

# Mid-Latitude Ice on Mars: A Science Target for Planetary Climates and a Resource for Exploration

A White Paper to be submitted to the Planetary Sciences Decadal Survey 2023–2032

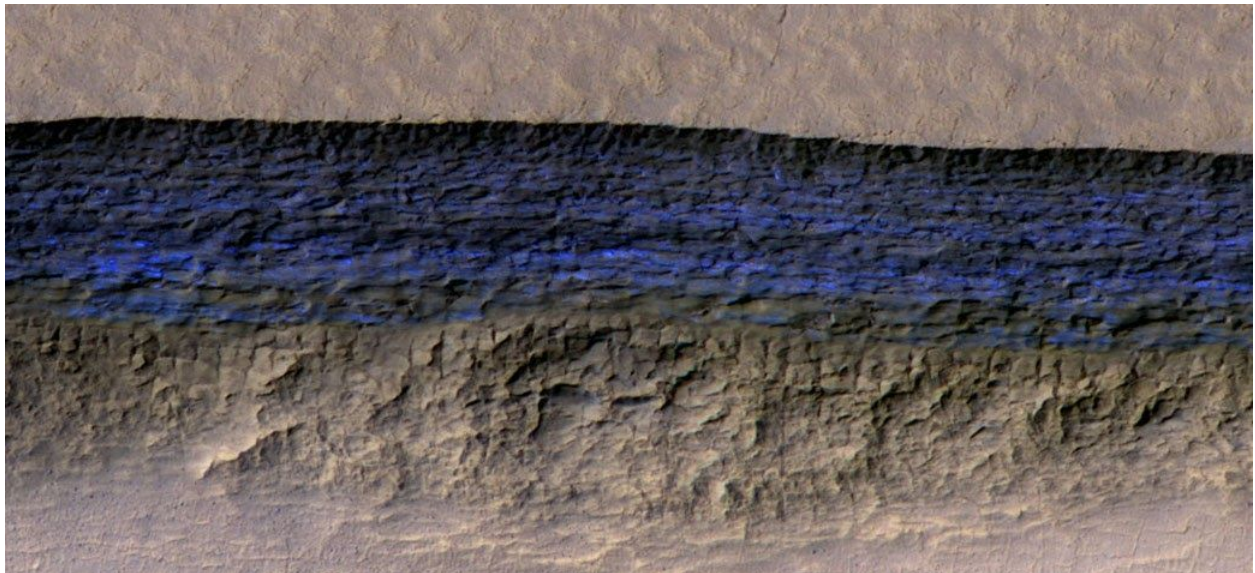
## Point of Contact:

Ali Bramson (BramsonA@purdue.edu)

## Current Author List:

Ali M. Bramson, Patricio Becerra, Samuel W. Courville, Colin M. Dundas, Shannon M. Hibbard, Gareth A. Morgan, Matthew R. Perry, Eric I. Petersen, Nathaniel E. Putzig, Hanna G. Sizemore, Isaac B. Smith, David E. Stillman

**Brief Description:** This white paper focuses on the outstanding questions surrounding the distribution and properties of mid-latitude ice on Mars, especially as relevant for planetary climate studies and as a resource to enable future human exploration of the planet.



In the last decade, aided by the high-resolution data and long-term monitoring by NASA's Mars Reconnaissance Orbiter (MRO), extensive evidence has emerged supporting the presence of abundant ground ice throughout much of the mid-latitudes of Mars. There is also growing evidence that much of this ice is relatively pure, extends very near to the surface, and reaches lower latitudes than previously thought, potentially providing an accessible record of the recent climate and a large in-situ resource for future human explorers at Mars.

We are reaching the limits of currently available datasets, just as we are on the cusp of unlocking the climate record and determining the water resources contained within the Martian mid-latitudes. A comprehensive understanding of the nature of this ice would place constraints on Mars' climate history and total water budget, and the effects of orbital/axial forcing on volatiles. This would open up Mars as a testbed for planetary climate studies, a subject where Mars is particularly important because it has many similarities to Earth but without the complicating effects of a biosphere, and where orbital/axial forcing dominates climate variability.

The major outstanding questions to be addressed in the next decade surrounding the nature of mid-latitude ice on Mars are:

- *What climate record is preserved in these mid-latitude deposits?*
- *How accessible is the ice as a resource for future exploration?*

**Status:** Drafting in progress

**Level of involvement/collaboration being sought:** We are happy to add additional co-authors (contact Ali if you are interested in being a co-author), and are soliciting cosigners/endorsers (see link below)!

**To add yourself as a cosignatory of this White Paper, please fill out the following form: <https://forms.gle/HasHVn1PiSanRvpS7>**