

## **Dr. Ratan Das**

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## **Broad Areas of Research**

Engineering Geology, Rock Mechanics, Tunnelling, and Numerical Modelling (FEM/DEM).

## **Teaching Interest**

Engineering Geology, Rock Mechanics, Structural Geology, Geotechnical Engineering, etc.

## **Education**

**Post-Doctoral Fellow**, Department of Geology and Geophysics, **IIT Kharagpur**, (17 March 2020 - 12 July 2021)  
Mentor: **Prof. Arindam Basu**, (Research Area: **Engineering Geology**)

**Ph.D. (Engineering Geology) Course Work (9.4/10)** Department of Earth Sciences, **IIT Bombay**, February 2019  
(Thesis Title: Stress and Deformational Behavior of Weak Jointed Rockmass during Tunnelling)  
Ph.D. Supervisor: **Prof. Trilok Nath Singh**

**M.Sc. (Applied Geology) – First Class (8.11/10)**, Department of Earth Sciences, **IIT Bombay**, 2015  
M.Sc. Dissertation supervisor: **Prof. Trilok Nath Singh**, (Specialization: **Engineering Geology**)

**B.Sc. (Geology) – First Class (71.90) with Distinction** with pass course Physics and Mathematics: Department of Geology, Cotton College, **Gauhati University**, 2013

**12<sup>th</sup> (Science) – First Class (65.20)** with English, Mathematics, Physics, Chemistry, Computer Science, Assamese: Oil India Higher Secondary School, Duliajan, **Assam Higher Secondary Education Council (AHSEC)**, 2010

**10<sup>th</sup> – First Class (65.83)** with English, Mathematics, General Science, Social Science, Assamese, Hindi: Duliajan Ucha Vidyalaya, Duliajan, **Secondary Education Board of Assam (SEBA)**, 2008

## **Editorships**

**Former Guest Editor**, Special Issue in **Environmental Earth Sciences (Springer Nature)**

## **Research Projects**

SI No.	Project Title	Funding Agency	Year	Fund sanctioned (INR)
1	Evaluation of geohazard risks due to climatic and geologic factors in the Cachar-Tripura-Mizoram (CTM) fold belt of northeast India: A coupled hydromechanical and geotechnical modelling <b>File Number: SRG/2022/000447</b>	DST SERB	2022-2024 (2 years)	33,00,000
2	Analysis of growth and initiation mechanism of rainfall-induced debris slides in Dima Hasao, Assam	In House (Cotton University, Guwahati)	2023-2025	1,00,000

## **Awards and Achievements**

- Received the **International Travel Support (ITS)** award from DST-SERB, 2023.
- Awarded the **Startup Research Grant (SRG)** from DST-SERB, 2022.
- Cleared **Joint CSIR-UGC NET** in **June 2020**.

- Cleared **IIT - JAM**, 2013, **ISM** 2013, and **IIT GATE GG 2015 to 2021**.
- Cleared **APSC Assistant Geologist** written examination 2018.
- Cleared **UPSC Assistant Geologist** written examination 2015.
- Recipient of “Chief Minister's Scheme for **Financial Assistance** to Meritorious Student of Assam” for qualifying IIT-JAM Entrance Examination in the Year 2013.
- Recipient of “**Anundoram Borooh Award**” and “**Amul Vidyashree Award**” for excellent academic performance in Matriculation 2008.

### **Teaching Experience**

**Assistant Professor**, Department of Geology, **Cotton University, Guwahati, Assam** (7<sup>th</sup> May 2022 - Present)

**Assistant Professor**, Department of Earth Science, **Assam University, Silchar, Assam** (14<sup>th</sup> July 2021 - 6<sup>th</sup> May 2022)

**Guest Assistant Professor**, Department of Geology, **Rajiv Gandhi University, Itanagar** (14<sup>th</sup> Sept 2018 – 13<sup>th</sup> March 2020)

**Teaching Assistant**, Department of Earth Sciences, **IIT Bombay, Powai** (16<sup>th</sup> July 2015 – 27<sup>th</sup> June 2018)

### **Publications in International Journals**

(<https://scholar.google.co.in/citations?user=nxoLeb8AAAAJ&hl=en>)

1. **Das R**, Singh TN, **2022**. A novel technique for temporal evolution of rockburst in underground rock tunnel: an experimental study. **Environmental Earth Sciences**. 81 (17), 420. doi: 10.1007/s12665-022-10546-y [ISSN / eISSN: 1866-6280 / 1866-6299], [Impact factor: 2.8], **Springer Nature**  
<https://doi.org/10.1007/s12665-022-10546-y>
2. **Das R**, Phukon P, Singh TN, **2021**. Understanding the cause and effect relationship of debris slides in Papumpare district, Arunachal Himalaya, India. **Natural Hazards**. 110, 1735-1760. doi: 10.1007/s11069-021-05010-2 [ISSN / eISSN: 0921-030X / 1573-0840], [Impact factor: 3.7], **Springer Nature**  
<https://doi.org/10.1007/s11069-021-05010-2>
3. **Das R**, Dhouchak R, Singh TN, **2021**. Analysis and prediction of brittle failure in rock blocks having a circular tunnel under uniaxial compression using acoustic Emission technique: laboratory testing and numerical simulation. **International Journal of Geo-Engineering**. 12, 14. doi: 10.1186/s40703-020-00136-x [ISSN / eISSN: 2092-9196 / 2198-2783], [Impact factor: 1.6], **Springer Nature**  
<https://doi.org/10.1186/s40703-020-00136-x>
4. **Das R**, Singh, TN, **2021**. Effect of Rock Bolt Support Mechanism on Tunnel Deformation in Jointed Rockmass: A Numerical Approach. **Underground Space**. 6, 409-420. doi: 10.1016/j.undsp.2020.06.001, [ISSN / eISSN: 2096-2754 / 2467-9674], [Impact factor: 6.4], **Elsevier B.V.**  
<https://doi.org/10.1016/j.undsp.2020.06.001>
5. **Das R**, Singh TN, **2020**. Effect of Closely Spaced, Non-Persistent Ubiquitous Joint on Tunnel Boundary Deformation: A Case Study from Himachal Himalaya. **Geotechnical and Geological Engineering**. 39, 2447-2459. doi: 10.1007/s10706-020-01637-3, [ISSN / eISSN: 0960-3182 / 1573-1529], [Impact factor: 1.7], **Springer Nature**  
<https://doi.org/10.1007/s10706-020-01637-3>
6. Panthee S, Singh PK, Kainthola A, **Das R**, Singh TN, **2018**. Comparative study of the deformation modulus of rock mass - a reply to the comments received from Gokceoglu (2018). **Bulletin of Engineering Geology and the Environment**. 77, 763–766. doi: 10.1007/s10064-018-1272-z, [ISSN / eISSN: 1435-9529 / 1435-9537], [Impact factor: 4.2], **Springer Nature**  
<https://doi.org/10.1007/s10064-018-1272-z>

7. **Das R**, Singh PK, Kainthola A, Panthee S, Singh TN, **2017**. Numerical analysis of surface subsidence in asymmetric parallel highway tunnels. **Journal of Rock Mechanics and Geotechnical Engineering**. 9, 170–179. doi: 10.1016/j.jrmge.2016.11.009, [ISSN / eISSN: 1674-7755 / 2589-0417], [Impact factor: 7.3], Elsevier B.V.  
<https://doi.org/10.1016/j.jrmge.2016.11.009>
8. Guha Roy D, Singh TN, Kodikara J, **Das R**, **2017**. Effect of Water Saturation on the Fracture and Mechanical Properties of Sedimentary Rocks. **Rock Mechanics and Rock Engineering**. 50, 2585–2600. doi:10.1007/s00603-017-1253-8, [ISSN / eISSN: 0723-2632 / 1434-453X], [Impact factor: 6.2], Springer Nature  
<https://doi.org/10.1007/s00603-017-1253-8>
9. Panthee S, Singh PK, Kainthola A, **Das R**, Singh TN, **2016**. Comparative study of the deformation modulus of rock mass. **Bulletin of Engineering Geology and the Environment**. 77, 751–760. doi:10.1007/s10064-016-0974-3, [ISSN / eISSN: 1435-9529 / 1435-9537], [Impact factor: 4.2], Springer Nature  
<https://doi.org/10.1007/s10064-016-0974-3>

### **Full Articles in International Conferences**

1. **Das R**, **2023**. Tunnelling in squeezing ground – a review on prediction and measurement of boundary deformation and available mitigation methods, in: **5<sup>th</sup> International Disaster Risk and Vulnerability Conference (DVRC 2023)**. K. R. Baiju, Karunakaran Akhildev, Joice K Joseph, Naveen Babu, Anithomas Idiculla, Asha Rose, Shibu K Mani, Mahesh Mohanand A.P. Pradeep kumar (Eds) 19 January- 21 January 2023, Mahatma Gandhi University, Kottayam, Kerala, India. [ISBN: 978-93-80419-73-2]  
<https://drvcdisaster.files.wordpress.com/2023/05/drvc-2023-proceeding-volume-final.pdf>
2. Prasad S, **Das R**, Singh TN, **2018**. Estimation of Rock Bolt Length for a Tunnel by Numerical Modeling: A Case Study in Himalayas, Arunachal Pradesh, India, in: **ISRM International Symposium - 10th Asian Rock Mechanics Symposium, ARMS 2018**. OnePetro, Z. Zhao, Y. Zhou, J. Shang (Eds) 29 October - 3 November - 2018, Singapore. [ISBN: 978-981-11-9003-2]  
<https://onepetro.org/ISRMARMS/proceedings/ARMS1018/All-ARMS1018/ISRM-ARMS10-2018-159/43325>
3. **Das R**, Sharma KM, Singh TN, **2018**. Physical and Numerical Model to Investigate Shallow Tunnel Instabilities in Loose Soil, in: **International Conference on Geo-Mechanics, Geo-Energy and Geo-Resources – IC3G 2018**, Sichuan University, Chengdu, China.
4. Prasad S, **Das R**, Singh TN, Prasad R, **2018**. Geological and Geotechnical Problems Encountered during Construction of Butterfly Valve Chamber and Penstock Assembly Chamber of Tehri Pumped Storage Plant, in: **International Conference on Geo-Mechanics, Geo-Energy and Geo-Resources – IC3G 2018**, Sichuan University, Chengdu, China.
5. Prasad S, **Das R**, Singh TN, Prasad R, **2018**. Assessment Causes of Overbreak and Control Measures In Underground Tunnel during Construction - A Case Study from Central Himalayas (HP), in: **International Conference on Geo-Mechanics, Geo-Energy and Geo-Resources – IC3G 2018**, Sichuan University, Chengdu, China.
6. **Das R**, Sirdesai NN, Singh TN, **2017**. Analysis of Deformational Behavior of Circular Underground Opening in Soft Ground Using Three-Dimensional Physical Model, in: **American Rock Mechanics Association (ARMA) 2017**, 51st US Rock Mechanics / Geomechanics Symposium (5 VOLS). San Francisco, California, USA. [ISBN: 978-15-1085-7582]  
<https://onepetro.org/ARMAUSRMS/proceedings/ARMA17/All-ARMA17/ARMA-2017-0172/124188>
7. Singh PK, **Das R**, Singh KK, Singh TN, **2016**. Landslide in fractured and stratified rocks - A case from Aizawl,

Mizoram, India, in: Proceedings of the Conference on **Recent Advances in Rock Engineering (RARE 2016), Bengaluru, India**. Atlantis Press, Paris, France, pp. 189–194. doi:10.2991/rare-16.2016.59, [ISBN: 978-94-6252-2]  
<https://www.atlantis-press.com/proceedings/rare-16/25864904>

### **Full Articles in National Conferences**

1. **Das R**, Singh TN, 2017. Numerical Modelling of Horseshoe Shaped Tunnel to Analyse the Extent and Effect of Disturbed Zone in Jointed Rockmass under Variable Joint spacing, in: **INDOROCK 2017: 7th Indian Rock Conference**. New Delhi, pp. 325–335.
2. **Das R**, Singh PK, Kainthola A, Singh TN, 2016. Deformational Behavior of Jointed Rockmass during Tunnelling and Determination of Support System Using Finite Element Method, in: **INDOROCK 2016: 6th Indian Rock Conference**. pp. 314–333.

### **Abstracts / Extended Abstracts in International Conference Proceedings**

1. Das S, **Das R**, Mazumder D (2024) Engineering characterisation of landslide derived material: A case study on Sonapur landslide, Meghalaya. In: **International Conference on Climate Change and Natural Resources Management for Sustainable Development (ICNS-2024)**, Editors: B.P. Mishra, Santanu Ghosh, Laltanpuia Renthlei, Madhurima, Organized by School of Earth Sciences and Natural Resources Management, Mizoram University, Aizawl, Mizoram, India.
2. Mazumder D, **Das R**, Das S (2024) Understanding the multi-aspect debris characteristics of a landslide along the Lumding-Haflong road section. In: **International Conference on Climate Change and Natural Resource Management for Sustainable Development (ICNS-2024)**, Editors: B.P. Mishra, Santanu Ghosh, Laltanpuia Renthlei, Madhurima, Organized by School of Earth Sciences and Natural Resources Management, Mizoram University, Aizawl, Mizoram, India.
3. Medhi D, **Das R** (2024) Rock mass characterization and classification along Guwahati Shillong national highway. In: **The 44<sup>th</sup> IIG Annual Meet and International Conference (IIG 2024): Shaping Tomorrow: Society, Culture, and the Environment in an Interconnected World**, Cotton University, Guwahati, Assam, India.
4. Das S, **Das R**, Mazumder D (2024) Simulating the effect of acid rain on the durability of limestone through accelerated weathering test. In: **The 44<sup>th</sup> IIG Annual Meet and International Conference (IIG 2024): Shaping Tomorrow: Society, Culture, and the Environment in an Interconnected World**, Cotton University, Guwahati, Assam, India.
5. Mazumder D, **Das R**, Das S (2024) Investigating physico-mechanical properties of Bhuban shale and their impact on landslides amidst rapid urbanization in Aizawl, Mizoram. In: **The 44<sup>th</sup> IIG Annual Meet and International Conference (IIG 2024): Shaping Tomorrow: Society, Culture, and the Environment in an Interconnected World**, Cotton University, Guwahati, Assam, India.
6. Mazumder D, **Das R**, Das S (2024) Laboratory simulation of rockfall hazard in different sedimentary rocks of Mizoram, India. In: **2<sup>nd</sup> International Conference on Geotechnical Issues in Energy, Infrastructure and Disaster Management (ICGEID 2024)**, IIT Patna, Bihar, India.
7. **Das R**, Das S, Singh TN (2023) Bedding-controlled landslide hazard in Assam Arakan Fold belt: A case study from Aizawl, Mizoram, India. In: **1<sup>st</sup> SLRMES Conference on Rock Mechanics for Infrastructure and Geo-Resources Development - an ISRM Specialized Conference**, Colombo, Sri Lanka, pp 83-84, [ISBN: 978-624-6506-00-1]

8. **Das R**, Phukon P, Niyogi A (2022) Numerical Modelling Approach to Evaluate Debris Slide: A Case Study from the North East Himalaya, India. In: Ghosh S, Mandal HS (Eds) **36<sup>th</sup> International Geological Congress**, Geosciences: The Basic Science for a Sustainable Future (The Volume of Abstracts). Geological Society of India, Bengaluru, New Delhi, pp 3274–3275, [ISBN: 978-93-80998-45-9]
9. Niyogi A, Sarkar K, **Das R**, Singh TN (2022) Evaluation of Rockfall Risk Potential Using Rigid Body Model Along National Highway 66 Near Ratnagiri, Maharashtra, India. In: Ghosh S, Mandal HS (Eds) **36<sup>th</sup> International Geological Congress**, Geosciences: The Basic Science for a Sustainable Future (The Volume of Abstracts). Geological Society of India, Bengaluru, New Delhi, pp 3215–3216, [ISBN: 978-93-80998-45-9]

### **Selected Seminars/Conferences Attended**

1. **ICGEID 2024**: 2<sup>nd</sup> International Conference on Geotechnical Issues in Energy, Infrastructure and Disaster Management, IIT Patna, Bihar, India, 18-20, Jan 2024.
2. **SLRMES 2023**: 1<sup>st</sup> SLRMES Conference on Rock Mechanics for Infrastructure and Geo-Resources Development - an ISRM Specialized Conference, Colombo, Sri Lanka, 3-7, Dec 2023.
3. **DRVC 2023**: 5<sup>th</sup> International Disaster Risk and Vulnerability Conference, Kerala, India, 19-21st Jan 2023.
4. **INDOROCK 2017**: 7<sup>th</sup> Indian Rock Conference, New Delhi, India, ISRM TT, 25-27<sup>th</sup> Oct 2017.
5. **ARMA 2017**: 51<sup>st</sup> US Rock Mechanics/Geomechanics Symposium, San Francisco, California, USA, 25-28<sup>th</sup> Jun 2017.
6. **ISRM, Recent Advances in Rock Engineering (RARE-2016)** Bengaluru, India, ISRM, 16-18<sup>th</sup> Nov 2016.
7. **INDOROCK 2016**: 6<sup>th</sup> Indian Rock Conference, Mumbai, India, ISRM TT, 17-18<sup>th</sup> Jun 2016.

### **MSc Dissertation supervision**

SI No.	Name of the Student	Dissertation topic	Year
5	Priyom Pankhi Handique (GLY2262014)	The effect of high temperature on tensile strength of sedimentary of Northeast India	2024
4	Ipshita Bezbaruah (GLY2162018)	Characterizing the physico-mechanical properties of rocks found along the Guwahati-Shillong National highway	2023
3	Jintu Moni Nath (GLY2162012)	Evaluation of geotechnical properties of Meghalayan Khasi Greenstone (Metadolerite) for suitability as a building stone	
2	Dhritismita Medhi (GLY2162014)	Rock mass characterization and classification along Guwahati Shillong national highway	
1	Debasish Mazumder (GLY2162019)	Simulating the rockfall hazards for different rock types of North-east India: An experimental study	

### **Technical Skills**

**Programming Skills:** Beginner level basic knowledge of C, C++, Python, MATLAB.

**Simulations and Software:** ITASCA Software Suite, COMSOL Multiphysics, Abaqus, RocScience Suite, Dips, PLAXIS, ArcGIS, Adobe Illustrator, Sigma-Pro, etc.

**Proficiency in Geotechnical Tests:** Compression Testing Machine (UCS, Shear, Tensile and Elastic Properties of rocks), Triaxial Testing Apparatus (Shear Strength Parameters), Ultrasonic Wave Velocity Test (PUNDIT Lab), Petrographic Microscopy, Slake Durability Test, Schmidt Hammer, Point Load Test.

### **Participation in consultancy projects & Field Experience**

1. Landslide **stability analysis** along Mumbra (Near Mumbai, Maharashtra) National Highway NH-4. (Sept 2016)

2. **Vibration measurement** test using “**InstanTel Minimate Pro**” of the concrete structure due to heavy machinery operations in GHARDA Chemical Plant in Chiplun, Maharashtra (Oct 2016)
3. **Vibration measurements** test using “**InstanTel Minimate Pro**” of hill slope due to heavy machinery operations in Colaba, Mumbai.
4. Geomechanical investigation of rock slope for **protection from rockfall** at Pune-Mumbai expressway. Maharashtra State Road Development Corporation, 2015-2016.
5. **Stability analysis of twin tunnel** in Bilaspur district of **Himachal Pradesh** (Nov 2014).
6. **Testing of soil samples** of Malsejghat, Maharashtra.
7. Others: Site investigation. Rockmass characterization (RMR, Q, SMR, etc.), rock core logging, Geological and Structural mapping, etc.

### **As a Reviewer**

1. *Environmental Earth Sciences* (**Springer**)
2. *KSCE Journal of Civil Engineering* (**Springer**)
3. *International Journal of Geo-Engineering* (**Springer**)
4. *Geotechnical and Geological Engineering* (**Springer**)
5. *Geomatics, Natural Hazards and Risk* (**Taylor & Francis**)
6. *Tunnelling and Underground Space Technology* (**Elsevier**)
7. *Bulletin of Engineering Geology and the Environment* (**Springer**)
8. *Journal of Rock Mechanics and Geotechnical Engineering* (**Elsevier**)
9. *Journal of Asian Architecture and Building Engineering* (**Taylor & Francis**)
10. *Himalayan Geology Journal* (**Wadia Institute of Himalayan Geology, Dehradun**)
11. *International Journal of Physical Modelling in Geotechnics* (**Institution of Civil Engineers, ICE**)

### **Member – Professional Body**

#### **Name**

- Society of Petroleum Engineers (SPE)
- American Rock Mechanics Association (ARMA)
- The Journal of Geological Society of India (JGSI)
- American Association of Petroleum Geologists (AAPG)
- Indian Society for Rock Mechanics and Tunneling Technology (ISRMTT)

### **Faculty induction / Orientation programme / Refresher course completed**

1. Completed 4-week Faculty Induction/Orientation Programme from Teaching Learning Centre, Ramanujan College, University of Delhi under the aegis of Ministry of Education, Government of India, PMMMNMTT Scheme (17 Sept - 16 Oct 2021): obtained Grade A+
  2. Completed 1-month Faculty Induction Programme (FIP) from UGC – Human Resource Development Centre, University of Allahabad (7 Nov - 6 Dec 2022): obtained Grade A
  3. Completed 2-week Refresher course in Earth Sciences and Allied Subjects (Multidisciplinary) of UGC-Human Resource Development Centre, NEHU, Shillong (19 Feb - 02 Mar 2024): obtained Grade A+
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