

MINERALOGIC MAPPING OF HUYGENS CRATER, MARS: A TRANSECT OF THE HIGHLANDS CRUST AND HELLAS BASIN RIM. S. E. Ackiss, K. D. Seelos, and D. L. Buczkowski, Johns Hopkins University Applied Physics Laboratory, Laurel, MD 20723 (Sheridan.Ackiss@jhuapl.edu).

Introduction: Huygens crater is a well preserved peak ring structure on Mars centered at 13.5°S, 55.5°E in the Noachian highlands between Terras Tyrrena and Sabaea. With a diameter of ~450 km, it uplifted and exhumed Noachian crustal materials from depths greater than 30 km, likely including Hellas rim material (Figure 1).

In neighboring terrains, numerous small outcrops of aqueously altered minerals, such as phyllosilicates, have been identified [1-2] as well as frequent expanses of mafic-bearing plains [3-6]. By mapping the distribution of these different mineral types in and around Huygens, we hope to offer unique insight into emplacement and alteration history of the highlands crust.

Methods: We utilize data from the Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) which acquires visible and near infrared (0.36-3.9 μm) data [7]. Twelve CRISM multispectral maptiles (mosaicked at ~230 meters/pixel and corrected to Lambert Albedo) were used to understand regional mineralogic trends and define unit contacts.

Preliminary Mapping Results: Four mineralogy-based units have been defined for the Huygens region so far: olivine-, high calcium pyroxene (HCP)-, low calcium pyroxene (LCP)-, and Fe/Mg phyllosilicate-bearing material.

The olivine-bearing unit is associated with topographically lower, generally flat-lying plains, including the floor of Huygens and the infilled floors of smaller surrounding craters. It is also observed on intercrater plains consistent with high thermal inertia, olivine-bearing "bedrock" units described by Rogers et al. [5] in the east of our study region. We have yet to confirm whether the olivine throughout the region is primary bedrock or transported material. Mapped occurrences of HCP-bearing material appear associated with similar plains morphology, also occurring in areas on the floor of Huygens as well as gradational with olivine-bearing plains within smaller, unnamed craters in the southwest part of the study region.

Exposures of LCP occur in distinct outcrops

concentrated in the southern portion of the map area, interior to the Hellas rim boundary [6], and perhaps representing uplifted Hellas impact material. LCP is associated with a more erosionally-resistant material, usually forming knobs.

Fe/Mg phyllosilicate-bearing materials are localized and have been exposed by impact cratering, with signatures observed on crater rims, walls, and in ejecta blankets. Phyllosilicates are identified both inside (on the floor of) and outside Huygens.

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Figure 1. (Below) MOLA regional topography showing impacts and associated rings >1000 km (black circles) [8]. Huygens study region in large black box. (Bottom Left) Zoomed in preliminary map showing units over THEMIS daytime IR.

