



GEOSPECTRUM

Volume 5 (August – September, 2025)



Theme of the volume **National Space Day**

National Space Day, celebrated annually on August 23, is a nationwide event aimed at promoting curiosity and awareness about space science and technology. The day is marked by activities such as model rocket launches, astronomy exhibitions, interactive lectures, quizzes, and sky observation sessions. Each year carries a unique theme, inspiring students and enthusiasts to explore the universe, foster scientific temper, and contribute to innovation in space research for a brighter future.



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From HoD's Desk

It gives me immense pleasure to present in this edition of the Department of Applied Geophysics newsletter, "Geospectrum" showcasing the remarkable achievements and vibrant academic activities that continue to define our department at IIT (ISM) Dhanbad. Our faculty members have brought great pride through their contributions at national and international levels. Prof. Sanjit Kumar Pal received the prestigious "National Geoscience Award 2024" for his outstanding contribution in integrated geological and geophysical methods to study mineral potential in gold bearing zones in parts of North Singhbhum Mobile Belt, Jharkhand. Prof. Saurabh Datta Gupta in May delivered an insightful presentation at IIT Guwahati on the role of upstream petroleum engineering in energy transition and further represented the department at the AOGS Conference in Singapore, where he presented original research on lunar tectonic deformation using seismic. Also, Prof.



Niptika Jana contributed significantly through her invited lecture at NEHU, Shillong, on seismotectonic studies of the Sikkim Himalayas and represented the department internationally at the IAGA/IASPEI joint scientific meeting in Lisbon, reflecting the department's growing global footprint. Again, in October, Prof Partha Pratim Mandal and his students had presented 6 posters at 15 th Biennial International Conference & Expo organized by Society of Petroleum Geophysics, India held at Jaipur. His research team presented a paper on Probabilistic Litho-facies Classification with ML application in the Geophysical Journal of SPG, as well as one of his students became the runner up of the SPG SLB Hackathon Program. The department has also hosted a series of impactful academic events, enriching both faculty and students. In July, alumnus Dr. Deepak Singh from IIT Bombay delivered an engaging lecture on "Planetary Remote Sensing and Cryosphere," providing valuable insights into advanced remote sensing applications in planetary and cryospheric studies. Two GIAN courses added further academic vibrancy—one in June on "Inverse Methods and Machine Learning: Applications in Geosciences," coordinated by Prof. Saumen Maiti with expert sessions by Prof. Mrinal K. Sen from the University of Texas at Austin, and another in August on "Engineering Seismology," led by Prof. Mohit Agrawal, featuring lectures by renowned seismologist Prof. Utpal Dutta. The Centenary Lecture by alumnus Dr. Pratap Sahay on "Slow Shear Wave in Poroelasticity" added a nostalgic and scholarly dimension to our departmental celebrations. Equally commendable are the recent alumni interactions, which have greatly benefited our students by fostering mentorship, industry networking, and placement opportunities. Such engagements provide practical exposure, inspire innovation, and build a strong bridge between academic learning and real-world applications. These collective achievements and initiatives reflect the department's ongoing commitment to excellence, collaboration, and global engagement in the field of applied geophysics. With delight, four faculties from the Department of Applied Geophysics, Prof. P.K. Khan, Prof. U.K. Singh, Prof. Saumen Maiti, and Prof. Saurabh Datta Gupta have become the Editors of the Prestigious Nature Scientific Report Journal. More exciting to know on card that one of our faculty colleagues of the department, Prof. Partha Pratim Mandal and his student's group become the winner of India AI Hackathon organised by MEITY, Govt. of India.

From HoD's Desk

While 100- years young the great institute is going to celebrate "Centenary Foundation Week" this year in December, instead of "Foundation Day", a lot of excitement will be on card. I extend my heartfelt appreciation to all faculty members, students, and alumni for their sincere efforts and continued support and contributions in enhancing the academic and research stature of our department.

Highlights:

National Geoscience Award 2024

ANRF, ISRO sponsored R&D projects

Winner of India AI Hackathon organised by MEITY, Govt. of India

Alumnus, Elected as Fellow of The World Academy of Sciences (FTWAS) under UNESCO.

Alumnus, become Honorary Professor at Vitus Bering Kamchatka State University

Runner up of the SPG SLB Hackathon Program

Prof. Saumen Maiti

Associate Professor

Head of the Department

Department of Applied Geophysics

IIT (ISM) Dhanbad, Jharkhand, India

Woman Faculty's Column

The growing presence of women in STEM is steadily transforming the scientific landscape. From fieldwork to data labs, women are now leading research, shaping policy, and mentoring future generations. Yet, the journey has not been without challenges — balancing multiple roles, navigating bias, and securing equal opportunities continue to test perseverance. But with every stride forward, women in science continue to redefine strength, collaboration, and creativity.



In our department, it is inspiring to witness more young women pursuing geosciences and contributing meaningfully to research, outreach and in industries alike. Diversity in science is not only about representation — it enriches perspectives, fuels innovation, and helps us ask better questions about our planet.

This year has been particularly enriching on both academic and mentoring fronts. I had the privilege of serving as the Faculty Advisor for student program in biennial Society of Petroleum Geophysicist, Expo and Exhibition 2025, Jaipur, India where our students demonstrated remarkable initiative, teamwork, and enthusiasm, earning appreciation on a national platform.

In September 2025, I had the opportunity to deliver an oral presentation on “Delineation of 3D crustal architecture across the Karakoram fault in western Tibet: Integration of seismic velocity and attenuation properties” at the IASPEI-IAGA Joint scientific meeting held in Lisbon, Portugal, sharing our recent research findings with the international seismological community. Engaging with scientists from across the world was both insightful and motivating.

Looking ahead, I am delighted to share that I will be co-convening a scientific session on “SM6.1 Joint modelling and inversion of multi-disciplinary geophysical datasets: crust and lithosphere (Co-organized by GD6/TS10)” at the European Geosciences Union (EGU) General Assembly 2026 to be held in Vienna, Austria in May 2026. This will be a valuable opportunity to promote collaboration, exchange ideas, and highlight the important contributions of our department — Early Career Scientist and of women scientists globally.

As we move forward, let us continue to encourage young women to explore the geosciences, to lead fearlessly, and to embrace the spirit of discovery. The future of STEM will be stronger, more inclusive, and more inspiring when every voice has the chance to be heard.

Prof. Niptika Jana

Assistant Professor

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

Departmental Activities

Centenary Lecture by Dr. Pratap Sahay



Speaker: Dr. Pratap Sahay
Department of Seismology, CICESE, Ensenada, Mexico
M.Sc. 1977 (Applied Geophysics), Ph.D. 1986
(Geophysics), University of Alberta

Dr. Pratap Sahay delivered a centenary lecture on “Slow Shear Wave in Poroelasticity”, focusing on recent advances in poroelastic wave propagation theory. Traditional Biot theory and its JKD extension, widely used for modeling wave propagation in porous media, lack terms capturing the shear restoring force in fluids. Dr. Sahay highlighted that by incorporating the fluid viscous stress tensor through the de la Cruz-Spanos poroelasticity framework, an additional shear wave—the slow shear wave—emerges. This slow shear wave represents an out-of-phase motion of fluid and solid phases, distinct from the conventional fast shear wave, and is characterized as a dispersive wave that attenuates rapidly within half a wavelength. The lecture provided insights into the macroscopic implications of pore-scale fluid dynamics and their role in understanding wave behavior in porous media.

Pre-Feasibility Study Identifies Bakreshwar as Potential Site for Winter Field Training

A **pre-feasibility study** was conducted at **Bakreshwar, West Bengal**, to evaluate its suitability as a potential site for the upcoming winter field training program of the Department of Applied Geophysics, IIT (ISM) Dhanbad. The study involved a preliminary assessment of the geological setup, accessibility, infrastructure, and logistical arrangements of the area. Bakreshwar, known for its geothermal features and diverse lithological exposures, offers an excellent natural laboratory for hands-on training in geophysical survey techniques, making it a promising site for academic field exercises.

Departmental Activities

Celebrating National Space Day 2025 at IIT (ISM) Dhanbad



The Department of Applied Geophysics, IIT (ISM) Dhanbad, in collaboration with the Regional Remote Sensing Centre-East (RRSC-East), ISRO, Kolkata, celebrated National Space Day 2025, engaging over 350 students from eight schools across Dhanbad. The event commemorated the successful landing of India's Chandrayaan-3 Vikram lander on the Moon's South Polar Region on August 23, 2023, and aimed to inspire curiosity and interest in space science among young minds. The day-long programme featured inspirational talks, interactive sessions with ISRO scientists, a



space exhibition, and a quiz competition, giving students a unique opportunity to explore space science and technology firsthand. Prof. Sukumar Mishra, Director of IIT (ISM) Dhanbad, encouraged students to channel their curiosity into knowledge, science, and engineering, highlighting the role of scientific pursuits in national development.

The event was organised by the Department of Applied Geophysics, with Prof. Sanjit K. Pal as the faculty coordinator. Students from the Geophysical Society, Department of Applied Geophysics, provided crucial support for the smooth conduct of all activities. Participants expressed enthusiasm for the hands-on sessions and exhibitions, noting that such initiatives ignite scientific temperament and motivate careers in science and technology.



This celebration reaffirmed IIT (ISM) Dhanbad's commitment to promoting STEM education and inspiring the next generation of innovators, reinforcing the importance of science and technology in shaping the nation's future.



Departmental Activities

Research Talk by Mr. Lalit Arya, PhD Scholar, National Taiwan University

The Department of Applied Geophysics, IIT(ISM) Dhanbad, organized an engaging research talk and interactive session with Mr. Lalit Arya, a PhD scholar from the Department of Geoscience, National Taiwan University (NTU), on 26th August 2025.

During the session, Mr. Arya delivered two insightful presentations on contemporary research themes in oceanic and seismic studies. His first presentation, titled “Listening to the Ocean’s Pulse: Microseism Observations from Mid-Pacific and Northern Ryukyu OBS Arrays, and Early Detection of Superstorms in the Western Pacific and Bay of Bengal,” highlighted the use of ocean-bottom seismometer (OBS) data to understand ocean–atmosphere interactions and to explore the potential of microseisms as early indicators of superstorms.

In his second talk, “Exploring Collaboration Opportunities between NTU and ISM Geoscience under the Indo–Taiwan DST–NSTC Program,” Mr. Arya discussed avenues for collaborative research, faculty exchange, and joint projects between NTU and IIT(ISM). The session fostered a productive dialogue between faculty members, researchers, and students, encouraging future academic cooperation and knowledge sharing between the two institutions.

The event provided a valuable platform for scholarly exchange and strengthened the international research linkage of the Department of Applied Geophysics.



Centenary Institute Guest Lecture by Dr. Deepak Singh

IIT (ISM) Dhanbad hosted a centenary guest lecture on “Planetary Remote Sensing & Cryosphere”, delivered by Dr. Deepak Singh, Assistant Professor at CSRE, IIT Bombay and alumnus of Integrated M.Sc. in Applied Geophysics, ISM Dhanbad. Dr. Singh holds an MS and PhD from the University of Michigan in Atmospheric, Oceanic, and Space Sciences, and has conducted postdoctoral research at PRL, Ahmedabad.

The lecture highlighted how planetary remote sensing has transformed cryospheric studies, providing high-resolution multispectral, hyperspectral, LiDAR, and radar data to analyze ice composition, dynamics, and energy balance both on Earth and across the Solar System. Key topics included glacier mass balance, snow/ice evolution, permafrost degradation, as well as

Departmental Activities

Martian polar caps and Europa's ice shells, emphasizing albedo feedbacks, dust-ice interactions, and subsurface layering.



Centenary Institute Guest Lecture and Student Interaction by Prof. Utpal Dutta



The Department of Applied Geophysics, IIT (ISM) Dhanbad, hosted a centenary guest lecture by Prof. Utpal Dutta, Professor of Civil Engineering at the University of Alaska Anchorage, USA, on "Seismic Microzonation of Anchorage, Alaska, & the 2018 M7.2 Anchorage Earthquake.", coordinated by Prof. Mohit Agrawal, Associate Professor (AGP), and Prof. Saumen Maiti, Head of Department (AGP).

An alumnus of IIT (ISM) Dhanbad, Prof. Dutta earned his M.Sc. (Tech) in Applied Geophysics (1988) and Ph.D. (1992) from the institute. He has since built an accomplished career in urban earthquake hazard assessment, seismic microzonation, and engineering seismology, with nearly 60 publications in international journals and conferences.

His lecture presented methodologies for seismic microzonation and insights from the 2018 Anchorage earthquake, offering valuable perspectives on earthquake preparedness and mitigation.

An interactive session with students was also organized, during which Prof. Dutta shared guidance on career development, research opportunities, and global collaboration in the field of earthquake studies.



Departmental Activities

Two-Week GIAN Course on “Engineering Seismology” Successfully Concludes at IIT (ISM) Dhanbad



The intensive two-week GIAN Course on “Engineering Seismology” was jointly led by Prof. Utpal Dutta (University of Alaska, Anchorage, USA) and Prof. Mohit Agrawal (Department of Applied Geophysics, IIT (ISM) Dhanbad). The course provided comprehensive training through lectures, discussions, tutorials, and field sessions, covering key areas such as seismic source characterization, ground motion analysis, microzonation, and hazard assessment, with an effective blend of theory and practice.



The course was jointly led by **Prof. Utpal Dutta** (University of Alaska, Anchorage, USA) and **Prof. Mohit Agrawal** (Department of Applied Geophysics, IIT (ISM) Dhanbad). It offered comprehensive training on key aspects of engineering seismology, including seismic source characterization, ground motion analysis, seismic microzonation, and hazard assessment. The sessions combined lectures, hands-on tutorials, and field exercises, providing participants with both theoretical insight and practical experience.

Certificates were awarded to participants during the valedictory session, marking the successful completion of this international academic programme conducted under the Ministry of Education’s GIAN initiative, aimed at fostering global collaboration and capacity building in the field of engineering seismology.

Faculties' Activities & Achievements

IIT (ISM) Dhanbad's Prof. Sanjit Kumar Pal Honoured with Prestigious National Geoscience Award

The Indian Institute of Technology (Indian School of Mines), Dhanbad, proudly congratulates Professor Sanjit Kumar Pal, Professor and Former Head, Department of Applied Geophysics, for receiving the National Geoscience Award 2024 from the Ministry of Mines, Government of India.



The award was presented by the Hon'ble President of India, Smt. Droupadi Murmu, on 26th September 2025 at Rashtrapati Bhavan, New Delhi. This prestigious recognition—the highest in the field of geosciences in India—honours Prof. Pal's exceptional contributions to Applied Geophysics and his pioneering efforts in integrating Artificial Intelligence and Machine Learning into geophysical data interpretation.

His extensive research covers UAV-based and Satellite Remote Sensing, Gravity and Magnetic Techniques, Electrical Resistivity Tomography, Seismic Tomography, and Ground Penetrating Radar, with wide-ranging applications in mining, groundwater and mineral exploration, environmental studies, and disaster mitigation.

Faculties' Activities & Achievements

IIT (ISM) Dhanbad and C-DAC Pune Sign MoU to Strengthen Research and Industry– Academia Collaboration

The Centre for Development of Advanced Computing (C-DAC), Pune, and the Indian Institute of Technology (Indian School of Mines), Dhanbad [IIT (ISM) Dhanbad] have signed a Memorandum of Understanding (MoU) to establish a strategic partnership focused on advanced research, joint innovation, development, and capacity building. The MoU was formally signed by Shri Sanjay Wandhekar, Centre Head, C-DAC Pune, and Prof. Sukumar Mishra, Director, IIT (ISM) Dhanbad, in the presence of Dr. Rastogi and Shri Abhishek Srivastava from C-DAC Pune, and Prof. Saurabh Datta Gupta from the Department of Applied Geophysics, IIT (ISM) Dhanbad. The collaboration aims to leverage the strengths of both institutions in emerging technologies, promote interdisciplinary research and knowledge exchange.

Prof. Saurabh Dutta Gupta Presents Lunar Subsurface Tectonics Research at AOGS 2025, Singapore

Professor Saurabh Dutta Gupta from the Department of Applied Geophysics, IIT (ISM) Dhanbad delivered a presentation titled "Capturing Structural Deformation Due to Tectonic Activities in the Shallow Subsurface of the Moon Based on Waveform and Velocity Contrast Analysis" at the Asia Oceania Geosciences Society (AOGS) Conference 2025, held in Singapore. The presentation highlighted innovative approaches in planetary geophysics, focusing on understanding lunar tectonic processes through advanced geophysical analysis.



Researchers' Activities & Achievements

PhD Thesis Submission



Varist Tiwari (PhD Scholar), has submitted his PhD thesis under the supervision of **Prof. Upendra K. Singh**, IIT(ISM) Dhanbad.

Associated Lab: Geophysical Inversion Lab

Publication details: [Google Scholar Link](#)



Anirban Biswas (PhD Scholar), has submitted his PhD thesis, entitled "**Lithospheric structure and mechanical strength variations over the Indo-Burma Subduction zone, Southeast Asia**" under the supervision of **Prof. Saumen Maiti**, IIT(ISM) Dhanbad and **Prof. Gangumalla Srinivasa Rao**, IIT Bombay.

Associated Lab: Machine Learning & Geo-computing Lab

Publication details: [Google Scholar Link](#)

PhD Thesis Pre-Submission



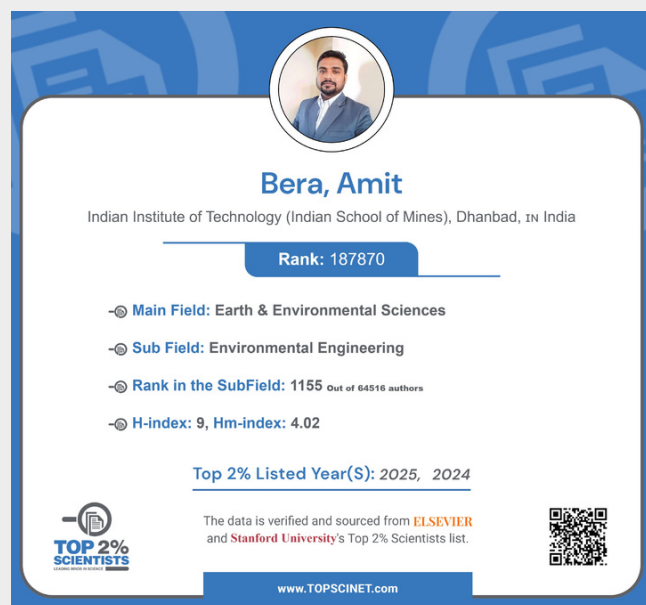
Dhiraj Kumar Singh (PhD Scholar), has submitted his PhD thesis, entitled "**Seismic Imaging of the Lithosphere and its Anisotropic Features Beneath Northeastern India Using Ambient Noise Tomography and Harmonic Decomposition of Receiver Functions**" under the supervision of Prof. **Mohit Agrawal** IIT(ISM) Dhanbad.

Associated Lab: Observational Seismology Lab

Publication details: [Google Scholar Link](#)

Researchers' Activities & Achievements

Global Recognition: Dr. Amit Bera Among Stanford's Top 2% Scientists (2024 & 2025)



Dr. Amit Bera has been recognized 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. His rankings stand at **145,287 (Overall)** and **866 (Subfield) for 2024**, and **187,870 (Overall)** and **1,155 (Subfield) for 2025**. This prestigious recognition is based on the comprehensive global database of standardized citation indicators compiled by Ioannidis, John P.A. (2025), titled "August 2025 data-update for 'Updated science-wide author databases of standardized citation indicators'", published in the Elsevier Data Repository (V8). Dr. Bera's individual profile and ranking details are available at <https://topresearcherslist.com/Home/Profile/897307>.

Achievement: Participation in the CSIR–Integrated Skill Initiative on Magnetotelluric Exploration for Earth Resources

Mr. Amit Bajpai, from the Department of Applied Geophysics, IIT(ISM) Dhanbad, participated in the "**Magnetotelluric (MT) Exploration for Earth Resources**" training program organized under the **CSIR–Integrated Skill Initiative**, held from September 22–26, 2025, at **CSIR–National Geophysical Research Institute (NGRI)**, Hyderabad. The program covered theoretical and practical aspects of the MT method, including data acquisition, processing, and modeling, and was coordinated by **Dr. Prasanta K. Patro** and **Dr. Abdul Azeez K.K.** along with their expert team.



Alumni Achievements

IIT (ISM) Dhanbad Alumnus Dr. Prakash Kumar Elected Fellow of The World Academy of Sciences (FTWAS)

Department of Applied Geophysics, IIT (ISM) Dhanbad proudly extends its heartfelt congratulations to its distinguished alumnus,

Dr. Prakash Kumar, Director, **CSIR–National Geophysical Research Institute (NGRI), Hyderabad**, on being elected as a **Fellow of The World Academy of Sciences (FTWAS)** under **UNESCO**. This prestigious recognition honors Dr. Kumar's exceptional contributions to **Geophysical Research and Earth Sciences**. Dr. Kumar's remarkable achievements in advancing the understanding of Earth's interior processes and his leadership in promoting geoscientific research have brought great pride to the IIT (ISM) community. His election to FTWAS stands as a testament to the global impact of IIT (ISM) alumni in the field of scientific innovation and research excellence.



**Global Recognition:
Dr. O.P. Mishra, IIT
(ISM) Alumnus,
Honored as Honorary
Professor at Vitus
Bering Kamchatka
State University**

Alumni Achievements

Department of Applied Geophysics, The Indian Institute of Technology (Indian School of Mines), Dhanbad, proudly congratulates Dr. O.P. Mishra, an esteemed alumnus of the Department of Applied Geophysics (M.Sc. Tech, 1990 batch) and the Director of the National Center for Seismology (NCS), New Delhi, on being conferred the prestigious title of Honorary Professor by Vitus Bering Kamchatka State University, Russia.

This international recognition acknowledges Dr. Mishra's exceptional contributions to the field of seismology, particularly in advancing research on earthquake processes, seismic hazard assessment, and disaster risk reduction. His dedication and scientific excellence have significantly strengthened the understanding of geodynamic processes and their societal impacts.

The honor also symbolizes a new chapter in scientific cooperation and academic exchange between India and Russia, highlighting the global influence of IIT (ISM) alumni in promoting research, innovation, and international collaboration. Dr. Mishra's achievement brings immense pride to IIT (ISM) Dhanbad, reflecting the institute's enduring legacy of nurturing leaders in Earth and geophysical sciences.



scientific reports

 Check for updates

OPEN Salt rock creep deformation forecasting using deep neural networks and analytical models for subsurface energy storage applications

Pradeep Kumar Shukla¹✉, Tanujit Chakraborty^{2,3}, Mustafa Sari⁴, Joel Sarout⁴ & Partha Pratim Mandal¹✉

Details: Shukla, Pradeep Kumar, et al. 2025. Salt rock creep deformation forecasting using deep neural networks and analytical models for subsurface energy storage applications. Scientific Reports 15.1 (2025): p.34560. ([Link](#))

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Journal of Earthquake and Tsunami | Online Ready

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Seismic Site Characterization Using Earthquake HVSR Modelling in the Eastern Chhotanagpur Plateau, India

Amaan Khan, Ravindra K. Gupta, and Mohit Agrawal ✉

<https://doi.org/10.1142/S1793431125500228> | Cited by: 0 (Source: Crossref)

Details: Khan, A., Gupta, R.K. and Agrawal, M., 2025. Seismic Site Characterization Using Earthquake HVSR Modelling in the Eastern Chhotanagpur Plateau, India. Journal of Earthquake and Tsunami, World Scientific Connect, p.2550022. ([Link](#))

Penetration depth of flow perturbations into a stably stratified layer driven by rotating laterally heterogeneous convection

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Tirtharaj Barman  and Swarandeeep Sahoo^{a)} 

[Details](#): **Barman, T. and Sahoo, S.**, 2025. Penetration depth of flow perturbations into a stably stratified layer driven by rotating laterally heterogeneous convection. Physics of Fluids, 37(8) ([Link](#)).



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