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REMOTE SENSING STUDIES OF THE NORTHEASTERN PORTION OF THE LUNAR NEARSIDE; B.R. Hawke, D.T. Blewett, P.G. Lucey, G.J. Taylor, C.A. Peterson, J.F. Bell, M.S. Robinson, Planetary Geosciences, SOEST, Univ. of Hawaii, Honolulu, HI 96822; J.F. Bell III, NASA-ARC , Moffet Field, CA 940355; C.R. Coombs, POD Associates, Albuquerque, NM 87106; R. Jaumann, H. Hiesinger, G. Neukum, DLR-Planetary Remote Sensing, Oberpfaffenhofen, FRG; P.D. Spudis, Lunar and Planetary Inst., Houston, TX 77058

During the Galileo spacecraft encounter with the Earth-Moon system in December, 1992, a variety of spectral data and imagery were obtained for the eastern limb region as well as much of the lunar nearside. In order to support this encounter, we have been collecting near-infrared spectra and other remote sensing data for that portion of the northeastern nearside (NEN region) for which the highest resolution Galileo data were obtained. Analysis of spectra obtained for highlands units in the NEN region indicates that most surface units are dominated by anorthositic norite. To date, no pure anorthosites have been identified in the region. Several dark-haloed impact craters have exposed mare material from beneath highlands-rich surface units. Hence, ancient mare volcanism occurred in at least a portion of the NEN region. Endogenic dark-haloed craters in the region are the sources of localized dark mantle deposits (LDMD) of pyroclastic origin and at least two compositional groups are present.

INTRODUCTION. The Galileo spacecraft obtained very high-resolution remote sensing data for the northeastern part of the nearside of the Moon. In order to prepare for and support this encounter, we have collected and analyzed a variety of spectral data for the NEN region. Numerous unanswered questions exist for this region. These include: 1) the composition and stratigraphy of the local highlands crust, 2) the nature and mode of formation of regional light plains, 3) the composition of localized pyroclastic deposits, and 4) the distribution of possible cryptomare in the region. The purpose of this paper is to present the preliminary results of our analyses of remote sensing data of remote sensing data obtained for the NEN region.

METHOD. Near-infrared reflectance spectra (0.6-2.5μm) were obtained at the 2.24-m telescope of the Mauna Kea Observatory during a series of observing runs using the Planetary Geosciences indium antimonide spectrometer. 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 using the methods described by McCord and Clark [1], and spectral analyses were made using the techniques described by McCord *et al.* [2]. The Earth-based multispectral images used in this study were described by McCord *et al.* [3], Bell and Hawke [4], and Neukum *et al.* [5]. Information concerning the reduction and calibration of Mariner 10 images for this portion of the Moon were described by Robinson *et al.* [6].

RESULTS AND DISCUSSION: In order to investigate the existence of cryptomare in the NEN region, near-IR spectra were collected for a series of features near the eastern edge of Mare Frigoris. Baily K (diameter=3 km) and a small mare crater immediately west of the mare/highlands contact exhibit spectral parameters characteristic of fresh mare basalt deposits. Both spectra have relatively deep "1μm" absorption features centered longward of 0.95μm. The spectrum for a light plains unit just east of the mare/highlands contact [7,8] indicates that this area is dominated by mare basalt with a minor component of highlands material. Apparently, this is a mare basalt deposit that has been contaminated with a small amount of highlands debris.

Gartner D is a small crater (diameter=8 km) with a partial dark halo which excavates material from beneath the surface of a light plains deposit in the floor of Gartner crater. Two spectra were obtained for Gartner D and both exhibit characteristics which clearly indicate that mare basalt was exposed by this impact event. Two other dark-haloed impact craters have exposed mare basalt from beneath highlands-rich material in the NEN region. One is located south of Hercules crater and the other is southeast of Chacornac. The DHC south of Hercules appears to have excavated mare basalt from beneath the highlands-rich ejecta blanket emplaced by the Hercules impact event. Additional analysis of multispectral imagery of the NEN region should clarify these stratigraphic relationships and provide more information concerning the distribution of cryptomare.

Endogenic dark-haloed craters in the region are the sources of localized dark mantle deposits (LDMD) of pyroclastic origin. Although LDMD exhibit many morphologic similarities, spectral reflectance studies indicate that two compositional groups are present in the region [9,10]. The first group includes spectra from the two dark-haloed craters on the floor of Atlas as well as the Franklin dark floor deposits. The spectral parameters determined for this group indicate the presence of feldspar-bearing mafic assemblages dominated by orthopyroxene and containing glass-rich juvenile material. The second group includes spectra obtained for two LDMD east of Aristoteles. These spectra closely resemble those obtained for mature mare areas, and the deposits in this group contain very large amounts of mare basalt. As part of this study, a previously unmapped LDMD has been identified on the floor of Gauss crater. Galileo data may provide compositional information for this endogenic dark-haloed crater as well as other LDMD on the floor of Gauss.

Analysis of spectra obtained for a variety of highlands materials in the NEN region indicates that most surface units are dominated by anorthositic norite. The most anorthositic material in the NEN region is exposed by Thales crater. To date, no pure anorthosites have been identified in the region.

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