VISIBLE AND NEAR INFRARED SPECTRAL STUDIES OF THE ARISTARCHUS REGION OF THE MOON

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The Aristarchus region is one of the most geologically complex areas on the moon. It includes Aristarchus Plateau, an elevated block of highlands material blanketed by spectrally anomalous pyroclastic deposits, and surrounding basalts of Oceanus Procellarum. The plateau is dissected by many sinuous rilles including the largest sinuous rille on the moon. Aristarchus crater lies directly on the boundary between the plateau and the mare and its ejecta blanket is spectrally asymmetric [Zisk *et al.*, *The Moon*, 59-99, 1977]. Deconvolved orbital geochemical data [Metzger *et al.*, *Lunar and Planetary Science* XI, 729, 1980] show a large Th anomaly apparently centered on Aristarchus crater.

The extreme spectral contrast of the area makes it particularly suitable for analysis by multispectral unit mapping techniques developed at the University of Hawaii for global unit-mapping of Mars [McCord *et al.*, *Lunar and Planetary Science* XI, Part 2, 697-699, 1980]. Using vidicon images of the area obtained in 1979 at 8 wavelengths as a data base the two-parameter unit mapping programs were used to generate a variety of maps based on several combinations of parameters. The basis of the mapping program is analysis of a two dimensional histogram of pixel values taken from two registered images which may be simple albedo or the result of complicated data reduction. The two dimensional histogram may show clusters of pixel values where several pixels share similar characteristics with respect to the two parameters selected. Each cluster can be assigned a value and those pixels included in a particular cluster are remapped onto their map positions with the value assigned in the previous step. The values are then assigned discrete colors or gray levels and the output is the unit map.

Three parameters have been chosen as most useful for unit discrimination in our study area and used in creating two unit maps. The .40/.56μm ratio image shows areal variations in the slope of the lunar spectral continuum in the visible region which is diagnostic of composition and maturity of the surface. The .96/.56μm ratio image shows areal variations of both the continuum slope and the depth of the 1μm band of pyroxene. The region has a very large albedo contrast with some of the brightest and darkest areas on the moon and so the .56μm albedo image has been included in the analysis. Two combinations of the three parameters were used for mapping, the .40/.56μm ratio image versus the .56μm albedo and the .40/.56μm ratio image versus the .96/.56μm ratio image. The two dimensional histograms generated from these two combinations show discrete clusters and trends which have been defined as units. The two unit maps corresponding to the ratio versus ratio and ratio versus albedo histogram plots will be presented. Each map shows a variety of units. The mare has been subdivided in general agreement with the efforts of previous workers [Zisk *et al.* (1977), Pieters C., and T.B. McCord, *Lunar and Planetary Science IX*, 897, 1978]. The ejecta blanket, wall, and rim of Aristarchus are radially asymmetric. Several anomalous spots were discriminated including the Cobra Head of Vallis Schroeteri and certain small craters on the plateau. The pyroclastics are characterized and mapped on the basis of their spectral properties. Vallis Schroeteri appears as a seperate unit on the ratio versus ratio map (the albedo of the rille decreases steadily with distance from the Cobra Head and was not expected to be a member of a coherent cluster in the albedo versus ratio

histogram). The units as defined will be checked for uniqueness using 8-point spectra extracted from the available multispectral imagery.

In addition to the direct scientific return these unit maps make excellent reconnaisance tools for the targeting of high resolution infrared spectra. Infrared spectra of the plateau and portions of Aristarchus crater were obtained in 1980 and 1981. Some of these spots were in units of particular interest and will be presented as further characterization of the units defined on the basis of their visible spectral properties. These units include the Cobra Head of Vallis Schroeteri and other spots which have been mapped as the same unit, pyroclastic deposits on the northern plateau, and several spots in units associated with Aristarchus crater. New spectra will be obtained using the maps as a guide to maximize information return in the limited observatory time available.