Debarati Das

Chick Keller Postdoctoral Fellow
ISR-6: Space Remote Sensing & Data Science
Los Alamos National Laboratory

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Career:

Los Alamos National Laboratory (2022-current)

- Postdoctoral Research Associate (2024-present)
- Chick Keller Fellowship (2022-2024)
- Science Payload Uplink Lead trainee for NASA Curiosity rover's ChemCam instrument (2023-24)
- NASA proposal review panelist

McGill University, Montreal, Canada (2017-2022)

- **PhD** in Planetary Geochemistry (Department of Earth & Planetary Sciences)
- Graduate academic advisors: Dr. Kim Berlo, co-advisor: Dr. Richard Leveille
- **GPA: 4.0**
- NASA's Mars Science Laboratory Science team member since May 2018-2024
- NASA proposal review panelist

Institute for Planetary Materials, Okayama University, Japan (2014-2017)

- 3-year **master's program** in Planetary Geochemistry (Pheasant Memorial Laboratory)
- Academic advisor: Takuya Kunihiro
- Grade: **A+ (GPA: 4.0)**

Indian Institute of Technology, Mumbai, India (2012-2014)

- 2-year **master's program** in Applied Geology (Department of Earth Science)
- Academic advisor: Bobby Mathews
- Cumulative performance index: **9.02/10 (GPA: 4.0)**

St. Xavier's College, Mumbai, India (2008-2011)

- 3-year **bachelor's program** in Applied Geology (Department of Geology)
- Percentage: **85.87% (GPA: 4.0)**

Research Grants and Fellowships:

- ISR Early Career Pitch Day Grant (2024, Los Alamos National Laboratory)
- Chick Keller Postdoctoral Fellowship (2022, Los Alamos National Laboratory) https://www.linkedin.com/pulse/from-earth-mars-back-again-los-alamos-national-laboratory
- National Geographic Early Career Grant (2018, National Geographic Grant https://www.nationalgeographic.org/find-explorers/debarati-das)

Scholarships:

- Graduate Research Enhancement and Travel award (for conference attendance, 2022, McGill University, Canada)
- Graduate Research Enhancement and Travel award (for conference attendance, 2021, McGill University, Canada)
- J.B Lynch award ($15000, 2020, McGill University)
- Eric Mountjoy Fellowship ($8000, 2019, McGill University)
- LeRoy Memorial Fellowship ($3000, 2018, McGill University)
- Astrobiology Grand Tour Student Scholarship (2018, University of New South Wales, Australia)

Academic Awards:

- Departmental symposium poster award (2019, McGill University)
- Departmental symposium poster award (2018, McGill University)
- Canadian Space Summit Student Challenge Award (2018, Students for the Exploration and Development of Space: SEDS, Canada) video link: https://www.youtube.com/watch?v=sm6szUoq5Ss
- Merit based Differential Fee Waiver (2018, McGill University)

- Salehbhai Kaderbhai Khalil Endowment Prize for highest score (2011, Mumbai University, India)
- Late Noshirwan H. Sethna Geology Scholarship (2011, St. Xavier's college, India)

Peer reviewed Publications:

- First authored: Title: **Boron and Lithium in Calcium Sulfate Veins: Tracking Precipitation of Diagenetic Materials in Vera Rubin Ridge, Gale Crater**. Author list: Das, D., Gasda, P. J., Wiens, R. C., Leveille, R. J., Berlo, K., Frydenvang, J., Mangold, N., Kronyak, R. E., Schwenzer, S. P., Forni, O., Cousin, A., (2020) *Journal of Geophysical Research: Planets,* Volume: 125, 8. Total number of citations on Google Scholar**:** 9

- Submitted (August 2024): **Simulating evaporative wet and dry cycles in Gale crater, Mars using thermochemical modelling techniques.** Author list: D. Das, S.M.R. Turner, S.P Schwenzer, P. J. Gasda, J. Palandri, K. Berlo, R. J. Leveille, L. Crossey, B. M. Tutolo, N. L. Lanza.

- In preparation**: Estimating past fluid pH and evaporative conditions in Gale crater using terrestrial analog evaporites and phyllosilicates.** Author list: D. Das, P. J. Gasda, K. Berlo, R. J. Leveille, M. A. Nellessen, L. Crossey, E. Peterson, R. Beal, A. L. Reyes-Newell, S. M. Clegg, A. M. Ollila, N. L. Lanza.

- In preparation: **VISIR Reflectance studies of Planetary analog materials using Spectro-goniometer technique.** Author list: D. Das, R. Martinez, C. Legett, E. Sklute, S.M. Clegg, A. Ziemann, Wolf. U.

- Co-authored (submitted-July 2024): **Elevated-Mn ChemCam Targets Illuminating Mn Redox Cycling and Diagenesis in the Bradbury Rise, Gale Crater, Mars**. Author list: J. M. Comellas, A. Essunfeld, R. Morris, N. Lanza, P. J. Gasda, D. Das, D. Delapp, R. C. Wiens, O. Gasnault, S. Clegg, C. C. Bedford, E. Dehouck, B. C. Clark, R. Anderson, W. Fisher, V. Lueth.

- Co-authored (submitted-June 2024): **Amapari Marker Band Metal-Enrichments: Potential Mechanisms and Implications for Surface and Subsurface Water and Weathering in Gale crater**. Author list: PJ Gasda, J Comellas, A Essunfeld, D Das, M Nellessen, E Dehouck, R Anderson, W Rapin, N Lanza, P-Y Meslin, G David, L Crossey, H Newsom, M Hoffman, D Fey, R Kronyak, J Frydenvang, J Bridges, SMR Turner, SP Schwenzer, RC Wiens, S Clegg, S Maurice, O Gasnault

- Co-authored (in preparation): **Formation of Warm-Temperature Salts in Gale Crater, Mars.** Author list: E. B. Hughes, F. Rivera-Hernández, J. Wray, W. Rapin, J. Johnson, K. Rammelkamp, Olivier Forni, P. Gasda, B. Tutolo, A. Eng, E. Sklute, D. Das, A. Roberts, R. Y. Sheppard, E. Dehouck, O. Gasnault, N. Lanza.

- Co-authored: **Boron adsorption in clay minerals: Implications for martian groundwater chemistry and boron on Mars**. Author list: Nellessen, M. A., Gasda, P. J., Crossey L., Peterson E., Abdulmehdi A., Zhang J., Zhou W., Das, D., Delapp, D., Clegg, S., Wiens, R. *Icarus* 401 (2023): 115599. Total number of citations on Google Scholar: 2

- Co-authored: **Askival: An altered feldspathic cumulate sample in Gale crater.** Author list: Bowden, D.L., Bridges, J.C., Cousin, A., Rapin, W., Semprich, J., Gasnault, O., Forni, O., Gasda, P., Das, D., Payré, V. and Sautter, V., 2023. *Meteoritics & Planetary Science*, *58*(1), pp.41-62. Total number of citations on Google Scholar: 1

- Co-authored: **Overview of the Morphology and Chemistry of Diagenesis in the Clay-Rich Unit of Gale Crater, Mars**. Author list: Gasda, P. J., Comellas, J., Essunfeld, A., Das D., Bryk, A. B., Schwenzer, S. P., Crossey, L., Herkenhoff, K., Johnson, J. R., Newsom, H., Lanza, N. L.,

Rapin, W., Goetz, W., Meslin, P-Y., Bridges, J. C., Anderson, R., David, G., Turner, S. M. R., Thorpe, M. T., Kah, L., Frydenvang, J., Kronyak., R., Caravaca, G., Ollila, A., Le Mouelic, S., Nellessen, M., Hoffman, M., Fey, D., Cousin, A., Wiens, R. C., Clegg, S. M., Maurice, S., Gasnault, O., Delapp, D., Reyes-Newell, A., (2022), *Journal of Geophysical Research: Planets.* Accepted on April 8, 2022. Total number of citations on Google Scholar: 19

- Co-authored: **Biosignature detection by Mars rover equivalent instruments in samples from the CanMars Mars Sample Return Analogue Deployment.** Author list: Stromberg, J. M., Parkinson, A., Morison, M., Cloutis, E., Casson, N., Applin, D., Poitras J., Moreas Marti A., Maggiori C., Cousins C., Whyte L., Kruzelecky R., Das D., Leveille, R., Berlo, K., Sharma S. K., Acosta-Maeda, T., Daly, M., Lalla, E., (2019). *Planetary and Space Science*, Volume: 176. Total number of citations on Google Scholar: 23

- Co-authored: **Titanite mineralization of Microbial Bioalteration textures in Jurassic Volcanic Glass, Coast Range Ophiolite, California.** Author list: Izawa, M., Banerjee, N. R., Shervais, J. W., Flemming, R. L., Hetherington, C. J., Muehlenbachs, K., Schultz C., Das D., Barry B. H., (2019). *Frontiers in Earth Science*, Volume: *7*, 315. Total number of citations on Google Scholar: 6

Talks and poster presentations:

- **Poster:** D. Das, R. Martinez, C. Legett, S. Clegg, A. Ziemann, E. Sklute.(2024, December). **VISIR reflectance studies of planetary analog materials using spectro-goniometer techniques.** *American Geophysical Union Conference, 2024.*

- **Poster:** D Das, VV Vesselinov, T Kliphuis, E Peterson, L Crossey, MA Nellessen, PJ Gasda, E Sklute, S Clegg, N Lanza (2024, March). **Characterizing Boron and Lithium Partitioning in Martian Analog Materials Using Comprehensive Geo-Chemical Analysis, Principal Component Analysis, and Machine Learning.** *Lunar and Planetary Science Conference* (Vol. 55).

- **Poster**: D. Das, P. J. Gasda, S. P. Schwenzer, S. M. Turner, B. M. Tutolo, A. M. Ollila, A. C. Strzelecki, N. L. Lanza. (2023, December). **Expanding the thermochemical parameter database for improved Martian and terrestrial geochemical models.** *American Geophysical Union Conference, 2023.*

- **Talk:** Das D., S.M.R. Turner, S.P Schwenzer, P. J. Gasda, J. Palandri, K. Berlo, R. J. Leveille, L. Crossey, B. M. Tutolo, N. L. Lanza. (2023, March). **Estimating Past Fluid pH and Evaporative Conditions in Gale Crater, Using Terrestrial Analog Evaporites and Clays**. *Lunar and Planetary Science Conference* (Vol. 54).

- **Poster**: Das, D., Gasda, P. J., Leveille, R. J., Berlo, K., Nellessen M. A., Crossey L., Peterson E., Beal R., Reyes-Newell A. L., Clegg S. M., Ollila A. M., Lanza N. L., (2022, March). **Evaporite Veins of Southern California: Searching for the Origins of Boron and Lithium in Calcium Sulfate Veins of Gale Crater**. *Lunar and Planetary Science Conference* (Vol. 53).

- **Poster:** Das, D., Gasda, P. J., Schwenzer, S. P., Crossey, L., Turner, S. M. R., Leveille, R. J., Berlo, K., Frydenvang J. (2022, March). **Understanding the Formation Stages of Evaporites in Gale Crater Using Thermochemical Modeling**. *Lunar and Planetary Science Conference* (Vol. 53).

- **Talk:** Das, D., Gasda, P. J., Schwenzer, S. P., Crossey, L., Turner, S. M. R., Leveille, R. J., Berlo, K., Wiens, R. C., (2021, March). **Modelling the Behaviour of Selected Water-Soluble**

Elements in Calcium Sulfate Veins of Gale Crater. *Lunar and Planetary Science Conference* (Vol. 52).

- **Poster:** Das, D., Gasda, P. J., Wiens, R. C., Leveille, R. J., Berlo, K., Kronyak, R., (2020). **Evaporites in Southern California: Preliminary Results from Analogs of Boron-Rich Calcium Sulfate Veins in Gale Crater, Mars.** *Lunar and Planetary Science Conference* (Vol. 51).

- **Poster:** Das, D., Gasda, P. J., Wiens, R. C., Leveille, R. J., & Berlo, K. (2020, October) **Fluid-Clay-Evaporite Interaction: An Analog for Evaporite Geochemistry in Gale Crater.** Clay Mineral Society Annual conference, 2020.

- **Poster:** Das, D., Gasda, P. J., Wiens, R. C., Leveille, R. J., & Berlo, K. (2019, March). **Measurement of Boron in Gale Crater Near Vera Rubin Ridge.** *Lunar and Planetary Science Conference* (Vol. 50) at Houston, TX.

Skills (5-proficient, 1-novice):

- CHIM-XPT (3), Matlab (2), Python (2), R (2), Adobe Illustrator (4), Adobe Photoshop (5)
- Languages: English (5), Hindi (5), Bengali (5), Marathi (3), Japanese (2), French (0.5).

Outreach, Leadership, and Professional Experiences:

Community engagement, outreach, and invited talks:

- ISR-6 Internal Seminar Series co-organizer (2023-current)
- NASA panel reviewer (February 2024)
- American Geophysical Union conference session co-chair (Martian Aqueous Processes Inferred from Observations, Analogues, and Experiments- December 2023)
- NASA panel executive secretary (Dec 2020)
- Journal reviewer for:
    - Nature Geosciences
    - Journal of Geophysical Research: Planets
    - Geochimica et Cosmochimica Acta
    - Meteoritics and Planetary Science
- National Geographic Explorer blogger (Apr 2019 – December 2022)
- Artwork sent to space on a Planet satellite for the largest exhibition in space (https://www.cbc.ca/player/play/1993061955789)
- National Geographic Education speaker (Oct 2023, https://www.youtube.com/watch?v=QaePjdeWI0c)
- National Geographic Education speaker (Nov 2021, https://www.youtube.com/watch?v=4OmHqrBxpz8&t=1971s)
- National Geographic Education speaker (Oct 2019, https://www.youtube.com/watch?v=_0U4gn6GIQc&t=589s)
- Bunsen and Beaker podcast chat about geochemistry on Mars: https://bunsenbernerbmd.buzzsprout.com/413041/13220859-season-5-episode-22-from-ocean-hues-to-mars-views-with-dr-debarati-das)
- Science based art illustrations for Montreal's Astronomy workshop platform Plateau Astro (January 2021, https://plateauastro.com/shop/future-skies-montreal-2021 and https://mailchi.mp/819d9eec7486/the-day-we-land-on-mars-future-skies?fbclid=IwAR2tPtJrbuumMe6aSlj_GTHeQIKK0BxY2l47I_DP01Uz-2fY1KpaXw-G7_M)
- WeMartians Podcast- Perseverance landing day discussion (February 2021 https://www.youtube.com/watch?v=6GlWMIPTguQ&t=2s)
- Off Nominal podcast- Interview with Jaime Green; author of "The Possibility of Life" https://offnom.com/episodes/107)

- Science educator volunteer for Let's Talk Science (June 2018-current, https://www.youtube.com/watch?v=Bnrg5wNEa6Q&list=PLSHdRdev5PmzB__5H8GHAA11ZjnWoX0rW)
- University of Southampton invited talk (Title: Chasing water on Mars with Lasers, July, 2020)
- Speaker for Pint of Science (May 2019, 2020, Montreal)
- Diaries of Space Explorers, chat about importance of creativity in Science (June 2021, https://diariesofspace.podbean.com/e/the-diaries-of-space-explorers-episode-20-fostering-creativity-in-a-kinder-academic-community/)
- Speaker for Broad Science Podcast (May 2019, McGill University https://soundcloud.com/broad-science/exploring-life-on-mars-extended-interview-with-debarati-das)
- Space science themed art illustration based small business promoting inclusivity and enthusiasm for space science (https://www.etsy.com/shop/EnterStellarCo?ref=simple-shop-header-name&listing_id=1121152084)

Leadership:

- Equity, Diversity, and Inclusivity student representative (2020-2022, Earth and Planetary Sciences, McGill University)
- Department Sustainability Committee student representative (2020-2022, Earth and Planetary Science, McGill University)
- Departmental Science Outreach student representative (2019-2020, EPS McGill University)
- Departmental Student Body Vice President (2018–2019, EPS, McGill University)
- Education and outreach leader for McGill Space Group (2018–2019, McGill University)

Professional experiences:

- Teaching assistant (2017- 2021, McGill University, Montreal, Canada)
- Research assistant (2014-2017, Institute for Planetary Materials, Okayama, Japan)
- Assistant professor (January- April 2014, St. Xavier's College, Mumbai, India)
- Summer intern: Misasa International Student Internship Program (July-August 2013, Institute for Planetary Materials, Misasa, Japan)
- Summer intern: Petroleum Exploration and Production (May 2012, Reliance Industries Limited, Mumbai, India)