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MULTISPECTRAL AND GEOMORPHIC STUDIES OF PROCESSED VOYAGER 2 IMAGES OF EUROPA
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High resolution images of Europa taken by the Voyager 2 spacecraft were used in an M.S. thesis to study a portion of Europa's dark lineations and the major white line feature Agenor Linea. Initial image processing of images 1195J2-001 (violet filter), 1198J2-001 (blue filter), 1201J2-001 (orange filter), and 1204J2-001 (ultraviolet filter) was performed at the U.S.G.S. Branch of Astrogeology in Flagstaff, Arizona. Processing was completed through the stages of image registration and color ratio image construction.

Image processing was then continued at the Lunar and Planetary Institute (LPI) in Houston, Texas. Using the facility's Gould/DeAnza IP8500 Image Processing System interfaced to a DEC VAX 11/780 computer, the following image products were generated: contrast enhancements of individual images, normal color composites, and color ratio composites; density-sliced images derived from normal images, contrast enhanced images, and color ratio images; principal components images (attempted but failed because of the spectral blandness of the images); and parallelepiped classified images of normal color composites and color ratio composites. In addition to these, pixel printouts of the orange, blue, and violet images were obtained for the dark lineation study area (220° to 180° Longitude and -24° to -2° Latitude) in 200 pixel-by-225 pixel blocks, and for the majority of Agenor Linea (220° to 173° Longitude and -44° to -41.5° Latitude).

Pixel printouts were used in a new technique of linear feature profiling to compensate for image misregistration through the mapping of features on the printouts. In all, 193 dark lineation segments were mapped and profiled. The more accurate multispectral data derived by this method was plotted using a new application of the ternary diagram, with orange, blue, and violet relative spectral reflectances serving as end members. These new techniques were initially described in Meier (1981), with the full, improved method presented in Meier (1983a). Statistical techniques were then applied to the ternary diagram plots. The image products generated at LPI were used mainly to cross-check and verify the results of the ternary diagram analysis.

Results of work at LPI both confirm and supplement previous multispectral studies of Europa. Notable among the findings was the discovery that there are essentially only two spectral/compositional units in the dark lineation study area, the plains units and the dark lineation material unit. All spectral variations found within the dark lineation suite were found to be gradational between the two spectral units. Also, each dark lineation spectral class could be strongly correlated to a dark lineation brightness class, with the brightest class being nearly spectrally identical to the plains unit. These data provide the first direct spectral evidence of resurfacing on Europa, since the plains unit seems to be replacing the dark lineation unit, progressively increasing dark lineation brightness as it does so.

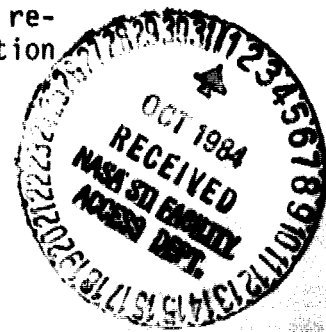
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