

GEOLOGY OF EUROPA REVEALED BY IMAGES FROM THE GALILEO SPACECRAFT

GREELEY, R. Ariz. State Univ., Tempe, AZ USA.

Galileo returned 478 images of Europa from 14 orbits of the spacecraft around Jupiter (through Sept. 1999), enabling a reconnaissance of this ice-covered rocky moon at resolutions ranging from global-scale (few km/pixel) to local (~8 m/pixel). Analyses of these images show that the European surface is composed predominantly of water ice that has been fractured, disrupted, and modified by ridge-forming and other processes. The patterns and morphologies of some ridges suggest crustal deformation associated with diurnal tides, and could reflect non-synchronous rotation of Europa around Jupiter. Other ridges, and some domes, dark spots, and flowlike features appear to have resulted from internal heating of ice and the intrusion, extrusion, and/or melt-through of sub-crustal materials to the surface. Although absolute ages of surface materials and events on Europa are not well constrained, the relative lack of impact craters 10 km suggests geologically-recent activity. A fundamental issue centers on the possible existence of liquid water beneath Europa's ice crust, and the possibility that Europa experiences cryovolcanic activity today. Resolving this issue probably must await results from a future mission.