

Combining high-pressure experiments and the meteorite record to constrain the origin of Earth's volatiles

FRIDAY MAY 2*Zoom: bit.ly/FORCEseminar***12 PM PDT/AZ***3 pm Eastern*

The habitability of rocky planets depends in part on how and when they acquired life-essential volatiles such as nitrogen, carbon, and water. Current models rely heavily on chondrites, which sample relatively late-accreting planetesimals. As a result, they may not accurately reflect the bulk volatile inventories of the early-formed bodies that seeded rocky planets—those likely formed near the onset of Solar System formation. In this talk, I present a new perspective on this long-standing question by integrating high-pressure, high-temperature experiments with insights from an often-overlooked class of meteorites: iron meteorites. Together, these approaches reveal how volatile behavior during thermal metamorphism and differentiation shaped the volatile budgets of forming planets, offering a revised framework for understanding the emergence of habitability in our Solar System and beyond.

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Daman joined ASU as an Assistant Professor in January 2024. He earned his integrated B.S.–M.S. degree from the Indian Institute of Technology (IIT) Kharagpur in 2012. Before graduate school, he taught physical, organic, and inorganic chemistry to high school students preparing for engineering and medical entrance exams and chemistry Olympiads. He completed his Ph.D. in Experimental Geochemistry and Petrology at Rice University in December 2021, working with Prof. Rajdeep Dasgupta. In January 2022, he began a Barr Foundation Postdoctoral Fellowship at the California Institute of Technology, working with Prof. Paul Asimow. Daman will be joining Yale University in May 2025 as an Assistant Professor.

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