## **General Disclaimer**

## One or more of the Following Statements may affect this Document

- This document has been reproduced from the best copy furnished by the organizational source. It is being released in the interest of making available as much information as possible.
- This document may contain data, which exceeds the sheet parameters. It was furnished in this condition by the organizational source and is the best copy available.
- This document may contain tone-on-tone or color graphs, charts and/or pictures, which have been reproduced in black and white.
- This document is paginated as submitted by the original source.
- Portions of this document are not fully legible due to the historical nature of some
  of the material. However, it is the best reproduction available from the original
  submission.

Produced by the NASA Center for Aerospace Information (CASI)

NASW-3389 DRA/HA.

## LUNAR AND PLANETARY INSTITUTE

3303 NASA ROAD 1 HOUSTON, TEXAS 77068 CABLE ADDRESS: LUNS!

MULTISPECTRAL AND GEOMORPHIC STUDIES OF PROCESSED VOYAGER 2 IMAGES OF EUROPA Thomas A. Meier, Dept. of Geosciences, University of Houston, Houston, Texas 77004.

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 parallelpiped 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 pixer blocks, and for the majority of Agneor Linea (220° to 178° 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 serrelated 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.

(NASA-CR-174075) HOLTISPECTEAL AND GEOMORPHIC STUDIES OF PROCESSED VOYAGER 2 IMAGES OF EUROPA (Houston Univ.) HC A02 'MF A01 CSCL 03B

N85-12848

63/9111507

Acknowledgements. Special thanks are due LPI staff members Dr. Peter Schultz, for serving as LPI VGF advisor; Rebecca McAllister, for image processing consulting; and Ron Weber, for help in obtaining Voyager image prints and pre-published shaded relief maps of Europa.

## **BIBLIOGRAPHY**

1) Meier, T.A. (1981). Color Distribution Fields of Geomorphic Features on Europa: Initial Results From a New Technique. In Reports of Planetary Geology Program-1981, NASA TM 84211, pp. 47-49.

2) Meier, T.A. (1983a). A Detailed Spectral Study of Agneor Linea, Europa. In Lunar and Planetary Science XIV, pp. 495-496.

3) Meier, T.A. (1983b). Possible Fossil Craters on Europa. In Lunar and Planetary Science XIV, pp. 497-498.