DRIPTA DUTTA, Ph.D.

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Overview

I am a structural geologist and much of my recent work focused on investigating crustal deformation processes in ductile and brittle regimes, from outcrop- to grain-scale. My primary expertise lies in the microstructural analysis of sheared rocks using SEM and EBSD. I have worked in the Indian Himalayas for about ten years now. I am proficient in C++, R, and MATLAB programming languages. One of my long-term goals is to learn R-based advanced statistical and big data analytics and communicate their applicability across various fields of Geosciences. Subsequently, I aim to contribute towards advancing the subject as a leading researcher at an academic institute and nurture next-generation geoscientists.

Education

Ph.D. (Tectonics & Structural Geology) Aug 2020
Department of Earth Sciences, IIT Bombay, India
Cumulative Performance Index: 8.41/10.0

M.Sc. (Applied Geology) Aug 2014
Department of Earth Sciences, IIT Bombay, India
Cumulative Performance Index: 8.53/10.0

B.Sc. (Geology Honors) Jul 2012
Presidency College, University of Calcutta, India
Aggregate: 72.25 % (Geology); 69.27 % (Geology, Physics, Mathematics, English)

Experiences

Assistant Professor (Fixed Term, 3 Yrs) Aug 2025 – present
Department of Earth and Planetary Systems Science
Hiroshima University, Japan

JSPS Postdoctoral Fellow Jul 2023 – July 2025
Institute of Frontier Science and Technology
Okayama University of Science, Japan

Institute Postdoctoral Fellow Feb 2021 – Jul 2023
Department of Earth Sciences, IIT Kanpur, India

Project Scientist Aug 2020 – Feb 2021
Department of Earth Sciences, IIT Kanpur, India

Research Associate Jan – Jul 2020
Department of Earth Sciences, IIT Bombay, India

Mentorships

Doctoral Student Feb 2021 – Jul 2023
Department of Earth Sciences, IIT Kanpur, India

- Assisted in framing the research problem and working out the possible approaches

- Ensured that the student was up to date with the latest developments in the research domain
- Reviewed manuscript drafts
- Conducted one-on-one meetings to resolve technical doubts and ensure gradual progress alongside mental health well-being

INSA Summer Research Fellows Jul – Aug 2021

Department of Earth Sciences, IIT Kanpur, India

- Discussed the basics of crystallography and the working principles of the EBSD instrument
- Explained the link between ductile deformation and crystallographic preferred orientations
- Helped them code in MATLAB and use the MTEX toolbox

Tutorship / Teaching Assistantships

Communication Skills in Earth Sciences (ES650A) Sept – Nov 2021, 2022

Department of Earth Sciences, IIT Kanpur, India

- Tutored 02 batches of 14 Master's Degree students (30 sessions of 75 mins each)
- Focused on scientific writing skills i.e., what are the different sections of a manuscript? how is scientific writing different from literary writing? the common mistakes, choice of voices, etc.
- Discussed accessibility issues in science, advantages of open-access journals, and pros and cons of preprints
- Prepared and corrected two sets of assignments

Structural Geology Jan – April 2021

NPTEL, Govt. of India funded e-Learning platform

- Prepared 12 weekly assignments, each consisting of 10 multiple-choice questions (MCQs) and another set of 50 MCQs for the final certification exam
- Addressed and resolved the queries raised by the participants about the assignments and their solutions
- Facilitated and monitored an online discussion forum designed for the participants to help them understand the concepts outlined in the course materials

Structural Geology Lab (GS413, GP420 and GS703) Jul 2015 – Jun 2018

Department of Earth Sciences, IIT Bombay, India

- Taught 04 batches of postgraduate students on geologic map interpretation focused on identifying topographic features and structural discontinuities, deciphering the depositional sequence, and decoding the deformation history
- Demonstrated the basics of paleostress analyses and numerical modeling

Fieldworks

Along-Menchuka transect (Arunachal Pradesh; Postdoc project; 12 days) Mar 2024

Renukoot-Anpara-Sidhi transect (Central India; Postdoc project; 24 days) Nov 2022

Tangtse and Shergole (Union Territory of Ladakh, India; 20 days) Aug 2022

Puga (Union Territory of Ladakh, India; Ph.D. thesis; 15 days) Mar 2016
Kargil (Jammu & Kashmir, India; Sponsored by the Govt. of India; 15 days) Aug 2015
Dehradun (Uttarakhand, India; M.Sc. dissertation; 10 days) Dec 2013
Kutch (Gujarat, India; M.Sc. field camp; 12 days) Dec 2012
Ramtek (Maharashtra, India; B.Sc. field camp; 05 days) Mar 2012
Ajmer (Rajasthan, India; B.Sc. field camp; 17 days) Dec 2010
Kalka (Haryana, India; B.Sc. field camp; 13 days) Jan 2010

Editorial and Review Services

EGU Blog Editor Sept 2025 – present
Tectonics and Structural Geology Division

Associate Editor May 2022 – present
Tektonika – Diamond Open Access Journal

Guest Editor Mar 2020 – Oct 2022
International Journal of Earth Sciences

Journal Peer Reviewer Feb 2016 – present
International Journal of Earth Sciences, Geological Journal, Nature Geoscience, Communications Earth & Environment, Geophysical Research Letters, Journal of Structural Geology, Tectonophysics, Lithosphere, Journal of Asian Earth Sciences, Canadian Journal of Earth Sciences, and Global and Planetary Change

Industrial and Research Internships

Summer Intern Jun – Jul 2013
Ambuja Cements Ltd., Rajasthan, India
- Conducted GPS-aided litho-structural mapping of the limestone-bearing ridge for 10 days
- Evaluated the grade of limestones by computing weight percentages of CaO and MgO in the drill samples by performing X-ray diffraction (XRD) analysis

Summer Project Fellow May – Jun 2013
Department of Earth Sciences, IIT Bombay, India
- Generated multiple log plots (viz. SP, GR, resistivity, density, etc.) from the well-derived raw log data
- Calculated petrophysical parameters such as shale volume, porosity (total, effective), formation water resistivity, permeability, etc., to demarcate hydrocarbon/water-bearing formations

Science Outreach

Published a blog titled "*Finding Geothermal Energy with Structural Geologists!*" for the Tectonics and Structural Geology Division of the European Geosciences Union (EGU) Feb 2026

Delivered a 90 minutes lecture as a part of the JSPS Science Dialogue Program at the Kagawa Chuo High School (Takamatsu, Japan). The participants of the lecture session included eight students from the 10th grade and three teachers. The lecture focused on geology basics, the contributions of structural geologists to the society, my current research, and demonstrations of using the stereonet to plot structural data. Nov 2024

Conference Session Convened

Oceanic and Continental Subduction Processes: petrologic and geochemical perspective (Session-ID: S-MP21). Conveners: Hafiz. U. Rehman, Takeshi Imayama, Sayanatani Chatterjee, and Dripta Dutta. *16th Japan Geoscience Union Meeting 2024* — May 2024

Invited Talk

Deformation mechanisms of phases crystallizing from the melt during shearing (Submission no. A-318). In: The Tectonic Evolution of Asia from Korea to Egypt. *77th General Assembly of the Geological Society of Korea, virtual* — Oct 2022

Research Grants

Research Start-up Grant (530,000 JPY, Hiroshima University, Japan)	Aug 2025
KAKENHI Grant-in-Aid for JSPS Fellows (2,000,000 JPY, 12 months, JSPS, Japan)	July 2023
Postdoctoral Contingency Grant (300,000 INR, 29 months, IIT Kanpur, India)	Feb 2021
Doctoral Contingency Grant (100,000 INR, 60 months, University Grants Commission, India)	Jan 2020

Awards, Fellowships & Other Recognitions

Seal of Excellence on the MSCA Postdoctoral Fellowship proposal	Feb 2026
JSPS Postdoctoral Fellowship (24 months Okayama University of Science, Japan)	Jul 2023
Visiting Researcher (12 months, Earthquake Research Institute, Japan) *(declined)*	Oct 2022
Institute Postdoctoral Fellowship (29 months, IIT Kanpur, India)	Feb 2021
Institute Research Associateship (06 months, IIT Bombay, India)	Jan 2020
DST-SERB (Govt. of India) International Travel Support	Aug 2019
Geological Society of America International Travel Grant	Jul 2019
Institute Research Fellowship (06 months, IRCC, IIT Bombay, India)	Jul 2019
International Conference Financial Grant (IIT Bombay, India)	Oct 2017
Research Fellowship in Earth Sciences (60 months, University Grants Commission)	Jul 2014
Finished in the top 1.4% of the IIT Graduate Aptitude Test for Engineering (GATE)	Mar 2014
Merit-cum-Means Scholarship for M.Sc. students (24 months, IIT Bombay, India)	Jul 2012
Graduated 4th in the University while attaining undergraduate degree	Jul 2012
Finished in the top 1% of the IIT Joint Admission Test for M.Sc. (JAM)	Feb 2012

Key Certifications (e-Course)

Research Integrity and Ethics in Science and Engineering (Japan Science and Technology)	Aug 2025
Data Science: Machine Learning (HarvardX)	Jun 2020
Essential Math for Machine Learning: R Edition (Microsoft & edX)	Jun 2020
Data Science Research Methods: R Edition (Microsoft & edX)	May 2020
Unconventional Reservoir Geomechanics (Stanford Online)	Jun 2019
Reservoir Geomechanics (Stanford Online)	Jun 2019
Advanced MATLAB for Scientific Computing (Stanford Online)	Dec 2018

Additional Skill Sets

Instruments operated JEOL JXA-8230 EPMA, JSM-6390A SEM, FEI Quanta 3D FEG, Rigaku ZSX Primus II Fluroscence Spectrometer, Agilent 7500CX Inductively Coupled Plasma Mass Spectrometer , ZEISS AxioScope, Buehler VibroMet 2, Buehler IsoMet Low Speed Saw

Software proficiency MATLAB 2021a, QGIS 3.34, COMSOL Multiphysics 5.4, T-Tecto Studio X5, X'Pert HighScore Plus, Origin 2018, EllipseFit v3.3, JMicroVision v1.2.5, MS Office Suite, RStudio

Publications

Published peer reviewed journal articles (lead author: 06, co-author: 09) (* - corresponding author)

1. **Dutta D***., Imayama. T., Sarkar DP., Ando J. & Das K. (2026) Creep behaviour of omphacite and amphibole-plagioclase symplectite: The role of heterogeneous hydration in the Tso Morari eclogite during retrogression. Contributions to Mineralogy & Petrology, 181
2. Sethi C., Hazra B., Soleimani A., Ostadhassan M*., Mukherjee S., **Dutta D**. & Pandey JK. (2025) Elastic response of doleritic sill to high temperatures, Sonhat Basin, India. Journal of Rock Mechanics and Geotechnical Engineering, 17
3. Todkar TB., Saha P., **Dutta D**. & Misra S.* (2025) Deformation of the Paleoproterozoic Lower Vindhyan Group in Central India: Synsedimentary origin or associated with the Mesoproterozoic convergence between the Bundelkhand and Bastar Cratons? Geological Magazine, 162
4. Sato A., Imayama T*., **Dutta D**., Kaneda Y., Watanabe S., Hasegawa T., Minami M., Wakasugi Y., Wakaki S. & Yi K. (2025) Supra-subduction zone magmatism and extreme mantle depletion in the Early Cretaceous Nidar Ophiolite Complex, NW India. Gondwana Research, 147
5. Arao M., Imayama T*., Sawada Y., Yagi K., Siddiqui RH. & **Dutta D**. (2025) Magmatic and metamorphic evolution of the Late Cretaceous Muslim Bagh Ophiolite, western Pakistan: Implications for ridge subduction after subduction initiation. International Geology Review, 67
6. Imayama T*., **Dutta D**. & Yi K. (2023) The origin of the ultrahigh-pressure Tso Morari Complex, NW Himalaya: Implication for Early Paleozoic rifting. Geological Magazine, 160
7. Sikdar A., **Dutta D**. & Misra S*. (2023) Superplastic deformation inside the knife-sharp shear bands in mid-crustal granites. Journal of Structural Geology, 177
8. Biswas T., Bose N., **Dutta D**. & Mukherjee S*. (2022) Arc-parallel shears in collisional orogens: Global review and paleostress analyses from the NW Lesser Himalayan Sequence (Garhwal region, Uttarakhand, India). Marine & Petroleum Geology, 138
9. **Dutta D**., Misra S*. & Karmakar S. (2022) Deformation mechanisms and characteristics of the meta-BIFs from an early Proterozoic shear system of the Southern Granulite Terrane (SGT), India. Journal of Structural Geology, 156
10. **Dutta D**., Misra S*. & Mainprice D. (2021) Syn-shearing deformation mechanisms of minerals in partially molten metapelites. Geophysical Research Letters, 48
11. **Dutta D***. & Mukherjee S. (2021) Extrusion kinematics of UHP terrane in a collisional orogen: EBSD and microstructure-based approach from the Tso Morari Crystallines (Ladakh Himalaya). Tectonophysics, 800
12. Bose N., **Dutta D**. & Mukherjee S*. (2020) Refraction of micro-fractures due to shear-induced mechanical stratigraphy in a low-grade meta-sedimentary rock. Journal of Structural Geology, 133
13. **Dutta D**. & Mukherjee S*. (2019) Opposite shear senses: Geneses, global occurrences, numerical simulations and a case study from the Indian Western Himalaya. Journal of Structural Geology, 126
14. **Dutta D**., Biswas T. & Mukherjee S*. (2019) Arc-parallel compression in NW Himalaya: Evidence from structural and palaeostress studies of brittle deformation from the clasts of the Upper Siwalik, Uttarakhand, India. Journal of Earth System Science, 128

15. Bose N., **Dutta D**. & Mukherjee S*. (2018) Role of grain-size in phyllonitisation: Insights from mineralogy, microstructures, strain analyses and numerical modeling. Journal of Structural Geology, 112

Book

1. Mukherjee S., Bose N., Ghosh R., **Dutta D**., Misra A. A., Kumar M., Dasgupta S., Biswas T., Joshi A. & Limaye M. (2020) Structural Geological Atlas. Springer Singapore. ISBN: 978-981-13-9825-4 (Link)

Peer reviewed book chapter (* - corresponding author)

1. **Dutta D**., Maji V., Abdullah S. & Misra S*. (2022) Application of Electron backscatter diffraction (EBSD) method in Earth Sciences In: Biswas K, Sri S, and Gurao N (Eds.), Electron Microscopy in Science and Engineering. Directions, IIT Kanpur. Vol. 6, pp. 61-70. Springer Nature. ISBN: 978-981-16-5100-7 (Link)

Book review

1. **Dutta D**. (2016) Ductile Shear Zones: From Micro- to Macro-scales. Edited by: Soumyajit Mukherjee and Kieran. F. Mulchrone. Wiley-Blackwell, Chichester, 2016. No. of pages: xii + 306. Price: US$175.00. ISBN: 978-1-118-84496-0 (hardcover). Geological Journal, 51.

Technical reports without peer review (co-author: 02) (* - corresponding author)

1. Sato A., Imayama T*. & **Dutta D.** (2022) Chemical composition and zoning of amphibole from igneous rocks of the Nidar Ophiolite in northwestern India. Bulletin of Institute of Frontiers in Science & Technology, Okayama University of Science, 3, pp. 37-41.
2. Imayama T*. & **Dutta D.** (2019) Research report of the Tso Morari ultra-high pressure metamorphic complex in Ladakh, NW India. Bulletin of Institute of Frontiers in Science & Technology, Okayama University of Science, 1, pp. 49-52

Peer reviewed photo articles (sole author: 01, co-author: 01) (* - corresponding author)

1. **Dutta D*.** (2016) Opposite ductile shear senses (Tso Morari Dome, Ladakh Himalaya, India). International Journal of Earth Sciences, 106, pp. 237-238
2. Biswas T*. & **Dutta D.** (2016) Broken pebble with small-scale brittle reverse-fault with top-to-SSE. Photograph of the month. Journal of Structural Geology, 85, pp. iii

Conference abstracts (presenting author: 07, co-author: 10) ($^{\#}$ - presenting author)

1. **Dutta D**$^{\#}$. & Imayama T. (2025) Deformation characteristics of migmatites and leucogranites from the Pangong Metamorphic Complex, Karakoram Himalaya, India (virtual Talk). Goldschmidt Conference 2025.
2. Behera S$^{\#}$., Chakraborty S., **Dutta D.** & Misra S. (2025) Deformation signatures of mass transfer processes: Insights from metasomatic reaction zones in the Archean Singbhum craton in eastern India using geochemical and microstructural analysis. In session: GMPV2.2 - Rock microstructure as a tool for understanding igneous and metamorphic processes (Talk). EGU General Assembly 2025.
3. Todkar TB$^{\#}$., Saha P., **Dutta D**. & Misra S. (2024) Structural Evolution of the Lower Vindhyan Sequence: Implications to Mesoproterozoic Compression in Central India. Rock Deformation & Structures - VIII 2024.

4. **Dutta D**[#]., Imayama T. & Sarkar DP. (2024) EBSD-based microstructural characterization of the (ultra-) high-pressure eclogite and retrogressed amphibolite from the Tso Morari Crystalline Complex in Ladakh, India. In session: T9S8. From microscale to macroscale: multidimensional exploration in structural geology and tectonics (Talk). International Geological Congress 2024

5. Arao M., Imayama T[#]., Sawada Y., Yagi K., Siddiqui RH. & **Dutta D**. (2024) Magmatic and metamorphic evolution of the Late Cretaceous Muslim Bagh Ophiolite, western Pakistan: Implications for ridge subduction after subduction initiation. In session: T9-S7. Himalaya, Karakoram and Tibet: the geology and tectonics of a giant orogen (Poster). International Geological Congress 2024

6. Parvez N[#]., Yashwanth A., Chakraborty S., **Dutta D**. & Mamtani M. (2024) Some important observations from microstructural analysis of the quartz-rich mylonites of the Main Central thrust from Sikkim, eastern Himalaya (Poster). In session: Deformation Mechanisms, Processes And Fabric Analysis In Earth Materials From The Global To The Nano Scale – Methods And Applications. IASGT Workshop 2024, pp. 148-151

7. Imayama T[#]., Sato A., **Dutta D**., Kaneda Y., Watanabe S., Hasegawa T., Minami M., Wakasugi Y., Wakaki S. & Yi K. (2023) Magmatic response to the subduction initiation of Early Cretaceous Nidar Ophiolite Complex, eastern Ladakh, NW Himalaya (Talk). In session: GD4.2. Initiation and evolution of subduction: dynamics, volatiles and melts from the surface to the deep mantle. EGU General Assembly 2023.

8. **Dutta D**[#]., Imayama T. & Yi K. (2022) Early Paleozoic rift-related magmatic origin of the Tso Morari Complex (NW Indian Himalayas) and the protolithic diversity of the Himalayan high and ultrahigh-pressure rocks. In session: V42D. The Metamorphic Kitchen Sink II (Poster). AGU Fall Meeting 2022, virtual

9. Sikdar A[#]., **Dutta D**. & Misra S. (2022) What causes shear band widening? – an EBSD based analysis. In session: MR15A. Physical Properties of Earth Materials (PPEM): From Micro to Macro and Back Again III (Poster). AGU Fall Meeting 2022, virtual

10. Sato A[#]., Imayama T., **Dutta D**., Kaneda Y., Watanabe S., Hasegawa T., Minami A., Wakasugi Y. & Wakaki S. (2021) (In Japanese) Petrological and geochemical studies of igneous rocks in the Nidar ophiolite complex, northwest India (Talk). Mineralogical Society of Japan Meeting 2021, virtual

11. Sato A[#]., Imayama T. & **Dutta D**. (2021) Multiple igneous activities recorded in the Nidar Ophiolite Complex, eastern Ladakh (Poster). Japan Geoscience Union Meeting 2021, virtual

12. **Dutta D**[#]., Misra S. & Karmakar S (2021). Deformation mechanisms of the meta-BIFs from an early Proterozoic shear system of the Southern Granulite Terrane (Talk). Rock Deformation & Structures - VI 2021, virtual

13. **Dutta D**[#]., Misra S., and Mainprice D. (2021) Understanding deformation behavior of lower crustal rocks from experimentally deformed metapelitic aggregate: an EBSD-based approach (Poster). In session: TS2.1. Deformation mechanisms and microstructures. EGU General Assembly 2021, virtual

14. **Dutta D**[#]. & Mukherjee S. (2019) Opposite shear senses: A comprehensive review of geneses, global occurrences, and a case study (Poster). In Session: T73. Structural Geology in the 21st Century: Rheology of Naturally Deformed Rocks. GSA Annual Meeting 2019, 51(5)

15. **Dutta D**[#]. & Mukherjee S. (2017) Structural and mineralogical studies of the Tso Morari Dome: Insight into the deformation kinematics of the eclogitic gneiss, Ladakh Himalaya, India (Poster). AGU Fall Meeting 2017

16. Bose N[#]., **Dutta D**. & Mukherjee S. (2016) Quantification of competency contrast from refraction of shear-induced micro-fractures in meta-sedimentary rock, Gangori Shear Zone, Bhagirathi river section, NW Indian Lesser Himalaya (Poster). AGU Fall Meeting 2016

17. Biswas T., **Dutta D**. & Mukherjee S[#]. (2014) Tectonics of Siwalik Himalaya in Dehradun-Roorkee section, India (Poster). In Session: T23. Exploring the Development of the Himalayan-Karakorum-Tibet Orogenic System from the Mantle to Mountain Peaks. GSA Annual Meeting 2014, 46(6), pp. 573