

SUBHAJIT GHOSH

- **WORK ADDRESS** : Woods Hole Oceanographic Institution (**WHOI**), 266 Woods Hole ROAD, Woods Hole, Massachusetts 02543
- **HOME ADDRESS**: 17, S.R. Dutta Sarani, Konnagar, Hooghly, 712235, West Bengal, India.
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CURRENT AFFILIATION

Postdoctoral researcher (NSF funded) in the Geology & Geophysics department, **Woods Hole Oceanographic Institution, USA.**

EXPERTISE

Rock mechanics, developing rheological creep (flow) laws, Grain-scale microphysics, High-Pressure and High-Temperature rock deformation experiments, Structural geology, Sintering synthetic mineral aggregates, Microstructural analysis, Analogue and numerical modelling, Himalayan tectonics.

SKILLS & ABILITIES

New generation hydraulically-driven **Griggs-type piston-cylinder** apparatus, **Uniaxial 1-atm** deformation apparatus (Shimadzu AG-X).

Scanning Electron Microscopy (**SEM**) with Electron Backscatter Diffraction (**EBS**D) (JEOL-JSM 7001F, Oxford Aztec system), Electron Probe Micro-analyzer (**EPMA**) equipped with hyperspectral cathodoluminescence (JEOL IHP 200F EPMA), X-ray diffraction, Fourier-transform infrared spectroscopy (**FTIR**).

Spark plasma sintering (**SPS**) technique.

Structural and lithological field work and **mapping**, cross-section balancing, proficient in the use of a **petrographic microscope**.

Analogue and numerical sandbox modelling, Anton paar rheometer.

MTEX toolbox (Matlab), Global Mapper, Grapher, numerical modelling (preferably GUI), CorelDRAW.

EXPERIENCE

January, 2024 (JOINING ON 5/01/2024)

NSF funded Postdoctoral Research Scientist, Geology & Geophysics department

Woods Hole Oceanographic Institution (WHOI), USA

Advisors: Dr. Andrew Cross (P), Dr. Veronique Le Roux

Experiments will be performed at the Brown University under the supervision of Prof. Greg Hirth.

December, 2020 – September, 2023

Post-Doctoral Research Scientist - Labex VOLTAIRE

Institut des Sciences de la Terre d'Orléans (ISTO)

Université d'Orléans, CNRS, BRGM, France

Advisors: Prof. Holger Stunitz (P), Prof. Hugues Raimbourg (P)
Experiments were performed under the supervision of Dr. Jacques Précigout.

February, 2019 – January, 2020

Post-Doctoral Research Scientist

Department of Materials Science, Earthquake Research Institute (ERI)

University of Tokyo, Japan

Advisor: Prof. Take Hiraga (P)

February, 2013 – September, 2018

Ph.D. in Structural geology and Tectonics

University Grants Commission (UGC-NET), India funded Research Fellow

Experimental Tectonics Laboratory (ETL), Department of Geology

University of Calcutta, India

Advisors: Prof. Santanu Bose (P)

September, 2011 – January, 2013

Department of Science and Technology (DST), Government of India funded Junior Research Fellow (JRF)

Project Title: Interpretation of multiple deformations in the Eastern Himalaya: A kinematic correlation with the orogenic.

Experimental Tectonics Laboratory (ETL), Department of Geology

University of Calcutta, India

Advisor: Prof. Santanu Bose (PI)

EDUCATION

February, 2013 – September, 2018 University of Calcutta Kolkata, India

Ph.D. in Structural geology and Tectonics

Thesis title: Structure and Tectonics of the Darjeeling-Sikkim fold-thrust belts and its implication on the evolution of Eastern Himalaya

(<http://hdl.handle.net/10603/244875>).

August, 2009 – September, 2011 University of Calcutta Kolkata, India

M.Sc. in Applied Geology

M.Sc. Specialization: “*Superposed buckling - An experimental investigation*” under the supervision of Prof. Santanu Bose.

August, 2006 – July, 2009 Asutosh College, University of Calcutta Kolkata, India

B.Sc. in Geology

Other Subjects: Mathematics, Physics

FIELDWORK EXPERIENCE

- Petrology and Rock Analysis in and around Ghatshila, Singhum Dist., Jharkhand, Eastern India; 2007.
- Topographical study and Mapping of the geological area in and around Galudih, Singhum Dist., Eastern India; 2008.

- Geological Field survey about Mining Geology in and around Raipur, Chhattisgarh, Central India; 2008.
- Geological Field Survey about structural mapping in and around Chitradurga, Karnataka, Southern India; 2010.
- Structural and lithological mapping of Darjeeling and Sikkim Himalaya, India; 2012 to 2018. **During this period, I worked as a student field instructor.**
- Structural and lithological mapping of Western Himalaya, India; 2017.
- In and around Mount Fuji and Hakone volcano, Japan 2019.
- Horoman peridotite complex in Hokkaido, Japan; 2019.

RESEARCH PROJECTS

- Earthquake Research Institute's cooperative research program titled “*Synthesis and distribution of standard polycrystalline minerals for room experiments*” (2020- B-01), in collaboration with Prof. Takehiko Hiraga, The University of Tokyo. Duration: 2021/04/01 ~ 2022/03/31 (**reapplied on 30/10/2022 for the year 2023**).

PEER-REVIEWED PUBLICATIONS

#M.Sc. student authors

1. **Ghosh, S.**, Mandal, N., Roy, S.#, Bose, S. (2023): Tectono-metamorphic transitions in the Higher Himalayan sequence: a clue for Main Central Thrust (MCT) localization in Darjeeling-Sikkim Himalaya. *Journal of Structural Geology*, 167, p.104783. doi.org/10.1016/j.jsg.2022.104783.
2. **Ghosh, S.**, Stunitz, H., Raimbourg, H., Précigout, J. (2022): Quartz rheology constrained from constant-load experiments: Consequences for the strength of the continental crust. *Earth and Planetary Science Letters*, 597, p.117814, https://doi.org/10.1016/j.epsl.2022.117814. **Citations: 3.**
3. **Ghosh, S.**, Koizumi, S., Hiraga, T. (2021): Diffusion creep of diopside. *Journal of Geophysical Research: Solid Earth*, 126, e2020JB019855, 10.1029/2020JB019855. **Citations: 7.**
4. **Ghosh, S.**, Bose, S., Mandal, N., Laik, A.# (2020): Mid-crustal ramping of the Main Himalayan Thrust in Nepal to Bhutan Himalaya: New insights from analogue and numerical experiments. *Tectonophysics*, 782-783, doi.org/10.1016/j.tecto.2020.228425. **Citations: 26.**
5. Marques F. O., Mandal, N., **Ghosh, S.**, Ranalli, G., Bose, S. (2019): REPLY “Interactive comment on Marques et al. (2018), Channel flow, tectonic overpressure, and exhumation of high-pressure rocks in the Greater Himalayas” by John P. Platt, *Solid Earth Discuss*, 10, 357-361, doi.org/10.5194/se-2018-92, 2018.
6. Marques F. O., Mandal, N., **Ghosh, S.**, Ranalli, G., Bose, S. (2018): Channel flow, tectonic overpressure, and exhumation of high-pressure rocks in the Greater Himalayas. *Solid Earth (EGU)*, 9, 1061–1078, doi.org/10.5194/se-9-1061-2018. **Citations: 14.**

7. **Ghosh, S.**, Bose, S., Mandal, N., Das, A.[#] (2018): Control on frontal thrust progression by the mechanically weak Gondwana horizon in the Darjeeling-Sikkim Himalaya. *Tectonophysics*, 727, pp.12-27, doi.org/10.1016/j.tecto.2018.01.033. **Citations: 9.**
8. Acharyya, S. K., **Ghosh, S.**, Mandal, N., Bose, S., Pande, K. (2017): Pre-Himalayan tectono-magmatic imprints in the Darjeeling-Sikkim Himalaya (DSH) constrained by 40 Ar/ 39 Ar dating of muscovite. *Journal of Asian Earth Sciences*, 146, 211–220, doi.org/10.1016/j.jseaes.2017.05.027. **Citations: 30.**
9. **Ghosh, S.**, Bose, S., Mandal, N., Dasgupta, S. (2016): Dynamic recrystallization mechanisms and their transition in the Daling Thrust (DT) zone, Darjeeling–Sikkim Himalaya. *Tectonophysics*, 674, 166–181, doi.org/10.1016/j.tecto.2016.02.023. **Citations: 23.**
10. Bose, S., Mandal, N., Acharyya, S. K., **Ghosh, S.**, Saha, P. (2014): Orogen-transverse tectonic window in the Eastern Himalayan fold belt: A superposed buckling model. *Journal of Structural Geology*, 66, 24–41, doi.org/10.1016/j.jsg.2014.05.008. **Citations: 35.**

PRE-PRINT OR PUBLISHED DATA

Ghosh, S., Stunitz, H., Raimbourg, H., Précigout, J., Di Carlo, I., Heilbronner, R., Piani, L. (2023). Importance of grain boundary processes for plasticity in quartz-dominated crust: Implications for flow law development [Data set]. Zenodo. <https://zenodo.org/doi/10.5281/zenodo.10152968>.

Ghosh, S., Stunitz, H., Raimbourg, H., Précigout, J. (2022). Quartz rheology constrained from constant-load experiments indicate lower strength of the continental crust [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.5901073>.

Ghosh, S., Koizumi, S., Hiraga, T. (2021). Diffusion creep of diopside. [Data set]. Zenodo. <http://doi.org/10.5281/zenodo.3975477>.

MANUSCRIPTS UNDER PREPARATION

Ghosh, S., Stunitz, H., Raimbourg, H., Précigout, J., Di Carlo, I., Heilbronner, R., Piani, L. (*Under review*): Importance of grain boundary processes for plasticity in quartz-dominated crust: Implications for flow law development

Ghosh, S., Bose, S., Mandal, N., Saha, P. (*Under review*): Complex Lesser Himalayan tectonics in the Darjeeling Sikkim Himalaya: new perspectives from a fold-duplex model.

Saha, S., Takeshita, T., **Ghosh, S.**, Srivastava, H. B. (*Under preparation*): Rheology of the continental shear zone at the mid-crustal condition and its implication for fabric development: Insights from the Main Central Thrust (MCT) zone, western Garhwal Himalaya, India.

CONFERENCE ABSTRACTS

1. **Ghosh, S.***, Stunitz, H., Raimbourg, H., Précigout, J. (2023): Rheology and Deformation Processes of Fine-grained Quartz Aggregate. EGU General Assembly at Vienna, Austria.
2. **Ghosh, S.***, Stunitz, H., Raimbourg, H., Précigout, J., (2022): Constraining Rheology and Deformation Processes of Fine-grained Quartz Aggregate from High-Pressure and High-Temperature Experiments. AGU fall meeting. USA.
3. **Ghosh, S.***, Stunitz, H., Raimbourg, H., Précigout, J. (2022): Constraining wet quartz rheology from constant-load experiments. EGU General Assembly at Vienna, Austria.
4. **Ghosh, S.***, Stunitz, H., Raimbourg, H., Précigout, J., Nègre, L., Pongrac, P., Jeřábek, P. (2021): Constraining rheology and deformation processes of wet quartzite from high-pressure and high-temperature experiments. AGU fall meeting. New Orleans, USA.
5. **Ghosh, S.***, Bose, S., Mandal, N., Saha, P. (2021): Oscillating Detachment and Buckling Dominated Fold-Duplex Model for the Darjeeling-Sikkim Himalayan Wedge and Its Seismotectonic Implications. AGU fall meeting. New Orleans, USA.
6. **Ghosh, S.***, Hiraga, T., Sano, K. (2020): Synthesis and diffusion creep of dry fine-grained diopside aggregates. 36th IGC 2020. Delhi, India. (not attended).
7. **Ghosh, S.***, Laik, A., Bose, S., Mandal, N. (2020): Modelling the structural segmentation of the Main Himalayan Thrust (MHT). 36th IGC 2020. Delhi, India. (not attended).
8. **Ghosh, S.***, Bose, S., Mandal, N. (2019): Tectono-thermal evolution of the Main Central Thrust (MCT) zone rocks of the Himalayan Crystalline Complex (HCC), Darjeeling-Sikkim Himalaya. SMP32-P11, *JpGU Meeting, Chiba, Japan*.
9. Saha, S. *, Takeshita, T., **Ghosh, S.**, Srivastava, H.B. (2019): Microstructural Analysis of Quartz grains in Monomineralic and Polyphase domains: A case study from Main Central Thrust (MCT) Zone mylonites, western Himalaya, India. *JpGU Meeting, Chiba, Japan*.
10. **Ghosh, S.***, Laik, A., Bose, S., Mandal, N. (2019): What caused the Main Himalayan Thrust (MHT) to ramp? Insights from analogue and numerical models. SCG61-07, *JpGU Meeting, Chiba, Japan*.
11. **Ghosh, S.***, Laik, A., Bose, S., Mandal, N. (2018): What caused the Main Himalayan Thrust (MHT) to ramp? [Abstract]. *Rock deformation and structures (RDS-V)* at Delhi University, India, October 2018, p. 27.
12. **Ghosh, S.***, Das, A., Bose, S., Mandal, N. (2017): Lithologically controlled strength variation and the Himalayan megathrust geometry: an analogue modeling approach [Abstract]. *EGU General Assembly Conference* at Vienna, Austria, April 2017, Vol. 19, p. 1213.
13. Das, A.* , Bose, S., **Ghosh, S.** (2017): Laboratory experiments on the role of mechanically weak layer on sequential thrusting in orogenic wedges [Abstract]. In *2nd National Geo-Research Scholars Meet 2017* at Wadia Institute of Himalayan Geology, Dehradun, India, May 2017, Vol.2, p. 56.
14. **Ghosh, S.***, Bose, S., Mandal, N. (2016): Strain localization along the Main Boundary Thrust (MBT) zone in the Eastern Himalaya: insights from field and experimental

- studies [Abstract]. *EGU General Assembly Conference* at Vienna, Austria, April 2016, Vol. 18, p. 6501.
15. **Ghosh, S.***, Bose, S., Mandal, N. (2016): Lithologically controlled strength variation and localization of the Main Boundary Thrust (MBT) zone in the Darjeeling-Sikkim Himalaya: explains from field and analogue modelling [Abstract]. *Rock deformation and structures (RDS-IV)* at Haldwani, India, November 2016, p. 66.
 16. Mukherjee, S.*, **Ghosh, S.**, Bose, S. (2016): Control of multiple weak layers in the development of decollement system in a convergent belt [Abstract]. *Rock deformation and structures (RDS-IV)* at Haldwani, India, November 2016, p. 72.
 17. **Ghosh, S.***, Bose, S., Mandal, N., Acharyya, S. K., Saha, P. (2014). A superposed buckling model for the development Tista dome, Darjeeling – Sikkim Himalaya (DSH), India [Abstract]. *Rock deformation and structures (RDS-III)*, at Dibrugarh, India, October, 2014.
 18. Sarkar, A. *, Bose, S., **Ghosh, S.** (2014): Analysis of structural complexity across Main Central Thrust (MCT), Rorathang area, eastern Sikkim Himalaya [Abstract]. *Rock deformation and structures (RDS-III)*, at Dibrugarh, India, October, 2014, p. 7.
 19. **Ghosh, S.***, Saha, P., Basu, R., Dasgupta, S., Acharyya, S. K., Mandal, N., Bose, S. (2012): Nature of deformation of the frontal wedge of Darjeeling-Sikkim Himalayas, India [Abstract]. (Journal of Nepal Geological Society) 27th Himalaya-Karakoram-Tibet Workshop at Kathmandu, Nepal., November 2012, Vol. 45, p. 171.
 20. **Ghosh, S.***, Bose, S. (2012): Experiments on superposed buckling in a set of asymmetric first fold [Abstract]. *Rock deformation and structures (RDS-II)* at Lucknow, India, October 2012, p. 49.

INVITED TALKS

1. Rheological properties of polycrystalline quartz aggregate in presence of H₂O: A mechanical and chemical analysis. **Ludwig-Maximilians-University (LMU)** Munich, Germany. 5th October 2022.
2. Synthesis and diffusion creep of dry fine-grained diopside. Institut des Sciences de la Terre d'Orléans, **Université d'Orléans, CNRS**, Orléans, France. April 2022.
3. Quartz rheology constrained from high-pressure and high-temperature experiments and its implications on crustal strength. DST-GATI sponsored international webinar on "*Emerging trends in Geosciences and its social impact* (ETGS 2022)". Organized by *Earth and Atmospheric Sciences*, **National Institute of Technology (NIT) Rourkela**, India. February 2022.
4. Constraining creep laws for geomaterials from high-Pressure and high-Temperature experiments. **Department of Earth Sciences, IISER Kolkata**, October 2021.
5. Synthesis and diffusion creep of dry fine-grained diopside aggregates. **Structural Geology and Tectonic Studies Group - India (SGTSGI)**, October 2020 ([link](#)).

6. Mid-crustal ramping of the Main Himalayan Thrust (MHT): new insight from physical and numerical models. **Earthquake Research Institute, The University of Tokyo, Japan, April 2018.**

ORGANIZATION AND OTHER ACTIVITIES

1. Experience in **supervising 6 M.Sc. students for their master's thesis** along with my Ph.D. supervisor. Also, **during this period, I worked as a student field instructor.**
2. Workshop on quartz deformation hosted by the Geodynamics group at the Institut des Sciences de la Terre d'Orléans, Université d'Orléans, CNRS, Orléans, France. June 2022.
3. **Judge for the Outstanding Student Presentation Awards (OSPA)** European Geosciences Union General Assembly (2022).

REVIEWER ACTIVITY

Island Arc, CATENA, Journal of Structural Geology, Frontiers of Earth Science

INDEPENDENT FUNDINGS

1. I qualify the **all-India examination known as the National Eligibility Test (NET)** in 2012, conducted by the Council of Scientific & Industrial Research (CSIR) for Junior Research Fellowship. This fellowship enabled me to **pursue full-time doctoral research** (monthly salary plus yearly contingency fund for research) independently for 5 years.
2. ERI research fellow (PI), Tokyo, Japan. This post-doctorate position was obtained by submitting an original proposal to study the rheology of the geological materials under high P-T conditions. The position came with a yearly gross salary of ~45,000,00 Yen plus research costs of ~3,00,000 Yen.
3. LabEx VOLTAIRE (PI), ISTO, Orléans, France. This post-doctorate position was obtained by submitting an original proposal to study the rheology of the geomaterial at the deep crustal conditions. This position is funded under the LABEX, which was awarded to Institut des Sciences de la Terre d'Orléans under the direction of Prof. Bruno Scaillet. The position came with a yearly gross salary of ~32,839 euros per year plus research costs.
4. I was awarded a very competitive travel grant under the International Travel Scheme (**ITS**), from Science and Engineering Research Board (**SERB**); India to attend the 2016 EGU conference in Vienna, Austria.

HONORS & AWARDS

1. CSIR-UGC National Eligibility Test (NET) for Lectureship June, **2011.**
2. CSIR-UGC-NET-Junior Research Fellowship (JRF) June, **2012.**
3. International Travel Grant; University of Calcutta, India **2012.**
4. *Sakura Exchange Program in Science* administered by Japan Science and Technology Agency (JST), **2015.**
5. *International Travel Scheme, SERB* (Science and Engineering Research Board; India), **2016.**

6. UPE International Travel Grant; University of Calcutta, India **2017**.
7. *National Post-Doctoral Fellowship (NPDF)* by Science and Engineering Research Board (SERB), India, **2018 (not availed)**.
8. *Visiting professor/post-doctoral fellow position* in the Earthquake Research Institute (ERI), University of Tokyo, **2018**.
9. Postdoctoral position at the Institute for Planetary Materials, Okayama University, Japan, **2020 (not availed due to COVID)**.
10. LabEx VOLTAIRE postdoctoral position at the Institut des Sciences de la Terre d'Orléans (ISTO), Université d'Orléans, CNRS, BRGM, France, **2020**.
11. Postdoctoral position in the Geological Engineering, University of Wisconsin-Madison, 2023 **(not availed)**.

SCIENTIFIC SOCIETIES

- *Sakura Science Club*, Japan Science and Technology Agency (JST).
- *Early Career Scientist (ECS) representative*, Division on Tectonics and Structural Geology (TS), European Geosciences Union (EGU), 2016-2017.
- American Geophysical Union (AGU), 2022.
- European Geosciences Union (EGU), 2023.