Platinum Jubilee International Conference: Department of Geology and Geophysics

"SCIENCE FOR THE SUSTAINABLE EARTH"

Proposed date: 2nd – 4th November, 2026.

Themes for the conference (involved faculty members):

1. **Exploration of Critical Resources and Green Energy**

[D. Upadhyay, K. L. Pruseth, P. N. Sinha Roy, D. K. Singha, S. Mukherjee]

2. Water Resources

[A. Mukherjee, S.P. Sharma]

3. Climate Change Predictions for rock record and climate modelling

[A. K. Gupta, M. K. Bera, S. Dey]

4. Deep and Surface Earth Processes, Natural Hazards

[S. Gupta, S. K. Bhowmik, R. Vadlamani, S. P. Sharma, M. A. Mamtani, A. Basu, P. Sengupta, W. K. Mohanty, D. Upadhyay, A. Singh, C. Singh, S. K. Ghosh, S. Agrahari, S. Maiti, S. Dey, C. P. Dubey]

5. Evolution of Life over Deep time

[R. Vadlamani, S. Ray, S. Paul]

6. Planetary Geology

[S. Gupta, D. Upadhyay, S. K. Ghosh]

Expected number of participants: 380-400

Tentative Schedule

02-11-2026 (MONDAY)

TIME	Events	Details
9:00-10:00 AM	Inauguration	
10:00-10:15 AM	Morning Tea Break	At conference venue
10:15-10:45 AM	Keynote speech 1 / Invited Talk 1	
10:45-11:15 AM	Invited Talk 2	
11:15AM-1:15 PM	Selected Talks on Theme 1	6 Talks
1:15-2:30 PM	Lunch at conference venue	
2:30-4:30 PM	Selected Talks on Theme 2	6 talks
4:30-5:00 PM	Evening snacks and Tea	at Poster venue
5:00 PM ONWARDS	Poster Session	Theme 1 and Theme 2
03-11-2026 (TUESDAY)		
TIME	**Events**	**Details**
9:00-9:30 AM	Invited Talk 3/ Keynote speech 2	
9:30-10:00 AM	Invited Talk 4	
10:00-10:30 AM	Morning Tea Break	At conference venue
10:30 AM-12:30 PM	Selected Talks on Theme 3	8 Talks
12:30-2:00 PM	Lunch at conference venue	
2:00-5:20 PM	Selected Talks on Theme 4	10 Talks
5:20 PM ONWARDS	Poster Session and Evening snacks and Tea	Theme 3 and Theme 4
04-11-2026 (WEDNESDAY)		
TIME	**Events**	**Details**
9:00-9:30 AM	Invited Talk 5 / Keynote speech 3	
9:30-10:00 AM	Invited Talk 6	
10:00-10:30 AM	Morning Tea Break	At conference venue
10:30 AM-12:30 PM	Selected Talks on Theme 6	6 Talks
12:30-1:30 PM	Lunch at conference venue	
1:30-4:50 PM	Selected Talks on Theme 5	10 Talks
4:50-5:30 PM	Poster Session and Evening snacks and Tea	Theme 5 and Theme 6 at Poster venue
5:30-6:00 PM	Conclusion session	

Total Expected Participation

1. Resource person/ delegates (India) (Full Funding)	6
2. Resource person/ delegate (foreign) (Full Funding)	6
3. Invited speakers (partial support)	24
4. Department faculty members	33
5. Departmental PhD scholar/ volunteers	150
6. Conference participants	145
7. Speakers (self-funded)	16
Technical persons involved	**380**

Platinum Jubilee International Conference titled "Science for the Sustainable Earth": 2 – 4 November 2026, IIT Kharagpur

The themes along with the names of coordinating faculty members are given below.

A. **Exploration of critical resources and green energy**

[D. Upadhyay, K. L. Pruseth, P. N. Sinha Roy, D. K. Singha]

The Conference on Exploration of Critical Resources and Green Energy aims to provide a distinguished forum for scientists, scholars, industry leaders, and policymakers to deliberate on the sustainable exploration and utilization of critical resources that underpin emerging green technologies. With a focus on advancing research, fostering interdisciplinary dialogue, and addressing the global imperatives of energy transition, this event will examine cutting-edge developments in mineral exploration, renewable energy generation, energy storage, and policy frameworks. The conference will explore the fundamental processes governing the origin, distribution, and formation of critical metals essential for advanced technologies and sustainable energy solutions. This event will highlight recent advances in mineralogical, geochemical, and petrological studies, providing insights into the mechanisms that control the genesis of rare and strategic resources. The conference aspires to enhance collaboration between academia, industry, and governance, thereby contributing to innovative strategies for resource security, technological advancement, and the realization of a sustainable, carbon-neutral future.

B. Safe and sustainable water in a changing world

[A. Mukherjee, S.P. Sharma]

Globally, an urgent need exists for a more in-depth, integrated understanding of groundwater systems and the development and implementation of strategies to address ongoing and worsening challenges, including chronic depletion, widespread contamination, extreme climate effects, and threats to food and water security. Of these, groundwater is regarded as the largest source of fresh water across the globe. This theme emphasizes collaboration and cross-disciplinary approaches, including geosciences, policy, economics, technology and education,

to achieve water resources sustainability and the human right to clean water. As the world's population expands, so will the demand for water (specifically groundwater), which is the primary source of water for drinking, sanitation, farming, and energy production, among other things. At the same time, human activities and climate change are disturbing natural water cycles, putting freshwater ecosystems at risk. Pollution, infrastructure development, and resource extraction present further challenges that form a nexus of water sustainability and safety.

C. Climate Change Predictions from rock record and climate modelling

[A. K. Gupta, M. K. Bera, S. Dey]

Earth's climate has undergone major shifts throughout its evolution, including periods of warming and cooling, influenced by factors such as volcanic activity, gas-hydrate dissociation, permafrost degradation, variations in solar energy, changes in Earth's orbit, opening and closing of the seaways, latitudinal distribution of continent, changes in the continental areas, and weathering intensity. These natural shifts can be seen in both long-term (like the repeated late Mesozoic warming and cooling, late Paleocene warming, the Cenozoic cooling, early Pliocene warmth and cold intervals of the middle Miocene polar cooling) and short-term paleo records (like the Last Glacial Maximum and Little Ice Age). The recent extreme events since the mid-20th century are driven by human activities, particularly fossil fuel burning, which increases heat-trapping greenhouse gas levels in Earth’s atmosphere, raising Earth’s average surface temperature. The greenhouse gases trap heat, raising global temperatures and leading to marked changes such as rising ocean acidification, melting ice, sea level rise, and increased extreme weather events. Natural processes, which have been overwhelmed by human activities, can also contribute to short-term climate change, including internal variability, e.g., El Niño, La Niña and the Pacific Decadal Oscillation. While climate modellers use model runs and reanalysis to understand interannual climate variability both present and past, geologists use marine and continental proxies (microfossils, speleothems, tree rings, ocean/lake/terrestrial sediments, ice cores, etc.) to understand long-term changes in the earth’s climate on decadal to centennial and millennial to million-year time scales. The faculty members at Department of Geology and Geophysics are actively involved in understanding the key processes and products of these major shifts in regional and global climates including the Mesozoic and early Cenozoic warming, Indian monsoon system during the Quaternary and Holocene and their impact on the South Asian human societies.

D. Deep and Surface Earth Processes, Natural Hazards

[S. Gupta, S. K. Bhowmik, R. Vadlamani, S. P. Sharma, M. A. Mamtani, A. Basu, P. Sengupta, W. K. Mohanty, D. Upadhyay, A. Singh, C. Singh, S. K. Ghosh, S. Agrahari, S. Maiti, S. Dey, C. P. Dubey]

Deep Earth processes, unique among the differentiated inner solar system planets, is dynamic and maintains a present-day lithospheric plate tectonic system. However, its evolutionary history, and attendant compositional differences between the differentiated mantle and crust formation processes has been modelled as a transition from stagnant-to squishy-lid to a mobile-lid geodynamic regime. In this session several approaches to resolve and reconstruct the temporal and chemical lithospheric evolution will utilize geodynamics, petrology, isotope geochemistry, geochronology and modelling of the preserved high-temperature rock record both from cratons and orogenic belts. We aim to focus on critical gaps in understanding petrological, structural and chemical features from the preserved rock record.

Earth Surface Processes vary across spatial and temporal scales. In this session, we focus on quantification of erosion and mass transport over annual to million-year timescales. Multi-proxy approach to understand the landscape evolution is the soul of this session. In the age of Anthropocene, understanding the feedback of anthropogenic activities on Earth Surface Processes is crucial. Studies on assessment and forecasting of human-induced natural hazards will be deeply valued.

Natural hazards such as earthquakes and landslides pose significant threats to life, infrastructure, and socioeconomic stability, particularly in tectonically active and mountainous regions. Earthquakes result from the sudden release of accumulated strain along geological faults, often triggering widespread ground shaking and secondary hazards. Landslides commonly occur due to slope instability driven by seismic activity, intense rainfall, or anthropogenic disturbances. The interaction between earthquakes and landslides amplifies disaster impacts by cascading failures across natural and built environments. Understanding their mechanisms is essential for effective hazard assessment, mitigation, and risk-informed planning.

E. Evolution of Life over Deep time

[R. Vadlamani, S. Ray, S. Paul]

Life on Earth experienced numerous evolutionary transitions from simple and complex molecules to the first single-celled organisms, to the origin of multicellularity, to the great radiation events leading to the diversification of organisms across different ecological niches. These long-term paleobiological and paleoecological trends are depicted through fossil forms and were significantly altered through mass extinction events and the subsequent resetting of the course of evolution. All these trends and perturbations throughout the last 3.8-3.7 billion years have been facilitated by the continual feedback from the external set of forcing factors, including lithospheric tectonics and magmatism, leading to changes in the chemistry of the oceans and the atmosphere. This session aims to elevate our present understanding of these evolutionary transitions, long-term trends, and the interplay of biotic and abiotic worlds.

F. Planetary Geology

[S. Gupta, D. Upadhyay, S. K. Ghosh]

Planetary science integrates geology, physics, chemistry, and space science to understand the origin, evolution, and sustainability of planetary bodies, including Earth. It combines laboratory experiments, high-pressure studies, advanced analytical techniques, and numerical modelling to investigate the formation and transformation of planetary materials across time. The discipline addresses fundamental questions related to early Solar System processes, differentiation of planets and asteroids, impact and shock metamorphism, surface alteration, space weathering, and the geological and geochemical records preserved in meteorites and returned samples. By promoting collaboration between academia and space research organizations, and aligning with India's ambitious space missions e.g., Chandrayaan, Mangalyaan, and coming sample-return program, planetary science plays a crucial role in advancing scientific knowledge, training the next generation of researchers, and strengthening India's contributions to global Solar System research.