

**Tuesday, July 10, 2007**  
**POSTER SESSION: MARS WATER AND THE MARTIAN INTERIOR**  
**11:30 a.m. Dabney Garden**

Ambard A. Mouginiis-Mark P. J.

*Water Channels near Olympus Mons, Mars* [#3043]

We have mapped water channels surrounding Olympus Mons volcano, and find that some of them do not follow the down-slope direction, despite their young age. This implies that either local tilting or that topographic obstacles (since removed) existed when the water was released to form the channels.

Anderson J. L. Peterson R. C.

*Sulfate Mineral Phase Equilibria as a Function of Relative Humidity. Intermediate Compositions in the (Mg,Fe,Cu)SO<sub>4</sub>-H<sub>2</sub>O System at 1 atm* [#3316]

Careful characterization of minerals present at the martian surface requires a detailed understanding of hydrous sulfate phase relationships. This study explores the effect of metal substitution on the hydration behaviour of hydrous metal sulfates.

Baldrige A. M. Christensen P. R.

*Thermal Infrared Studies of Salt Cements; Implications for Mars* [#3221]

This study utilizes thermal infrared laboratory measurements of chloride salt mixtures and crusts to characterize their spectral features to allow for their detection on the martian surface.

Baptista A. R. Mangold N. Ansan V. Costard F. Masson P. Lognonné P. Neukum G. HRSC Team  
*Rheological Properties of Emplaced Lobate Lava Flows on Syria Planum, Mars* [#3132]

Our study identifies, describes and characterizes the volcanic lava flows on the Syria Planum region, and their relation with the surrounded volcanic structures in order to understand its relationships with the Tharsis bulge complex history.

Baratoux D. Pinet P. Gendrin A. Kanner L. Mustard J. Daydou Y. Bibring J.-P.

*Impact Craters Mineralogy from OMEGA Data: Implications on Alteration History, Ejecta Emplacement, and Subsurface Composition* [#3183]

This paper reports on the mineral composition of ejecta of craters at Syrtis Major from the OMEGA data. Observations of ejecta mineralogy have exciting implications for both weathering history and deep subsurface composition of volcanic surfaces.

Barnhart C. J. Howard A. D. Moore J. M.

*Model Simulations of Fluvial Incision in Parana Basin* [#3319]

A landform evolution model is used to explore scenarios responsible for the late-Noachian early-Hesperian fluvial incision on the Southern Highlands. Simulation DEMs are statistically compared to actual DEMs in order to evaluate working hypotheses.

Barriot J. P. Karatekin O. Dehant V.

*Mars Time-Variable Gravity Field: A Possible Cumulative Effect on a Family of Equatorial Orbits* [#3091]

We demonstrate that periodic variations of the gravity coefficient of Mars may induce small cumulative perturbations on a given family of circular equatorial orbits, and that these perturbations could be measurable with current radio science technologies.

Bills B. G. Ghent R. R. Nimmo F.

*Why is Mars So Dissipative?* [#3239]

The orbital evolution of Phobos shows Mars to be much more dissipative than Earth's mantle, contrary to expectation of simple thermo-physical models. We examine a variety of implications, and present a range of models which accommodate this behavior.

Bouley S. Ansan V. Mangold N. Masson Ph. Neukum G. HRSC Co-Investigator Team  
*Study of Naktong Vallis, Mars: Sustained Fluvial Activity Extending During the Hesperian Period* [#3130]  
Naktong Vallis, located on the southern plateau, is a valley network with a medium drainage density. With the HRSC camera, it is possible to determine which processes have formed this valley and to determine precisely when Naktong Vallis was active.

Bowles J. A. Hammer J. E. Brachfeld S. A.  
*Magnetic and Petrographic Characterization of Synthetic Martian Basalts* [#3255]  
Results of dynamic crystallization experiments on synthetic martian basalts (under varying  $f_{O_2}$  and cooling rates) provide further constraints on the plausibility of primary magmatic Fe-Ti(-Cr) oxides as a source for martian magnetic anomalies.

Buczowski D. L.  
*Comparing Quasi-Circular Depression (QCD) Locations to Northern Lowland Materials on Mars* [#3302]  
Northern lowland sQCDs are located and their surface reliefs evaluated. The nature of the materials in which sQCDs form is examined. Stealth QCD location is compared to geologic units and the inferred materials.

Campbell B. A. Carter L. M. Plaut J. J. Phillips R. J. Safaeinili A. Seu R. Biccari D. Orosei R. Marinangeli L. Masdea A. Picardi G. Putzig N. E. Egan A. Bernardini F. SHARAD Team  
*SHARAD Mapping of Subsurface Geologic Horizons in Amazonis Planitia* [#3225]  
SHARAD radar signals reveal a subsurface dielectric interface in the south part of the basin that may correspond with the interface between mid-Amazonian basalts and the underlying sedimentary basin fill.

Capitan R. D.  
*Chronologic Surface Methodology — A New Method for Dating Martian Landscapes* [#3268]  
The new methodology for determining the age of surface deposits on Mars take into consideration the relationship between crater diameter and crater depth, which changes in the course of crater's evolution. The results describe more recent landforming events on Mars.

Chavdarian G. V. Sumner D. Y.  
*Water Cycling in Hydrous Sulfate Sands as a Possible Analog for Dehydration of Meridiani Planum Outcrops* [#3346]  
Cracks and fins in hydrous sulfate sands at White Sands National Monument, New Mexico, demonstrate vapor transport between the atmosphere and subsurface. A similar process may be forming cracks and fins in Meridiani outcrops in the recent past.

Coleman N. M. Dinwiddie C. L.  
*Hydrologic Analysis of the Birth of Elaver Vallis, Mars by Catastrophic Drainage of a Lake in Morella Crater* [#3107]  
Elaver Vallis was carved by catastrophic drainage of a Hesperian lake in Morella Crater. We estimate the minimum time for groundwater to fill the lake, the peak flood discharge rate, and the local cryosphere thickness, groundwater depth, and crustal heat flux at the time of the flood.

Davatzes A. E. K. Gulick V. C. HiRISE Team  
*New Insight into Cataracts in Outflow Channel Systems from HiRISE Images* [#3202]  
HiRISE images of cataracts allow us to see fine details and help in understanding the history of large outflow channels. These cataracts are strikingly similar to terrestrial jökulhaups and have many of the same morphological features preserved.

Dickson J. Head J. W. Marchant D. R.  
*Modification of Graben Along the Dichotomy Boundary in Eastern Arabia Terra (Coloe Fossae; 53–59°E, 37–41°N): Nature, Evolution and Thickness of Lobate Debris Aprons and Lineated Valley Fill* [#3177]  
Coloe Fossae lies on the dichotomy boundary of Mars and shows evidence for widespread glaciation in its recent history. We use MOC, HRSC and MOLA data to measure minimum thickness for the initial volume of ice.

Dickson J. L. Head J. W. Marchant D. R. Morgan G. A. Levy J. S.  
*Recent Gully Activity on Mars: Clues from Late-Stage Water Flow in Gully Systems and Channels in the Antarctic Dry Valleys* [#3165]

We describe fieldwork on gullies in the Antarctic Dry Valleys as an analog to gullies on Mars. Despite the desert conditions and cold temperatures, small packs of snow melt in the summer, flow down-channel and modify the surface.

Dimitrova L. L. Holt W. E. Haines A. J. Schultz R. A.  
*Lithospheric Stress and Strain Models: Constraints from a Global Dataset of Surface Faults* [#3337]

We use a recent global MOLA map of normal and reverse faults to evaluate geophysical models for lithospheric deformation. We find that removal of material and/or lithospheric subsidence after fault formation is required in the eastern hemisphere.

Echaurren J. C.  
*New Calculations and Mathematical Refinements for Impact Conditions on Argyre Planitia, Mars* [#3289]  
The aim of this work is to calculate the impact conditions on Argyre Planitia, based in mathematical models which have been generated with the intervention of polynomial functions, soliton theory and quantum formalism.

Edgar L. A. Frey H. V.  
*Buried Impact Basin Distribution on Mars: Contributions from Crustal Thickness Data* [#3083]  
Circular Thin Areas seen in crustal thickness data may represent additional buried impact basins on Mars. If so, the highlands and lowlands appear to have similar basement ages, and all regions are older than previously thought based on QCDs alone.

Fassett C. I. Head J. W. III  
*Direct Constraints on the Timing of Martian Valley Network Formation Derived Using Buffered Crater Counting* [#3050]  
Buffered crater counting on martian valley networks reveal they are Early Hesperian or older, with only a few interesting local exceptions. This is consistent with a global shift in the surface environment having occurred from early Mars to today.

Filiberto J. Treiman A. H.  
*Experimental Investigation into the Effect of Chlorine in a Martian Basaltic System* [#3191]  
We are initiating a study investigating the effects of Cl on liquidus and crystallization behavior of a martian magma composition.

Gilmore M. S. Ollila A. M. Lanza N. L. Vasavada A. R.  
*Geometric and Thermal Context of Gullied Slopes in the Northern Hemisphere of Mars: Prediction and Measurement* [#3320]  
Gullied slopes are found to have warmer summer temperatures and receive a more limited range of insolation than slopes without gullies. Melting of near-surface ice is perhaps facilitated by the thermal environment associated with subsurface rock layers.

Grott M. Hauber E. Kronberg P.  
*Martian Rifting in the Absence of Plate Tectonics?* [#3077]  
We investigate the stresses necessary to induce rifting in the Thaumasia Highlands. We show that forces connected to plate tectonics need not be invoked to explain the observed lithosphere-scale faulting and present an alternative scenario.

Harrison K. P. Grimm R. E.  
*Multiple Flooding Events in Martian Outflow Channels: Quantitative Considerations* [#3219]  
We investigate regional groundwater flow associated with multiple, discrete flooding events at martian outflow channel sources. The large number of events required suggest that water would have to pond locally before generating floods.

Hart S. D. Nimmo F. Korycansky D. Agnor C.

*Probing the Giant Impact Hypothesis of the Martian Crustal Dichotomy* [#3332]

An exploration of the single giant impact hypothesis for the martian crustal dichotomy, using numerical hydrocode simulations.

Hauber E. Charalambakis E. Gwinner K. Knapmeyer M. Grott M.

*Displacement-Length Relationships of Normal Faults on Mars: New Observations with MOLA and HRSC* [#3110]

We present displacement-length data for 145 normal faults on Ophir Planum, Mars. We use single MOLA tracks and HRSC DEM and present examples for the displacement distribution along faults, and discuss implications for fault linkage.

Head J. W. Marchant D. R. Dickson J. Levy J. Morgan G. Kreslavsky M.

*Mars Gully Analogs in the Antarctic Dry Valleys: Geological Setting and Processes* [#3118]

We examine Mars-like Antarctic Dry Valley analogs for recent gullies on Mars and find that top-down melting of surface/near-surface ice and snow can both carve gullies and prolong their active stages through topographic trapping of wind-blown snow.

Irwin R. P. III Maxwell T. A. Howard A. D.

*Water Budgets on Early Mars: Empirical Constraints from Paleolake Basin and Watershed Areas* [#3400]

The areas of breached impact craters and their contributing watersheds are used to constrain annual water budgets on early Mars. Results are similar to terrestrial arid to semiarid climates.

Ivanov B. A. Pierazzo E.

*Ice-rock Mixture Behavior in Full Scale Impact Crater Modeling* [#3236]

We present modeling results of an impact crater formation in martian crust with variable initial ice/water content. Final parameter fields may be used to start analysis of the hydrothermal cell start.

Jaumann R. Reiss D. Sander T. Gwinner K. Hauber E. Hoffmann H. Roatsch T. Erkeling G. Friedrich S. Neukum G.

*Source Regions and Multiple Water Release Events in Valley Networks of the Libya Montes Region on Mars* [#3046]

The morphology and topography of the source regions provide information about the origin of water on the surface. Furthermore, the analysis of internal valley structures in combination with crater counts allows reconstructing water release with time.

Jouglet D. Poulet F. Langevin Y. Bibring J. P. Gondet B.

*Global Study of the Martian Surface Hydration: New MEX/OMEGA Data* [#3157]

We present the recalibration of a part of the OMEGA [2.5–5.1  $\mu\text{m}$ ] channel dataset and the improvement of the water ice rejection. These methods are used to extend the global study of the martian surface hydration through the 3  $\mu\text{m}$  feature.

Jouglet D. Poulet F. Bibring J. P. Langevin Y. Gondet B.

*Search for Carbonates on Mars with the OMEGA/Mars Express Data* [#3153]

We present the search for carbonates on Mars performed on a large part of the Mars Express/OMEGA data. This work uses automatic tools based on the band depth of the 3.4  $\mu\text{m}$  feature.

Karner J. M. Papike J. J. Shearer C. K. McKay G. Le L. Burger P. V.

*The Martian Interior: Oxygen Fugacity of the Martian Mantle Based on V and Cr Oxybarometry* [#3051]

V and Cr oxybarometry applied to martian basalts Y 980459 and QUE 94201 indicate an  $f_{\text{O}_2}$  of IW to IW+1 for the upper martian mantle.

Khan A. Connolly J. A. D.

*Constraining the Composition and Thermal State of Mars from Inversion of Geophysical Data* [#3013]

We have inverted global geophysical data for martian composition and thermal state. The results suggest a mantle enriched in FeO relative to Earth, but less than the SNCs. We also find a liquid Fe core, ~1600 km in radius, containing ~12 wt% S, with CMB temperatures around 2350 K.

Kostama V.-P. Raitala J. Ivanov M. A. Törmänen T. Korteniemi J.

*Preliminary View of the Geological History of the Western Promethei Terra Smooth Plains Region* [#3308]

We present a preliminary view of the possible evolution of the smooth plains region near Promethei Terra, and characterize the features found within the region.

Kreslavsky M. A. Head J. W.

*Slope Streaks on Mars: An Assessment of "Wet" Scenarios and the Role of Concentrated Brines* [#3203]

Formation of slope streaks on Mars by shallow subsurface flow of concentrated chloride brines is marginally (im)possible...

Lahtela H. Korteniemi J. Kostama V.-P. Raitala J.

*Three Paleolakes in Promethei Terra, Mars* [#3243]

Analysis of three martian paleolakes and connecting channels in Promethei Terra.

Levy J. S. Head J. W. Marchant D. R. Morgan G. A. Dickson J. L.

*Gully-Polygon Interaction and Stratigraphy on Earth and Mars: Sand-Wedge Polygons as Part of Cold-Desert, Near-Surface Fluvial Systems* [#3059]

We present field observations suggesting polygonally patterned ground contributes to the production, transport, and storage of liquid water in Antarctic gullies; analogous features on Mars suggest that similar processes may be forming and modifying gullies in both environments.

Lillis R. J. Frey H. V. Manga M. Mitchell D. L. Lin R. P. Acuña M. H.

*Magnetic Signatures and Crater Retention Ages of Giant Buried Basins on Mars: New Constraints on the Timing of the Ancient Dynamo* [#3090]

Magnetic signatures and crater retention ages of the 20 largest impact basins on Mars reveal that the most strongly magnetized crust is extremely old and that the core dynamo likely ceased geologically quite rapidly.

Mangold N. Poulet F. Mustard J. F. Bibring J.-P. Langevin Y. Gondet B. Ansan V. Masson P. Hoffmann H. Neukum G. OMEGA Team HRSC Team

*The Clay-rich Region of Nili Fossae as Observed with Mars Express Data* [#3126]

Nili Fossae is a region of unique spectral diversity. Phyllosilicates are present in the ancient crust as outcrops exhumed by erosion and as ejecta of large impacts.

Marinova M. M. Aharonson O. Asphaug E.

*Do Mega Impacts Leave Craters? Characterizing Mega Impacts and Their Relation to the Mars Hemispheric Dichotomy* [#3354]

We simulate planetary-scale impacts, and relate their attributes to the Mars hemispheric dichotomy. We find that slow, head-on impacts melt much of the surface, but faster and oblique impacts are less disruptive and preserve attributes of the event.

Milbury C. A. Raymond C. A. Smrekar S. E. Kulikov I. K. Schubert G.

*Correlations of Gravity and Magnetic Anomalies Along Mars' Eastern Dichotomy Boundary* [#3357]

We jointly analyze gravity and magnetic field data along Mars' eastern dichotomy boundary where correlations of the scale and amplitude of gravity and magnetic field anomalies are observed.

Moore J. M. Bullock M. A. Sharp T. G.

*Mars-Analog Evaporite Experiment: Evaporation Results* [#3085]

This research is part of a multi-year experimental investigation of brines and evaporates on Mars. Here we report the results from our evaporites apparatus in which two types of brine were subjected to evaporation under Mars-like conditions.

Morgan G. A. Head J. W. Marchant D. R. Dickson L. J. Levy J. S.  
*Gully Formation on Mars: Testing the Snowpack Hypothesis from Analysis of Analogs in the Antarctic Dry Valleys* [#3080]

Gully analogs (Antarctic Dry Valleys) show that trapped windblown snow (in alcoves, depressions and channels) is an important water source for gully formation; this supports a top-down (rather than deep groundwater) origin of martian gullies.

Mustard J. F. Thollot P. Murchie S. L. Pelkey S. M. Ehlmann B. L. Roach L. A. Seelos F. Poulet F. Bibring J.-P. CRISM Science Team

*OMEGA-CRISM Characterization of Mafic Crustal Composition: Pyroxene* [#3230]

There is a statistically significant difference in relative pyroxene content of the Noachian highlands relative to the Hesperian-aged lavas of Syrtis Major. Noachian-aged terrains show a greater variance in pyroxene composition than the lava plains.

Okubo C. H. HiRISE Team

*Deformation Bands on Mars and Implications for Subsurface Fluid Flow* [#3041]

HiRISE observations of fault-related damage zones in light-toned layered deposits enable indepth study of the evolution of structurally controlled fluid reservoirs on Mars.

Painter S. L. Grimm R. E.

*Three-Phase Simulations of Moisture Movement in the Martian Subsurface* [#3272]

MarsFlo, a general-purpose three-phase, two-component numerical simulator for Mars subsurface hydrology, is under development. Existing laboratory experiments on freezing in porous media were well reproduced in validation activities. Simulations of cryosphere formation will be presented.

Poulet F. Arvidson R. E. Bibring J.-P. Murchie S. Gomez C. Morris R. Wiseman S. Langevin Y. Gondet B.

*Can the Formation Models of the Meridiani Planum Outcrops be Applied to the Entire Etched Terrains of Terra Meridiani?* [#3184]

This paper focuses on a spectroscopic study of Terra Meridiani from remote sensing observations done by OMEGA and CRISM.

Poulet F. Bibring J.-P. Gondet B. Langevin Y. Mustard J. Mangold N. Chevrier V. Gendrin A.  
*Discovery, Mapping and Mineralogy of Phyllosilicates on Mars by MEx-OMEGA: A Reappraisal* [#3170]

This abstract presents an overview of the discovery, mapping and mineralogy of phyllosilicates on Mars by MEX-OMEGA.

Sato H. Baratoux D. Kurita K.

*Crevasse Craters on Mars: Detection of Ancient Volatile Rich Crust* [#3166]

This paper reports on new statistical observations on crevasse craters in the outflow channels regions. We infer from these observation a model of the distribution of the volatile in the martian crust at the time of their formation.

Sato H. Baratoux D. Kurita K. Heuripeau F. Pinet P.

*Volume Measurements of Martian Landslides: Accuracy Assessment and Implications for Dynamics* [#3169]

An accurate methodology for measuring landslide volumes and gravity center are developed. The results show major differences with previous measurements. This work is considered as a prerequisite for any statement concerning landslide dynamics.

Sotin C. Couturier F.

*The Gravity Potential Along Paleo-Shorelines: Implications for the Geological History of Mars* [#3404]

The calculation of gravity potential along hypothetic paleo shorelines provides insight on the amount of water and the timing of several key events during Mars evolution.

Stemmer K. Breuer D.

*Core Formation with Implications to the Martian Dichotomy: Thermo-Chemical Convection in a Spherical Shell* [#3205]

We have investigated the idea that the martian dichotomy originates from a one-degree core formation process generating an early crust by running 3D spherical thermo-chemical convection simulations.

Stopar J. D. Taylor G. J. Norman M. D.

*Aqueous Alteration in Nakhlite MIL 03346: LA-ICPMS and Raman Spectroscopy* [#3105]

An analysis of aqueous alteration products in MIL 03346 by LA-ICPMS and Raman microscopy. Element abundances suggest mobilization of elements from phases in the mesostasis (phosphates, glass) that can be readily dissolved when in contact with water.

Thakur P. K. Bhardwaj A. Aggarwal S. P.

*Hydrological Parameter Extraction and Analysis of Mangala Valles of Mars* [#3116]

This study has made an attempt to extract the major historical streams of Mangala Valles using MDIM 2.1 digital elevation model and GIS-based hydrological processing tools. The ILWIS 3.3 software was used to derive the basic hydrological parameters.

Treiman A. H.

*Large-Scale Fault-controlled Paleo-Fluid Flow in the Valles Marineris: Fault-Continuation Ridges* [#3187]

Traces of some graben-bounding faults adjacent to the Valles Marineris can be followed as ridges, to >100 km long, on the VM walls. As with the much smaller ridges in VM interior deposits, these ridges are likely to be fault planes hardened and bleached by flowing groundwater.

Vidal A.

*Valley Network Analysis and Drainage Characteristics of Proposed Mars Science Laboratory Landing Sites* [#3237]

Valley networks and drainage basins are mapped for seven proposed MSL landing sites to evaluate network maturity and drainage density.

Wyatt M. B.

*The Chemically Altered Basaltic Northern Plains of Mars: TES, OMEGA, and GRS Integrated Data Sets and Conclusions* [#3402]

TES, OMEGA, and GRS data sets lead to the following conclusions: 1) the northern plains are basaltic; 2) the basalt is chemically altered; and 3) the alteration likely resulted from surface interactions with volatiles (snow) deposited during phases of high obliquity.

Zahnle K. J. Colaprete A.

*Secondary Craters and the Liberation of Ice on Mars* [#3274]

Recycling of water ice by secondary cratering may provide a missing link between the disappearance of warm wet climates and the end of the late bombardment.