

**Friday, March 11, 2011**  
**COLDMEMBER: ICY OCEAN WORLDS**  
**1:30 p.m. Waterway Ballroom 5**

**Chairs:** Joshua Emery  
 William McKinnon

- 1:30 p.m. Vance S. D. \* Brown J. M.  
[Laboratory Simulations of Ammonia-Rich Oceans in Icy Worlds](#) [#1563]  
 We discuss recent acquisition and analysis of sound velocities in aqueous ammonia to 800 MPa pressure, in the range  $-20^{\circ}$  to  $100^{\circ}\text{C}$ , conditions relevant to deep icy world oceans.
- 1:45 p.m. Ishimaru R. \* Sekine Y. Matsui T. Mousis O.  
[Oxidizing Proto-Titan: Constraint from the Impact Origin of Its  \$\text{N}\_2\$  Atmosphere](#) [#1358]  
 We show that a  $\text{CO}_2$ -rich oxidizing proto-atmosphere is necessary to form Titan's current  $\text{N}_2$  atmosphere by impact shock heating, implying that the chemical composition of satellitesimals that formed the saturnian system containing Titan should be oxidizing.
- 2:00 p.m. Estrada P. R. \* Mosqueira I.  
[Titan's Accretion and Long Term Thermal History](#) [#1679]  
 We investigate Titan's long-term thermal evolution starting with its accretion history. We describe the structure of the interior and how Titan can avoid complete differentiation over its lifetime.
- 2:15 p.m. O'Rourke J. G. \* Stevenson D. J.  
[Stability of Ice/Rock Mixtures with Application to Titan](#) [#1629]  
 Motivated by recent gravity data, the thermal evolution of Titan's deep interior is modeled with double-diffusive convection theory, concluding that a partially differentiated ice/rock interior likely could not avoid differentiating.
- 2:30 p.m. Spencer J. R. \* Howett C. J. A. Verbiscer A. J. Hurford T. A. Segura M. E. Pearl J. C.  
[High-Resolution Observations of Thermal Emission from the South Pole of Enceladus](#) [#2553]  
 We discuss the spatial distribution and temperature of the 7–16- $\mu\text{m}$  endogenic thermal emission from Enceladus, measured by the Cassini Composite Infrared Spectrometer on seven flybys between March 2008 and August 2010.
- 2:45 p.m. Matson D. L. \* Castillo-Rogez J. C. Johnson T. V. Lunine J. I. Davies A. G.  
[Enceladus and Europa: How Does Hydrothermal Activity Begin at the Surface?](#) [#1565]  
 The question of how the surface hydrothermal activity (e.g., eruptive plumes and heat flow) is initiated can be addressed within the framework of our "Perrier Ocean" model. A number of processes for doing this will be discussed.
- 3:00 p.m. Han L. \* Tobie G. Showman A. P.  
[The Dichotomy of Thermal Convection in Enceladus' Ice Shell](#) [#2211]  
 We perform numerical simulations in three-dimensional spherical geometry to explain the dichotomy of thermal convection in Enceladus' ice shell by implementing temperature-dependent viscosity and a weak south pole.

- 3:15 p.m. Patthoff D. A. \* Kattenhorn S. A.  
[\*Separating Old and Young: The South Polar Dichotomy on Enceladus\*](#) [#2700]  
On Enceladus, a narrow band of deformation separates the young south polar terrain from the older regions to the north. This study characterizes the dichotomy and determines its relationship to the present-day and paleo tiger stripes.
- 3:30 p.m. Barr A. C. \*  
[\*Strain History of the Ice Shells of the Galilean Satellites from Radar Sounding\*](#) [#2212]  
Crystal orientation fabric, indicative of strain history, can cause radar reflections in terrestrial ice sheets. I show that fabric can form and be detected in the Galilean satellites, providing a way of testing hypotheses about ice shell geology.
- 3:45 p.m. Pappalardo R. T. \*  
[\*What We Don't Know About Europa\*](#) [#1635]  
Given Europa's high astrobiological potential, bizarre geology, and intriguing geophysical processes, twelve questions can be posed which, once answered, would contribute to changing our paradigm regarding Europa.
- 4:00 p.m. Schmidt B. E. \* Blankenship D. D.  
[\*A Melt-Hydrofracture Model for the Formation of Europa's Chaos Terrain\*](#) [#2105]  
We present a new model for formation of Europa's chaos terrain based on lessons drawn from the Earth's cryosphere.
- 4:15 p.m. Kattenhorn S. A. \* Kay J. P.  
[\*Geologically Young Troughs on Europa May Be Active\*](#) [#1561]  
We compare the orientations of troughs on Europa with global stress fields over a range of nonsynchronous rotation rates to determine age of formation. Troughs may have formed hundreds to tens of thousands of years ago and could thus still be active.
- 4:30 p.m. Bland M. T. \* Singer K. N. McKinnon W. B. Schenk P. M.  
[\*Constraints on Ganymede's Thermal Evolution from Models of Crater Relaxation\*](#) [#1814]  
We combine high-resolution topography data of viscously relaxed craters on Ganymede with numerical modeling of crater relaxation to constrain the thermal evolution of the satellite.