

# RASC-AL SPECIAL EDITION: MARS ICE CHALLENGE

## 2017 Steering Committee Insights

- 🌍 **Mars is hard:** every team encountered challenges with the regolith, whether in moving through it or having it contaminate their collected water. The **interaction of the regolith with the ice** added a degree of difficulty as compared to only trying to move overburden or acquire pristine ice. As observed in the Phoenix mission, the wet regolith can become sticky, posing a challenge for extraction and separation of water. Teams encountered this same challenge and had mixed success overcoming it.
- 🌍 **Integrated testing is crucial:** for most of the teams, this was the first time they operated their entire system in an integrated configuration, on an actual testbed. As a result, most teams spent much of their time debugging and modifying their systems rather than drilling for ice. The need for integrated testing is even more applicable when working in the hostile, remote environment of the Mars surface.
- 🌍 **There is no one right way to get water:** each team brought a different approach to the competition, varying from “conventional” drilling and pumping to ice coring to downhole melting with oil. This diversity provided an **opportunity for NASA and industry to evaluate eight distinct concepts for a relatively small investment.**
- 🌍 **Relevance to future missions:** water extraction is **critical to a sustained presence on Mars**, as the quantities of propellant and consumables required make delivery from Earth expensive. In addition, there are **similarities between ISRU for Mars and for the Moon** that provide a cross-cutting benefit when examining the systems for acquiring and processing water.
- 🌍 **Autonomous operations remain a challenge:** the remotely-operated/teleoperated portion of the competition saw little success from any of the teams, with only one team extracting less than two milliliters of water during this phase. None of the teams performed in truly autonomous fashion, as will likely be need for a future Mars mission.
- 🌍 **Awareness and understanding of the potential of water on Mars:** this competition raised awareness of both the existence of water on Mars, and the ways it can be harnessed. The **teams, visitors, and the public** following along at home all learned about the relevance and importance of the competition, and how it plays into the larger picture of human exploration.