Friday, March 18, 2005
EUROPA (AND TRITON)
8:30 a.m. Salon A

Chairs: A. C. Barr
S. A. Kattenhorn

8:30 a.m. Prockter L. M. * Nimmo F. Pappalardo R. T.
A Shear Heating Origin for Ridges on Triton **[#1722]**
Morphologically similar ridges are present on the geologically young surfaces of Triton and Europa. We show that a plausible mechanism for Triton ridge formation is shear heating, driven by diurnal stresses occurring soon after Triton's capture.

8:45 a.m. Schenk P. *
The Crop Circles of Europa **[#2081]**
Giant Circles on Europa Astound and Amaze! Two antipodal sets of concentric troughs, at least 1500 km in diameter, are 500–1500 m deep and may be related to tidal or rotational stresses.

9:00 a.m. Nimmo F. * Schenk P. M.
Normal Faulting on Europa: Implications for Ice Shell Properties **[#1264]**
We use stereo topography to identify two normal faults on Europa, with D/L ratios similar to Earth. Modelling suggests the ice shell has a low shear modulus and elastic thickness of 0.2–1.2 km.

9:15 a.m. Lee S. * Pappalardo R. T. Makris N. C.
Surface Generated Cracks on Europa **[#2368]**
Conditions are derived for surface cracks to penetrate through Europa's ice shell based on fracture mechanics. It is shown that the cracks may reach the bottom of the shell under diurnal tensile stress if the shell is several kilometers thick.

9:30 a.m. Crawford Z. Pappalardo R. T. * Barr A. C. Gleeson D. Mullen M. Nimmo F. Stempel M. M. Wahr J.
Wavy Lineaments on Europa: Fracture Propagation into Combined Nonsynchronous and Diurnal Stress Fields **[#2042]**
The variety of Europa's observed lineament planforms from cycloidal, to wavy, to arcuate can be produced by propagation of fractures into a combined static nonsynchronous rotation stress and time-varying diurnal stress field.

9:45 a.m. Kattenhorn S. A. *
Compressive Anti-Cracks at the Tips of Strike-Slip Faults on Europa and Implications for Fault Mechanics **[#1144]**
Compressive quadrants at the tips of strike-slip faults on Europa show evidence of convergent structures, or anti-cracks, that partly accommodate the effects of the creation of new surface area by plate-spreading mechanisms.

10:00 a.m. Miyamoto H. * Mitri G. Dohm J. M. Showman A. P.
Flow-like Features on Europa: Geometric Patterns and Relation to Topography Collectively Constrain Material Properties and Effusion Rates **[#1616]**
We present numerical simulations of surface-ice flows on Europa to illuminate whether putative flow-like features actually resulted from flows. We provide theoretical support for the view that many of these features are not cryovolcanismic in origin.

10:15 a.m. Riley J. * Greenberg R. J. Sarid A. R.
Europa's South Polar Region: Reconstruction of the Sequential Resurfacing History **[#1516]**
Reconstruction of several generations of resurfacing and crust displacement near Europa's south pole shows that much of the surface was modified in the time between two separate chaos-formation events. The process of chaos formation seems unchanged over much of the history of the surface.

10:30 a.m. Mitri G. * Showman A. P.
Conductive-Convective Switches of the Ice Shell of Europa: Implications for the Surfaces Structures **[#1872]**
Modest variation in the heat flux in Europa's interior can produce repeated switches from a conductive to a convective configuration of the ice shell, with rapid and large variations in thickness. The rapidity of these switches implies that stress buildup, hence extensive fracture, would occur.

10:45 a.m. Han L. * Showman A. P.
Thermo-Chemical Convection in Europa's Icy Shell with Salinity **[#1465]**
We present numerical simulations of thermo-chemical convection to test the hypothesis that convection with salinity can produce Europa's pits and domes. Our simulations show that domes (200–300 m) and pits (300–400 m) can be produced under appropriate conditions.

11:00 a.m. Barr A. C. * Pappalardo R. T.
Convection in Ice I with Composite Newtonian/Non-Newtonian Rheology: Application to the Icy Galilean Satellites **[#2146]**
We use numerical models to determine the conditions required to trigger convection in the ice I shells of the icy Galilean satellites with a stress- temperature- and grain-size dependent rheology for ice I.

11:15 a.m. McKinnon W. B. *
On Convection in Ice I Shells of Outer Solar System Bodies — Application to Callisto and Titan **[#2387]**
Convection in Callisto's floating ice I shell is possible for reasonable grain sizes. Diffusion creep is the key. Not only possible, but probably required throughout much of Solar System history. For Titan, it depends on grain size and composition.

11:30 a.m. Vance S. * Brown J. M.
Double-Diffusive Convection and Other Modes of Salinity-modulated Heat and Material Transport in Europa's Ocean **[#2264]**
We assess the affect of salinity on dynamics and heat transport from floor to ceiling in Europa's ocean. We discuss a fluid-dynamical analysis of plume properties and possible connections with surface features.