

Applications for externally funded PhD positions in Department of Earth Sciences (DES)

The Department of Earth Sciences (DES), IISER Kolkata is looking for bright and motivated students, who have completed their M.Sc./MS/M.Sc. Tech/M. Tech (with **minimum of 55% marks**) in: 1) Geology/Applied Geology/Geophysics/Earth Sciences/Marine geology/Environmental Sciences/Environmental Studies/Atmospheric Science/Environmental Engineering/Civil Engineering or any other branch of Geological sciences.

Or

2) Physics/Chemistry/Mathematics/Biological Sciences/Computational Seismology/interested to pursue research with the DES faculty member in the matching specialization.

Final year post-graduate students who are yet to obtain their degree may also apply; however, they must have completed their degree at the time of admission. Some of the important information about this program is provided below.

Eligibility for externally funded students: Candidates having valid **CSIR NET JRF / UGC-NET JRF / DST-INSPIRE / other equivalent fellowship** would be eligible to apply. Candidates must have **physics, chemistry and mathematics at 10+2 level**, and at least one of these subjects at their bachelor level. They can work with any faculty member in DES based on mutual research interest. The research areas in which department is looking for young and bright minds are listed below-

Earth Surface Dynamics- The group led by *Dr. Sanjay Kumar Mandal* studies the diverse processes that operate together to create the surface geology of the Earth. The focus of the group is on tectonic processes that deform the near-surface of the Earth and erosional processes that sculpt the surface, thereby forming the topography and creating sediment. Himalaya is the best example of this linked system, with orogenic processes occurring due to the ongoing collision between the two continental plates, raising the high mountains that erode rapidly under the influence of monsoon climate. This produces sediments that are deposited in the river valleys, intermontane basins, Indo-Gangetic foreland basin, and ultimately in the Bengal and Indus fans. These sedimentary records chronicle the orogenic evolution of the Himalayas. The processes of continental collision, tectonic mountain building, erosion, sediment production, and transport in the Himalayan system are all of interest to the Earth Surface Dynamics group. The researchers employ a variety of techniques to study this system. These include fieldwork, geochemical, and isotopic analysis, cosmogenic nuclide analysis, GIS, remote sensing, and computer modeling. Fieldwork is an important component of our research.

The Ph.D. students will have the opportunity to design and conduct research in one or more of the following broad areas: (1) Tectonics & Landscape Evolution; (2) Cosmogenic Nuclides, Thermochronometry, and Isotope Studies; (3) Sedimentology. For more details, please visit the ESD group website: <https://esd-iiserkol.in/>

The following figures show our fieldworks in the northwestern Indian Himalaya:



Figure 1. Researchers are mapping the Siwalik section at the foothills of Himachal Himalaya.

Metamorphic Petrology- The group led by *Dr. Tapabrato Sarkar* is interested in understanding the processes involved in the formation and evolution of continental crust through geological time by studying the high-grade metamorphic rocks in orogenic belts. High-grade metamorphic rocks provide us a window into the lower crust. The information stored in these rocks helps to characterize tectonometamorphic processes and reconstruct the pressure-temperature (P-T) evolution path followed by the rocks. Dating metamorphic events is a major aspect for the understanding of orogenic processes. It brings temporal constraints on the pressure-temperature evolution (P-T path) of rocks during their burial (e.g. in subduction zones) and subsequent exhumation. Coupling metamorphic and geochronological data is therefore crucial for the understanding of the dynamics of orogenic belts and, consequently, for proposing any geodynamic reconstructions.

The group is currently working on the different problems related to the Southern Granulite Terrane and Eastern Ghats Belt. The goal of these studies is to combine state-of-the-art petrological, geochemical and geochronological analyses on the studied rocks to understand crustal evolution. Highly motivated candidates interested in field excursions are encouraged to apply.

For more information visit the group website: <https://www.iiserkol.ac.in/~tapabrato/>

Paleobiology – *Dr. Subhronil Mondal* is looking for a motivated PhD candidate to work on a problem related to paleobiogeographic patterns of marine organisms across space and time.

Organic Geochemistry- *Prof. Prasanta Sanyal* is looking for bright and motivated candidates interested in working in Organic Geochemistry to solve paleoclimatology and paleoecology related problems. The For details, please visit www.iiserkol.ac.in/~silika

Archean crustal evolution-



The actual mechanism of Archean crust formation remains a major research interest globally. Granitoids are the dominant rock type in Archean cratons. They provide vital clues to the mechanism and geodynamic setting of continental crust formation. Archean granitoids of diverse types are well exposed in the central India. This Ph.D. project aims to study the field and age relationship, and geochemistry of these granitoids to understand their petrogenesis, role in crust formation and crust-mantle interaction, and to suggest geodynamic model for Archean crustal evolution. The project will provide an opportunity to the candidate to get involved in field mapping and detailed sampling in exotic terrains followed by petro-mineralogical study, whole-rock geochemistry and zircon U-Pb dating and Hf isotopic study. Candidates with their own fellowships and flair for fieldwork are encouraged to apply. The PhD student will be supervised by *Prof. Sukanta Dey* in the broad topic Archean crustal evolution in central India: A granitoid perspective.

Seismology- Dr. Kajaljyoti Borah is looking for a bright and motivated PhD candidate to work on the ‘Evolution of the Bastar craton’ with the help of seismology. Archean cratons are the prime targets of the scientific community for a long time because they store records of the long Earth’s history and they have economic significance as a major source of the World’s minerals. The crustal thickness, crustal composition (inferred from seismic wave velocities), structure and physical properties of crust-mantle transition (commonly used as Moho by the seismologists), and lithospheric discontinuities are the key parameters for understanding the formation and evolution of cratonic lithosphere. This project is focussed at elucidating the origin and evolutionary history of the relatively unexplored Bastar craton along with other

Archean cratons all over the globe by modelling the physical properties of the underlying crust and mantle using seismological data from these regions.

Please note that fulfilling the minimum essential criteria does not ensure that a candidate will be called for the interview. Additional criteria for shortlisting might be set by the department based on academic records, experience and research interest of the candidates. Reservations of candidates will be as per government norms. The departmental faculty profiles can be found at the URL: <http://www.iiserkol.ac.in>