

## Measuring Tidal Deformations at Europa's Surface

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### Abstract

Key information on Europa's interior can be gained by monitoring tidally-induced surface deformations from orbiting and landed spacecraft. Such observations would provide constraints on the thickness and rheology of Europa's ice and liquid water layer, thereby providing an important tool to characterize basic physical properties of the satellite's putative subsurface water ocean. We will present relations between the interior of Europa and key tidal parameters that can be retrieved from an instrument suite monitoring tidally-induced changes of local gravity, tilt, latitude, and strain at the surface of Europa, focusing on implications for the outermost ice and water layer. A most promising approach would involve laser altimetry and gravitational field observations from an orbiting spacecraft combined with monitoring of tidally-induced gravity and tilt changes at the surface. However, tidal measurements at the surface may be significantly impeded by instrumental drift, instrument coupling to the surface, local sources of noise and the presumably short lifetime of the instruments due to the harsh radiation environment.