

Instrumentation for Lunar Volatile Analysis

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ABSTRACT

Understanding the available lunar resources is key to incorporating their availability into exploration architectures. Previous lunar missions have provided insight into the potential resources on the moon as an initial step enabling in-situ resource utilization (ISRU). Orbiting missions, such as Clementine and Lunar Prospector, have mapped the lunar polar region and found enhanced hydrogen signals on kilometer-scale resolution. The Lunar Crater Observation and Sensing Satellite (LCROSS) mission provided the first direct measurement of water ice in a permanently shadowed region. Future missions will provide ground truth data to measure and quantify lunar volatiles.

One approach to exploration capitalizes on commercial partnerships for Class D risk aware missions. Partnerships with commercial partners enable rapid design cycles, leveraging the investment of the commercial industry in instrument development. Modified Commercial off the Shelf (COTS) hardware can be utilized to enhance capabilities in exploration missions. The hardware under development at the Kennedy Space Center for availability within the Commercial Lunar Payload Services opportunities capitalizes on modified COTS, enabling an aggressive delivery schedule and low-cost development. The modified hardware has been integrated and tested in a thermal vacuum environment, with final flight modifications currently in work. The use of a modified COTS instruments will be discussed for space applications.