

PYROCLASTIC DEPOSITS IN THE NECTARIS REGION OF THE MOON. Cassandra R. Coombs<sup>1</sup>, B. Ray Hawke<sup>2</sup>, C. Peterson<sup>2</sup>, and Paul G. Lucey<sup>2</sup>, <sup>1</sup>SN15 Johnson Space Center, Houston, TX 77058; <sup>2</sup>Planetary Geosciences, Hawaii Institute of Geophysics, Honolulu, HI 96822.

## INTRODUCTION

Pyroclastic deposits are widespread on the lunar nearside. They are most commonly found in the floors of ancient impact craters and in association with rilles and/or floor fractures. Several dark mantling deposits of possible pyroclastic origin have been identified in the course of mapping the Nectaris region. Nectaris basin is centered at approximately 34°E, 16°S and is 860 km in diameter. No previous detailed remote sensing studies of these deposits have yet been undertaken, although their presence has been mentioned several times in relation to other studies, e.g.,<sup>1,2</sup>.

In this study we have conducted a variety of geologic and remote sensing investigations of the dark mantling deposits in the Nectaris region in order to: (1) determine which of the dark mantling deposits are of pyroclastic origin; (2) investigate the origin of those that are not of pyroclastic origin; (3) determine the composition of the pyroclastic deposits; (4) investigate the relationships among the pyroclastic deposits and the mare basaltic deposits in Nectaris; (5) investigate the eruption mechanisms responsible for the emplacement of the pyroclastic deposits; and (6) investigate the factors which influence the distribution of the deposits.

## METHOD

Geologic maps were constructed using a wide variety of Earth-based and spacecraft photography. In addition, various spectral data sets were utilized. These spectral data include: (1) near-infrared reflectance spectra (0.6 - 2.5  $\mu\text{m}$ ); (2) multispectral images (0.40/0.56  $\mu\text{m}$ , 0.56  $\mu\text{m}$ , 0.95/0.56  $\mu\text{m}$ ); and (3) lunar color difference photography produced by Whitaker<sup>3</sup>. Information concerning the surface roughness of the Nectaris pyroclastics was obtained from the 3.8  $\mu\text{m}$  radar images presented by Zisk et al.<sup>4</sup>.

## RESULTS

Numerous pyroclastic deposits have been identified in the Nectaris region e.g.,<sup>2</sup>. In this project, the criteria established by Head and Wilson<sup>5</sup> were used; i.e., impact craters are more circular than endogenic craters and have distinguishable crater rays. Other criteria that help identify dark mantle deposits from surrounding terrain include an association with an irregular source vent and a general "subduing" effect of the mantling deposit over the region. The composition of these deposits also helps distinguish them from the host terrain.

Pyroclastic deposits identified and analyzed in this study include both localized and regional deposits. Localized dark mantle deposits are small (<250  $\text{km}^2$ ) mantling units which often have a single source vent, whereas, regional pyroclastic deposits are extensive (thousands to tens of thousands of  $\text{km}^2$ ) mantling units that may originate from one or more vents. The localized deposits looked at in this analysis include the Bohnenberger DHC, the Gaudibert B volcanic complex, the Gaudibert crater DMD, and a deposit on part of the Daguerre rim.

The localized deposits exhibit relatively low values in the 0.40/0.56  $\mu\text{m}$  multispectral ratio images. Near-infrared spectra (0.6 - 2.5  $\mu\text{m}$ ) for various portions of the Gaudibert B pyroclastic deposit fall within Group 1 as identified by Hawke et al.<sup>1</sup>. Spectra for these Group 1 deposits exhibit 1.0  $\mu\text{m}$  absorption band centers near 0.93 - 0.95  $\mu\text{m}$  and depths of approximately 4-5%. These bands are generally asymmetrical and have been described as "checkmark-like" with a straight, steep short-wavelength edge followed by a shallower,

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straight long-wavelength edge. The group 1 band parameters indicate the presence of feldspar-bearing lithologies with mafic assemblages dominated by orthopyroxene.

A possible pyroclastic deposit of regional extent may exist southeast of Nectaris. This unit exhibits unusual values in the multispectral images and color-difference photographs. In addition, this low albedo deposit exhibits relatively low values in the depolarized 3.8 cm radar backscatter images.

## REFERENCES

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