that happens, the softer materials can move along the harder layer underneath."

By integrating seismic results with borehole data, the researchers were able to map potential sliding planes and calculate soil bearing capacity along three survey lines. Their analysis confirmed that zones with low shear-wave velocity and low bearing capacity are the most prone to failure — especially during prolonged rainfall.

Drone image of massive landslide cut off the road in the Pondok Balik, Central Aceh, Indonesia.

"Rain doesn't just fall on slopes; it infiltrates weak soils and activates hidden sliding planes underground."

The research demonstrates how modern geophysics can turn invisible underground structures into actionable knowledge. As climate change brings more intense rainfall to mountainous regions, such integrated approaches may become essential tools for safeguarding transport networks across Southeast Asia and beyond.

Ir. Zul Fadhli, is the Coordinator of the Geophysical Engineering Study Program, Faculty of Engineering, Universitas Syiah Kuala, Aceh. His academic and professional activities focus on education, research, and professional practice in geophysical engineering.

Dr. Nur Azwin Ismail, Senior Lecturer in Geophysics Group at USM, specializes in geotechnical & engineering geophysics. Her research focuses on analyzing near surface geophysics for geohazards identification and mineral exploration.

HIGHLIGHTS

- Seismic imaging revealed soft clay and sandy gravel overlying hard marl, creating natural sliding planes during heavy rainfall.
- Combining MASW, N-SPT, and bearing-capacity analysis pinpointed areas with very low stability (<200 kN/m²), explaining why landslides repeatedly occur.
- Results provide a scientific basis for slope stabilisation, drainage design, and landslide early-warning systems to protect roads and communities.

REFERENCE

Fadhli, Zul Fadhli Zul, et al. "Integration of S-Wave Value, N-SPT and Soil Bearing Capacity for Landslide Analysis." The Iraqi Geological Journal (2025): 36-50.

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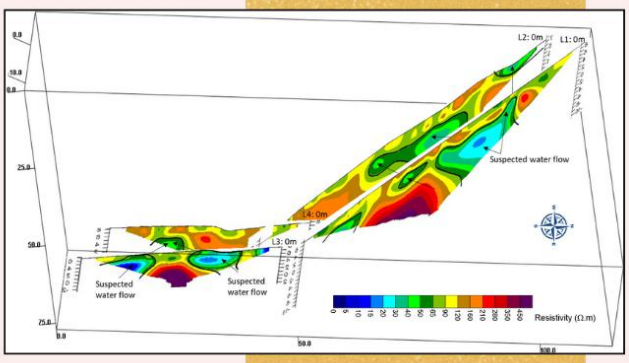
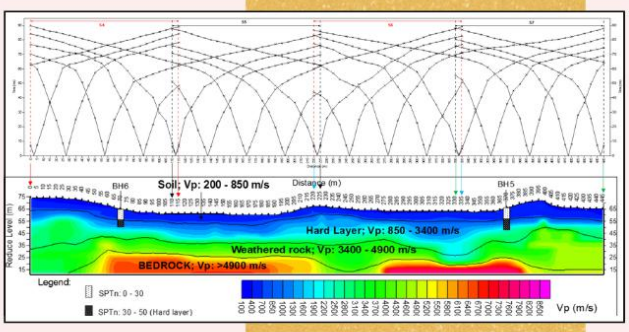


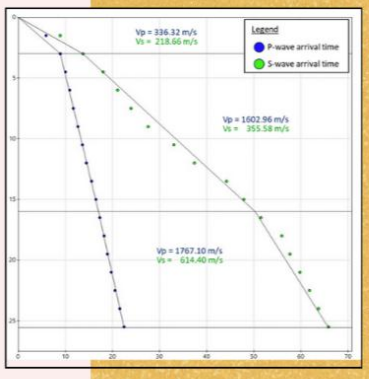
Seismic Refraction

- Identifies bedrock depth, weathered layers and rippability.
- Suitable for site investigation and foundation studies.



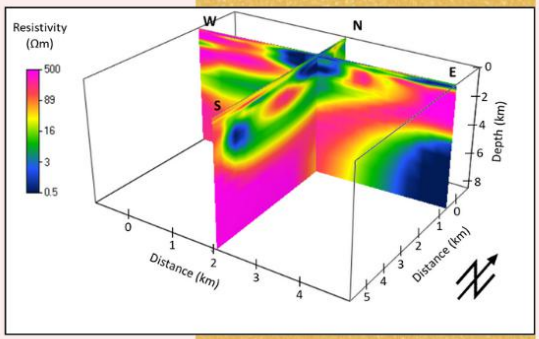
Downhole Seismic / Parallel Seismic

- Accurately determines pile length and bedrock depth.
- Commonly used in bridge, foundation and infrastructure assessment.



Magnetotellurics

- Investigates deep resistivity structure (hundreds of meters to kilometers).
- Suitable for geothermal, mineral and regional tectonic studies.



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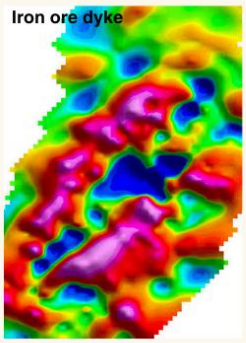
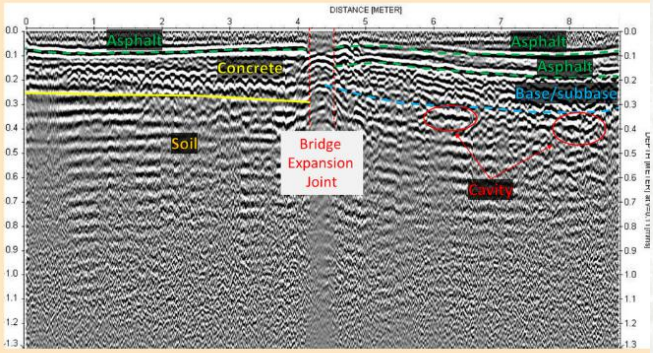
Magnetic

- Locates ferrous objects, structures and geological features.
- Widely used in mineral exploration & UXO detection.

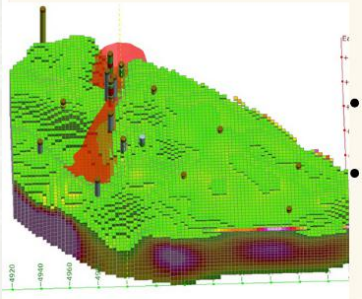


Ground Penetrating Radar

- Provides high resolution data for shallow mapping.
- Commonly used in detection of shallow geological layer and man-made structures e.g. utility, cavity, pile cap and rebar.



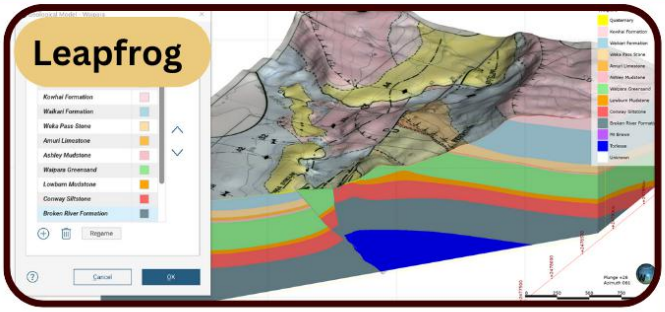
Gravity



- Detects density contrasts in the subsurface.
- Useful in basin studies, void detection & structural mapping.

SOFTWARE AUTHORIZED RESELLER

Leapfrog



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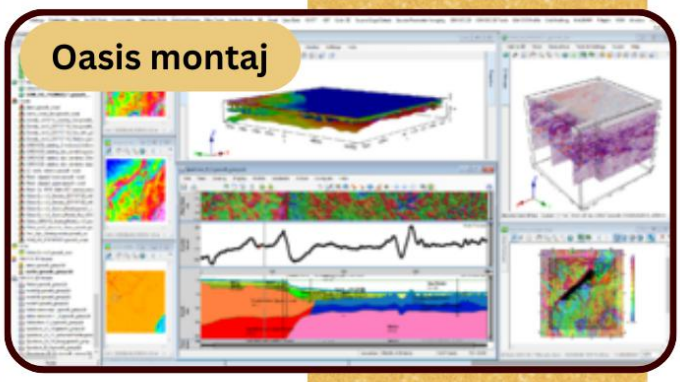
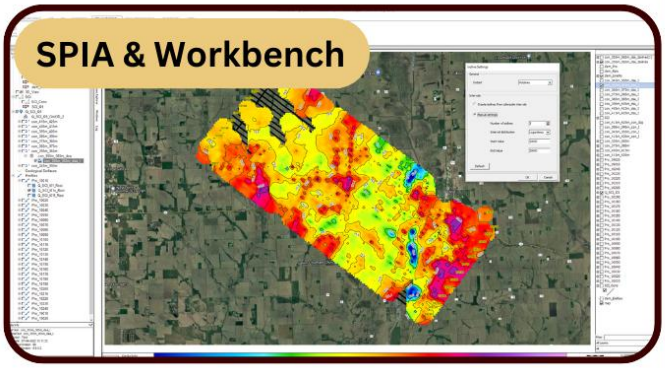


SPIA & Workbench



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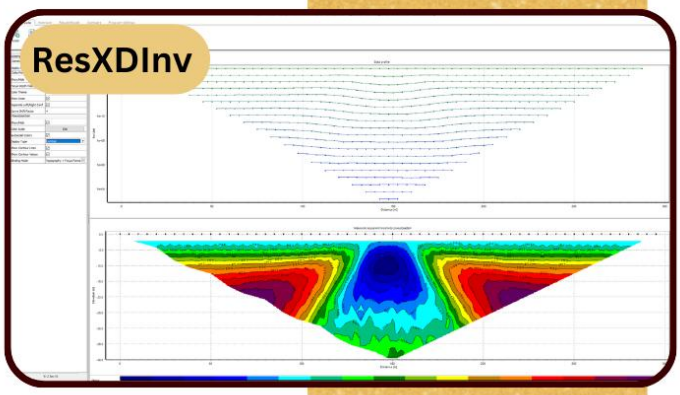

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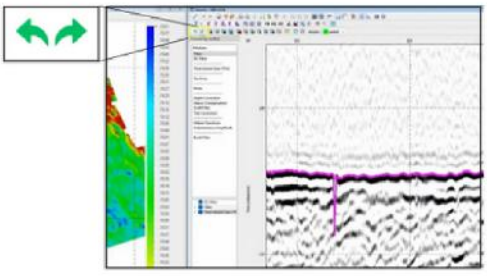
- Marine Surveys & Environmental Studies
- 2D/3D Seismic Processing (UgeoSeis)
- Technical Training (UgeoAcademy)
- Software Development (UgeoSoft,Wadugs)

INNOVATIONS & TECHNOLOGY

UgeoSoft Wadugs

- Managing (development and marketing) Wadugs, a software designed to revolutionize data quality control, processing, and interpretation, all seamlessly integrated into one powerful platform
- Innovate and create tools to simplify and facilitate data processing interpretation
- Managing all digital assets, software, hardware and cloud web

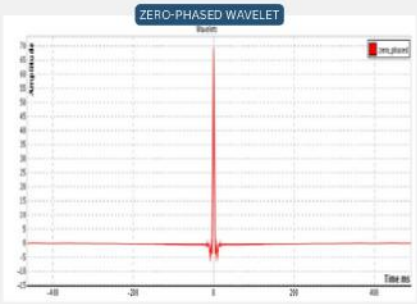


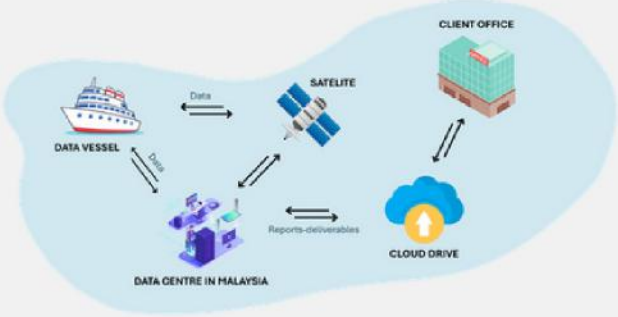
UgeoSeis

In-house Seismic Processing specialize in:

- **2D High-Resolution**
- **3D Ultra High-Resolution**

seismic data processing, delivering critical support for geohazard identification and subsurface interpretation.





Work from anywhere without compromise. Our secure platform delivers enterprise-grade data management with complete remote capabilities for quality control, processing and interpretation

GLOBAL OFFSHORE WIND EXPERTISE

- Cross-Market Leadership – Consultancy experience in Taiwan, Korea, Europe, UK & Australia since 2022
- APAC Trusted Partner – Delivering reliable pipeline & site survey solutions since 2021
- Data-Driven Results – Transforming raw survey data into actionable insights with precision

WHY PARTNER WITH US?

- Proven Industry Alliances – Strong collaborations with global renewable energy leaders
- End-to-End Capabilities – From feasibility studies to execution, tailored to your project needs
- Future-Ready Solutions – Bridging local expertise with international best practices

UNDERGRADUATE STUDENTS

YEAR 1

Total Students: 17

Row 1 (from left): Nana, Irah, Anis, Dhi, Alya.
Row 2 (from left): Jiresh, Aisar, Alia, Auni, Najihah, Vivenesh, Han, Aira, Aabid, Zarffan.
Not in the picture: Irfan, Molish.

YEAR 2

Total Students: 9

Row 1 (from left): Ilham, Safwan, Sufi.
Row 2 (from left): Sahana, Jaja, Mimi, Ilya.
Not in the picture: Danush, Elina.

UNDERGRADUATE STUDENTS

YEAR 3

Total Students: 26

Row 1 (from left): Hafiz, Safwan, Kim, Wei Xiang, Aidid, Syaker.
Row 2 (from left): Hadirah, Ardilla, Awadah, Ayu, Xin Hui, Maisarah, Ain, Hanani, Afieda.
Row 3 (from left): Karyn, Zulaikha, Dani, Yana, Farwizah, Madihah, Zuyyen.
Not in the picture: Raihana, Madihah Amir, Nabil, Malique.

YEAR 4

Total Students: 31

Row 1 (from left): Haris, Irfan, Auji, Adib, Syahmi, Alif, Hakim, Hasif, Danial, Rau.
Row 2 (from left): Ezreen, Anis, Fatin, Hidayah, Najla, Ummi, Ain, Aqilah, Fakhira, Theresa, Li Xuan, Syasya, Aina, Miemy, Adlina.
Row 3 (from left): Naim, Haziq, Abid, Faiz, Ikhwan.
Not in the picture: Abbygail.

HE DOES GEOPHYSICS

Contours of our Journey

22/26

HARIS

"The path to success is never a straight line"

ADIB

"SUPERR"

HAKIM

"Don't be sorry, be better"

NAIM

"Enjoy Life and Become Better Than Yesterday."

ABID

"There is a blessing in everything"

AUJI

"To the rhythm of eternity"

DANIAL

"Sometime Silent Is Better Than Explaining"

IKHWAN

"now or never"

RAU

"Geophysicist have all the Gravity"

IRFAN

"When the seagulls follow the trawler, it is because they think sardines will be thrown into the sea"

HAZIQ

"in a world full of noise, be the clean signal"

SYAHMI

"Work smart in silence, let your success be your noise?"

FAIZ

6 7

ALIFF

"Life is a ROCK!"

HASIF

"Effort and tawakkal, that's were the peace begin"

SHE DOES GEOPHYSICS

Contours of our Journey

22/26

HIDAYAH

"you don't have to be sorry for leaving and growing up"

FAKHIRA

"Success is earned, not given"

SYASYA

"capture it, remember it"

ANIS

"Small steps matter."

UMMI

"Leave comfort, explore more"

AINA

"forgive and pardon"

NAJLA

"Smiles for miles."

AIN

"To be or not to be, that is the question?"

LI XUAN

"Life's a journey, gotta trust in your flow"

MIEMY

"soft heart, strong mind"

THERESA

"XP gained. Wisdom loading…"

AQILAH

"Don't be scared ! Just do it !"

ABBYGAIL

"Not all storms destroy, some reshape"

FATIN

"Expect nothing and just enjoy the journey"

ADLINA

"Loving me and food equally."

EZREEN

"Indeed, with hardship will be ease"

PLANNING FOR 2026

In 2026, the Geophysics Group aims to strengthen its position through focused rebranding and increased visibility across Malaysia, while expanding networking with industry partners. The group will continue to build meaningful collaborations that connect academia and industry, while remaining committed to developing competent, industry-ready talents. Most planned programmes and activities will be shared through our official media platforms to enhance outreach, engagement, and participation.

GEOPHYSICS WORKSHOP

* The Geophysics Group plans to organize several workshops aimed at sharing ongoing research activities while engaging industry partners, experienced lecturers, and researchers. These sessions are designed to promote wider knowledge exchange, strengthen collaboration, and create impactful platforms for learning and professional development across academia and industry.

GEOPHYSICS COLLABORATION

* Collaboration with industry partners will play a key role in our rebranding efforts and in strengthening regional visibility through initiatives such as the Earth Sciences Academia and Industrial Collaboration (ESAIC) programme. Through strategic partnerships, joint initiatives, and professional engagement, we aim to expand our reach while creating meaningful and sustainable impact for both academia and industry.

COMPUTERS FOR LABORATORY

* Efforts are underway to secure three additional computer workstations for the Geophysics Laboratory to strengthen our digital infrastructure. This initiative aims to better equip students with up-to-date geophysics and geoscience data processing skills, supporting hands-on learning and industry-relevant competencies.

PARTNER WITH US

SPONSORSHIP INVITATION

We warmly invite your organization to partner with the Geophysics Group, Universiti Sains Malaysia, through sponsorship that supports our academic programmes, student development activities, public outreach, and impactful research–industry collaborations.

SPONSORSHIP FORM

To: Dr. Nur Azwin Ismail
Programme Chairperson (Geophysics)
School of Physics
Universiti Sains Malaysia (USM)
11800 USM, Pulau Pinang, Malaysia

SPONSORSHIP FOR GEOPHYSICS GROUP

The Geophysics Group, School of Physics, Universiti Sains Malaysia welcomes sponsorship and collaboration from industry partners, government agencies, and stakeholders.

SPONSOR INFORMATION

Agency / Company Name:
Person-in-Charge (PIC):
Designation:
Address:
Telephone:
Email:

SPONSORSHIP DETAILS

Description / Activity	Amount
Total	

*** You may include relevant attachments or supporting documents, if required.**

PURPOSE OF SPONSORSHIP (Optional)

☐ Academic & Student Activities
☐ Workshops / Short Courses / Training
☐ Outreach & Public Engagement
☐ Research & Innovation
☐ Industry–Academia Collaboration
☐ Others: _____

CONTACT DETAILS

Dr. Nur Azwin Ismail
School of Physics, Universiti Sains Malaysia
11800 USM, Pulau Pinang
Email: nurazwin@usm.my, Phone: +604 653 3676

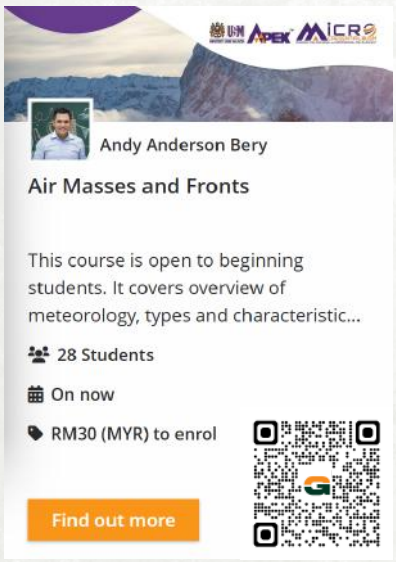
Download Sponsorship Form Here

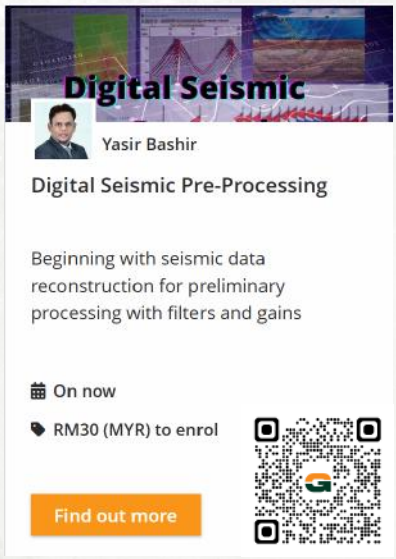
MICRO-CREDENTIAL

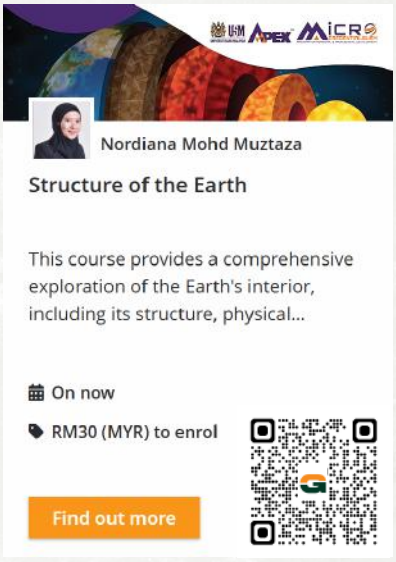
Program for Personal & Professional Development

Universiti Sains Malaysia and OpenLearning Global (M) Sdn Bhd have teamed up to create a micro-credential competency based learning platform - the first of its kind in Malaysia - that enables any individual to earn recognition for skills and competencies they have learned throughout their careers and their life.

Geophysics Group's Micro-Credential online learning portal will support lifelong learner, educators and workforce in any organisation or industry in acquiring desired competencies aligned to their own needs and priorities. it is designed in such a way to make learning and training very flexible, manageable, convenient, and most importantly, very affordable.







ACKNOWLEDGEMENTS

The Geophysics Programme sincerely thanks all agencies, industry partners, and collaborators for their continued support through research grants, projects, software, and collaborative initiatives. Your contributions have been instrumental in strengthening our teaching, research, and student development, while fostering meaningful connections between academia and industry. We deeply appreciate this enduring partnership and look forward to advancing geophysics together.

HAMPSONRUSSELL

SLB

ELIIS

S&P GLOBAL

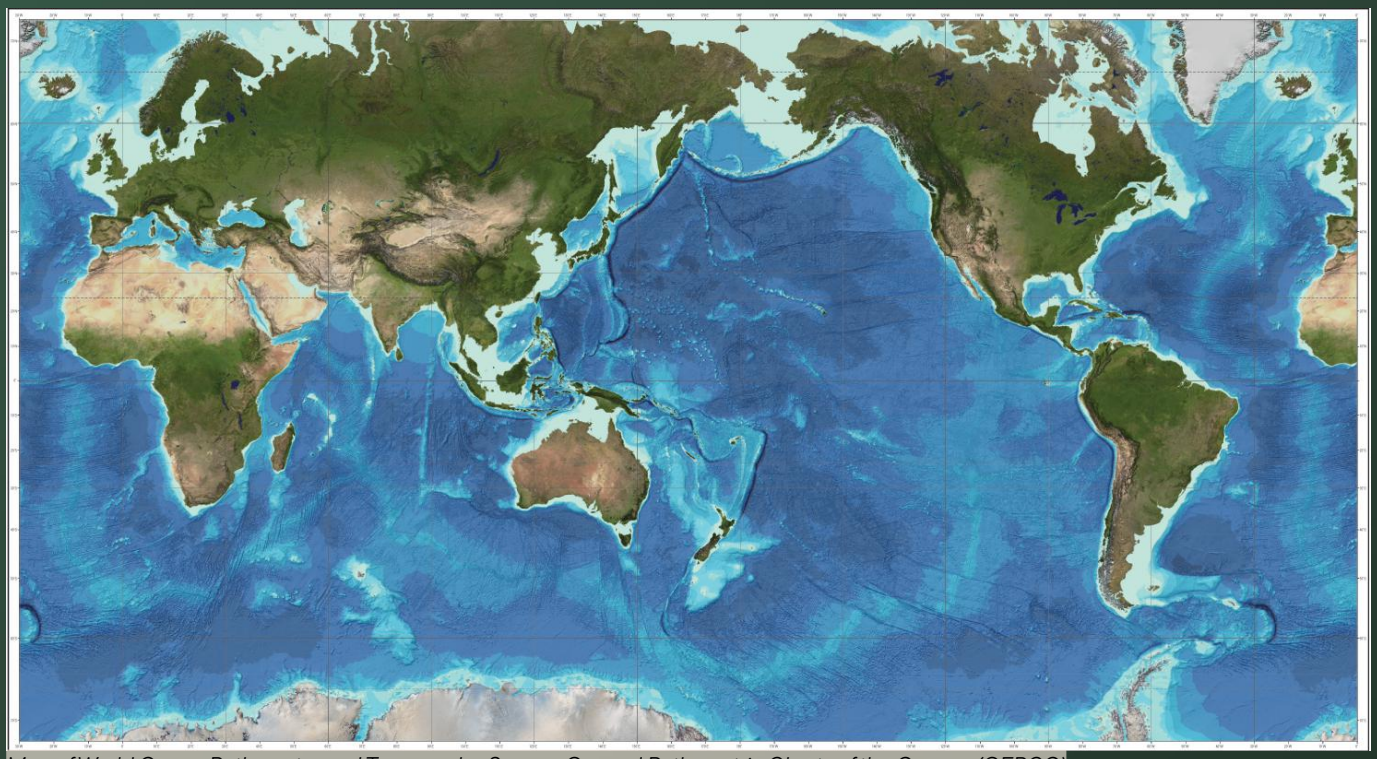
GLOBAL GEO EXPERTS

GEOTHERMAL RESOURCES SDN BHD

MALAYSIA RAPID TRANSIT CORPORATION SDN. BHD.

UGEO SOLUTIONS SDN. BHD.

GEO TECHNOLOGY RESOURCES SDN. BHD.



Map of World Ocean Bathymetry and Topography. Source: General Bathymetric Charts of the Oceans (GEBCO)

Follow us for more updates!

@GeofizikUSM

GEO PHYSICS

UNIVERSITI SAINS MALAYSIA