

**Tuesday, March 18, 2003**  
**MOVING AND GROOVING ICE**  
**8:30 a.m. Salon A**

**Chairs: F. Nimmo**  
**A. P. Showman**

Showman A. P. \* Han L.

*Numerical Simulations of Convection in Europa's Ice Shell: Implications for Surface Features* [#1806]

Numerical simulations of convection in Europa's ice shell show that 100-200 m-amplitude topography results from the convection under reasonable conditions. This may help explain some, though not all, of the numerous pits, uplifts, and spots seen on Europa's surface.

Barr A. C. \* Pappalardo R. T.

*Numerical Simulations of Non-Newtonian Convection in Ice: Application to Europa* [#1477]

We present results of numerical simulations of solid-state convection using a non-newtonian rheology for ice. Implications for the interior structure of Europa are discussed.

Goodman J. C. \* Collins G. C. Marshall J. Pierrehumbert R. T.

*Dynamics of Hydrothermal Plumes on Europa: Implications for Chaos Formation* [#1834]

We compute scaling laws which govern the dimensions of hydrothermal plumes in Europa's liquid layer. These laws lead to predictions of plume size, heat flux, and velocity which aid discussion of chaos formation mechanisms.

Figueredo P. H. \* Greeley R.

*The Emerging Resurfacing History of Europa from Pole-to-Pole Geologic Mapping* [#1017]

Results from regional geologic mapping show gradual changes in the styles of cryovolcanic and tectonic mechanisms over the visible geologic history. These changes appear to reflect the effects of tidal and thermal processes on a thickening ice shell.

Bart G. D. \* Greenberg R. Hoppa G. V.

*Cycloids and Wedges: Global Patterns from Tidal Stress on Europa* [#1396]

Variations in diurnal tensile stress result in both cycloids and boxy-to-circular crack features. The latter follow very tightly curved paths that are similar in size, shape, and location to the crack patterns in the wedges and sub-jovian regions.

Sarid A. R. \* Greenberg R. Geissler P. Hoppa G. V.

*Crack Azimuth Sequences on Europa: The Southern Leading Hemisphere* [#1445]

Cross-cutting relationships among tectonic lineaments in the southern leading hemisphere of Europa yield systematic changes in azimuth suggestive of tidal stress changes over several cycles of non-synchronous rotation.

Greenberg R. \* Hurford T.

*The Evil Twin of Agenor: More Evidence for Tectonic Convergence on Europa* [#1861]

Reconstruction along a lineament similar to Agenor, but located diametrically opposite, indicates it is a convergence site, confirming hypotheses that similar features elsewhere formed that way and helping solve the surface-area budget problem.

Nimmo F. \* Giese B. Pappalardo R. T.

*Estimates of Europa's Ice Shell Thickness from Elastically-supported Topography* [#1296]

Flexural topographic profiles near Cilix crater, Europa, give an elastic thickness of 6(+5,-2)km. Based on this value, the total ice shell thickness must exceed 6 km, and is probably ~25 km.

Pappalardo R. T. \* Collins G. C. Head J. W. Moore J. M. Schenk P. M.

*Grooved Terrain on Ganymede: A Galileo-based Synthesis* [#1509]

Galileo imaging has greatly improved understanding of the emplacement history and geological implications of grooved terrain, supporting a rift-like model, with important modifications from previous scenarios.

Hibbitts C. A. \* Hansen G. B. McCord T. B. Stephan K.

*Impactor Contamination of Dark Ray Craters on Ganymede* [#1925]

Spectra from the Near Infrared Mapping Spectrometer aboard Galileo of dark ray material from the Kittu impact crater on Ganymede show evidence of contamination by a C-type impactor. Spectra from areas unaffected by dark ray craters conform to a mixture of waterice and Ganymede nonice material.

Stephan K. \* Jaumann R. Wagner R. Hibbitts C. A. Hansen G. B.

*Ganymede Craters: Relationships Between Spectral Properties and Crater Retention Age* [#1687]

The amount of water ice in bright impact craters and the amount of non-ice contaminant(s) within crater material and ejecta of dark ray craters observed by NIMS and SSI on Ganymede is assumed to be indicative of relative crater retention age.

Zahnle K. \* Schenk P. Dones L. Levison H.

*Cratering Rates in the Outer Solar System* [#1522]

We assess the sizes and numbers of the comets, and discuss impact rates by comets and asteroids on planets and satellites throughout the outer solar system. We do some other stuff too, but you can read about that in the abstract.

Makris N. C. \* Lee S. Zanolin M. Pappalardo R. T.

*Probing Europa's Interior with Natural Sound Sources* [#1449]

Our goal is to use acoustic echo-sounding and tomographic techniques to determine Europa's interior structure. We show that robust estimates can be made of Europa's ice layering structure and potential ocean depth with a single acoustic sensor.