Tuesday, July 10, 2007
VOLATILES AND INTERIOR EVOLUTION
2:00 p.m. Beckman Auditorium

Chairs: R. J. Phillips
L. T. Elkins-Tanton

2:00 p.m. INTRODUCTORY REMARKS – FRAMING THE SESSION

2:05 p.m. Sotin C. * Bibring J.-P. Choblet G. Couturier F.
The Coupling Between the Dynamo Shutdown and the Water Abundance on Mars: The Mantle Filter **[#3312]**
Models describing differentiation and mantle convection suggest that the heat generated by the differentiation of the planet would be quickly released. They predict that the dynamo would stop a few hundreds of million years after differentiation.

2:20 p.m. Zaranek S. W. * Manga M.
Mantle Plumes and Long-lived Volcanism on Mars as a Result of Mantle Compositional Layering **[#3145]**
We address the influence of a layered mantle on the thermal evolution of Mars. Layered mantles provide a viable way to extended volcanism on Mars, increasing both the amount and duration of melting.

2:35 p.m. Elkins-Tanton L. T. * Parmentier E. M.
Water in the Formation and Early Evolution of Mars **[#3212]**
Though surface morphology shows the past presence of water, its source is debated. Models demonstrate that clement surface conditions can be reached ~15 Ma after a magma ocean, and that small initial volatile contents can produce water-rich surfaces.

2:50 p.m. Phillips R. J. * Bullock M. A.
Tharsis, Volatiles, and Climate **[#3078]**
Tharsis outgassing of carbon dioxide, water, sulfur gases, and methane during the Noachian very likely perturbed the climate episodically, though whether or not it drove the surface temperature to 273 K (or warmer) is uncertain.

3:05 p.m. Li Q. * Kiefer W. S.
Mantle Convection and Magma Production on Present-Day Mars: The Effects of Temperature-dependent Rheology and Water **[#3306]**
With available geological and geophysical constraints, we explore the mechanism of mantle convection and magma production on present-day Mars by incorporating the effects of temperature-dependent rheology and water.

3:20 p.m. BREAK

3:40 p.m. Grott M. * Breuer D.
The Evolution of the Martian Lithosphere and Implications for Crustal and Mantle Rheology **[#3005]**
We study the influence of crustal and mantle rheology on the evolution of the martian elastic lithosphere thickness and compare the results to elastic thickness data given in the literature.

3:55 p.m. Smrekar S. E. * Guest A.
Thermal and Volatile Evolution of Mars from Dichotomy Relaxation Models **[#3342]**
We show that loss of crustal volatiles, at least locally, at the Hesperian/Amazonian boundary is needed along with cooling predicted by thermal evolution models to preserve the dichotomy topography and crustal thickness variations to the present day.

4:10 p.m. Frey H. * Edgar L. Lillis R.
Very Large Visible and Buried Impact Basins on Mars: Implications for Internal and Crustal Evolution and the Late Heavy Bombardment in the Inner Solar System **[#3070]**
Several new very large (>1000 km diameter) impact basins bring the total population on Mars to ~20. These provide information on age of the lowlands, how fast the martian dynamo died and a possible martian equivalent of a "terminal lunar cataclysm".

4:25 p.m. Hahn B. C. * McLennan S. M.
Evolution and Geochemistry of the Martian Crust: Integrating Mission Datasets **[#3179]**
We review our recent work detailing variations in chemistry across different martian age provinces and as compared to global mineralogy and dust abundance, and consider an approach for estimating the chemical composition of the upper martian crust.

4:40 p.m. Nekvasil H. * McCubbin F. M. Harrington A. O'Leary M. C. Elardo S. Lindsley D. H.
Crustal Differentiation on Mars: Insights from Rocks Analyzed by the MER Rover Spirit **[#3181]**
We propose that the formation of the secondary crust on Mars involved chemical stratification due to magma fractionation during ascent and that the shallow crust may be more Fe-rich and silica-poor than the cumulus mineral-enriched lower crust.

4:55 p.m. Shearer C. K. * Burger P. V. Papike J. J. Borg L. E. Irving A. J. Herd C. D. K.
Evolution of the Martian Mantle and Crust. A Crystal Chemical Perspective from Olivine in Basaltic Shergottites **[#3072]**
Here, we constrain the physical mechanisms by which shergottites obtain their compositional characteristics through a major and trace element study of one of the earliest crystallizing phases (olivine) in some of the more primitive shergottites.

5:10 p.m. MODERATED DISCUSSION

5:35 p.m. BARBECUE DINNER AT BECKMAN MALL