

## [Applications for externally funded and IISER Kolkata 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/Geographical Science/Agricultural Science or any other branch of Geological sciences.

Or

2) Physics/Chemistry/Mathematics/Biological Sciences/Computational Seismology and 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 minded **externally funded** students are listed below-

**Stable Isotope Geology-** Prof. Prasanta Sanyal is looking for prospective students interested to work on the following research problems using stable isotopes.

1. Past climate and its impact on ecology: Involves reconstruction of rainfall using oxygen isotopes of soil carbonate and hydrogen isotopes of plant molecules; carbon isotopes of soil carbonate and plant molecules. Fluvial and lake sediments will be used for this purpose.
2. Temperature reconstruction of past: Lipid components such as brGDGT, IsoGDGT and 3 OH Fatty acids will be used for this purpose.
3. Understanding the Nitrogen Cycle: Nitrogen and oxygen isotopes of dissolved nitrate will be used for this purpose.

For more details, please visit the webpage: <http://www.iiserkol.ac.in/~silika>

**Paleobiology** – Dr. Subhronil Mondal is looking for a motivated PhD candidate to work on problems related to paleoecological and evolutionary patterns of marine invertebrates across space and time.

**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. 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/>

**Crustal evolution** – Prof. Sukanta Dey is looking for a bright and motivated PhD candidate to work on the topic ‘**How did continental crust form in Early Earth?**’. The actual mechanism of continental crust formation in Early Earth (during the Archaean Eon) remains a major research interest globally. Granite-greenstone belts provide vital clues to the mechanism and geodynamic setting of continental crust formation. Archaean rocks of diverse types are well exposed in the granite-greenstone belts of the cratonic blocks of India. This Ph.D. project aims to study the field and age relationship, and geochemistry of a few granite-greenstone belt rocks to understand their petrogenesis, role in crust formation and crust-mantle interaction, and to suggest geodynamic model for Archaean 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 a flair for fieldwork are encouraged to apply.

**Seismology**- Dr. Kajaljyoti Borah is looking for a bright and motivated PhD candidate to work on the ‘**Evolution of Archean cratons: insight from 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.

**Near-surface isotope and trace element geochemistry**- Dr. Tarun Kumar Dalai is interested in prospective candidates to work on any of the following research areas.

### **Areas of research**

1. The fate of biospheric and petrogenic carbon in the river basins: This project would use proxies of biospheric carbon (i.e. stable ( $^{13}\text{C}/^{12}\text{C}$ ) and radio ( $^{14}\text{C}$ ) carbon) and petrogenic carbon (rhenium) of suspended and bed sediments in the rivers of Eastern India. The eventual goal is to assess the net effect on the atmospheric carbon due to  $\text{CO}_2$  consumption via silicate weathering vs. the release of  $\text{CO}_2$  via oxidation of biospheric and petrogenic carbon in the river basins.
2. Behaviour of elements and isotopes during weathering and transport: The primary goal of this project is to test the robustness of isotopes of neodymium ( $^{143}\text{Nd}/^{144}\text{Nd}$ ), lithium ( $^7\text{Li}/^6\text{Li}$ ), strontium ( $^{87}\text{Sr}/^{86}\text{Sr}$ ) as proxies of silicate weathering. We will use these isotopes and a suite of major and trace elements in basaltic and granitic weathering profiles for investigation.

3. Any other areas of mutual interest based on discussions with prospective candidates.

\*Candidates having bachelor and master degrees in the field of earth sciences will be preferred\*

### Eligibility for institute funded students:

Candidates must have qualified in one of the following examinations, **GATE, UGC/CSIR NET-LS, INSPIRE or other equivalent examinations**. Candidates must have **physics, chemistry and mathematics at 10+2 level**, and at least one of these subjects at their bachelor level.

The research areas in which department is looking for young and bright minded students who could be **funded by IISER Kolkata** are listed below-

**Seismology-** Dr. Kajaljyoti Borah is looking for a bright and motivated PhD candidate to work on the '3D- shear velocity anisotropic structure in the Indo Burma Ranges and its geodynamic implication'. Imaging 3-D shear velocity structure beneath Indo-Burma ranges and the adjoining regions by modeling receiver functions, surface wave data extracted from earthquake and ambient noise to unravel the deep structure across diverse geological terranes. Azimuthal anisotropy estimation from splitting analysis of teleseismic core-refracted phases, which can be used to decipher crust-mantle flow and mantle deformation patterns around the subducting slab.

**Near-surface isotope and trace element geochemistry-** Dr. Tarun Kumar Dalai in prospective candidates to work on any of the following research areas.

#### **Areas of research**

1. The fate of biospheric and petrogenic carbon in the river basins: This project would use proxies of biospheric carbon (i.e. stable ( $^{13}\text{C}/^{12}\text{C}$ ) and radio ( $^{14}\text{C}$ ) carbon) and petrogenic carbon (rhenium) of suspended and bed sediments in the rivers of Eastern India. The eventual goal is to assess the net effect on the atmospheric carbon due to  $\text{CO}_2$  consumption via silicate weathering vs. the release of  $\text{CO}_2$  via oxidation of biospheric and petrogenic carbon in the river basins.
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**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. **Selection of**

*various reserved category candidates will be as per the norms of the Government of India.  
The departmental faculty profiles can be found at the URL: <http://www.iiserkol.ac.in>.*

**DES Autumn 2023 PhD Timeline:**

- PhD application portal opens: **22.09.2023**
- Application portal closes: **19.10.2023**
- Window for publication of shortlist for the Interview: **30.10. to 02.11.2023**
- Selection Interview window: **13.11 to 17.11.2023**
- Publication of PhD interview results by: **11.12.2023**
- Pre-registration portal opens: **18.12.2023**
- Pre-registration deadline: **27.12.2023**
- PhD Registration: **29.12.2023**