

DAMANVEER S. GREWAL

Department of Earth, Environmental, and Planetary Sciences, Rice University, 6100 Main Street,
MS-126, Houston, TX 77005, USA

damanveer.iitkgp@gmail.com • dsg10@rice.edu • www.damanveergrewal.com

EDUCATION

- 2016-Present **PhD (Geochemistry/Planetary Science)**
Rice University, Houston, USA
Origin of nitrogen and carbon in rocky bodies of the inner Solar System
- 2007-2012 **Integrated MSc (Applied Geology)**
Indian Institute of Technology (IIT), Kharagpur, India

PROFESSIONAL APPOINTMENTS

- 2022 (January) Barr Foundation Postdoctoral Fellow, California Institute of Technology, Pasadena, USA
- 2016-Present Research Assistant, Rice University, Houston, USA
- 2014-15 Chemistry Teacher, Lakshya Institute, Patiala, India
- 2012-14 Chemistry Teacher, iQuest Eduventures, Patiala, India
- 2010 Research Intern, Christian-Albrechts-Universität zu Kiel, Germany

GRANTS, FELLOWSHIPS, AND AWARDS

- 2022 Barr Foundation Postdoctoral Fellowship, California Institute of Technology (\$136,500)
- 2021 Alexander von Humboldt Postdoctoral Fellowship (€73,680) *deferred*
- 2021 SESE Exploration Postdoctoral Fellowship, Arizona State University (\$247,000) *declined*
- 2021 Outstanding Graduate Student Award, Rice University (\$2000)
- 2021 Goldschmidt Registration Grant
- 2019 Future Investigators in NASA Earth and Space Science and Technology (FINNEST) (\$90,000)
- 2019 Lodieska Stockbridge Vaughn Fellowship, Rice University (\$16,750)
- 2019 Torkild Rieber Award in Geology, Rice University (\$2000)
- 2019 Goldschmidt Travel Grant (\$1000)
- 2018 Goldschmidt Travel Grant (\$1800)
- 2015 Award for teaching excellence, Lakshya Institute
- 2014 Best teacher, iQuest Eduventures
- 2013 Best teacher, iQuest Eduventures
- 2007 Innovation in Science Pursuit for Inspired Research, Department of Science and Technology, India

PEER-REVIEWED ARTICLES

Published

(# designates supervised interns)

9. **Grewal, D.S.**, Dasgupta, R., Aithala, S.# (2021) The effect of carbon concentration on its core-mantle partitioning behavior in inner Solar System rocky bodies. *Earth and Planetary Science Letters*. doi: [10.1016/j.epsl.2021.117090](https://doi.org/10.1016/j.epsl.2021.117090)
8. **Grewal, D.S.**, Dasgupta, R., Hough T.#, Farnell, A.# (2021) Rates of protoplanetary accretion and differentiation set nitrogen budget of rocky planets. *Nature Geoscience* **14**: 369-376. doi: [10.1038/s41561-021-00733-0](https://doi.org/10.1038/s41561-021-00733-0)

DAMANVEER S. GREWAL

7. **Grewal, D.S.**, Dasgupta, R., Marty, B. (2021) A very early origin of nitrogen in inner Solar System protoplanets. *Nature Astronomy* **5**: 356-364. doi: [10.1038/s41550-020-01283-y](https://doi.org/10.1038/s41550-020-01283-y)
6. **Grewal, D.S.**, Dasgupta, R., Farnell, A.[#] (2020) The speciation of carbon, nitrogen, and water in magma oceans and its effect on volatile partitioning between major reservoirs of the Solar System rocky bodies. *Geochimica et Cosmochimica Acta* **280**: 281-301. doi: [10.1016/j.gca.2020.04.023](https://doi.org/10.1016/j.gca.2020.04.023)
5. Dasgupta, R., **Grewal, D.S.** (2019). Origin and Early Differentiation of Carbon and Associated Life-Essential Volatile Elements on Earth. In Orcutt, B., Daniel, I., Dasgupta, R. (Eds.) *Deep Carbon: Past to Present (Cambridge University Press)*. 4-39. doi: [10.1017/9781108677950.002](https://doi.org/10.1017/9781108677950.002)
4. Hakim, K., Spaargaren, R., **Grewal D.S.**, Rohrbach A., Brendt J., Dominik, C., van Westrenen, W. (2019) A laboratory approach to probe the mineralogy of carbon-rich rocky exoplanets. *Astrobiology* **9**: Number 7. doi: [10.1089/ast.2018.1930](https://doi.org/10.1089/ast.2018.1930)
3. **Grewal, D.S.**, Dasgupta, R., Holmes, A.K.[#], Costin, G, Li Y., Tsuno K. (2019) The fate of nitrogen during core-mantle separation on Earth. *Geochimica et Cosmochimica Acta* **251**: 87-115. doi: [10.1016/j.gca.2019.02.009](https://doi.org/10.1016/j.gca.2019.02.009)
2. **Grewal, D.S.**, Dasgupta, R., Sun, C., Tsuno K., Costin, G. (2019) Delivery of Carbon, Nitrogen and Sulfur to the Silicate Earth. *Science Advances* **5**: eaau3669. doi: [10.1126/sciadv.aau3669](https://doi.org/10.1126/sciadv.aau3669)
1. Tsuno, K., **Grewal, D.S.**, Dasgupta, R. (2018). Core-mantle fractionation of carbon in Earth and Mars: The effects of sulfur. *Geochimica et Cosmochimica Acta* **238**: 477-495. doi: [10.1016/j.gca.2018.07.010](https://doi.org/10.1016/j.gca.2018.07.010)

Under review

10. **Grewal, D.S.**, Seales, J., Dasgupta, R. (202x) Magma Ocean differentiation regime of Solar System's earliest protoplanets constrained by nitrogen and carbon fractionation. *Earth and Planetary Science Letters*

SEMINARS AND COLLOQUIA

- **Grewal, D.S.** A very early origin of nitrogen in inner Solar System protoplanets. *Prebiotic Chemistry and Early Earth Environments Consortium Seminar Series* (August 2021)
- **Grewal, D.S.** Origin of nitrogen in the inner Solar System protoplanets and planets. *Geodynamics Research Center, Ehime University* (June 2021)
- **Grewal, D.S.** Origin of nitrogen in the inner Solar System protoplanets and planets. *University of Cambridge (Geochemistry group)* (June 2021)
- **Grewal, D.S.** Origin of nitrogen in the inner Solar System protoplanets and planets. *CRPG Nancy* (April 2021)
- **Grewal, D.S.** Origin of major volatiles in rocky bodies of the inner Solar System. *University of California, Riverside (Biogeochemistry group)* (April 2020)

PRESENTATIONS AT SCIENTIFIC MEETINGS AND CONFERENCES

(* designates presenting author, # designates supervised interns)

31. **Grewal, D.S.***, Dasgupta, R, Aithala, S.[#] The effect of carbon concentration on its core-mantle partitioning behavior in inner Solar System rocky bodies. *American Geophysical Union Fall Meeting* (December 2021) [ORAL]
30. **Grewal, D.S.***, Dasgupta, R, Hough T.[#], Farnell, A.[#] Rates of protoplanetary accretion and differentiation set nitrogen budget of rocky planets. *American Geophysical Union Fall Meeting* (December 2021) [ORAL]

DAMANVEER S. GREWAL

29. **Grewal, D.S.***, Dasgupta, R., Marty, B. A very early origin of nitrogen in inner Solar System protoplanets. *Goldschmidt Conference* (July 2021) [ORAL] *Invited*
28. Dasgupta, R.*, **Grewal, D.S.**, Hough T.#, Farnell, A.# (2021) Nitrogen depletion in the inner Solar System planets linked to the rates of protoplanetary accretion and differentiation. *Goldschmidt Conference* (July 2021) [ORAL]
27. **Grewal, D.S.***, Dasgupta, R., Marty, B. A very early origin of nitrogen in inner Solar System protoplanets. *Lunar and Planetary Science Conference* (July 2021) [ORAL]
26. **Grewal, D.S.***, Dasgupta, R., Marty, B. A very early origin of nitrogen in inner Solar System protoplanets. *Habitable Worlds Workshop* (February 2021) [POSTER]
25. **Grewal, D.S.***, Dasgupta, R. Magma Ocean differentiation regime in the earliest formed rocky bodies - Internal or External? *Habitable Worlds Workshop* (February 2021) [POSTER]
24. **Grewal, D.S.***, Dasgupta, R., Aithala, S.# The effect of bulk carbon on its core-mantle partitioning behavior. *American Geophysical Union Fall Meeting* (December 2020) [ORAL]
23. Dasgupta, R., **Grewal, D.S.*** Magma Ocean differentiation regime in the earliest formed rocky bodies inferred from volatile abundances in iron meteorites. *American Geophysical Union Fall Meeting* (December 2020) [ORAL]
22. **Grewal, D.S.***, Dasgupta, R. The Effect of Differentiation via Internal Versus External Magma Oceans on the Carbon and Nitrogen Budgets of Rocky Planets. *Goldschmidt Conference* (June 2020) [ORAL]
21. **Grewal, D.S.***, Hough T.#, Dasgupta, R., Aithala, S.# Protoplanetary Differentiation is the Primary Cause of Nitrogen Depletion in Bulk Silicate Reservoirs of Rocky Bodies. *Lunar and Planetary Science Conference* (March 2020) [ORAL] *Cancelled due to COVID-19*
20. **Grewal, D.S.***, Dasgupta, R., Hough T.# The core-mantle partitioning of carbon and nitrogen in carbon-undersaturated ultramafic systems. *American Geophysical Union Fall Meeting* (December 2019) [POSTER]
19. **Grewal, D.S.***, Hough T.#, Dasgupta, R. The core-mantle partitioning of nitrogen in carbon-undersaturated ultramafic Systems. *Goldschmidt Conference* (August 2019) [ORAL]
18. Dasgupta, R.*, **Grewal, D.S.**, Tsuno K. Control of Accretion and Early Differentiation Process on the Diversity of Volatile Inventory of Rocky Solar System Objects. *Goldschmidt Conference* (August 2019) [ORAL]
17. Dasgupta, R.*, **Grewal, D.S.**, Tsuno K. Origin of Life-essential Volatile Elements in Rocky Planets – Insights from Accretion and Early Differentiation of Inner Solar System Objects. *Astrobiology Science Conference* (June 2019) [ORAL]
16. **Grewal, D.S.***, Dasgupta, R., Holmes, A.K.#, Costin, G, Li Y., Tsuno K. The fate of nitrogen during core-mantle separation. *Lunar and Planetary Science Conference* (March 2019) [ORAL]
15. **Grewal, D.S.***, Dasgupta, R., Farnell, A.#, Hough T.#, Costin, G, Tsuno K, Li Y., Holmes, A.K. The compositions of the early atmospheres formed by magma ocean degassing. *Lunar and Planetary Science Conference* (March 2019) [POSTER]
14. Dasgupta, R., **Grewal, D.S.***, Sun, C., Tsuno, K., Costin, G. The Origin of Earth's Major Volatiles via Accretion of a Large Planetary Embryo. *Lunar and Planetary Science Conference* (March 2019) [POSTER]
13. **Grewal, D.S.***, Dasgupta, R., Farnell, A.#, Hough T.#, Costin, G, Tsuno K, Li Y., Holmes, A.K. Evolution of the C/N ratio of the Bulk Silicate Earth as a probe to understand the roles of volatile accretion and differentiation. *American Geophysical Union Fall Meeting* (December 2018) [POSTER]

DAMANVEER S. GREWAL

12. Dasgupta, R.* , **Grewal, D.S.** Origin and Early Differentiation of Carbon and Associated Life-Essential Volatile Elements on Earth. *American Geophysical Union Fall Meeting* (December 2018) [POSTER]
11. **Grewal, D.S.***, Dasgupta, R., Holmes, A.K.#, Costin, G, Li Y., Tsuno K. The fate of nitrogen during core-mantle separation on Earth. *Goldschmidt Conference* (August 2018) [ORAL]
10. **Grewal, D.S.***, Dasgupta, R., Costin, G, Tsuno K, Li Y., Holmes, A.K.# Evolution of the C/N ratio of the Bulk Silicate Earth as a probe to understand the roles of volatile accretion and differentiation. *Gordon Research Conference* (June 2018) [POSTER]
9. **Grewal, D.S.***, Dasgupta, R., Sun, C., Tsuno K., Costin, G. Delivery of Carbon, Nitrogen and Sulfur to the **Silicate** Earth. *Carbon in the Solar System Workshop* (April 2018) [ORAL]
8. **Grewal, D.S.***, Dasgupta, R. The origin of volatiles on Earth. *Pre-IRESS Workshop, Rice University* (February 2018) [ORAL]
7. **Grewal, D.S.***, Dasgupta, R., Sun, C., Tsuno, K. Simultaneous alloy-silicate fractionation of carbon, nitrogen, and sulfur at high pressures and temperatures: Implications for establishing the volatile budget of the Earth. *American Geophysical Union Fall Meeting* (December 2017) [ORAL]
6. Tsuno, K.* , Dasgupta, R., **Grewal, D.S.** The effects of sulfur on carbon partitioning and solubility in high pressure-temperature alloy-silicate systems: Implications for fractionation of carbon and sulfur during accretion and core formation of Earth and Mars. *American Geophysical Union Fall Meeting* (December 2017) [ORAL]
5. **Grewal, D.S.***, Dasgupta, R., Sun, C., Tsuno, K., Costin, G. Delivery of Carbon, Nitrogen and Sulfur to the Silicate Earth by a Giant Impact. *Deep Carbon Observatory Extreme Physics and Chemistry Workshop, Arizona State University* (November 2017) [ORAL]
4. Tsuno, K.* , Dasgupta, R., **Grewal, D.S.** The effects of sulfur on carbon partitioning and solubility in high pressure-temperature alloy-silicate systems. *Deep Carbon Observatory Extreme Physics and Chemistry Workshop, Arizona State University* (November 2017) [POSTER]
3. **Grewal, D.S.***, Dasgupta, R., Sun, C., Tsuno, K., Costin, G. Delivery of Carbon, Nitrogen and Sulfur to the Silicate Earth by a Giant Impact. *Graduate Interdisciplinary Earth Science Symposia, Rice University* (November 2017) [ORAL]
2. **Grewal, D.S.***, Dasgupta, R., Tsuno, K. Simultaneous alloy-silicate fractionation of carbon, nitrogen, and sulfur at high pressures and temperatures: Implications for establishing the volatile budget of the Earth. *Gordon Research Conference* (June 2017). [POSTER]
1. Tsuno, K.* , Dasgupta, R., **Grewal, D.S.** The effects of sulfur on carbon partitioning and solubility in high pressure-temperature alloy-silicate systems. *Gordon Research Conference* (June 2017). [POSTER]

SELECTED POPULAR MEDIA COVERAGE

- *Our Nature Geoscience* (2021) was covered by [Universe Today](#), [CosmoQuest](#), [Science Daily](#), [Centauri Dreams](#), [Space Daily](#), [Newswise](#), [Phys.org](#), and [Scienmag](#), amongst other news outlets.
- *Our Nature Astronomy* (2021) was covered by [Many Worlds](#), [EOS](#), [TechExplorist](#), [Medium](#), [Science Daily](#), [Phys.org](#), [Sciencenewsnet](#), and [SciTechDaily](#), amongst other news outlets.
- Our *Science Advances* (2019) paper had one of the highest altimetric score of research published in geochemistry/planetary science ([1435](#); top 0.02% of all research papers ever tracked) with press release being covered by 161 news outlets across the globe including [CNN](#), [BBC](#), [The Guardian](#), [Daily Mail](#), [Spain's News](#), [Times of India](#), [China Daily](#), [Phys.org](#), [Universe Today](#), [Space Daily](#), [Sky News](#),

DAMANVEER S. GREWAL

[Space.com](#), [Yahoo News](#), [USA Today](#), [Vice](#), [Science Daily](#), [Gizmodo](#), [Sky & Telescope](#), [The Wire](#), and [Inverse](#).

SCIENCE ARTICLES

- **Grewal, D.S.**, Furtney, M. When planets collide: Origin of life on Earth. *The Science Breaker* (under review)
- **Grewal, D.S.**, Lv, M., Dorfman, S. Press Release - *Extreme Physics and Chemistry Community Workshop, Arizona State University, USA. Deep Carbon Observatory* (November 2017)

SYNERGISTIC ACTIVITIES

Academic

- 2021 Co-organizer, CLEVER Planets Seminar Series
- 2020 Panelist, Session: Forming Habitable Worlds, Habitable Worlds 2021 Workshop
- 2017-Present Reviewer for *Earth and Planetary Science Letters*, *Geochemical Perspectives Letters*, *Geochimica et Cosmochimica Acta*, *Journal of Geophysical Research: Planets*, *Nature Communications*, and *Science Advances*

Non-academic

- 2021 Member of Unlearning Racism in Geosciences (URGE) Admissions and Hiring Policies Group, Rice University, Houston (USA)
- 2021 Member of URGE Policies for Working with Communities of Color Group, Rice University, Houston (USA)
- 2021 Volunteer Speaker for Department of Earth, Environmental and Planetary Sciences, O-Week Academic Fair, Rice University, Houston (USA)
- 2012-15 Volunteer teacher, Tibetan Village Children's School, Suja (India)
- 2012-14 Volunteer student recruiter and teacher, Pehal Charitable Trust, Patiala (India)

PRACTICAL AND ANALYTICAL PROFICIENCY

Performing high P-T experiments using piston-cylinder and multi-anvil apparatus, Electron Probe Micro Analyzer (EPMA), Fourier Transform Infrared Spectroscopy (FTIR), Raman Spectroscopy, programming in MATLAB, and Secondary Ion Mass Spectrometry (in collaboration with others)

TEACHING EXPERIENCE

- 2020 Lecturer for ESCI 114 – Discoveries in Earth, Environmental and Planetary Sciences
- 2019 Lecturer for ESCI 114 – Discoveries in Earth, Environmental and Planetary Sciences
- 2018 Guest Lecturer for ESCI 412/612 – Advanced Petrology
- 2012-15 Lectures on undergraduate level Physical, Organic and Inorganic Chemistry to more than 800 students for engineering, medical and science university entrance examinations
- 2012-15 Lectures on Physical, Organic and Inorganic Chemistry for International and National Chemistry Olympiads

RESEARCH SUPERVISION

- 2019-20 Melinda Zhou (high school student from Mayde Creek High School, Katy)
- 2019-20 Sanath Aithala (undergraduate from University of Houston)
- 2019 Naod Araya (undergraduate thesis co-supervisor at Rice University)

DAMANVEER S. GREWAL

- 2019 Ryan Anselm (high school student from Clemens High School, Sugarland)
- 2018-19 Alexandra Farnell (high school student from St. John's School, Houston)
- 2018-19 Taylor Hough (undergraduate student from Brown University)
- 2017 Rohil P. Bathija (high school student from Awty International School, Houston)
- 2016-18 Alexandra K. Holmes (undergraduate thesis co-supervisor at Rice University)

GEOLOGICAL FIELD EXPERIENCE

- 2017 Study of volcanic eruption deposits and collecting xenoliths, South California, USA
- 2015 Study of volcanic deposits in the Cascades, USA
- 2011 Structural mapping of a complex metamorphic terrain in the Eastern Ghats Province, Angul (Eastern India)
- 2010 Reconstruction of Paleocurrent direction and Paleostratigraphy in the Rewa Basin, Madhya Pradesh (Eastern India)
- 2010 Strike mapping and ore volume estimation in an underground Uranium mine, Jaduguda (Eastern India)
- 2009 Mapping in a sedimentary-metamorphic terrain of the Singhbhum Shear Zone Jharkhand (Eastern India)
- 2008 Structural mapping and identification of deformation structures in a Precambrian orogenic belt, Ghatshila (Eastern India)

MEMBERSHIP WITH PROFESSIONAL SOCIETIES

- 2018-Present Geochemical Society
- 2016-Present American Geophysical Union