Indian Institute of Technology (Indian School of Mines) Dhanbad

Geoscope: Applied Geology News

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From the HoD's Desk

It gives me immense pleasure to present this issue of the Department of Applied Geology Newsletter, which reflects the vibrant academic, research, and field-based activities of our department. Geology is a discipline deeply connected to society—addressing challenges related to natural resources, energy security, environmental sustainability, and geohazards. Through rigorous academics, hands-on field training, and research-oriented learning, our department continues to nurture students with strong scientific grounding, critical thinking, and practical skills essential for professional and research careers.

I take pride in the dedicated efforts of our faculty, students, research scholars, and alumni, whose achievements bring distinction to the department at both national and international levels. I encourage our students to remain curious, ethical, and committed to excellence, and I look forward to continued collaboration as we strive to advance geoscientific knowledge in service of society and sustainable development.

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Publications

- Chakraborty, P., Sen, P., Peketi, A., Mishra, S., Chakraborty, P., Kumari, J., Bhaumik, A. K. & Hazra, B. (2026). Source-specific health risks of metallic elements in road dust from coal mining affected urban areas using an integrated PMF–HHR–Monte Carlo framework. Environmental Geochemistry and Health, 48(2), 70.

- Sethi, C., Ostadhassan, M., Vishal, V., Wuttke, F., & Hazra, B. (2025). Minireview and perspectives of gas–rock interactions in shale reservoirs for symbiotic storage of H_2 and CO_2. Energy & Fuels.

- Emmiru, B. T., Tsegaye, S. G., & Sahoo, P. R. (2025). Geological and physicochemical characterization of Kobe Sorsa graphite deposit, Ethiopia. Scientific Reports, 15(1), 44019.

- Sarkar, K., Dutta, A., & Singh, T. N. (2025). Assessing the impact of water saturation on planar and wedge stability: Limit equilibrium modelling with RocPlane and SWedge. Journal of the Geological Society of India, 101(12), 1747–1756.

- Chaudhuri, S., Bose, K., Chattopadhyay, K., Das, S. S., & Bhaumik, A. K. (2025). Biostratigraphy, mineralogy and paleoenvironmental analysis of the Miocene Gaj Formation from the Dwarka Basin, western India. Geological Magazine, 162, e49.

- Tripathy, A., Verma, A. K., Mamgain, G., Sabri, M. S., Dimri, R., & Singh, T. N. (2026). A metaheuristic-based ANN framework for overbreak prediction in the Rishikesh–Karnaprayag railway tunnel. Tunnelling and Underground Space Technology, 169, 107310.

- Vinod, A., Prasad, A. K., Mishra, S., Purkait, B., Mukherjee, S., Shukla, A., Sarkar B. C., & Varma, A. K. (2025). Gross Calorific Value Estimation in Coal Using Multi-Model FTIR and Machine Learning Approach. Applied Sciences, 15(22), 12209.

- Sahoo, A., Mohapatra, S., Tripathy, A., Verma, A. K., & Singh, T. N. (2025). A predictive, GIS-based, landslide susceptibility study of Tamenglong district, Manipur, India using the frequency ratio approach: A case study. Journal of Earth System Science, 134(4), 222.

- Jha, D. K., Dasgupta, S., & Sanyal, R. (2025). A geoarchaeological timeline of India. Quaternary Environments & Humans, 3(4), 100089.

- Harshitha, G., González-Álvarez, I., Manikyamba, C., D'Andres, J., Yadav, J. K., & Mukherjee, M. K. (2025). Critical mineral potential of indian phosphorites: Evidence of REE enrichment in Ediacaran Sediments from the Cuddapah Basin. Journal of Geochemical Exploration, 107918.

- Rahman, T., Sarkar, K., Vishal, V., & Singh, T. N. (2025). Thermo-mechanical behavior of Raniganj sandstones, India: Role of grain size and mineral composition. Rock Mechanics and Rock Engineering, 1–17.

- Altaher, Z. A., Ghosh, S., Mukherjee, M. K., & Rajpoot, A. (2025). The influence of mineralogy and geomechanical properties on the development of natural fractures in coal-bearing strata and its implications: an example from Barakar Formation, Eastern India. International Journal of Earth Sciences, 114(7), 1377-1396.

Patents

- Indian Patent No. 573950: Title: “Multi-model method and system of estimation of ash yield in coal using mid-infrared Fourier transform infrared spectroscopy”, No. 202431065336, Granted 18.11.2025. In the name of Indian Institute of Technology (Indian School of Mines), Dhanbad. Inventors: Anup Krishna Prasad, Sameeksha Mishra, Arya Vinod, Anubhav Shukla, Shailayee Mukherjee, Bitan Purkait, Atul Kumar Varma, Bhabesh Chandra Sarkar.
- Indian Patent No. 577115: Title: “A novel multi-model method of estimation of the gross calorific value (GCV) in coal using mid-infrared fourier transform infrared spectroscopy", No. 202531012376, Granted 31/12/2025. In the name of Indian Institute of Technology (Indian School of Mines), Dhanbad. Inventors: Anup Krishna Prasad, Arya Vinod, Sameeksha Mishra, Bitan Purkait, Anubhav Shukla, Shailayee Mukherjee, Bhabesh Chandra Sarkar, Atul Kumar Varma.

R & D Projects

Geoscientific Study of Conventional Core Samples from the Upper Carbonate Formation of the Baghewala Oil Field, Oil India Limited, Rajasthan Field. Funding Agency: Oil India Limited, Amount: 41.30 lakhs, Role: PI, Prof. P. R. Sahoo (AGL), Co-PI, Prof. S. Sarangi (AGL), Prof. Chandan Sahu (PE)

Awards and Achievements

IIT(ISM) Dhanbad signed a Memorandum of Understanding (MoU) with the **Directorate of Geology and Mining (DGM), Government of Chhattisgarh**. The event took place in the presence of the Honorable Chief Minister of Chhattisgarh, Shri Vishnu Deo Sai, during the prestigious “Mining Conclave 2025”, October 5, 2025. Prof. Shushanta Sarangi, Head of the Department of Applied Geology, represented IIT(ISM) Dhanbad and formally shared the MoU document with Shri Rajat Bansal (IAS), Director of DGM, Chhattisgarh. The MoU was spearheaded by Prof. Anup K. Prasad from the Department of Applied Geology, IIT(ISM) Dhanbad, in close coordination with officials from DGM, Chhattisgarh. This partnership aims to foster joint research especially in the field of exploration of critical minerals, leveraging IIT(ISM)'s expertise in applied geosciences. The signing occurred amidst Chief Minister of Chhattisgarh and other distinguished dignitaries, underscoring the significance of this collaboration for our shared vision to advance mineral exploration through cutting-edge technologies.

MoU Signing Ceremony with Directorate of Geology and Mining (DGM), Chhattisgarh

Prof. M. K. Mukherjee was invited to give a special lecture for **Faculty Development Program** in the "Department of Electrical Engineering, B. C. Roy College of Engineering, Durgapur" on Nov 21, 2025, on "Emerging trends and Challenges in Renewable Energy". Prof. Mukherjee delivered a talk on "Geothermal energy- the geological controls and its implications on power generation" that received a wide appreciation and applaud.

Introduction of a new course "**Geoarchaeology**" by Prof. D. K. Jha of the Department of Applied Geology, IIT (ISM) Dhanbad attracted wide News Media coverage

Prof. A. K. Bhaumik chaired a session with Dr. Rahul Mohan in session XII (**Fossils as proxy in palaeoclimate and palaeoceanography, NK Panikkar Hall),** in Palaeontological Society of India Platinum Jubilee Conference.

Prof. Ashutosh Tripathy received "**International Travel Support from ANRF**" to attend "Euroconf 2026, Switzerland".

Prof. Ashutosh Tripathy received an "**Early Career Researcher Grant**" from 'Euroconf 2026'.

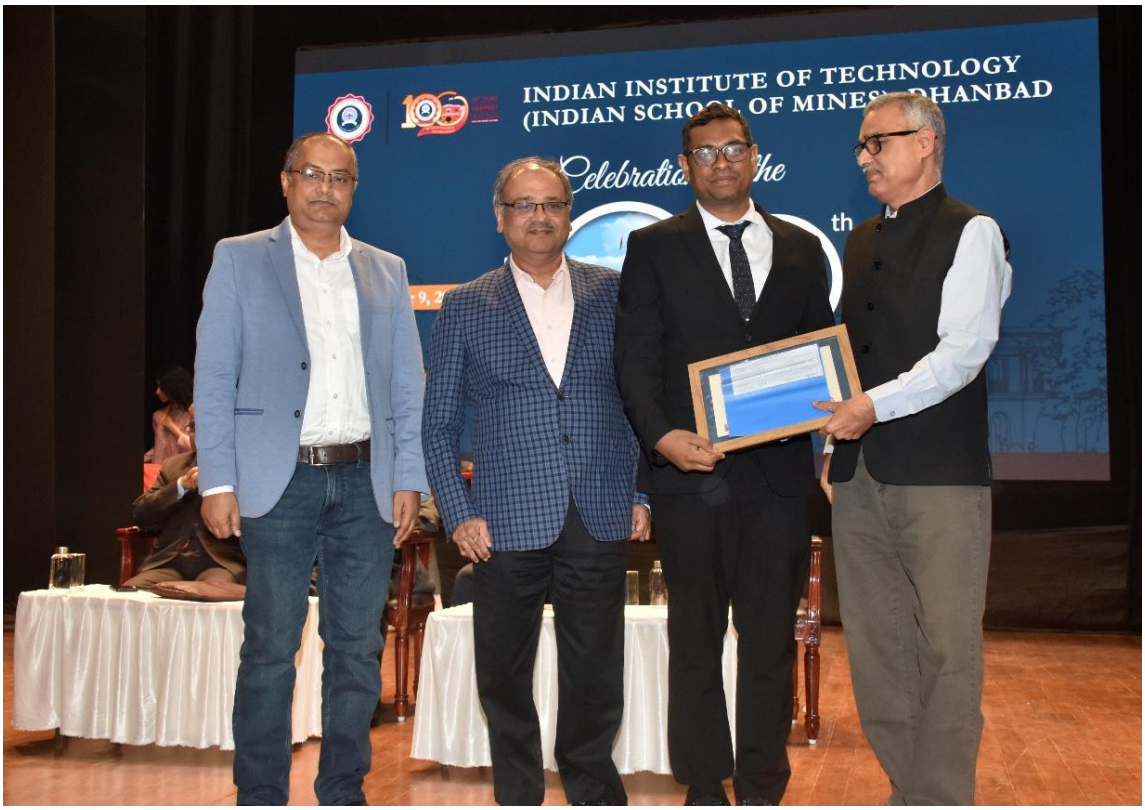
Prof. B. Hazra received the "**K. R. Gupta Gold Medal Award**" for the year 2025, from "The Geological Society of India". The K.R. Gupta Gold Medal is given to a Scientist, below 40 years, for outstanding contributions in any branch of Earth Science.

The paper entitled "Experimental study on pore structure evolution of thermally treated shales: implications for CO_2 storage in underground thermally treated shale horizons" authored by Prof. B. Hazra has been selected as one of **the best 10 papers** in the "International Journal of Coal Science and Technology", for papers published between 2022-2024.

Prof. B. Hazra received the "**JGSI Radhakrishna Prize 2025**" from "The Geological Society of India" for the best paper published in JGSI.

Prof. B. Hazra received the "**Melpadom Attumalil Georgekutty Young Scientist Award, 2025**" for his outstanding contributions in the field of Science and Technology, from the Malankara Mar Thoma Syrian Church.

On the occasion of IIT(ISM) Foundation Day, observed on 9 December 2025 during its centenary (100) year celebrations, the **Inder Mohan Thapar Research (IMTR) Award** for 2023 in the Department of Applied Geology was conferred upon Dr. Suren Nayak, Assistant Professor at Utkal University, Bhubaneswar. This accolade recognized his outstanding PhD research work conducted in 2022, co-honoring his PhD supervisor, Prof. Anup Krishna Prasad of the Department of Applied Geology. The award was based on their publication: Nayak, S.; Vinod, A.; Prasad, A.K. Spatial Characteristics and Temporal Trend of Urban Heat Island Effect over Major Cities in India Using Long-Term Space-Based MODIS Land Surface Temperature Observations (2000–2023). Applied Sciences 2023, 13, 13323.



Dr. Suren Nayak, Assistant Professor at Utkal University receiving IMTR Award - 2023 in presence of Prof. Sukumar Mishra, Director IIT(ISM) Dhanbad and Prof. Anup K. Prasad

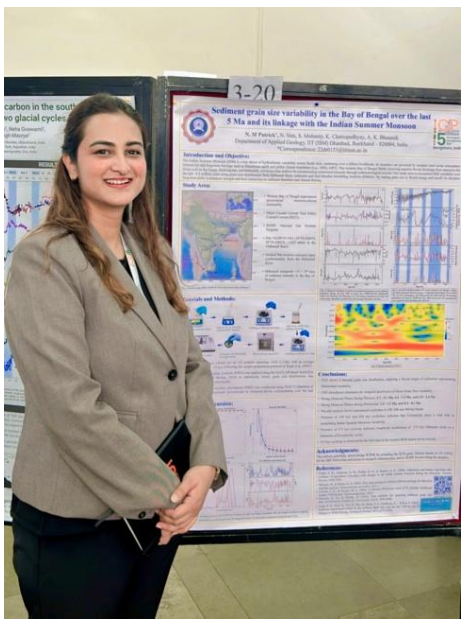
Prof. A. S. Majumdar and Prof. P. Prusty joined as **Editorial Board Members** of the Journal "Scientific Reports" (Springer Nature)

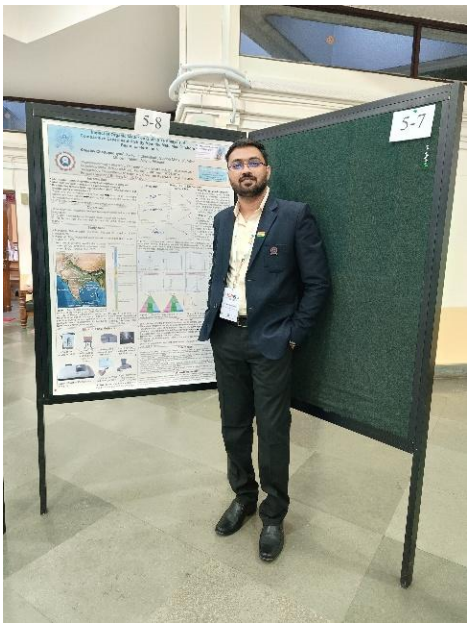
Conferences and Workshops

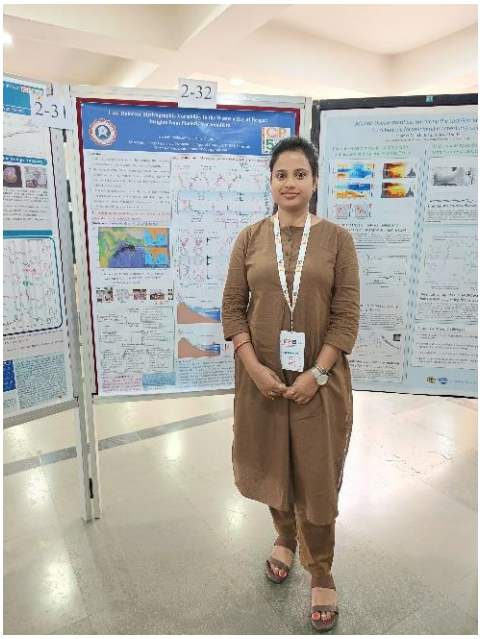
Mr. Shashi Prakash Mahli, a PhD Scholar under Prof. K. Sarkar presented a research paper in the "**10th Indian Rock Conference (INDOROCK-2025)**" held at Hotel Radisson Blu, Dwarka, New Delhi during 5-7 November 2025. Title of the paper: Hazard Assessment of Critical Cut Slopes along Chardham Highway Corridor near Pipalkoti, Uttarakhand.

Prof. A. K. Bhaumik presented his research work in the "**Palaeontological Society of India Platinum Jubilee Conference**" organised in NIO Goa during 29-31 October 2025. Paper title: Documentation and extension of mid-depth MTD in the K-G basin: Benthic foraminiferal evidence by Ajoy K. Bhaumik, Shiv Kumar, Sarmistha Chowdhury Under the theme Recent advancements in palaeontology and its applications.

Dr. Satabdi Mohanty, Ms. Nitika Millicent Patrick, and Mr. Koustav Chattopadhyay from Micropaleontology Lab successfully presented their research works at the "**15th International Conference on Palaeoceanography (ICP15)**" held at IISc Bengaluru, India, from Aug 31 to Sep 5, 2025. They were all awarded an ECR funding grant to attend the conference.







Centenary Events

Prof. A.K. Bhaumik organized the **5th Centenary Lecture** titled "Hydroclimatic Hazards and Climate Change: Cost on Life and Livelihood" delivered by **Prof. Arpita Mandal**, Department of Geography and Geology, University of the West Indies, Mona held in GJLT on 17 October 2025.

Expert Guest Lectures on Geophysics for Petroleum Geology

In a boost to industry-academia collaboration, Department of Applied Geology at IIT(ISM) Dhanbad organized **6th Centenary Lecture Series** as a part of Centenary Celebrations in IIT(ISM) Dhanbad" from November 27 to 28, 2025 on the topic "***Geophysics for Geologists and Petroleum Engineers"***. The sessions targeted MSc Tech students in Applied Geology, Integrated MTech students, and PE students. The lecture series was delivered by industry expert **Dr. Ranjan Kumar Sinha**, Deputy General Manager (Chief Hydrogeologist) at Cairn Oil & Gas, Vedanta Ltd. The lectures provided practical insights into geophysical techniques essential for petroleum exploration. Dr. Sinha, with his extensive field experience, bridged theoretical coursework with real-world applications in oil and gas geophysics. Prof. Shushanta Sarangi, HOD & Co-ordinator, Department of Applied Geology encouraged all students and research scholars to take advantage to enhance students' employability in the energy sector. This event underscores IIT(ISM) Dhanbad's commitment to integrating industry expertise into its curriculum, preparing students for dynamic roles in petroleum geology.

Centenary Foundation Week Celebrations

IIT(ISM) Dhanbad commemorated its centenary year through an elaborate **Foundation Week**, held from December 3 to December 9, 2025. The week-long event featured a diverse array of activities, including keynote lectures, panel discussions, cultural programs, and exhibitions that reflected the institute's rich legacy in science, technology, and engineering.

The Department of Applied Geology actively participated by showcasing its pioneering research achievements. Highlights included presentations on cutting-edge studies in mineral exploration, structural geology, hydrogeology, and environmental geosciences. Complementing these displays were meticulously curated samples from the Department's Geological Museum, offering visitors tangible insights into India's geological diversity, rare mineral specimens, and fossil records. The Chairman and Director of IIT (ISM) and several eminent scientists and industrialists visited the stall.

Geological Museum Tour: The department also hosted an engaging tour of the Geological Museum for a wide audience, including distinguished visitors, esteemed alumni, and school students. Guided by faculty and student volunteers, the tour provided interactive sessions on rock formations, critical minerals, ore deposits, and tectonic processes, fostering public appreciation for geosciences and inspiring the next generation of earth scientists.

Geological Fieldwork

Prof. S. Singh, Prof. P. Das and Prof. D. K. Jha conducted "Local Geological Field Excursion" in and around Dhanbad and Jharia for IV Integrated M.Tech. during December 2025

Prof. K. Sarkar, Prof. U. Dutta and Prof. R. Anand conducted "Local Geological Field Excursion" in and around Dhanbad for II M.Sc. Tech. (AGP) and VI Integrated M.Tech. (AGP) during December 2025.

Prof. Mrinal Kanti Mukherjee, Prof. Anup Krishna Prasad, and Prof. Ashutosh Tripathy conducted winter field training with 8th Semester Integrated MTech in Applied Geology and 4th Semester MSc Tech in Applied Geology students in and around Jamshedpur covering Bandhuhrang Uraniuam Mines (UCIL) and its surroundings, Surda Copper Mines (HCL) and its surroundings. The fieldwork was for Structural and Economic Geology Field Training.

Prof. S. Sarangi, Prof. A. K. Bhaumik and Prof. B. Hazra conducted “Sedimentary Terrain Mapping Training” around the Kuju and Dudhinala areas for II M.Sc. Tech. and VI Integrated M.Tech. during December 2025.

Prof. R. K. Dubey, Prof. U. Bansal and Prof. P. Prusty conducted "Sedimentary Terrain Mapping Training" around Robertsganj, UP for II M.Sc. Tech. and VI Integrated M.Tech. during December 2025.

Prof. A. K. Bhaumik and his group collected grab samples using Van-Veen Grab sampler and measured ocean water physical parameters using CTD meter at Digha offshore, Bay of Bengal.