

# Ritwick Sen

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## • Objective:-

Application for PhD position in Earth and Planetary Sciences for Fall 2022 session

## • Academic Career:-

| Degree          | University/Institute                    | Department                         | Year  | CGPA |
|-----------------|---|------------------------------------|-------|------|
| M.Sc. (Geology) | IIT Kharagpur<br>(W.B., India)          | Dept. of Geology and<br>Geophysics | 2022* | 9.66 |
| B.Sc. (Geology) | Jadavpur University<br>(Kolkata, India) | Dept. of Geological<br>Sciences    | 2020  | 8.37 |

## • Areas of Interest:-

Planetary Geology; Igneous Petrology; Isotope Geochemistry; Remote Sensing and Geospatial analysis

## • Research Experience:-

### ♦ **MASTER'S THESIS PROJECT-** (Guide:- Dr. Saibal Gupta)

**August, 2021- Present**

#### **Spectroscopic analysis of Lunar FFCs-**

Currently using Spectroscopic data gathered from lunar orbiters to study the mineralogy of Arzachel Crater- a lunar floor fractured complex crater.

Importance of studying Lunar FFCs-

- i. Fractured, convex upwards crater floor at Arzachel indicates a presence of magmatic intrusion beneath the surface, which hints at the occurrence of magmatic activity on Moon.
- ii. Like other complex craters, Arzachel Crater also hosts deeper material on its surface, which could provide clue about the Mantle geochemistry on the Moon.

For this study, spectroscopic data were analysed using ENVI & MATLAB and mapped using ArcGIS.

### ♦ **SUMMER RESEARCH INTERN, PHYSICAL RESEARCH LABORATORY- PRL AHMEDABAD**

(Guide:- Dr. Dwijesh Ray)

**May, 2021- July, 2021**

#### **Comparison of Martian and Terrestrial Basalt by a geochemical approach**

Prepared various Geochemical plots based on the concentrations of Major Oxides and Trace Element data in rock samples and gathered from different literature sources in order to compare and better understand the geochemical trends of Terrestrial Basaltic rock suites- N MORB, E MORB, OIB & CFBs and Martian rock suites- Enriched Shergottitic & Depleted Shergottitic Meteorites.

### ♦ **SUMMER RESEARCH INTERN, INDIAN INSTITUTE OF TECHNOLOGY- IIT KANPUR**

(Guide:- Prof. Deepak Dhingra)

**April- May, 2021 & July- August, 2021**

#### **Lunar Impact Melt Mapping**

Surveyed the lunar far side using LROC- WAC & NAC Data and QuickMap to locate, identify and classify different melt morphologies and plotted them in LROC WAC Mosaic on ArcMap in order to find the spatial extent of the melt deposit and to narrow down the possible source crater of the impact melt.

◆ **BACHELOR'S DEGREE RESEARCH SEMINAR-**

(Guide:- Dr. Soumik Mukhopadhyay)

July, 2019- Sept, 2020

**A Study on Paleohydrological Conditions of Fluvial Systems through Geological Times**

Surveyed various literature sources on the topic of the evolution of river systems through geological time preserved in rock record in order to-

- i. Analyse the change in characteristics of fluvial systems- from dominantly braided river systems in Precambrian and Early Phanerozoic to dominantly Meandering and Anatomosing river channels in later part of Phanerozoic Eon
- ii. To determine causes for such a change of fluvial characteristics and to determine the effect of vegetation in bank stability.

For the study, various hydraulic parameters were calculated from Cross bed thickness and Clast sizes filling up the channel forms, which are preserved in the sedimentary rock record

◆ **POSTER PRESENTATION-** (Guide:- Dr. Soumik Mukhopadhyay)

March, 2019

Presented a poster on '*A Study on Sedimentological and Tectonic Features on Mars*' in CAS-sponsored **Geosymposium** event at **Jadavpur University, India**.

• Work Experience:-

◆ **PROJECT INTERN, ZHEJIANG UNIVERSITY, CHINA**

March, 2021- July, 2021

**Code preparation for calculating thermodynamic parameters of chemical species using MATLAB**

Written a MATLAB Code which would calculate activities of different Fe-Ni-S species in melt compositions at different temperatures from a set of laboratory derived values of mole fraction, activity coefficient and then perform bilinear interpolation to find the activity of that chemical species over a large temperature range.

• Scholastic Distinctions:-

- ◆ **All India Rank (AIR) 35** in Geology in Indian Institute of Technology Joint Admission Test for M.Sc. (IIT-JAM). **2020**
- ◆ **TOEFL iBT score- 108** (out of 120) overall with sectional score of: Reading- 30; Listening 26; Speaking: 28; Writing: 24. **2021**
- ◆ Graduation with **First Class** in Bachelor of Science (Hons.) Degree in Geology from Jadavpur University, Kolkata, India. **2020**
- ◆ 2 times recipient of **Aditya Birla group 'President's Gold Medal'** for securing 90% and above in Madhyamik/Secondary Examination- 2014 and Higher Secondary/ +2 Examination. **2016**
- ◆ Selected for **DST INSPIRE** Scholarship for Higher Education for scoring within top 1% of their Higher Secondary/ +2 examination of the West Bengal State Education Board in India- Discontinued. **2016**

• Publications:-

- ◆ R. Sen\*, D. Ray (2022). '*Is Continental Flood Basalt a Potential Analog for Martian Crust? : A Geochemical Analysis*'. 53<sup>rd</sup> Lunar and Planetary Science Conference- LPSC 2022, The Woodlands, Texas, U.S.- <https://www.hou.usra.edu/meetings/lpsc2022/pdf/1067.pdf>.
- ◆ D. Dhingra, S. Kumar, R. Sen\*, R. Das (2022). '*Constraining the source of an anomalous impact melt deposit on the lunar far side: New insights*'. 21<sup>st</sup> National Space Science Symposium- NSSS 2022, IISER Kolkata, India, pg.- 305- [http://www.cessi.in/nsss/Abstract\\_Booklet.pdf](http://www.cessi.in/nsss/Abstract_Booklet.pdf)

- Skills & Expertise :-

Geological Field Mapping, MS Office, ENVI, MATLAB, Python, ArcGIS, QGIS, Google Earth Pro, ERDAS Imagine, Igpet, COREL Draw, GeoFry Plots

- Laboratory Experience:-

- ◆ **Petrographic transmitted light microscope**- used in identification of Igneous, Sedimentary and Metamorphic thin sections rock samples.
- ◆ **Petrographic reflected light (polished section) microscope**- used in identification of Sulphide, Oxide and Carbonate ore mineral polished sections.
- ◆ **Petrographic thin section sample preparation equipment**- used to prepare thin sections of Kaladgi-Badami (Karnataka, India) sedimentary field rock samples.

- Major Fieldworks:-

- ◆ **2020**: Sedimentological and Paleontological fieldwork in and around Chandipur coastal region -beach, bar, estuary and tidal flat area in Orissa, India under the guidance of Dr. Soumik Mukhopadhyay and Dr. Anupam Ghosh, B.Sc. 3<sup>rd</sup> year, Jadavpur University.
- ◆ **2019**: Study on the formation and distribution of 'Mud balls' along the active bar front in the Chandipur area, Orissa, India under the guidance of Dr. Soumik Mukhopadhyay.
- ◆ **2019**: Structural and Lithological Mapping and tectonic analysis of Chotanagpur Granitic- Gneissic Complex (CGGC) terrain in and around Deoghar- Jasidih area, Jharkhand, India under the guidance of Dr. Pulak Sengupta and Dr. Subrata Karmakar, B.Sc. 2<sup>nd</sup> year, Jadavpur University.
- ◆ **2018**: Study and reconnaissance of different types of rocks in and around Maithon (CGGC and Gondwana group of rocks). Primary idea of mapping. Study of the stability of the Maithon dam and visit to the open cast coal mine at Ramnagar Colliery under the guidance of Dr. Supriya Mandal and Dr. Susanta Chaudhuri, B.Sc. 1<sup>st</sup> year, Jadavpur University.

- Skill Enhancement Courses & Certificates:-

- ◆ **Remote Sensing: Principles and Applications**- secured Elite+ Silver level certification in online course organized by IIT Bombay (via NPTEL)- **August, 2021**
- ◆ **Lunar Remote Sensing and Applications**- certification of participation in online workshop organized by Indian Institute of Remote Sensing- IIRS, Dehradun, under ISRO. **August, 2021**
- ◆ **The Process and Lifetime of a Space Mission**- online course completion certificate issued by ASU Continuing and Professional Education, Arizona State University, US. **July, 2021**
- ◆ **A Sustainable Earth**- online course completion certificate issued by ASU Continuing and Professional Education, Arizona State University, US. **July, 2021**
- ◆ **SAR Application for Flood hazard mapping and monitoring**- certification of participation in online workshop organized by Indian Institute of Remote Sensing- IIRS, Dehradun, under Indian Space Research Organization- ISRO. **July, 2021**
- ◆ **Machine Learning to Deep Learning: A journey for remote sensing data classification**- certification of participation in online course organized by Indian Institute of Remote Sensing- IIRS, Dehradun, under Indian Space Research Organization- ISRO. **July, 2021**
- ◆ **Introduction to Meteorites and Planetary Sciences**- an online course completion certificate issued by Geological Survey of India Training Institute (GSITI) Hyderabad. **June, 2021**
- ◆ **Basics of Remote Sensing**- an online course completion certificate issued by Geological Survey of India Training Institute (GSITI) Hyderabad. **June, 2021**

- ◆ **Course in GIS Analysis**- an online course completion certificate issued by Geological Survey of India Training Institute (GSITI) Hyderabad- **June, 2021**
- ◆ **Application of Remote Sensing in Mineral Exploration**- an online course completion certificate issued by Geological Survey of India Training Institute (GSITI) Hyderabad. **June, 2021**
- ◆ **Course on Thin section Preparation**- an online course completion certificate issued by Geological Survey of India Training Institute (GSITI) Hyderabad. **June, 2021**
- ◆ **MATLAB Onramp**- course completion certificate issued by MATHWORKS. **May, 2021**
- ◆ **Image Processing Onramp (using MATLAB)** - a course completion certificate issued by MATHWORKS. **May, 2021**
- ◆ **Machine Learning Onramp (using MATLAB)** - a course completion certificate issued by MATHWORKS. **May, 2021**
- ◆ **Programming for Everybody (Getting Started with Python)**- course completion certificate in an online non- credit course authorized by University of Michigan through Coursera. **April, 2021**
- ◆ **Introduction to Programming with MATLAB**- course completion certificate in an online non- credit course authorized by Vanderbilt University and offered through Coursera. **January 2021**

- **Extracurricular activities:-**

- ◆ Secured **1<sup>st</sup> position** in geological quiz competition ‘Geo Quarry’ at Geo-symposium **Melange ’20** organised by Geological Institute at Department of Geology, Presidency University, Kolkata- **2020**.
- ◆ Secured **2<sup>nd</sup> Position** in geological sample identification event ‘Game of Stones’ at Technical Geo-symposium ‘**Protolith ’20**’ organized by Dept. of Earth Sciences, Indian Institute of Technology (IIT) Bombay- **2020**.
- ◆ Secured **3<sup>rd</sup> position** in online geological quiz competition 2020 organized by **Geological Institute and Presidency University SPE Student Chapter**, Kolkata- **2020**.
- ◆ Member of **Earth Science Study Circle**, Dept. of Geology and Geophysics, IIT Kharagpur
- ◆ Member of **American Association of Petroleum Geologists- AAPG**, IIT Kharagpur student chapter
- ◆ Former member of **Jadavpur University Geological Society (JUGS)**
- ◆ Member of **Organizing Committee for Lithify’19**- Geological symposium organised by JUGS and sponsored by CAS Phase VI at Jadavpur University.
- ◆ Member of ‘**Utsaar**’- a non-profit social welfare group dealing with helping people in need

- **Hobbies:-**

Quizzing, Debating, Stargazing, Acoustic Guitar (Hawaiian & Spanish), Football, Cricket, Badminton.

- **Languages :-**

English, Hindi, Bengali- (Reading/ Writing/ Speaking)