

Flexure of Europa's lithosphere due to ridge-loading

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Models of Europa's interior predict a liquid ocean underneath its icy outer shell. The thickness of this ice shell is not known, yet has important implications for future European spacecraft missions and the habitability of Europa's ocean. Early investigation of images sent back by the Galileo spacecraft showed a few clear cases of crustal flexure near ridges [1,2,3]. Those cases were observable because favorable lighting conditions highlighted the flexure, and yielded estimates of the thickness of the elastic portion of Europa's ice crust of ~200 m.

Now using photogrammetry, we are extending the investigation of flexure near ridges which allows determination of the elastic thickness at a variety of locations across Europa's surface. We have investigated the elastic thickness over a wide range of longitudes and latitudes and in a variety of geological settings. The amount of flexure seen yields an elastic thickness of generally ~300 m, consistent with earlier estimates. Intriguing preliminary indications of variations in the elastic thickness with proximity to chaos are observed.

[1] Tufts, R., et al. 1997. Crustal displacement features on Europa. *Geol. Soc. Am. Abstr. Programs* 29, A-312 [2] Tufts, R. 1998. Lithospheric Displacement Features on Europa and their Interpretation. PhD Dissertation. University of Arizona. [3] Williams, K. K. and R. Greeley. 1998. Estimates of ice thickness in the Conamara Chaos region of Europa. *Geophys. Res. Lett.*, 25, 4273-4276.