Dr. Peter Schroedl
Department of Biology
5 Cummington Mall
Boston, MA 02215
astrobio@bu.edu

Education

Ph.D., Biology, Boston University — *2026*

Dissertation: Microbe–Mineral Interactions in Extremophile Habitats

B.S., Earth Sciences, University of Minnesota — *2017*

Research Interests

Geomicrobiology; microbe–mineral interactions; microbial ecology; terrestrial biogeochemistry; marine biogeochemistry; deep-sea ecosystems; desert ecosystems; planetary analog environments; biosignatures; laser microtomy; isotope geochemistry; molecular biology.

Publications

1. Hadland, H., Hamilton, C.W., **Schroedl, P.,** Calabrese, F., Marlow, J. and Duhamel, S., 2026 Microbial dispersal from a hyperactive sandsheet in the Icelandic Highland. Science of the Total Environment. https://doi.org/10.1016/j.scitotenv.2026.181659
2. Stack, K.M., Francis, R., Calef, F.J., Gwizd, S.J., Schroeder, J.F., Voigt, J.R., Kristinsson, T., **Schroedl, P.,** Shah, J., Varnam, M. and Neish, C.D., 2025. Simulating Science Operations for a Joint Rover-helicopter Mission Architecture in a Mars Analog Setting. *The Planetary Science Journal*, *6*(7), p.173. https://doi.org/10.48577/jpl.OMMBYO
3. Sweetman, A.K., Smith, A.J., de Jonge, D.S., Hahn, T., **Schroedl, P.,** Silverstein, M., Andrade, C., Edwards, R.L., Lough, A.J., Woulds, C. and Homoky, W.B., 2024. Evidence of dark oxygen production at the abyssal seafloor. *Nature Geoscience*, *17*(8), pp.737-739. https://doi.org/10.1038/s41561-024-01480-8
4. **Schroedl, P.**, Silverstein, M., DiGregorio, D., Blättler, C.L., Loyd, S., Bradbury, H.J., Edwards, R.L. and Marlow, J., 2024. Carbonate chimneys at the highly productive point Dume methane seep: Fine-scale mineralogical, geochemical, and microbiological heterogeneity reflects dynamic and long-lived methane-metabolizing habitats. *Geobiology*, *22*(4), p.e12608. https://doi.org/10.1111/gbi.12608
5. Neveu, M., Quinn, R., Barge, L.M., Craft, K.L., German, C.R., Getty, S., Glein, C., Parra, M., Burton, A.S., … **Schroedl P., …,** and Yang Z., 2024. Future of the search for life: Workshop report. *Astrobiology*, *24*(1), pp.114-129. https://doi.org/10.1089/ast.2022.0158
6. Jaqueto, P., Trindade, R.I., Terra-Nova, F., Feinberg, J.M., Novello, V.F., Stríkis, N.M., **Schroedl, P.,** Azevedo, V., Strauss, B.E., Cruz, F.W., Cheng, H. and Edwards, R.L., 2022. Stalagmite paleomagnetic record of a quiet mid-to-late Holocene field activity in central South America. *Nature Communications*, *13*(1), p.1349. https://doi.org/10.1038/s41467-022-28972-8

7. Leprich, D.J., Flood, B.E., **Schroedl, P.R.,** Ricci, E., Marlow, J.J., Girguis, P.R. and Bailey, J.V., 2021. Sulfur bacteria promote dissolution of authigenic carbonates at marine methane seeps. *The ISME journal*, *15*(7), pp.2043-2056. https://doi.org/10.1038/s41396-021-00903-3

Publications (in review/revision)

1. **Schroedl, P.**, Calabrese, F., Rousteau, P., Feinberg, J., Doctor, R., Cavanaugh, T., Gustavsen, H., Reynolds, M., Blute, T., Sheldon, K., Richter H., Stolze B., Terban, M., D'Elia, B., Frates, E., Silverstein, M., Holder, S., Li, X., Edwards, R.L., Ruff, E., Sweetman, A. and Marlow, J. Linking mineralogical and microbial features of the oxygen-rich Clarion-Clipperton Zone through magnetic, elemental, and genomic analyses. *Elementa: Science of the Anthropocene*.
2. Shi, Y., **Schroedl, P.,** Marlow, J., Cui, D., Weitz, D., Song, Y. Evolution of organic and inorganic matter in cold seep rocks during anaerobic oxidation of methane studied by solid-state NMR. *Solid State Nuclear Magnetic Resonance*

Honors, Awards, Certifications

- 2026 – Explorers Club (Fellow)
- 2025 – Boston University Warren McLeod Fellowship
- 2025 – Fjällräven Guide
- 2023 – Explorers Club (Term Member)
- 2022 – Explorers Club x Fjällräven Field Grant Awardee
- 2021 – STCW Seafarer's Training (Including Firefighting)
- 2018 – NASA-ACA "Astrobiology Grand Tour" Student Scholarship
- 2018 – PADI level 2 SCUBA certified
- 2017 – University of Minnesota Discovery Scholars Grantee
- 2017 – ASBOG nationally certified Geologist in Training
- 2016 – University of Minnesota Confocal Microscopy Workshop Participant
- 2016 – HAZMAT/HAZWOPPER certified

Research Experience, Field Expeditions, and Exploration Activities

- 2025 — *Workshop Participant*, NASA Astrobiology Spectral Database Workshop
    - Goal: Guide robotic planetary exploration via characterization of biosignatures
    - Role: Presented findings, contributed to standardization and best practices
    - Results: Findings communicated to project leads, multi-institution workshop paper planned in 2027
- 2024 — *Scientist & Documentarian*, Schmidt Ocean Institute Cruise (R/V *Falkor(too)*)
    - Goal: Explore understudied Chilean deep-sea methane seeps
    - Role: Documented biodiversity, conducted shipboard field operations and experiments
    - Results: Conference poster, manuscript in prep for *Deep Sea Research* in 2026
- 2023 — *Researcher*, Boston University, NASA grant #80NSSC23K0224
    - Goal: Sample a Mars analog environment and quantify microbe-mineral interactions

    - Role: Collected samples, measured geochemical variables at NASA Ames Research Center
    - Results: Fjällräven social media appearance, multiple manuscripts in prep for 2026/2027
- 2023 — *Support Scientist & Documentarian*, NASA MAGPIE Field Operations
    - Goal: Optimize rover-drone mission architecture
    - Role: Carried out rover-drone planetary exploration simulations, presented findings
    - Results: Manuscript published in *The Planetary Science Journal*
- 2022 — *Scientist,* Fagradalsfjall Volcano Eruption, Fjällräven Field Grant
    - Goal: Conduct initial sampling and experimentation
    - Role: Led low biomass sampling, geomicrobiology incubations, supported drone operations
    - Results: Eruption videos featured at 2023, 2024, and 2025 ECAD, submitted field grant report
- 2022 — *Astrobiology Assistant*, NASA RAVEN Field Operations
    - Goal: Test new rover-drone technologies and execute field operations
    - Role: Facilitated rover–drone field operations, conducted aerobiological experiments
    - Results: Two manuscripts in progress, available upon request
- 2022 — *Workshop Participant*, NASA Future of the Search for Life Workshop
    - Goal: Identify and characterize biosignature detection methodology
    - Role: Developed mission targets and methods, co-authored workshop manuscript
    - Results: Manuscript published in the journal *Astrobiology*
- 2021 — *Contractor*, The Metals Company (*Maersk Launcher*)
    - Goal: Conduct UN mandated environmental baseline studies
    - Role: Deployed deep-sea landers, conducted field operations and shipboard experiments
    - Results: Manuscript published in *Nature Geoscience*
- 2017–2021 — *Researcher*, University of Minnesota
    - Goal: Quantify isotopes along transect depth profiles, establish paleoclimate geochronology
    - Role: Measured Arctic and Pacific Ocean isotopes for GEOTRACES cruises, U–Th dating
    - Results: Several conference posters/talks, manuscript published in *Nature Communications*
- 2018–2020 — *Payload Specialist*, NASA Minnesota Space Grant Consortium
    - Goal: Sample and characterize the microbiology of the upper atmosphere
    - Role: Led undergraduate team, designed aerobiology samplers for stratospheric balloons
    - Results: Conference poster, six flights completed prior to pandemic shut down
- 2018 — *Team Member,* NASA x ACA “Astrobiology Grand Tour”

    - Goal: Study and sample Archaean stromatolites in the Pilbara of Western Australia
    - Role: Studied some of the best preserved evidence of early life as an expedition member
    - Results: Conference poster, manuscript in prep for *Precambrian Research* in 2026
- 2016 — *Field Courses,* University of Minnesota
    - Goal: Learn and apply geological mapping and hydrogeological techniques
    - Role: Team-based fieldwork in NW Argentina, SW Montana, aquifer well installation and sampling, groundwater flux measurement techniques
    - Results: Hand drawn geological maps and field reports available upon request
- 2014–2017 — *Researcher*, University of Minnesota, NASA grant #NNX-14AK20G
    - Goal: Study deep-sea microbes to quantify and constrain global methane budgets
    - Role: Developed CDC biofilm bioreactor and microscopy flow cell experiments, quantified micrometer-scale pH gradients and mineral dissolution rates
    - Results: Manuscript published in *ISME Journal*, several conference posters
- 2013–2014 — *Undergraduate Research Assistant*, University of Minnesota–Fermilab
    - Goal: Characterize neutrino oscillations
    - Role: Assembled and tested neutrino oscillation detectors at the module factory for later installation at NOvA detector facility (Ash River, MN).
    - Result: Detector modules completed without defects, several manuscripts published (non-author)

Fieldwork (Selected)

- Deep-sea sampling — Chilean Margin, Clarion-Clipperton Zone
- High-latitude volcanology — Fagradalsfjall eruption (Iceland)
- Planetary analog missions — Icelandic Highlands, Mojave, Stratospheric Ballooning
- Stromatolite sampling — Pilbara Craton (Western Australia)
- Marsh & coastal biogeochemistry — New England, Minnesota
- Puna de Atacama geomorphology — Northwestern Argentina

Teaching Positions

1. 2022-2025, Teaching Assistant, “Marine Microbes”, Boston University
    a. Led laboratory sections for 10-16 students
    b. Frequent guest lecturer
2. 2021, Teaching Assistant, “Biology of Global Change”, Boston University
    a. Led laboratory and discussion of two class sections each ~30 Students
3. 2017-2021, Researcher, “U-Th Methodology and Practice”, University of Minnesota
    a. Taught graduate students and visiting researchers U-Th extraction and mass spectrometry analytical techniques
4. 2017, Lead Teacher, “Microscopy and English” Thai United Foundation
    a. Designed and implemented lesson plans for science and English courses grades K-12, typical class size of 30 students

    b. Volunteered >40 hrs/week at Wang Muang, Ban Na Dok Mai, and Erawan Witttaykhom Schools
    c. Brought more than $500 of school supplies, chemistry kits, microscopes and projectors to rural communities
5. 2014-2017, Lead Teacher, Assistant Teacher, Planetarium Education Assistant, "Astronomy and Geology", Bell Museum of Natural History
    a. Developed and led planetarium presentations on diverse celestial objects for beginners to expert audiences
    b. Worked "star parties" led demonstrations for up to a hundred people, setting up and aligning Dobson and refracting telescopes to observe the night sky, including Mars, Io, Europa, Ganymede and Callisto
    c. Conducted giant inflatable (portable) planetarium presentations to schools unable to come to the museum
    d. Taught science courses for the museum's summer programs
6. 2010-2013, Lead/Assistant Teacher, "Woodshop, Environmental Sciences, etc." Southwest Community Education
    a. Wrote and adhered to lesson plans for courses (grades 1-8)
    b. Developed student management skills, typical class size of 15 students

Conferences

- AbSciCon
    - 2024 "Assessing Geomicrobiological Heterogeneity in Methane Seep Chimneys by Correlative Techniques"
- Academic High-Altitude Conference
    - 2019 "Sampling and Sequencing the Microbiology of the Stratosphere using Weather Balloons"
- American Geophysical Union
    - 2026 "Uncovering the Microbial Ecology and Metabolic Activity of Chilean Methane Seeps"
    - 2024 "Correlating Fumarolic Biology with Hyperspectral Signatures to Determine Critical Spatial Resolution Thresholds"
    - 2024 "Enhanced Trace Metal Scavenging by Resuspended Sediments in the Pacific Ocean along the GEOTRACES GP15 Transect"
    - 2022 "Enhanced Scavenging by Resuspended Sediments in the Pacific Ocean along the GEOTRACES GP15 Transect"
    - 2022 "The Cycling of ^{231}Pa in the Pacific Ocean and Implications for Its Use as a Paleoceanographic Proxy"
    - 2021 "A 6000 years Speleothem Paleomagnetic Record of the South Atlantic Anomaly in central South America"
    - 2021 "Quantifying Meridional Transport of Scavenged Radionuclides over Pacific Biogeochemical Provinces"
- Goldschmidt
    - 2021 "Thorium-derived dust fluxes in the Pacific: examining seawater, particle and sediment-based estimates"

    - 2021 “Particle dynamics in the central Pacific Ocean: Insights from Th and Pa isotopes”
    - 2018 “Sulfide-Oxidizing Bacteria Dissolve Carbonate Minerals in Marine Cold Seep Settings”
- Lunar and Planetary Science Conference
    - 2023 “Correlating Aerial and Ground-Based Hyperspectral Data with Microbial Composition and Diversity in a Mars Analog Hydrothermal System in Iceland”
    - 2023 “The Holuhraun Region of Iceland as a High-Fidelity Planetary Analog Site for Robotic and Human Exploration”
- Northeast Geobiology Symposium
    - 2021 “Decoding the Geobiological Structure of the Point Dume Methane Seep System”
- Ocean Sciences Meeting
    - 2026 “Thorium and Protactinium Isotopes as Tracers of Hydrothermal Scavenging: Differences in Scavenging across Multiple Plume Systems Sampled on GEOTRACES Cruises”
- University of Minnesota Undergraduate Research Symposium
    - 2016 “Investigation of Acidic Dissolution of Carbonate Rocks by Bacterial Biofilms Under Low Flow Rate Conditions”