

Thursday, March 26, 2009
MAGMATIC VOLATILES AND ERUPTIVE CONDITIONS OF LUNAR BASALTS
8:30 a.m. Waterway Ballroom 4

Chairs: Justin Hagerty
Brad Jolliff

- 8:30 a.m. Friedman B. Saal A. E. * Hauri E. H. Van Orman J. Rutherford M. J.
[*The Volatile Content of the Apollo 15 Picritic Glasses*](#) [#2444]
We report over 200 new volatile data on volcanic glasses from the Apollo 15 mission. These new data extend the range of previously reported H₂O, C, F, S and Cl contents, and confirm the presence of significant dissolved magmatic volatiles in lunar volcanic glasses.
- 8:45 a.m. McCubbin F. M. * Nekvasil H. Jolliff B. L. Carpenter P. K. Zeigler R. A.
[*Inhomogeneous Distribution of Magmatic Volatiles in the Lunar Interior: Clues from the Mineral Apatite*](#) [#2246]
The variations in apatite volatile contents (F, Cl, OH) between mare basalts and the magnesian and alkali-suite rocks indicate that the lunar interior may be stratified with respect to magmatic volatiles.
- 9:00 a.m. Agee C. B. * Duncan M. S.
[*The Effect of CO₂ on Density of Molten Apollo 14 Black Glass at High Pressure*](#) [#1266]
We present new experimental data on the effect of pressure on CO₂ in lunar magmas.
- 9:15 a.m. Grimm R. E. * McSween H. Y. Jr.
[*Water and the Electrical Conductivity of the Lunar Mantle*](#) [#1958]
Tens of ppm H₂O in ultramafic minerals can fit the lunar conductivity profile, without recourse to high alumina content.
- 9:30 a.m. Barr J. A. * Grove T. L.
[*Toward Developing a Garnet Lherzolite Saturation Model for Lunar Low-Ti, Ultramafic Green Glass Compositions*](#) [#2161]
To evaluate the possible role of primordial lunar mantle in the derivation of the low-Ti ultramafic green glasses, a model of garnet lherzolite melting must be developed for relevant lunar compositions.
- 9:45 a.m. Liang Y. * Hess P. C.
[*Simple Models for Trace Element Fractionation During Melting and Melt Migration in an Upwelling Heterogeneous Lunar Mantle*](#) [#2117]
The lunar mantle is chemically and lithologically heterogeneous. In this paper, we present simple models for trace element fractionation during melting and melt migration in a heterogeneous lunar mantle and discuss their implications for lunar magma genesis.
- 10:00 a.m. Wilson L. * Head J. W.
[*Lunar Volcanism: Factors Controlling Intrusion Geometries and Eruption Conditions*](#) [#1160]
We review theoretical factors controlling geometries of dikes that either do or do not reach the surface to feed eruptions. We then compare the surface expressions of the consequences of both kinds of event with observed lunar volcanic features.
- 10:15 a.m. Thomson B. J. * Grosfils E. B. Bussey D. B. J. Spudis P. D.
[*The Thickness of Mare Basalts in Imbrium Basin Estimated from Penetrating Craters*](#) [#1727]
Here we report basalt thicknesses values in Imbrium Basin derived from analyses of Clementine UV-VIS multispectral images of large craters that penetrate (or failed to penetrate) the mare. The mare volume is ~2× greater than some previous estimates.

- 10:30 a.m. Oshrin J. Neal C. R. *
[*Crystal Size Distributions and Basalt Evolution: More from Fra Mauro*](#) [#1706]
Crystal size distributions have been used to calculate residence times for plagioclase crystals. Trace element data from different crystal populations are also presented.
- 10:45 a.m. Kramer G. Y. * Hawke B. R. Giguere T. A. Heitman G. McCord T. B.
[*The Mare Basalts of Eastern Frigoris*](#) [#2369]
The ejecta composition of small, immature impacts into Eastern Mare Frigoris reveal low-Fe, very low-Ti mare basalts, which may even be high alumina basalts.
- 11:00 a.m. Hawke B. R. Giguere T. A. * Blewett D. T. Boyce J. M. Cahill J. Gillis-Davis J. J. Hagerty J. J. Lucey P. G. Peterson C. A. Smith G. A. Spudis P. D. Taylor G. J.
[*Remote Sensing and Geologic Studies of the Northeastern Portion of the Lunar Nearside: Final Results*](#) [#1483]
Almost all of the light plains units immediately east and southeast of eastern Mare Frigoris are shown to be cryptomare deposits. The buried or obscured mare flows are dominated by VLT and low-TiO₂ mare basalts.
- 11:15 a.m. Kiefer W. S. *
[*Gravity Observations of the Aristarchus Plateau on the Moon: Implications for the Volcanic and Impact Histories of the Plateau*](#) [#1106]
Gravity anomalies in this region wrap around the fault-bounded eastern margin of the Aristarchus Plateau and place constraints on the impact-induced uplift history of the plateau.
- 11:30 a.m. Hagerty J. J. * Lawrence D. J. Hawke B. R. Gaddis L. R.
[*New Estimates of Thorium Abundances for the Rima Bode Pyroclastic Glass Deposit*](#) [#1852]
We use forward modeling of Lunar Prospector Gamma Ray Spectrometer thorium data to show that the Rima Bode pyroclastic glass deposit contains elevated thorium abundances.

Thursday, March 26, 2009
COMPARATIVE PLANETOLOGY
8:30 a.m. Waterway Ballroom 5

Chairs: Patrick McGovern
Kathleen Nicoll

- 8:30 a.m. Montési L. G. J. *
[*Fabric Development, Shear Zone Formation, and the Possibility of Plate Tectonics on Earth and Venus*](#) [#2350]
The presence of plate tectonics on Earth and not Venus can be explained by the formation of ductile shear, which is possible as a consequence of layer development in a polyphase material on Earth, but not if all phases are dry.
- 8:45 a.m. McGovern P. J. * Watters T. R.
[*Interaction of Membrane Stresses and Magma Ascent at Large Impact Basins on Mars and Mercury*](#) [#1765]
We use a simple mathematical model of the broad-scale loading effects induced by impact basins to investigate how such loading may control magmatism within and around basins on Mars (Borealis, Utopia, and Hellas) and Mercury (Caloris).
- 9:00 a.m. Lee C.-T. A. * Luffi P. Dalton H. A.
[*Application of New Thermobarometers to Constraining the Origin of Magmas on Mars, Venus, Earth, the Moon, and the Eucrite Parent Body*](#) [#1467]
New thermobarometers are presented that can estimate T-P of magma generation on Earth, Mars and other planetary bodies, providing constraints on lithosphere thickness and planetary thermal state (emphasis will be on Mars).
- 9:15 a.m. Horodyskyj U. N. * Wyatt M. B.
[*Compositional Variations with Depth in Icelandic Cores: Applications to Integrated Mars Remote Sensing Data Sets*](#) [#2527]
To better constrain the regional effects and depth of alteration at high-latitudes on Mars, we are examining compositional variations with depth in Icelandic basaltic cores.
- 9:30 a.m. Nicoll K. * Chan M. A. Parker T. J. Jewell P. W. Komatsu G. Okubo C. H.
[*Bonneville Basin Analogues for Large Lake Processes and Chronologies of Geomorphic Development on Mars*](#) [#1962]
We present an inventory of geomorphic analogues for Lake Bonneville and Mars, with focus on potential standing-water features. The goal is to understand water as a geomorphic agent at a variety of temporal and spatial scales.
- 9:45 a.m. Halevy I. * Schrag D. P. Pierrehumbert R. T.
[*Radiative Transfer in the Early Atmospheres of Mars and Earth*](#) [#1029]
Small differences in the formulation of CO₂ absorption in a line-by-line model result in large differences in the radiative forcing provided by 0.1–5 bars of CO₂. This uncertainty pervades any modeling study of the early planetary climate.

Thursday, March 26, 2009
INTERSTELLAR MATTER: ORIGINS AND RELATIONSHIPS
10:00 a.m. Waterway Ballroom 5

Chair: Frank Stadermann

- 10:00 a.m. Duprat J. * Dobrica E. Engrand C. Aléon J. Gounelle M. Leroux H. Marrocchi Y. Meibom A. Mostefaoui S. Rouzaud J.-N. Robert F.
[*Extreme Deuterium Enrichment in Organic Matter from Cometary Antarctic Micrometeorites* \[#1724\]](#)
Deuterium rich organic matter, with D/H up to 30 times the terrestrial value, has been identified in ultra-carbonaceous micrometeorites from central Antarctic snow, strongly suggesting a cometary origin for these objects.
- 10:15 a.m. Floss C. * Stadermann F. J. Yada T. Noguchi T. Nakamura T.
[*Anomalous Nitrogen Isotopic Compositions in the Stardust-rich Antarctic Micrometeorite T98G8: Affinities to Primitive CR Chondrites and Anhydrous IDPs* \[#1082\]](#)
We report the presence of abundant N isotopic anomalies in T98G8, an Antarctic micrometeorite that contains high abundances of presolar grains. Its mineralogical and isotopic characteristics suggest a link to IDPs or certain CR chondrites.
- 10:30 a.m. Bonal L. * Huss G. R. Krot A. N. Nagashima K.
[*Highly ¹⁵N-enriched Chondritic Clasts in the CB/CH-like Isheyevo Meteorite* \[#2046\]](#)
We report the discovery of chondritic clasts in the CB/CH-like meteorite Isheyevo, characterized by bulk ¹⁵N-enrichment such as $\delta^{15}\text{N} = 1000\text{--}1300\text{‰}$ and where hotspots (up to $\delta^{15}\text{N} = 4000\text{‰}$) are present. Their origin will be discussed.
- 10:45 a.m. Ishii H. A. * Bradley J. P. Bonal L. Krot A. N. Huss G. R. Nagashima K. Hutcheon I. D. Teslich N.
[*Transmission Electron Microscopy on Highly ¹⁵N-Enriched Chondritic Clasts in the Isheyevo Meteorite* \[#2467\]](#)
To explore the possible origin and carrier(s) of extreme ¹⁵N enrichments in unique chondritic clasts in the Isheyevo CH/CB-like meteorite, TEM analyses are being undertaken. Initial results from bulk-enriched and hotspot areas are presented.
- 11:00 a.m. Briani G. * Gounelle M. Marrocchi Y. Mostefaoui S. Robert F. Leroux H. Meibom A.
[*Ultra-Pristine Extra-Terrestrial Material with Unprecedented Nitrogen Isotopic Variation* \[#1642\]](#)
A xenolith in the chondrite Isheyevo shows pristine mineralogy and the most extreme N isotopic variation measured in any solar system material — but no H and C isotopic anomalies. This poses new challenges for models for light element fractionation.
- 11:15 a.m. De Gregorio B. T. * Stroud R. M. Nittler L. R. Cody G. D. Kilcoyne A. L. D.
[*Isotopically Anomalous Organic Globules from Comet 81P/Wild 2* \[#1130\]](#)
Two Stardust cometary organic globules contain anomalous δD or $\delta^{15}\text{N}$ (but not both), indicating a presolar origin.

Thursday, March 26, 2009
IMPACTS II: CRATERS AND EJECTA
8:30 a.m. Waterway Ballroom 6

Chairs: Peter Schulte
Tamara Goldin

- 8:30 a.m. van Soest M. C. * Wartho J.-A. Monteleone B. D. Hodges K. V. Koeberl C. Schmieder M. Buchner E. Spray J. G. Bezys R. K. Reimold W. U.
[*\(U-Th\)/He Dating of Single Zircon and Apatite Crystals — A New Tool for Dating Terrestrial Impact Structures* \[#2041\]](#)
The low temperature (U-Th)/He technique has been utilized to date individual crystals from the Manicouagan, Lake Saint Martin, and Bosumtwi impact structures. New (U-Th)/He zircon ages are in agreement with ages obtained via other dating methods.
- 8:45 a.m. Sapers H. M. * Osinski G. R. Banerjee N.
[*Re-Evaluating the Rochechouart Impactites: Petrographic Classification, Hydrothermal Alteration and Evidence for Carbonate Bearing Target Rocks* \[#1284\]](#)
A systematic classification of the Rochechouart impacts is proposed. Evidence for post-impact hydrothermal alteration was observed. A carbonate clast within the lithic impact breccia suggests the existence of carbonate in the pre-impact target rocks.
- 9:00 a.m. Mohr-Westheide T. * Reimold W. U.
[*Chemical Analysis of Small-Scale Pseudotachylitic Breccia in Archean Gneiss of the Vredefort Dome, South Africa* \[#1528\]](#)
Results of a new microchemical investigation of small-scale pseudotachylitic breccias from the Archean gneiss of the Vredefort dome are reported. Limited mixing and for small veinlets local melt formation are observed.
- 9:15 a.m. McDonald I. Koeberl C. * Gurov E.
[*A Meteoritic Component in Melt Rocks from the Boltysk Impact Structure, Ukraine: First Assessment* \[#1252\]](#)
A chondritic component has been detected in impact melt rocks from the Boltysk impact structure, Ukraine.
- 9:30 a.m. Schmieder M. * Jourdan F. Hietala S. Moilanen J. Öhman T. Buchner E.
[*A High-Precision Late Mesoproterozoic \$^{40}\text{Ar}/^{39}\text{Ar}\$ Age for the Keuruselkä Impact Structure \(Finland\)* \[#1028\]](#)
The Kirkkoranta pseudotachylitic breccia dike is the first finding of impact-related melt lithologies known from the deeply eroded Keuruselkä impact structure, Finland. $^{40}\text{Ar}/^{39}\text{Ar}$ dating yielded a late Mesoproterozoic (Stenian) age of the rock.
- 9:45 a.m. Kofman R. S. * Herd C. D. K. Walton E. L. Froese D. G.
[*The Late Holocene Whitecourt Meteorite Impact Crater: A Low-Energy Hypervelocity Event* \[#1942\]](#)
The Whitecourt Meteorite Impact Crater resulted from the low-energy hypervelocity impact of an iron meteoroid. The crater is 36 m in diameter with meteorites scattered up to 70 m from the rim. The crater and ejecta blanket are all well-preserved.
- 10:00 a.m. Kenkmann T. * Reimold W. U. Khirfan M. Salameh E. Konsul K. Lehmann T. Khoury H.
[*The Impact Crater Jebel Waqf as Suwwan in Jordan: Effects of Target Heterogeneity and Impact Obliquity on Central Uplift Formation* \[#1592\]](#)
We present results of a field campaign to the first large impact crater of the Middle East, which has recently been discovered. A superb exposure of the central uplift allows block sizes to be measured and the impact direction to be derived.

- 10:15 a.m. Herrick R. R. * Schenk P. M.
[Surveys of Elliptical Crater Populations on the Saturnian Satellites and Mercury](#) [#2352]
Planetary impacts at the lowest impact angles form elliptical craters. The angle at which this occurs can be inferred from a planet's cratering record. Here we compare five saturnian moons and Mercury to previous work for the Moon, Mars, and Venus.
- 10:30 a.m. Schmitz B. * Heck P. R. Alwmark C. Kita N. T. Peucker-Ehrenbrink B. Ushikubo T. Valley J. W.
[Determining the Impactor of the Ordovician Lockne Crater: Oxygen Isotopes in Chromite Versus Sedimentary PGE Signatures](#) [#1161]
Oxygen isotopic results for chromite from the Lockne Crater and new PGE results show that the claims by Tagle and Schmitt (2008, LPSC abstr. #1418) that the Lockne Crater was caused by a nonmagmatic iron meteorite lacks substance entirely.
- 10:45 a.m. Schulte P. * Deutsch A. Salge T.
[A Dual-Layer Chicxulub Ejecta Sequence with Shocked Carbonates from the Cretaceous-Tertiary \(K/T\) Boundary, ODP Leg 207, Western Atlantic](#) [#1859]
An up to 2-cm-thick Chicxulub ejecta deposit marks the Cretaceous-Tertiary boundary in ODP Leg 207 (Western Atlantic). High-resolution analysis reveals the presence of spherules as well as shocked tectosilicates and carbonate clasts.
- 11:00 a.m. Goldin T. J. * Melosh H. J.
[Planet Earth Set to Broil: Thermal Radiation from Chicxulub Ejecta Reentry](#) [#2342]
We model the thermal radiation transfer due to the atmospheric reentry of hypervelocity Chicxulub impact ejecta. Self-shielding of downward radiation by the spherules limits the magnitude and duration of the thermal pulse at the Earth's surface.
- 11:15 a.m. Ferrière L. * Robin E.
[Composition and Origin of Ni-rich Spinel from the Cretaceous-Tertiary Boundary](#) [#1812]
The main objective of our study is to characterize, at the nanometric scale, the internal microstructure of Ni-rich spinel from the K/T boundary, to better understand and constrain their formation conditions.
- 11:30 a.m. Harris R. S. * Schultz P. H.
[Microscopic Fragments of an Angrite-like Asteroid in 5.28 Ma Impact Melt Breccias from Bahía Blanca, Argentina](#) [#2453]
Meteoritic fragments preserved in a 5.28 Ma impact melt are mineralogically similar to angrites. We report the details and implications of their petrology and geochemistry.

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.

Thursday, March 26, 2009
MARS ANALOGS II: GEOLOGICAL
1:30 p.m. Waterway Ballroom 4

Chair: R. Aileen Yingst

- 1:30 p.m. Clarke J. D. A. * Bourke M. C.
[*Recognition Criteria of Spring Deposits on Mars at all Scales: Evidence from the Dalhousie Springs Analog \(Australia\) \[#1102\]*](#)
Spring deposits at Dalhousie have a suite of distinctive characteristics at all scales that allows their recognition. These characteristics are found in many terrestrial spring deposits. These may assist in the recognition of such deposits on Mars.
- 1:45 p.m. Yingst R. A. * Kuhlman K. R.
[*Microscale Characteristics of Particles Deposited by the 1996 Skeiðarársandur Jökulhlaup: A Potential Terrestrial Analog to Mars \[#1326\]*](#)
As part of our effort to characterize and create a database of important martian analogs at the microscale, we here report on the characteristics of particles deposited by the 1996 Skeiðarársandur jökulhlaup.
- 2:00 p.m. Zimbelman J. R. * Garry W. B. Irwin R. P. III
[*Precision Topography of Pluvial Features in Western Nevada as Analogs for Possible Pluvial Landforms on Mars \[#1370\]*](#)
Ten DGPS topographic surveys from Surprise Valley, on the Nevada-California border, provide insights into the precision required to identify and correlate pluvial features.
- 2:15 p.m. Wang A. * Zheng M. P.
[*Evaporative Salts from Saline Lakes on Tibetan Plateau: An Analog for Salts on Mars \[#1858\]*](#)
We report the initial results from a field campaign to a sulfate-dominated lacustrine system on the Tibetan Plateau. Results from *in situ* and laboratory measurements of the collected salt samples will be presented.
- 2:30 p.m. Ulrich M. * Morgenstern A. Guenther F. Roessler S.
[*Investigation of Thermokarst Features in NE Siberia as Possible Terrestrial Analogues of Martian Scalloped Depressions \[#1076\]*](#)
We investigate permafrost degradation in ice-rich, fine-grained deposits in NE Siberia as terrestrial analogues for martian degraded volatile-rich mantle deposits focusing on the influence of solar insolation on thermokarst morphology.
- 2:45 p.m. Xiang S. M. * Huang D. H.
[*Analogue Research in China's Lunar Exploration \[#1458\]*](#)
We conduct analogue research on the northwestern China stony desert pavements, which appear to have similar surface material as the Moon and Mars, tremendous temperature cycling, and are almost lifeless.

Thursday, March 26, 2009
EXPLORING THE DIVERSITY OF LUNAR LITHOLOGIES WITH
SAMPLE ANALYSES AND REMOTE SENSING
3:00 p.m. Waterway Ballroom 4

Chairs: Paul Lucey
Allan Treiman

- 3:00 p.m. Lucey P. G. * Cahill J. T. S.
[*The Composition of the Lunar Surface Relative to Lunar Samples*](#) [#2424]
Remote sensing measurements of plagioclase abundance and Mg²⁺ (Mg/Mg + Fe) show a compositionally heterogeneous lunar surface with three major compositional types: ferroan anorthosites, Mg-suite and mare basalt.
- 3:15 p.m. Klima R. L. * Pieters C. M. Dyar M. D.
[*Pyroxene Spectroscopy: Probing Composition and Thermal History of the Lunar Surface*](#) [#2155]
We present a quantitative analysis of spectra of eight lunar pyroxenes in the context of an extensive study of compositionally controlled synthetic pyroxenes to determine which spectral properties can be related to elevated amounts of Ti³⁺ and/or Al³⁺.
- 3:30 p.m. Zeigler R. A. * Korotev R. L. Jolliff B. L.
[*A Study of Apollo 16 Feldspathic Glasses: Locally Produced or Ballistically Deposited?*](#) [#2533]
This study presents the results of a coordinated major-, minor-, and trace-element study of Apollo 16 glasses, concentrating on the feldspathic glasses, in order to ascertain their likely provenances.
- 3:45 p.m. Cook D. L. * Berger E. Faestermann T. Herzog G. F. Knie K. Korschinek G. Poutivtsev M. Rugel G. Serefiddin F.
[*⁶⁰Fe, ¹⁰Be, and ²⁶Al in Lunar Cores 12025/8 and 60006/7: Search for a Nearby Supernova*](#) [#1129]
We measured the short-lived nuclides ⁶⁰Fe, ¹⁰Be, and ²⁶Al in two lunar cores (12025/28 and 60006/7). Live ⁶⁰Fe was detected in the topmost sample of 12025/8. Possible sources of the ⁶⁰Fe are discussed, including debris from a nearby supernova.
- 4:00 p.m. Shearer C. K. * Burger P. V. Guan Y.
[*Vapor Element Transport in the Lunar Crust and Implications for Lunar Ore Deposits*](#) [#1299]
Troilite veins and replacement textures occur in numerous lunar samples. Here we differentiate between the several proposed transport models and thereby gain a clearer understanding of volatile element transport in the relatively dry lunar crust.
- 4:15 p.m. Fuller M. * Weiss B. P.
[*The Paleomagnetic Record of the Apollo Samples*](#) [#1192]
Analyses of demagnetization characteristics of the Apollo samples give promise of distinguishing primary NRM carried by mare basalts from impact related shock magnetization and other contamination.

Thursday, March 26, 2009
CHONDRITE ACCRETION AND EARLY HISTORY
1:30 p.m. Waterway Ballroom 5

Chairs: Denton Ebel
Rhiannon Mayne

- 1:30 p.m. Howard K. T. * Benedix G. K. Bland P. A. Cressey G.
[*Modal Mineralogy of CV3 Chondrites by PSD-XRD: Mineralogic Insights into a Complex Evolutionary History*](#) [#1235]
CV3 chondrites Vigarano, Efremovka, Allende, Mokoia, Grosnaja and Kaba are amongst the most studied rocks in existence. By XRD we define the first quantitative modal mineralogy of these samples and explore implications of our data to petrogenesis.
- 1:45 p.m. Ebel D. S. * Leftwich K. Brunner C. E. Weisberg M. K.
[*Abundance and Size Distribution of Inclusions in CV3 Chondrites by X-Ray Image Analysis*](#) [#2065]
Chondrule, matrix, CAI and AOA abundances and log-normal clast size distributions for Allende, Mokoia, Nova 002, Leoville and Vigarano are determined with a new technique. Oxidized CVs have ~2× matrix and ~50% chondrule area compared to reduced CVs.
- 2:00 p.m. Zanda B. * Bland P. A. Le Guillou C. Hewins R. H.
[*Volatile Element Distribution in Matrix and Chondrules of Carbonaceous and Ordinary Chondrites*](#) [#1810]
Presolar diamond, H₂O, C, N and volatiles in OCs and CCs correlate with matrix abundance. Matrix accreted with a uniform composition throughout chondrite groups for the first four species, but chondrule-matrix complementarity is possible for volatiles.
- 2:15 p.m. Kunihiro T. * Maruyama S. Watanabe M. Nakamura E.
[*Elemental and Isotopic Abundances of Lithium in Chondrule Constituents in the Allende Meteorite*](#) [#1500]
We report data on the distribution of Li elemental and isotopic abundances in chondrule constituents and in the neighboring matrix of the Allende meteorite.
- 2:30 p.m. Weiss B. P. * Carporzen L. Elkins-Tanton L. T. Ebel D. S.
[*Evidence for Internally Generated Magnetic Fields on the CV Chondrite Parent Planetesimal*](#) [#2237]
Paleomagnetic analyses of Allende suggest that the CV parent body generated a dynamo field in a convecting metallic core. This would imply that the parent planetesimal is partially differentiated and has a relic, chondritic surface.
- 2:45 p.m. Nimmo F. *
[*Energetics of Asteroid Dynamos and the Role of Compositional Convection*](#) [#1142]
Asteroid dynamos require core cooling rates of < 0.1 K/Myr if compositional convection driven by a light element (e.g., sulphur) occurs, but 1–100 K/Myr otherwise. Parent bodies of several existing meteorites cooled fast enough to generate dynamos.
- 3:00 p.m. Elkins-Tanton L. T. * Weiss B. P.
[*Chondrites as Samples of Differentiated Planetesimals*](#) [#1293]
The physical and compositional effects of an internal magma ocean on the solid, undifferentiated outer shell of a planetesimal provides a starting model from which to explain a variety of observations of chondrite meteorites.

- 3:15 p.m. Hewins R. H. * Ganguly J. Mariani E.
[*Diffusion Modeling of Cooling Rates of Relict Olivine in Semarkona Chondrules*](#) [#1513]
Diffusive exchange profiles between relict olivine and melt-grown olivine in Semarkona Type IIA chondrules were oriented by EBSD to correct D. Results for Fe-Mg (D from Dohmen) and Cr (Ito and Ganguly) are concordant at 300°–400°C/hr.
- 3:30 p.m. Wittmann A. * Weirich J. R. Swindle T. D. Rumble D. III Kring D. A.
[*Petrography of MIL05029, the First Accretional Impact Melt from the L-Chondrite Parent Body*](#) [#1426]
Petrographic characteristics, radioisotopic age, and the thermal history of MIL05029, an igneous rock with L-chondritic affinity, suggest formation as an impact melt in a 15–60 km diameter crater during accretion of the L-chondrite parent body.
- 3:45 p.m. Mayne R. G. * McCoy T. J.
[*Metamorphism and Melting in an “Unmetamorphosed” Mesosiderite*](#) [#1728]
We present SEM and EMP analyses from two silicate clasts within Crab Orchard specifically to compare the degree of metamorphism of these clasts to similar clasts in eucrites and to understand the igneous processes that occurred upon mixing with the metal.
- 4:00 p.m. Rubin A. E. *
[*Shock Effects in EH6 Chondrites and Aubrites: Implications for Collisional Heating of Asteroids*](#) [#1353]
Many EH4–EH7 chondrites have been impact melted, implying that collisional heating is responsible for EH-chondrite metamorphism. Two aubrites show evidence of post-shock annealing, a process that appears to be common among asteroids.
- 4:15 p.m. Humayun M. * Keil K. Bischoff A.
[*Siderophile Elements in Metal from Northwest Africa 2526, an Enstatite Chondrite Partial Melt Residue*](#) [#1744]
Siderophile elements confirm that metal in NWA 2526, an enstatite chondrite partial melt residue, equilibrated with C- and S-bearing metallic liquids, and provide a chemical link to Si-bearing iron meteorites.
- 4:30 p.m. van Niekirk D. * Humayun M. Keil K.
[*In Situ Determination of Siderophile Trace Elements in EL3 Meteorites*](#) [#2049]
Siderophile elements in kamacite from Metal-Silicate-Sulfide assemblages from EL3 chondrites confirm that these assemblages formed as partial melts, not nebular condensates, supporting an origin as impact melts.

Thursday, March 26, 2009
SCIENCE INSTRUMENTS FOR THE MARS SCIENCE LANDER
1:30 p.m. Waterway Ballroom 6

Chairs: Leslie Tamppari
Noah Petro

- 1:30 p.m. Gellert R. * Campbell J. L. King P. L. Leshin L. A. Lugmair G. W. Spray J. G. Squyres S. W. Yen A. S.
[*The Alpha-Particle-X-Ray-Spectrometer\(APXS\) for the Mars Science Laboratory \(MSL\) Rover Mission* \[#2364\]](#)
The new APXS for the MSL Rover mission was successfully tested, calibrated and delivered to NASA/JPL. The data acquisition time compared to MER was decreased by about a factor of 3, allowing a full *in situ* chemical analysis within ~3 hours at temperatures below ~-5°C.
- 1:45 p.m. Wiens R. C. * Clegg S. Bender S. Lanza N. Barraclough B. Perez R. Maurice S. Dyar M. D. Newsom H. Chemcam Team
[*Initial Calibration of the ChemCam LIBS Instrument for the Mars Science Laboratory \(MSL\) Rover* \[#1461\]](#)
The ChemCam laser-induced breakdown spectroscopy (LIBS) flight instrument was calibrated at distances up to 7 m with 65 standards. We report in terms of quantitative elemental abundances, sample classification, and remote dust removal from samples.
- 2:00 p.m. SAM Team Mahaffy P. R. * Cabane M. Conrad P. G. Webster C. R.
[*Sample Analysis at Mars \(SAM\) Instrument Suite for the 2011 Mars Science Laboratory* \[#1088\]](#)
The measurement capabilities of the Sample Analysis at Mars (SAM) Instrument Suite for the 2011 Mars Science Laboratory (MSL) are described. MSL explores present and past habitability of Mars and the SAM focus is volatiles, isotopes, and organics.
- 2:15 p.m. Litvak M. L. * Mitrofanov I. G. Shvecov V. N. Timoshenko G. N. Kozyrev A. S. Malakhov A. V. Mokrousov M. I. Sanin A. B. Tretyakov V. Vostrukhin A. Golovin D. V. Varenikov A.
[*DAN/MSL Instrument: Road from Field Tests to the Estimation of Hydrated Minerals in the Martian Subsurface* \[#1250\]](#)
Results of DAN/MSL field tests and predictions for operations onboard MSL rover are presented.
- 2:30 p.m. Gómez-Elvira J. * Castañer L. Lepinette A. Moreno J. Polko J. Sebastian E. Torres J. Zorzano MP. REMS Team
[*REMS, an Instrument for Mars Science Laboratory Rover* \[#1540\]](#)
REMS (Rover Environmental Monitoring Station) is part of the MSL instrument suite. All qualification and protoflight tests have been accomplished, as well most of the calibration ones. A description of the flight model status and calibration tests is presented.

- 2:45 p.m. Hassler D. M. * Andrews J. Bullock M. Grinspoon D. Neal K. Posner A. Rafkin S. Tyler Y. Vincent M. Weigle E. Zeitlin C. Beaujean R. Boehm E. Boettcher S. Burmeister S. Kortmann O. Martin C. Muller-Mellin R. Wimmer-Schweingruber R. F. Reitz G. Brinza D. Cucinotta F. Cleghorn T.
[*The Radiation Assessment Detector \(RAD\) on the Mars Science Laboratory \(MSL\) \[#2297\]*](#)
The Radiation Assessment Detector (RAD) will detect and analyze the most hazardous energetic particle radiation on the surface of Mars as a key element of the Mars Science Laboratory (MSL) mission.
- 3:00 p.m. Blake D. F. * Vaniman D. Anderson R. Bish D. Chipera S. Chemtob S. Crisp J. DesMarais D. J. Downs R. Farmer J. Gailhanou M. Ming D. Morris D. Stolper E. Sarrazin P. Treiman A. Yen A.
[*The CheMin Mineralogical Instrument on the Mars Science Laboratory Mission \[#1484\]*](#)
The CheMin mineralogical instrument aboard MSL will for the first time return definitive and quantitative mineralogical data from the Mars surface. During MSL's two-year mission, CheMin will provide XRD data from as many as 72 separate rock or soil samples.

Thursday, March 26, 2009
MARTIAN GULLIES: MORPHOLOGY AND ORIGINS
3:15 p.m. Waterway Ballroom 6

Chairs: Timothy Titus
Nina Lanza

- 3:15 p.m. Schon S. C. * Head J. W. Fassett C. I.
[*Unique Chronostratigraphic Marker in Depositional Fan Stratigraphy on Mars: Evidence for ~1.25 Ma Old Gully Activity and Surficial Meltwater Origin*](#) [#1677]
Gully fan morphology indicates multiple periods of depositional activity with date-able secondary craters from a nearby rayed-crater emplaced during an intermediate period in deposition, which provides a maximum age for recent activity of this gully.
- 3:30 p.m. Parsons R. A. * Nimmo F.
[*Fluvial Discharge Rates of Martian Gullies: Slope Measurements from Stereo HiRISE Images and Numerical Modeling of Sediment Transport*](#) [#1947]
Based on fluvial discharge and sediment transport theory from Kleinhans [2005], groundwater is a plausible mechanism for forming gullies on Mars if the supplying aquifer is permeable and ~10s of meters thick. Our model suggests gullies form rapidly (~h).
- 3:45 p.m. Coleman K. A. * Dixon J. C.
[*Martian Gully Morphologies*](#) [#1230]
Numerous morphologically distinct forms on Mars are referred to using the term “gullies”. We analyzed HiRISE and MOC images and began to build a database of morphologies seen in gullies on Mars. To date seven distinct morphologies have been identified.
- 4:00 p.m. Xu D. * Zeng Z. Yue Z. Wang J. Zhang Z. Birnbaum S. J. Xie H. Yan D.
[*A Case Study of an Application of Fractal Theory to Gully’s Alcove on Mars*](#) [#2481]
Poleward facing gullies have higher fractal values than those of equator-ward facing ones in crater of Mars and provides evidence for the hypothesis, formation of gullies is related to snow and ice accumulation and melting due to climatic processes.
- 4:15 p.m. Morgan G. A. * Head J. W. III Marchant D. R. Dickson J. Levy J.
[*The Effect of Varying Annual Snow Accumulation on Gully Formation in Antarctica: Comparisons Between ‘Wet’ and ‘Dry’ Seasons and Implications for Gully Formation on Mars*](#) [#2331]
The sensitivity of gully activity to snow volume in Antarctica demonstrates the importance of snow accumulation, in addition to temperatures permitting melt generation, in determining the location of gully activity.
- 4:30 p.m. Lanza N. L. * Meyer G. A. Okubo C. Newsom H. E. Wiens R. C.
[*Preliminary Evidence for a Debris Flow Gully Slope-Area Relationship on Mars and Implications for a Source Liquid*](#) [#2225]
We compare morphometric characteristics of terrestrial gullies associated with debris flows with a subset of martian gullies to test the hypothesis that these martian gullies are formed by saturation and failure of the regolith.

Thursday, March 26, 2009
POSTER SESSION II: MERCURY
6:30 p.m. Town Center Exhibit Area

Gómez-Perez N. Wicht J.

[*Magnetic Field at Mercury: Effects of External Sources on Planetary Dynamos*](#) [#1634]

In Mercury, magnetospheric currents induce a magnetic field at the top of the core. We study dynamo simulations with the presence of an external field and find that fully convective cores result in weakened dipole fields.

Johnson C. L. Uno H. Purucker M. E. Anderson B. J. Korth H. Slavin J. A. Solomon S. C.

[*Mercury's Magnetic Field: Assessing the Effects of External Fields on Internal Field Models*](#) [#1385]

MESSENGER data confirm the presence of an intrinsic magnetic field at Mercury. Here we discuss several approaches to modeling magnetospheric fields, and the implications for assessing internal field structure and its origin.

Blewett D. T. Denevi B. W. Robinson M. S. Purucker M. E.

[*Do Lunar-like Swirls Occur on Mercury?*](#) [#1352]

Lunar swirls are unusual high-albedo markings. Mercury swirls were tentatively identified by Mariner 10. We examine potential swirls with MESSENGER, and consider the implications for the origin of swirls and the agent of space weathering.

Frigeri A. Federico C. Pauselli C. Coradini A.

[*Fostering Digital Geologic Maps: The Digital Geologic Map of Mercury from the USGS Atlas of Mercury. Geologic Series*](#) [#2417]

We present the digital geologic map of Mercury generated from the merge of the USGS Atlas of Mars, Geologic Series originally published by the USGS, and based on Mariner data. This single map offers several advantages over a series of distinct maps.

André S. L. Watters T. R.

[*Tectonic Features Revealed in MESSENGER Images Detailed Within Mariner 10 Stereo Topography*](#) [#2341]

Tectonic landforms were revealed in MESSENGER images within areas imaged by Mariner 10. Some of these landforms are recognizable in Mariner 10 derived stereo topography. We present topographic data for some newly identified tectonic features.

Barnouin-Jha O. S. Zuber M. T. Oberst J. Preusker F. Smith D. E. Neumann G. A. Solomon S. C.

Hauck S. A. II Phillips R. J. Head J. W. III Prockter L. M. Robinson M. S.

[*Assessing the Relationship Between Crater Depth and Diameter on Mercury with Topographic Measurements by MESSENGER*](#) [#1638]

Altimetry and imaging data acquired by the MErcury Surface, Space ENvironment, GEochemistry, and Ranging (MESSENGER) spacecraft allow reassessing the relationship between crater depth and diameter on Mercury.

Gillis-Davis J. J. Blewett D. T. Denevi B. W. Robinson M. S. Solomon S. C.

Strom R. G. MESSENGER Team

[*Pit-Floor Craters on Mercury: Characteristics and Modes of Formation*](#) [#2234]

We classify pit craters on Mercury into two categories on the basis of morphology and size: small irregular-sized pit craters and larger-sized, steep-sided pit craters. We conclude that differences in pit morphology relates to the mode of formation.

Fassett C. I. Head J. W. Blewett D. T. Chapman C. R. Dickson J. L. Murchie S. L.
Strom R. G. Watters T. R.

[Caloris Impact Basin: Exterior Geomorphology, Stratigraphy, Morphometry, Radial Sculpture, and Smooth Plains Deposits](#) [#1899]

MESSENGER data allow new consideration of the stratigraphy and geology of materials surrounding the Caloris basin. We discuss radial impact sculpture and secondaries associated with the basin, as well as the origin of the plains outside of its rim.

Izenberg N. R. Blewett D. T. McNutt R. L. Chabot N. L. Chapman C. R. Denevi B. W. Robinson M. S.
Prockter L. M. Murchie S. L.

[MESSENGER Views of Crater Rays on Mercury](#) [#1676]

High-reflectance crater materials and extensive ray systems are notable in imaging from MESSENGER's two Mercury flybys in 2008. These images provide the opportunity to make comparisons with lunar rays and Earth-based radar images of Mercury.

Domingue D. L. Denevi B. W. Ernst C. M. Holsclaw G. M. Izenberg N. R. McClintock W. E.
Murchie S. L. Robinson M. S.

[Regional Color Photometry of Mercury's Surface](#) [#1301]

Using images from both flybys of Mercury, the photometric properties of the planet in general, and of spectral units is examined.

Helbert J. D'Amore M. Maturilli A. Izenberg N. R. Sprague A. L. Holsclaw G. M. Head J. W.
McClintock W. E. Blewett D. T. Solomon S. C.

[Compositional Units on Mercury Along MESSENGER Ground Tracks from Principal Component Analysis of Spectral Observations](#) [#1529]

We have started analysis of the MESSENGER MASCS surface spectra using a principal component approach. The main goal of this analysis is to identify surface units along the ground tracks and characterize them.

Riner M. A. Lucey P. G. Desch S. J. McCubbin F. M.

[Opacities in Mercury's Crust: Additional Evidence for a Low-FeO Magma Ocean](#) [#2062]

Laboratory spectra of opaque oxides together with MESSENGER observations of Mercury's surface suggest Mercury's crust is not the lunar highlands, modified, but is a unique array of lithologies produced by crystallization of a low-FeO magma ocean.

Warell J. Sprague A. L. Kozlowski R. W. Helbert J.

[Surface Composition and Chemistry of Mercury: Hapke Modeling of MESSENGER/MASCS Reflectance Spectra](#) [#1902]

We present results of modeling of published MASCS/VIRS reflectance spectra from the first MESSENGER Mercury flyby using multicomponent mixtures with microphase iron in Hapke's radiative transfer model.

Warell J. Kozlowski R. W. Sprague A. L. Helbert J. Önehag A. Trout G. Rothery D.

[Ground-based Infrared Spectroscopy of Mercury's Near-Global Surface with IRTF/SPEX: Complementing MESSENGER Compositional Observations](#) [#1931]

Using SpeX at the NASA IRTF telescope we have obtained disk-resolved spectra of Mercury and lunar sites in the wavelength range 0.8–5.5 μm . These will be compared to MESSENGER data, searched for IR spectral features, and modeled to determine surface properties.

Kozyrev A. S. Gurvits L. I. Litvak M. L. Malakhov A. A. Mokrousov M. I. Mitrofanov I. G.
Rogozhin A. A. Sanin A. B. Owens A. Schvetsov V. N. Tretyakov V. I. Vostrukhin A. V.

[Studying Mercury Surface Composition by Mercury Gamma-Rays and Neutron Spectrometers \(MGNS\) from BepiColombo Spacecraft](#) [#1372]

MGNS instrument, selected for the payload of the BepiColombo mission, is shown to have necessary capabilities to characterize the elementary composition of subsurface layer of Mercury and to test the presence of water ice deposits at both polar regions of the planet.

Thursday, March 26, 2009
POSTER SESSION II: PURSUING LUNAR EXPLORATION
6:30 p.m. Town Center Exhibit Area

Wilson T. L. Lee K. T.

[*Photon Luminescence of the Moon*](#) [#1918]

The space-radiation-induced photon luminescence existing on the Moon is derived from SEP and GCR sources. Its spectrum is present in the upper X-ray and lower γ -ray portion of the electromagnetic spectrum. Dose mitigation measures are addressed.

Bussey D. B. J. Sorensen S.-A. Spudis P. D.

[*Illumination and Temperature Modelling of the Lunar Polar Regions*](#) [#2027]

We have produced a model for determining the illumination and thermal conditions inside the permanently shadowed regions near the lunar poles.

Petro N. E. Bleacher J. E. Clark P. E. Mest S. C. Lewis R.

[*Optimizing Lunar Surface Science: Comparison of Shackleton Base Scenario and Sortie Surface Scenarios at the Nectaris Basin, Marius Hills, and Olivine Hill*](#) [#2206]

The work reported here responds to the need to provide the Constellation program with science requirements for a surface system architecture and metrics for surface operations. We compare surface scenarios for an outpost at Shackleton to three sorties.

Fong T. Broxton M. Deans M. C. Helper M. Hodges K. V. Schaber G. G. Schmitt H. H. Smith T.

[*Traverse Planning for Robotic Recon and Human Exploration of Hadley Rille*](#) [#1233]

We recently conducted a lunar traverse planning exercise at NASA Ames. The objective was to plan an EVA traverse for a hypothetical, manned mission to the Apollo 15 region and then identify where ground-level data (acquired by robotic scouting) would help refine the plan.

Ruberg R. Wood C. A. Reese D. D. Lightfritz C. Harrison A.

[*MoonWorld: Virtual Fieldwork in Second Life*](#) [#2229]

MoonWorld is a Second Life simulation that models the Moon as a tool for learning lunar science through virtual fieldwork. Avatars climb into craters to collect samples and observe structure to understand crater formation.

Boldoghy B. Kummert J. Varga T. P. Szilágyi I. Darányi I. Bérczi Sz. Varga T. N. Hudoba G. Jr.

[*Buildings of Great Inner Space Created with Low Asset Requirement and High Efficiency for the Moon*](#) [#2458]

For constructing lunar base buildings of great inner space we propose a plan, architectural concept, and building technology of using local materials by various technologies, baking, bagging and moving of the regolith to cover the building.

Thursday, March 26, 2009
POSTER SESSION II: SOURCES AND ERUPTION OF LUNAR BASALTS
6:30 p.m. Town Center Exhibit Area

Arai T. Misawa K. Tomiyama T. Yoshitake M. Irving A. J.

[*Constraints on Lunar KREEP Magmatism: A Variety of KREEP Basalt Derivatives in Lunar Meteorite NWA 4485*](#) [#2292]

Lunar meteorite NWA 4485 includes a variety of lithic clasts derived from KREEP magmatism. Pyroxene composition and zoning trends indicate that the KREEP basalt clasts in this meteorites are moderately equilibrated relative to Apollo KREEP basalts.

Burger P. V. Shearer C. K. Papike J. J.

[*The Multi-Stage Cooling History of Lunar Meteorite NWA 032 as Recorded by Phenocrystic Olivine and Pyroxene*](#) [#2043]

This study examines previously undocumented oscillatory zoning in phenocrystic pyroxene grains from lunar meteorite NWA 032, and its implication for the crystallization history of this sample.

Hauri E. H. Saal A. E. Van Orman J. Rutherford M. J. Friedman B.

[*New Estimates of the Water Content of the Moon from Apollo 15 Picritic Glasses*](#) [#2344]

In this abstract, we report the results of new SIMS measurements of water on over 200 new samples of picritic glasses recovered from the Apollo 15 mission. Our new measurements suggest an upward revision of current estimates for the water content of lunar magmas.

van Kan Parker M. Agee C. B. van Westrenen W.

[*Density of Molten "Apollo 17 Orange Glass"*](#) [#1722]

The density of molten intermediate-high titanium bearing Apollo 17 orange glass was determined at lunar mantle pressures and temperatures using the sink/float technique.

van Kan Parker M. van Westrenen W. van Sijl J.

[*Computational Study of Trace Element Partitioning Between Orthopyroxene and Melt: Implications for Substitution Mechanisms in Earth and Moon*](#) [#1714]

A computational study of element partitioning between orthopyroxene and silicate melt highlighting the possible effects of iron content and charge balancing mechanisms on partition coefficients.

Krawczynski M. J. Sutton S. R. Grove T. L. Newville M.

[*Titanium Oxidation State and Coordination in the Lunar High-Titanium Glass Source Mantle*](#) [#2164]

XANES and EXAFS spectra from synthetic HiTi lunar glasses determine coordination of Ti in the HiTi source region. The amount of Ti^{3+} present affects the olivine-opx equilibrium, and the total amount of Ti^{3+} present requires a pyx bearing source.

Fernandes V. A. Korotev R. L. Renne P. R.

[*\$^{40}Ar\$ - \$^{39}Ar\$ Ages and Chemical Composition for Lunar Mare Basalts: NWA 4734 and NWA 4898*](#) [#1045]

^{40}Ar - ^{39}Ar ages are reported for lunar mare basalts NWA 4734 and NWA 4898. The age obtained for NWA 4734 is 2.766 ± 0.022 Ga (same as NWA 032/479) and for NWA 4898 is 3.520 ± 0.060 Ga, the same as Rb-Sr age reported by Gaffney et al. (2008).

Donohue P. Neal C. R.

[*Apollo 17 High-Titanium Basalt Petrogenesis Revealed by Crystal Size Distributions and Mineral Geochemistry*](#) [#1805]

Crystal size distributions (CSDs) and mineral geochemistry are presented for ilmenite crystals in a Type B2 (70275,35) lunar sample, and two Type C (74255,55 and 74275,312) lunar samples.

Liu Y. Spicuzza M. J. Valley J. W. Taylor L. A.

[Oxygen Isotopes of Lunar Rocks: Different Sources for Different Hi-Ti Basalts?](#) [#2291]

New oxygen isotopes of lunar mare basalts show difference among high-Ti basalts.

Haloda J. Tycova P. Thöni M. Jelenc M.

[The Petrogenesis and Chronology of Lunar Meteorite Northeast Africa 003-A: Sm-Nd and Rb-Sr Isotopic Studies](#) [#1247]

The Sm-Nd age of lunar mare basalt NEA 3.089 ± 0.064 Ga represents the crystallization age of the meteorite, suggesting that NEA 003-A can be a product of younger low-Ti mare basalt volcanism within the Apollo 15 olivine-normative basalt suite.

Wilson L. Head J. W.

[Lunar Volcanic Eruptions: Range of Eruption Styles and Implications for Magma Ascent and Emplacement](#) [#1159]

We characterize the range of volcanic feature morphologies observed on the Moon in a manner suitable to allow them to be related to the conditions under which eruptions and intrusions took place.

Thursday, March 26, 2009
POSTER SESSION II: CHEMICAL AND PHYSICAL PROPERTIES OF THE LUNAR REGOLITH
6:30 p.m. Town Center Exhibit Area

Spudis P. D. Taylor G. J.

[*A Major KREEP-Basalt — Mare Basalt Unconformity on the Moon*](#) [#1039]

The Station 2 boulder at Apollo 15 preserves a major 500 Ma unconformity between early Imbrian-age non-mare KREEP basalts and late Imbrian-age mare basalt. These samples may represent a paleoregolith, an ancient regolith preserved between two lava flows on the Moon.

McKay D. S. Cooper B. L. Riofrio L. M.

[*New Measurements of the Particle Size Distribution of Apollo 11 Lunar Soil*](#) [#2051]

We have initiated a major new program to determine the grain size distribution of nearly all lunar soils collected in the Apollo program. The use of a laser diffraction instrument improves upon previous work using sieving.

Johnson J. R. Shepard M. K. Paige D. A. Foote E. J. Grundy W.

[*Spectrogoniometric Measurements and Modeling of Apollo 11 Soil 10084*](#) [#1427]

Laboratory visible/near-infrared multispectral goniometer observations of Apollo 11 soil 10084 were acquired using the Bloomsburg University Goniometer to provide constraints on Hapke radiative transfer models for comparison to lunar analog soils.

Seddio S. M. Jolliff B. L. Korotev R. L. Zeigler R. A.

[*A Newly Characterized Granite from the Apollo 12 Regolith*](#) [#2285]

The newly characterized lunar sample 12032,366-19 is a pristine lunar granite with a unique texture and mineral assemblage and no impact-generated glass or brecciated material.

Johnson D. Jolliff B. Zeigler R. Carpenter P.

[*Distribution of Ti in Glass and Mineral Components of Lunar Soils 10084 and 71501; Grain Size Fraction 100 to 210 \$\mu\$ m*](#) [#2346]

The grain size and shape of ilmenite and the distribution of Ti in components of Apollo 11 and Apollo 17 soils are discussed.

Seddio S. M. Korotev R. L. Jolliff B. L. Zeigler R. A.

[*Petrographic Diversity in Apollo 12 Regolith Rock Particles*](#) [#2415]

A set of 52 lithic fragments of the Apollo 12 regolith are analyzed to understand the petrographic diversity that the site contains focusing on regolith breccias, KREEP impact-melt breccias and other high-Th samples, and basalts.

Ling Z. C. Wang A. Jolliff B. L. Li C. Liu J. Bian W. Ren X. Mu L. Su Y.

[*Raman Spectroscopic Study of Quartz in Lunar Soils from Apollo 14 and 15 Missions*](#) [#1823]

Quartz, a rare but important mineral indicator for Moon, is detected from soil 14163 and 15273 by Raman point-count procedures. The two major Raman peaks of quartz show considerable red shift, indicating different shock effect on these grains.

Isaacson P. J. Pieters C. M. Klima R. L. Hiroi T. Sarbadhikari A. B. Liu Y. Taylor L. A.

[*The Lunar Rock and Mineral Characterization Consortium \(LRMCC\): Integrated Analyses and Mineral Endmembers from Mare Basalts*](#) [#1821]

The LRMCC has conducted coordinated mineralogy/petrology and spectroscopy analyses of four lunar basalt samples and associated mineral separates. The dataset provides key ground truth and constraints on spectral mixing and space weathering models.

Nemchin A. A. Pidgeon R. T. Grange M. L.

[*REE Patterns in Lunar Zircons*](#) [#1509]

Zircon grains from breccia sample 14321 show significant REE variation, indicating that these zircons formed in the rocks with a wide compositional range.

Yakovlev O. I. Gerasimov M. V. Dikov Yu. P.

[Temperatures of Formation of HASP and GASP Particles](#) [#1261]

Comparison of chemical composition of HASP glasses and GASP particles with compositions of residual melt and corresponding equilibrium vapor for lunar mare basalt show correlation to experimental data at ~1870°–1650°C and mass loss in the range 20–50%.

Edmunson J. Cohen B. A. Spilde M. N.

[Characterizing the Effect of Shock on Isotopic Ages I: Ferroan Anorthosite Major Elements](#) [#2094]

Ferroan anorthosites 62236 and 67075 do not show major element mobility due to shock in microprobe analysis. The shock pressure of 67075 is estimated at <50 kilobars.

Sharp Z. D. Shearer C. K. Jr. Barnes J. D.

[The Chlorine Isotope Composition of the Moon](#) [#2351]

The chlorine isotope composition of leached pyroclastic glass (Apollo 17) were measured using gas source mass spectrometry and found to be -0.74‰ (vs. SMOC), different from bulk Earth (0‰). The Cl bulk concentration is 80 ± 20 ppm.

ten Kate I. L. Glavin D. P. VAPoR Team

[Evolved Gas Analysis of Two Lunar Simulants, Apollo 16 Regolith and a Carbonaceous Meteorite \(Murchison\) Using VAPoR](#) [#2232]

Volatile Analysis by Pyrolysis of Regolith (VAPoR) on the Moon using mass spectrometry is one technique that should be considered for *in situ* analysis of lunar regolith. Here we present evolved gas analysis data obtained with the VAPoR breadboard.

Thursday, March 26, 2009
POSTER SESSION II: LUNAR DUST AND TRANSIENT SURFACE PHENOMENA
6:30 p.m. Town Center Exhibit Area

Wohl C. J. Belcher M. A. Hopkins J. W. Connell J. W.

[*Topographical Modification of Materials for Lunar Dust Adhesion Mitigation*](#) [#1121]

The surface energy of polymer films was reduced by topographical modification, towards lunar dust adhesion mitigation. Contact angle goniometry and microscopy characterized the modified surfaces. Laser ablation afforded high fidelity topographies.

Tranfield E. Rask J. C. Wallace W. T. Kerschmann R. Loftus D. J.

[*Enhanced Chemical Reactivity of Crystalline Quartz by Mechanical Grinding*](#) [#2529]

We have developed a technique for mechanically grinding crystalline silica which increases the chemical reactivity of the material as judged by the terephthalate assay. This technique uses a modern, commercially available ball mill.

Wallace W. T. Jeevarajan A. S.

[*Understanding the Activation and Solution Properties of Lunar Dust for Future Lunar Habitation*](#) [#2483]

Grinding of lunar dust results in increased hydroxyl radical production in solution. Lower pH and grinding causes lunar simulant to release increased amounts of ions into solution.

Horanyi M. Sternovsky Z. Gruen E. Srama R. Lankton M. Gathright D.

[*The Lunar Dust EXperiment \(LDEX\) on the Lunar Atmosphere and Dust Environment Explorer \(LADEE\) Mission*](#) [#1741]

LDEX is designed to map the variability of the spatial and size distributions of dust grains in the lunar environment.

Wilson T. L.

[*Lunar Dust and Dusty Plasma Physics*](#) [#1314]

Lunar dust is addressed using the physics of dusty plasmas. Equations for small dust grains on the Moon are given and related to MHD effects of plasma precipitation as it orbits through the Earth's plasma sphere, magnetosphere, and the solar wind.

Taylor L. A. Liu Y. Zhang A.

[*Shape and Size Relationship of Several Lunar Dusts: Preliminary Results*](#) [#2106]

The abstract reports preliminary results of shape and size relationship of several lunar dusts.

Irwin S. A. Durrance S. T. Buhler C. R. Calle C. I.

[*Method to Investigate the Charging of Lunar Dust Particles*](#) [#2521]

Charging characteristics of lunar dust particles are studied experimentally with borosilicate glass beads in a constant electric field, within an environmental chamber at various humidities.

Cook A. C. Grande M.

[*Preliminary Analysis of Transient Lunar Phenomena Catalog Data*](#) [#2429]

We have completed a new catalog of Transient Lunar Phenomena and have performed an initial statistical analysis on this.

Crotts A. P. S. Berger A. Cecil G. Cseresnjcs P. Ebel D. Hickson P. Joner M. Pfrommer T. Marka S. Morehead R. Radebaugh J. Schultz P.

[*Status of a Program Monitoring Optical Lunar Surface Transients*](#) [#2373]

We are observing the lunar near side intensively with a network of robotic imaging telescopes tuned to detect small transient changes in photometry (on timescales of ~1 to 100 min). We also describe a parallel program to detect quasi-permanent photometric surface changes.

Daly R. T. Radebaugh J. Austin D. E.

[*Computational Study of the Lunar Time-of-Flight Mass Spectrometer \(LTMS\): Meteorite Impacts and Outgassing Events*](#) [#2411]

A miniature mass spectrometer uses imaging pattern analysis to determine the location, magnitude, and composition of meteorite impacts and regolith outgassing on the lunar surface. Simulations examine range, detection limit, and spatial resolution.

Thursday, March 26, 2009
POSTER SESSION II: LUNAR DATABASES AND DATA RESTORATION
6:30 p.m. Town Center Exhibit Area

Archinal B. Lunar Geodesy and Cartography Working Group

[*Activities of the NASA LPRP Lunar Geodesy and Cartography Working Group*](#) [#2095]

We describe the purpose, operation, activities, and future plans of the NASA Lunar Precursor Robotic Program Lunar Geodesy and Cartography Working Group. New standards/recommendations and the need to geodetically control lunar datasets are examined.

Gaddis L. Becker T. Weller L. Hare T. Isbell C.

[*Lunar Orbiter Digital Frame Mosaics: Ready for Prime Time*](#) [#2437]

This abstract announces the availability of Lunar Orbiter (LO) projected and cosmetically processed frame mosaics. Frames from medium- and high-resolution cameras from LO missions III, IV, and V are available via the Lunar Orbiter Frame Viewer web tool at USGS.

Wingo D. R. Cowing K. L.

[*Recovering High Resolution Lunar Orbiter Images from Analog Tape*](#) [#2517]

Original FR-900 tape recorders have been refurbished to play, digitize, and store, the original highest resolution images of the Moon. This paper outlines the process and the initial results of our efforts.

Williams D. R. Schultz A. B. Hills H. K. Guinness E. A. Lowman P. D. Taylor P. T.

[*Restoration of Apollo Data by the PDS Lunar Data Node*](#) [#1991]

The Lunar Data Node (LDN) has been formed to put relevant, scientifically important Apollo data into accessible digital form for use by researchers and mission planners. We will report on progress made since last year and plans for future data restorations.

Broxton M. J. Moratto Z. M. Nefian A. Bunte M. Robinson M. S.

[*Preliminary Stereo Reconstruction from Apollo 15 Metric Camera Imagery*](#) [#2282]

We present preliminary results from automated stereo processing of 70 image pairs from the Apollo 15 Metric Camera. Geo-registration of these data is discussed, as well as a new algorithm for improved sub-pixel stereo matching.

McClanahan T. P. Evans L. G. Starr R. D. Mitrofanov I.

[*Fast Ray Tracing of Lunar Digital Elevation Models*](#) [#2092]

Methods for optimizing ray-tracing processes for radiation analysis of digital elevation models (DEM)'s. Point-vector methods are demonstrated using Clementine DEM to determine degree of illumination as a function for large-scale DEM analysis, complex orbital ephemeris.

Lee E. M. Gaddis L. R. Weller L. Richie J. O. Becker T. Shinaman J. Rosiek M. R. Archinal B. A.

[*A New Clementine Basemap of the Moon*](#) [#2445]

The new basemap of the Moon based on ULCN2005 will be distributed through USGS Map-A-Planet web site (<http://www.mapaplanet.org>). The image geometry was verified for accuracy, and radiometric and photometric corrections applied and mosaicked.

Losiak A. Wilhelms D. E. Byrne C. J. Thaisen K. Weider S. Z. Kohout T. O'Sullivan K. Kring D. A.

[*A New Lunar Impact Crater Database*](#) [#1532]

The aim of this abstract is to describe a new database of lunar impact craters which integrates information concerning the locations and ages of craters, as well as various measured and calculated physical characteristics.

Thursday, March 26, 2009
POSTER SESSION II: METEORITIC SAMPLES OF THE MOON
6:30 p.m. Town Center Exhibit Area

Korotev R. L. Zeigler R. A. Irving A. J. Bunch T. E.

[Keeping up with the Lunar Meteorites — 2009](#) [#1137]

We report results of compositional analyses of 16 new lunar meteorite stones for which names have been approved since our report of last year and speculate about pairing relationships on the basis of composition and preliminary petrographic data.

Isaacson P. J. Liu Y. Patchen A. Pieters C. M. Taylor L. A.

[Integrated Analyses of Lunar Meteorites: Expanded Data for Lunar Ground Truth](#) [#2119]

Lunar meteorites are a valuable opportunity to expand our lunar sample library. We have conducted preliminary mineralogy/petrography/spectroscopy analyses needed to apply them as ground truth and to determine their geologic context with remote data.

Welten K. C. Owens T. L. DePaolo D. J.

[Thermal Ionization Mass Spectrometry Studies of Sm and Gd Isotopic Shifts in Lunar Meteorites Due to Neutron Capture: A Progress Report](#) [#2449]

We will present preliminary TIMS measurements of Sm and Gd isotopic shifts in lunar meteorites due to neutron-capture effects. These studies will provide more insight in the evolutionary history of meteorites on the lunar surface.

Carpenter P. K. Zeigler R. A. Jolliff B. L. Vicenzi E. P. Davis J. M. Donovan J. J.

[Advances in Electron-Probe Microanalysis and Compositional Mapping: Applications to Lunar Samples](#) [#2531]

Advances in instrumentation and analytical techniques using EPMA and XRF have been applied to the study of lunar samples. The analysis of multiphase sample volumes using defocused beam analysis presents a central problem to both microanalysis and the study of lunar samples.

Snape J. F. Joy K. H. Crawford I. A.

[A Trace-Element Investigation of Lunar Meteorite Northeast Africa 001](#) [#1539]

A trace-element investigation of NEA 001 (a feldspathic polymict breccia). Our results have revealed that several VLT basalt clasts in the sample have unusual REE profiles and positive Eu anomalies.

Foreman A. B. Korotev R. L. Zeigler R. A. Wittmann A. Kring D. A. Irving A. J. Kuehner S. M.

[Petrographic and Geochemical Analysis of Feldspathic Lunar Meteorite Shisr 161](#) [#2304]

We present petrographic and geochemical analyses of the lunar meteorite Shisr 161 — a feldspathic regolith breccia compositionally similar to the NWA 3163/4483/4881 granulites.

Takeda H. Karouji Y. Ogawa Y. Otsuki M. Yamaguchi A. Ohtake M. Arai T.

Matsunaga T. Haruyama J.

[Iron Contents of Plagioclases in Dhofar 307 Lunar Meteorite and Surface Materials of the Farside Large Basins](#) [#1565]

FeO contents of clear plagioclase crystals in Dhofar 307 lunar meteorite, have been determined in connection with spectral data of the Kaguya mission and propose a model of formation of such breccia in a large basin of the farside.

Liu Y. Zhang A. Thaisen K. G. Anand M. Taylor L. A.

[Mineralogy and Petrography of a Lunar Highland Breccia Meteorite, MIL 07006](#) [#2105]

Mineralogy and petrography of a new lunar feldspathic breccia, MIL 07006.

Rahilly K. E. Treiman A. H.

[Granulite Clasts of Intermediate Mg* in Lunar Meteorite ALHA 81005: Chemical Compositions and Origins](#) [#1168]

Many granulite clasts in lunar highland meteorites have Mg* (molar Mg/(Mg + Fe)) between those of ferroan anorthosite (FAN) and magnesian anorthositic granulite (MAG). Compositions of these clasts are inconsistent with simple mixing of MAG and FAN, but require multiple origins.

Fernandes V. A. Irving A. J. Kuehner S. M. Gellissen M. Korotev R. L. Bandfield J. L.

[Petrology, Bulk Composition, Ar-Ar Age and IR Emission Spectrum of Lunar Granulite Northwest Africa 4881](#) [#2009]

Petrology, bulk composition, ⁴⁰Ar-³⁹Ar age and IR emission spectrum data of lunar granulite Northwest Africa 4881 will be presented and showing the combination of laboratory and remotely sensed data is an idea to search for meteorite provenance.

Joy K. H. Burgess R. Hinton R. Fernandes V. A. Crawford I. A. Kearsley A. T.
Irving A. J. EIMF Team

[U-Pb and Ar-Ar Chronology of Lunar Meteorite Northwest Africa 4472](#) [#1708]

We report Ar-Ar and U-Pb chronology studies of KREEP-rich lunar meteorite NWA 4472.

Liu D. Wan Y. Zhang Y. Dong C. Jolliff B. L. Zeigler R. A. Korotev R. L.

[Age of Zircons in the Impact-Melt Breccia in SaU 169 Lunar Meteorite: Beijing SHRIMP II Study](#) [#2499]

Age dating of zircon grains using SHRIMP methods yields an age of 3918 Ma for the mafic impact-melt breccia lithology in SaU 169, which is chemically and petrographically identical to a group of impact melt breccias from Apollo 12.

Nishiizumi K. Caffee M. W. Vogel N. Wieler R. Leclerc M. D. Jull A. J. T.

[Exposure History of Lunar Meteorite Northwest Africa 5000](#) [#1476]

Cosmogenic radionuclides and noble gases were measured in NWA 5000. After ~600 Myr residence in the lunar regolith, it was ejected from a depth of ~335 g/cm² on the Moon. The minimum transit time was 1.3 kyr with a short terrestrial age.

Thursday, March 26, 2009
POSTER SESSION II: CHONDRITES, THEIR CLASTS, AND ALTERATION
6:30 p.m. Town Center Exhibit Area

Le Guillou C. Rouzaud J. N. Findling N. Düber S.

[*Experimental Graphitization and Oxidation Kinetic of Nanodiamond: Implication for Nebular Thermal Processing*](#) [#2070]

Graphitization/oxidation kinetic of nanodiamonds is investigated to determine which reaction governs diamonds destruction in chondrites. Graphitization prevails and kinetic parameters indicate a high temperature (~1300°C) short time (hours) event.

Dyl K. A. Bischoff A. Ziegler K. Wimmer K. Young E. D.

[*Metamorphic Conditions within the Villalbeto de la Peña L-Chondrite Parent Body Based on Petrologic and UV Laser Fluorination Oxygen Isotopic Studies on an Unique Fragment*](#) [#2506]

Oxygen isotope data from a foreign feldspar fragment in Villalbeto de la Peña (L6) record an isotopic profile across the object. This and NaSi-CaAl exchange suggest the presence of a volatile phase responsible for the fragment's alteration.

Lehner S. W. Buseck P. R.

[*The Highly Unequilibrated EH Chondrite, Sahara 97072, May Be a Primitive Breccia*](#) [#2154]

We have investigated a breccia lump in the unequilibrated enstatite chondrite Sahara 97072, which we interpret to be a primitive breccia.

Macke R. J. Britt D. T. Consolmagno G. J.

[*Enstatite Chondrite Physical Properties: Density, Porosity and Magnetic Susceptibility*](#) [#1598]

We measured density, porosity and magnetic susceptibility for 26 stones from 16 enstatite chondrites. We find no difference between EH and EL in these properties. Despite some outliers, enstatite chondrites grouped tightly in these properties.

Zhang A. Guan Y. Hsu W. Liu Y. Patchen A. D. Taylor L. A.

[*An Unusual Lithic Clast in the Grove Mountains 021536 CM2 Chondrite: Petrography, Mineralogy, and Oxygen Isotopes*](#) [#1270]

This abstract reports petrography, mineralogy, and oxygen isotopic compositions of an unusual lithic clast in a new CM2 chondrite GRV 021536.

Lyon I. Spring N. King A. Henkel T. Rost D.

[*The Li and Trace Element Budget of Acfer 094 Matrix*](#) [#2335]

Acfer 094 matrix has been studied by TOFSIMS elemental and isotopic analysis. Unusual minerals including a Li and Cr silicate has been found. These unusual minerals may account for a significant fraction of the budget of lithium and chromium in Acfer 094.

Matsuda S. Nakashima D. Iio H. Bajo K. Nagao K.

[*Laser Microprobe Noble Gas Analysis of Chondrules in the NWA 801 CR2 Chondrite*](#) [#1628]

Chondrules in NWA 801 show variations in cosmogenic ³He and ²¹Ne concentrations, suggesting cosmic-ray exposure on the parent body. In addition, we found solar-like noble gases in a chondrule in NWA 801.

Chizmadia L. J. Cabret-Lebrón E.

[*La Paz 031117: A New Primitive CO3 Carbonaceous Chondrite*](#) [#2031]

Lap 031117 has AOIs with an average olivine composition of 0.56 mol% Fa with a standard deviation of 0.21. Type II chondrules have an average Cr₂O₃ content of 0.39 wt% and the standard deviation is 0.12. These two properties are consistent with Lap 031117 being subtype 3.0.

Ivanova M. A. Moroz L. V. Kononkova N. N.
[Altered Material in CH/CB Chondrite Isheyevo](#) [#1259]

Isheyevo is a metal-rich meteorite with similarities to both CH and CB chondrites. Here we report results on mineralogical and IR-microspectroscopic studies of several lithic clasts and layered chondrules with rim of altered materials from Isheyevo.

Petit M. Gounelle M. McKeegan K. Mostefaoui S. Marrocchi Y. Meibom A. Zolensky M. E.
[Kaidun Carbonates: Re-Examining the \$^{53}\text{Mn}\$ - \$^{53}\text{Cr}\$ Systematics](#) [#1666]

In this work, we used a NanoSims to characterize ^{53}Mn - ^{53}Cr internal isochrons on individual dolomite grains found in two different CI-lithologies of Kaidun.

Blinova A. I. Herd C. D. K. Zega T. De Gregorio B. Stroud R.
[Preliminary SEM and TEM Study of Pristine Samples of Tagish Lake Meteorite](#) [#2039]

We present preliminary SEM and TEM study of the pristine dark-dusty and compact-coherent lithologies from the Tagish Lake meteorite.

Nakashima D. Matsuda S. Iio H. Bajo K. Ebisawa N. Nagao K.
[Noble Gases in the NWA 852/801 CR2 Chondrites](#) [#1661]

NWA 852/801 are solar noble gas rich meteorites and petrologically similar, suggesting they are paired. The constituents had been exposed to solar winds and cosmic-rays for >57 Ma on the parent body surface followed by meteoroid flight of ~9 Ma.

Kuehner S. M. Irving A. J. Rumble D. III Nicklin I. Gregory D. A.
[Exotic, Primitive Micrometeorite Clasts Related to CM Chondrites in Polymict Eucrite Breccia Northwest Africa 5232](#) [#2315]

Dark CM chondritic clasts in a eucrite breccia contain characteristic phosphosulfides.

Gordon S. H. Hammond S. J. Howard L. E. Bland P. A.
[Dark Inclusions: Clasts of CM-type Material Within Allende](#) [#1713]

Dark inclusions of Allende (CV3) are found to be CM in origin. Trace and minor element determinations carried out by solutions ICP-MS show very similar volatile element depletion patterns for the two materials.

Izawa M. R. M. Barker I. Moser D. E. Flemming R. L. McCausland P. J. A.
[Colour SEM-Cathodoluminescence Investigation of the Tagish Lake C2 Chondrite](#) [#1757]

Color + UV SEM-CL imaging reveals variations in at least three constituents of Tagish Lake. Intra- and intergrain differences appear to be uncorrelated with major element chemistry, but may identify trace element records of thermochemical evolution.

Morlok A. Neff D. Libourel G.
[Alteration of Metal in CR2 Chondrites as Analogue for Long Term Corrosion Processes: Raman Studies of Corrosion Rims](#) [#1296]

We use alteration features of metal and glass in CR2 chondrites as analogues for corrosion features of steel and Si-glass in the long term repository of nuclear waste. This presentation focuses on Raman analyses of corrosion rims around metal grains in Al Rais and GRO 95577.

Hiyagon H. Yamakawa Y. Sasaki M. Uchiyama K. Ushikubo T. Lin Y. Kimura M.
[Rare Earth Element Fractionation in Fine-grained Inclusions from the Ningqiang and Other Carbonaceous Chondrites: Origin of Positive Ce-Eu-Yb Anomalies](#) [#1493]

Fine-grained inclusions sometimes show positive anomalies in Ce, (Eu) and Yb often associated with HREE-depletions (Modified Group II). We suggest that they are produced by addition of a Ce-Eu-Yb-rich component onto Group II-like precursors.

Zolensky M. E. Briani G. Gounelle M. Mikouchi T. Ohsumi K. Weisberg M. K. Le L. Satake W. Kurihara T.
[Searching for Chips of Kuiper Belt Objects in Meteorites](#) [#2162]

We report progress toward locating pieces of Kuiper belt objects in meteorites.

Thursday, March 26, 2009
POSTER SESSION II: ACHONDRITES: PRIMITIVE AND NOT SO PRIMITIVE
6:30 p.m. Town Center Exhibit Area

Nyquist L. E. Shih C.-Y. Reese Y. D.

[*Early Petrogenesis and Late Impact\(?\) Metamorphism on the GRA 06128/9 Parent Body*](#) [#1290]

Sm-Nd analyses of GRA06128 and GRA06129 determine its crystallization age to be 4.550 ± 0.034 Ga. Plagioclase, whole rock, and leachate (phosphate) samples give a secondary isochron age of 3.4 ± 0.4 Ga probably dating an impact event on the parent body.

Day J. M. D. Sunshine J. M. Ash R. D. Walker R. J. Liu Y. Rumble D. III
McDonough W. F. Taylor L. A.

[*Making Crust in the Asteroid Belt: Evidence from GRA 06128/9 and Brachinites*](#) [#2012]

The GRA 06128/9 achondrite meteorites are thought to be fragments of evolved asteroidal crust. We examine their petrogenesis, possible link to brachinites and search for their parent body in the solar system.

Sanborn M. E. Wadhwa M.

[*Rare Earth Element Geochemistry of Angrites Northwest Africa 4590 and Northwest Africa 4801*](#) [#1345]

We report ion microprobe analyses of rare earth element abundances in minerals of the plutonic angrites NWA 4590 and NWA 4801. Based on these results, implications are presented for the petrogenetic history of these two angrites and their relationships to other angrites.

Irving A. J. Rumble D. III Kuehner S. M. Gellissen M. Hupé G. M.

[*Ultramafic Achondrite Northwest Africa 5400: A Unique Brachinite-like Meteorite with Terrestrial Oxygen Isotopic Composition*](#) [#2332]

We characterize a remarkable brachinite-like specimen, which is perhaps a sample of proto-Earth or Theia.

Crowther S. A. Whitby J. A. Busfield A. Holland G. Busemann H. Gilmour J. D.

[*The I-Xe System in Lodranites Suggests Impact-related Rapid Cooling*](#) [#1595]

The I-Xe system of three lodranites has been investigated. Two metal and one silicate separate from GRA 95209 gave ages consistent with each other (and the I-Xe age of Acapulco feldspar), suggesting the parent material underwent a period of rapid cooling.

Thursday, March 26, 2009
POSTER SESSION II: IRON METEORITES
6:30 p.m. Town Center Exhibit Area

Yang J. Goldstein J. I. Michael J. R. Kotula P. G.

[*Composition and Thermal History of the IVB Iron Meteorites*](#) [#1186]

Cooling rates across IVB iron group vary more than a factor of six, which is against the constant cooling rate as shown in previous studies. Implications to the early evolution of asteroids will be discussed.

Qin L. Dauphas N.

[*Cosmogenic Stable Isotope Effects in Carbo*](#) [#2278]

Samples from the same iron meteorite, Carbo, show resolvable variations in $\epsilon^{182}\text{W}$. The variations are correlated with ^3He and depth from pre-atmospheric center. These are best explained by cosmogenic effects. No variation in $\epsilon^{184}\text{W}$ can be resolved.

Garvie L. A. J. Németh P.

[*The Structure of Canyon Diablo "Diamonds"*](#) [#1346]

"Diamond" from the Canyon Diablo meteorite is composed of a nanoscale intergrowth of diamond and lonsdaleite, with [0-11] zone axis of diamond parallel to [010] of diamond.

Thursday, March 26, 2009
POSTER SESSION II: METEORITE METHODOLOGY
6:30 p.m. Town Center Exhibit Area

Pourmand A. Dauphas N.

[*The Lu and Hf Isotopic Compositions of Meteorites: A Comparative Study of Alkali Flux Fusion and HF Parr Bomb Dissolution*](#) [#2452]

We compare Lu and Hf isotopic compositions and concentrations of Allende standard material dissolved in HF Parr bombs and alkali flux fusion in high-purity graphite, glassy carbon and platinum crucibles. Results from 12 meteorites are also presented.

Patzer A. Pack A. Gerdes A.

[*Determination of High-Precision Zr/Hf Ratios in Bulk Meteorites Using LA-ICP-MS*](#) [#2522]

We will present high-precision Zr/Hf data of different meteorite classes.

Minnick M. A. Strait M. M. Flynn G. J. Durda D. D.

[*Investigation of the Hydration of Anhydrous Chondrite Meteorites*](#) [#2224]

The purpose of our investigation was to examine the possibility and effectiveness of hydrating bulk meteorites from anhydrous samples to be used for fragmentation studies currently examining the origin of interplanetary dust particles.

Beck A. W. McSween H. Y. Jr. Mittlefehldt D. W. Lee C.-T. A.

[*Fused Bead Analysis in Diogenite Meteorites*](#) [#1177]

This study examines the accuracy of fused bead analysis in diogenites. We find elemental heterogeneity in the beads along with the presence of quench crystals. These findings suggest that fused bead cannot be used to accurately determine bulk chemistry of diogenites.

Shirai N. Humayun M. Irving A. J.

[*The Bulk Composition of Coarse-grained Meteorites from Laser Ablation Analysis of their Fusion Crusts*](#) [#2170]

We determined elemental abundances for an angrite, NWA 4590, and a shergottite, NWA 4468, from laser ablation analysis of broad areas of their fusion crusts.

Thursday, March 26, 2009
POSTER SESSION II: ANTARCTIC MICROMETEORITES
6:30 p.m. Town Center Exhibit Area

Dobrica E. Engrand C. Leroux H. Rouzaud J. N. Duprat J.

[Transmission Electron Microscopy of Ultracarbonaceous Antarctic Micrometeorites of Possible Cometary Origin](#) [#1534]

TEM observations of ultracarbonaceous Antarctic micrometeorites show intimate mixing of disordered carbon and fine-scale assemblages of minerals like Mg-rich olivine, pyroxenes and Fe-Ni sulphides and alloys.

Imae N. Iwata N.

[Compositions of Relict Olivines and Pyroxenes in Micrometeorites: In Comparison with Unequilibrated Chondrites](#) [#1501]

Relict olivines and pyroxenes survived the atmospheric entry heating among Antarctic micrometeorites tend to be similar to the CR2 and CO3.0 chondrites rather than the CM2 and Tagish Lake chondrites.

Taylor S. Herzog G. F. Jones K. W.

[Tomography of Metal Beads in Micrometeorites](#) [#1692]

To better understand metal bead formation in micrometeorites (MMs) we measured the shapes and size distribution of beads relative to their host MMs in section and mapped the internal structure of MMs using synchrotron computed microtomography.

Badjukov D. D. Brandstaetter F. Raitala J. Kurat G.

[Unmelted FeNi Metal Micrometeorites from the Novaya Zemlya Glacier](#) [#1499]

We report on the texture and mineralogy of two FeNi metal and one metal-chromite particles, which possibly are the first unmelted metal micrometeorites found so far.

Suavet C. Alexandre A. Franchi I. A. Gattacceca J. Sonzogni C. Folco L.

Greenwood R. C. Rochette P.

[Oxygen Isotope Ratios of Large Cosmic Spherules: Carbonaceous and Ordinary Chondrite Parent Bodies](#) [#1776]

Oxygen isotopes measurements of 33 cosmic spherules, using IR-laser fluorination/mass spectrometry, indicate that 30% of them are above the terrestrial fractionation line, i.e., are unrelated to carbonaceous chondrites but rather to ordinary and R chondrites.

Onoue T. Yasuda C. Haranosono T. Morita K. Nakamura T.

[Cosmic Spherules from Triassic Deep-Sea Sediments in Japan](#) [#1228]

We report the textures and major element compositions of cosmic spherules from the Triassic deep-sea sediments that accumulated in a mid-oceanic basin of the ancient Pacific Ocean.

Thursday, March 26, 2009
POSTER SESSION II: HEDs AND VESTA
6:30 p.m. Town Center Exhibit Area

Warren P. H. Rubin A. E. Ziegler K.

[*Northwest Africa 5415: A Howarditic Impact-Melt Breccia with Zoned Relict Orthopyroxenes and Augites, and Corroded, Complexly Mantled Fo-59 Olivines*](#) [#2545]

NWA5415 is unusual among HEDs for its clear manifestation of origin by large-scale impact melting. Our section's five relict olivines display reaction textures (pyroxene coronas) formed by immersion in melt on the Si-rich side of the ol-px liquidus.

Roszjar J. Srinivasan G. Bischoff A. Mezger K. Whitehouse M.

[*Hf-W Ages of Zircons — New Constraints on the Evolution of the Eucrite Parent Body*](#) [#1655]

We determined Hf-W ages from zircons found in four basaltic eucrites using the Cameca 1270 ion microprobe. The consistent crystallization ages suggest that the eucrite zircons formed in between a short time period after core-mantle segregation.

Greenwood R. C. Haack H. Buchanan P. C. Franchi I. A. Smith C. L. Johnson D. Burbine T. H.

[*Searching for the Missing Mantles of Disrupted Asteroids: Evidence from an Olivine-rich Clast in the Vaca Muerta Mesosiderite*](#) [#2456]

As part of an investigation into the olivine-rich material in mesosiderites we have looked in detail at a clast from Vaca Muerta which may represent preserved mantle material.

Ghosh A. Day R.

[*Thermal Simulation of a Magma Ocean on Asteroid 4 Vesta*](#) [#1850]

We present a thermal model of a magma ocean scenario on 4 Vesta.

Scott E. R. D. Greenwood R. C. Franchi I. A. Sanders I. S.

[*Oxygen Isotopic Constraints on the Origin and Parent Bodies of Eucrites, Howardites, and Diogenites*](#) [#2263]

Our oxygen isotopic analyses of 18 eucrites and four diogenites suggest that Vesta was isotopically homogeneous and that five of these eucrites with abnormal O isotopic compositions plus NWA 011 come from five Vesta-like bodies.

Righter K. Sutton S. Danielson L. Pando K. Le L. Newville M.

[*Using Vanadium in Spinel as a Sensor of Oxygen Fugacity in Meteorites: Applications to Mars, Vesta, and Other Asteroids*](#) [#2213]

Some meteorites do not contain mineral assemblages required to apply traditional oxy-barometers. Here we introduce a technique using vanadium X-ray absorption features in spinels to characterize the oxygen fugacity of meteoritic dunites, pyroxenites, and chondrites.

Irving A. J. Bunch T. E. Kuehner S. M. Wittke J. H. Rumble D. III

[*Peridotites Related to 4 Vesta: Deep Crustal Igneous Cumulates and Mantle Samples*](#) [#2466]

NWA 5480 may be a sample of Vesta-Related Mantle, but 4Vesta may be just one part of a former, larger body (Opis).

Bogard D. Garrison D.

[*Ar-Ar Impact Heating Ages of Eucrites and Timing of the LHB*](#) [#1131]

Ar-Ar ages indicate impact resetting ~4.48 Ga ago for unbrecciated eucrites and ~3.4–4.1 Ga for brecciated eucrites. These impacts likely are related to the late heavy bombardment (LHB) of the Moon.

Thursday, March 26, 2009
POSTER SESSION II: DUST FORMATION AND TRANSFORMATION
6:30 p.m. Town Center Exhibit Area

Flynn G. J. Durda D. D. Minnick M. A. Strait M.

[*Production of Cosmic Dust by Hydrous and Anhydrous Asteroids: Implications for the Production of Interplanetary Dust Particles and Micrometeorites*](#) [#1164]

Comparison of the debris from hypervelocity disruption of four hydrous CM2 meteorites to that from the anhydrous meteorite Saratov indicates the hydrous meteorites significantly overproduce dust in the 10^{-4} to 10^{-7} gram mass range.

Rietmeijer F. J. M. Hadamcik E. Pun A. Renard J.-B. Nuth J. A. III Levasseur-Regourd A. C.

[*Light Scattering by Fluffy Low-Silica Al-Fe-SiO and Ca-SiO Smokes Obtained by Non-Equilibrium Vapor Phase Condensation*](#) [#1742]

The effects of grain size, grain size distributions and bulk composition on maximum polarization and the phase angle function were studied for vapor phase condensed Ca-SiO and low-silica Al-Fe-SiO smokes, serving as analogs for comet dust.

Roskosz M. Leroux H.

[*Subsolidus Transformation of Amorphous Interstellar Dusts After Injection in a Protoplanetary Disk*](#) [#1745]

Subsolidus reheating of amorphous interstellar silicate dust analogs produces an unexpected diversity of minerals and a large redistribution of elements. Some of these phases look very similar to condensation and high-temperature products.

Thursday, March 26, 2009
POSTER SESSION II: INTERSTELLAR ORGANIC MATTER
6:30 p.m. Town Center Exhibit Area

Dobrica E. Engrand C. Quirico E. Montagnac G. Duprat J.

[*Immature Carbonaceous Matter in CONCORDIA Antarctic Micrometeorites*](#) [#1688]

Raman spectroscopy of Antarctic micrometeorites reveals abundant and highly disorganized carbonaceous matter in all types of unmelted to partially melted particles. The cyanide functional group was found in an ultracarbonaceous micrometeorite.

Floss C. Stadermann F. J.

[*Interstellar Components in the Primitive CR3 Chondrites QUE 99177 and MET 00426*](#) [#1083]

QUE 99177 and MET 00426 contain abundant N- and C-anomalous phases of interstellar origin. High abundances carbonaceous matter with C isotopic anomalies in these meteorites suggests that their scarcity in other samples is due to secondary processes.

Croat T. K. Bernatowicz T. J. Stadermann F. J.

[*Auger and NanoSIMS Investigations of Pristine Presolar SiC Surfaces*](#) [#1887]

From Auger Electron Spectroscopy of 15 pristine SiC surfaces (prepared without harsh acids) and subsequent NanoSIMS measurement of three SiCs, we find evidence for C-rich, Si-poor coatings and C and N isotopic distinctions between surface and bulk.

Wirick S. Flynn G. J. Frank D. Sandford S. A. Zolensky M. E. Tsou P. Peltzer C. Jacobsen C.

[*Carbon XANES Data from Six Aerogel Picokeystones Cut from the Top and Bottom Sides of the Stardust Comet Sample Tray*](#) [#1340]

Nine aerogel picokeystones were cut from the top (comet-side) and bottom of the comet sample tray tiles for C XANES spectra analyses. Six of these keystones have been analyzed and four types of C XANES spectra have been found in the non-track containing aerogel.

De Gregorio B. T. Stroud R. M. Nittler L. R. Cody G. D.

[*Variety of Organic Matter in Stardust Return Samples from Comet 81P/Wild 2*](#) [#2260]

Cometary organics show a wide variety of morphology and chemistry, including a growing population of N-rich organic matter.

Nuth J. A. III

[*Fischer-Tropsch-Type Catalytic Activity in the Primitive Solar Nebula: Results of New Experimental Studies Using Graphite and Noble Gases*](#) [#2401]

A carbonaceous coating forms via Fischer-Tropsch type reactions that is a better catalyst than amorphous iron silicates. Such a coating on grain surfaces could explain rich deposits of macromolecular carbon found in primitive meteorites and could have other consequences.

Thursday, March 26, 2009
POSTER SESSION II: EARLY SOLAR SYSTEM CHRONOLOGY
6:30 p.m. Town Center Exhibit Area

Moynier F. Dauphas N. Podosek F.

[*A Search for \$^{70}\text{Zn}\$ Anomalies in Meteorites*](#) [#1646]

^{70}Zn is homogeneously distributed in the early solar system at a precision of 0.70 ϵ which confirms the homogeneity in planetary bodies of neutron rich isotopes around the iron peak.

Parai R. Jacobsen S. B.

[*Precise Determination of Initial Solar System \$^{87}\text{Sr}/^{86}\text{Sr}\$ and Implications for Early Solar System Chronology*](#) [#1995]

We measure Sr isotopes in CAIs, angrites, lunar anorthosites and eucrites to determine initial solar system $^{87}\text{Sr}/^{86}\text{Sr}$ with better precision than previous studies, thus providing better resolution of early solar system chronology.

Bowers M. R. Collon P. Kashiv Y. Lamm L. Lu W. Paul M. Robertson D. Schmitt C.

[*Proposed Measurements of \$^{36}\text{Cl}\$ Cross Sections for In-Situ Production in the Early Solar System*](#) [#2113]

An overabundance of ^{36}S in CAIs was interpreted as evidence for the extinct ^{36}Cl . We are planning to measure the ^{36}Cl production cross sections in the relevant $E < 20$ MeV/A range for irradiation from a young Sun with accelerator mass spectrometry.

Hans U. Kleine T. Bourdon B.

[*The Chronology of Accretion and Volatile Depletion of Differentiated Protoplanets Inferred from Rb-Sr Systematics of Angrites*](#) [#2440]

We present new high-precision Sr isotope data for plagioclase separates from angrites and use these data to constrain the chronology of volatile depletion and accretion of the angrite parent body.

Chaussidon M. Barrat J.-A.

[*\$^{60}\text{Fe}\$ in Eucrite NWA 4523: Evidences for Secondary Redistribution of Ni and for Secondary Apparent High \$^{60}\text{Fe}/^{56}\text{Fe}\$ Ratios in Troilite*](#) [#1752]

High apparent $^{60}\text{Fe}/^{56}\text{Fe}$ ratios have been found in troilite from the eucrite NWA 4523. These ratios are likely explained by a redistribution of Ni isotopes after the decay of ^{60}Fe .

Brennecka G. A. Weyer S. Wadhwa M. Janney P. E. Anbar A. D.

[*\$^{238}\text{U}/^{235}\text{U}\$ Variations in CAIs: Implications for Pb-Pb Dating*](#) [#1061]

Data obtained from CAIs of the Allende meteorite challenges the assumed uniformity of $^{238}\text{U}/^{235}\text{U}$ used in the Pb-Pb age equation for meteoritic material. Such data may require revision of the absolute age of the first solids in the solar system.

Chen J. H. Papanastassiou D. A.

[*Nickel Isotopic Compositions in Pallasites and Iron Meteorites*](#) [#1844]

Fe-Ni measurements in pallasites do not show preserved evidence of *in situ* ^{60}Fe decay (1.5 Ma half life) but still place pallasite formation within 15 Ma of unequilibrated chondrites.

Quitté G. Cosmidis J. Poitrasson F.

[*Nickel Nucleosynthetic Anomalies in Leachates of Carbonaceous Chondrites*](#) [#2324]

Ni isotopes were measured in sequentially digested carbonaceous chondrites. Orgueil leachates show deficits in ^{60}Ni and ^{62}Ni , while anomalies in Allende and Murchison can generally not be resolved from the standard isotope composition.

Yin Q.-Z. Amelin Y. Jacobsen B.

[*Project Milestones: Testing Consistent Chronologies Between Extinct \$^{53}\text{Mn}\$ - \$^{53}\text{Cr}\$ and Extant U-Pb Systematics in the Early Solar System* \[#2060\]](#)

New ^{53}Mn - ^{53}Cr data are presented for four “milestones” with well-known Pb-Pb ages. We demonstrate consistent chronologies between extinct ^{53}Mn - ^{53}Cr and U-Pb systematics in the early solar system. $^{53}\text{Mn}/^{55}\text{Mn}$ heterogeneity could be tested with future work.

Liu M.-C. Nittler L. R. Alexander C. M. O’D. Lee T.

[*A Search for Internal \$^{26}\text{Al}\$ Isochrons in CM Hibonite* \[#1739\]](#)

We conducted a high spatial-resolution investigation of the internal Mg isotopic distribution in a spinel-hibonite spherule from Murchison to seek an internal ^{26}Al isochron.

Ito M. Ganguly J.

[*Mg Diffusion in Minerals in CAIs: New Experimental Data for Melilites and Implications for the Al-Mg Chronometer and Thermal History of CAIs* \[#1753\]](#)

We evaluate the relative robustness of CAI minerals for Al-Mg chronometer, and the possible resetting of Mg isotopic composition during the period of residence of the CAIs in the protoplanetary disk and by thermal processes in the parent body.

Spivak-Birndorf L. J. Wadhwa M.

[*\$^{26}\text{Al}\$ - \$^{26}\text{Mg}\$ Systematics in Brachina and the Unique Achondrite GRA 06129* \[#2131\]](#)

We report an investigation of the ^{26}Al - ^{26}Mg chronology of the possibly related achondrites, Brachina and GRA 06129. Both meteorites show evidence of very early crystallization (~2–3 Myr after solar system) followed by later thermal metamorphism.

Thursday, March 26, 2009
POSTER SESSION II: COMPARATIVE PLANETOLOGY
6:30 p.m. Town Center Exhibit Area

Sharkov E. Bogatikov O.

[*Irreversible Evolution of the Terrestrial Planets: Geological and Petrological Data*](#) [#1065]

All terrestrial planetary bodies have been self-developed systems, evolved on the close scenario, which provides cardinal change of tectonomagmatic processes at the middle stages of their evolution; except the Earth, they are “dead” bodies now.

Stoddard P. R. Jurdy D. M.

[*Topographic Comparisons of Uplift Features on Venus and Earth: Implications for Venus Tectonics*](#) [#2236]

Topographic profiles of regiones and rifts on Venus are compared to hotspots and mid-ocean spreading centers on Earth. Principal component analysis shows that the continental Yellowstone hotpot corresponds well with Venus regions.

Litherland M. M. McGovern P. J.

[*Effects of Planetary Radius on Lithospheric Stresses and Magma Ascent on the Terrestrial Planets*](#) [#2201]

We model how varying planetary curvature affects the lithospheric stress beneath a load. We then examine how this can assist or inhibit magma ascent beneath volcanoes and basins on differently sized planets.

Baptista A. R. Craddock R. A. Mangold N.

[*Small Martian Shield Volcanoes and Terrestrial Analogues*](#) [#2102]

We are conducting field studies in Hawaii and in Iceland to understand the formation of parasitic shield volcanoes and their related lava flows. The rheological properties of Mars Syria Planum small shields volcanoes make them a good analog.

Gadányi P. Gucsik A. Bérczi Sz.

[*Pseudokarstic Subsidences Induced by Subsurface Melting of Tephra-covered Firn — Analogues for Martian Subsidences in the Dyngjufjöll Massif, Iceland*](#) [#2353]

The subsidences from the selected area of Iceland can aid to understand more about the newly discovered ice shields on Mars and their morphological features and climatic environments.

Tretyakov V. I. Kozyrev A. S. Litvak M. L. Malakhov A. V. Mitrofanov I. G. Mokrousov M. I. Sanin A. B. Vostrukhin A. A.

[*Comparison of Neutron Environment and Neutron Component of Radiation Doze for Space around Earth and Mars from Data of Instruments HEND/MarsOdyssey and BTN/ISS*](#) [#1292]

Data from two similar instruments — HEND onboard NASA’s Mars Odyssey and BTN onboard International Space Station — allows us to compare the neutron environment in the space near Mars and Earth and estimate the neutron dose for interplanetary flights.

Schmedemann N. Neukum G. Denk T. Wagner R.

[*Impact Crater Size-Frequency Distribution \(SFD\) on Saturnian Satellites and Comparison with Other Solar-System Bodies*](#) [#1941]

Our research shows high similarities of impact crater-SFDs between the inner solar-system bodies, the saturnian satellites and the asteroid body-SFD.

Garry W. B. Zimbelman J. R. Bleacher J. E. Crumpler L. S.

[*Topography and Inflation Features of the 1859 Mauna Loa Lava Flow, Hawai’i: Applications to Inflated Flows on Mars*](#) [#1200]

Topography and inflation features from the distal end of the 1859 lava flow on Mauna Loa volcano Hawai’i will be compared to possible inflated flows on Mars.

Bleacher J. E. Garry W. B. Zimbelman J. R. Richardson P. W.

[*Field Observations of Rootless Vents over the Pohue Bay Lava Tube, Hawai'i: Comparisons with Olympus Mons Lava Fans, Mars*](#) [#1980]

Field studies of rootless vents over lava tubes on Hawai'i suggest that most Olympus Mons lava fans are also rootless eruption points. Rift zones, if present, are likely responsible for a smaller population of flank fans.

Shockey K. M. Gregg T. K. P.

[*The Spatial Relationship Within Fields of Shield Volcanoes*](#) [#2056]

We statistically examine the spatial distribution of volcanic edifices within fields on the terrestrial planets.

Thursday, March 26, 2009
POSTER SESSION II: IMPACTS I: MODELS AND EXPERIMENTS
6:30 p.m. Town Center Exhibit Area

Ivanov B. A.

[*Multiphase Equations of State for Planetary Impact Study — II*](#) [#2283]

First results of the construction of the ANEOS-base multiphase EOS of forsterite are presented. The new EOS promises more accurate impact melt calculations in high-velocity planetary impact modeling.

Carter R. T. Jandir P. S. Kress M. E.

[*Estimating the Drag Coefficients of Meteorites for All Mach Number Regimes*](#) [#2059]

Most models that describe the descent of meteorites use a constant drag coefficient. We present a numerical method to calculate drag coefficients as a function of Mach number.

Wünnemann K. Elbeshausen D. Collins G. S.

[*Structural Evidence for the Direction of Impact at Complex Craters: Insight from 3D Numerical Modeling*](#) [#1593]

We use 3D hydrocode modeling of impact crater formation to investigate the effect of the angle of incidence on structural asymmetries in the resulting crater morphology.

Kurta A. T. Wünnemann K. Kenkmann T.

[*Morphometry and Structure of Eroded Complex Impact Craters: A Parameter Study Using Hydrocode Modeling*](#) [#1948]

The crater diameter and the size of the central uplift and the ring syncline change with the amount of erosion a complex impact crater has undergone. We systematically analyse these quantities as a function of depth utilizing numerical simulations.

Elbeshausen D. Wünnemann K. Collins G. S.

[*Oblique Impacts in Frictional Targets — Implications for Crater Size and Scaling*](#) [#1559]

We conducted more than 200 3D-hydrocode simulations to reveal the effect of the impact angle on crater size and the role of friction in oblique impacts. We prove whether existing scaling laws can be extended to describe both the effect of obliquity and friction.

Ernst C. M. Barnouin-Jha O. S. Ramesh K. T. Swaminathan P. K. Kimberley J.

[*Strain Rate and Dynamic Fracturing in Planetary-Scale Impacts*](#) [#2523]

Using numerical simulations and new dynamic fragmentation models, we investigate what strain rates might be generated during large scale impacts and assess implications for fragmentation considering new dynamic fragmentation models.

Potter R. W. K. Collins G. S. Elbeshausen D. Wünnemann K.

[*The Effect of Asteroid Shape, Velocity and Target Material on Asteroid Survivability*](#) [#1610]

Numerical simulations of asteroid impacts show that a substantial fraction of the asteroid remains solid (does not melt or vaporize) if the impact is near escape velocity, into a deep water layer or if the impactor is significantly prolate.

Ormö J. Lepinette A. Lindström M. Sturkell E. Shuvalov V. Housen K. Holsapple K.

[*Dynamics of the Water Resurge at Marine-Target Impact Craters Analyzed with a Combination of Low-Velocity Impact Experiments and Numerical Simulation*](#) [#1571]

Projectile impact experiments complement numerical simulations when illustrating the processes involved in the formation and modification of marine-target craters.

Holsapple K. A. Housen K. R.

[*Deep Impact: An Outburst Triggered by an Impact?*](#) [#1936]

The Deep Impact ejecta apparently had more kinetic energy than the impactor. We suggest some possible reasons, and present the results of experiments that may give clues to the interpretation of the event.

Housen K. R.

[*Dynamic Strength Measurements on Granite and Basalt*](#) [#1701]

Dynamic strength measurements on granite and basalt are reported and compared with measurements of flaw size distributions.

Sugita S. Kurosawa K. Kadono T. Hironaka Y. Otani K. Shiroshita A. Ozaki N. Miyanishi K. Sekine Y. Nakamura K. Fukuzaki S. Sano T. Sakaiya T. Fujiwara T. Mochiyama T. Takarada S. Fujioka S. Shigemori K. Ohno S. Tachibana S. Matsui T.

[*In-Situ Spectroscopic Observation of Silicate Vaporization Due to >10 km/s Impacts Using a Laser-driven Launcher*](#) [#2493]

A high-power laser was used to accelerate heavy metal (Ta) flyers to 9 km/s, to shock heat and compress silicate samples to near critical conditions. High-speed spectroscopic observation reveals that diopside vaporizes around 4 GPa and 8000 K.

Stickle A. Schultz P. H. Crawford D. A.

[*The Role of Shear in Oblique Impacts*](#) [#2357]

Shear failure plays a significant role in hypervelocity impacts. Experimental results are compared to CTH models to determine regions of shear and extensional failure in a variety of targets.

Schultz P. H.

[*Uprange Plumes and Nature of the Comet 9P/Tempel 1*](#) [#2386]

Hypervelocity impact experiments were performed for a variety of targets in order to assess conditions leading to reverse vapor plumes during early stages of crater formation with implications for deep impact.

Thursday, March 26, 2009
POSTER SESSION II: IMPACTS II: CRATERS AND EJECTA
6:30 p.m. Town Center Exhibit Area

Koeberl C. Bartosova K. Brandstätter F.

[*Melt Particles in the Chesapeake Bay Impact Structure Eyreville Drill Core — A Progress Report*](#) [#1715]

Geochemical studies of melt fragments in a Chesapeake Bay crater drillcore indicate that no widespread homogenization of the melt took place.

Watson J. S. Gilmour I. Kelley S. P. Jolley D. W.

[*Scientific Drilling of the Boltysch Impact Crater, Ukraine*](#) [#1719]

We have re-drilled the Boltysch impact crater and have recovered a near continuous record of ~400 m of organic-rich sediments together with 15 m of suevite.

Albin E. F. Harris R. S. King D. T. Jr. Jaret S. J. Jarrett R. E.

[*Alternate Twin Deformation in Plagioclase: Possible Evidence of Shock Deformation in Charnockitic Rocks Associated with the Woodbury Structure*](#) [#2544]

Charnockitic rocks associated with the Woodbury structure contain evidence of possible shock metamorphism in plagioclase grains.

Milam K. A.

[*Deformation Fabrics and Their Cross-Cutting Relationships in the Central Uplifts of Large Impact Structures*](#) [#2455]

Deformation fabrics and the petrogenetic sequence observed in smaller complex craters (<20 km in diameter) are now being observed in the larger complex impact structures.

Ferrière L. Koeberl C. Reimold W. U. Hecht L. Bartosova K.

[*The Origin of "Toasted" Quartz in Impactites Revisited*](#) [#1751]

The toasted appearance of quartz is caused by an increase in light scattering due to the presence of numerous vesicles. Toasted quartz is formed by vesiculation after pressure release, at high post-shock temperatures.

Morrow J. R. Weber J. C.

[*Comparison of Low-Pressure Shock-Metamorphic Effects in Quartz from Barringer Crater, Arizona, and Kentland Dome, Indiana*](#) [#1913]

Low-pressure (=10 GPa) shock effects in quartz from Coconino Ss., Barringer Crater, and St. Peter Ss., Kentland Dome, are compared. Although showing overall similar post-shock microfabrics, very different PFs and incipient PDFs are developed.

Schmieder M. Buchner E. Kröcher J.

[*'Ballen Silica' in Impactites and Magmatic Rocks*](#) [#1020]

Recent studies pointed out that 'ballen silica' is an impact-diagnostic feature. However, ballen-textured α -cristobalite was also reported in rocks not related to impact.

Poelchau M. H. Kurta A. T. Kenkmann T.

[*Signatures of an Oblique Impact in the Central Uplift of Martin Crater, Mars*](#) [#1796]

The internal, layered structure of Martin Crater's central peak reveals a preferential orientation of strike that is perpendicular to the impact direction. Preliminary results are presented and implications for the cratering process are discussed.

Crasselt C. Reimold W. U.

[*Impact Related Pseudotachylitic Breccias in the Schurwedraai and Baviaan-Krantz Alkali Granite Complexes in the Collar of the Vredefort Dome, South Africa*](#) [#2085]

Structural and petrographic observations and chemical data of pseudotachylitic breccia occurrences in alkali granite of the collar of the Vredefort Dome are discussed with regard to the possible formation of these enigmatic melt breccias.

Wartho J-A. Schmieder M. van Soest M. C. Buchner E. Hodges K. V. Bezys R. K. Reimold W. U.
[*New \(U-Th\)/He Zircon and Apatite Ages for the Lake Saint Martin Impact Structure \(Manitoba, Canada\) and Implications for the Late Triassic Multiple Impact Theory*](#) [#2004]

New (U-Th)/He single crystal zircon and apatite ages for the 40 km Lake Saint Martin impact structure suggests that this crater is too now old to be included in the postulated ca. 214 Ma Late Triassic multiple impact event.

Buchner E. Moilanen J. Öhman T. Schmieder M.

[*Shock-Molten Sandstone Clasts in Impact Melt Rocks: Age Constraints for the Paasselkä Impact Structure \(SE Finland\)*](#) [#2169]

Partially molten sandstone clasts in impact melt rocks suggest a new <1.4 Ga age for the Paasselkä impact structure, SE Finland.

Ormö J. Hill A. Self-Trail J. M. Frisk Å. M.

[*A Method to Determine the End of Impact-related Sedimentation at Marine-Target Craters: Geochemistry and Micropaleontology of the Transition from Resurge to Secular Deposits at the Lockne, Tvären, and Chesapeake Bay Impact Structures*](#) [#1318]

Stable isotope and major element analysis is proving to be a necessary complement to inadequate visual inspection for distinguishing the end of impact-related sedimentation at marine-target craters.

Bliss K. M. Morrow J. R. Weber J. C. Vice M.

[*Evaluation of XRD and Raman Peak Broadening in Shock-Metamorphosed Carbonates from Carbonate-Target Bolide Impact Structures*](#) [#2211]

Carbonate samples were analyzed from eight confirmed carbonate-target impact structures and other high temperature-pressure settings to determine whether XRD and micro-Raman peak broadening in the resulting spectra is unique to impact settings.

Cernok A. Kring D. A.

[*Were Carbonate Impact Melts Produced from the Carbonate-rich Target Lithologies at Meteor Crater, Arizona?*](#) [#1825]

During the Meteor Crater impact event mafic silicate melts intensively degassed of CO₂ were produced. Recently, existence of carbonate melt has been reported. To test this concept, we analyzed interior fall-back breccia and ejected melt particles.

Orr Key W. R. Schultz R. A.

[*Fault Formation at Impact Craters in Porous Sedimentary Rock Targets*](#) [#1073]

We present results of a study in which the mechanics of faulting at high strain rates in porous sedimentary rocks were evaluated at the Upheaval Dome impact crater in southeast Utah.

Byrne C. J. Lordi N. G.

[*Radial Profiles of Lunar Basins and Large Craters*](#) [#1351]

The centers and diameter of large lunar impact features are derived from radial elevation profiles. Some published basins are not confirmed, some parameters are significantly different, and new basins are identified.

Bray V. J. Schenk P. M. Melosh H. J. Collins G. S. Morgan J. V.

[*Dimensions of Central Pits in Ganymede Craters*](#) [#1350]

Central pit craters are an unusual class of impact crater seen most commonly on the icy Galilean satellites and Mars. We will present topographic profiles of central pit craters on Ganymede, using these data to construct scaling trends.

Goeritz M. Kenkmann T. Wünnemann K. van Gasselt S.

[*Asymmetric Structure of Lunar Impact Craters Due to Oblique Impacts?*](#) [#2096]

Based upon observations of asymmetric lunar mare craters we investigated deviations of the central peak positions from the geometric center of the craters. We found slight correlations between the peak offset and the impact direction.

Vijayan S. Vani K. Sanjeevi S.

[*Crater Mapping and Analysis Using Cartosat 1 DEM*](#) [#2427]

Impact craters study using DEM: Analog to lunar mare crater.

Plescia J. B.

[*Wetumpka Impact Structure, Alabama: Gravity Survey*](#) [#1218]

A gravity survey of the Wetumpka impact shows a simple anomaly — a central low (−5.75 mGal) surrounded by a high (+2.5 mGal). There is no suggestion of a buried central uplift.

King D. T. Jr. Petruny L. W.

[*Upper Cretaceous Chalk at Wetumpka Impact Structure, Alabama: Post-Impact Sediment?*](#) [#2381]

Wetumpka impact structure, a 7.6 km diameter, Late Cretaceous marine impact feature, contains coeval chalk deposits that represent both displaced target megablocks and post-impact sediments with the interior and exterior terrains.

Glidewell J.

[*Seismic Data Through the Hico Structure: A Possible Impact Feature in North-Central Texas*](#) [#2563]

The Hico Structure in north-central Texas has been proposed to be an impact feature. Recent seismic data through the feature support this theory.

Kirkland L. E. Herr K. C. Adams P. M.

[*Remote Sensing of Geologic Materials at Man-Made Craters*](#) [#2153]

We use ground and airborne infrared remote sensing to explore geologic materials exposed by large manmade craters at the Nevada Test Site. The site and methods are analogs to rover and satellite exploration of the Moon and Mars.

Mihályi K. Gucsik A. Szabó J. Bérczi Sz.

[*Facts, Theories and Further Questions Around the Ries-Steinheim Simultaneous Impact Event: A Review*](#) [#1542]

This proposed paleogeographic reconstruction study can aid to understand more about the environmental effects of a terrestrial impact event such a double-type one: Ries-Steinheimer impact events and their influences on the paleoecological environment.

Danilin A. N.

[*A New Astrobleme in the Polar Urals \(Russia\)*](#) [#1001]

A reasonable assumption is made that one of the largest ancient astroblemes in the Earth is in the Polar Urals (Russia).

Rajmon D.

[*Circular Geomorphologic Feature Near Urengoy, West Siberia*](#) [#1881]

Circular polygonal feature 4.5 km in diameter near Urengoy in West Siberia is unique in the wider area. Geologic review indicates that a meteorite impact or transpression tectonics are the most likely formation mechanisms.

Bron K. T.

[*The Tookoonooka Tsunami Sequence: Evidence for Marine Impact in Australia's Lower Cretaceous*](#) [#2560]

The Tookoonooka subsurface impact structure (Australia) is located in the lower Cretaceous Eromanga Basin sedimentary succession. An ejecta-bearing tsunami sequence with basin-wide extent was discovered, and provides clear evidence that Tookoonooka was a shallow marine impact.

Aden D. J. Milam K. A. Kah L. C. Gilleaudeau G. J.

[*An Anomalous Breccia in the Mesoproterozoic \(~1.1 Ga\) Atar Group, Mauritania: Potential Evidence for an Impact-generated Tsunami* \[#2003\]](#)

Initial observations reveal that an anomalous high-energy breccia in the Mesoproterozoic Atar Group, Mauritania, is a possible candidate for an ancient tsunamite, which may have been triggered by a marine impact event.

Deutsch A. Berndt J. Mezger K. Schulte P.

[*The Pristine Chicxulub Ejecta Sequence at ODP Leg 207: A Micro-Chemical Study* \[#1245\]](#)

A La-ICP-MS study across the uppermost 6 mm of the exceptionally well preserved K/T boundary in Site 1259C (ODP Leg 207) allows assessing which components have contributed to the Chicxulub ejecta layer.

Jaret S. J. Kah L. C. French B. M.

[*Petrographic Investigation of Ejecta from the Tenoumer Impact Crater, Mauritania* \[#1281\]](#)

To improve our understanding of the excavation, shock metamorphism, and impact melting in simple craters, we undertook a mineralogical and petrological study of ejecta and impact melt from the Tenoumer impact crater, Mauritania.

Böhlitz M. C. Langenhorst F.

[*Liquid Immiscibility and Gas Content in Dark Schlieren of Libyan Desert Glass* \[#2018\]](#)

We report microprobe and gas analyses of dark schlieren in Libyan Desert Glass (LDG). Schlieren contain two immiscible metastable silicate liquids that have formed by rapid cooling. High volatile contents in schlieren point to hydrous phases as precursor materials.

Harris R. S. Duncan M. S. Roden M. F. Schroeder P. A.

[*Discovery of In Situ Impact Glass in Upper Eocene Coastal Plain Strata, Jefferson County, Georgia* \[#2502\]](#)

We report the discovery of *in situ* impact glass fragments in an upper Eocene ejecta. Their compositions are consistent with microtektites in the North American strewn field.

Adolph L. Deutsch A.

[*Glass Spherules Related to the El'gytgyn Impact Crater \(Siberia\)* \[#1116\]](#)

We report the results of a geochemical investigation on glass spherules from a terrace deposit outside the rim of the El'gytgyn impact crater (NE Siberia, Russia). These spherules are very homogeneous yet differ in their composition from dacitic to basaltic-andesitic.

Das P. K. Misra S. Basavaiah N. Newsom H. Dube A.

[*Rock Magnetic Evidence of Asteroid Impact Origin of Ramgarh Structure, India* \[#1466\]](#)

The magnetic properties of spherules and other materials from the Ramgarh structure in India have high NRM, possibly associated with formation of the impact structure.

Miura Y.

[*Impact-related Indicators of Grains with Akaganeite Composition Found at Takamatsu, Nio, Kuga \(Japan\) and Carancas \(Peru\)* \[#2565\]](#)

Chlorine (Cl)-bearing Fe and Ni phases (as akaganeite composition) originated from impacts of meteoroids are found at Takamatsu, Nio, Kuga and Carancas compared with awaruite and artificial grains.

Hargitai H.

[*Water Ejecta of Marine Impacts and Ice Meteorites* \[#2439\]](#)

There is a debate on ice meteorites of extraterrestrial origin — but what if ice meteorites are made locally? A possibility of ice meteorites may be marine impacts.

Cagen K. T. Abbott D. Nitsche F. West A. Bunch T. Breger D. Slagle A. Carbotte S.

[*Impact Ejecta in a Possible Tsunami Layer in the Hudson River: Regional or Local Event?* \[#2276\]](#)

Recent discoveries point to a tsunami event in the New York metropolitan area approximately 2300 BP. Our discovery of impact ejecta deposited by the tsunami in the Hudson River suggests that the tsunami was caused by an impact in the Atlantic Ocean.

Buchner E. Schmieder M. Strasser M. Strasser A. Kröcher J.

[Impacts on Spherules](#) [#1017]

Characteristic marks of low- and high-speed particle contacts (microcratering), respectively, may reveal a possible tool to discriminate between iron spherules of anthropogenic/industrial (low-speed) and cosmic/impact (high-speed) origin.

Abbott D. H. Gerard-Little P. Costa S. Breger D.

[Odd \$\text{CaCO}_3\$ from the Southwest Indian Ocean Near Burckle Crater Candidate: Impact Ejecta or Hydrothermal Precipitate?](#) [#2243]

Unusual carbonate crystals from the vicinity of Burckle Crater candidate may be impact ejecta or hydrothermal precipitates from ridge crest vents. However, they occur with translucent C impact spherules, native metals, and well preserved mineral fragments and glass.

Thursday, March 26, 2009
POSTER SESSION II: MARS: VOLCANISM
6:30 p.m. Town Center Exhibit Area

Hamilton C. W. Fagents S. A.

[*The Tartarus-Colles Cone Group and Its Implications for Explosive Lava-Water Interactions in the Grijota Valles Region of Mars*](#) [#1924]

Terrestrial volcanic rootless cones (VRCs) are the products of explosive-lava water interactions. We describe the Tartarus-Colles cone group on Mars and provide morphological and geospatial evidence to support the interpretation that these landforms are VRCs.

Lanz J. K. Saric M. B.

[*Possible Traces of Hydrothermal Venting in Aeolis Planum, Mars*](#) [#1014]

We have studied pitted cones and ridges north of Aeolis Planum that show striking differences to other cone complexes on Mars. We propose that they were formed by hydrothermal venting processes similar to hydrothermal vent complexes on Earth.

Kerber L. Head J. W. Madeleine J. B. Forget F. Wilson L.

[*The Dispersal of Pyroclasts from Apollinaris Patera, Mars*](#) [#2176]

Using a Mars global circulation model, we model the dispersal of ash from Apollinaris Patera, varying parameters such as plume height, grain size, and season. We test the hypothesis that Apollinaris could be a source for the Medusae Fossae formation.

Lang N. P.

[*Another Look at the Summit Caldera of Apollinaris Patera*](#) [#2370]

This project focuses on documenting the structural and volcanic evolution of the summit caldera on Apollinaris Patera.

Fagan A. L. Sakimoto S. E. H.

[*Formation Constraints on Martian North Polar Volcanic Edifices*](#) [#1976]

Comparisons of topographic characteristics between Icelandic volcanoes and martian north polar edifices imply that many of the latter may be of subglacial origin and thus suggest a potential former ice sheet with a minimum thickness of 80–550 m.

Tyson S. Wilson L. Gilbert J. S. Lane S. J.

[*A New Mechanism for Caldera Formation Resulting from Interactions Between Magmatic Heat and Cryospheric Ice*](#) [#1716]

We propose a new mechanism of caldera formation that does not require local removal of magma.

Tyson S. Wilson L. Lane S. J. Gilbert J. S.

[*Hecates Tholus: Defrosting a Volcano*](#) [#1158]

We explore how magmatic heat influences the survival of the cryosphere and any possible snowpack at the summit of Hecates Tholus.

Byrne P. K. van Wyk de Vries B. Murray J. B. Troll V. R.

[*An Overview of Volcano Flank Terraces on Mars*](#) [#2192]

Using MOLA, HRSC, and CTX images, and laboratory analogue modelling, we report on the nature, origin, and context of volcano flank terraces on Mars.

Spagnuolo M. G. Pio Rossi A.

[*Analog Modelling for Pit Craters and Its Relation to Extensional Features on Mars*](#) [#1307]

We performed analog modelling to study pit crater formation on Mars. Preliminary results show that pit craters in fact form in the presence of unconsolidated material over hard layers but no faults are developed.

Cushing G. E. Titus T. N.

[*Kilauea Pit Craters as Mars Analogs: A New Direction for Cave-Detection Techniques*](#) [#1203]

Some Kilauea pit craters provide access to extensive cave networks, and from the outside, appear morphologically similar to anomalous pit craters found on Mars. Thermal comparisons may enable future studies to indirectly identify caves on Mars.

Lopez T. Baratoux D. Rabinowicz M. Antoine R. Ayoub F. D'Uston L.

[*What Does Control the Thermal Behaviour of the Pits Near Arsia Mons?*](#) [#1912]

The THEMIS instrument onboard Mars Odyssey imaged deep pits, localised North of Arsia Mons, in the visible and infrared channels. We present a detailed thermal study of these pits to evaluate several hypotheses that could explain their thermal behavior.

Leverington D. W.

[*Reconciling Channel Formation Processes with the Nature of Elevated Hesperian Outflow Systems at Valles Marineris*](#) [#1469]

A volcanic origin for relatively small outflow systems at uplands adjacent to Valles Marineris is in accord with channel characteristics, regional geological context, and solar system analogs.

Basilevsky A. T. Neukum G. Kneissl T. Dumke A.

[*Geologic Analysis of HRSC Images of the Area East of the Mangala Valles Head Graben, Mars*](#) [#1833]

This study shows that the lava flows associated with a graben being the continuation to the east of the head graben of the Mangala Valles formed around ~0.5 Ga ago and thus correlate with one of the episodes of the Mangala Valles flood activity.

Crown D. A. Berman D. C. Rivas R. Ramsey M. S.

[*Arsia Mons Lava Flows: Insights into Flow Field Emplacement and Stratigraphy from CTX and HiRISE Images*](#) [#2252]

This research focuses on lava flows south of Arsia Mons and utilizes high-resolution images as well as topographic and thermal infrared data to examine development of channel and levee systems, local sequences of flow emplacement, and degradation of flow field surfaces.

Hiesinger H. Pasckert J. H. Reiss D.

[*Rheology of Lava Flows on Elysium Mons, Mars*](#) [#1983]

We have mapped 25 individual lava flows in the Elysium Mons region and measured their dimensions. On the basis of these measurements, we have calculated the yield strengths, effusion rates and viscosities of the lava flows.

Hiesinger H. Rohkamp D. Sturm S. Thiessen F. Reiss D.

[*Geology, Ages, Morphology, and Morphometry of Thumbprint Terrain in Isidis Planitia, Mars*](#) [#1953]

We constructed a map of thumbprint terrain and measured the heights, lengths, basal diameters, and the diameters of the central depressions. We dated the geologic units on which the thumbprint terrain occurs and superposed rampart craters.

Milazzo M. P. Keszthelyi L. P. Jaeger W. L. Rosiek M. Mattson S. Verba C. Beyer R. A.

Geissler P. E. McEwen A. S. HiRISE Team

[*The Distribution of Columnar Lavas on Mars as Seen by HiRISE*](#) [#2159]

On Mars, water floods mix with hot lavas; joints form. HiRISE sees from space.

Korteniemi J.

[*Interpreting Remote Sensing Data: Martian Dikes vs. Other Features*](#) [#2084]

Examples of structures which may be (mis)interpreted as magmatic dikes or their surface manifestations.

Pedersen G. B. M. Head J. W. III Wilson L.

[*Early Amazonian Dike Swarms in Utopia Basin, Mars: Nature of Substrate and Estimates of Effusion Rates*](#) [#1541]

Hundreds of narrow, linear ridge segments are found in the transition zone between Elysium Rise and Utopia Basin. The linear ridges are interpreted to be dikes and the multiple ridge systems are interpreted to be dike swarms.

Woerner W. R. Coraor E. K. McCubbin F. M. Nekvasil H. Lindsley D. H.

[*The Effect of Pressure on Residual Liquid Compositions from Crystallization of a Humphrey-like Magma: Implications for Crustal Stratigraphy in Martian Volcanic Provinces*](#) [#2203]

Experiments indicate that Humphrey-like liquids ponding at the base of a thickened crust in major volcanic provinces on Mars would produce a pigeonite-rich cumulus layer at depth and highly silica-undersaturated sodic residual liquids.

Usui T. McSween H. Y. Jr. Clark B. C. III

[*CO₂-related Noachian Alkaline Magmatism on Mars: Evidence from High-Phosphorous Wishstone-Class Rocks in Gusev Crater*](#) [#1055]

We demonstrate that high-phosphorous tephrites (Wishstone class) in Gusev crater formed in association with carbonatitic melt/fluid. This could yield insights into the effects of CO₂ (an effective greenhouse gas) on Noachian magmatism.

Hutchins K. I. Agee C. B. Draper D. S.

[*Experimental Constraints on the Source Regions of the Shergottites and Gusev Basalts*](#) [#1845]

Rover data from rocks sampled at Gusev Crater on Mars combined with data from the martian basaltic meteorites (shergottites) suggest there are at least two distinct basalt source regions in the martian mantle.

Boisson J. Heggy E. Clifford S. M. Frigeri A. Plaut J. J. Farrell W. M. Putzig N. Picardi G. Orosei R. Lognonné P. Gurnett D. A.

[*The Geoelectrical Properties of Athabasca Broken-Rafted Plate Terrain as Derived from the MARSIS Radar Sounding Data*](#) [#2001]

To test the volcanic or fluvial formation hypothesis of Athabasca rafted plate terrain, we investigate the geoelectrical properties of the subsurface in this zone derived as derived from MARSIS radar data.

Thursday, March 26, 2009
POSTER SESSION II: MARS: TECTONICS AND DYNAMICS
6:30 p.m. Town Center Exhibit Area

Wang Y. Wen L. Weidner D. J.

[*Constraining Composition of Mars Using Geophysical Constraints and Mineral Physics Data*](#) [#1880]

We construct 1-D density models of Mars for different mantle and core compositions, and calculate the hydrostatic gravity, moment of inertia and flattening factor, and then compare the predictions with the observations to constrain Mars composition.

Nunes D. C. Smrekar S. E. Konopliv A. S.

[*Survey of Gravity Admittance for Mars from the High-Resolution Mars Reconnaissance Orbiter Data*](#) [#2011]

We examine martian admittance spectra obtained with high-resolution gravity data from MRO, contrasting signatures from northern lowlands, southern highlands, and major volcanoes.

Spagnoulo M. G. Grings F. Perna P. Karszenbaum H. Ramos V. A.

[*Interpreting SHARAD Radargrams Using Interaction Models and Geological Constraints to Study Faults Zones in Mars*](#) [#2163]

The objective of this work is to present evidence of the SHARAD capabilities to retrieve information about the structure of a fault zone located at North-East of Ismeniae Fossae.

Roberts J. H. Lillis R. Manga M.

[*Giant Impacts on Early Mars and the Cessation of the Martian Dynamo*](#) [#1265]

The global magnetic field on Mars disappeared during the mid-Noachian, at the end of a sequence of giant impacts. We find that impact heating can reduce the CMB heat flow by up to 40%, and may have led to the cessation of dynamo activity.

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

[*Tidal Dissipation in Mars: Where and How?*](#) [#1712]

Tidal dissipation in Mars is surprisingly vigorous. Tides raised by Phobos dissipate 3.3 MW. We consider several possible mechanisms for this dissipation, including tidally driven water flow in crustal aquifer systems.

Ruedas T. Tackley P. J. Solomon S. C.

[*Water, Melting, and Convection in the Martian Mantle*](#) [#1463]

In numerical thermochemical convection models of the partially molten martian mantle, radionuclides and water are being redistributed. This leads to a stiff upper mantle and a longer-wavelength thermal structure in water-bearing models.

Miskovic A. Grove T. L.

[*Stability of Hydrous Silicates and Deep Melting of the Early Martian Mantle*](#) [#2539]

Experimental phase relations predict that hydrous silicates can be buried deep in a growing planet. Relations between hydrous minerals and vapor-saturated solidus in martian mantle are investigated during the early planetary differentiation.

Kite E. S. Manga M. Perron J. T.

[*Evidence for Past Kilometer-Scale Overturn\(s\) in Deformed, Layered Terrain Near the Deepest Point on Mars*](#) [#1248]

In NW Hellas, wind has exhumed layered terrain showing ductile deformation. A kilometer-scale cellular pattern is identified, consistent with thermal and/or compositional convection. 'Frozen-in' convection within an impact melt sheet is consistent with observations.

Zeng Z. Zhang Z. Birnbaum S. J. Xie H. Yang W.

[*Global Dynamical Significance of Zigzag Fractures in South Polar Ice Cap of Mars*](#) [#1225]

Regional zigzag fractures and an echelon fractures developed in the south polar ice cap of Mars implies an accelerating spinning of Mars about its axis after the formation of the cap and proves the formation mechanism of the spiral trough in the cap.

Lucas A. Mangeney A. Mège D. Bouchut F.

[*Landslide Scar Geometry Effect on Flow Spreading: Application to Martian Landslides*](#) [#1770]

The geometry of the landslide scar may play a role mass spreading but it is usually unknown. Numerical tests have been performed so as to figure out this effect. Application to martian cases and implications in terms of mass balance will be discussed.

Thursday, March 26, 2009

POSTER SESSION II: MARTIAN STRATIGRAPHY: UNDERSTANDING THE GEOLOGIC HISTORY OF MARS THROUGH THE SEDIMENTARY ROCK RECORD

6:30 p.m. Town Center Exhibit Area

Garchar L. A. Calvin W. M.

[*Characterization of Outcrop Rock Targets in Meridiani Planum Using Pancam and Mini-TES Spectra*](#) [#1019]

We hope to gain insight into the compositional variability of outcrop rocks through analysis of concurrent Pancam and Mini-TES spectra. We have analyzed color and spectral data from Pancam and unmixed the Mini-TES using surface component end-members.

Fan C. Xie H. Schulze-Makuch D. Ackley S.

[*A Likely Formation Mechanism of the Hematite-rich Spherules in the Equatorial Region of Western Mars*](#) [#1470]

We argue that the hematite-rich spherules were originally formed in Valles Marineris and transported to Meridiani Planum accompanied with accretion of finer volcanic materials, abrasion of basaltic fragments and break down of the spherules during the wash-out flows.

D'Arcangelo S. Pondrelli M. Rossi A. P. Michael G.

[*Geological Characterization of the Layered Deposits of the Crommelin Crater \(Mars\)*](#) [#1601]

The layered deposits cropping out in the Crommelin crater have been analyzed and mapped and their origin has been hypothesised as related to possible spring processes.

Chuang F. C. Weitz C. M.

[*Characteristics and Regional Distribution of Intracrater Layered Deposits in Arabia Terra, Mars*](#) [#2057]

Using several datasets from the Mars Reconnaissance Orbiter mission, we are assessing the morphology and other characteristics of intracrater layered deposits with regard to their regional distribution in Arabia Terra.

Rossi A. P. Pondrelli M. Hauber E. Baliva A. Michael G. Ori G. G. Pompilio L. Parente M. Ivanov A. Neukum G.

[*Stratigraphic Architecture and Structural Control on Sediment Emplacement in Becquerel Crater \(Mars\)*](#) [#1588]

We investigate the link between structure and sedimentation on becquerel light-toned deposits and their relation with regional tectonic features in Arabia Terra.

Anderson R. B. Bell J. F. III Milliken R. E.

[*Geologic and Thermophysical Unit Mapping of the Proposed Mars Science Laboratory Landing Site and Traverse Path in Gale Crater*](#) [#2030]

We present a unit map of the proposed MSL landing site and traverse path in Gale crater, with descriptions and preliminary interpretations of key units on the crater floor and in the layered mound.

Sowe M. Roach L. H. Hauber E. Jaumann R. Mustard J. F. Neukum G.

[*Comparison of Interior Layered Deposits in Chaotic Terrains*](#) [#1938]

The characterization of ILDs using high-resolution image, elevation and spectral data demonstrated differences in terms of erosional shape, thickness, elevation, material competence and possibly mineralogy, but similarities in morphology.

Raitala J. Kostama V.-P.

[*Deformation of the Light Blocks on the Floor of Ius Chasma*](#) [#1574]

Layered blocks on the floor of Ius Chasma provide tectonics, cross-cuts and insights into the development, materials, layering, strata forming events and early geology on the tableland surrounding Ius.

Fueten F. Abdulla Y. Stesky R. MacKinnon P. Hauber E. Zegers T. Gwinner K.

[*Detailed Observation of an ILD Within Southern Coprates Chasma, Valles Marineris, Mars*](#) [#1324]

Attitudes of the lowest layers of an ILD on the southern edge of Coprates Canyon within Valles Marineris suggest deposition on local basement topography. This ILD postdates the formation of this part of Valles Marineris.

Wendt L. Gross C. McGuire P. C. Combe J.-P. Neukum G.

[*Analysis of Juventae Chasma Sulfate Mound B using the Multiple-Endmember Linear Spectral Unmixing Model \(MELSUM\) on CRISM Data*](#) [#1531]

MELSUM, is a novel, efficient method to analyze hyperspectral NIR data using a linear mixing model. It identifies monohydrated and polyhydrated iron and magnesium bearing sulfates as the spectral components of this outcrop.

Racher H. Slingerland M. Fueten F. Stesky R. MacKinnon P. Hauber E. Gwinner K. Zegers T.

[*Structural Analysis of an Interior Layered Deposit in Southern Coprates Chasma, Mars*](#) [#1472]

A triangular shaped ILD in Southern Coprates Chasma within Valles Marineris is interpreted as a rotated fault block. The rotation can be interpreted as a back rotation consistent with the opening of a rift valley.

Roach L. H. Mustard J. F. Murchie S. L. Bishop J. L. Ehlmann B. L. Lichtenberg K. Parente M.
CRISM Science Team

[*Sulfate and Hematite Stratigraphy in Capri Chasma, Valles Marineris*](#) [#1826]

We present sulfate and red hematite stratigraphy within the central Interior Layered Deposit of Capri Chasma, Valles Marineris, from spectral analysis of CRISM data.

Le Deit L. Bourgeois O. Mège D. Le Mouélic S. Massé M. Hauber E. Jaumann R. Bibring J.-P.

[*Geological History of a Light-toned Formation Draping the Plateaus in the Region of Valles Marineris, Mars*](#) [#1856]

We perform a geological analysis of layered deposits cropping out on the plateaus around Valles Marineris in order to determine their possible formation scenario and the role of water in their geological history.

Farrand W. H. Rice J. W. Jr. Glotch T. D.

[*Evidence of the Presence of Jarosite and Diagenetic Activity in the Mawrth Vallis Region*](#) [#2080]

CRISM and HiRISE data over the Mawrth Vallis region are examined and we find evidence for diagenetic activity and find a localized occurrence with a distinctive spectral signature which we identify as jarosite. Implications for the history of the region are discussed.

Crumpler L. Arvidson R. Blaney D. Cabrol N. deSouza P. Farrand W. Farmer J. Greeley R. Hurowitz J. Lewis K. McCoy T. McEwen A. McSween H. Ming D. Morris R. V. Rice J. W. Jr. Rice M. Ruff S. Schmidt M. Schröder C. Squyres S. Yen A. Yingst A.

[*Field Reconnaissance Geologic Mapping of the Columbia Hills, Gusev Crater from MER Spirit Rover and HiRISE Observations*](#) [#2045]

This study presents the results of the first field reconnaissance geologic mapping on another planetary surface. We show that geologic units on Mars are complex like their terrestrial counterparts, but can be mapped at human and rover scales of observation.

Gurgurewicz J.

[*Mineralogy of Noctis Labyrinthus on the Basis of OMEGA/MEX and PFS/MEX Data*](#) [#1576]

The OMEGA/MEX and PFS/MEX data have been used to study the diversification of the mineral composition of the Noctis Labyrinthus region, which is situated in the western end of the Valles Marineris canyon on Mars.

Quantin C. Flahaut J. Allemand P.

[*Buried Layers Beneath South Rim of Valles Marineris Revealed by Central Uplift of Impact Craters*](#) [#1651]

Our study of exhumed layers in central peak of impact craters revealed extended buried layers below the southern plateau of Valles Marineris. According to their origin elevation, these layers could be exposed in the deepest parts of Valles Marineris.

Thursday, March 26, 2009
POSTER SESSION II: MARS: VALLEYS AND VALLEY NETWORKS
6:30 p.m. Town Center Exhibit Area

Hoke M. R. T. Hynek B. M.

[*Valley Network Formation on the Ancient Highlands of Mars Occurred in the Late Noachian and Early Hesperian Epochs*](#) [#1885]

We compare valley network N(2) crater numbers with isochrons to place the end of their formation in the L. Noachian and E. Hesperian Epochs. Analysis of their crater populations indicates five of these networks experienced multiple periods of formation.

Luo W. Stepinski T. F.

[*Global, Computer-generated Map of Valley Networks on Mars*](#) [#1311]

The new, global map of valley networks on Mars has been created entirely by a computer algorithm parsing topographic data. Dependencies between dissection density and its potential controlling factors are derived and discussed.

Yamaguchi Y. Miyamoto H. Tanaka K. L. Palmero Rodriguez J. A.

[*Mapping Valley Networks in the Noachian Terrain around Naktong Vallis, Mars: Topographic Control on Drainage Density*](#) [#1630]

We find that a positive correlation exists between the mean slope and the drainage density of valley networks in Naktong Vallis on Mars, indicating that precipitation-fed surface runoff played a significant role in the valley formations.

Bodager E. C. Sweitzer-Lamme J. W. Tobias M. J.

[*An Analysis of Potential Fluvial Patterns on Mars' Surface Utilizing THEMIS*](#) [#1955]

Application of THEMIS rendered visual evidence for analysis of evidence and indicators of fluvial systems on Mars' surface. Results formulated by examining the thermal inertia of the area of interest.

Fassett C. I. Dickson J. L. Head J. W.

[*Small, Young Fluvial Features in Icy Terrains on Mars*](#) [#1185]

We describe small valleys found in association with ice-rich terrains on Mars (lobate debris aprons and viscous flow features). The most probable mechanism for their formation is the melting of ice, likely during the Amazonian.

Dickson J. L. Fassett C. I. Head J. W.

[*Young Valley Networks on Mars: Persistent Flow of Water in Lyot Crater, an Amazonian Impact Basin Microenvironment*](#) [#1184]

We document a suite of sinuous valley networks on the floor of Lyot Crater that incise a mantling unit dated as mid-Amazonian. We interpret the valley networks to be fluvial in origin and to have been sourced by mid- or late-Amazonian glacial units.

Newsom H. E. Lanza N. L. Ollila A. M. Wiseman S. M. Roush T. L. Marzo G. A. Tornabene L. L. Crumpler L. S. Okubo C. H. Osterloo M. M. Hamilton V. E.

[*Inverted Channels on the Floor of Miyamoto Crater, Mars, Viewed by the HiRISE Camera*](#) [#1396]

Curvilinear ridges on the western floor of Miyamoto crater have similar characteristics to positive relief channel deposits seen on Earth near Green River, UT that are interpreted as exhumed, inverted, fluvial paleochannel deposits.

Marzo G. A. Roush T. L. Lanza N. L. McGuire P. C. Newsom H. E. Ollila A. M. Wiseman S. M.

[*Mineralogy of the Inverted Channel on the Floor of Miyamoto Crater, Mars*](#) [#1236]

Miyamoto Crater contains an inverted paleochannel deposit. Based on CRISM and HRSC observations, the paleochannel appears located in an area rich in Fe/Mg-smectite uniquely associated with the lowest terrain in the area.

Burr D. M. Williams R. M. E.

[*The Stanislaus Table Mountain: Observations of a Lava-capped Inverted Paleochannel for Interpretation of Inverted Paleochannels on Mars*](#) [#1633]

Inverted fluvial features on Mars may form through a variety of processes. Investigations into a lava-capped paleochannel on Earth provide observations that aid in distinguishing among formation mechanisms and assessing paleochannel preservation.

Bouley S. Craddock R. A. Mangold N. Ansan V.

[*Comparison of Different Crater Counting Methods Applied to Parana Valles*](#) [#1097]

The exact timing of valleys networks is still not well understood. We set out to test the reliability of different counting methods applied to Parana Valles using a large dataset of HR images that allow to reduce uncertainties in age determination.

Dohm J. M. Hare T. M.

[*Coupling Viking Information with Themis and Mola Data Results in Significant Improvement in Paleoerosional Detail of Warrego Valles*](#) [#1949]

Here we report preliminary findings on the re-evaluation of the Viking-based, published geologic map information of the Thaumasia region through detailed investigation of the Warrego rise region, which includes Warrego Valles.

Musiol S. Cailleau B. Neukum G.

[*A Model of Pore-Fluid Flow Applied to the Formation of Outflow Channels in the North-Eastern Hellas Region on Mars*](#) [#1023]

The numerical calculations are done with the finite-elements software ABAQUS. We analyse stresses and pore-fluid flow in the lithosphere under the assumption of a poroelastic martian crust, and compare our results to surface structures.

Thursday, March 26, 2009
POSTER SESSION II: MARS: AQUEOUS PROCESSES IN VALLES MARINERIS
AND THE SOUTHERN HIGHLANDS
6:30 p.m. Town Center Exhibit Area

Lucchitta B. K.

[*Lakes in Valles Marineris, Mars \(I\): Walls, Mounds, Moats, and Volcanoes*](#) [#2068]

Synthesis of research concerning lakes in the Valles Marineris suggests that the interior layered deposits were emplaced in a wet environment. Addressed are exhumation from the walls; eolian, fluvial, or volcanic origin; moats and inclined layers.

Lucchitta B. K.

[*Lakes in Valles Marineris, Mars \(II\): Valleys, Channels, Shallow Lakes, and Age*](#) [#2345]

Synthesis of research concerning lakes in the Valles Marineris suggests that interior layered deposits were emplaced in a wet environment. Addressed are the provenance of water; shallow, deep, and late lakes; ancestral basins; and age relations.

Popa C. Esposito F. Colangeli L.

[*Tithonium Chasma on Mars: Evidences for Water Related Processes Time Span on Mars*](#) [#1611]

Tithonium Chasma system west of VM present sulfate outcrops in ambiguous relationship with material that cuts through. We discuss the implications of their presence to the limits of water-dry transitions on Mars.

Gross C. Wendt L. Dumke A. Neukum G.

[*Further Evidence for Multiple Flooding Events at Juventae Chasma and Maja Valles, Mars*](#) [#1890]

We investigate the age relationship of Juventae Chasma to the adjacent Maja Valles to gain an explanation for the evolution of rhythmic LLD. We use impact crater size-frequency distributions for dating of the surface in the region.

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

[*Hydrologic History of the Eastern Hellas Basin Region, Mars*](#) [#1582]

The eastern Hellas Basin rim region displays evidence for continued fluvial and glacial activity from Noachian-early Hesperian to Amazonian. The observations and analysis of the region suggest a complex and multitemporal fluvial activity.

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

[*Floor Materials of Open Paleolake Basins on Mars*](#) [#2358]

In Terra Cimmeria, Mars, Noachian craters with etched floor deposits are clustered in relatively dust-free areas, suggesting locally efficient aeolian erosion of crater floor sediments or more volcanic resurfacing closer to the dichotomy boundary.

Annex A. Grigsby B. Turney D. Zimbelman J. R. Rice J. W. Jr.

[*Preliminary Analysis of Tinto Vallis and Palos Crater: A Proposal for CRISM Targeting*](#) [#1459]

Preliminary CRISM study results of the Tinto Vallis and Palos crater paleo lake system. CTX, THEMIS, and TES data indicate water related minerals could be present in and around Palos, justifying the need for high resolution CRISM targets.

Baker D. M. Head J. W.

[*The Origin of Eridania Lake and Ma'adim Vallis: An Investigation of Closed Chaos Basins, Hesperian Ridged Plains, and Tectonic Constructs on the Floor of a Large Hypothesized Paleolake on Mars*](#) [#1835]

The stratigraphy of structures and units is analyzed on the floor of a potential paleolake south of Ma'adim Vallis, Mars. Closed chaos basins are potential sources of groundwater inputs, and may have been modified by later lava flow loading.

Thursday, March 26, 2009
POSTER SESSION II: MARS: AQUEOUS GEOMORPHOLOGY
6:30 p.m. Town Center Exhibit Area

de Villiers G. Kleinhans M. Postma G. Hauber E. de Jong S. de Boer P. L.

[*Types of Martian Fan-shaped Sedimentary Deposits*](#) [#1901]

Our objectives are to qualify and quantify the morphological elements of martian fan-shaped sedimentary deposits with the use of Mars Express-HRSC data. Based on size, shape, and gradient, we describe different types of fan-shaped deposits.

Pondrelli M. Rossi A. P. Marinangeli L. Baliva A.

[*The Holden and Eberswalde Deltaic Systems: Lithofacies and Depositional Environments*](#) [#1619]

The Holden and Eberswalde fan deltas have been analyzed in order to map the lithofacies assemblage, to recognize sedimentary processes and to infer depositional environments.

Kleinhans M. G. van de Kastele H. E. Hauber E. de Villiers G. Postma G. de Jong S. de Boer P. L.

[*Palaeoflow and Sediment Delivery Reconstructions from Martian Delta Morphology by Combined Modelling and HRSC DTM Analysis*](#) [#1495]

Morphology of crater lake deltas indicates formative time scale, sediment flux and water flux. Our new morphological model predicts quantitative morphology which we compare to DTM data. Five studied deltas formed in less than ten years.

Di Achille G. Hynek B. M.

[*Possible Primordial Oceans on Mars: Evidence from the Global Distribution of Ancient Deltas?*](#) [#1977]

Terrestrial marine deltas share the characteristic of being formed at the mean global sea level. By using the global distribution of martian deltas, we report preliminary results of a test for the possible ancient ocean on Mars.

Berman D. C. Feldman W. C. Rodriguez J. A. P.

[*Volatile-driven Morphologies Relating to Zones of High WEH in Xanthe Terra*](#) [#1333]

The MO Neutron Spectrometer has detected moderate concentrations of WEH in western Xanthe Terra. We utilize new high-resolution images to analyze the morphologies of craters and small channels to look for evidence of water-rich degradation.

Howard A. D. Moore J. M.

[*Subaqueous Mega-Slides on the Floor of Hellas*](#) [#1376]

Extensive subaqueous mass movements have been involved in the emplacement and deformation of the Hellas Basin floor deposits, followed by intensive eolian erosion.

Craft K. Lowell R. Kraal E.

[*Models of Martian Hydrothermal Systems and Implications for Geomorphology*](#) [#1535]

Systems driven by magmatic intrusions are first investigated by applying boundary layer theory to obtain results for heat and fluid fluxes and then by using numerical modeling to explore other parameters including ice-melting and brine formation.

Harrison K. P.

[*An Alternative View of Martian Chaotic Terrain Formation*](#) [#1743]

Martian chaotic terrains have traditionally been regarded as groundwater source regions for outflow channels. However, the near ubiquitous presence of upstream fluvial inlets suggests that their status as source regions should be revisited.

Oehler D. Z. Allen C. C.

[*Mud Volcanoes in the Martian Lowlands: Potential Windows to Fluid-Rich Samples from Depth*](#) [#1034]

Mud volcanoes in the martian lowlands may provide access to relatively unaltered samples of fluid-rich strata from depths that would otherwise be unreachable. The Chryse-Acidalia region is particularly prospective for such structures.

Neather A. C. Wilson L. Lane S.

[*Muddy CO₂-driven Brine Fountains at Mangala Valles, Mars*](#) [#1154]

We compare the mass flux provided by a theorised CO₂-driven water fountain with the flux required to emplace the apparently muddy deposits seen around the eastern arm of Mangala Valles, Mars, concluding that the fountain is a reasonable explanation.

Kereszturi A. Horváth A. Sik A. Kuti A. Bérczi Sz. Gánti T. Pócs T. Szathmáry E.

[*Possible Liquid-like Water Produced Seepage Features on Mars*](#) [#1111]

Seepage-like features emanate from Dark Dune Spots, and their seasonal changes were observed on northern dunes of Mars. Based on observations and theoretical computations, they may form by the movement of interfacial water-lubricated dune grains.

Thursday, March 26, 2009
POSTER SESSION II: MARTIAN GULLIES: MORPHOLOGY AND ORIGINS
6:30 p.m. Town Center Exhibit Area

Schon S. C. Head J. W.

[*Terraced Cutbanks and Longitudinal Bars in Gully Channels on Mars: Evidence for Multiple Episodes of Fluvial Transport*](#) [#1691]

Longitudinal bars and multiple terraced cutbanks suggest distinct episodes of fluvial transport in gully channels. The low preservation potential of these high-slope, steep-sided, non-lithified features implies that they are latest Amazonian in age.

Kneissl T. Reiss D. van Gasselt S. Neukum G.

[*Northern-Hemisphere Gullies on Mars — Distribution and Orientation from the Evaluation of HRSC and MOC-NA Data*](#) [#1590]

We evaluated HRSC and MOC-NA data covering the northern hemisphere in order to analyse geographical and latitudinal distribution, geological context and orientation of gullied slopes.

Bryson K. L. Sears D. W. G.

[*Evaporation Effects on the Formation of Martian Gullies*](#) [#1368]

We analyze HiRISE images of martian gullies and adjacent dunes to evaluate the hypothesis that evaporation is a limiting factor in gully formation.

Johnsson A. Olvmo M. Reiss D. Hiesinger H.

[*Latitudinal Survey of Periglacial Landforms and Gullies of Eastern Argyre and Poleward on Mars*](#) [#2405]

We perform an investigation of periglacial landforms and gullies of eastern Argyre and poleward. Aim of study is to characterize the environment with a focus on landform zonation and its linkage to topography, geology, surface conditions and climate.

Dove A. R. Toon O. B. Heldmann J. L.

[*Observations and Modeling of the Mass and Energy Balance of Terrestrial Snowpacks to Constrain Martian Snowpack Models*](#) [#1730]

In order to improve martian snowpack models, we utilize numerical modeling and observations of terrestrial snowpacks to gain a better understanding of the physical processes that drive snowpack metamorphosis.

Rivera-Valentin E. G. Gavin P. Coleman K. A. Dixon J.

[*Liquid Water and Water-Ice Slush Flume Simulations of Gully Synthesis Varying Exit Aperture Diameter*](#) [#1355]

In an attempt to better understand the proposed wet gully synthesis hypothesis, this project undertakes the task of simulating liquid water and water-ice slush flows within a flume. We specifically study the effects of varying exit aperture diameter.

Dickson J. L. Head J. W.

[*The Formation and Evolution of Youthful Gullies on Mars: Gullies as a Late-Stage Product of Mars' Most Recent Ice Age*](#) [#1768]

We place new data of gullies from MRO in the context of data from MGS to explain the formation and evolution of gullies within the last several million years from the repeated melting of cold-trapped wind-blown snow.

Roehm C. L. Soare R. J. Osinski G. R. Costard C.

[*Crater-Rim Gully Formation in Utopia Planitia: Hydrological Support of the Periglacial Origin Hypothesis*](#) [#2245]

In this study, we present preliminary data derived from MOC imagery comparing the volumetric capacity of ejecta-based depressions with the volumetric dimensions of nearby crater-rim gullies.

Reiss D. Hiesinger H. Hauber E. Zanetti M. Preusker F. Trauthan F. Reimann G. M. Raack J. Carlsson A. E. Johnsson A. Olvmo M. Jaumann R. Johansson H. A. B. Johansson L. McDaniel S. [*Morphologic and Morphometric Comparison of Gullies on Svalbard and Mars*](#) [#2362]

We compare terrestrial analogs on Svalbard morphologically and morphometrically with martian gullies in order to constrain the formation process (fluvial and/or debris flow).

Araki S. Williams R. M. E. Dombard A. J.

[*Examining Formation Mechanisms of Martian Gullies Using Mars Reconnaissance Orbiter Context Imagery*](#) [#2497]

We surveyed Context imagery to construct a database of gully features and used image-based observations to test gully formation mechanisms. Thus far we find that no one formation mechanism can explain the gully features observed.

Gulick V. C. Davatzes A. E. K.

[*MRO's HiRISE Coverage of Fluvial Landforms on Mars During its Primary Science Phase*](#) [#2562]

MRO HiRISE imaging of fluvial features is summarized, with a focus on gully forms.

Hart S. D. Gulick V. C. Parsons R. A. Barnhart C. J.

[*Gully Slopes and Discharges on Lyot Crater's Central Peak*](#) [#2349]

This study focuses on two large gullies present on the local topographic high of the central peak of Lyot crater. We use HiRISE stereo images to create high resolution gully profiles and cross sections, and calculate discharge estimates based on these measurements.

Kolb K. J. McEwen A. S. Pelletier J. D. HiRISE Science Team

[*Measuring Slopes of Gully Fan Apices Using Digital Elevation Models*](#) [#2268]

We measure channel gradients above the highest observable extent of deposition in gullies to assess the involvement of liquid water in gully-carving flows.

Conway S. J. Balme M. R. Murray J. B. Towner M. C.

[*Debris Flow as a Mechanism for Forming Martian Gullies*](#) [#1950]

Recently active gullies presents an apparent paradox, as the conditions on Mars prevent the survival of surface water. We compare the morphology of these gullies to those on Earth and tentatively suggest debris flow as forming the martian gullies.

Lucas A. Mangeney A. Mangold N. Mège D. Bouchut F.

[*New Insights into the Dynamics of Martian Gullies*](#) [#1784]

Numerical simulations have been performed so as to figure out the dynamics of dry granular media. Comparisons with bright deposits gully show that a pure dry granular media could not explain their bright deposits.

Costard F. Védie E. Font M. Lagarde J. L.

[*Laboratory Simulations of Martian Gullies over Sand Dunes: Impact of the Permafrost Table*](#) [#1289]

Some unusual linear gullies over sand dunes (Russell crater, Mars) are characterized by their long and narrow channels. This study focuses on the formation of these gullies by means of laboratory simulations within a cold room.

Chevrier V. F. Ulrich R. Altheide T. S.

[*Viscosity of Liquid Ferric Sulfate Solutions and Application to the Formation of Gullies on Mars*](#) [#1424]

Viscosity of ferric sulfate solutions has been experimentally measured and used in a numerical model of gully flow. Results show that boulders up to four meters can be moved in the channel, explaining size segregation observed by MRO-HiRISE.

Thursday, March 26, 2009
POSTER SESSION II: MARS: DUNES, DUST, AND WIND
6:30 p.m. Town Center Exhibit Area

Ellehøj M. D. Johnsen S. J. Madsen M. B.

[*D/H Fractionation in the Atmosphere-Ground Ice System on Mars*](#) [#1561]

The solid-vapor fractionation processes of Deuterium/Hydrogen (D/H) in the ground ice-atmosphere system on Mars are investigated through experiments and modeling. Preliminary results mainly from the experimental work are presented.

Segura T. L. Colaprete A.

[*Global Modeling of Impact-induced Greenhouse Warming on Early Mars*](#) [#1056]

We have modeled the climate effects of impacts on early Mars. The model includes evaporation/precipitation of water, water and CO₂ cloud microphysics, the radiative and latent heating effects of water and CO₂ clouds, and water cloud coalescence.

Metzger S. Balme M. Pathare A.

[*Meteorologic Conditions and the Formation of Terrestrial Dust Devils*](#) [#1229]

We examine the relationship between ground surface solar heating, ambient meteorologic conditions and the formation of terrestrial dust devils.

Wurm G. Teiser J. Reiss D. Kelling T.

[*Lifting Dust on Mars by Greenhouse Effects and Thermophoresis*](#) [#1516]

The GT-effect, a combination of a (solid state) greenhouse effect and thermophoresis can efficiently lift dust from a surface at low pressure. We discuss how this effect might lift dust from the martian surface.

Hayward R. K. Titus T. N. Michaels T. I. Colaprete A. Verba C. A. Christensen P. R.

[*Aeolian Dunes as Ground Truth for GCM and Mesoscale Modeling on Mars*](#) [#1212]

Aeolian dunes preserve a record of atmosphere/surface interaction, serving as ground truth for atmospheric models. We compare dune centroid azimuth and slipface orientation to a General Circulation Model and a mesoscale model.

Gardin E. Allemand P. Quantin C.

[*A Global Morphological Study at High Resolution on the Dune Fields on Mars*](#) [#2510]

Dune fields are possible recorders of paeloclimat. The high available resolution images permit to complete the GIS of the MD3.

Bandeira L. Marques J. S. Pina P.

[*Automatic Delimitation of Regions with Aeolian Features on Mars*](#) [#1288]

This text describes an adaptive approach based on HOG features and SVM classifier to detect automatically regions with dune fields on Mars.

Toyota T. Kurita K.

[*Dark Halo: Enigmatic Features of Dark Streaks at Martian Volcanoes*](#) [#1597]

Interactions between the atmosphere and the ground surface cause observable changes in the surface patterns. Here we report a new kind of time-variable surface pattern called "Dark Halo" near the top of high altitude volcanoes in Tharsis region.

Chuang F. C. Beyer R. A.

[*Modification of Martian Slope Streaks*](#) [#2104]

This study focuses on features that were not identified or were uncommon in previous studies of slope streaks including ridge-like structures, terminal deposits, and mantle deposits.

Grant J. A. Wilson S. A. Noe Dobrea E. Ferguson R. L. Griffes J. L. Moore J. M. Howard A. D.
[HiRISE Views an Enigmatic Deposit in the Electris Region of Mars](#) [#1871]

The Electris region of Mars defines a broadly distributed, unconformable deposit whose characteristics appear most consistent with emplacement as loess.

Tirsch D. Jaumann R. Pacifici A. Poulet F. Roach L. H. Mustard J. L. Bibring J.-P. Neukum G.
[Dark Layers as Local Sources for the Dark Intra-Crater Dunes on Mars](#) [#1004]

We present morphological indications and mineralogical evidence for dark layers acting as local sources for the dark dune material on Mars.

Szynkiewicz A. Ewing R. C. Fishbaugh K. E. Bourke M. C. Bustos D. Pratt L. M.
[Geomorphological Evidence of Plausible Water Activity and Evaporative Deposition in Interdune Areas of the Gypsum-rich Olympia Undae Dune Field](#) [#2038]

New morphological features (e.g., cross-bedding strata, bright patches), revealed by HiRISE for the gypsum-rich Olympia Undae Dune Field, appear to indicate the change(s) in paleoenvironmental conditions likely controlled by climate fluctuations in the North Pole of Mars.

Horgan B. H. N. Bell J. F. III
[Insights from Ferrous Mineralogy into the Transport of Martian North Polar Materials](#) [#2457]

NIR spectra of the north polar region of Mars indicate the presence of various pyroxenes and olivine. The distribution of these minerals suggests a complex relationship between the regional sedimentary units, and that saltation affects composition.

Lahtela H. Titus T. N. Geissler P. E. Roach L. H. Verba C. A. Mustard J. F. Murchie S. L. Brown A. J. Seelos F. Seelos K. Calvin W. M. Parente M. Cornwall C.

[Coordinated HiRISE/CRISM Observation on Gypsum Signature in Martian Polar Dunes](#) [#2254]

Our independent HiRISE/CRISM study conformed that the source for gypsum signature in Mars north polar dunes is in the dark dunes themselves, not in the bright bedrock.

Diniega S. Byrne S. Glasner K.
[Controls on the Spacing and Size of Martian Polar Dunes from a Buried Ice Table](#) [#1434]

Dune fields often exhibit a stable characteristic dune size and spacing. We consider the possible effect of topography on dune scaling during dune formation and evolution, and consider the effect of an evolving ice table under martian polar dunes.

Necsoiu M. Leprince S. Dinwiddie C. Hooper D. Walter G.
[Recent Migration Rates of the Great Kobuk Sand Dunes, Alaska: Technologic and Scientific Implications for Planetary Dune Systems](#) [#2074]

A novel method based on correlation of optical satellite imagery was applied to dune migration rates in Kobuk Valley, AK. This method could be applied to monitor other morphological processes on planetary surfaces and remote terrestrial locales.

Howald T. V. Schieber J.
[Preparing for MSL — Experimental Eolian Erosion of Soft Sedimentary Rocks](#) [#1872]

An eolian erosion device was constructed to explore long-term eolian abrasion of soft sediments with wind velocities and sediment types that are more likely to be encountered on the martian surface.

Durham W. B. Pathare A. V. Stern L. A. Lenferink H.
[Does the Brittle-to-Ductile \(Mobility\) Transition of Icy Sand Packs Coincide with the Maximum Packing Density?](#) [#1703]

We present preliminary experimental data indicating a correspondence between the brittle-to-ductile transition of icy sand packs and the maximum packing density of sand in such packs.

Thursday, March 26, 2009
POSTER SESSION II: MARS: REMOTE SENSING
6:30 p.m. Town Center Exhibit Area

Bandfield J. L. Mayorga L. C. Edwards C. S. Glotch T. D.

[An Integrated Analysis of Martian Surface Compositions Using Near Infrared Through Thermal Infrared Spectroscopic Data](#) [#1072]

TES, THEMIS, and CRISM spectroscopic data are used to analyze sites of mineralogical interest on Mars. The combined wavelength coverage provides a more complete perspective of surface compositions and their formation processes.

Lane M. D. Glotch T. D. Dyar M. D. Bishop J. L. Pieters C. M. Klima R. Hiroi T. Sunshine J. M.

[Thermal Infrared Spectroscopy of a Synthetic Olivine Series \(Forsterite-Fayalite\) and Interpretation of the Nili Fossae, Syrtis Major, and Isidis Regions of Mars](#) [#2469]

Synthetic olivines in the forsterite to fayalite solid solution series were made (14 different Fo values) and their midinfrared spectra were applied to Mars. Olivine was mapped in the Nili Fossae, Syrtis Major, and Isidis basin regions.

Osterloo M. M. Hamilton V. E. Anderson F. S. Koeppen W. C.

[THEMIS Detections of Forsterite-Fayalite Compositions Within Terra Tyrrhena](#) [#1405]

The objective of this study is to determine if the Thermal Emission Imaging System (THEMIS) can detect variations in the Mg-Fe content of olivines on the martian surface. We have selected four sites within Terra Tyrrhena to conduct our analysis.

Tsang S. W. R. Eckert-Erdheim A. M. Williams L. H.

[Thermal Emissions Spectroscopy of Olivine](#) [#1206]

Many scientists have noticed the absorptions in olivine move closer to 0 wavenumbers as the Fe content increases, but no one has quantified this phenomenon. The model that we have created will enable scientists to determine Fo values remotely.

Nuding D. L. Cohen B. A.

[Characterization of Rock Types at Meridiani Planum, Mars Using MER 13-Filter Pancam Spectra](#) [#2023]

A database of Pancam spectra shows the diversity of rocks on Meridiani Planum. It is difficult to distinguish cobble groups with simple methods. We identified a group of possible meteorites near Eagle Crater that may be related to Heat Shield Rock.

Ashley J. W. Ruff S. W. Knudson A. T. Christensen P. R.

[Mini-TES Measurements of Santa Catarina-Type, Stony-Iron Meteorite Candidates by the Opportunity Rover](#) [#2468]

Most meteorites found on Mars can be regarded as witness samples for surface-volatile interactions. We report on the Mini-TES evaluation of 12 cobbles located near Victoria Crater, and conclude that at least three of these are similar to meteorite candidate Santa Catarina.

Schröder C. Ashley J. W. Chapman M. G. Cohen B. A. Farrand W. H. Fleischer I. Gellert R. Herkenhoff K. E. Johnson J. R. Jolliff B. L. Joseph J. Klingelhöfer G. Morris R. V. Squyres S. W. Wright S. P. Athena Science Team

[Santorini, Another Meteorite on Mars and Third of a Kind](#) [#1665]

The rock fragment Santorini is similar in chemical and mineralogical composition to two other fragments investigated earlier during Opportunity's mission. These rocks are of meteoritic origin and probably fragments of the same originally larger body.

Karunatillake S. Squyres S. W. Wray J. J. Taylor G. J. Gasnault O. McLennan S. M. Boynton W. El Maarry M. R. Dohm J. M.

[*Chemically Striking Martian Regions and Stealth Revisited*](#) [#1302]

The Mars Odyssey GRS chemical maps establish chemically striking regions. They represent the surface to tens of centimeter depths, complementing tens-of-micron sampling depths of infrared spectra. We discuss the one region that overlaps with classic Stealth.

Plaut J. J. Safaeinili A. Campbell B. A. Phillips R. J. Putzig N. E. Nunes D. C. Seu R.
[*A Widespread Radar-Transparent Layer Detected by SHARAD in Arcadia Planitia, Mars*](#) [#2312]

The subsurface sounder SHARAD on MRO has detected a widespread radar-transparent layer up to 50–90 m thick in the Arcadia region of Mars.

Stillman D. E. Grimm R. E. Harrison K. P.

[*The Anomalous Radar Transparency of Central Elysium Planitia and Amazonis Planitia*](#) [#2412]

The only ice-free rocky units that SHARAD has been successful at penetrating into are in Elysium and Amazonis Planitia. These are the youngest units on Mars and probably have low radar loss because they have been insufficiently exposed to water.

Mouginot J. Kofman W. Grima C. Safaeinili A. Plaut J. J.

[*Martian Surface Radar Reflectivity by MARSIS*](#) [#1546]

Martian radar surface reflectivity by MARSIS: Calibration — Simulation — Analysis.

De Angelis G. Dachev Ts. P. Semkova J. V. Maltchev S. Tomov B. Matviichuk Yu. Koleva R. Benghin V. Chernykh I. Shurshakov V. Petrov V.

[*Models for the Radiation Environment of Planet Mars and of Its Moon Phobos*](#) [#1308]

Models of radiation environment induced by Galactic Cosmic Rays (GCR) and Solar Particle Events (SPE) on Mars and Phobos have been developed, as well as for the mission cruise phase, and used for the Liulin-Phobos experiment onboard the Phobos-Soil mission.

Sefton-Nash E. Catling D. C. Wood S. E.

[*Developments in Deriving Best-Fit Thermal Inertia of the Surface of Mars Using THEMIS Images*](#) [#1773]

We improve the resolution and accuracy of derived thermal inertia of the martian surface by 1) Implementing a validity test for THEMIS images based on a thermal model and 2) Using HRSC topography to produce high resolution slope and azimuth data.

Ferguson R. L. Christensen P. R.

[*New View of the Martian Surface: THEMIS Global Thermal Inertia Mosaic*](#) [#1997]

We are generating a new global thermal inertia mosaic using THEMIS IR data at 256 m per pixel. This mosaic has facilitated an improved understanding of geologic processes acting on local scales, including the nature of moderate TI surfaces.

Edwards C. S. Bandfield J. L. Christensen P. R. Ferguson R. L.

[*Global Distribution of Bedrock and the Nature of the Upper Martian Crust*](#) [#2022]

THEMIS thermal inertia data were used to map the distribution of interpreted bedrock on Mars. Most of the instances are concentrated in the southern highlands and globally few instances were identified, indicating large scale crustal processing.

Piatek J. L.

[*Thermophysical Properties of Terrestrial Rock and Debris-covered Glaciers as Analogs for Martian Lobate Debris Aprons*](#) [#2127]

A survey of the thermophysical properties of terrestrial rock and debris-covered glaciers suggests these properties may be used to distinguish between massive debris-covered ice and intimate rock/ice mixtures in martian lobate debris aprons.

Thursday, March 26, 2009
POSTER SESSION II: MARS: GEOLOGIC MAPPING, PHOTOGRAMMETRY, AND CRATERING
6:30 p.m. Town Center Exhibit Area

Tanaka K. L. Dohm J. M. Irwin R. Kolb E. J. Skinner J. A. Jr. Hare T. M.

[*Progress in Global Geologic Mapping of Mars*](#) [#1975]

We describe new and updated aspects of our Mars global geologic mapping effort, including use of data sets, mapping approaches and progress, current issues, and future work.

Mest S. C. Crown D. A.

[*Geologic Mapping of MTM-30247, -35247 and -40247 Quadrangles, Reull Vallis Region of Mars*](#) [#1930]

Geologic mapping of MTMs -30247, -35247, and -40247 characterizes the upper reaches of Reull Vallis, located in the eastern Hellas region of Mars. Crater size-frequency distributions will be generated for mapped units using high-resolution images.

Crown D. A. Bleamaster L. F. III Mest S. C. Mustard J. F.

[*Geologic Mapping of the NW Rim of Hellas Basin, Mars*](#) [#1705]

Geologic mapping of the NW rim of Hellas basin is providing new constraints on the magnitudes, extents, and history of volatile-driven processes as well as a geologic context for mineralogic identifications.

Philippoff A. J. Tornabene L. L. McEwen A. S. Baker V. R. Melosh H. J.

Berman D. C. HiRISE Science Team

[*Geomorphic Mapping of Hale Crater, Mars*](#) [#1737]

Presented here is a geomorphic map of Hale Crater that highlights the channels found within and emanating from Hale's ejecta blanket and the implications they may have for the early climate and landscape evolution of Mars.

Griffin L. J. Zimbelman J. R.

[*Geologic Mapping of Western Medusae Fossae Formation, Mars \(MC 23-NW\): Redefining Unit Boundaries and Features to Reveal a History of Tectonism, Wind Erosion, and Episodic Water Flow*](#) [#1196]

Mapping has revealed substantial patches of layered materials that are interpreted to be outliers of Medusae Fossae Formation (MFF) materials. Eroded MFF materials show evidence suggesting localized folding, plus exhumed fluvial features.

Skinner J. A. Jr. Fergason R. L. Tanaka K. L.

[*Occurrence and Origin of Lobate Materials in the Highland-Lowland Boundary of Southern Utopia Planitia, Mars*](#) [#2459]

The southern Utopia HLB has been interpreted as colluvial sequences associated with HLB scarp erosion. We re-examine these interpretations and present evidence for the existence of extensive flow-related geologic processes.

Pina P. Antunes J. Bandeira L. Saraiva J.

[*Analyzing the Large Extension of Polygonal Terrain in the Northern Plains of Mars*](#) [#2035]

This work describes a plan for the automated analysis of the large extension of terrain covered by polygonal networks on the northern plains of Mars.

Dumke A. Spiegel M. van Gasselt S. Neukum G.

[*Valles Marineris, Mars: High-Resolution Digital Terrain Model on the Basis of Mars-Express HRSC Data*](#) [#1985]

High resolution digital terrain models (DTM) are necessary for geoscientific studies of Mars. To get a more comprehensive view of regional processes on Mars, images as well as topographic data have to be mosaicked photogrammetrically.

Chen Y. Hwangbo J. W. Li R.

[Photogrammetric Processing of High-Resolution Planetary Orbital Imagery for Large-Area Topographic Mapping](#) [#2129]

A photogrammetric method to process HiRISE stereo images is described. This bundle adjustment based method removes inconsistencies between different HiRISE images covering the same area to generate topographic products of the best quality.

Li R. Chen Y. He S. Yang L. Tang M. MER Science Team

[Rover Localization: Comparison between Bundle Adjustment-based and HiRISE Orbital Image-based Methods](#) [#2208]

A bundle adjustment-based rover localization method has been developed. Rover positions are also estimated by matching a ground image orthophoto to a HiRISE orthophoto. We estimated the differences in traverse positions between the two methods.

Watters W. A. Zuber M. T.

[Relating Target Properties to the Planimetric Shape of Simple Impact Craters](#) [#2556]

We investigate the dependence of planimetric crater shape on the properties of geological targets, by comparing the distribution of morphometric quantities derived from the rim trace of fresh impact craters captured in HiRISE and MOC images.

Daubar I. J. McEwen A. S.

[Depth to Diameter Ratios of Recent Primary Impact Craters on Mars](#) [#2419]

Very recent small martian primary craters confirmed by HiRISE have a depth/diameter ratio of ~ 0.26 , close to expected for primaries and significantly higher than that measured for secondaries or many small fresh craters of unknown origin.

Barlow N. G.

[Martian Central Pit Craters: Summary of Northern Hemisphere Results](#) [#1915]

We have completed our survey of central pit craters in the northern hemisphere of Mars. We present results on the characteristics and distributions of these central pit craters.

DeVries R. J. Barlow N. G.

[Central Pit Craters in the Southern Hemisphere of Mars](#) [#1929]

We are conducting a survey of the characteristics and distributions of central pit craters in the southern hemisphere of Mars. We present the early results of this study.

Bray V. J. Tornabene L. L. McEwen A. S. Mattson S. S.

[Measurement of Small-Scale Pits in the Corinto Crater, Mars](#) [#1389]

HiRISE imagery has revealed small-scale pits in fresh martian impact craters. We are collecting measurement of pit dimensions in the Corinto crater, so that the possible relation of pit-concentration and terrain subsidence can be quantified.

Komatsu G. de Pablo M. A. Ormó J. Tornabene L. L.

[Small Craters from Oblique Impacts and the Origin of an Unusual Streak in Elysium Planitia, Mars](#) [#1779]

We present a HiRISE image revealing details of small craters (<100 m) that are probably secondaries formed by oblique impacts. We also discuss working hypotheses for the formation mechanisms of the light-toned streak associated with one of them.

Wyant M. A. Frey H. V. Davatzes A. K.

[Relative Age Dating of Martian Geologic Units Through a Study of Buried Impact Structures Using an Improved Crustal Thickness Model](#) [#1767]

The improved crustal thickness model for Mars allows for the identification of buried impact structures at greater resolution. Using this model we can look at individual regions of the planet and discern relationships between the units relative ages.

Thursday, March 26, 2009
POSTER SESSION II: MARTIAN MINERALOGY: CONSTRAINTS FROM MISSIONS AND
LABORATORY INVESTIGATIONS
6:30 p.m. Town Center Exhibit Area

Bishop J. L. Dyar M. D. Majzlan J. Lane M. D.

[*Spectral Properties of Copiapites with Variable Cation Compositions and Implications for Characterization of Copiapite on Mars*](#) [#2073]

The spectral properties of synthetic copiapite samples were analyzed for comparison with martian data. Changes with Fe vs Mg abundances are most notable in IR spectra near 2, 9, 11, 18 and 45 μm and in the relative areas of Mössbauer doublets 1 and 2.

Cloutis E. A.

[*Reflectance Spectra of Low Atomic Weight \("APXS-Blind"\) Na-bearing Minerals: Nitrates, Nitrites, Borates, Hydroxides, and Peroxides*](#) [#1176]

The reflectance spectra of a number of low atomic-weight element-bearing phases, including nitrates, nitrites, borates, hydroxides, and peroxides show a diversity of features, largely related to O + H and cation-OH absorptions.

Fairén A. G. Davila A. F. Duport L. G. Amils R. McKay C. P.

[*Mars: Cold and Wet*](#) [#1155]

The role of solutes depressing the melting point of water in a frozen martian environment supports the idea that the majority of the water on Mars was forming super-cooled liquid solutions with large masses of ice covering parts of them.

Hahn B. C. McLennan S. M. Tosca N. J. Reeder R. J.

[*Trace Element Behavior in Martian Evaporite Minerals: Experimental Constraints*](#) [#1194]

We detail a series of laboratory investigations determining the partitioning coefficients of the trace elements Ni, Zn, and Cr into a suite of precipitating sulfate evaporite minerals observed on the martian surface.

Altheide T. S. Chevrier V. F. Denson J. Nicholson C.

[*Evaporation of Sulfate and Chloride Brines on the Surface of Mars*](#) [#1011]

When evaporated under simulated martian conditions, brines composed of sulfates and chlorides demonstrate lower evaporation rates than pure water, due to ion interactions and, depending on concentration and temperature, salt crystallization.

Xu W. Parise J. B.

[*\(H₃O\)Fe\(SO₄\)₂, A New Phase Formed by Dehydrating Rhomboclase*](#) [#1816]

The stability of rhomboclase with respect to temperature and humidity was examined by *in situ* XRD method, and a new phase (H₃O)Fe(SO₄)₂ was found, which needs to be considered when analyzing sulfate mineralogy on Mars.

Rice M. S. Bell J. F. III Cloutis E. A. Wang A. Ruff S. W. Craig M. A. Bailey D. T. Johnson J. R. de Souza P. A. Farrand W. H.

[*Silica-rich Deposits and Hydrated Minerals at Gusev Crater, Mars*](#) [#2134]

The Si-rich materials discovered by Spirit have distinct Vis-NIR features in their Pancam spectra that may result from adsorbed water or hydrated minerals. We find that spectrally similar materials are widespread throughout the Columbia Hills.

McGlynn I. O. McSween H. Y. Jr. Fedo C. M.

[Mineralogical Characterization of Soils in Gusev Crater and Meridiani Planum, Mars](#) [#2249]

The mineralogy of soil sediments at Gusev Crater and Meridiani Planum sites are evaluated combining APXS and MB data from the Mars Exploration Rovers. Soils are basaltic with minimal chemical weathering, are globally similar with local variability.

Ehlmann B. L. Mustard J. F. Poulet F.

[Modeling Modal Mineralogy of Laboratory Mixtures of Nontronite and Mafic Minerals from Visible Near-Infrared Spectral Data](#) [#1771]

Initial results assessing the efficacy of Shkuratov and Hapke radiative transfer models in estimating modal mineralogy from visible near infrared (VNIR) spectral data for various laboratory mixtures of phyllosilicate and light and dark mafic minerals.

Thursday, March 26, 2009
POSTER SESSION II: MARS ANALOGS: CHEMICAL AND PHYSICAL
6:30 p.m. Town Center Exhibit Area

Blackburn D. G. Ulrich R. Elwood Madden M. E. Leeman J. R. Chevrier V. F.
[*Experimental Study of the Kinetics of CO₂ Hydrate Dissociation Under Simulated Martian Conditions*](#) [#1341]
We performed an experimental study of the kinetics of CO₂ hydrate dissociation under simulated martian conditions, which indicated the hydrates are heat-transfer limited and do not exhibit anomalous self-preservation behavior at 6 mbar.

Gillot J. Roskosz M. Depecker C. Roussel P. Leroux H.
[*Calcite Formation from Nanoporous Amorphous Silicates in Interaction with Carbon Dioxide*](#) [#1755]
In situ infrared spectroscopy and X-ray diffraction reveal that amorphous porous silicate dusts react readily with CO₂ to form calcite at ambient temperature. Dry carbonation can then account for the formation of carbonates observed around stars.

Gillot J. Roskosz M. Depecker C. Roussel P. Leroux H.
[*Sol-Gel Synthesis and Crystallization of Magnesium and Calcium Rich Silicate Dust Analogs*](#) [#1763]
A new sol-gel method optimized to synthesize amorphous and porous silicate dust analogs is proposed. The crystallization of such analogs is metastable and polyphasic. Their high reactivity is probably due to high surface/volume ratio.

ten Kate I. L. Zuray M. S. Mahaffy P. R.
[*Dust Storm Electrification in a Mars Chamber — First Results*](#) [#2273]
Analogue studies and numerical simulations suggest that in martian dust devils and dusty convective storms large-scale electric fields are generated. A laboratory setup has been built to investigate their effects on the composition of the atmosphere.

Needham A. W. Smith C. L. Howard K. T. Sephton M. A. Martins Z. Foster N. J.
Franchi I. A. Russell S. S.
[*Gamma Irradiation Effects in Mars Analogues*](#) [#1971]
The effects of gamma irradiation on geological samples continue to be investigated in preparation for potential sterilisation of samples returned from the surface of Mars in the coming decades.

Cereti A. Mellon M. T. Sizemore H. G. Phillips R. J.
[*Measurements of Dielectric Properties of Mars Analog Soils with Variable Temperature and Moisture Content*](#) [#2189]
We performed impedance spectroscopy of various martian analog soils, with varying temperature and moisture content, to investigate how the complex dielectric permittivity depends on these factors, as this parameter can strongly affect radar signals propagation.

Ukstins Peate I. Cabrol N. A. Grin E. A. French R. Dressing C. Franklin T. Parsons K.
Piatek J. Chong G.
[*Mechanisms for Planetary Spherules Formation and Alteration: Salar Grande, Chile — An Example of Volcanic/Aqueous Processes Interactions*](#) [#1435]
Silica nodules and hematite spherules are observed at Salar Grande and Monturaqui, Atacama Desert, Chile. The Planetary Spherules Project investigates formation, deposition and alteration processes as analogs to Gusev Crater and Meridiani, Mars.

Chan M. A. Potter S. L. Bowen B. B.
[*Overview of Iron Oxide Concretions and Implications for Mars: Current Knowledge and Gaps*](#) [#2187]
Terrestrial concretion analogs indicate that small Mars “blueberries” likely formed quickly by diffusive mass transfer, under conditions of abundant iron supply in chemically reactive host rock.

Pompilio L. Tampella G. Lisotti A. Rossi A. P. Sgavetti M.

[Multi-Resolution Approach to the Spectral Analysis of Martian Outcrops](#) [#1801]

Here we present demonstrative results of the multi-resolution approach to the interpretation of the spectral variability of a multispectral survey for a terrestrial area, through multispectral Landsat TM5 data.

Kraft M. D. Alvarado C. M. Sharp T. G. Rampe E. B.

[Spectral Indexing of Chemical Weathering in the Mid-Infrared: New Means to Evaluate Weathering on Mars](#) [#2289]

Features of mid-infrared spectra from a large suite of weathered basalt can be indexed to distinguish weathered and unweathered surfaces, suggesting that weathering can be studied on Mars without using spectral modeling methods.

Mayer D. P. Arvidson R. E. Wang A. Sobron P. Zheng M. P.

[Mapping Minerals at a Potential Mars Analog Site on the Tibetan Plateau](#) [#1877]

A new mineral facies map of lacustrine deposits from the cold, arid Qaidam Basin, China shows hydrated sulfates, carbonates, chlorides and phyllosilicates. This area may offer insight into the history of evaporite deposits identified on Mars.

McKeown N. K. Noe Dobrea E. Z. Bishop J. L. Silver E. A.

[Coordinated Lab, Field, and Aerial Studies of the Painted Desert, AZ, as a Potential Analog Site for Phyllosilicates at Mawrth Vallis, Mars](#) [#2509]

One hypothesis for clay formation at Mawrth Vallis is an altered ash-fall, like bentonites in the Painted Desert, Arizona. We compare lab, field, and aerial data to determine if silicate spectral features are accurately captured in aerial datasets.

Sanders N. H. Sailer D. S. Kelley E. M. Clarke R. S. Davis S. J. Eckert-Erdheim A. M. Tsang S. W. R. Benson S. M. Fuerst A. J. Heyer K. M. Lee N. F. Oliver B. L. Slotterer G. J. Suitt C. B.

[Effects of Fine Sediment Mantle on the Thermal Inertia Signature of Underlying Materials](#) [#1195]

Results of modeling the effect that overlying fine sediment has on materials underneath suggest that even as little as .5 cm of overlying fine sediment essentially masks the thermal signature of any underlying material.

Zheng M. P. Wang A. Kong F. J. Ma N. N.

[Saline Lakes on Qinghai-Tibet Plateau and Salts on Mars](#) [#1454]

The Qinghai-Tibet Plateau stands in the east of Asia, with an area of ~2.5 million km² and an average elevation of ~4500 m, and its general terrain slopes. It is a unique physico-geographical unit and also the youngest plateau on the Earth.

Irwin R. P. III Fortezzo C. M. Tooth S. E. Howard A. D. Zimbelman J. R. Barnhart C. J. Benthem A. J. Brown C. C. Parsons R. A.

[Origin of Theater-headed Tributaries to Escalante and Glen Canyons, Utah](#) [#1644]

Theater-headed tributaries to Glen Canyon, Utah, are important analogs to martian valley networks. Our field study suggests a hybrid model involving seepage weathering of Navajo sandstone, sheet fracturing, and transport of debris by flash floods.

Wynne J. J. Titus T. N. Jhabvala M. D. Cushing G. E. Cabrol N. A. Grin E. A.

[Distinguishing Caves from Non-Cave Anomalies Using Thermal Infrared: Lessons for the Moon and Mars](#) [#2451]

Research has shown one example differentiating caves from non-cave anomalies in the Mojave Desert, California. This work has important implications for detecting caves on the Moon and Mars.

Grudzinski B. P. Luo W. Pederson D.

[Estimating Hydraulic Conductivity from Drainage Patterns Derived from DEM — A Case Study in the Oregon Cascades](#) [#2112]

This study introduces a new method of estimating hydraulic conductivity from drainage dissection pattern derived from digital elevation model (DEM). Tests in Cascades region, Oregon show promising results. It has the potential to be applied to Mars.

Williams R. M. E. Irwin R. P. III

[*Morphology of Lava-Capped Inverted Valleys Near St. George, Utah: Analogs for Martian Sinuous Ridges*](#) [#2413]

We report on the morphological attributes of multiple lava-capped mesas near St. George, Utah that preserve portions of the ancestral Virgin River drainage in inverted relief.

Pain C. F. Clarke J. D. A.

[*Relief Inversion: Australian Analogs of a Common Feature of Martian Landscape Evolution*](#) [#1100]

The Australian continent is particularly favourable for the formation and preservation of inverted relief and therefore provides a wide range of potential analogs for similar features on Mars.

Kraal E. R.

[*Hyperarid Fans in the Atacama Desert are an Interesting Analog to Martian Fans*](#) [#1104]

Alluvial fans in the Atacama Desert, Chile are valuable analogs for understanding fan formation in hyperarid conditions that may be similar to those experienced on Mars.

Byram S. K. Ukstins Peate I. Reagan M. K. Cabrol N. A. Grin E. A.

[*U-Th Geochronological Constraints on Paleolake Levels and Climate Change Recorded in Carbonate Sedimentation at Laguna Lejía, Northern Chile*](#) [#2137]

The unique climate of the Atacama Desert makes it a useful analogue to the environment on early Mars. Paleoterrace deposits at Laguna Lejía record rapid climate change and give insight into the organisms that survive in such extreme environments.

Weidinger T. Istenes Z. Hargitai H. Tepliczky I. Bérczi Sz.

[*Micrometeorological Station at the Mars Analog Field Work, Utah, April, 2008*](#) [#1282]

The 71st crew of MDRS, Utah, meteorological station dataset of near surface layers of temperate belt and desert environments, were compared as terrestrial to martian conditions showing differences between the two planetary environments.

Merrison J. P. Holstein-Rathlou C. Gunnlaugsson H. P. Nornberg P.

[*A Forthcoming European Mars Simulation Wind Tunnel Facility*](#) [#1544]

A unique European Mars Simulator Facility is close to completion at Aarhus University in Denmark. It is intended for scientific study and instrument testing and will be accessible to international collaborators and space agencies.

Thursday, March 26, 2009
POSTER SESSION II: MARS ANALOGS: SULFATES AND SULFIDES
6:30 p.m. Town Center Exhibit Area

Wang A. Freeman J. J.

[Pathways and Rates of Mg-Sulfate Dehydration and Rehydration on Mars](#) [#2029]

New understandings are developed based on a study of the stability field and phase transition pathways of Mg-sulfates in $50^{\circ}\text{C} = \text{T} = -10^{\circ}\text{C}$ and $7\% < \text{RH} < 100\%$. Especially, the rates of reactions were extracted.

Liu Y. Wang A. Freeman J. J.

[Raman, MIR, and NIR Spectroscopic Study of Calcium Sulfates: Gypsum, Bassanite, and Anhydrite](#) [#2128]

The spectral peak assignments for fundamental vibration modes in Raman and MIR, for overtone and combination modes in NIR of Ca-sulfates, will help the interpretation of the mission data from current and future exploration to Mars and Venus.

Freeman J. J. Wang A.

[Hydrated Magnesium Sulfates Below \$0^{\circ}\text{C}\$ — Stable Phases and Polymorphs](#) [#2301]

We found a low-T polymorph of epsomite at -10°C and mid-RH during an experimental study of stability fields and phase boundaries of hydrated Mg-sulfates. Meridianiite was found stable at -10°C and $\text{RH} > 90\%$.

Grindrod P. M. Heap M. J. Meredith P. G. Sammonds P. M.

[Strength and Elastic Moduli of Magnesium Sulfate Hydrates Under Martian Conditions](#) [#1515]

We present experimentally-derived values of unconfined compressive strength and elastic moduli of mono- and poly-hydrated magnesium sulfates, which control the mechanical behaviour of similar equatorial deposits on Mars.

Kong W. G. Wang A. Freeman J. J. Sobron P. S.

[A Comprehensive Spectroscopic Study \(Raman, MIR, Vis-NIR, LIBS, XRD\) of Synthetic \$\text{Fe}^{2+}\$, \$\text{Fe}^{3+}\$, \$\text{Mg}^{2+}\$, \$\text{Al}^{3+}\$ Copiapites](#) [#1659]

Fe^{2+} , Fe^{3+} , Mg^{2+} , and Al^{3+} copiapites were synthesized and investigated by Vis-NIR, Raman, and MIR. These studies will help *in situ* mineral ID, and to link the remote sensing data with the observed ferric sulfates during ground exploration on Mars.

Hyde B. C. King P. L.

[Quantification of Structural \$\text{H}_2\text{O}\$ and Total \$\text{H}_2\text{O}\$ Contents in Iron Sulfate Minerals Using Diffuse Reflectance Infrared Fourier Transform Spectroscopy](#) [#1895]

H-bearing Fe-sulfates are found on Mars. Better characterization includes $\text{H}_2\text{O}/\text{OH}^-$ quantification. Kubelka-Munk theory and the NOPL method were applied to biconical diffuse reflectance data. NOPL produces better fits. Both methods are mineral dependent.

Chipera S. J. Sarrazin P. Alcantar-Lopez L. Vaniman D. T. Bish D. L. Blake D. Chiari G.

[Real-Time XRD/XRF at a Mars-Analog Sulfate Site in Leadville, Colorado, Using a CheMin-Heritage Instrument](#) [#1328]

Real-time XRD/XRF of an acid-sulfate deposit demonstrates the value of *in situ* analysis in the study of ephemeral minerals and hydrates susceptible to rapid alteration and significantly aids in the identification of similar chemical species.

Sansano A. Sobron P. Lafuente B. Medina J. Rull F.

[Raman Analysis of Sulfate Sequence of Precipitation from Iron-rich Waters of Rio Tinto River](#) [#2076]

Rio Tinto area is considered a referent as an extremophilic scenery of iron rich. Raman spectroscopy is a powerful technique that allows studying these. This work shows the application of this technique on natural and simulated evaporitic samples.

Sobron P. Wang A.

[*Raman and LIBS: A Definitive Combination for the Characterization of Natural Samples from the Rio Tinto Mars Analog*](#) [#2400]

A combined Raman and LIBS study on natural sulfates from Rio Tinto demonstrated a fully characterization of Gypsum, Al/Mg-copiapite and Na/NH₄-jarosite. It was proven to be a powerful tool for min/geochemical investigations at planetary surfaces.

Gómez-Ortiz D. Fernández-Remolar D. C. Prieto-Ballesteros O. Gómez F. Amils R.

[*Hydrogeological Study of the Rio Tinto Mars Analog: Implications for Mars Underground Water Fluxes*](#) [#1550]

A hydrogeological survey, including different tests of tracer injection, has been carried out in order to unravel the groundwater flow scheme of the Rio Tinto martian analog.

Calvin W. M. Shoffner J. D.

[*Remote Sensing Image Analysis at Leviathan Mine, Ca: A Sedimentary Sulfate Mars Analog Site*](#) [#1210]

An open pit mine site provides exposures of a wide variety of sulfate minerals. We have mapped the site using multi-spectral satellite data and high spatial resolution hyperspectral data. The results have implications for remote mapping of sulfates on Mars.

Cavalazzi B. Barbieri R. Ori G. G. Westall F. Cady S. L. Gennaro S. Lui A. Canteri R. Bersani M. Lazzeri P. Pepponi G.

[*Unusual Fe-rich Framboids from Devonian Carbonate Mounds \(Sahara Desert, Morocco\) Investigated by HR-SEM and ToF-SIMS: Fossil Analogues of OAM-SRB Consortia?*](#) [#1113]

Microaggregates from fossil mounds are likely related to hydrothermal and methane venting. The aggregates are considered a fossil analogue of living MOA and SRB. The detection of carbonate rocks on Mars make this finding remarkable for astrobiology.

Dyar M. D. Holden J. F. Bishop J. L. Lane M. D.

[*Spectroscopic Characterization of Hydrothermal Sulfide Chimneys at the Juan de Fuca Ridge*](#) [#2221]

We present here results of the study of a small sample suite from the Juan de Fuca Ridge using Mössbauer, mid-IR thermal emission, and visible, near-IR, and mid-IR diffuse reflectance spectroscopy.

Thursday, March 26, 2009
POSTER SESSION II: MISSIONS: APPROACHES, ARCHITECTURES,
ANALOGS, AND ACTUALITIES
6:30 p.m. Town Center Exhibit Area

Clark K. Stankov A. Pappalardo R. T. Greeley R. Blanc M. Lebreton J.-P. Van Houten T.
[*The Europa Jupiter System Mission*](#) [#2338]

The two sister spacecraft of the EJSM — the Jupiter Europa and Jupiter Ganymede Orbiters — perform a choreographed dance exploring the Jupiter system and studying the processes that led to the diversity and interactions of its associated components.

Coustenis A. Lunine J. Matson D. Hansen C. Reh K. Beauchamp P. Lebreton J.-P. Erd C.
[*The Joint NASA-ESA Titan Saturn System Mission \(TSSM\) Study*](#) [#1060]

The NASA-ESA Titan Saturn System Mission designed for an in-depth exploration of Titan and Enceladus. The mission comprises both remote (orbiter dedicated to Titan) and *in situ* (montgolfiere, lander) elements. Launch would be around 2020.

Green J. R. Dudzinski L. A. Sutliff T. J. Spilker T. R. Arakelian T.
[*Small Radioisotope Power Systems for Planetary Science Mission Applications*](#) [#2484]

NASA's RPS Program anticipates development of a small RPS for mission applications. We will present the current state of the art and invite the science community to actively participate in defining the requirements for this new capability.

Chicarro A. F.
[*Mars Express — Science Summary After Five Years in Orbit*](#) [#1392]

ESA's Mars Express has been orbiting Mars for over five years, providing unprecedented results on the interior, subsurface, surface, atmosphere and space environment of the Red Planet, allowing Europe to chart a future Mars exploration program.

McEwen A. Keszthelyi L. Spencer J. Thomas N. Johnson T. Christensen P. Wurz P. Glassmeier K.-H. Shinohara C. Girard T. Heinsohn G. Furfaro R. Gardner T. Cheeseman D. Beatty R. Ludwinski J. Kowalkowski T. Yen C. Elliot T. Turtle E. Strohheln K. Janesick J. Falco C. Evans R.
[*Io Volcano Observer \(IVO\)*](#) [#1876]

IVO is a concept mission for Discovery, and would make multiple fast polar flybys of Io and acquire remote sensing and *in situ* measurements to address key questions about volcanic processes, tidal heating, and affects on the Jupiter environment.

Sollitt L. S. Kroening K. Malmstrom R. Segura T. Spittler C.
[*Mission Concepts to 4015 Wilson-Harrington*](#) [#2391]

We present a number of different architectures for mission concepts to 4015 Wilson-Harrington, a body which exhibits features of both comets and asteroids. We examine orbiter/lander missions as well as sample return missions, in different size classes.

Bellerose J. Yano H.
[*Requirements and Constraints for Exploration of Binary Asteroid Systems: From Didymos to Hektor*](#) [#2443]

Many questions remain regarding close orbit operations at a binary. We present important requirements and constraints including recent work on out-of-plane orbits, influence of the SRP, and contact binaries.

Blome H.-J. Wilson T. L.
[*Hyperbolic Orbits and the Planetary Flyby Anomaly*](#) [#1704]

The virial theorem in astrophysics is used to show that energy is not being conserved during the gravity assist procedure used in planetary flybys. These involve hyperbolic trajectories. So the so-called flyby anomaly exists at a very fundamental level.

Jenniskens P. Dissly R. Boyd I. D. ReVelle D. O. Nuth J. A. Worden S. P.

[ASIMA — Asteroid Impact Analyzer: A Proposed Close-to-Home Planetary Mission to Probe the Diversity of Comets and Asteroids](#) [#2305]

The proposed Asteroid Impact Analyzer (ASIMA) is a Partner Mission of Opportunity that will measure how the bulk carbon-to-metal ratio varies among comets and asteroids.

Foing B. H. Batenburg P. Drijkoningen G. Slob E. Poulakis P. Visentin G. Page J. Noroozi A. Gill E. Guglielmi M. Freire M. Walker R. Sabbatini M. Pletser V. Monaghan E. Boche-Sauvan L. Ernst R. Oosthoek J. Peters S. Borst A. Mahapatra P. Wills D. Thiel C. Wendt L. Gross C. Petrova D. Lebreton J. P. Zegers T. Stoker C. Zhavaleta J. Sarrazin P. Blake C. McKay C. Ehrenfreund P. Chicarro A. Koschny D. Vago J. Svedhem H. Davies G. ExoGeoLab Team EuroGeoMars Team

[ExoGeoLab Lander/Rover Instruments and EuroGeoMars MDRS Campaign](#) [#2567]

We describe ExoGeoLab a planetary surface instruments research incubator, and the EuroGeoMars campaign at the Mars Desert Research station aimed at validating a procedure for martian surface *in situ* and return science.

Lee P. Gernhardt M. Abercromby A. Braham S. Chase T. Comtois J.-M. Deans M. Effenhauser R. Fong T. Frankel C. Glass B. Hodgson E. Hoffman S. J. Jones J. A. Nelson J. Schutt J. W. Vasquez M.

[Moon/Mars Science and Exploration in Pressurized Rovers: Early Lessons from Analog Studies at the Haughton-Mars Project Site, Devon Island, High Arctic](#) [#2498]

Pressurized rovers will be key science “instruments” in the future human exploration of the Moon and Mars. Lessons from long-range vehicular field traverses conducted at the Haughton-Mars Project site, Devon Island, High Arctic, are presented.

Ori G. G. Flamini E. Dell’Arciprete I. Taj-Eddine K.

[A Facility of the Agenzia Spaziale Italiana to Test Operations, Instruments and Landing Systems for Mars Exploration: The PLANLAB Project of the Ibn Battuta Centre at Marrakech \(Morocco\)](#) [#1587]

The Agenzia Spaziale Italiana in collaboration with the IRSPS has started a program (PLANLAB) to prepare and execute tests of rovers, landing systems, instruments and operations related to the exploration of Mars.

Garry W. B. Hörz F. Lofgren G. E. Kring D. A. Chapman M. G. Eppler D. B. Rice J. W. Jr. Lee P. Nelson J. Gernhardt M. L. Walheim R. J.

[Science Operations for the 2008 NASA Lunar Analog Field Test at Black Point Lava Flow, Arizona](#) [#1649]

Surface science operations on the Moon will require merging lessons from Apollo with new operation concepts that take advantage of the Constellation Lunar Architecture. We will present science operations for two prototype lunar rovers.

Cottingham C. M. Roark S. E. Deininger W. D. Dissly R. W. Epstein K. W. Waller D. M. Scheeres D. J. [Small Surface Probes for Enhanced Asteroid and Comet Rendezvous Missions](#) [#2310]

This poster will discuss system concepts, architectures, and technology development work to mature critical components for low-cost surface probes for small solar system bodies.

Lawrence D. J. Elphic R. C. Weinberg J. D. Delory G. T. Dissly R. Evanyo J. Crider D. H. Lucey P. G. Fong T. Vondrak R. Zacny K. Yachbes I.

[Exomoon — A Discovery and Scout Mission Capabilities Expansion Concept](#) [#1451]

This submission describes a Discovery class landed mission concept for the *in situ* investigation of volatiles in the lunar polar cold traps. This mission is enabled by the use of the Advanced Stirling Radioisotope Generators (ASRG), currently in development by NASA.

Gilyén A. Szvoboda P.

[Development of the Hungarosphere: The Husar-11 Rover Within a Transparent Spherical Space Probe Model with Special Planetary Surface Activities](#) [#1170]

We built a spherical Hungaroszféra (Husar-11) rover: with transparent plexy body, camera can see bottom, it moves by inner driving, no spur outsteming from the sphere, can move on fluids, all instruments are defended from dust pollution.

Pasztor A. Simon T. Nagy Sz. Bérczi Sz.

[Husar-8 Rover Swarm Collective Activity Around Hunveyor-8: Planetary Robotics at the Kecskemét College, GAMF Faculty, Hungary](#) [#1491]

By constructing the HUSAR-8 model the GAMF Faculty at Kecskemét College began student robotics program with swarm strategy for navigation on the field trip in order to develop teaching programming and trigger student personal activity.

Perl S. M. DeLaurentis D. A. Caldwell B. S. Crossley W. A.

[Adapting System-of-Systems Engineering for the Advancement of the Mars Exploration Program](#) [#1911]

To introduce the System-of-Systems (SoS) methodology for modeling the data network of the Mars Science Laboratory (MSL) mission. The goal of this protocol is to obtain the best science data return with a finite and varying amount of resources.

Clark P. E. Millar P. S. Beaman B. Choi M. Cooper L. Feng S. King R. Leshin L. Lewis R. Yeh P. S. Young E. Lorenz J.

[Science Packages and Tools Designed for the Lunar Surface](#) [#1126]

Lunar surface science packages may need to operate without radioisotope-based power systems available for Apollo. We demonstrate here that alternative state-of-the-art design and components can meet the power and mass constraints of earlier packages.

Griffes J. L. Grotzinger J. Grant J. Vasavada A. R. Golombek M. McEwen A.

[Analysis of Four Potential Mars Science Laboratory Landing Sites Using HiRISE](#) [#1800]

An overview of the four landing sites remaining under consideration for the 2011 Mars Science Laboratory Mission: Holden Crater, Gale Crater, Eberswalde Crater, and Mawrth Vallis.

Golombek M. Grant J. Vasavada A. R. Grotzinger J. Watkins M. Kipp D. Noe Dobrea E. Griffes J. Parker T.

[Selection of Four Landing Sites for the Mars Science Laboratory](#) [#1404]

This abstract describes the four landing sites under consideration and the selection process for the Mars Science Laboratory (MSL) after discussion of seven downselected sites at the third Landing Site Workshop and a subsequent project meeting.

Golombek M. P. Haldemann A. F. C. Simpson R. A. Fergason R. L. Putzig N. E. Huertas A. Arvidson R. E. Heet T. Bell J. F. III Mellon M. T. McEwen A. S.

[Relationships Between Remote Sensing Data and Surface Properties of Mars Landing Sites](#) [#1409]

The surface characteristics and material properties found at the landing sites are used as “ground truth” for interpreting orbital and Earth-based remote sensing data of Mars.

Thursday, March 26, 2009
**POSTER SESSION II: NOT JUST SKIN DEEP: ELECTRON MICROSCOPY,
HEAT FLOW, RADAR, AND SEISMOLOGY INSTRUMENTS**
6:30 p.m. Town Center Exhibit Area

Thaisen K. G. Taylor L. A. Gaskin J. A. Jerman G. Ramsey B. D.

[*An ESEM/SEM Study of Lunar Soil and the Potential for a Miniaturized Version on the Moon*](#) [#1697]

A PIDDP funded program involving the miniaturization of an Environmental Scanning Electron Microscope with Energy Dispersive Spectroscopy capability for potential use on rovers.

Gaskin J. G. Jerman G. A. Ramsey B. D. Ferguson C. K. Abbott T. O. O'Brien S. Joy D. C.

Thaisen K. G. Taylor L. A. Sampson A. R. Rhodes E. A. Darlington E. H. Bussey B. J.

Harvey R. P. Spudis P. D.

[*Miniature Scanning Electron Microscope for In-Situ Planetary Studies: Electron Gun Development*](#) [#2318]

We are developing a miniaturized scanning electron microscope that will permit *in situ* morphological and chemical characterization of lunar soil. Work presented here concerns the development and testing of the electron gun component of this system.

Stojic A. Brenker F. E.

[*Argon Ion Slicing \(ArIS\) of Mineral and Rock Samples: A Novel Tool to Prepare Large Electron Transparent Thin Films for TEM Use*](#) [#1807]

A new approach to TEM sample preparation is presented using Argon Ion Slicing a novel technique which provides larger electron transparent thin films than had been possible so far.

Smrekar S. E. Mungas G. Peters G. Hudson T. L. Morgan P.

[*Lunar Heat Flow Simulation and Testing Chamber*](#) [#2055]

Heat flow is a key indicator of planetary thermal and chemical evolution. We have constructed a vacuum chamber to provide a testbed for evaluating heat flow instrumentation and measurement issues and calibration techniques prior to flight.

Grott M. Spohn T. Richter L. Wieczorek M. A. Knollenberg J. Smrekar S. E. Kargl G.

Ambrosi R. M. HP³ Instrument Team

[*HP³ — A Heat Flow Probe Proposed for the International Lunar Network*](#) [#1107]

HP³, the heat flow and physical properties package, is proposed to be flown on the International Lunar Network mission. It will measure the thermal conductivity and thermal gradient to a depth of at least 3 m, allowing for a direct determination of the planetary heat flow.

Wawrzaszek R. Seweryn K. Grygorczuk J. Banaszkiwicz M. Gurgurewicz J. Neal C. R.

Huang S. Kömle N.

[*The Heat-Flow Probe Hardware Component \(HPHC\) of the LGIP Package*](#) [#1511]

This work is focused on the integration of the Heat Flow Probe Hardware Component – instrument in the L-GIP Package, designed for direct measurements of the thermal energy flux from the interior of the Moon using mole device developed in SRC PAS.

Nagihara S. Zacny K. Taylor P. T. Milam M. B. Mumm E. Maksymuk M. Fink P. Hernandez W.

[*Heat Flow Probe Deployment Options for the International Lunar Network Missions*](#) [#1165]

The present work describes instrument design options for a lunar heat flow probe that can meet the logistical constraints and the science objectives of the International Lunar Network lander missions planned in the next decade.

Ciarletti V. Corbel C. Cais F. Plettemeier D. Hamran S. E. Øyan M. WISDOM Team
[Performances of the WISDOM GPR Designed for the Shallow Sounding of Mars](#) [#2367]

WISDOM is the UHF GPR selected to be onboard the rover of the ExoMars mission. It is designed to characterize the shallow subsurface structure of Mars prior to drilling operation. The first measurements performed on Earth show very promising results.

Zacny K. Mumm E. Fink P. Hernandez W. Paulsen G. Maksymuk M.
[Telescopic/Pneumatic Heat Flow Deployment for the International Lunar Network Missions](#) [#1070]

We describe a method of deploying heat flow probe for the International Lunar Network that consists of a telescopic probe with deployable isolated thermal anchors. The pneumatic hammer and gas flushing uses left over helium from a propulsion system.

Asphaug E. Safaeinili A. Belton M. J. S. Scheeres D. J. Chesley S. Yeomans D.
[Deep Interior: High-Resolution Volumetric Radar Imaging of a Comet Nucleus](#) [#2109]

Deep Interior uses a SHARAD-type radar to acquire 10 Tb of global echoes from a comet nucleus, a data set that will resolve the whole-body geology to better than 10 m in 3D.

Neal C. R. Weinberg J. D. Lognonné P. Hood L. Mimoun D. Wawrzaszek R.
Banaszkiwicz M. LGIP Team

[Lunar Geophysical Instrument Package as a Payload for the International Lunar Network](#) [#1447]

This submission describes the characteristics of the Lunar Geophysical Instrument Package (LGIP), its suitability as a payload for the ILN and the distinct advantages of using a common integrated suite of instruments.

Heggy E. Fong T. Kring D. Deans M. Anglade A. Mahiouz K. Bualat M. Lee P.
Horz F. Bluethmann W.

[Potential of Probing the Lunar Regolith Using Rover-mounted Ground Penetrating Radar: Moses Lake Dune Field Analog Study](#) [#2183]

We present Ground Penetrating Radar results of the Moses-Lake survey performed in June 2008 using two rover mounted probing instruments. Our results explore the utility of GPR to explore subsurface volatiles and structural elements in lunar analog terrains.

Grimm R. E. Delory G. T.
[Magnetotelluric Sounding of Terrestrial Planet and Satellite Interiors](#) [#2382]

Simultaneous measurement of ambient electric and magnetic fields enables subsurface soundings from a single platform.

Schibler P. Lognonne P. Mimoun D. Zweifel P. Roll R. Kreuse I. Pike W. T. Calcutt S. Debus A.
[Planetary Protection Policy Applied to HPL-ExoMars Seismometer](#) [#1312]

The scope of this presentation is to describe how the instrument project will be conducted so as to meet the planetary protection requirements specified for ExoMars mission.

Batenburg P. A. W. Foing B. H. Drijkoningen G. G. Gill E. K. A. Poulakis P. Visentin G. Page J.
Pletser V. Peters S. Borst A. Mahapatra P. ExoGeoLab Team EuroGeoMars Team
[Reflection Seismology Systems for Planetary Geology: First Tests at ESTEC ExoGeoLab and MDRS, Utah](#) [#2536]

The authors investigated the use of reflective seismology for Planetary geology within ESA's ExoGeoLab pilot project. During the EuroGeoMars expedition tests were performed to test the influence of surface coupling and composition on data quality.

Thursday, March 26, 2009
POSTER SESSION II: PLANETARY DATA SYSTEMS, TECHNIQUES, AND INTERPRETATION
6:30 p.m. Town Center Exhibit Area

Oosthoek J. H. P. Kleuskens M. H. P.

[3D Interpretation of SHARAD Radargram Data](#) [#2473]

SHARAD radar data is interpreted in 3D using reservoir engineering software. Here, the radar data is treated as seismic data. This enables us to distinguish between layers, which could help to better understand the formation process of the icecap.

Salamuniccar G. Loncaric S.

[Morphometry, Votes-Analysis and Calibration Improvements of Crater Detection Algorithms Based on Edge Detectors and Radon/Hough Transform](#) [#1084]

Six previously implemented Crater Detection Algorithms (CDAs) were improved using morphometry measurements (some new and some improved), votes-analysis and calibration. The results were analyzed using the Framework for Evaluation of CDAs (FECDA).

Robbins S. J. Hynes B. M.

[Towards a New Catalog of Lobed Martian Craters Compared with a New Global Crater Database, Complete to 1.5 km](#) [#2460]

Presenting preliminary results of a new crater database, focusing on lobed crater characteristics. Database is complete to at least 1.5 km-diameter craters and contains more characteristics of each crater than previous catalogs.

Nava R. A. Skinner J. A. Jr. Hare T. M.

[Using Distributional Characteristics of Superposed Large-Scale Crater Clusters as Temporal Indicators of Geologic Processes](#) [#2530]

We present a GIS-based tool that utilizes standard geoprocessing scripts to use the occurrence and orientation of large crater clusters as stratigraphic makers.

Stepinski T. F. Urbach E. R.

[The First Automatic Survey of Impact Craters on Mars: Global Maps of Depth/Diameter Ratio](#) [#1117]

The catalog of 75,919 craters on Mars is compiled by a computer algorithm. Using crater depths listed by this catalog, global maps of depth/diameter ratio are created. Such maps indicate existence of cryosphere at depths that varies with latitude.

Stepinski T. F. Bagaria C.

[Automatic Mapping of Martian Physiography: Application to Tharsis Region](#) [#1118]

Physiographic map of Tharsis region on Mars is created automatically by a computer algorithm. The map summarizes all relevant topographic features and presents them in a handy visual format that is also well suited for further quantitative analysis.

Salamuniccar G. Loncaric S.

[Automated Depth/Diameter and Topographic-Cross-Profile Measurements Based on GT-57633 Catalogue of Martian Impact Craters and MOLA Data](#) [#1085]

The methods for the automated depth/diameter and topographic-cross-profile measurements were applied to the newly available GT-57633 catalogue and MOLA data. The result is improved insight into the global geometric properties of martian craters.

Anderson S. W. Finnegan D.

[Relationships Between Block Size Distributions and Topographic and Topographic Roughness: An Experimental Approach Using LIDAR Scanning and Variogram Analysis](#) [#2190]

Block size distributions on rocky surfaces contain information regarding the lithologic material properties and the geologic processes creating the deposit. Here, we discuss experiments designed to show relationships between topographic roughness and block size.

Roark J. H.

[Enhancements to Gridview: Software for Topography Data Analysis](#) [#1711]

Gridview is an IDL software application designed to help users analyze, measure, and visualize gridded data. It has been used to study visible and buried basins on Mars, investigate the dichotomy boundary, and measure slope as well as volcano and crater geometry.

Clark C. S. Clark P. E.

[Using Boundary-based Mapping Projections for Morphological Classification of Small Bodies](#) [#1133]

We present a systematic approach to interpreting and classifying asteroids based on shape and surface morphology using Constant Scale Natural Boundary (CSNB) map projection applied to Deimos, Phobos, Eros, and Ida.

Kirk R. L. Howington-Kraus E. Rosiek M. R.

[Build Your Own Topographic Model: A Photogrammetry Guest Facility for Planetary Researchers](#) [#1414]

The USGS and NASA invite you to Flagstaff, where we will train you and help you collect high-resolution topographic data for your research, from spot heights to DTMs, using a state of the art stereo workstation and a wide variety of stereo images.

Walter S. H. G. Michael G. Neukum G.

[Publishing Planetary Remote Sensing Data as OGC Web Services by Use of Open Source Software](#) [#1609]

We will demonstrate techniques to deliver HRSC and SRC image data as well as OMEGA footprint data based on standards defined by the Open Geospatial Consortium (OGC) using open source software.

Parente M. Clark J. T. Bishop J. L. Brown A. J.

[Simulating CRISM Images: A Tool for Researchers in Testing and Confirming Geologic Analyses of CRISM Images on Mars](#) [#2487]

We present a system for simulating CRISM images as a tool to analyze the feasibility of mineral detections on the martian surface in different scenarios involving variable compositional, atmospheric and instrumental conditions.

Patterson G. W. Barnouin-Jha O. S. Murchie S. L. Seelos F. Ehlmann B. L. Mustard J. F.

[Developing Tools to Highlight the Presence of Carbonates in CRISM Images of Mars](#) [#2361]

CRISM hyperspectral images of Mars have recently been used to identify magnesium carbonate deposits. To better assess their spatial distribution and geological context, we are exploring improved techniques to identify these carbonates.

Dziková L. Dzik P. Fürstová J. Skála R.

[Color of Moldavites Measured by Colorimetry](#) [#1720]

Transmittance spectra of moldavites were measured to evaluate their color quantitatively. These data were converted to L*a*b* coordinates of the CIE color space. Cluster analysis was applied. The results were compared to empirical color assessment.

D'Amore M. Helbert J. Maturilli A.

[Berlin Emissivity Database \(BED\) Archive](#) [#1024]

The Berlin Emissivity Database ranges from 3 to 50 μm . BED comprises several grain-sized mineral, up to high temperature, and has a modular structure, to collect in the future Raman measurement, samples pictures, thin section images and so on.

Hare T. M. Skinner J. A. Jr. Tanaka K. L. Fortezzo C. M. Bleamaster L. F. III Sucharski R. M.

[GIS-based Planetary Geologic Maps: Recommendations for Improved Preparation, Review, and Publication](#) [#2538]

The PG&G funding opportunity this year will require geologic maps submitted after Jan. 2011 to be in a GIS-compatible format. To help alleviate this transition for the mapping community we have begun to implement several initiatives addressed here.

Hancher M. D. Beyer R. Broxton M. Gorelick N. Kolb E. Weiss-Malik M.

[Visualizing Mars Data and Imagery with Google Earth](#) [#2308]

The latest Google Earth and KML features aid in Mars data visualization, including full-resolution imagery, terrain maps, and coverage maps allowing scientists to browse satellite imagery from many instruments within a single easy-to-use interface.

Akins S. W. Gaddis L. Becker K. Barrett J. Bailen M. Hare T. Soderblom L. Raub R.

[Status of the PDS Unified Planetary Coordinates Database and the Planetary Image Locator Tool \(PILOT\)](#) [#2002]

The current status of the PDS Unified Planetary Coordinates (UPC) database and the Planetary Image Locator Tool (PILOT) web interface to search the UPC.

Wang J. Bennett K. J. Scholes D. Arvidson R. Ward J. G. Slavney S. Guinness E. A.

Stein T. C. Heil-Chapdelaine V.

[Planetary Data Access Through the Orbital Data Explorer from the PDS Geosciences Node](#) [#1193]

An overview of Orbital Data Explorer (ODE) developed at NASA's Planetary Data System's Geosciences Node. ODE provides web-based functions to search, retrieve, and download data from multiple missions and instruments in the rapidly expanding planetary data archives.

Slavney S. Arvidson R. E. Guinness E. A. Stein T. C.

[PDS Geosciences Node Data and Services](#) [#1303]

The PDS Geosciences Node archives science data related to the study of the terrestrial planets. The node provides services in the form of a web site where data may be browsed and downloaded, and specialized tools for orbital and landed data sets.

Hughes J. S. Crichton D. J. Mattmann C. A.

[A Framework to Manage Information Models — The Planetary Data System Case Study](#) [#1139]

The Planetary Data System (PDS) information model has been captured in an ontology based tool framework. A generated specification document now provides a basis for improving the PDS standards for use both within PDS and internationally.

Henneken E. A. Accomazzi A. Grant C. S. Kurtz M. J. Thompson D. Bohlen E. Murray S. S.

[The SAO/NASA Astrophysics Data System: A Gateway to the Planetary Sciences Literature](#) [#1873]

The SAO/NASA Astrophysics Data System (ADS) provides various free services for finding, accessing, and managing bibliographic data, including a basic search form, the myADS notification service, and private libraries, plus access to scanned published articles.

Friday, March 27, 2009
MARS: DUNES, DUST, AND WIND
8:30 a.m. Waterway Ballroom 1

Chairs: **Lori Fenton**
 Steve Metzger

- 8:30 a.m. Chojnacki M. * Moersch J. E.
[Valles Marineris Dune Fields: Thermophysical Properties, Morphology, and Provenance](#) [#2486]
We examined 25 dune fields in Valles Marineris to identify significant trends in thermophysical properties, morphology and origin. Many dunes have high thermal inertia values (>350) implying fossilized dune surfaces or large grain sizes (1–1.7 mm).
- 8:45 a.m. Berman D. C. * Balme M. R. Bourke M. C. Rafkin S. Zimbelman J. R.
[Transverse Aeolian Ridges on Mars: Distribution, Orientations, and Ages](#) [#1973]
We have conducted a survey of all high-resolution MOC images in a pole-to-pole swath between 0° and 45°E longitude to identify and classify Transverse Aeolian Ridges (TARs) on Mars and determine their distribution, orientations and age.
- 9:00 a.m. Silvestro S. * Fenton L. K. Michaels T. I. Ori G. G.
[Complex Dark Dune Fields in Noachis Terra, Mars. Relationship Between Morphologies and Wind Regimes](#) [#1862]
We analyzed three dark dune fields in Noachis Terra. The comparison between the observed morphologies and the atmospheric models suggest that these features could be in equilibrium with present day atmospheric conditions.
- 9:15 a.m. Bourke M. C. * Philippoff A. Bridges N.
[Studies of Dune Change on Mars Combining MOC and HiRISE Images](#) [#1748]
Another example is shown where a dome dune in the North Polar region of Mars is completely eroded. This confirms that there is active sand transport on Mars. Domes dunes <30 m wide are the most likely to show change over short time periods.
- 9:30 a.m. Fenton L. K. *
[Small Scale Features Reveal Aeolian Inactivity Poleward of 60°S in HiRISE Images of Southern Hemisphere Dune Fields on Mars](#) [#1425]
HiRISE images reveal several types of small scale (2–30 m) features on southern hemisphere high-latitude dunes. The occurrence of these features indicates varying levels of aeolian activity and their spatial distribution corresponds with ground ice.
- 9:45 a.m. Ewing R. C. * Bourke M. Kocurek G.
[Transport Conditions and Stages of Dune Development in the Olympia Undae Dune Field](#) [#2426]
Dune patterns analyzed in Olympia Undae indicate two generations of dune construction and a change in wind regime. Flow fields inferred from wind ripple orientations indicate transport from the ENE, which aligns with the youngest dunes.
- 10:00 a.m. Bridges N. T. * Keszthelyi L. P. Thomson B. J. Wray J. J. Banks M. E. Chuang F. C.
Herkenhoff K. E. Fishbaugh K. E. McEwen A. S. Michaels T. I.
[Characteristics and Possible Genetic Link Between Dust Aggregate Bedforms and Yardangs as Seen by the HiRISE Camera](#) [#2099]
We propose that bedforms in Tharsis are dust aggregates. These may eventually lithify into abradable yardangs and indurated surfaces, a “duststone” that appears to be a common martian rock with no known terrestrial analog.

- 10:15 a.m. Geissler P. E. * Arvidson R. Bell J. Bridges N. Desouza P. Golombek M. Greenberger R. Greeley R. Herkenhoff K. Lahtela H. Johnson J. R. Landis G. Li R. Moersch J. Richter L. Sims M. Soderblom J. Sullivan R. Thompson B. Verba C. Waller D. Wang A. HiRISE Team MER Team
[Constraints on Aeolian Degradation Rates on Mars from Erasure of Rover Tracks](#) [#2257]
 Surface and orbital observations of the erasure of the wheel tracks made by the MER rovers Spirit and Opportunity provide insights into the mechanisms and timescales of aeolian degradation on Mars.
- 10:30 a.m. Metzger S. * Balme M. Towner M. Bos B. Pathare A.
[Direct In-Situ Measurement of Natural Dust Devil Sediment Loading and Flux](#) [#1220]
In situ sampling of dust devils reveals total suspended particle (TSP; 296 mgm⁻³) and fine dust loadings (PM10; 15.1 to 43.8 mgm⁻³), 12.3 ms⁻¹ rotation and 2.7 ms⁻¹ uplift, mean TSP flux of 1689 mgm⁻³s⁻¹ and dust flux of ~ 1.0 to ~50.0 mgm⁻³s⁻¹.
- 10:45 a.m. Hall N. W. * Lemmon M. T.
[Mass Ejected from Martian Dust Devils as a Function of Height and Dust Devil Morphology](#) [#2409]
 An investigation of morphology, density, vertical velocities, and mass flux characteristics of martian dust devils observed by MER. The conservation of mass is utilized to estimate quantity and height of dust ejected into the martian atmosphere by dust devils.
- 11:00 a.m. Reiss D. * Lüsebrink D. Hiesinger H. Kelling T. Wurm G. Teiser J.
[High Altitude Dust Devils on Arsia Mons, Mars: Testing the Greenhouse and Thermophoresis Hypothesis of Dust Lifting](#) [#1961]
 We investigated high altitude dust devils on Arsia Mons. Their occurrence in these low pressure (~1 mbar) environments might be possible to a Greenhouse and Thermophoresis (GT) effect which lowers the threshold for dust entrainment by wind stress.
- 11:15 a.m. Verba C. A. * Geissler P. E. HiRISE Team
[Comparative Analysis of Martian Dust Devil Track Morphologies in Gusev and Russell Craters](#) [#1979]
 Seasonal variations of dust devil activity in Russell and Gusev craters are influenced by topography, sediment supply, and altitude, as well as latitudinal variations in the atmospheric dust cycle and local winds.
- 11:30 a.m. Masse M. * Bourgeois O. Le Mouelic S. Verpoorter C. Le Deit L. Combe J.-Ph.
[Dust Deposits Within and Around the North Polar Ice Cap of Mars: What are Their Mineralogical Compositions, Their Sources and Their Accumulation Processes?](#) [#1841]
 We have performed an integrated morphological, structural and compositional analyses of selected areas along the contact between the North Polar Cap and the surrounding superficial sediments.

Friday, March 27, 2009
MARS: VOLCANISM
8:30 a.m. Waterway Ballroom 4

Chairs: Tracy Gregg
Karen Stockstill-Cahill

- 8:30 a.m. Williams D. A. * Greeley R. Manfredi L. Ferguson R. L. Combe J.-Ph. Poulet F. Pinet P. Rosemberg C. Clenet H. McCord T. B. Raitala J. Neukum G.
[*The Circum-Hellas Volcanic Province, Mars: Detailed Area-Age Estimates and Physical-Compositional Properties of the Surface* \[#1401\]](#)
We discuss new analyses for terrain in and around the Circum-Hellas Volcanic Province on Mars, providing new estimates of size and age of the province, and information on its physical-compositional properties.
- 8:45 a.m. Gregg T. K. P. * de Silva S.
[*Tyrrhena Patera and Hesperia Planum, Mars: New Insights \(and Old Interpretations\) from High-Resolution Imagery* \[#1700\]](#)
We present our efforts to constrain the lithologies of Tyrrhena Patera flank materials and the ridged plains of Hesperia Planum using MOC and HiRISE images.
- 9:00 a.m. Kortenienmi J. * Raitala J. Aittola M. Ivanov M. Öhman T. Kostama V.-P. Hiesinger H.
[*Evidence for Dike Swarms on the Eastern Hellas Rim, Mars* \[#2126\]](#)
We present evidence for extensive dike systems on the Hadriaca Patera volcano on the east Hellas rim and in the volcanic plains south of it, near the outflow channels, and hypothesise on what controls their distribution and orientation.
- 9:15 a.m. Carter L. M. * Campbell B. A. Holt J. W. Phillips R. J. Putzig N. E. Okubo C. H. Seu R. Biccari D.
[*SHARAD Observations of Lava Flow Fields West of Ascraeus Mons* \[#1954\]](#)
SHARAD detects subsurface interfaces associated with the distal parts of smooth flows northwest of Ascraeus Mons. The dielectric properties of these flows are consistent with basaltic lavas.
- 9:30 a.m. Baptista A. R. * Mangold N. Zimbelman J.
[*Origin and Evolution of Long Lobate Lava Flows on Syria Planum, Mars* \[#2090\]](#)
We identified and described a shield volcano, Volcano A, in Syria Planum, Mars, which is the origin of long lobate lava flows placed in a complex plains-style volcanic region.
- 9:45 a.m. Richardson P. W. * Bleacher J. E. Glaze L. S. Baloga S. M.
[*The Relationship Between Lava Fans and Tubes on Olympus Mons in the Tharsis Region, Mars* \[#1527\]](#)
Lava fans and tubes were mapped on the flank of Olympus Mons. 82% of the fans were associated with lava tubes. The fan locations are not consistent with a random Poisson distribution, suggesting the possibility of more than one formation mechanism.
- 10:00 a.m. Kerber L. * Head J. W. III
[*The Age of the Medusae Fossae Formation: Reassessment Using Lava Flow Cast and Mold Contacts* \[#2235\]](#)
We reassess the age of the Medusae Fossae Formation using evidence from ancient contacts between the formation and adjacent lava flows. These relationships add stratigraphic information and suggest a Hesperian age for some parts of the formation.

- 10:15 a.m. Platz T. * McGuire P. C. Münn S. Cailleau B. Dumke A. Neukum G. Procter J. N.
[*Growth and Destruction Cycles and Eruption Styles at Tharsis Tholus, Mars*](#) [#1522]
In the >3.6 Gyrs of volcanic activity at Tharsis Tholus, the edifice experienced multiple volcano-tectonic events. The present-day edifice is characterised by destruction and re-growth cycles also causing the locus of activity to be shifted across the volcano.
- 10:30 a.m. Stockstill-Cahill K. R. * Lucey P. G. Taylor G. J. Blake D.
[*Thermal Emission Measurements of Foidite Rocks: Possible Martian Lithologies*](#) [#2061]
We collected thermal infrared spectra of the Honolulu volcanic rock suite to assess the significance and effect of unmixing spectra of silica-undersaturated rocks without feldspathoid spectra.
- 10:45 a.m. Poulet F. * Langevin Y. Le Roux M. Mangold N. Bibring J.-P. Gondet B.
[*Mars: Identification, Mapping and Modal Mineralogy of Low-Calcium Pyroxene-rich Deposits*](#) [#1555]
We present a systematic analysis of low calcium pyroxene-rich deposits on Mars as seen by OMEGA/MEx.
- 11:00 a.m. Farrand W. H. * Lane M. D. Edwards B. R.
[*Evidence of Mafic Volcanic Compositions Associated with Domes in Arcadia and Utopia Planitiae, Mars*](#) [#1268]
Domes occurring in Arcadia and Utopia Planitiae are examined with CRISM data and are found to be associated with high Ca pyroxene and are thus interpreted as basaltic volcanic domes.
- 11:15 a.m. Salvatore M. R. * Mustard J. F. Wyatt M. B. Murchie S. L. Barnouin-Jha O. S.
[*Assessing the Mineralogy of Acidalia Planitia, Mars, Using Near-Infrared Orbital Spectroscopy*](#) [#2050]
CRISM targeted observations of impact craters in Acidalia Planitia are examined. The identification of near-surface olivine and pyroxene supports theories that this region is primarily basaltic with limited surface alteration.
- 11:30 a.m. Stanley B. D. * Hirschmann M. M. Withers A. C.
[*CO₂ Solubility in Martian Basalts and Applications to Atmospheric Evolution*](#) [#1952]
We investigate the solubility of carbon dioxide in martian analogue basaltic melts at 2.0 GPa to constrain the magmatic outgassing fluxes of carbon dioxide during martian atmospheric evolution.

Friday, March 27, 2009
EARLY SOLAR SYSTEM CHRONOLOGY
8:30 a.m. Waterway Ballroom 5

Chairs: Gary Huss
Audrey Bouvier

- 8:30 a.m. Meyer B. S. * Huss G. R.
[*Galactic Chemical Evolution and the Steady-State Abundances of Short-lived Radioactivities in the Interstellar Medium* \[#1756\]](#)
Simple models that treat the build up of the galactic disk by metal-poor infall can provide useful information on the steady-state abundances of short-lived radioactivities in the interstellar medium. Details of such models are presented.
- 8:45 a.m. Huss G. R. * Meyer B. S.
[*Galactic Chemical Evolution and the Abundances of Short-lived Radionuclides Inherited by the Solar System from the Interstellar Medium* \[#1957\]](#)
We discuss the implications of a realistic model of galactic chemical evolution for the origin of the short-lived nuclides in the early solar system. A late addition of newly synthesized material, probably from a stellar source, is clearly required.
- 9:00 a.m. Leya I. * Schönbächler M. Halliday A. N.
[*Titanium Isotopes in CAIs — Heterogeneities in the Early Solar System* \[#1480\]](#)
We present Ti isotope data for CAIs from Allende and Efremovka. The new data demonstrate that n-rich isotopes, e.g., ^{50}Ti , ^{62}Ni , and ^{96}Zr , are correlated in CAIs and that the n-rich addition was heterogeneously distributed in the early solar system.
- 9:15 a.m. Yin Q.-Z. * Yamashita K. Yamakawa A. Tanaka R. Jacobsen B. Ebel D. Hutcheon I. D. Nakamura E.
 [*\$^{53}\text{Mn}\$ - \$^{53}\text{Cr}\$ Systematics of Allende Chondrules and epsilon \$^{54}\text{Cr}\$ —Cap Delta \$^{17}\text{O}\$ Correlation in Bulk Carbonaceous Chondrites* \[#2006\]](#)
New Allende chondrules ^{53}Mn - ^{53}Cr date suggest they formed at 4567.5 Ma ago, removing the age gap with CAIs. Strong correlation of nuclear anomalies of $\epsilon^{54}\text{Cr}$ with $\Delta^{17}\text{O}$ from the same samples suggests nucleosynthetic origin of oxygen anomalies may still be viable.
- 9:30 a.m. Mishra R. K. Goswami J. N. * Tachibana S. Huss G. R. Rudraswami N. G.
[*Fe-Ni and Al-Mg Isotope Systematics in Chondrules from Unequilibrated Ordinary Chondrites* \[#1689\]](#)
Fe-Ni and Al-Mg isotope systematics study was carried out on Unequilibrated ordinary chondrites which suggest supernova as the plausible source of ^{60}Fe ejected simultaneously with ^{26}Al .
- 9:45 a.m. Tachibana S. * Huss G. R. Nagashima K.
[*Ion Microprobe Study of \$^{60}\text{Fe}\$ - \$^{60}\text{Ni}\$ System in Ferromagnesian Pyroxene Chondrules in Krymka \(LL3.1\) by Multicollection* \[#1808\]](#)
We report our first multi-collection ion-microprobe data for the ^{60}Fe - ^{60}Ni systems in ferromagnesian pyroxene-rich chondrules from Krymka (LL3.1). Three measured chondrules showed excesses of ^{60}Ni , but the ^{60}Fe - ^{60}Ni systems may have been disturbed.
- 10:00 a.m. Connolly H. C. Jr.* Young E. D. Huss G. R. Nagashima K. McDonough W. F. Ash R. D. Beckett J. R. Tonui E. McCoy T. J.
[*Supra-Canonical \$^{26}\text{Al}\$ Detected by In Situ LA-MC-ICPMS and SIMS Techniques: But What Does It All Mean?* \[#1993\]](#)
We report a comprehensive study of a CAI from Allende to address the role of analytical artifacts and test interpretations of supra-canonical $^{26}\text{Al}/^{27}\text{Al}$ data. Agreement between LA-MC-ICPMS and SIMS techniques for the ^{26}Al - ^{26}Mg system is demonstrated.

- 10:15 a.m. Ito M. * Messenger S.
[High Precision Magnesium Isotopic Measurement of CAI Minerals with Low Al/Mg Ratio from Allende Utilizing a NanoSIMS 50L Ion Microprobe](#) [#1740]
We report high-precision Mg isotopic measurements in melilite, spinel and fassaite in an Allende CAI by a NanoSIMS 50L with four Faraday cups in multidetection in order to evaluate the chronology of complex history of CAIs in the early solar system.
- 10:30 a.m. Wadhwa M. * Janney P. E. Krot A. N.
[Evidence of Disturbance in the \$^{26}\text{Al}\$ - \$^{26}\text{Mg}\$ Systematics of the Efremovka E60 CAI: Implications for the High-Resolution Chronology of the Early Solar System](#) [#2495]
We report results of a laser ablation MC-ICPMS study of the Efremovka E60 CAI. Our data indicate that the ^{26}Al - ^{26}Mg systematics in E60 are disturbed and we present the chronological implications of this finding.
- 10:45 a.m. Kleine T. * Bourdon B. Irving A. J.
[Hf-W Chronology of the Angrite Parent Body: Timing of Accretion, Core Formation and Magmatism](#) [#2403]
We present Hf-W isochrons for angrites and compare the Hf-W ages to those obtained from the Pb-Pb, Al-Mg and Mn-Cr chronometers. The Hf-W data are furthermore used to estimate the timescale for the accretion and earliest differentiation of the angrite parent body.
- 11:00 a.m. Shukolyukov A. * Lugmair G. W. Irving A. J.
[Mn-Cr Isotope Systematics of Angrite Northwest Africa 4801](#) [#1381]
We studied the Mn-Cr isotope systematics of the angrite Northwest Africa and calculated a $^{53}\text{Mn}/^{55}\text{Mn}$ ratio of $(0.96 \pm 0.04) \times 10^{-6}$ at the time of isotope closure. These data combined with a precise absolute Pb-Pb age allow to use this meteorite as an absolute time marker.
- 11:15 a.m. Bouvier A. * Wadhwa M.
[Synchronizing the Absolute and Relative Clocks: Pb-Pb and Al-Mg Systematics in CAIs from the Allende and NWA 2364 CV3 Chondrites](#) [#2184]
A Pb-Pb internal isochron of a type-B CAI from the NWA 2364 CV3 chondrite gives an absolute age of 4568.6 ± 0.2 Ma which contrasts with previous internal Pb-Pb ages of CAIs from Allende and Efremovka. Al-Mg systematics are also reported for CV3 CAIs.
- 11:30 a.m. Qin L. * Alexander C. M. O'D. Carlson R. W. Horan M. F.
[Understanding Various Contributions to the Chromium Isotopic Composition of Meteorites, and Their Implications for Mn-Cr Chronology](#) [#1672]
We show here that both nucleosynthetic effects and cosmogenic effects can contribute to the variations observed in Cr isotopic composition of meteorites. These suggest caution in use of the Mn-Cr chronometer.

Friday, March 27, 2009
SEEK OUT AND EXPLORE: UPCOMING AND FUTURE MISSIONS
8:30 a.m. Waterway Ballroom 6

Chairs: **Agustin Chicarro**
Wendy Calvin

- 8:30 a.m. Meyer M. *
[*Mars Science Laboratory in Context*](#) [#2210]
The Mars Science Laboratory (MSL) is considered the first astrobiology mission since Viking and represents a major step in assessing the preservation potential of martian deposits, opening the window to paleoenvironments and guiding us on what to seek on future missions.
- 8:45 a.m. Vasavada A. R. * MSL Science Team
[*Mars Science Laboratory: Looking Ahead to 2011*](#) [#1441]
The Mars Science Laboratory, now scheduled for launch in late 2011, retains the next-generation scientific and technological capabilities that make it a critical element in NASA's Mars Exploration Program.
- 9:00 a.m. Newsom H. E. * Ollila A. M. Lanza N. L. King P. Gallegos Z. Osinski G. R. Clegg S. M. Wiens R. C. Vaniman D. Lee P. Glass B. J. Walker E. Thackrey S. Parnell J.
[*Simulated Rover Field Test at the Haughton-Mars Project Impact Crater Field Station*](#) [#1446]
Initial results from a field test for several Mars Science Laboratory instruments at the Haughton impact structure.
- 9:15 a.m. Chicarro A. F. *
[*MARS-NEXT—A Future Major Step in the European Exploration of Mars*](#) [#1271]
The Mars-NEXT mission represents a new concept for a three-lander network on Mars within ESA's Exploration Programme, to investigate the interior of the planet, its atmospheric dynamics, and the geology of each landing site.
- 9:30 a.m. Banerdt W. B. *
[*Cerberus: A Mars Geophysical Network Mission for New Frontiers*](#) [#2485]
We are developing a three-lander mission to Mars carrying geophysical instrumentation that fits within the New Frontiers guidelines. This mission will investigate the deep interior with seismometers, precision tracking and EM sounding.
- 9:45 a.m. Klesh A. T. *
[*SHOTPUT Sample Return: Examining the Compositional Gradient of Small-Body Objects*](#) [#1223]
A unique trajectory exists that will allow the visiting of 2001 HM10, (624) Hektor and S/2006 and 39/P Oterma. We present a mission design with triple impactors and sample return capability to establish a compositional gradient of small-body objects.
- 10:00 a.m. Colaprete A. Briggs G. Ennico K. Wooden D. Heldmann J. L. Sollitt L. Asphaug E. Korycansky D. Schultz P. Christensen A. Galal K. Bart G. D. LCROSS Team
[*An Overview of the Lunar Crater Observation and Sensing Satellite \(LCROSS\) Mission — An ESMD Mission to Investigate Lunar Polar Hydrogen*](#) [#1861]
The primary objective of the Lunar Crater Observation and Sensing Satellite (LCROSS) is to confirm the presence or absence of water ice in a permanently shadowed polar region.
- 10:15 a.m. Delory G. T. * Elphic R. Morgan T. Colaprete T. Horanyi M. Mahaffy P. Hine B. Boroson D.
[*The Lunar Atmosphere and Dust Environment Explorer \(LADEE\)*](#) [#2025]
We describe the Lunar Atmosphere and Dust Environment Explorer (LADEE) mission, designed to study the pristine lunar exosphere and dynamic dust activity.

- 10:30 a.m. Miller R. S. * Bonamente M. Burgess J. M. Jenke P. Lawrence D. J. O'Brien S. Orr M. R. Paciesas W. S. Young C. A.
[*The Lunar Occultation Observer \(LOCO\) — A Nuclear Astrophysics All-Sky Survey Mission Concept*](#) [#1364]
The Lunar Occultation Observer (LOCO) is a new γ -ray astrophysics mission concept expected to have unprecedented sensitivity in the nuclear regime. Operating in lunar orbit, LOCO will utilize lunar occultation imaging to survey and probe the cosmos.
- 10:45 a.m. Cohen B. A. * Bassler J. A. McDougal J. M. Harris D. W. Hill L. Hammond M. S. Morse B. J. Reed C. L. B. Kirby K. W. Morgan T. H. ILN Science Definition Team
MSFC/APL ILN Engineering Team
[*The International Lunar Network \(ILN\) Anchor Nodes Mission Update*](#) [#2021]
The Anchor Nodes project at MSFC and APL will contribute 2–4 small geophysical stations to the ILN, improving our understanding of lunar interior structure and composition. We report our progress in pre-Phase A science and engineering activities.
- 11:00 a.m. Smith A. * Crawford I. A. Barber S. J. Brown P. Church P. Gao Y. Gowen R. A. Griffiths A. Hagermann A. Joy K. Pike W. T. Phipps A. Proud W. G. Sheridan S. Sims M. R. Talboys D. L. Wells N.
[*MoonLITE Programmatic and Technological Update*](#) [#1508]
MoonLITE is a proposed four penetrator lunar mission. Following a US/UK working group assessment, a science assessment and the first UK impact trials, a full mission-level phase A study has begun. A technological and programmatic update of the mission is given.
- 11:15 a.m. Weisbin C. R. * Clark P. Shelton K. Smith J. H. Mrozinski J. Lincoln W. Elfes A. Hua H. Adumitroaie V. Silberg R.
[*Formulation, Modeling and Analysis of a Mission to the Moon's Malapert Mountain*](#) [#1054]
This study analyzes a proposed exploration mission which takes a group of astronauts and their robotic assistants from a landing site at Shackleton Crater near the lunar south pole to Malapert Mountain, which is about 130 km away.
- 11:30 a.m. Lebreton J-P. * Niebur C. Cutts J. Falkner P. Greeley R. Lunine J. Blanc M. Coustenis A. Pappalardo R. Matson D. Clark K. Reh K. Stankov A. Erd C. Beauchamp P.
[*Joint NASA-ESA Outer Planet Mission Study Overview*](#) [#2383]
This presentation is an overview of the Outer Planet Mission [Europa Jupiter System Mission (EJSM) or Titan Saturn System Mission (TSSM)] selected by NASA and ESA and outlines the next steps toward implementation.

Friday, March 27, 2009
MARS: EARLY HISTORY AND IMPACT PROCESSES
1:30 p.m. Waterway Ballroom 1

Chairs: Shane Byrne
Lon Hood

- 1:30 p.m. Frey H. V. *
[*New Large Late Heavy Bombardment Impact Basins on Mars Revealed in Crustal Thickness Data: Crater Retention Ages and Implications*](#) [#1123]
Crater retention ages for newly identified large impact basins are not significantly older than for basins already known. The large impact late heavy bombardment on Mars was a relatively brief event or the record of previous large impacts was erased.
- 1:45 p.m. Rodriguez J. A. P. * Kargel J. S. Tanaka K. L. Berman D. C.
[*Construction of a Volatile-rich Martian Upper Crust During the Impact Cataclysm*](#) [#2347]
We have investigated the distribution of pristine and degraded impact craters and QCDs in the plateau surfaces forming the peripheries of the chasmata, chaotic terrains and outflow channels in order to investigate the construction of a volatile-rich crust in the region.
- 2:00 p.m. Lillis R. J. * Halekas J. S. Louzada K. L. Stewart S. T. Manga M.
[*Impact Demagnetization at Mars: Using Multiple Altitude Magnetic Field Data to Constrain Properties of Crustal Magnetization*](#) [#1444]
We use statistical magnetization modeling and magnetic field data at two separate altitudes (185 km and ~400 km) in order to constrain crustal magnetization properties at martian impact craters. At Hellas, the demagnetization radius is 1.18 times the basin radius.
- 2:15 p.m. Hood L. L. * Harrison K. P. Langlais B. Lillis R. J. Poulet F. Williams D. A.
[*Correlations of Martian Crustal Magnetic Fields With Valley Networks, Phyllosilicate Exposures, and Volcanic Constructs: Implications for Magnetic Sources and Dynamo History*](#) [#1747]
We report correlations of (a) phyllosilicate exposures identified using Mars Express OMEGA data with strong crustal fields and valley networks; and (b) weaker magnetic anomalies with the Medusae Fossae Formation adjacent to Apollinaris Patera.
- 2:30 p.m. Loizeau D. * Bouley S. Mangold N. Meresse S. Costard F. Poulet F. Ansan V. Le Mouelic S. Bibring J.-P. Gondet B. Langevin Y.
[*Tyrrhena Terra: Hydrated Lobate Ejecta and Plains*](#) [#2010]
Hydrated minerals as phyllosilicates have been identified with OMEGA/Mars Express in Tyrrhena Terra, both on crater ejecta blankets and alluvial plains. Hypothesis are formulated about their origin and link.
- 2:45 p.m. Schwenzer S. P. * Kring D. A.
[*Impact-generated Hydrothermal Alteration on Mars: Clay Minerals, Oxides, Zeolites, and More*](#) [#1421]
We explore alteration mineral assemblages produced in hydrothermal systems as a function of host rock variability and thermochemical conditions and compare the results to OMEGA and CRISM data.
- 3:00 p.m. Barnhart C. J. * Nimmo F. Travis B. J.
[*Observable Effects of Post-Impact Hydrothermal Systems Incorporating Freezing*](#) [#2013]
We model post-impact hydrothermal systems exposed to subfreezing temperatures and quantify observable geochemical and geomorphic signatures such as discharge rate, total discharge volume, and W/R ratios.

- 3:15 p.m. HiRISE Team Ivanov B. A. * Melosh H. J. McEwen A. S.
[*Small Impact Crater Clusters in High Resolution HiRISE Images - II*](#) [#1410]
We present the analysis of new data on small craters and crater clusters accumulated by the HiRISE team for the first 10,000 orbits of MRO.
- 3:30 p.m. Burleigh K. J. * Melosh H. J. Tornabene L. L. McEwen A. S.
[*Small Impacts Trigger Dust Landslides on Mars*](#) [#1431]
Small (~10 m diameter) recent craters on Mars triggered large numbers of small dust avalanches. Mapping reveals that the trigger mechanism is airblast by the incoming bolide, not seismic shaking.
- 3:45 p.m. Byrne S. * Dundas C. M. Kennedy M. R. Mellon M. Shean D. Daubar I. Cull S. Seelos K. D. Murchie S. Cantor B. Arvidson R. E. Edgett K. McEwen A. Harrison T. Posiolova L. Seelos F. P. HiRISE Team CTX Team CRISM Team
[*Excavation of Subsurface Ice on Mars by New Impact Craters*](#) [#1831]
New impact craters, a few meters in size, have excavated ground ice in the martian mid-latitudes. HiRISE data show sublimation of this exposed ice over six months. We will describe this new discovery and discuss the implications of the ice-table depth.
- 4:00 p.m. Clevy J. R. * Kattenhorn S. A.
[*Localized Seasonal Variations in Water Equivalent Hydrogen on Mars and Possible Relationship to Recent Impacts*](#) [#2265]
Seasonal variations in water equivalent hydrogen in the eastern equatorial region of Mars, as determined from neutron spectrometer data, are considered to be a potential result of recent impacts having exposed materials rich in water ice.
- 4:15 p.m. Kreslavsky M. A. *
[*Dynamic Landscapes at High Latitudes on Mars: Constraints from Populations of Small Craters*](#) [#2311]
Statistical properties of populations of small impact craters at the high-latitude patterned ground on Mars indicate very quick modification and obliteration of craters and hence highly dynamic landscapes.
- 4:30 p.m. Hartmann W. K. * Quantin C. Werner S. C. Popova O.
[*Ice Flow in Debris Aprons and Central Peaks, and the Application of Crater Counts*](#) [#1204]
We apply studies of decameter-scale craters to studies of probable ice-flow-related features on Mars, to interpret both chronometry and geological processes among the features. We find losses of decameter-scale craters relative to nearby plains, probably due to sublimation.

Friday, March 27, 2009
MARS ANALOGS I: CHEMICAL AND SPECTRAL
1:30 p.m. Waterway Ballroom 4

Chairs: Lindsay McHenry
Eldar Noe Dobrea

- 1:30 p.m. Gough R. V. * Tolbert M. A. McKay C. P. Toon O. B.
[Methane Adsorption on Martian Soil Analogs: A Possible Abiogenic Explanation for Methane Variability](#) [#1968]
We report laboratory results of methane adsorption onto JSC-Mars-1. Uptake coefficient values are small; however, atmospheric methane can access a large mineral surface area in the regolith. Significant methane may be temporarily lost in a season.
- 1:45 p.m. Pommerol A. * Schmitt B. Beck P. Brissaud O.
[Water Sorption on Martian Regolith Analogs: Near-Infrared Reflectance Spectroscopy and Thermodynamics](#) [#1608]
Adsorption of water by a suite of six plausible martian regolith analogs is experimentally investigated. Adsorption and desorption isotherms are measured as well as near-infrared reflectance spectra for each step of hydration/dehydration processes.
- 2:00 p.m. Rull F. * Sansano A. Sobron P. Lafuente B. Sarrazin P. Gailhanou M. Blake D.
[Raman and XRD Field Characterisation of Sulfate Efflorescences at Rio Tinto \(Spain\)](#) [#1974]
In this work a comparative *in situ* analysis of evaporate minerals from Rio Tinto (Spain) is undertaken using two techniques selected for Mars exploration: Raman spectrometer and CheMin XRD both selected as part of the ExoMars and MSL missions respectively.
- 2:15 p.m. McHenry L. J. * Chevrier V. F. Schröder C.
[Jarosite in an East African Saline-Alkaline Paleolake Deposit: Implications for Mars](#) [#1635]
Jarosite occurs in zeolite-dominated altered tephra from a pleistocene saline-alkaline lake deposit at Olduvai Gorge, Tanzania. This suggests that the presence of jarosite alone is insufficient evidence to demonstrate dominantly acidic conditions.
- 2:30 p.m. Potter S. L. * Chan M. A.
[Characterization of Navajo Sandstone Concretions: Mars Comparisons and Criteria for Distinguishing Diagenetic Origins](#) [#2100]
Characterization of Utah concretions and Mars spherules yields important criteria for distinguishing diagenetic origin in comparison to other models. The similarities between the two examples suggest a concretionary genesis for the Mars spherules.
- 2:45 p.m. McAdam A. C. * Sharp T. G. Leshin L. A. Harvey R. P. Hoffman E. J.
[Antarctic Mars Analogs and Interpretation of Martian Alteration Signatures](#) [#1032]
The dominant process which produced Antarctic clay-bearing soils from a Mars analog lithology was physical weathering of the deuterically altered parent rock. Lesser low temperature weathering produced salts, more Fe oxides, and minor clays minerals.
- 3:00 p.m. Noe Dobrea E. Z. * McKeown N. Bishop J. L. Silver E.
[Terrestrial Analog Studies of Mawrth Vallis, Mars: The Painted Desert](#) [#2165]
We perform airborne hyperspectral imaging studies of the Painted Desert, an analog site to Mawrth Vallis, Mars. These complement field studies of the same site.

- 3:15 p.m. Garvie L. A. J. * Burt D. M. Buseck P. R.
[*A Microscopists View of Desert Varnish from the Sonoran Desert*](#) [#1344]
Nanometer-scale element mapping and spectroscopy of desert varnish reveals a dynamic disequilibrium system characterized by post-depositional mineralogical, chemical, and structural changes, activated by liquid water.
- 3:30 p.m. Chemtob S. M. * Rossman G. R. Eiler J. M. Jolliff B. L.
[*Silica Coatings on the 1974 Kilauea Flow: New SEM and SIMS Results and Implications for Mars*](#) [#2156]
Silica and Fe-Ti oxide coatings occur on young flows in the Ka'u Desert, Hawaii, a Mars analog terrain. We present new textural, spectral and isotopic observations to determine the coating formation mechanism and apply the results to silica on Mars.
- 3:45 p.m. McDowell M. L. * Hamilton V. E. Cady S. L. Knauth P.
[*Thermal Infrared and Visible to Near-Infrared Spectral Analysis of Chert and Amorphous Silica*](#) [#1419]
We look in detail at the thermal infrared and visible to near-infrared spectra of various forms of chert and amorphous silica and compare the spectral variations between samples with variations in physical and chemical characteristics.
- 4:00 p.m. Rampe E. B. * Kraft M. D. Sharp T. G.
[*Chemical Weathering Trends from TIR Spectral Models: Implications for Deriving Weathering Trends from Martian Spectral Data*](#) [#2132]
We compare measured chemical compositions and weathering trends of terrestrial basalts to those derived from TIR spectral models. Deriving true chemistry and weathering trends from TIR models of weathered surfaces on Mars may be impractical.
- 4:15 p.m. Hardgrove C. J. * Moersch J. E. Whisner S. C.
[*Identification of Sedimentary Processes on Alluvial Fans Using Thermal Images and Ground Truth*](#) [#1211]
Aerial thermal images and ground based observations are used to study sedimentary processes on a wide assortment of alluvial fans in desert southwest. Thermal images reveal evidence of channelized flow, debris flows, levees and weathering processes.
- 4:30 p.m. Murphy N. W. * Jakosky B. M. Mellon M. T. Budd D. A.
[*Thermophysical Properties of Martian Duricrust Analogs*](#) [#1420]
We measured thermophysical properties of samples of terrestrial duricrust from a gypsum deposit in New Mexico and Lunar Lake Playa. Our results suggest that well-indurated materials may cover a significant portion of the Mars surface.

Friday, March 27, 2009
ACHONDRITES AND THEIR PARENT BODIES
1:30 p.m. Waterway Ballroom 5

Chairs: Gretchen Benedix
Edward Scott

- 1:30 p.m. Kita N. T. * Goodrich C. A. Spicuzza M. J. Valley J. W.
[*Oxygen Isotopes in Ungrouped Achondrite NWA 1500 and Comparison to Brachinites*](#) [#1393]
NWA 1500 ungrouped achondrite may be related to brachinite based on new oxygen isotope analyses using both SIMS and laser fluorination methods. We compare NWA 1500 with brachinites and ureilites and discuss their parent body processes.
- 1:45 p.m. Shirai N. * Humayun M. Righter K.
[*Analysis of Moderately Siderophile Elements in Angrites: Implications for Core Formation of the Angrite Parent Body*](#) [#2122]
We determined moderately siderophile element abundances in angrites. Based on the analytical data, we discuss the core formation of the angrite parent body.
- 2:00 p.m. Benedix G. K. * McCoy T. J. Spratt J.
[*Thermodynamic Constraints on the Formation History of Lodranites*](#) [#1494]
We discuss closure temperatures and oxidation state of lodranites and compare to acapulcoites, winonaites and IAB irons. The effect of melting on oxidation state is elucidated by the presence of two different populations of chromite.
- 2:15 p.m. Gardner-Vandy K. G. * McCoy T. J. Laretta D. S.
[*Formation Conditions of FeO-rich Primitive Achondrites*](#) [#2520]
We present a study of the fO_2 conditions under which the FeO-rich primitive achondrites (the brachinites and several ungrouped primitive achondrites) formed, and we relate these conditions to those of other primitive achondrite groups.
- 2:30 p.m. Huang S. * Humayun M. Downes H. Singletary S. Van Orman J. A. Jacobsen S. B.
[*Petrogenesis of Augite-bearing Ureilites: A LA-ICP-MS Approach*](#) [#1330]
Major, minor and trace elements have been determined on silicate minerals from ureilites LAR 04315, North Haig and FRO 93008 using LA-ICP-MS. The element compositions in ureilite minerals are consistent with ureilites being melting/smelting restites from a spinel peridotite.
- 2:45 p.m. Ash R. D. Goodrich C. A. * McDonough W. F. Van Orman J. A.
[*Metal in Ureilites: Siderophile Elements from LA-ICP-MS*](#) [#1422]
Ureilites are hard to understand. Why did God make so many ureilites? We address this question with LA-ICP-MS analyses of siderophile elements in metal, oxidized metal and silicates in ureilites.
- 3:00 p.m. Van Orman J. A. * Goodrich C. A. Wilson L.
[*Metal and Siderophile Elements in Ureilites: Reconciliation with Smelting?*](#) [#1986]
Ureilite bulk siderophile patterns can be reasonably modeled by batch or fractional melting in the Fe-S system, within a narrow range of starting compositions. Lack of fractionation in the Fe-C system does not contradict a smelting model.
- 3:15 p.m. Scott E. R. D. * Bogard D. D. Bottke W. F. Taylor G. J. Greenwood R. C. Franchi I. A. Keil K. Moskovitz N. A. Nesvorny D.
[*Impact Histories of Vesta and Vestoids Inferred from Howardites, Eucrites, and Diogenites*](#) [#2295]
Impact histories of Vesta, vestoids and other V-type asteroids are investigated using constraints from oxygen isotopic compositions and Ar-Ar ages of HEDs and ungrouped eucrites, and dynamical and astronomical studies of main belt asteroids.

- 3:30 p.m. Warren P. H. * Huber H. Choe W.
[*Siderophile and Other Geochemical Mixing Relationships Among HED-Meteoritic Breccias: Need for Recognition of Regolithic Howardite as a Distinct Subtype*](#) [#2471]
We report new (mainly INAA) data on the major- and trace-element bulk compositions of ~100 HEDs; these, along with noble-gas and petrographic data, show that that only a small and distinctive subset of the howardites are truly regolithic breccias.
- 3:45 p.m. Day J. M. D. * Walker R. J. Rumble D. III Irving A. J.
[*Peridotites from Another Planet? Osmium Isotope and Highly Siderophile Element Constraints on the Evolution of Diogenites and the HED Parent Body*](#) [#1992]
Highly siderophile element systematics of diogenites point to chondritic relative proportions of these elements in the HED parent body, providing new insight into planetary accretion processes.
- 4:00 p.m. Yamaguchi A. * Takeda H. Barrat J. A.
[*Petrology of Ferroan Diogenites, Yamato 75032 Type, Asuka 881839, and Dhofar 700*](#) [#1547]
Y-75032 type, A 881839, Dho 700 are among the most ferroan diogenites, slightly more magnesian than cumulate eucrites. Minor element compositions in pyroxenes and chromite compositions indicate that Y-75032 type and the ferroan diogenites formed from different parental melts.
- 4:15 p.m. Isa J. * Yamaguchi A. Shinotsuka K. Ebihara M.
[*Northwest Africa 1109 and Camel Donga: Metal-bearing Brecciated Eucrites*](#) [#1919]
Two eucrites NWA1109 and Camel Donga contain significant amounts of Fe-metals. In order to better understand the origin of the Fe-metals, we performed a petrological and geochemical study of these meteorites.
- 4:30 p.m. Mittlefehldt D. W. * Beck A. W. Lee C.-T. A. McSween H. Y. Jr.
[*Chemistry of Diogenites and Evolution of Their Parent Asteroid*](#) [#1038]
Trace element compositions have been determined for a suite of diogenites. The results are discussed in the context of HED parent asteroid differentiations.

Friday, March 27, 2009
PLANNING FOR FUTURE EXPLORATION OF THE MOON
1:30 p.m. Waterway Ballroom 6

Chairs: Jacob Bleacher
Noah Petro

- 1:30 p.m. Neal C. R. *
[*The Lunar Exploration Roadmap: A Progress Report from the Lunar Exploration Analysis Group \(LEAG\) \[#2558\]*](#)
The paper is a summary of progress to date of progress of LEAG in developing a grassroots community Lunar Exploration Roadmap.
- 1:45 p.m. Stubbs T. J. Glenar D. A. * Richard D. T. Colaprete A.
[*Predictions for the Optical Scattering at the Moon, as Observed by the LADEE UV/Vis Spectrometer \[#2348\]*](#)
Predictions are made for exospheric atomic line emissions, coronal and zodiacal light, as well as for "lunar horizon glow" produced by the forward scattering of sunlight by exospheric dust.
- 2:00 p.m. Halekas J. S. * Delory G. T. Stubbs T. J. Farrell W. M. Lin R. P.
[*Developing a Predictive Capability for Lunar Surface Charging During Solar Energetic Particle Events \[#1357\]*](#)
We investigate lunar surface charging during solar energetic particle events, with the aim of developing a predictive capability. The lunar surface can charge to kilovolt-scale negative potentials during these events, which has possible implications for lunar exploration.
- 2:15 p.m. Xiao Z. * Zeng Z. Xie H. Birnbaum S. J. Zhang Z.
[*A Preliminary Study on the Effect of Lunar-Dust Movement on the Lunar Magnetic Field \[#1227\]*](#)
Result from our model, the Electromagnetic Induction Model of Charged Active Lunar Dust, suggests the movement of lunar dust has influenced the lunar magnetic field and the influence is not negligible.
- 2:30 p.m. Kuhlman K. R. * Sridharan K. Garrison D. H. McKay D. S. Taylor L. A.
[*Decay of Reactivity Induced by Simulated Solar Wind Implantation of a Forsteritic Olivine \[#2303\]*](#)
LADTAG is studying the lifetime of reactive sites on the surfaces of irradiated lunar analogs of interest to those studying human health because of the free radicals that may be formed and not passivate when exposed to spacecraft air.
- 2:45 p.m. Siegler M. A. * Bills B. G. Paige D. A.
[*History of the Lunar Polar Cryosphere \[#2259\]*](#)
Cold traps near the lunar poles have not always existed due to changes in the lunar orbit. We examine a 4.5 Byr history of insolation in the lunar polar environment and the resulting surface and subsurface temperatures to comment on ice mobility.
- 3:00 p.m. Hibbitts C. A. * Dyar M. D. Orlando T. M. Grieves G. Szanyi J.
[*Cold Trapping of Volatiles in the Lunar Regolith \[#1926\]*](#)
Water may cold trap (cryosorb) onto non-ice materials at the lunar poles, and not exist as ice. Water can remain present, adsorbed onto the samples, at several 10s of degrees above which its ice would sublime, but not at or near room temperature.
- 3:15 p.m. Fouch M. J. * Garnero E. J. Robinson M. S. Yu H.
[*A New Paradigm for Seismic Exploration of the Moon, Mars, and Beyond \[#2233\]*](#)
In this abstract, we propose a new approach to seismic exploration of the Moon using arrays of seismic systems, which we term Small Aperture Lunar Seismic Arrays (SALSAs).

- 3:30 p.m. Li R. * Wu B. He S. Skopljak B. Yilmaz A. Jiang J. Banks M. S. Oman C. Bhasin K. B. Warner J. D. Knoblock E. J.
[*LASOIS: Enhancing the Spatial Orientation Capabilities of Astronauts on the Lunar Surface*](#) [#1191]
This paper presents the initial efforts in developing a Lunar Astronaut Spatial Orientation and Information System (LASOIS) to enhance the spatial-orientation capabilities of astronauts on the lunar surface to support future lunar manned missions.
- 3:45 p.m. Kohout T. * O'Sullivan K. Losiak A. Thaisen K. G. Weider S. Kring D. A.
[*Scientific Opportunities for Human Exploration of the Moon's Schrödinger Basin*](#) [#1572]
The Schrödinger Basin provides a diverse suite of scientific opportunities because of the superposition of several geologic processes and because of its relatively young age. Three possible landing sites were evaluated for human exploration.
- 4:00 p.m. Clark P. E. * Bleacher J. Mest S. Petro N. Leshin L.
[*Lunar Field Exploration Scenarios for a South Pole Outpost*](#) [#1135]
Three major 10–100's km scale field science thrusts could address high priority science objectives from the outpost: 1) SPA Basin structure (Malapert, Schrodinger); 2) Bombardment history, South Pole Highlands; 3) Volatile anomaly and inventory study.
- 4:15 p.m. Bleacher J. * Clark P. E. Mest S. Petro N. Leshin L.
[*Lunar Field Exploration Scenarios for Three Sorties*](#) [#2148]
We report the planning of three representative science objective-driven Apollo J scale (10 km radius) sortie missions to sites of potentially high science yield (Marius Hills, Olivine Hill, Nectaris Basin) to supplement outpost activity.
- 4:30 p.m. Yingst R. A. * Gregg T. K. P.
[*Lunar Geologic Mapping: A Preliminary Map of a Portion of the Marius Quadrangle*](#) [#1319]
As part of a new lunar mapping program, we report on a 1:2,500,000-scale preliminary map of a subset of Lunar Quadrangle 10 and discuss the first-order science results.

PRINT ONLY: MERCURY AND VENUS

Barata M. T. Alves E. I. Vaz D.

[*Automatic Extraction of Wrinkle Ridges in Venus Magellan Imagery*](#) [#1025]

The parameters of wrinkle ridges (length, size, orientation) are determinate in a simple way if the wrinkle ridges are easily detected. This work presents the preliminary results of automatic detection of wrinkle ridges from SAR imagery at different scales.

Holin I. V.

[*Mercury's Core from Radar to Orbiter*](#) [#1016]

Messenger and BepiColombo will determine the state and size of Mercury's core to high precision. Earth-based radar can improve the final accuracies. In an intermediate state of the core additional information is desirable.

Kozlova E. A.

[*The Thermal Regime of "Low-Latitudinal" Cold Traps on Mercury*](#) [#1956]

Using the two-layer model we calculate the diurnal variance of subsurface temperatures on the depth at the different thickness of regolith layer. The calculations demonstrate that the water ice deposits can exist in such conditions during geological time.

PRINT ONLY: MOON

Abdrakhimov A. M.

[*Re-Examine Lunokhod Sites: Old and New Geochemical Data*](#) [#2547]

The geochemical comparing of soviet lunar rovers data and Clementine data were executed.

Evans R. Wöhler C. Lena R.

[*Analysis of Absorption Trough Features Using Clementine UVIS+ NIR Imagery*](#) [#1093]

This study explores the mapping of spectral parameters of lunar features, describing the absorption trough near 1000 nm, using the calibrated Clementine UVIS+NIR data set covering the wavelength range between 415 and 2000 nm.

Peters S. Foing B. H. Koschny D. Grieger B. Lossett J.-L. Beauvivre S. Grande M. Huovelin J. Keller H. U. Mall U. Nathues A. Malkki A. Noci G. Sodnik Z. Kellett B. Pinet P. Chevrel S. Cerroni P. de Sanctis M. C. Barucci M. A. Erard S. Despan D. Muinonen K. Shevchenko V. Shkuratov Y. Ellouzi M. Peters S. Borst A. Bexkens F. Almeida M. Frew D. Volp J. Heather D. McMannamon P. Camino O. Racca G.

[*SMART-1: Review of Lunar Highlights*](#) [#2298]

The SMART-1 spacecraft operated from 400-3000 km for 1.5 year until impact. We shall report at LPSC2009 on SMART-1 lunar highlights relevant for science and exploration, in relation with subsequent missions Kaguya, Chang'E1 and Chandrayaan-1.

Ivatury V. McClanahan T. P.

[*Image Restoration of Lunar Neutron Albedo Maps for the Lunar Exploration Neutron Detector \(LEND\)*](#) [#1134]

Determine the optimal image restoration technique for restoring the hydrogen lunar albedo maps for the Lunar Exploration Neutron Detector (LEND) on the Lunar Reconnaissance Orbiter (LRO).

Khisina N. Nazarov M. Senin V. Mohov A.

[*Cr-Ca Symplectite Lamellae in an Olivine Grain from the Luna-24 Regolith*](#) [#1053]

Lamellae of Cr-Ca symplectites consisted of spinel + diopside + orthopyroxene + larnite in the olivine grain from Luna-24 regolith were investigated using of EMPA and ASEM. The origin of the Ca-Cr symplectite lamellae is discussed.

Lena R. Wöhler C.

[*Effusive Lunar Domes Near Kepler and Piccolomini: Morphometry and Mode of Emplacement*](#) [#1092]

In this study we provide a comparative morphometric and rheologic analysis of two lunar effusive domes, located in Oceanus Procellarum to the west of the crater Kepler, and inside Rupes Altai near the crater Piccolomini, respectively.

McCallum I. S. Mullen E. K.

[*Mare Basalt Petrogenesis Revisited: Rb/Sr, Sm/Nd and Lu/Hf Fractionation Factors, Mantle Source Regions and Crustal Contamination*](#) [#2380]

Fractionation factors (Rb/Sr, Sm/Nd, Lu/Hf) of mare basalts at the time of formation constrain the mineralogy and melt fraction of mantle sources. For all but high-K basalts, mantle residues are harzburgitic. High-K basalts are KREEP contaminated.

Pugacheva S. G. Shevchenko V. V. Chikmachev V. I.

[*The Dependence of the Chemistry on the Depth for the South Pole-Aitken Lunar Basin*](#) [#1109]

The distribution of the major chemical elements (Fe and Th) depending upon the structure height levels of the South Pole-Aitken Lunar Basin, has been obtained.

Shevchenko V. El-Baz F. Gaddis L. Hiesinger H. Shkuratov Yu. Whitaker E. Wilson L. Blue J.
[*The IAU/WGPSN Lunar Task Group and the Status of Lunar Nomenclature*](#) [#2016]

This abstract summarizes the rules for naming features on planets as well as the status of nomenclature for the Moon.

Wöhler C. Lena R.

[*The Lunar Concentric Crater Archytas G Associated with an Intrusive Dome*](#) [#1091]

In this study we show that the lunar concentric crater Archytas G is associated with the intrusive dome Ar1. We estimate the morphometric parameters of Archytas G and Ar1 and discuss possible modes of formation for the concentric crater.

PRINT ONLY: MARS

Bibring J-P. Poulet F. Morbidelli A.

[*The Martian P/T Transition: Sounding Mars Early Evolution and Habitability*](#) [#2093]

Mars evolution can be traced by its surface mineralogy, as inferred from orbital (OMEGA/MEX and CRISM/MRO) data. The Noachian includes a diversity of eras with distinct environments, the Phyllosian/Theikian transition ending the habitability era.

Haltigin T. W. Pollard W. H. Osinski G. R. Dutilleul P.

[*Polygon Morphology Within Scalloped Depressions, Utopia Planitia, Mars*](#) [#2566]

This paper examines possible periglacial landforms in ice-rich sediments within Utopia Planitia, Mars, using an examination of HiRISE imagery to demonstrate that polygonal terrain morphology varies with the stage of scalloped depression development.

Heet T. Arvidson R. E. Mellon M. T. Phoenix Science Team

[*Regional Geology and Rock Distributions of the Mars Phoenix Landing Site*](#) [#1114]

A geologic map of the Phoenix Mars landing site is presented. Crater counts are used to date mapped units and rock distributions provide insight into the origin and alteration of surface materials.

Maxe L. P.

[*Martian Dust as an End-Member of Semi-Cosmic Weathering*](#) [#2020]

The martian dust is a compound close to terrestrial amorphous spinel's minerals such as Hercynite, spinel ferrites. The semi-cosmic weathering affects the mineral surface by both ways: reduction (in the top layer) and oxidation (in the deeper layer).

Molina A. de Pablo M. A. Ramos M.

[*Study of the Surface Temperature at Nili Fossae, Mars. Preliminary Results.*](#) [#1031]

Here we present our preliminary analysis of surface temperature from BTR THEMIS IR data focused on the study of a possible permafrost and active layer in Nili Fossae, Mars.

Nußbaumer J. W.

[*Liquid Water Formed Scroll Bars in River Meanders for Decades in Elysium Planitia, Mars*](#) [#1437]

HiRISE images show evidence for meandering channels with scroll bars in parts of southern Elysium, Mars. The river formed meanders during a wetter climate in the past and during long term wet conditions.

Petrowsky M. J. Jones R. Coleman N. M.

[*Structural Deformation and Surface Properties of a Martian Crater — Insights from THEMIS Infrared Images*](#) [#1213]

We use THEMIS infrared images to analyze the history and surface properties of a large crater on Mars. We take advantage of a special condition – that the crater floor was offset by faulting, revealing a cross-section of underlying strata.

Sprenke K. F.

[*Magnetic Anomalies Within the Elliptical Borealis Basin of Mars*](#) [#1140]

Significant magnetic anomalies exist within the proposed elliptical Borealis Basin of Mars. These anomalies raise questions about the actual shape of the mega-impact basin as well as timing of the core field relative to the purported single impact.

Thomas C. Picaud S. Mousis O. Ballenegger V.

[*A Theoretical Investigation of the Influence of Clathrate Hydrates on the Atmosphere of Mars*](#) [#1264]

Traces of methane have recently been evidenced in the martian atmosphere. Clathrate hydrates may be at the origin of the detected CH₄, if a primitive methane-rich atmosphere has existed or if a subsurface source of CH₄ has been (or is still) present.

Tichý M.

[*A Creeping Soil Field on Mars*](#) [#1190]

A creeping soil field exists on Mars. A mass of martian soil moves along rock outcrops, which get abraded, and as a result, strands of abraded material can be observed. Previously the phenomenon was explained as the result of wind streaks.

Valenciano A. de Pablo M. A. Pacifici A.

[*The Role of Water on the Evolution of the Nepenthes Mensae Region of Mars*](#) [#1052]

Here we show the preliminary results of a detailed search of water- and ice-related landforms in the Nepenthes Mensae region of Mars, what will be used in the future for a wide study of the evolution of water in this martian region.

Welty C. B. Crown D. A. Balme M. R.

[*Morphologic Properties of Martian Gully Systems*](#) [#2339]

From high-resolution Mars imagery, analyses of gully morphometric parameters, locations, and settings suggest a source volume dependency over gully length and that gully formation mechanisms are likely consistent across the martian surface.

Xiao L. Smith M. Huang J. He Q. Petford N. Williams D. A. Liu J. G. Greeley R.

[*Volcanic Features on the Syria-Thaumasia Block, Mars: Implications for Ancient Martian Volcanology*](#) [#1026]

This study provides new observations of various volcanic features in the Syria-Thaumasia block. Four types of volcanic features are recognized in the area.

de Pablo M. A. Pacifici A.

[*Chain of Depressions and the Watersheet Evolution in Nepenthes Mensae, Mars*](#) [#1095]

Our analysis of the MOLA-derived topographic map of the Nepenthes Mensae area, Mars, revealed the existence of different depressions near the highlands-lowlands boundary. We interpret the depressions such as a possible chain of lakes.

PRINT ONLY: ASTROBIOLOGY

Horner J. Mousis O. Petit J.-M. Jones B. W.

[*Differences Between the Impact Regimes of the Terrestrial Planets*](#) [#1179]

We present detailed results on the similarities and differences between the impact regimes experienced by Venus, the Earth and Mars, taking into account populations of asteroidal and cometary impactors.

Ivarsson M. Lindgren P. Neubeck A. Broman C. Holm N. G. Henkel H.

[*Filamentous Structures in a Hydrothermal System of the Dellen Impact Structure, Sweden — Putative Microfossils?*](#) [#1260]

This is a report on the occurrence of putative microfossils in a hydrothermal system of the Dellen impact structure, Sweden.

Méndez A.

[*Standard Planetary Habitability \(SPH\) of Global Land Areas*](#) [#2333]

This work presents the Standard Planetary Habitability (SPH), a quantity that measures and compares the potential for life of global land areas for primary producers. The SPH provides a simpler and complimentary method to NDVI, faPAR, and NPP to assess the biosphere.

Thomas-Keprta K. L. Clemett S. J. McKay D. S. Gibson E. K. Wentworth S. J.

[*Thermal Decomposition of an Impure \(Roxbury\) Siderite: Relevance to the Presence of Chemically Pure Magnetite Crystals in ALH84001 Carbonate Disks*](#) [#2116]

Thermal decomposition of Roxbury siderite resulted in the formation of impure (Mg,Mn)-ferrites. These findings, which are supported by kinetic and thermodynamic equilibrium modeling studies, are in stark contrast to the chemically pure ALH 84001 magnetite.

PRINT ONLY: METEORITES

Alexandrov A. B. Bagulya A. V. Vladimirov M. S. Goncharova L. A. Ivliev A. I.
Kalinina G. V. Kashkarov L. L. Konovalova N. S. Okat'eva N. M. Polukhina N. G.
Roussetski A. S. Starkov N. I. Tsarev V. A.

[*Super Heavy \(Z>50\) Galactic Cosmic Ray Nuclei Abundance on the Base of the Track Parameters Measuring in the Pallasite Olivine Crystals*](#) [#1407]

New results of the super-heavy cosmic ray nuclei abundance due to the track in the pallasite olivine in the frame of OLIMPIA project are presented. It was detected near 850 tracks with Z>50 and four corresponding Th-U group.

Alexeev V. A.

[*Ordovician Fossil Meteorites in Sweden: Numerous Meteorite Falls or Single Meteorite Shower?*](#) [#1003]

There is no necessity to set up a hypothesis of intensive flux of meteorites to Earth during ~1–2 Ma about 480 Ma ago.

Caporali S. Pratesi G. Moggi-Cecchi V. Franchi I. A. Greenwood R. C.

[*NWA 4419: A New R Chondrite from Northwest Africa*](#) [#2488]

NWA 4419 is an R chondrite recently found in Northwest Africa. Textural, compositional and isotopic data are presented, supporting the classification as R4 chondrite.

Dredge I. Parnell J. Lindgren P. Taylor C. Bowden S.

[*Elevated Flux of Mid-Ordovician Micrometeorites*](#) [#1273]

An elevated flux of micrometeorites is recorded from a mid-Ordovician limestone section in NW Scotland. This coincides with an elevated flux of meteorites detected previously in Sweden.

Golubeva L. F. McFadden L. A. Shestopalov D. I. Hasanova L. O.

[*Comparative Analysis of the Color Characteristics of Vesta's Areas and HED Meteorites*](#) [#1064]

From comparing the colors of the units in the northern hemisphere of Vesta and HED meteorites we inferred that Vesta units differ from HEDs in sizes of grains scattering light and in mineral compositions.

Korochantsev A. V. Lorenz C. A. Ivanova M. A. Zaytsev A. V. Kononkova N. N. Roshina I. A.

Korochantseva E. V. Sadilenko D. A.

[*Sediment-Dispersed Extraterrestrial Chromite in Ordovician Limestone from Russia*](#) [#1101]

The high content of extraterrestrial chromite grains was discovered in Russian Ordovician sediments, those are coeval to Swedish limestones, bearing the fossil meteorites and extraterrestrial chromites.

Kurat G. Zinner E. Varela M. E. Ntaflos T.

[*SiGrMet05: A Silicate-Graphite-Metal Inclusion from the Campo del Cielo \(IAB\) Iron*](#) [#1536]

Lithologies either rich in silicates, or chromite, or graphite, form sub-units of the inclusion, which is cut by metal-graphite veins. Complex break-down reactions of exotic precursors are indicated.

Lavrentjeva Z. A.

[*The Formation of Pallasites*](#) [#1042]

Pallasites may have been formed not from core-mantle boundaries as widely inferred, but from impact-generated mixtures of core and mantle materials.

Lorenz C. A. Teplyakova S. N. Korochantsev A. V. Kononkova N. N. Roshina I. A. Sadilenko D. A.

[*The Structure and Composition of Large Metal Nodule from the Ghubara L5 Chondrite*](#) [#1103]

The large metal nodule was found in the Ghubara L5 chondrite. The metal demonstrates widmannstätten texture that is unique in chondritic metal. The nodule could be formed by the partial or complete impact melting of chondritic precursor.

Lyul A. Yu. Kolesov G. M.

[*Distribution of Some Elements Among Chondrules of Unequilibrated Chondrites: 1. Fe, Cr, Na, and Sc*](#) [#1552]

The histograms of the distribution of Fe, Cr, Na and Sc contents among chondrules of unequilibrated chondrites are presented. Effect of metamorphic processes on chemical composition of chondrules is discussed.

Marakushev A. A. Zinovieva N. G.

[*Liquid Immiscibility in the Parent Bodies of Ordinary Chondrites and Genetic Types of Iron Meteorites*](#) [#1057]

Our data on ordinary chondrites prove their genetic relations with some iron meteorites, which led us to suggest that iron and pallasite cores may occur even in planets of the most primitive (chondritic) evolutionary level.

Miyamoto M. Koizumi E. Mikouchi T.

[*Cooling Rates of Y 980459 and DaG 476 Shergottites on the Basis of Fe-Mg Zoning of Olivine*](#) [#1143]

We have developed a model to calculate the cooling rate by using the Fe-Mg zoning of olivine and applied it to martian meteorites. The results are 0.20°C/h and 0.089°C/h for Y 980459 and DaG 476 shergottites, respectively.

Moggi-Cecchi V. Pratesi G. Franchi I. A. Greenwood R. C.

[*Textural and Compositional Features of NWA 4222, a New Martian Meteorite*](#) [#2387]

Textural and compositional features of the recently discovered martian meteorite NWA 4222 are presented, focusing on differences and affinities with other desert martian meteorites.

Nazarov M. A. Ntaflos Th. Brandstaetter F. Kurat G.

[*FeO/MnO Ratios of Lunar Meteorite Minerals*](#) [#1059]

FeO/MnO ratios of lunar meteorite minerals were determined based on numerous EMP analyses. The ratio of Ca-rich pyroxene was found to be dependent on Ca content and MG#. FeO/MnO ratio of olivines and orthopyroxenes is least variable.

Papike J. J. Karner J. M. Shearer C. K. Burger P. V.

[*Pyroxene Mineralogy of Martian Meteorites: Major and Minor Element Systematics*](#) [#1180]

Chemistry of pyroxene from 19 martian meteorites.

Pizzarello S. Williams L. B.

[*Soluble Organic Species Released from the Insoluble Carbonaceous Material of a Pristine CR2 Meteorite*](#) [#1369]

The hydrothermolytic treatment of a CR2 macromolecular carbonaceous material released several aliphatic and aromatic hydrocarbons.

Pratesi G. Moggi-Cecchi V. Franchi I. A. Greenwood R. C.

[*NWA 4418: A New Mesosiderite from Northwest Africa*](#) [#2430]

NWA 4418 is a new mesosiderite recently found in Northwest Africa. Textural, compositional and isotopic data are presented, and a subclassification as 3B is proposed.

Slyuta E. N. Nikitin S. M. Korochantsev A. V. Lorents C. A. Skripnik A. Ya.

[*Strong Physical and Mechanical Anisotropy of Ordinary Chondrites*](#) [#1051]

The revealed three-dimensional distribution of compressive strength in ordinary chondrites can be approximated by prolate ellipsoid.

Wasson J. T. Choe W.-H.

[*The IIG Iron Meteorites: Probable Formation in the IIAB Core*](#) [#2271]

Because, on most element-Au diagrams, the IIG irons plot along approximate extensions of IIAB trends, we argue that these P-rich irons formed in the evolved IIAB core. Offsets on some element-Au diagrams suggest formation in pockets of P-rich magma.

PRINT ONLY: IMPACTS

Huang J. Xiao L. Wang K.

[*Xifeng Circular Basin: Another Failed Potential Crater in China*](#) [#1035]

There has been no substantiated impact crater in China. In 2006, a possible one was discovered in Xifeng County, Guizhou Province. By analysis of morphology, stratigraphy and impact metamorphism, we propose that it is not an impact crater but a reformed syncline.

Ivliev A. I. Lukanin O. A. Kuyunko N. S.

[*The Impact Glasses Characteristics Studying by the Thermoluminescence Method*](#) [#1058]

In the given work new results of TL measurements in impact origins glasses are presented: in tektites from various strewn fields, in Libyan Desert glasses, and also impact glasses genetically connected with impact craters Zhamanshine and Elgygytyn.

Lindgren P. Broman C. Holm N. G. Parnell J. Bowden S. A. Osinski G. R. Lee P.

[*The Raman Signature of Shocked Carbonates from the Houghton Impact Structure, Devon Island, Canada*](#) [#1258]

This is a study of the Raman signature of calcite and dolomite in shocked carbonate clasts within the Houghton impact melt rocks. The impact shock effects are observed with Raman analyses in dolomite, while the calcite structure remains intact.

Llorca J. Trigo-Rodriguez J. M. Docobo J. A. Neira H.

[*Evidence for an Atmospheric Airburst of a Huge Bolide over Spain in 939AD as Recorded in Medieval Chronicles*](#) [#1359]

Medieval chronicles of Spain describe the impact of a huge bolide on June 1, 939 AD. The resulting airburst may be correlated with temperature variations preserved in ice cores and tree rings present in the period 930–940 AD.

Misra S. Newsom H. Panda D. Sisodia M. S. Dube A.

[*Additional Studies of Materials from the Ramgarh Structure, India*](#) [#1693]

Continuing work on materials from the Ramgarh structure, India, include analysis of magnetic particles found near the structure.

Parnell J. Taylor C. W. Thackrey S. Osinski G. R. Lee P.

[*Permeability Data for Impact Breccias*](#) [#1157]

Permeability data is reported for impact breccias from the Houghton and other craters. Values are consistently low.

Povenmire H.

[*The First Tektites Found in Wilcox and Turner Counties, Georgia*](#) [#1208]

Field research describing the expansion of the Georgia tektite strewn field.

Svetsov V. V.

[*Impact Erosion of Water Ocean on the Early Earth with a Thin Atmosphere*](#) [#1147]

The work purpose was to calculate the masses of lost and retained water after the impacts of comets and asteroids on oceans of various depths. The bombardment of an atmosphereless planet by fast asteroids can wipe out the most part of an ocean.

Vishnevsky S. A. Gibsher N. A. Palchik N. A.

[*H₂O + Melt Jets in the Popigai Lechatelierites: Products of Shock-induced Fluid + Melt Selective Separation Derived from the Target Gneiss*](#) [#1108]

Lechatelierites from the Popigai suevite were intruded by jets of hot and mobile material from outside. The material was a result of early impact anatexis of target gneiss. Selective separation of Si, Na, K and H₂O vs. low mobile Al took place at this.

PRINT ONLY: OUTER SOLAR SYSTEM

Mousis O. Lunine J. I. Pasek M. Cordier D. Waite J. H. Jr. Mandt K. E. Lewis W. S. Nguyen M.-J.
[*Is Serpentinization the Source of Titan's Atmospheric Methane?*](#) [#1182]

We calculate the initial D/H ratio that must be acquired by Titan's H₂O ice to be consistent with hydrothermal reactions that may produce CH₄ in the satellite's interior. If methane derives from such reactions, then the initial D/H ratio in H₂O is lower than the SMOW value.

Starodubtseva O. M. Akimov L. A.

[*Semiannual Variations in the North-South Asymmetry of Polarized Light of Jupiter*](#) [#1018]

Results of long-term polarimetric observations of Jupiter made in Kharkiv Astronomical Observatory over a 25-year period are presented. They reveal the semiannual variations in the north-south asymmetry of polarized light of Jupiter.

Ward Wm. R.

[*Particle Filtering by a Planetary Gap*](#) [#1477]

The ability of density gradients at the walls of a planetary gap to exclude particles via drag induced migration is examined. We suggest that particle diffusion and build-up at the gap edge could eventually defeat the drag barrier, enabling grain accretion by the planet.

PRINT ONLY: ASTEROIDS AND COMETS

Hasegawa S. Miyasaka S. Tokimasa N. Sogame A. Ibrahimov M. A. Yoshida F. Abe M. Kuroda D.
[BRz' Phase Function of Asteroid 4 Vesta During the 2006 Opposition](#) [#1503]

We show BRz' phase function of asteroid 4 Vesta during the 2006 opposition. The phase function of 4 Vesta with parameters with HB = 3.93 mag and GB = 0.24, HR = 2.77 and GR = 0.21, and Hz' = 2.95 and Gz' = 0.20 were obtained.

Marboeuf U. Petit J.-M. Mousis O.

[Thermodynamic Evolution of Planetesimals in the Primordial Edgeworth-Kuiper Belt Induced by Collisions](#) [#1568]

We examine the implications of collisional effects on the physical and chemical differentiation of the planetesimals located in the primitive Edgeworth-Kuiper Belt. Results show changes in the initial composition only in the subsurface layers.

Rietmeijer F. J. M.

[Corrected Chemical Signatures in Stardust Glass Reveal Wild 2 Particles that Resemble Matrix Grains of Aggregate IDPs](#) [#1189]

Corrected for an elemental background and aerogel silica, Wild 2 chemical signatures preserved in Si-rich glass show the original petrologic grain properties.

Shevchenko V. G. Krugly Yu. N. Belskaya I. N. Chiorny V. G. Gaftonyuk N. M. Slyusarev I. G. Tereschenko I. A. Donchev Z. Ivanova V. Borisov G. Ibrahimov M. A. Marshalkina A. L. Molotov I. E.
[Do Trojan Asteroids Have the Brightness Opposition Effect?](#) [#1391]

Photometric observations of the Trojan asteroids 588 Achilles are presented. The rotation period and the detailed magnitude phase dependence were obtained. We have not revealed any noticeable opposition brightening down to 0.1° of phase angle.

Slyuta E. N.

[Gravitational Deformation of Small Solar System Bodies](#) [#1050]

Strength properties of small solar system bodies dependent on their composition vary within an extremely broad range – from 0.002 up to 350 MPa. There are five basic groups of objects dependent on their rheologic properties.

Tikhomirova E. N.

[To the Problem of Meteor Streams and Comets Relationship](#) [#1087]

The meteor streams and parent comets are suggested to identify by using the integrals of motion in frame of the averaged perturbed two-body problem. The parent comets of beta-Cancrids and lambda-Cygnids are 3D and 73P correspondingly.

Trigo-Rodríguez J. M. Madiedo J. M. Williams I. P. Castro-Tirado A. J. Llorca J. Vitek S. Jelínek M.
[A Meteorite Dropping Superbolide from the Catastrophically Disrupted Comet C1919Q2 Metcalf: A Pathway for Meteorites from Jupiter Family Comets](#) [#1286]

A meter-sized meteoroid probably produced during the disintegration of comet C1919Q2 Metcalf was observed producing a –18 magn. bolide (*MNRAS*, in press). The progenitor meteoroid was sufficiently large and of high enough tensile strength to produce meteorites.

PRINT ONLY: PRESOLAR GRAINS AND EARLY SOLAR NEBULA

Makalkin A. B. Dorofeeva V. A.

[Formation of Satellites in the Accretion Disks of Jupiter and Saturn: Comparative Modeling](#) [#2309]

We present the results of comparative modeling of formation of regular satellites of Jupiter and Saturn in the accretion circumplanetary disks.

Pravdivtseva O. Meshik A. Hohenberg C. M. Kurat G.

[I-Xe System in Campo del Cielo Silicates](#) [#1578]

High precision I-Xe ages were determined for two distinct silicates separated from a polished section of Campo del Cielo.

Shiryaev A. A. Fisenko A. V. Krivobok V. S. Vlasov I. I. Semjonova L. F.

[Nitrogen in Meteoritic Nanodiamonds: Lattice Impurity in Diamond Core or a Constituent of an Associated Carbonaceous Phases?](#) [#1317]

Results of investigation of structure and of spectroscopically-active defects in nanodiamonds from Efremovka CV3 chondrite are presented. The data are discussed in comparison with known models of synthetic nanodiamonds.

Simon J. I. Young E. D.

[Resetting, Errorchrons and the Meaning of Canonical CAI Initial \$^{26}\text{Al}/^{27}\text{Al}\$ Values](#) [#1945]

Here we use simple mass balance calculations to quantify the importance of open system isotopic exchange during CAI evolution and show that *in situ* supra-canonical and canonical and bulk canonical measurements can all exist for an individual CAI.

Throop H. Bally J.

[UV Photolysis and Creation of Complex Organic Molecules in the Solar Nebula](#) [#2139]

Nearby O/B stars in the Sun's birth environment can irradiate ices in the solar nebula and synthesize complex organic molecules. This process may explain the early solar system's complex organics, such as those found in chondritic meteorites.

Ustinova G. K.

[On Origin of Xe-HL in Meteoritic Nanodiamonds](#) [#1007]

The Xe-HL component is shown to be formed and captured simultaneously with the nanodiamond synthesis in the conditions of shock wave propagation from supernova explosions, and its isotopic composition is an effect of acceleration in the shock waves.

Young E. D. Gounelle M. Smith R. L. Morris M. R. Pontoppidan K. M.

[The Oxygen Isotopic Composition of the Solar System in a Galactic Context: New Results for CO in Young Stellar Objects and Implications for the Birth Environment of the Solar System](#) [#1967]

We compare newly-acquired oxygen isotope ratio data for young stellar objects with new data for molecular clouds to show that the birth-place of the solar system was polluted by supernova ejecta.

PRINT ONLY: MISSIONS AND INSTRUMENTS

Anderson J. A. Robinson M. S.

[*Challenges Utilizing Pushframe Camera Images*](#) [#1905]

Processing and analyzing images from pushframe cameras poses a difficult challenge when compared to typical frame or pushbroom instruments.

Edgett K. S. Ravine M. A. Caplinger M. A. Ghaemi F. T. Schaffner J. A. Malin M. C.
Baker J. M. DiBiase D. R. Laramée J. Maki J. N. Willson R. G. Bell J. F. III Cameron J. F.
Dietrich W. E. Edwards L. J. Hallet B. Herkenhoff K. E. Heydari E. Kah L. C. Lemmon M. T.
Minitti M. E. Olson T. S. Parker T. J. Rowland S. K. Schieber J. Sullivan R. J. Sumner D. Y.
Thomas P. C. Yingst R. A.

[*The Mars Science Laboratory \(MSL\) Mars Hand Lens Imager \(MAHLI\) Flight Instrument*](#) [#1197]

The MSL Mars Hand Lens Imager (MAHLI) flight instrument has been completed and delivered to JPL for installation on the rover. MAHLI is a focusable color camera that can image geologic materials at resolutions as high as 14 microns per pixel.

Malin M. C. Caplinger M. A. Edgett K. S. Ghaemi F. T. Ravine M. A. Schaffner J. A. Maki J. N.
Willson R. G. Bell J. F. III Cameron J. F. Dietrich W. E. Edwards L. J. Hallet B. Herkenhoff K. E.
Heydari E. Kah L. C. Lemmon M. T. Minitti M. E. Olson T. S. Parker T. J. Rowland S. K. Schieber J.
Sullivan R. J. Sumner D. Y. Thomas P. C. Yingst R. A.

[*The Mars Science Laboratory \(MSL\) Mars Descent Imager \(MARDI\) Flight Instrument*](#) [#1199]

The MSL Mars Descent Imager (MARDI) flight instrument has been completed and installed on the rover. MARDI will provide hundreds of color images during the descent of MSL to the martian surface in 2012.

Mitrofanov I. G. Litvak M. L. Kozyrev A. S. Sanin A. B. Tretyakov V. I.

[*Nuclear Instruments and Methods for Space Planetology: Recent Results and New Developments*](#) [#1207]

New developments are presented of methods of nuclear physics for studies of celestial bodies. Using the heritage of instruments HEND for Mars Odyssey, LEND for LRO and DAN for MSL, the concepts of new instruments are discussed for future missions.

Zabalueva E. V. Shingareva T. V. Basilevsky A. T. Fedotov V. P. Ruzskiy E. G.

[*Russian "FOBOS-GRUNT" Mission. Examples of Surface Roughness Models for Phobos*](#) [#1243]

To support Russian Fobos-Grunt mission the digital model of Phobos surface was synthesized by combining the global model (P. Thomas) of the body with the geometry/abundances of typical landforms of Phobos and the Moon.

PRINT ONLY: EDUCATION AND PUBLIC OUTREACH AND DATA VISUALIZATION

Bérczi Sz. Boldoghy B. Cech V. Fabriczy A. Hargitai H. Hegyi S. Horváth A. Hudoba Gy. Kummert J. Nehéz I. Schiller I. Takács B. Varga T. Weidinger T.

[*Systems Woven by Two Flux-Subsystems: One of Them is Planetary. Concise Atlas of the Solar System \(12\): Space Science and Technology*](#) [#1256]

Overview from terrestrial environmental fluxes to confined fluxes in technologies at the space station help studying interrelations of various complex systems by a matrix: woven from environmental fluxes and production technologies.

Horvai F. Kereszturi A.

[*Geology of Mars: New University Course in Hungary*](#) [#1673]

The structure and characteristics of a new university course in Hungary on the geology of Mars is summarized.

Huffman J. N. Forsberg A. S. Head J. W. Dickson J. L. Fassett C. I.

[*Testing Geoscience Data Visualization Systems for Geological Mapping and Training*](#) [#2086]

We compare and describe our use of display technologies for use with planetary datasets, including a fully immersive virtual reality system, a large tiled-wall display, a stereo-capable “Practical Powerwall”, and the standard computer desktop.

Lang A. Szalay K. Erdélyi S. Nickl I. Panyi T. Kiss D. Bérczi Sz.

[*Chemistry Experiment Measuring \(pH\) of the “Planetary” Soil by the Husar-5 NTX-based Rover Model of the Széchenyi István High School, Sopron, Hungary*](#) [#1325]

We report by a detailed description of the experiment built by students on Husar-5 rover model: how the chemical characteristics of the “planetary” soil can be measured by the indicator ribbon method, if we artificially made wet the soil.

Magyar I. Badics A. Bakonyi I. Csiszár Á. Franko M. Gyürki Á. Héricsz M. Marschall B. Nagyházi Á. Varga T. N. Végh Gy. Varga T. P. Bérczi Sz.

[*Identification of Rocks on Planetary Surface Using Husar-9 Rover Camera: Field Work Simulations with Hunveyor-9 Space Probe Model System at Eötvös High School, Tata, Hungary*](#) [#1120]

We studied the rock types along the Husar-9 rover’s path and identified them on the basis of their shape, color and surface textures: komatiite, basalt, granite, conglomerate, schist rock, porphyritic granite, suevite breccia, and vesicular basalt.

Simon T. Kereszturi A.

[*Online Astrobiology Course in Hungary*](#) [#1048]

We present the basic characteristics of the first online astrobiology course, specialized in planetary science in Hungary.

Sipos A. Vizi P. G.

[*Simulated Mars Rover Model Competition*](#) [#2519]

This is a competition of applied engineering sciences. The actual goal of the competition can be achieved by building a device, a rover. The track is an 8 × 8 square meter sized field of sand or special material. Competitors have to build a rover model.