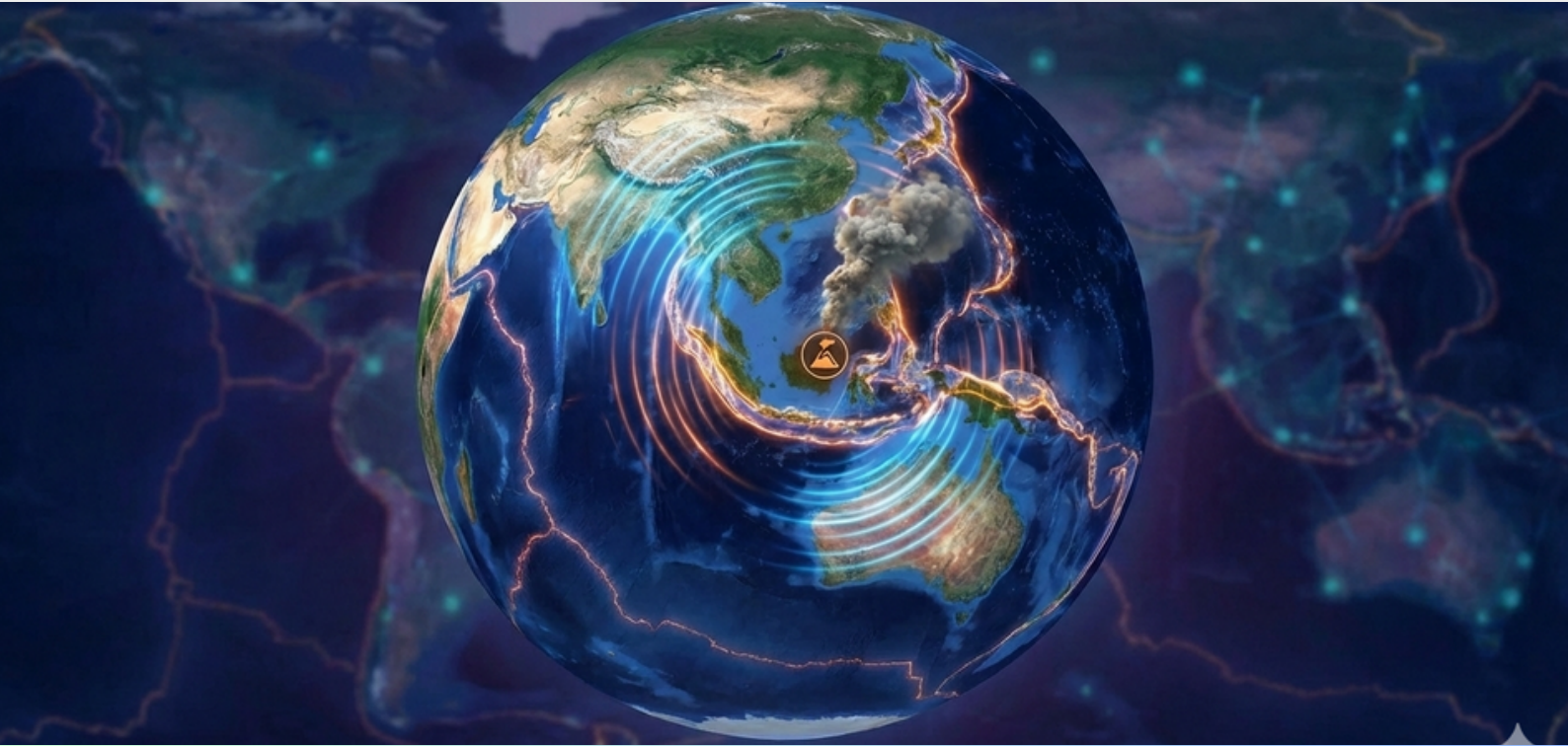




GEOSPECTRUM

Volume 6 (October – December, 2025)



Theme of the volume

Quarter of a Restless Earth

The Restless Earth initiative spotlights the dynamic nature of global seismic and volcanic activity, aiming to deepen understanding of geodynamic processes. It is defined by the rigorous application of seismology, deformation monitoring, and hazard analysis. This theme inspires students and researchers to leverage advanced geophysical tools, fostering scientific inquiry and contributing to vital innovations in Earth monitoring for a resilient future.



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From HoD's Desk

It is my pleasure to present the sixth volume of the departmental newsletter, Geospectrum, which encapsulates the academic vibrancy, research excellence, and outreach activities of the Department of Applied Geophysics over the recent period. This volume reflects our continued commitment to advancing geoscientific knowledge, fostering industry-academia collaboration, and providing meaningful experiential learning opportunities to our students.

During November 2025, the department had the privilege of hosting Dr. O. P. Pandey, distinguished alumnus and Chief Editor of The Journal of Geophysical Union, who delivered a Centenary lecture titled "Enigmatic Indian crust and underlying mantle lithosphere: A new understanding provided by recent geophysical studies and deep scientific drilling results."



In the same month, the department, through CROPC, signed an MoU with Prof. Prosanta Kumar Khan for the Winter Internship Program 2025–2026, with focused emphasis on climate management and disaster management projects. The program aimed to equip students with practical skills through hands-on experience, live datasets, expert mentorship, professional engagement, and certification.

Further strengthening field-based learning, the Annual Winter Field Training 2025 for pre-final year students was successfully conducted at Bakreswar, West Bengal, from 12th to 23rd December 2025. Students gained extensive hands-on exposure in data acquisition and analysis using advanced geophysical instruments, including multi-channel seismographs, gravimeters, magnetometers, resistivity and ERT systems, GPR, DGPS, and related survey equipment.

The department takes pride in the global recognition earned by its postdoctoral researcher, Dr. Amit Bera has been listed among the World's Top 2% Scientists for both 2024 and 2025, as per the Stanford University Global List, in the main field of Earth & Environmental Science and subfield of Environmental Engineering, based on standardized citation indicators compiled by Ioannidis, John P.A.

With delight it may be noted that that our faculties are being invited to deliver the keynote talks at various national and international forum. This volume captures such moments with details, for example, keynote address on "Interpretable and Explainable AI/ML for Geoscientific Data" at FIGA, INCOIS, Hyderabad by me. As the Geological Survey of India (GSI) is celebrating its 175th anniversary (1851–2026) with a year-long commemoration highlighting its legacy in geoscientific research and mineral exploration, as part of these celebrations, a two-day international seminar, "Unearthing the Past, Shaping the Future: 175 Years of GSI," was held on November 20–21, 2025, at the Rajasthan International Centre, Jaipur where Prof. Sanjit Kumar Pal was invited to deliver the talk on "Advancing Geophysical Practices Beyond Conventional Boundaries" which needs special mention. Moreover, Prof. Partha Pratim Mandal delivered an invited talk at the specialized workshop titled "Workshop on Rare Earth Metal and AI" on 11th December 2025 which was jointly organized by the Department of Electrical Engineering, IIT Delhi, in collaboration with the Machine Intelligence Unit, Indian Statistical Institute (ISI), Kolkata, demonstrating active academic contributions

From HoD's Desk

towards India's critical mineral exploration program.

A major highlight of this period was the Centenary Celebration Foundation Week of IIT (ISM) Dhanbad, held from 3rd to 9th December 2025. The Department of Applied Geophysics actively contributed through a series of academic, technical, and outreach events. Beginning on 4th December, activities included Geophysical Field Challenges, a visit to the Seismological Observatory, demonstrations on Disaster Management, a Geoscience Quiz, and a distinguished Guest Lecture by Padma Shri Dr. Harsh K. Gupta. An online lecture by Dr. Steve Cuddy, Petro Physicist at Petro-Innovations, on 8th December 2025 provided valuable international industry insights. The Geophysical Global Hackathon, conducted in hybrid mode on 6th December 2025 fostered collaborative innovation, while an interactive departmental stall featuring GPR demonstrations, resistivity measurements, and live 24×7 seismograph recordings attracted wide interest throughout the celebrations.

I hope this issue of Geospectrum serves as a comprehensive record of our collective efforts and achievements, and inspires continued excellence among our students, faculty, alumni, and collaborators.

Prof. Saumen Maiti

Associate Professor

Head of the Department

Department of Applied Geophysics
IIT (ISM) Dhanbad, Jharkhand, India

Departmental Activities

Applied Geophysics Stall at IIT (ISM) Centenary Foundation Day

As part of the 100th Foundation Day celebrations of the Indian Institute of Technology (Indian School of Mines), Dhanbad, the Department of Applied Geophysics set up an engaging and informative exhibition stall to showcase the role of geophysics in Earth exploration and societal development. The stall featured a range of geophysical instruments and demonstration models, highlighting both fundamental principles and practical applications in mineral, groundwater, environmental, and engineering investigations.

Faculty members, research scholars, and students of the department actively interacted with visitors, providing explanations on the working principles, data acquisition techniques, and real-world applications of the displayed instruments. The exhibition attracted enthusiastic participation from students, alumni, faculty, and invited guests, fostering scientific curiosity and interdisciplinary dialogue.



The stall effectively reflected the department's academic strengths, research contributions, and commitment to hands-on learning, while also celebrating its legacy and contributions over the past century. The initiative added significant value to the Centenary Foundation Day celebrations by promoting awareness of applied geophysics and its relevance in addressing contemporary geoscientific challenges.

Overall, the exhibition stall served as a vibrant platform for outreach and knowledge exchange, reinforcing the department's role in bridging fundamental geophysical science with real-world applications. It not only enhanced public understanding of geophysics but also inspired the next generation of geoscientists by demonstrating the discipline's critical contribution to sustainable development and nation-building.

Departmental Activities

Winter Geophysical Field Training

The Department of Applied Geophysics, IIT (ISM) Dhanbad, is a premier centre for education, research, and training in applied geophysical sciences, with a strong emphasis on the application of geophysical methods to address challenges in resource exploration, environmental studies, natural hazards, and earth system processes. The department combines rigorous theoretical instruction with extensive practical and field-based learning. As a key academic component, the department conducts the Winter Geophysical Field Training, which provides students with hands-on experience in planning, executing, and interpreting geophysical surveys in real geological settings. This training bridges classroom learning with field practice, equipping students with essential technical skills, professional competence, and an appreciation of real-world geophysical problem-solving.



Departmental Activities

This year, the Winter Geophysical Field Training was conducted at Bakreswar, West Bengal, from December 12 to 23, 2025, under the supervision of Prof. Saurabh Datta Gupta, Prof. Swarandeeep Sahoo, Prof. Ujjal Borah, and Prof. Niptika Jana for the students of 2nd Year MSc.Tech and 4th Year Integrated M.Tech. The training programme was designed to provide hands-on exposure to field-based geophysical investigations in a geothermally active terrain, complementing classroom instruction with practical experience. The Bakreswar geothermal area served as an ideal natural laboratory, enabling students to understand the application of geophysical methods in a complex geological setting. The successful execution of the field training was strongly supported by the dedicated efforts of the departmental staff members Amit Rana, Hansraj Kumar, and Chandan Saw. Overall, the field training significantly enhanced students' practical skills, observational abilities, and understanding of applied geophysical techniques, while also fostering teamwork and problem-solving in real-world scenarios.

Faculties' Activities & Achievements

Invited Talk by Prof. Partha Pratim Mandal at PReMI 2025

The Department of Applied Geophysics takes pride in sharing that Prof. Partha Pratim Mandal was invited as a speaker at the 11th International Conference on Pattern Recognition and Machine Intelligence (PReMI 2025), held from 11–14 December 2025 at the Indian Institute of Technology (IIT) Delhi, India.



Prof. Mandal delivered an invited talk at the specialized workshop titled “Workshop on Rare Earth Metal and AI” on 11 December 2025. The conference was jointly organized by the Department of Electrical Engineering, IIT Delhi, in collaboration with the Machine Intelligence Unit, Indian Statistical Institute (ISI), Kolkata.

In his lecture, Prof. Mandal highlighted the integration of artificial intelligence with critical mineral and rare earth exploration, emphasizing its growing importance in addressing challenges related to resource discovery and sustainable development. His talk drew significant attention from researchers and participants due to its interdisciplinary approach and strong practical relevance.

In recognition of his valuable contribution, Prof. Mandal was formally felicitated with a memento during the conference. The event served as a vibrant platform for academic exchange among national and international experts in pattern recognition, machine intelligence, and applied AI, fostering meaningful discussions and collaborations.

Researchers' Activities & Achievements

PhD Thesis Submission

Scholar: Priyabrata Mukherjee

Date of Final Thesis Submission: 10 October 2025

Title: Convection and Dynamo Action in the Earth's Outer Core with Spatially Non-uniform Thermal Stratification

The thesis investigates the influence of stable thermal stratification near the core-mantle boundary and lateral thermal heterogeneity on convection and magnetic field generation in the Earth's outer core. Using three-dimensional numerical simulations combined with data-driven analysis, the study examines how variations in buoyancy structure and boundary forcing affect the onset of convection, flow organization, helicity, and dynamo efficiency.

Proper Orthogonal Decomposition (POD) is employed to identify dominant flow and magnetic field patterns from both simulated outputs and observational data. The findings offer new insights into the physical mechanisms controlling geomagnetic field morphology and contribute to a better understanding of Earth-like dynamo behavior.

<https://scholar.google.com/citations?hl=en&user=rv0IMoMAAAAJ>



Scholar: Dheeraj Kumar Sharma

Title: Heterogeneous Buoyancy-Driven Flows with Dynamo Action in a Spherical Shell Modelling the Earth's Outer Core

Date of Final Thesis Submission: 16 October 2025



This thesis investigates thermal convection in rotating spherical shells with direct relevance to the dynamics of Earth's outer core, focusing on the influence of spatially heterogeneous internal heat sources. The study demonstrates that heterogeneous volumetric heating can play a dominant role in governing outer core convection, extending beyond the traditionally assumed boundary-driven mechanisms.

Systematic analysis of convection onset, turbulent flow regimes, and dynamo action reveals that source heterogeneity fundamentally alters the structure and spatial organization of convective motions. These modified flow patterns enhance thermal coupling between the inner and outer core and significantly influence the efficiency and morphology of geomagnetic field generation, highlighting non-uniform secular cooling as a key factor in Earth's core dynamics.

<https://scholar.google.com/citations?user=ABt9HNYAAAAAJ&hl=en&oi=sra>

Researchers' Activities & Achievements

Career Advancement Announcement

Litan Dutta has taken up a new position as **Junior Manager (Geophysics)** at **Sakariya Mines & Minerals**. He previously served as a Project Associate under Dr. Partha Pratim Mandal for two years, during which he developed a strong foundation in Applied Geophysics.

His areas of expertise include remote sensing, GIS, mineral exploration, landslide risk assessment, and gravity-magnetic data analysis. He has worked extensively on AI/ML-driven frameworks for mineral prospectivity mapping and landslide susceptibility assessment, employing advanced geospatial and geophysical tools such as ArcGIS, QGIS, Oasis Montaj (Geosoft), and Google Earth Engine. His skill set effectively bridges modern data-driven approaches with practical geophysical applications. We wish him every success in his future professional endeavors.



Research Presentation Highlight: SPG 2025

Mr. Tanmay Singh, Research Scholar under Dr. Partha Pratim Mandal, presented a poster titled "**Potential H₂-bearing Reservoir Zones Identification with Machine Learning Application from Historical Wells**" at the **15th Biennial International Conference & Exposition (SPG 2025)** held in Jaipur, Rajasthan.



His work employed machine learning techniques on historical well and subsurface datasets to identify zones favorable for hydrogen storage and accumulation. The study emphasized the effectiveness of data-driven approaches in efficiently screening reservoirs and reducing geological uncertainty, and highlighted the expanding role of AI/ML in supporting subsurface energy transition research, particularly in the areas of hydrogen exploration and storage.

Placement Update

Dr. Pradeep Kumar Shukla has taken up a new position as **Research Assistant Professor** at **Sathyabama Institute of Science & Technology, Chennai**. He previously served as an Institute Postdoctoral Fellow under Dr. Partha Pratim Mandal, where he developed strong

Researchers' Activities & Achievements

expertise in subsurface studies. His research centers on subsurface energy storage and reservoir characterization, integrating petrophysics, rock physics, and geomechanics. His key research interests include reservoir geomechanics, rock mechanics, in-situ stress analysis, wellbore and fracture stability, and salt-rock creep deformation. By employing advanced modeling and data-driven approaches, he seeks to understand and predict long-term subsurface behavior. We wish him every success and a rewarding journey ahead in his new academic role.

Conference Presentation

Dheeraj Kumar Singh under the supervision of Prof Mohit Agrawal presented an abstract titled **"Decoding the Anisotropic Lithosphere of Northeastern India through Ambient Noise and Receiver Function Techniques"** at the **Fourth Triennial**

Congress of the Federation of Indian Geosciences Associations (FIGA). The congress, themed **"Geosciences for Blue Economy – Potential of the Indian Ocean,"** was organized by the **Indian National Centre for Ocean Information Services (INCOIS)** under the **Ministry of Earth Sciences, Government of India**. His presentation showcased the application of ambient noise and receiver function techniques to understand lithospheric anisotropy in northeastern India, contributing to advanced geophysical insights discussed during the conference.



Students' Activities & Achievements

Master's Student Research Presentation

Aman Sharma, a Master's student, presented his research through an oral presentation at **RIC-25, IIT Guwahati (October 2025)** and a poster presentation at the 12th UK Geothermal Symposium (November 2025). His work, titled **"Numerical Investigation of the Onset of Convection in Heterogeneous Porous Media: Implications for Geothermal Reservoirs,"** investigates buoyancy-driven convection in heterogeneous porous media with relevance to geothermal energy extraction and geological CO₂ storage. Using the Darcy–Boussinesq framework and solving the governing equations on the Dedalus spectral platform, the study systematically examines the influence of vertical layering, lateral heterogeneity, and permeability anisotropy on convective onset and flow behaviour. The research aims to improve physical understanding of subsurface convection in realistic geological settings and to support more reliable numerical modelling strategies for geothermal reservoirs.

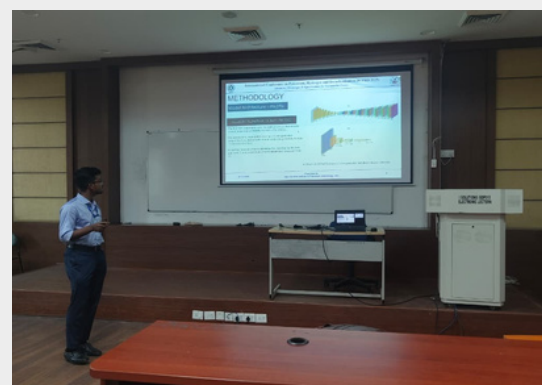
Partha Pratim Jana, a Master's student, presented his research through poster presentations at RIC-25, IIT Guwahati, and the **9th NGRSM-2025 at WIHG (October 2025)**. His work, titled **"Investigating the Mechanism of the Geodynamo in Earth's Primitive Core During Proterozoic Geomagnetic Superchrons,"** examines geomagnetic polarity reversal mechanisms in pre-inner core Earth dynamos during the Proterozoic and earlier eons, focusing on the role of core–mantle boundary heat-flux heterogeneity associated with lower-mantle structures and large igneous provinces. Using realistic LLSVP-like CMB patterns derived from the thermochemical mantle model of Dannberg et al. (2023), spherical-shell geodynamo simulations with negligible inner-core heat flux are performed, and the resulting multi-scale convective flows, magnetic field morphology, and reversal behaviour are analysed across spherical harmonics using the spectral framework of Majumder and Sreenivasan (2025).

Suraj Kumar, a Master's student, presented his work through poster presentations at RIC-25, IIT Guwahati, and the **9th NGRSM-2025 at WIHG (October 2025)**. His research, titled **"Thermal and Velocity Measurement in a Laboratory Setup for the Earth's Outer Core,"** proposes a laboratory-scale rotating annular tank experiment to investigate thermal and velocity characteristics of fluid systems analogous to the Earth's outer core. The experimental setup comprises a central aluminium cylinder for cooling and an outer transparent acrylic cylinder for heating and optical access, mounted on a motor-driven rotating platform. Heat flux is quantified using calibrated thermal gradients, temperature fields are monitored using embedded sensors, and Particle Image Velocimetry (PIV) is employed to obtain high-resolution velocity field measurements using laser-illuminated tracer particles, with the outcomes expected to enhance understanding of convection under planetary conditions and provide an improved experimental basis for geodynamo modelling.

Students' Activities & Achievements

Rachana Kumari, a Master's student, presented her work through poster presentations at RIC-25, IIT Guwahati, and the **9th NGRSM-2025 at WIHG (October 2025)**. Her research, titled **"Pore-scale Morphology and Fluid Flow Simulation in Reservoir Rocks,"** focuses on digital rock physics-based pore-scale characterization and flow simulation in shale and sandstone. For calcareous shale, high-resolution Micro-CT images were processed to reconstruct three-dimensional pore spaces, followed by pore network modeling using the Maximal Ball Algorithm to quantify pore and throat size distributions, coordination number, and connectivity, revealing very low porosity (~2–3%) with predominantly sub-micron to 10 μm pores but relatively good connectivity. In the case of Bentheimer sandstone, Micro-CT-derived pore networks were used for pore-scale flow simulations employing the Lattice Boltzmann Method, with permeability estimated for varying fluid viscosities. The results demonstrate that pore connectivity plays a dominant role in controlling flow behavior, and the simulated permeability values show good agreement with experimental data, validating the robustness of the adopted workflow.

Priyanshu Baidya, a third-year Master's student, delivered an oral presentation at the **International Conference on Petroleum, Hydrocarbon, and Decarbonization (ICPHD 2026)** held at the **Rajiv Gandhi Institute of Petroleum Technology (RGPT)**, Jais, Amethi. His presentation, titled **"3D Seismic Volume Denoising Using Advanced Deep Learning Techniques,"** showcased his Master's thesis work focused on applying state-of-the-art deep learning approaches, including GANs and U-Net architectures, to enhance seismic data quality for improved subsurface interpretation. The presentation provided an opportunity to interact with researchers, experts, and industry professionals, and to receive valuable technical feedback. The experience highlighted the growing role of AI-driven methodologies in geophysical research and reinforced the relevance of advanced data analytics for efficient and sustainable resource exploration in the context of energy transition.



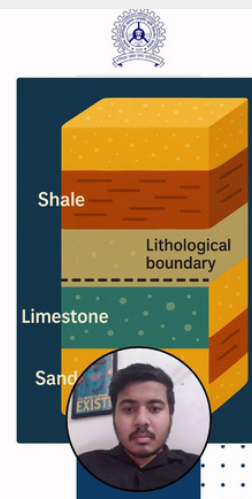
Pritam Kundu presented his Master's thesis at **ICSAE 2025, UPES**. His work, titled **"Lithological Boundary Identification from Well Log Data Using Wavelet Transform,"** focuses on developing a wavelet-based framework for automatic detection of lithological boundaries from borehole well log data. The study applies the **Discrete Wavelet Transform (DWT)** to decompose multiple well logs—Gamma Ray, Resistivity, Density, Neutron Porosity, and PEF—into low- and high-frequency components, enabling improved identification of subtle formation interfaces in noisy and non-stationary signals. An optimized selection of mother wavelets and decomposition levels was achieved through statistical error evaluation, followed by a

Students' Activities & Achievements

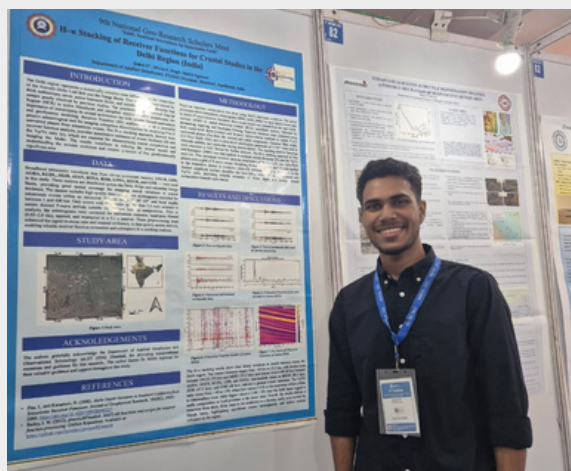
composite energy-based boundary picking technique. The methodology was validated using data from the Luke G U well in the Hugoton-Panoma Gas Field, demonstrating enhanced resolution of thin beds and lithological transitions compared to conventional interpretation approaches.

Lithological Boundary Identification from Well Log Data using Wavelet Transform

Presented By:
Pritam Kundu
23MC0060
M.Sc. Tech. in
Applied Geophysics



Mr. Gokul K. presented a poster titled **"H- κ Stacking of Receiver Functions for Crustal Studies in the Delhi Region (India)"** at the **National Geo-Research Scholars Meet (NGRSM)**, a flagship national-level conference organized by the **Wadia Institute of Himalayan Geology (WIHG), Dehradun, under the theme "RISE: Resilient Innovations for Sustainable Earth."** The study focused on estimating crustal thickness and Vp/Vs ratio beneath the Delhi region using the H- κ stacking technique applied to teleseismic receiver functions, contributing to an



improved understanding of the crustal architecture and seismotectonic framework of the region. The presentation facilitated scientific interaction with researchers from diverse geoscience disciplines, enabled constructive feedback on methodology and interpretation, and provided valuable exposure to contemporary research themes and advanced analytical approaches at a national platform.

Arijit Chell presented his Master's thesis titled **"1D Mechanical Earth Modeling & Fault Slip Analysis for CCS Site Screening: A Case Study from the Southern Perth Basin"** at the **4th UPES Energy Summit (ICSAE-2025)**, an international conference held in Dehradun, Uttarakhand. The study focuses on the geomechanical characterization of the Southern Perth Basin, Western Australia, with particular emphasis on evaluating fault reactivation potential resulting from pore pressure increase, a critical factor in carbon capture and storage (CCS) site screening. The work provides insights into subsurface stress conditions and fault stability relevant to safe and effective CO₂ sequestration. The author gratefully acknowledges Dr. Mohit Agarwal for his invaluable mentorship, guidance, and continued support throughout the research. Participation in ICSAE-2025 offered a valuable platform for interaction with researchers and industry professionals and facilitated discussions on recent advances in subsurface characterization and carbon sequestration technologies.

Students' Activities & Achievements



Participation in **ICSAE-2025** offered a valuable platform for interaction with researchers and industry professionals and facilitated discussions on recent advances in subsurface characterization and carbon sequestration technologies.

Nabin Mandal presented a poster at **SPG'25 – the 15th Biennial International Conference and Exposition held in Jaipur, Rajasthan**. His work, titled **"A Semi-Automated Python-Script-Based Interactive Workflow for Fracture Analysis from Image Logs,"** proposed an efficient approach for fracture characterization using image log data. The workflow integrates Python-based automation with interactive interpretation, enhancing accuracy while reducing manual effort. The study demonstrated improved consistency in fracture identification and orientation analysis, and the work was well appreciated for its practical applicability in subsurface and reservoir characterization studies.



Soumesh Ghatak, a final-year student, presented his research at **SPG'25 – the 15th Biennial International Conference and Exposition held in Jaipur, Rajasthan**. His work, titled **"Ultrasonic and Geochemical Characterization of Basalt for CO₂ Sequestration,"** focused on evaluating basaltic rocks as potential reservoirs for long-term carbon storage. The study



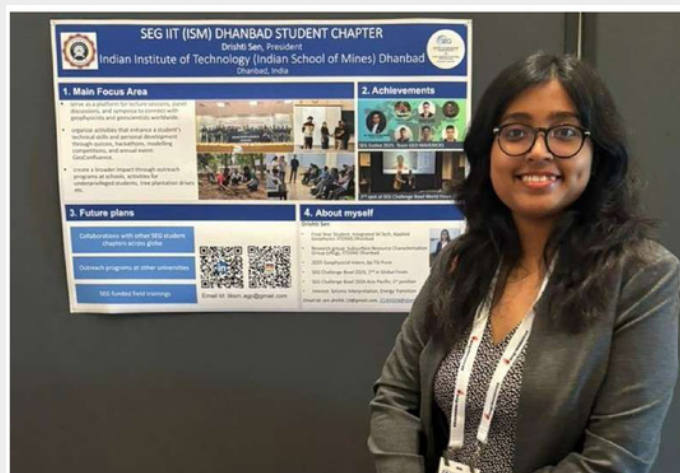
combined ultrasonic velocity measurements with geochemical analyses to assess rock integrity and reactivity, demonstrating the suitability of basalt formations for secure and sustainable CO₂ sequestration.

Students' Activities & Achievements

Research Internship and Scholarships

Drishti Sen, a final-year student, completed a two-month research internship under the GeolIntern International program at the Department of Geoscience, UiT – The Arctic University of Norway. Her project focused on automated mineral quantification of seafloor massive sulfide mineralization using SEM-EDS mapping techniques, emphasizing high-resolution mineralogical characterization and data-driven automation for improved interpretation. This research contributed to advancing understanding of subsea mineral systems and analytical workflows, while providing valuable international research exposure and hands-on experience with state-of-the-art instrumentation.

In recognition of her academic excellence and research potential, Drishti was awarded the SPWLA Foundation Scholarship for the academic year 2025–2026. She is also a recipient of the SEG/Chevron Student Leadership Symposium (SLS) Travel Grant, enabling her to participate in the SLS program and attend the 2025 IMAGE Convention held from 23–28 August 2025 in Houston, Texas. These honors underscore her leadership qualities and growing impact in geoscience research.



Best Oral Presentation Award

Tignangshu Das received the Best Oral Presentation Award at the International Conference on Petroleum, Hydrogen & Decarbonization (ICPHD 2025) held at the Rajiv Gandhi Institute of Petroleum Technology (RGPT). He presented his thesis research titled “Hybrid Machine Learning and Deep Learning Approaches for Estimating Petrophysical Properties from Inverted Elastic Parameters and Seismic Attributes.” The study integrates seismic inversion outputs with advanced machine learning and deep learning models to estimate key petrophysical

properties in complex reservoir settings. By employing hybrid ML-DL architectures, the work demonstrates improved prediction accuracy compared to conventional approaches, contributing to reduced uncertainty in reservoir characterization and supporting robust, data-driven decision-making in subsurface exploration and development.



Students' Activities & Achievements

ISMAANA Academic Excellence Award

Pratyush Singh, a 4th-year Integrated M.Tech student in Applied Geophysics, was conferred the **ISMAANA Academic Excellence Award** by the **ISM Alumni Association – North America**

(ISMAANA) Chapter during the 100th Foundation Day celebrations. He received this prestigious recognition for achieving the highest CGPA and demonstrating exceptional academic performance throughout his programme.



Group Achievement:

Subsurface Resource Characterization group (sRCg) lab

The team led by **Prof. Partha Pratim Mandal** emerged as winners of the **IndiaAI Hackathon for Mineral Targeting–2025**, organized under the Applications Development Pillar of the IndiaAI Mission, in collaboration with the Geological Survey of India (GSI), Ministry of Mines.

The hackathon focused on leveraging artificial intelligence and machine learning to advance mineral prognostication through the integrated analysis of geological, geophysical, geochemical, and remote sensing datasets. The team's winning solution, titled "CricSM AI: Critical and Strategic Mineral Mapping with AI," presented a robust, data-driven framework for identifying prospective zones of critical and strategic minerals.

The proposed methodology combined multidimensional datasets with advanced AI models, significantly enhancing targeting accuracy while reducing exploration uncertainty. The solution demonstrated strong potential for improving decision-making in mineral exploration and supporting sustainable resource development.



The Subsurface Resource Characterization Group (SRCg) Lab achieved notable recognition as **Pradyut and his team secured the 1st Runner-Up position at the SPG–SLB Hackathon**, jointly organized by the Society of Petroleum Geophysicists (SPG) and SLB, during SPG 2025: 15th Biennial International Conference & Exposition, held in Jaipur, Rajasthan.



In addition to the hackathon achievement, Pradyut also presented a poster titled "**Automated Mud-Loss Prediction in Carbonate Reservoirs**" at the same conference. His work focused on applying data-driven and automation-based techniques to predict mud-loss zones, a critical challenge encountered during drilling in carbonate formations.

The study demonstrated the practical application of intelligent prediction workflows to minimize non-productive time and optimize drilling operations.

[Home](#) > [Arabian Journal for Science and Engineering](#) > [Article](#)

In-situ Stress State of the Shushan Basin, Western Desert, Egypt: Implications for Developing Tight Cretaceous and Paleozoic Reservoirs

Research Article–Earth Sciences | Published: 31 October 2025

(2025) [Cite this article](#)

✓ Access provided by Indian Institute of Technology (ISM), Dhanbad

[Sherif Farouk](#), [Souvik Sen](#) ✉, [Sayantan Ghosh](#) ✉ & [Partha Pratim Mandal](#)

Details: Farouk, S., Sen, S., Ghosh, S. and Mandal, P.P., 2025. In-Situ stress State of the Shushan Basin, Western desert, Egypt: implications for developing tight Cretaceous and Paleozoic reservoirs. Arabian Journal for Science and Engineering, pp.1-22. ([Link](#))

RESEARCH ARTICLE | OCTOBER 13, 2025

🔒 Newly Published

Full Rock Anisotropy Characterization Using Laser Ultrasonics

Partha Pratim Mandal; Jonathan Simpson; Joel Sarout; Yevhen Kovalyshen; Ludmila Adam; Kasper van Wijk

Details: Mandal, P.P., Simpson, J., Sarout, J., Kovalyshen, Y., Adam, L. and Wijk, K.V., 2025. Full Rock Anisotropy Characterization Using Laser Ultrasonics. Geophysics, pp.1-50. ([Link](#))



FEATURE ARTICLE

Probabilistic lithofacies classification with machine learning application for improved confidence in subsurface modelling

Tanmay Singh¹, Pradyut Laha¹, Nabin Mandal¹ and Partha Pratim Mandal¹

Details: Singh, T., Laha, P. and Mandal, N.M.P.P., Probabilistic lithofacies classification with machine learning application for improved confidence in subsurface modelling. ([Link](#))

Physica Scripta



PAPER

Convection in rotating fluids permeated by an axial magnetic field with non-uniform stratification

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Tirtharaj Barman and Swarandeeep Sahoo*

Department of Applied Geophysics, Indian Institute of Technology (Indian School of Mines) Dhanbad 826004, India

* Author to whom any correspondence should be addressed.

E-mail: swarandeeep@iitism.ac.in

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