

## Abstract #253268

---

### Estimating Water Ice Abundance from Short-wave Infrared Spectra of Drill Cuttings at Cryogenic Temperatures

---

**Ted L Roush**<sup>1</sup>, Anthony Colaprete<sup>1</sup>, Julie Kleinhenz<sup>2</sup> and Amanda Cook<sup>3</sup>, (1)NASA Ames Research Center, Moffett Field, CA, United States, (2)NASA Glenn Research Center, Cleveland, OH, United States, (3)Millennium Engineering, Sunnyvale, CA, United States

#### Abstract Text:

NASA's Resource Prospector (RP) mission intends to visit a lunar polar region to characterize the volatile distribution. Part of the RP payload, the Near-infrared Volatile Spectrometer System (NIRVSS) is a spectrometer operating from 1600-3400 nm that provides sensitivity to water ice, and other volatiles. For multiple years, the NIRVSS system has been incorporated into on-going RP payload testing in a cryogenic vacuum facility at Glenn Research Center. Soil tubes of lunar simulants, prepared with known amounts of water, are placed in the vacuum chamber and cooled to cryogenic temperatures (soil temperatures of 110-170° K) and placed under low vacuum (a few  $\times 10^{-6}$  Torr). During these tests NIRVSS continuously measures spectra of soil cuttings emplaced onto the surface by a drill. Real time processing of NIRVSS spectra produces two spectral parameters associated with water ice absorption features near 2000 and 3000 nm that can be used to inform decision-making activities such as delivery of the soil to a sealable container. Post-test collection and analyses of the soils permit characterization the water content as a function of depth. These water content profiles exhibit the characteristics of a vacuum desiccation zone to depths of about 40 cm. Subsequent to completion of the tests, NIRVSS spectra are processed to produce two spectral parameters associated with water ice absorption features near 2000 and 3000 nm. These features can be evaluated as a function of time, and correlated with drill depth, and other measurements, throughout the drilling activities. Until now no effort was attempted to quantitatively relate these parameters to water abundance. This is the focus of our efforts to be presented.

#### Session Selection:

Exploring the Surface Properties of the Moon, Asteroids, and Other Airless Bodies

#### Submitter's E-mail Address:

Ted.L.Roush@nasa.gov

#### Abstract Title:

Estimating Water Ice Abundance from Short-wave Infrared Spectra of Drill Cuttings at Cryogenic Temperatures

#### Requested Presentation Type:

Assigned by Program Committee (oral, panel, poster, or lightning poster talk)

#### Previously Published?:

No

#### AGU On-Demand:

No

#### Abstract Payment:

Paid ( XXXXXXXXXX )

*For non-students only: I do not want to be involved in OSPA or the Mentoring program.*

First Presenting Author

---

#### Presenting Author

Ted L Roush