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
Phae 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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Is NASA's Commercial Lunar Payload Services (CLPS) program a series of:

- Shots on Goal
- Hail Mary passes

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