

EVIDENCE FOR A COMPLETE ROTATION OF EUROPA'S CRUST FROM GALILEO SSI DATA

FIGUEREDO, P. H., GREELEY, R., and the GALILEO SSI TEAM. Department of Geology, Arizona State University, Tempe, AZ, USA.

The surface of the Jovian satellite Europa displays a complex geologic history involving the formation of plains, lineaments and areas of crustal disruption. We are undertaking a study of the sequence, distribution and orientation of morphological units on the northern leading hemisphere of the satellite in order to evaluate temporal trends and possible global processes that may control the formation of terrain types. The distribution of disruption zones was found to broadly match that of areas of crustal thinning predicted by tidal heating models of Europa. We measured the orientation of lineaments in the area, and combined this information with their stratigraphic position in order to determine the change in orientation with time. We documented that lineaments -and therefore inferred stresses- rotated clockwise with time. This result agrees with predictions from models that combine tidal deformation and non-synchronous rotation of Europa. In these models, the detached outer shell of the satellite gradually sweeps eastward over the deformed interior. Using the stress fields predicted by these models and our results of change in lineament orientation with time, we reconstructed the different longitudinal positions that the studied area may have occupied in the past. Our data show that Europa's crust completed more than a full rotation relative to the tidally deformed interior. We are in the process of comparing these results with similar analyses over the southern-leading and trailing hemispheres of Europa.