Thursday, March 10, 2011
POSTER SESSION II: PLANETARY DYNAMICS AND TECTONICS
6:00 p.m. Town Center Exhibit Area

Rivoldini A. Van Hoolst T. Verhoeven O. Mocquet A. Dehant V.
Constraints on the Interior Structure and Composition of Mars from Geodesy **[#2178]**
We use the recent geodesy data of Konopliv et al. 2010 to constrain the composition and interior structure of Mars. The data is consistent with Mars having a molten core of radius 1794±65km and a core sulfur concentration of 16±2 wt%.

Pithawala T. M. Ghent R. R. Bills B. G.
Modeling the Internal Structure of Mars Using Normal Mode Relaxation Theory **[#1549]**
Mantle and core viscosity structure of Mars, using normal mode relaxation theory.

Toyokuni G. Ishihara Y. Takenaka H.
Preliminary Modeling of Global Seismic Wave Propagation in the Whole Mars **[#1631]**
Global seismic wave propagation in the whole Mars is simulated by an accurate and efficient numerical scheme which has been developed for the Earth. Simple Mars models are used to obtain preliminary results of martian seismic waveform modeling.

Roberts J. H. Arkani-Hamed J.
Impact-Induced Mantle Dynamics on Mars **[#1205]**
Heating of the martian mantle by a large basin-forming impact (e.g., Utopia) drives long-lived degree-1 mantle convection with the upwelling beneath the impact site. The heat flux recovers fastest if the impact occurs over a preexisting upwelling.

Sekhar P. King S. D.
3D Modeling of Melting History of the Martian Mantle **[#2057]**
The formation of Tharsis rise places a constraint on the timing of melt production and thus, the thermal history of Mars.The temperature-dependent, stagnant lid models in 3D produce similar plume structures to Kiefer's axisymmetric model.

Šrámek O. Zhong S.
Martian Dichotomy Formation by Partial Melting Coupled to Early Tharsis Migration **[#2366]**
We investigate the effect of partial melt residue stiffening on the plume-lithosphere dynamics on Mars, in order to further test a self-consistent endogenic model of dichotomy formation by partial melting and the subsequent Tharsis evolution.

Sandu C. Kiefer W. S.
Degassing of the Martian Mantle and Its Effects on the Thermal Evolution and Magnetic Field History **[#2566]**
We analyze the effect of water concentration on martian thermal evolution. This parameter controls the convection intensity and the heat removal process. Results show how degassing history affects the early magnetic field lifespan on the planet.

Azuma S. Katayama I. Hirauchi K. Yamashita S.
Strength Contrast between Plagioclase and Olivine: Implication for Rheological Layering in the Terrestrial Planets **[#1251]**
We performed an experiment to directly determine the relative strength between plagioclase and olivine without any extrapolating of flow law and evaluated rheological variation in the crust-mantle transition of terrestrial planets.

Tielke J. A. Zimmerman M. E. Kohlstedt D. L.
Deformation of Olivine Single Crystals in a Hydrous Environment: Insight into the Rheological Behavior of the Lithospheric Mantle of Terrestrial Planets **[#2273]**
Deformation of olivine demonstrates that viscosity decreases with increasing water fugacity and decreasing silica activity, consistent with point defect models in which water is incorporated into olivine as defect associates involving Si or Me vacancies with H ions.

Lewis K. W. Simons F. J.
Spatial Variability of the Martian Crustal Magnetic Field **[#2621]**
The crust of Mars retains heterogenous remanent magnetism. Magnetic power spectra can provide constraints on the depths and strengths of magnetic sources. We use a spatiospectral windowing approach to map local variability across the planet.

Milbury C. Schubert G. Raymond C. A. Smrekar S. E.
Inversion of Gravity and Magnetic Field Data for Tyrrhena Patera **[#2243]**
We model the gravity and magnetic field data for Tyrrhena Patera and the surrounding area to infer the magnetization history.

Lillis R. J. Dufek J. Kiefer W. S. Karlstrom L. Bleacher J. E. Manga M.
Magmatic Intrusions Beneath Martian Highland Volcanoes: Clues from Eruptive History, Thermal-Magnetic-Gravity Modeling and Electron Reflectometry **[#2180]**
Gravity and magnetic field measurements imply that the magma chamber beneath Tyrrhena Patera partially demagnetized surrounding crust, while the larger magma accumulation at Syrtis Major completely demagnetized 10,000s of square kilometers of crust.

Cheung K. K. King S. D.
Using Crustal Thickness Modeling to Study Mars' Crustal/Mantle Structures **[#1534]**
Mars' topographic dichotomy divides the planet into two distinct hemispheres. By using the gravitational potential of Mars and integrating it with topography, we can study the interior structure of the planet with a crustal thickness model.

Yin A.
Impact-Induced Subduction and Slab Rollback for the Tectonic Origin of the Tharsis Rise on Mars **[#1525]**
To explain Tharsis evolution, I propose that its volcanism and graben development were induced by slab rollback of a southeast-dipping plate. Subduction was initiated near Syria Planum by early Hesperian volcanic flooding, possibly triggered by the Argyre impact.

Davis B. J. Andrews-Hanna J. C.
Flexural Response to Sediment Erosion and Unloading at Valles Marineris, Mars **[#2557]**
Models of the Valles Marineris formation have difficulty accounting for the observed gravity and topography surrounding the troughs. We show that these features can be explained by lithospheric flexure in response to the erosion of ancient sediments.

Williams N. R. Pritchard M. E. Bell J. F. Watters T. R. Banks M. E. Robinson M. S. Tran T.
Two Tectonic Landforms from Lunar Reconnaissance Orbiter Camera Digital Terrain Models **[#1624]**
Topography derived from Lunar Reconnaissance Orbiter Camera (LROC) stereo images provides new insights and constraints on the mechanics and kinematics of contractional tectonic landforms on the Moon.

Runyon K. D. Davatzes A. K. Davatzes N. C.
Structural Characterization of the Cerberus Fossae at the Athabasca Valles Source Region, Mars **[#1913]**
The Cerberus Fossae displacement profiles and surface expression are consistent with a normal fault interpretation. Mechanical interaction of fossae segments is indicated by displacement profiles and fracture intensity measurements.

Birnie C. Fueten F. Stesky R. Hauber E.
Underlying Structural Control of Small Scale Fault and Fracture Orientations Viewed in HiRISE Images Within West Candor Chasma, Mars **[#1488]**
Small-scale fault and fracture orientations measured within HiRISE images of West Candor Chasma display a clear relationship with large-scale underlying chasma-forming faults and potentially identify additional chasma-forming structures.

Vaz D. A. Barata M. T. Alves E. I.
Transtension in Thaumasia Planum: Evidences for a Coprates Rise Oblique Transfer Zone **[#1105]**
An automatic method for strain assessment was applied to a rift located in Thaumasia Planum. A transtensive regime for the rift formation was confirmed. The presented strain analysis gives a better perspective of the kinematics of the rift.

Raitala J. T. Kostama V.-P.
Marker Strata and the Light Blocks on the Floor of Ius Chasma **[#1062]**
A marker layer divides stratified blocks on the floor of Ius Chasma into light-gray and darker-gray units with numerous cross-cutting strike-slip faults. The blocks probably originated from the rim of Ius Chasma.

Beuthe M. Rivoldini A. Dehant V.
Only 3 Spatial Patterns of Tidal Heating **[#2279]**
We show that the spatial pattern of tidal dissipation within a body can be factorized into three basic patterns multiplied by radial functions that depend on the internal structure.

Rhoden A. R. Hurford T. A. Manga M.
The Contribution of Io-Raised Tides to Europa's Diurnally-Varying Surface Stresses **[#2241]**
We show that the daily tidal distortion of Europa by Io is non-negligible compared to that of Jupiter. Io's contribution is likely large enough to affect tidally-driven fractures especially if obliquity is also included.

Bland M. T. McKinnon W. B.
The Importance of Brittle Deformation in Models of Icy Satellite Tectonics **[#2482]**
Models of tectonics provide insight into planetary evolution, but particular care must be used when simulating brittle deformation of the lithosphere. We describe a case study that illustrates the uncertainties involved.

Patterson G. W. Ernst C. M.
Modeling Plate Motion on Europa: Phaidra Linea **[#2102]**
We are using plate motion modeling to determine the presence and magnitude of non-rigid behavior present within a complex system of plates on Europa defined by the prominent band Phaidra Linea.

Malaska M. Radebaugh J. Le Gall A. Mitchell K. Lopes R. Wall S.
Evidence for an Eroded Upwarp Near Sikun Labyrinthus, Titan **[#1567]**
From an analysis of valley and channel patterns observed by synthetic aperture radar (SAR) during the T39 flyby, evidence for an eroded regional upwarp on Titan is described. A putative evolution sequence will be presented.

Martin E. S. Kattenhorn S. A.
Crater-Fracture Interactions on Enceladus: The Control of Crater Size on Perturbations of Fracture Growth **[#2666]**
On Enceladus, we aim to understand localized changes in fracture orientation seemingly caused by local perturbations in the stress field by craters within the cratered terrains, and whether or not these changes are dependent on crater size.

Gifford P. K. Yoshinobu A. S.
Geometry and Kinematics of Structures in the South Polar Terrain of Enceladus: Over-Interpreting Kinematics? **[#2734]**
Evidence suggests that the south polar terrain of Enceladus, specifically the "tiger stripes," has been formed by both extensional and shear forces, as well as compression.

Giese B. Helfenstein P. Hurford T. A. Neukum G. Porco C. C.
Observation of Cycloidal Features on Enceladus **[#2007]**
We observe geologically young cycloidal segments in different places on the surface of Saturn's moon Enceladus. From these we conclude that there must have been (or still is) a fluid subsurface layer, potentially a global subsurface ocean.

Walker C. C. Bassis J. N.
On the Formation of a South Polar Basin in the Ice Shell of Enceladus **[#1719]**
Enceladus' topography suggests that the SPT region could have formed in the style of a basin on the Earth. The McKenzie Model for basin formation (McKenzie, 1978) on the Earth and knowledge of terrestrial ice is applied to the Enceladus setting.

Manga M. Wang C.-Y. Rudolph M. L.
Pressurized Oceans, Cracking the Ice Shell, and the Eruption of Liquid Water on Enceladus **[#1138]**
We calculate the pressure in an ocean produced by freezing of the overlying ice shell. We find that for reasonable tensile strengths of ice, and shells less than a few tens of kilometers thick, the entire shell can crack and liquid water could erupt onto the surface.

Beddingfield C. B. Yoshinobu A. S.
Features Analogous to Ice Streams and Ice Rises on Enceladus' Leading Hemisphere: Indicative of Subsurface Water? **[#2737]**
The leading hemisphere of Enceladus contains a variety of features that we suggest are analogous to terrestrial ice streams. These features may indicate the presence of a large amount of subsurface water during the time of their formation.