IISER Kolkata Post-doctoral Fellowship (PDF) Programme
Department of Earth Sciences (DES)
Autumn, 2021

Indian Institute of Science Education & Research Kolkata is the first among five IISERs, to have established a Department of Earth Sciences. The department started its journey in 2007, a year after IISER Kolkata was established. The first batch of BS-MS Earth Science Major students graduated in 2012. Please check the department website for further details: http://earth.iiserkol.ac.in/.

The Department is committed to building a community of researchers including students and faculty members. Our goal is to develop a modern center for Earth Science Education and Research in three core areas:

1. Environmental & Ecological studies in modern and ancient systems,
2. Isotope Geochemistry & Biogeochemical studies,
3. Solid Earth studies

Number of positions:
Maximum 07

Department-specific Eligibility:
At least one publication from the PhD work of the candidate

Departmental Contact:
Email: pdf.des@iiserkol.ac.in

Department-specific Application Format:
Please fill up the form given below and send it to: pdf.des@iiserkol.ac.in.

Important Dates:
Last date of application: 20/08/2021
Date of publication of the interview list (tentative): 10/09/2021
Interview date (tentative): 20/09/2021
Date of publication of results: will be informed later

Available Research Areas/projects:

The Department of Earth Sciences is looking for post-doctoral fellows in various research areas. Candidates can apply for the research proposals which are listed below. Candidates are also encouraged to apply with their own research proposals related to the available research areas listed below.

RESEARCH PROPOSALS

Research Project #1: Seismology, Continental Tectonics, Geophysics

Prof. Supriyo Mitra and Dr. Kajaljyoti Borah

Seismological imaging of the sub-continental lithospheric mantle (SCLM) discontinuities

The Earth is a large and slowly evolving planet and is divided into crust, mantle, outer core and inner core. The Mohorovicic discontinuity (Moho) is the most important, globally correlated boundary, and is interpreted as the boundary between crustal felsic-mafic rocks and the upper mantle ultramafic peridotites. Seismologically, the Moho is the boundary where the shear-wave velocity (vs) increases rapidly to 4.3-4.5 km/s. Multi-scale secondary discontinuities, like, Hales discontinuity (4% increase of vs between 75-110 km depth), Lehman discontinuity (2% to 4% increase of vp and vs at ~220 km depth), mid-lithospheric discontinuities (MLD) or 8° discontinuity (negative vs gradient at depths of 80-150 km) have been observed regionally at varying depths, which reflects changes in parameters, such as composition, seismic velocities, density and temperature. Their observation and interpretation could lead to significant advancement in understanding the evolution of the continents. Most of these secondary discontinuities have been observed in the Archean Cratons. Large numbers of seismograph stations are presently operational in Archean Cratons across the globe (Fig. 1). In the proposed project, teleseismic earthquake data from these stations will be used to image the structure of the lithosphere beneath Archean Cratons. P- and S-wave receiver functions (P-to-S and S-to-P converted phases) and the recently developed seismic daylight imaging (SDI) method will be used for imaging the lithospheric structure and discontinuities. The broad objectives of the proposed project are as follows: (a) Presence, structure and depth variation of sub-continental lithospheric mantle discontinuities (e.g. Hales, Lehman, MLD etc.) beneath Cratons. (b) Role of these discontinuities in the evolution of the Cratonic lithosphere.

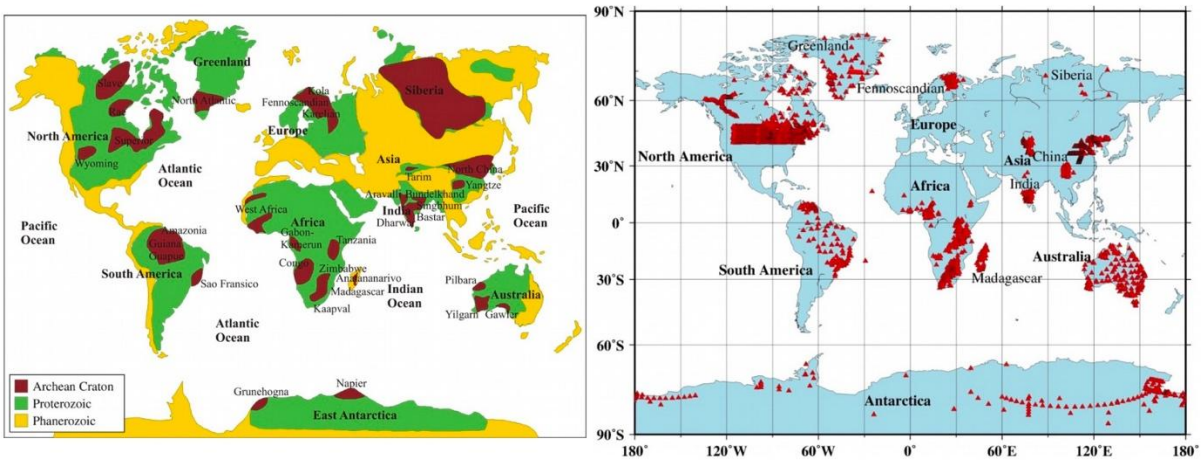

Figure 1: (Left) Worldwide distribution of Archean Cratons (brown). (Right) Worldwide distribution of stations (red triangles) in the Archean cratons and adjoining areas.

Research Project # 2:

Dr. Sanjay Kumar Mandal and Dr. Kathakali Bhattacharyya

Addressing interaction between structural growth and flexural geometry of the foreland basin from eastern Himalayan fold thrust belt

The spatial and temporal growth of foreland basin flexural geometry can provide insights into the structural growth of a fold thrust belt. We propose to address the interaction between the along-strike structural variation and its possible contribution to the flexural geometry of the peripheral foreland basin. This study will be primarily focused on eastern Himalaya.

Additional Requirements: Strong background in Structural Geology, Sedimentology and Fieldwork.

Research Project # 3:

Dr. Manoj K. Jaiswal

Luminescence Dating dates the event of the last daylight exposure of the sediment or firing event in the case of pottery/bricks of archaeological importance. The minerals used for dating are Quartz and Feldspar present in sediments and hence ubiquity of the minerals in almost all the kind of sediment makes its application wider to almost all the kind of sediments of various origin e.g. fluvial, aeolian, glacial, shoreline, mass wasting and even volcanic ash. Hence it finds its applications in dating a variety of sediments linked with climatic and tectonic events and thus bracket the events and rate the endogenic and exogenic earth surface processes.

We would like to have applications from people working in paleoclimate/Paleoseismic studies with the application of luminescence chronology to reconstruct past climate or tectonic events. A preference might be given to those working in paleoflood studies using luminescence chronology of floodplain deposits or tectonically uplifted terraces in Himalayas to estimate rate of uplift and also establish climatic-tectonic relationships of various deposits as these are mostly climato-tectonic landforms. We prefer to work in eastern Himalayas but not restricted to.

However, an interesting research problem using luminescence chronology or research proposals working towards the development of the technique and experimental protocols can also be accepted.

Research Project # 4:

Dr. Sukanta Dey and Dr. Tapabrato Sarkar

Archean crustal evolution and geodynamics

In contrast to the well-understood modern day plate tectonics, the Precambrian geodynamics, especially the Archean geodynamics, is still debated and various models have been proposed. Many of these models are based on numerical simulations and validation of these models based on information preserved in Archean rock record is rather limited. The Bastar craton in central India, surrounded by cratonic blocks and Paleoproterozoic to Neoproterozoic

orogenic belts, is a window to investigate the Archean-Paleoproterozoic crustal evolution and tectonic processes. More importantly, the relatively smaller granulite belts, within the widespread greenschist-amphibolite grade rocks of the Bastar craton, provides a window into the Archean lower crust, enabling us to study the lower crustal processes. The successful candidate will study the petrological and geochemical evolution of certain belts of the Bastar craton to decipher the Archean crustal evolution and tectonic processes.

Apart from the general eligibility requirements, the applicant should have a strong background in metamorphic petrology, geochemistry and geochronology and have the ability to conduct field work independently.

AVAILABLE RESEARCH AREAS

Research Area # 1:

Prof. Prasanta Sanyal

Shall seek Post Doc with expertise in Organic Geochemistry or Bio Organic Chemistry interested to work on Evolution (life related) issues.

Research Area # 2:

Dr. Gopala Krishna Darbha

The candidate should have a broad knowledge to work in the field of environmental chemistry. Specifically, we are looking for a candidate with expertise on 1) water/soil pollution: Understanding the fate and transport of pollutants/emerging contaminants in the aqueous and soil environments 2) Understanding the exposure pathways of contaminants by trophic transfer experiments 3) Application of eco-friendly methods for the remediation of contaminants in the water and soils 4) Application of artificial intelligence/machine learning for monitoring the water quality. The candidate should have Ph.D. in Environmental Sciences/Chemistry/biology or a closely related field.

Research Area # 3:

Dr. Tarun Kumar Dalai

Broad area: Trace element and isotope geochemistry in the low-temperature envt.

Specific area: Cycling of trace elements (B, Li, Mg) and their isotopes in the estuarine environment and its impact on marine isotope records. The marine isotope records are used to reconstruct records of (i) paleo-pH (e.g., B isotopes), ii) history of the intensity of silicate weathering (e.g., Li isotopes). Understanding how these elements and isotopes are modified in

estuaries would help construct/modify models aimed at the interpretation of marine isotope records.

I am open to working on a problem a prospective candidate's choice subject to mutual interest.

Research Area # 4:

Dr. Kathakali Bhattacharyya

Broad Area: Structural Geology

Specific Area : Fracture, Veins and Progressive deformation in rocks

Rocks deform through different stages of progressive deformation to reach their finite deformed state. Growth of fractures and veins are often associated with various stages of progressive deformation, and may provide critical insights into the deformation path. This project proposes to address the role of such structures toward the kinematics of the deformed state. Candidates with their own research proposals are also encouraged to apply.

INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH KOLKATA

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Website: www.iiserkol.ac.in

INSTITUTE POSTDOCTORAL FELLOWSHIPS
DEPARTMENT OF EARTH SCIENCES

Department / Centre :	**Department of Earth Sciences (DES)**
Proposed Faculty Host :	
Name of Applicant :	

Address for Communication:	**Permanent Address :**
Mobile No. 1	Email 1
Mobile No. 2	Email 2

Date of Birth DD MM YYYY			**Nationality**	**Sex** (M/F)	**Category** (GE/ST/SC/OBC/PD)

PhD Programme details:

Title of the Thesis		
Name of the Supervisor		
Name of the Co-supervisor (if any)		
Name of the Institution / University		
Month and year of Submission / Award*****	DD MM YYYY	Awarded / Submitted

***** Expected dates in case of PhD degree has not been awarded at the time of applying.

Salient Features of your PhD in 3-5 bullets:

-
-
-

Details of academic record (from Bachelor onwards)

Sl. No.	Degree	Year	Institution/University	Subjects	CGPA/Grade/% of Marks
1.					
2.					
3.					

Details of past employment (After Ph.D onwards)

Sl. No.	Designation	Organisation	Duration	
			From	To
1.				
2.				
3.				
4.				

Details of Publication (use separate sheet, if required)

Sl. No.	Title, Authors, Journal
1.	
2.	
3.	

Referees (Three (3) Nos)

Sl. No.	Name	Contact Address with email and phone number
1.		
	Email :	Phone :
2.		

	Email :		Phone :
3.			
	Email :		Phone :

Details of the Proposed Proposal (in case of self-identified proposal) OR the Statement of Purpose for the pre-defined research areas/projects listed above (use separate sheet, if required)**:**
*for self-identified project, clearly stated the following within 400 words – Objectives, Methodology, Deliverables

Choice of the Research areas/Project (please see above). For self-identified proposals, please mention your choice of mentor(s) (up to three).

Mentor 1 -
Mentor 2 -
Mentor 3 -

Enclosures (check list √)

- ☐ Application Form
- ☐ Curriculum Vitae
- ☐ List of Publications

Declaration

I hereby declare that all the information provided in the application form is correct to the best of my knowledge and belief. I am aware that providing of incorrect information in the application may lead to cancellation of candidature at any stage.

Place:

Date:

Signature of the applicant

Please send the application along with enclosures, marked **"Application for PDF, Department of Earth Sciences (DES)"** to pdf.des@iiserkol.ac.in.