SPECTRAL REFLECTANCE STUDIES OF THE GRIMALDI REGION OF THE MOON;
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INTRODUCTION: Grimaldi is a pre-Nectarian impact structure (center = 5°S, 68°W) on the western limb of the lunar nearside. This multiringed basin was identified and described by Hartmann and Kuiper.[1] The outer basin ring is approximately 430 km in diameter. This ring was described as the topographic basin rim (or main rim) by Wilhelms.[2] The discontinuous rugged, inner peak ring is ~230 km in diameter. Many of the features associated with the Grimaldi basin have been obscured by deposits emplaced by the Orientale impact event, and no distinct deposits of ejecta from Grimaldi were identified by Wilhelms.[2] The highlands units in the Grimaldi region have been mapped as facies of the Orientale ejecta deposit.[3] Much of the inner portion of the Grimaldi basin is flooded with mare basalt, and a major pyroclastic deposit is located northeast of the inner ring.[3]

We have been conducting a variety of remote sensing studies of geologic units on the western limb of the Moon in order to better understand the composition of lunar surface units as well as the stratigraphy of the highlands crust.[4] The purpose of this report is to present our latest findings concerning: 1) the composition of the material exposed by the Grimaldi impact event, 2) the lithology of Orientale-related units in the region, and 3) the composition of the Grimaldi mare and pyroclastic deposits.

METHOD: Numerous near-infrared reflectance spectra were obtained at the Mauna Kea Observatory during a series of observing runs conducted during favorable lunar librations. It was possible to collect spectra for areas as small as ~5 km in diameter near the lunar western limb. The lunar standard area at the Apollo 16 landing site was frequently observed during the course of each evening, and these observations were used to monitor atmospheric extinction throughout each night. Extinction corrections were made utilizing the methods presented by McCord and Clark.[5] Analyses of spectral continuum slopes as well as "1μm" band positions and shapes were made using the techniques described by McCord et al.[6]

RESULTS AND DISCUSSION: Our spectral data indicate that pure anorthosite (plagioclase >90%) is exposed on the Grimaldi inner ring. We have obtained one spectrum of an anorthosite for a small crater which excavated peak ring material. Other spectra for the inner Grimaldi ring exhibit very shallow pyroxene absorption features. Only very minor amounts of orthopyroxene are present in these areas, and some deposits may prove to be composed of anorthosite. While no anorthosites have been identified on the outer ring of Grimaldi, a crater on the floor of the basin does expose anorthosite. Other highlands deposits emplaced in the Grimaldi region as a result of the Orientale impact event appear to be composed of noritic anorthosite.[4] In addition, small craters that have exposed probable Grimaldi ejecta appear to be dominated by similar material. We conclude that a layer of pure anorthosite was exposed by the Grimaldi basin-forming event.

Our spectra for the mare unit on the interior of Grimaldi indicate that this deposit is dominated by high-calcium pyroxene. These spectra are similar to those collected for mare units on the central portion of the lunar nearside.

References: 1) W. Hartmann and C. Kuiper (1962) *Commun. LPL 1, No. 12*, 51; 2) D. Wilhelms (1987) *USGS Prof. Paper 1348*; 3) D. Scott et al. (1977) *USGS Map I-1034*; 4) B. Hawke et al. (1991) *GRL 18*, 2141; 5) T. McCord and R. Clark (1979) *Publ. Astron. Soc. Pac. 91*, 571; 6) T. McCord et al. (1981) *JGR 86*, 10883.