Monitoring Volatiles While Drilling Into Frozen Lunar Simulant.

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Near-InfraRed Volatile Spectrometer System (NIRVSS) Component Fields of View

DOC, camera + LEDs
IR emitter
SW 1600-2400 nm
LW 2300-3400 nm
LCS 8 µm
LCS 10 µm
LCS 12.5 µm
GRC 2015, Soil Tube 1, 3/9/2015

Drill Hole Pattern

Temporal Sequence

Not Discussed
What spectral features might be present?

Water vapor, water ice and simulant spectra
GRC 2015 Soil Tube 1, Drill Hole 1, Peck 3

- Bit depth
- Mass 18 Images
- Drill Bit Depth, cm
- Band Depth
- Time

- Ratio to PreDrill
- Wavelength, nm

- Mass 18 pressure, torr
- Images
- Band Depth
Peck 3, max depth = 30 cm

Why are the ice features subdued @ 30 cm?
Anomalous spectral behavior of Hole 5 caused by back-filling previous holes.
Summary

**NIRVSS** successfully observed the immediate vicinity of the drill site before and during drilling operations to look for near real-time changes in the properties of the exposed materials.

**Spectrometers** were used to identify the appearance and disappearance of water ice, providing the ability to constrain its presence in the stratified soils.

**DOC** images provided the ability to
- explain differences in spectral properties observed between different holes drilled into the surface.
- document the surface changes, and soil mechanical properties during drilling (not discussed)