International Mars Ice Mapper Mission: The First Human Exploration Reconnaissance Mission to Mars.

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This talk will provide an overview of ongoing planning for the International Mars Ice Mapper mission which would detect the location, depth, spatial extent, abundance, and purity of near-surface (top 5-10 meters) water ice. NASA is collaborating with the Canadian, Italian, and Japanese space agencies to develop this concept. An Agency-level initiative, Mars Ice Mapper would be the first dedicated reconnaissance mission to Mars, designed to focus on "what we need to know before humans go."

Mapping near-surface water ice will advance NASA's "Follow the Water" strategy and the search for life, the evolution of Mars' climate, and exploring Martian ice reserves are all key themes for the next decade of scientific exploration. Additionally, multilateral mission planners are exploring rideshare opportunities – that is, other small payloads that could "piggyback" aboard the spacecraft or its launch vehicle - as part of their study. All science data from the mission would be made available to the international science community for both planetary science and reconnaissance.

Additionally, finding places on Mars with abundant, accessible, near-surface water ice will drive the future selection and characterization of candidate sites for the first human mission(s) to the surface. It is a critical Martian natural resource that would supply local "ingredients" for propellant (hydrogen as a component of methane and oxygen) to launch astronauts from the Martian surface for their return trip to Earth, as well provide resources for back-up life support, civil engineering, mining, manufacturing, and eventually, agriculture. Transporting the water we need from Earth to Mars would be extremely costly, so a local resource on the Martian surface is essential. Access to water ice will also be central to scientific investigations led by future human explorers on the surface, who may one day core, sample, and analyze the ice to understand the record of climate and geologic change on Mars and its astrobiological potential (i.e., signs of any existing or cryogenically preserved ancient microbial life within it).

Preliminarily, the mission concept includes a sun-synchronous, polar orbiter carrying a multi-mode, L-band synthetic aperture radar (SAR) / Sounder and the possibility of additional high-altitude communications orbiters. This next-generation communications capability would support the high data volume from the SAR, enable continuous connectivity between Earth and Mars, replace the aging infrastructure currently at Mars, and provide high-bandwidth, high-data-rate communications orders of magnitude greater than current capabilities for all future Mars missions (including robust backup communications for Mars sample return).

This talk will focus on the status of the current multilateral concept study for the mission including evolving plans to maximize opportunities for greater involvement by the scientific community and other potential international and commercial partners.