



Tidal response of Europa's subsurface ocean

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Observations of Cassini and Galileo spacecrafts suggest the presence of subsurface global water oceans under the icy shells of several satellites of Jupiter and Saturn. Previous studies have shown that in the presence of subsurface oceans, time-variable tides cause large periodic surface displacements and that tidal dissipation in the icy shell becomes a major energy source that can affect long-term orbital evolution. However, in most studies so far, the dynamics of these satellite oceans have been neglected. In the present study, we investigate the tidal response of the subsurface ocean of Europa to a time-varying potential. Two-dimensional nonlinear shallow water equations are solved on a sphere by means of a finite element code. The resulting ocean tidal flow velocities and surface displacements will be presented.