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Author: Dr. Paul van Susante  
Michigan Technological University, United States, pjvansus@mtu.edu

Dr. Kris Zacny  
Honeybee Robotics, United States, zacny@honeybeerobotics.com

WATER MINING METHODS FOR THE MOON AND MARS

**Abstract**

In Situ Resource Utilization on the Moon and Mars will be crucial to allow sustainable human space exploration. Since a large fraction of a rockets' mass consists of rocket propellant, the capability to refuel along the journey will significantly increase our capability to explore and/or reduce complexity and risk. Any method to extract water will require various in-situ data to be collected before a final excavation and extraction system can be designed and tested. Current excavation and extraction methods under development for water extraction for human exploration are based on three types, taking many small or one large scoops, drilling or using a fluid to transport the granular materials. For excavating hard rock and ice, limited data exists but traditional methods such as blasting, ripping and water jetting have been considered. After excavation, the material would need to be heated to extract the water (ice) from the minerals. This paper will explore all the excavation methods and discuss some recent result of new prototypes and testing for Mars and Lunar water mining.