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Lunar Water Resource Demonstration

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In cooperation with the Canadian Space Agency, the Northern Centre for Advanced Technology, Inc., the Carnegie-Mellon University, JPL, and NEPTEC, NASA has undertaken the In-Situ Resource Utilization (ISRU) project called RESOLVE. This project is a ground demonstration of a system that would be sent to explore permanently shadowed polar lunar craters, drill into the regolith, determine what volatiles are present, and quantify them in addition to recovering oxygen by hydrogen reduction. The Lunar Prospector has determined these craters contain enhanced hydrogen concentrations averaging about 0.1%. If the hydrogen is in the form of water, the water concentration would be around 1%, which would translate into billions of tons of water on the Moon, a tremendous resource. The Lunar Water Resource Demonstration (LWRD) is a part of RESOLVE designed to capture lunar water and hydrogen and quantify them as a backup to gas chromatography analysis. This presentation will briefly review the design of LWRD and some of the results of testing the subsystem. RESOLVE is to be integrated with the Scarab rover from CMU and the whole system demonstrated on Mauna Kea on Hawaii in November 2008. The implications of lunar water for Mars exploration are two-fold: 1) RESOLVE and LWRD could be used in a similar fashion on Mars to locate and quantify water resources, and 2) electrolysis of lunar water could provide large amounts of liquid oxygen in LEO, leading to lower costs for travel to Mars, in addition to being very useful at lunar outposts.

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