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## **NIAC Award: Thermal Mining of Ices on Cold Solar System Bodies**

April 25, 2019 April 14, 2019 [Doug Messier News 3 Comments](#)

Thermal mining of ices on cold solar system bodies (Credit: George Sowers)

**NASA Innovative Advanced Concepts (NIAC) Program**

Phase I Award: Up to \$125,000 for 9 Months

**Thermal Mining of Ices on Cold Solar System Bodies**

George Sowers

Colorado School of Mines

**Innovation**

- Applying heat directly to frozen volatile bearing materials allows extraction of the volatile without the cost, mass and complexity of excavation.
- Heat is applied directly to the surface in the form of redirected sunlight or subsurface via conducting rods or heaters emplaced in boreholes.
- Vapor is captured within a dome-like tent and refrozen in cold traps for processing.

### **Technical Approach**

- Colorado School of Mines brings its world renowned expertise in terrestrial resource extraction to space.
- We will explore locations throughout the solar system where Thermal Mining might be applicable.
- We will develop a detailed mission scenario for the use of Thermal Mining for lunar water extraction.
- We will test the effectiveness of various Thermal Mining techniques in our cryogenic vacuum chamber.

### **Potential & Benefits**

- Estimates for extracting water from the permanently shadowed regions of the Moon show Thermal Mining can produce industrial quantities of water (for propellant) for 60% less mass and energy than excavation.
- Volatiles have many uses for space exploration and space commerce.
- Propellant from lunar polar ice will lower all transportation costs beyond low Earth orbit by factors from three to seventy.

### **[2019 Phase 1 and Phase II Selections](#) [2011-2019 Consolidated List](#)**

[Colorado School of Mines](#), [George Sowers](#), [ISRU](#), [lunar mining](#), [NASA](#), [NIAC](#)

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- Shots on Goal
- Hail Mary passes

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