Tuesday, September 11, 2012

STRUCTURE AND DYNAMICS OF THE MARTIAN MANTLE
8:30 a.m.   Lecture Hall

Contributions from geodynamics, petrology, geochemistry, and seismology
to understanding the nature of heterogeneity in the martian mantle

Chairs: Bruce Banerdt
Walter Kiefer

Mar. Igneous Geochemistry: The Nature of the Martian Mantle [#6035]
The trace-element compositions of martian meteorites reveal elemental fractionation patterns imposed by their
source regions. Modeling the magma ocean and cumulate overturn stages of Mars establishes how those mantle
sources may have been formed.

Castillo-Rogez J. C. * Banerdt W. B. [Contributed 15-minute talk]
Impact of Anelasticity on Mars’ Dissipative Properties — Application to the InSight Mission [#6032]
We reinterpret Mars’ dissipation factor inferred from Phobos’ secular acceleration of Phobos. We demonstrate
that material anelasticity is likely responsible for the observed dissipation and set a new constraint on the mantle
mean temperature.

King S. D. * Sekhar P. Cheung K. K. [Contributed 15-minute talk]
Martian Mantle Dynamics Constrained by Geological and Geophysical Observations [#6029]
We discuss mantle convection calculations with melting that aim to explain the rapid emplacement of Tharsis rise
nearly a billion years after the planet formed and the subsequent limited volcanism after Tharsis formation.

Kiefer W. S. * Filiberto J. Sandu C. [Contributed 15-minute talk]
The Thermochemical Evolution of the Martian Mantle: Alkali Abundances and Their Effects on the Mantle
Solidus and Magma Production Rate over Time [#6034]
The martian mantle is enriched in Na and Fe relative to Earth. This lowers the solidus by up to 50 K and increases
the initial magma production rate on Mars. Loss of Na from the mantle increases the solidus and decreases magma
production over time.

BREAK [15 minutes]

Michel N. C. * Forni O. Hauck S. A. II [Invited 20-minute talk]
Mars Mantle Convection: Influence of Phase Transitions on Core Activity [#6018]
We have employed the axisymmetric mantle convection code CITCOM to investigate the effects of phase
transitions in the mantle and the consequences on the planet’s thermal evolution.

Roberts J. H. * Arkani-Hamed J. [Contributed 15-minute talk]
Coupled Core Cooling and Mantle Dynamics on Mars [#6016]
Heating from impact / Core stable to convection / Single mantle plume

Civet F. * Tarits P. [Contributed 15-minute talk]
Mars Internal Structure Derived from MGS Magnetic Data [#6024]
We defined a new global electromagnetic induction method to infer internal electrical conductivity in telluric
bodies. We tested this method on Mars Global Surveyor magnetic data to obtain a one-dimensional electrical view
of the internal structure of Mars.