

**Thursday, March 26, 2009**  
**MARS: TECTONICS AND DYNAMICS**  
**1:30 p.m. Waterway Ballroom 1**

**Chairs: Leslie Bleamaster**  
**Jeffrey Andrews-Hanna**

- 1:30 p.m. Schultz R. A. \* Nahm A. L.  
[\*Transient and Long-Term Displacement-Length Scaling of Planetary Faults\*](#) [#1075]  
 We examine the relationship between fault displacement profiles and displacement-length scaling relations to identify transient and long-term fault growth.
- 1:45 p.m. Wyrick D. Y. \* Smart K. J.  
[\*Discrete Element Modeling of Dike-induced Deformation\*](#) [#1647]  
 Discrete element models of dike-induced deformation suggest the most distinctive topographic signature of an underlying dike are parallel ridges formed by contractional folding bounding a trough rather than an extensional fault-bounded graben.
- 2:00 p.m. Evans A. J. \* Andrews-Hanna J. C. Zuber M. T.  
[\*Quantitative Constraints on Surface Erosion via Admittance Localization for Arabia Terra, Mars\*](#) [#2368]  
 This research focuses on constraining erosion in Arabia Terra based on flexural modeling coupled with the observations.
- 2:15 p.m. Nahm A. L. \* Schultz R. A.  
[\*Evaluation of the Orogenic Belt Hypothesis for the Formation of the Thaumasia Highlands, Mars\*](#) [#1069]  
 The orogenic belt hypothesis for the formation of the Thaumasia Highlands is tested using critical taper wedge mechanics. We find that conditions required for their formation as an orogenic belt are improbable for Mars.
- 2:30 p.m. Bleamaster L. F. III\*  
[\*A Dynamic Mechanism for Valles Marineris Formation\*](#) [#2552]  
 I propose that although Tharsis uplift plays an important role in Valles Marineris formation, a Tharsis-driven tectonic history is incomplete and secondary to the long-lived dynamic influence of northern Borealis basin subsidence and adjustment of the northern lowlands.
- 2:45 p.m. Andrews-Hanna J. C. \*  
[\*The Opening of the Valles Marineris Canyons on Mars: Stress Focusing Along the Buried Dichotomy Boundary Beneath Tharsis\*](#) [#1094]  
 The Valles Marineris canyons formed as a result of Tharsis loading over the preexisting crustal dichotomy boundary, which generated a narrow belt of strongly extensional stresses just south of the boundary at the present-day location of the canyons.
- 3:00 p.m. Zhong S. \* Sramek O.  
[\*The Causes and Consequences of the Crustal Dichotomy and Their Implications for the Early Evolution of Mars\*](#) [#2432]  
 Endogenic and exogenic formation mechanisms for the crustal dichotomy and their consequences on mantle dynamics, melting and volcanism are critically compared and examined.
- 3:15 p.m. Šrámek O. \* Zhong S.  
[\*Dynamic Stress at Martian Surface in the Model of Rotation of the Lithosphere\*](#) [#2491]  
 We compute dynamic stresses at the martian surface in the model of rotation of the lithosphere and we will discuss the implications for martian tectonics.

- 3:30 p.m. Wen L. \*  
[\*Dynamics of Mars and Origin of Tharsis\*](#) [#1436]  
A large fraction of the longest-wavelength observed Mars' geoid and topography ( $l = 2,3$ ) has to come from a thermo-chemical anomaly in the deep lower mantle beneath Tharsis, which also explains its presence, and formation and evolution of Tharsis.
- 3:45 p.m. Schumacher S. \*  
[\*Influence of Regional Crustal Variations on the Global Temperature Field of Mars\*](#) [#1520]  
The effects of regional crustal variations on the present-day temperature distribution of Mars are shown using 2D-models. The results indicate that the thermal anomalies generated can be larger than those caused by a potential mantle plume.
- 4:00 p.m. Kiefer W. S. \* Li Q.  
[\*Mars Is Not Dead: Mantle Convection Controls the Observed Lateral Variations in Lithospheric Thickness on Present-Day Mars\*](#) [#1416]  
Mantle convection is a natural explanation for the observed lateral variations in lithospheric thickness on present-day Mars. Lithospheric flexure at the north polar cap of Mars is consistent with an interior with moderately vigorous convection.
- 4:15 p.m. Li Q. \* Kiefer W. S.  
[\*Layered Mantle Convection and Magma Production on Mars: Effects of Dense Layer Properties\*](#) [#1399]  
We explore the effects of a chemically dense deep layer and its properties on martian mantle dynamics. Our focus is on the viscosity and radioactivity contrast between the dense layer and upper portion of the mantle.
- 4:30 p.m. King S. D. \*  
[\*Mars Mantle Structure: Results from Calculations with an Imposed Hemispheric Lithospheric Step\*](#) [#1680]  
I examine spherical convection with a step viscosity increase in the lithosphere. With a low-viscosity channel below the lithosphere, small-scale convection develops at the step within the first 100 MY. I discuss application to Tharsis.