

Thursday, March 15, 2007
MARS SURFACE PROCESS AND EVOLUTION
8:30 a.m. Crystal Ballroom A

Chairs: J. A. Skinner Jr.
T. K. P. Gregg

- 8:30 a.m. Basilevsky A. T. * Neukum G. Werner S. C. van Gasselt S. Dumke A. Zuschneid W. Chapman M. Greeley R.
Geological Evolution of Mangala Valles, Mars: Analysis of the HRSC Image H0286 [#1079]
Analysis of the HRSC image H0286 showed that the Mangala Valley flooding had more than one source. One, known from previous works, was the graben in the valley head, another was the release of ground water from the valley slopes and floor.
- 8:45 a.m. Chapman M. G. * Neukum G. Werner S. C. van Gasselt S. Dumke A. Zuschneid W. Michael G.
Echus Chasma and Kasei Valles, Mars: New Data and Geologic Interpretations [#1407]
A new study of volcanic and fluvial materials from the Echus Chasma and Kasei Valles system that utilizes data from HRSC images and derived DTMs, THEMIS, MOC, and MOLA.
- 9:00 a.m. Oosthoek J. H. P. Zegers T. E. * Rossi A. Foing B. Neukum G. HRSC Co-Investigation Team
3D Mapping of Aram Chaos: S Record of Fracturing and Fluid Activity [#1577]
Mapping of structures and stratigraphic units of Aram Chaos was performed with HRSC data, using in particular the stereo (3D) capabilities of HRSC. In combination with published spectral information from TES, THEMIS and OMEGA, 3D mapping was used to derive the geological evolution of the area.
- 9:15 a.m. Nelson P. A. * Manga M. Bourke M. C. Clarke J. D. A.
A Model for Mound Spring Formation and Evolution [#2111]
We present a model of mound spring deposit formation and evolution and discuss its potential application in understanding martian paleohydrology.
- 9:30 a.m. Popa C. I. * Esposito F. Ori G. G. Marinangeli L. Colangeli L.
Tithonium Chasma Domes: A Result of Salt Diapirism by Means of Thin-skinned Extension? [#1848]
The study focuses on the origin and evolution of the salt bearing deposits in Tithonium Chasma. We tested the hypothesis of domes as result of diapirism upraise in thin-skinned extension conditions from a previously deposited salt layer.
- 9:45 a.m. Skinner J. A. Jr.* Skinner L. A. Kargel J. S.
Re-Assessment of Hydrovolcanism-based Resurfacing Within the Galaxias Fossae Region of Mars [#1998]
Based on analysis of high-resolution images, we re-assess the character of the Galaxias Fossae region and speculate it evolved through debris intrusion into transient ice-rich mantles during (and perhaps throughout) the Amazonian.
- 10:00 a.m. Rogers A. D. * Aharonson O. Bandfield J. L. Christensen P. R.
The Nature and Origin of Mars' Intercrater Plains: New Insight from THEMIS [#2313]
New geologic and mineralogic units within the intercrater plains on Mars are resolved with THEMIS. These units are analyzed in an effort to understand the relative contribution of volcanic, sedimentary, and impact material to intercrater plains.

- 10:15 a.m. Mest S. C. *
Characteristics of Impact Crater Interior Deposits in Noachis Terra, Mars [#1841]
Impact craters (D>15 km) in the highlands of Noachis Terra contain interior deposits that display morphologies, surface textures and features that indicate a variety of geologic processes modified the craters subsequent to their formation.
- 10:30 a.m. Balme M. R. * Murray J. B. Ackley S. F. Muller J-P. Kim J. R.
Morphological Evidence for a Sea-Ice Origin for Elysium Planitia Platy Terrain [#2202]
The origin of platy terrain in Elysium Planitia is controversial with possible formation mechanisms including flood lava plains or as remnants of a frozen sea. We present observations from ongoing mapping West of Cerberus Fossae that suggests a sea ice genesis.
- 10:45 a.m. Ackley S. F. * Wagner P. Xie H.
Sea Ice Ridging and Rafting Structures: Is the Microstructural Controlled Transition from Ductile to Brittle Behavior on Earth Also Seen on Mars? [#2035]
From the similarity of sea ice pressure ridge between Mars and Earth, we infer that they first started from a ductile material to a single phase while deforming, resulting in brittle behavior near the end of the ridging process.
- 11:00 a.m. Sakimoto S. E. H. * Gregg T. K. P. Fagan A. L.
Mechanical and Flow Models Constraints on the Origins of Platy Flows on Mars: Lava, Frozen Sea or Something Rather Muddy? [#2441]
We will discuss the constraints on Mars platy terrain from models, etc.
- 11:15 a.m. Jaeger W. L. * Keszthelyi L. P. McEwen A. S. Russell P. S. HiRISE Team
Early HiRISE Observations of Athabasca Valles: A Lava-draped Channel System [#2066]
Early HiRISE images show that the flood-carved landscape in Athabasca Valles is draped by a thin veneer of lava. More recently, the region was mantled by a layer of light-toned, friable material that has since been stripped away by eolian erosion.
- 11:30 a.m. Gregg T. K. P. * Crown D. A.
Redefining Hesperia Planum, Mars, Through Geologic Mapping [#1190]
The ridged plains of Hesperia Planum, Mars, are not a single geologic unit emplaced at the same geologic time.

Thursday, March 15, 2007
MARTIAN METEORITES:
NAKHLITES, EXPERIMENTS, AND THE GREAT SHERGOTTITE AGE DEBATE
8:30 a.m. Crystal Ballroom B

Chairs: C. D. K. Herd
E. P. Vicenzi

- 8:30 a.m. Stopar J. D. * Taylor G. J. Norman M. D.
Major and Trace Elements in Nakhilite MIL 03346 with a Focus on Aqueous Alteration Products [#1448]
REE abundances for clinopyroxene, olivine, mesostasis, olivine melt inclusions, and the alteration products of these phases in MIL 03346 were determined by LA-ICPMS. The REE patterns for these phases will be presented and compared to other nakhlites.
- 8:45 a.m. Vicenzi E. P. * Fries M. Fahey A. Rost D. Greenwood J. P. Steele A.
Detailed Elemental, Mineralogical, and Isotopic Examination of Jarosite in Martian Meteorite MIL 03346 [#2335]
This study represents a detailed examination of the sulfate mineralization in MIL 03346 by means of SEM EDS, Raman, and hydrogen isotope analysis.
- 9:00 a.m. McKay G. * Schwandt C. Le L. Mikouchi T.
Minor Elements in Nakhilite Pyroxenes: Does Cr Record Changes in REDOX Conditions During Crystallization? [#1721]
The origin of "reverse" Cr zoning in pyroxenes in nakhlite MIL 03346 is difficult to understand. One possibility is a change in REDOX conditions during crystallization. However, stoichiometry fails to support this proposition.
- 9:15 a.m. Farquhar J. * Kim S.-T. Masterson A.
Sulfur Isotope Analysis of the Nakhla Meteorite: Implications for the Origin of Sulfate and the Processing of Sulfur in the Meteorite Parent [#1438]
Analyses of the sulfur isotopes for the Nakhla meteorite (BM 1913.25) point to a part of the sulfur cycle that is distinct from igneous, hydrothermal, and aqueous phase effects, and not accounted for by existing gas-phase photochemical experiments.
- 9:30 a.m. Shearer C. K. * Burger P. V. Papike J. J. Borg L. E. Irving A. J. Herd C. D. K.
Petrogenetic Linkages Among Martian Basalts. Implications Based on Trace Element Chemistry of Olivine [#1140]
We define the petrogenesis of olivine in the olivine-phyric shergottites, evaluate its use in recording the earliest stages of martian basalt crystallization, and compare olivine in olivine-phyric shergottites to olivine in other martian basaltic lithologies (nakhlites, Iherzolitic shergottites).
- 9:45 a.m. Karner J. M. * Papike J. J. Shearer C. K. McKay G. Le L. Burger P.
Valence State Partitioning of Cr and V Between Pyroxene-Melt: Estimates of Oxygen Fugacity for Martian Basalt QUE 94201 [#1153]
Based on DCr and DV between pigeonite cores and bulk composition, we estimate QUE 94201 crystallized at an f_{O_2} between IW+0.2 and IW+0.9, with DCr/DV suggesting IW+0.6.
- 10:00 a.m. Draper D. S. *
Water-Undersaturated Near-Liquidus Phase Relations of Yamato 980459: Preliminary Results [#1447]
The Yamato 980459 liquidus is ~200° cooler under water-undersaturated conditions compared to anhydrous experiments. A wet Y98 source could mean a thicker martian crust and cooler melt generation temperatures.

- 10:15 a.m. Dalton H. A. * Sharp T. G. Holloway J. R.
Investigation of the Effects of Water on a Martian Mantle Composition [#2102]
High-pressure experiments were performed on a primitive martian meteorite composition with 0.5 weight percent H₂O added to determine the effect of water on martian melt compositions.
- 10:30 a.m. Calvin C. L. * Rutherford M. J.
Implications of Crystallization Experiments on a Parental Melt of ALH 77005 [#1198]
Crystallization experiments were performed on a parental melt of ALH 77005. Conclusions on the depth of crystallization, hydration state, and the role of P₂O₅ and Cr₂O₃ are discussed.
- 10:45 a.m. Shih C.-Y. * Nyquist L. E. Reese Y.
Rb-Sr and Sm-Nd Isotopic Studies of Martian Depleted Shergottites SaU 094/005 [#1745]
Sm-Nd mineral isochron of depleted shergottites SaU 005/094 indicates that they were formed 445±18 Ma ago, contemporaneous to DaG 476 and Y980459. A three-stage model is proposed for the genesis of these shergottites.
- 11:00 a.m. Herd C. D. K. * Simonetti A. Peterson N. D.
In Situ U-Pb Geochronology of Martian Baddeleyite by Laser Ablation MC-ICP-MS [#1664]
We report on the first *in situ* U-Pb geochronology of baddeleyite in martian meteorites. Using an 8-µm laser ablation spot size, coupled to a multicollector ICP-MS, we obtain ²⁰⁶Pb/²³⁸U ages of 171 ± 129 for NWA 3171 and 70 ± 35 Ma for Zagami.
- 11:15 a.m. Bouvier A. * Blichert-Toft J. Vervoort J. D. Albarède F.
The Conundrum of the Age of Shergottites [#1683]
We re-examine the contamination issue and show that a Pb-Pb age of ~4 Ga is the most tenable interpretation of Pb-Pb isotope systematics in shergottites, further supported by recent laser ablation Ar-Ar data.
- 11:30 a.m. Bogard D. D. * Park J.
Ar-Ar Age of NWA-1460 and Evidence for Young Formation Ages of the Shergottites [#1096]
Identical Ar-Ar, Sm-Nd, and Rb-Sr ages for NWA 1460 and evidence against significant ⁴⁰Ar degassing of Zagami during shock-heating to ~70°C argue against old formation ages for shergottites, but are consistent with young ages.

Thursday, March 15, 2007
STARDUST: MAINLY MINERALOGY
8:30 a.m. Marina Plaza Ballroom

Chairs: F. J. M. Rietmeijer
D. E. Brownlee

- 8:30 a.m. Nakamura T. * Tsuchiyama A. Akaki T. Uesugi K. Nakano T. Noguchi T.
Bulk Mineralogy and Three Dimensional Tomography of Individual Stardust Particles [#1107]
We have utilized synchrotron radiation X-ray to characterize bulk mineralogy and three dimensional structures of individual Stardust particles and found that Stardust particles can be classified to only two types: crystalline type and amorphous-rich type.
- 8:45 a.m. Tomeoka K. * Tomioka N. Ohnishi I.
Silicates and Glass in Comet Wild 2 Samples: An Analytical Transmission Electron Microscope Study [#1267]
This paper presents the results of detailed mineralogical investigation of seven Comet Wild 2 samples using a transmission electron microscope. It focuses on mineralogical characteristics of silicates and Si-O glass and discusses their relationship.
- 9:00 a.m. Mikouchi T. * Tachikawa O. Hagiya K. Ohsumi K. Suzuki Y. Uesugi K.
Takeuchi A. Zolensky M. E.
Mineralogy and Crystallography of Comet 81P/Wild 2 Particles [#1946]
We report mineralogy and crystallography of several interesting phases in Comet Wild 2 particles analyzed by SEM, TEM and SR-XRD. These phases include possible Mg-Fe carbonate, Mg-rich chromite, and silica minerals (tridymite and cristobalite).
- 9:15 a.m. Chi M. * Ishii H. Toppani A. Dai Z. R. Joswiak D. J. Leroux H. Zolensky M. Keller L. P.
Browning N. D. Bradley J. P.
Does Comet Wild-2 Contain GEMS? [#2010]
We have searched for GEMS in the comet Wild-2 sample. Most of the "GEMS-like" materials in Stardust were formed during hypervelocity impact of cometary grains into aerogel.
- 9:30 a.m. Joswiak D. J. * Matrajt G. Brownlee D. E. Westphal A. J. Snead C. J.
A Roedderite-bearing Terminal Particle from Stardust Track 56: Comparison with Rare Peralkaline Chondrules in Ordinary Chondrites [#2142]
A roedderite-bearing Stardust terminal particle may have links with rare alkali-rich ferromagnesian chondrules found in some in ordinary chondrites.
- 9:45 a.m. Gainsforth Z. * Butterworth A. Fakra S. Marcus M. A. Snead C. Westphal A. J.
Mineralogical Identification of Stardust Particles by XANES at the Advanced Light Source [#2273]
Micro-XANES at ALS beam line 10.3.2 provides a unique and powerful survey technique for CAI-like materials in Stardust samples by combining high counting statistics with *in situ* chemical and mineralogical identification.
- 10:00 a.m. Rietmeijer F. J. M. *
Challenges to Understand Aerogel Contaminated by Hypervelocity-impacted Comet Wild 2 Dust [#1082]
The smallest Wild 2 Fe-Ni-S and silicate phases in vesicular aerogel have predictable trends partially reminiscent of matrix units in aggregate IDPs.

- 10:15 a.m. Kearsley A. T. * Burchell M. J. Graham G. A. Hörz F. Wozniakiewicz P. A. Cole M. J.
Cometary Dust Characteristics: Comparison of Stardust Craters with Laboratory Impacts [#1562]
Comparison of digital elevation models of craters from laboratory gun shots with those from seven >50 µm impact features on Stardust Al foils shows that most of these larger comet Wild 2 dust impacts were produced by grains of low internal porosity.
- 10:30 a.m. Graham G. A. * Kearsley A. T. Vicenzi E. P. Teslich N. Dai Z. R. Rost D. Hörz F. Bradley J. P.
Analysis of Cometary Dust Impact Residues in the Aluminum Foil Craters of Stardust [#1990]
In this abstract we consider the state of residue preservation in a diverse range of micro-craters generated by comet Wild-2 dust impacts on the aluminum foil surfaces that were wrapped around the Stardust sample tray assembly.
- 10:45 a.m. Borg J. * Hörz F. Bridges J. C. Burchell M. J. Djouadi Z. Floss C. Graham G. A. Green S. F. Heck P. R. Hoppe P. Huth J. Kearsley A. Leroux H. Marhas K. Stadermann F. J. Teslich N.
SEM-EDS Analyses of Small Craters in Stardust Aluminium Foils: Implications for the Wild-2 Dust Distribution [#1592]
Implications for the Wild-2 dust distribution of the statistical results obtained by SEM-EDS from nearly 300 impact craters on aluminium foils of the Stardust sample tray assembly.
- 11:00 a.m. Bridges J. C. * Franchi I. A. Green S. F.
Stardust Microcrater Residue Compositional Groups [#2180]
Compositional groups are defined in residue from Stardust craters (1-9 Dc) by qualitative EDS. These compositional groups are being further studied by a FIB-SEM technique to determine representative residue compositions.
- 11:15 a.m. Brownlee D. E. * Joswiak D. Bradley J. Matrajt G.
The Origin of Crystalline Silicates in Comets and Large Scale Mixing in the Solar Nebula [#2189]
Many of the crystalline silicates in comet Wild 2 are related to rare components of primitive meteorites. These materials do not appear to have formed by annealing of amorphous interstellar grains but by high temperature processes that occurred in the inner regions of the solar nebula.
- 11:30 a.m. Ciesla F. J. * Cuzzi J. N.
Radial Transport of High Temperature Materials in the Solar Nebula: Applications to Stardust [#1386]
We are performing 2-D simulations of the outward transport of high temperature materials through the solar nebula region by turbulence in order to collect statistics on the paths and efficiency of this mode of transport.

Thursday, March 15, 2007
ASTROBIOLOGY
8:30 a.m. Amphitheater

Chairs: S. D. Vance
J. G. Blank

- 8:30 a.m. Glamoclija M. * Schieber J. Szykiewicz A. Beard B.
Sulfur and Iron Geochemistry, and Their Relations to Microbial Communities from the Submarine Hydrothermal Site North of Panarea Island, Tyrrhenian Sea, Italy [#2270]
We present combined $\delta^{34}\text{S}$ and $\delta^{56}\text{Fe}$ data obtained from geologically young hydrothermal crusts from a submarine vent north of Panarea Island, Tyrrhenian Sea, Italy, and correlated with differences in sample mineralogy, microbial morphologies, and $\delta^{13}\text{C}$.
- 8:45 a.m. Black J. R. * Yin Q.-Z. Casey W. H.
Photosynthesis and Biogenic Fractionation of Magnesium Isotopes: An Experimental Study [#1938]
Magnesium isotopic fractionations associated with chlorophyll-a may provide a new tool for identifying the abundance of molecular oxygen producing photosynthesis in specific environments here on our planet and others.
- 9:00 a.m. Chafetz H. S. *
Bacterially Induced Mn-Oxides: Mn^{+4} a Biosignature [#1365]
Bacterially induced deposits from Yellowstone, N.P., New Mexico, and Morocco display oxidation states ≥ 3.7 whereas laboratory produced abiotic Mn-oxides are reported around 3.0. A high Mn-oxidation state is a possible indicator of bacterially induced precipitation, i.e., a biosignature.
- 9:15 a.m. Kuhlman K. R. * McKay C. P.
Occurrence of Rock Varnish at Yungay, Atacama Desert, Chile [#2251]
Rock varnish is a thin nanostratigraphic coating consisting of clay particles cemented together by Fe and Mn oxides and is ubiquitous in arid climates. We report the occurrence of rock varnish in the Mars-like conditions present at Yungay.
- 9:30 a.m. Van Houten K. A. * Pilato R. S. Murray G. M. Izenberg N. R.
Affinity Resins for Biomarker Amine Detection [#2034]
Molecular Imprinted Polymer (MIP)-based sensors are being developed to detect biomarkers and biosigns for astrobiological planetary and space environment applications.
- 9:45 a.m. Binet L. Gourier D. * Skrzypczak-Bonduelle A. Delpoux O. Derenne S.
EPR and Primitive Life: Dating and Visualizing the Organic Matter in the Oldest Rocks [#1533]
An EPR study of cherts of different ages showed that the age of the embedded fossil organic matter can be estimated from the EPR lineshape of the radicals. Nondestructive 3D visualization of bacterial mats in cherts is also possible by EPR imaging.
- 10:00 a.m. Huang Y. * Alexandre M. R.
Racemic Monocarboxylic Acids in Carbonaceous Chondrites Question UVCPL as the Source of Molecular Asymmetry Observed in Meteoritic Amino Acids [#1798]
We discover, for the first time, that monocarboxylic acids in Murchison and Orgueil are racemic. The contrast between monoacids and amino acids are inconsistent with the popular theory for the origin of chirality by UVCPL.
- 10:15 a.m. Lindgren P. Parnell J. * Bowden S. A. Taylor C. Osinski G. R. Lee P.
Preservation of Organic Carbon in Impact Melt Breccia, Haughton Impact Structure [#1142]
Quantitative analysis of organic carbon contents in target rocks and melt breccias in a crater shows that at least 20% of the carbon is preserved through the melt process, so fossil carbon should survive on heavily impacted planetary surfaces.

- 10:30 a.m. Misgaiski M. * Meyer C. Stöffler D. Fritz J. Horneck G. Moeller R. Rabbow E. Cockell C. S. De Vera J. P. Ott S. Hornemann U.
The Influence of Shock Pressure, Pre-Shock Temperature, and Host Rock Composition on the Survival Rate of Endolithic Microorganisms During Impact Ejection from Mars [#1286]
Petrographic and biological analysis of shock recovery experiments confirms the possible life transport due to an impact from Mars to Earth.
- 10:45 a.m. Blank C. E. * Ahrens T. J. Long M. Bertani L. E. Rashev M. Cady S. L. Hugo R. C. Orphan V. J.
Ballistic Impact Studies of a Thermophilic Bacterium — The Importance of Growth Phase in Survival [#2206]
Our studies of *Thermus* and *E. coli* suggest that growth temperature, growth phase (whether cells are actively growing or starved), morphology, and cell wall ultrastructure play important roles in microbial survivability following ballistic impact.
- 11:00 a.m. Altheide T. * Chevrier V. Kral T.
Oxidation of Iron and Metabolization of Carbonate Through Methanogenesis: Implications for the Early Terrestrial Environment [#1063]
The appearance of life on early Earth had tremendous effects on the surrounding environment, most notably, by allowing the build up of oxygen. In addition to photosynthetic life, methane producing microbes may have also contributed by a more indirect method.
- 11:15 a.m. Cates N. L. * Mojzsis S. J.
“Rare” or “Prevalent” Earth? Conditions Suitable for Life were Established Rapidly on the Young Earth [#2239]
There is mounting evidence that Earth became habitable very early in its history, boding well for the search of other habitable planets in our galactic neighborhood.
- 11:30 a.m. Moores J. E. * Smith P. H. Tanner R. Schuerger A. C. Venkateswaran K. J.
The Shielding Effect of Small-Scale Surface Geometry on Ultraviolet Flux [#1285]
A radiative transfer sky model was used to derive the reduction in UV flux on the surface of Mars due to rocks, pits, cracks, and overhangs. The implications for planetary protection and the survival of simple organic molecules in terms of the extension of residence times will be discussed.

Thursday, March 15, 2007
WIND-SURFACE INTERACTIONS ON MARS AND EARTH
1:30 p.m. Crystal Ballroom A

Chairs: P. E. Geissler
J. R. Zimbelman

- 1:30 p.m. Bridges N. T. * Keszthelyi L. P. McEwen A. S. Thomas N. Thomson B. J. HiRISE Team
Aeolian Studies from HiRISE [#2098]
HiRISE reveals the aeolian geology of Mars as complex, with evidence for current activity and a variable history. The Medusae Fossae contains cliff-forming layers, dune and ripples show a variety of scales and orientations, and very recent craters and other features have been affected by wind.
- 1:45 p.m. Roach L. H. * Mustard J. F. Murchie S. Langevin Y. Bibring J.-P. Bishop J. Bridges N. Brown A. Byrne S. Ehlmann B. L. Herkenhoff K. McGuire P. C. Milliken R. E. Pelkey S. Poulet F. Seelos F. P. Seelos K. CRISM Team
CRISM Spectral Signatures of the North Polar Gypsum Dunes [#1970]
CRISM and HiRISE imagery of northern circum-polar dunes confirm the OMEGA detection of gypsum. We present spectral variations in gypsum-rich dunes that suggest dynamic processes and search for a gypsum source region in the north polar basal unit.
- 2:00 p.m. Tirsch D. * Jaumann R. Reiss D. Helbert J. Forget F. Millour E. Poulet F. Neukum G.
Dark Dunes in Martian Craters [#1569]
We present an analysis of the dune volume and a possible consolidation of the surface material of the dark dunes in martian craters. For the latter analysis we measured the brightness temperatures and the thermal inertia of the dune surfaces.
- 2:15 p.m. Feldman W. C. * Bourke M. C. Elphic R. C. Maurice S. Prettyman T. H. Lawrence D. J. Hagerty J. J.
Constraints on the Structure and Composition of Sand Dunes Within Olympia Undae Using Mars Odyssey Neutron Spectrometer Data [#2311]
Neutron spectrometer data for Olympia Undae show a water equivalent hydrogen content between 0.19 and 0.25 mass fraction. This corresponds to the filling of an open pore volume between 40% and 50% respectively in the upper 50 cm of dune deposits.
- 2:30 p.m. Warner N. H. * Farmer J. D.
Importance of Aeolian Processes in the Origin of the North Polar Chasmata [#1342]
In this report, we re-examine the debate over the origin of the martian north polar chasmata. We conclude that a model for chasmata formation that emphasizes long-term aeolian erosion and modification of the polar layered material best explains the available data.
- 2:45 p.m. Wheeler A. J. Bishop M. A. *
Pilot Study of Higher Order Neighbor Statistics for Crescentic Dunes of the Martian North Polar Region [#1414]
This pilot study reports on the geography of simple crescentic dunes (barchans) for the north polar region of Mars using ordered neighbor point pattern analysis within a geographical information system (GIS).
- 3:00 p.m. Geissler P. E. * Enga M.
Surface Changes on Mars: Gradual or Episodic? [#2190]
Repeated observations by the Mars Global Surveyor spacecraft over four martian years suggest that surface albedo changes take place both episodically, during major dust storms, and also gradually by the cumulative action of winds and dust devils over several seasonal cycles.

- 3:15 p.m. Herkenhoff K. E. * Squyres S. Arvidson R. Athena Science Team
Overview of Recent Athena Microscopic Imager Results [#1421]
The Microscopic Imagers on Spirit and Opportunity continue to return excellent image data after more than three years on the martian surface. Recent results will be discussed.
- 3:30 p.m. Sullivan R. * Arvidson R. Grotzinger J. Knoll A. Golombek M. Jolliff B.
Squyres S. Weitz C.
Aeolian Geomorphology with MER Opportunity at Meridiani Planum, Mars [#2048]
Wind/surface interactions are responsible for most geomorphologic characteristics of the landscape investigated by Opportunity, including many larger-scale features seen from orbit. Here we summarize this unusual weathering/erosion system.
- 3:45 p.m. Seiler W. M. * Chan M. A. Sullivan R. J.
Hematite "Microberry" Wind Ripples: Eolian Conditions for a Terrestrial Martian Analog from the Jurassic Navajo Sandstone, Utah-Arizona [#2076]
Hematite micro-concretion wind ripples from Jurassic Navajo Sandstone form unique analogs to martian "microberry" ripples and may be useful to scale geologic and atmospheric conditions on Mars.
- 4:00 p.m. Zimelman J. R. * Irwin R. P. III Williams S. H. Bunch F. Valdez A. Stevens S.
Granule Ripples on Earth and Mars: Documented Movement at Great Sand Dunes National Park, and Implications for Granule Movement on Mars [#1324]
We documented the volume of granules on large ripples that were moved by saltating sand during strong winds at Great Sand Dunes National Park. Wind data from nearby Alamosa airport allowed us to compare the granule movement to predicted sand flux.
- 4:15 p.m. Thomson B. J. * Bridges N. T.
Rock Abrasion Features in the Columbia Hills [#1780]
Wind-abraded rocks (ventifacts) were mapped along the Mars Exploration Rover Spirit traverse in the Columbia Hills. Mapped ventifacts deviate from orbital wind indicators, suggesting that local topography strongly influences aeolian processes.
- 4:30 p.m. Bourke M. C. * Nicoli J. Viles H. A. Holmlund J.
The Persistence of Fluvial Features on Clasts: Results of Wind Tunnel Abrasion Experiments [#1942]
Wind tunnel experiments show that there is differential persistence of fluvial transport signatures on clasts. We identify features, diagnostic of fluvial transport, that may survive in a muted form or have been loci for enhanced aeolian abrasion on Mars.

Thursday, March 15, 2007
ICY SATELLITE SURFACES
1:30 p.m. Crystal Ballroom B

Chairs: A. R. Hendrix
L. M. Prockter

- 1:30 p.m. Dalton J. B. *
Icy Saturnian Satellite Surface Compositions: Mapping and Modeling [#2415]
The icy saturnian satellites are slowly, if grudgingly, beginning to give up the secrets of their surface composition.
- 1:45 p.m. Hendrix A. R. * Hansen C. J.
Iapetus, Hyperion and Phoebe: Comparisons from Cassini UVIS [#1916]
Cassini UVIS data of Hyperion, Phobe and Iapetus' dark and bright terrains are intercompared in the 110–190 nm region. Compositional variations are measured within Iapetus' dark terrain. The Phoebe spectrum does not match the Iapetus dark spectrum.
- 2:00 p.m. Wagner R. J. * Neukum G. Giese B. Roatsch T. Wolf U.
The Global Geology of Rhea: Preliminary Implications from the Cassini ISS Data [#1958]
Cassini ISS camera data returned from Saturn's second-largest satellite Rhea were examined. Geologic and topographic data were extracted. Geologic units were dated with cratering chronology models.
- 2:15 p.m. Patterson G. W. * Head J. W.
Non-Transform Structural Discontinuities on Europa [#1081]
We use segmentation along terrestrial mid-ocean ridges as an analog for the mechanics of formation and the evolution of Belus Linea, a complex ridge on Europa.
- 2:30 p.m. Zahnle K. * Alvarellos J. Dobrovolskis A. Hamill P.
Transfer of Impact Ejecta from Io to Europa [#2001]
Comet impacts on Io generate numerous high velocity spalls, many of which are ejected at speeds high enough to escape into independent orbits around Jupiter. Many of the spalls ultimately reach Io, and some reach Ganymede. Spalls from Io are the chief source of rocks to Europa's ice shell.
- 2:45 p.m. Desch S. J. * Cook J. C. Hawley W. Doggett T. C.
Cryovolcanism on Charon and Other Kuiper Belt Objects [#1901]
We present time-dependent thermal evolution models of KBO interiors and find that bodies as small as Charon can retain liquid water to the present day and experience cryovolcanism, consistent with observations of Charon and Quaoar.

Thursday, March 15, 2007
VENUS
3:00 p.m. Crystal Ballroom B

Chairs: R. A. Simpson
P. J. McGovern

- 3:00 p.m. McGovern P. J. * Rumpf M. E.
Implications of Volcanic Edifice Shapes and Structures for the Volcanological and Thermal Evolution of Venus [#2387]
The recently discovered link between volcanic edifice shape and lithospheric thickness has several important implications for Venus. Some coronae are simply strangely shaped volcanic edifices. Edifice shapes may allow mapping of lithosphere thickness.
- 3:15 p.m. Kostama V.-P. * Törmänen T.
Giant Spiders of Venus — Redefinition, Revised Population, and Implications of Formational Processes of Arachnoids [#1639]
The large population of volcano-tectonic structures is characteristic to the surface of Venus. In addition to the well studied coronae, there are other smaller groups of features, such as the arachnoids.
- 3:30 p.m. Ivanov M. A. * Head J. W.
Semuni Dorsa: An Extinct Zone of Convergence, Underthrusting and Subduction on Venus? [#1031]
Topography, structure, stratigraphy and geological history suggest the Semuni Dorsa ridge belt, located along the northern margin of Fortuna Tessera, represents a zone of convergence, shortening, underthrusting, crustal thickening and possible subduction on Venus.
- 3:45 p.m. Oshigami S. * Namiki N. Komatsu G.
A Thermal Erosion Origin for Venusian Sinuous Rilles [#1185]
We reconstructed cross-sections of nine venusian sinuous rilles by using a radar clinometric method. It is shown that floors of these channels are clearly lower than surrounding plains. The depths are strongly related to distance from the source region, implying thermal erosion for the origin.
- 4:00 p.m. Simpson R. A. * Tyler G. L. Häusler B. Pätzold M.
Search for Anomalous Surface Properties at Maxwell Montes with Venus Express Bistatic Radar [#2240]
Venus Express bistatic radar experiments have confirmed anomalously high surface dielectric constants within Maxwell Montes; although the data are noisy, the phase shift that would be expected for a conducting surface is not seen.
- 4:15 p.m. Izenberg N. R. * Helbert J. Prockter L. M. McAdams J. V. Solomon S. C. McClintock W. E. Müller N.
The MESSENGER 2007 Venus Flyby: Peeking Through Atmospheric Windows with MASCS, MDIS, and Venus Express' VIRTIS [#1305]
Unique complimentary observations of Venus' atmosphere, surface, and space environment are planned between the Mercury-bound MESSENGER spacecraft, and ESA's VEX spacecraft currently orbiting Venus, during MESSENGER's second Venus flyby.
- 4:30 p.m. Aittola M. Raitala J. * Basilevsky A. T. Ivanov M. A. Head J. W.
Landing on Venus: Past and Future [#1330]
This paper briefly reviews what was done in previous landings by the Venera/Vega spacecraft, discusses a new approach for selection of the landing sites, and considers a few candidate sites for future landings on Venus.

Thursday, March 15, 2007
LUNAR REMOTE SENSING, SPACE WEATHERING, AND IMPACT EFFECTS
1:30 p.m. Marina Plaza Ballroom

Chairs: J. J. Gillis-Davis
P. H. Schultz

- 1:30 p.m. Blewett D. T. * Hughes C. G. Hawke B. R. Richmond N. C.
Varieties of Lunar Swirls [#1232]
We investigate the optical properties of lunar swirls and examine the relationship between optical properties and magnetic field strength at various swirl locations.
- 1:45 p.m. Gillis-Davis J. J. * Lucey P. G. Hammer J. E. Wilcox B. B.
Syntheses and Reflectance Analyses of Lunar Red Glass Compositions: Information to Improve Understanding of Remotely Sensed Spectral Data [#1443]
We synthesize glasses of lunar-like compositions and oxygen fugacity to facilitate study of the relationship between the optical properties of "lunar" glass and FeO, TiO₂ concentrations and improve the ability to determine lunar surface compositions.
- 2:00 p.m. Hawke B. R. Giguere T. A. * Blewett D. T. Campbell B. A. Gillis-Davis J. J. Hagerty J. J. Lawrence D. J. Lucey P. G. Peterson C. A. Smith G. A. Spudis P. D. Taylor G. J.
Remote Sensing Studies of the Schiller-Schickard Region of the Moon: Final Results [#1474]
Clementine multispectral images, Lunar Prospector chemical data, and depolarized 70-cm radar images were used to investigate buried VLT and low-TiO₂ mare basalts in the Schiller-Schickard region.
- 2:15 p.m. Petro N. E. * Pieters C. M.
Foreign Material in the Lunar Regolith: Lateral Transport by Post-Basin Cratering [#2069]
We assess the cumulative lateral transport by post-basin craters 30–300 km in diameter. These craters distributed material across the entire Moon. The foreign component of the post-basin regolith is derived mostly from within 1000 km of any location.
- 2:30 p.m. Isaacson P. J. * Pieters C. M.
Spectroscopic Investigation of the Water Content of Lunar Soil [#2070]
To aid in the search for lunar water with remote sensors, the source of 3 μm features in lunar soil is investigated. Lunar soil was heated to remove water, and then analyzed by FTIR spectroscopy. Water remained in the sample after heating to 300°C.
- 2:45 p.m. Lawrence D. J. * Puetter R. C. Elphic R. C. Feldman W. C. Hagerty J. J. Prettyman T. H. Spudis P. D.
Global Spatial Deconvolution of Lunar Prospector Th Abundances Using the Pixon and Jansson Deconvolution Methods [#1883]
We have carried out a spatial deconvolution of global lunar thorium abundances using two methods: Pixon and Jansson. We conclude that the Pixon method produces significantly improved deconvolved maps, which we use to revisit geologically complex regions, such as the Aristarchus Plateau.
- 3:00 p.m. Schaler E. W. Purucker M. E. *
Lunar South Pole Hydrogen & Water Ice Deposits: Constraints from Lunar Prospector Magnetic Field Observations [#1034]
We find a positive correlation between high hydrogen presence and an elevated magnetic field over several south polar craters, including Shoemaker and Nobile. This correlation suggests that implanted hydrogen is not a significant hydrogen source.

- 3:15 p.m. Schultz P. H. *
A Possible Link Between Procellarum and the South-Pole-Aitken Basin [#1839]
 The “Procellarum Basin” is proposed to represent offset antipodal effects from the formation of South-Pole-Aitken Basin by an oblique impact on the Moon. This process may account for the concentration of nearside maria, radial/concentric structures, and conduits for recent degassing events.
- 3:30 p.m. Nimura T. * Hiroi T. Pieters C. M.
An Improved Spectroscopic Model for Space Weathering Through the Formation of a Vapor Deposition Layer Containing Nanophase Reduced Iron Particles [#2167]
 A new modeling approach for space weathering is introduced. The basic scheme of model is very simple and accounts for the actual structure of the particle which is covered with a vapor coating layer. The model can reproduce lunar soil spectra well.
- 3:45 p.m. Noble S. K. * Keller L. P. Stroud R. M.
Probing the Depths of Space Weathering: A Cross-Sectional View of Lunar Rock 76015 [#1359]
 The use of FIB (focused ion beam) techniques for TEM sample preparation has allowed us to preserve the delicate stratigraphy of a patina coating on lunar rock 76015, providing a unique view into the space weathering process.
- 4:00 p.m. Ong L. * Asphaug E. Nimmo F. Korycansky D. Coker R.
Volatile Retention During Cometary Impact on the Moon and Mars [#1433]
 Using a new modeling method we investigate the gravitational retention of volatiles released during cometary impact on the Moon and Mars as a function of impact velocity and atmospheric pressure.
- 4:15 p.m. Warren P. H. * Tonui E. Young E. D. Newman W. I.
Lunar Rock-Rain: Diverse Silicate Impact-Vapor Condensates in an Apollo-14 Regolith Breccia [#2406]
 Apollo 14 breccia 14076 contains diverse silicate impact-vapor condensates: quenched-melt spheroids mostly <5 μm across, clasts up to 200 μm ; all extremely low in refractory oxides. Spheroids have mg from 7–84 mol%, and FeO/SiO₂ (wt.) from 0.002–0.67.
- 4:30 p.m. Ozima M. * Yin Q.-Z. Seki H. Podosek F. Zahnle K.
Biotic Earth Wind as the Origin of Oxygen Isotope Anomalies in Contemporary Lunar Regolith [#1129]
 Anomalous oxygen in lunar metal particles (Ireland et al., 2006) can be attributed to oxygen produced in the ozone layer, transported to the Moon, and does not contradict that the solar O-isotopic composition is the same as those in planets.

Thursday, March 15, 2007
INTERPLANETARY DUST/GENESIS
1:30 p.m. Amphitheater

Chairs: G. J. Flynn
C. Floss

- 1:30 p.m. Nguyen A. N. * Busemann H. Nittler L. R.
Remarkably High Abundance of Presolar Grains in Interplanetary Dust Particles Collected from the Comet Grigg-Skjellerup Dust Stream [#2332]
Isotopic studies of IDPs collected from the comet Grigg-Skjellerup dust stream reveal extremely high abundances of presolar grains in two of four IDPs. These abundances exceed those of any other extraterrestrial material analyzed and support a cometary origin for these IDPs.
- 1:45 p.m. Messenger S. * Keller L. Nakamura-Messenger K. Ito M.
The Abundance and Distribution of Presolar Materials in Cluster IDPs [#2122]
We report the initial results of a study aimed at (1) determining the abundances of presolar grains in IDPs with improved accuracy and (2) evaluating whether presolar molecular cloud material (with H and/or N isotopic anomalies) is preferentially associated with presolar dust grains.
- 2:00 p.m. Floss C. * Stadermann F. J. Mertz A. Bernatowicz T.
Anatomy of an Isotopically Primitive Interplanetary Dust Particle: Coordinated NanoSIMS and Auger Nanoprobe Analyses [#1145]
Slices of the isotopically primitive IDP Andric contain multiple presolar grains and N-anomalous compositions. Auger elemental maps of C and N suggest that the highest C and N abundances are not associated with the most anomalous N compositions.
- 2:15 p.m. Flynn G. J. * Lanzirotti A. Sutton S. R. Sitnitsky I.
Chemical Compositions of Five Large Cluster IDPs [#2290]
We measured the elemental compositions of five large cluster IDPs, the mass equivalent of hundreds of ~10- μ m IDPs, and are measuring their X-ray diffraction patterns to determine their mineralogy, and infer the mean composition of their parent bodies.
- 2:30 p.m. Nishiizumi K. * Nakamura T. Caffee M. W. Yada T.
Exposure Histories of 10 Microgram Individual Antarctic Micrometeorites: Radionuclide Measurements, Chemical, and Morphological Analyses [#2129]
We measured cosmogenic radionuclides in ≤ 10 μ g of Antarctic micrometeorites (AMMs). We have also performed chemical, mineralogical, and morphological analyses. The ^{10}Be exposure ages for all AMMs is >3 Myr, assuming exposure as a small body.
- 2:45 p.m. Morlok A. * Koike C. Tomioka N. Tomeoka K.
Mid-Infrared Spectroscopy of Experimentally Shocked Murchison CM2 Samples: Comparison with Astronomical Observations of Circumstellar Dust [#1023]
Mid-infrared spectra of matrix material from the Murchison CM2 chondrite, shocked with pressures from 10 to 49 GPa, were obtained. The results are compared to infrared spectra of dust from collisions in debris disks.
- 3:00 p.m. Yokoyama M. * Takigawa A. Tachibana S. Nagahara H. Ozawa K.
Anisotropic Evaporation of Forsterite in Hydrogen Gas [#1724]
Evaporation experiments of forsterite in hydrogen gas showed that anisotropy in evaporation rates is different from that in vacuum. This implies that evaporated forsterite grains have different shapes in different hydrogen pressure conditions.

- 3:15 p.m. Rietmeijer F. J. M. * Pun A. Nuth J. A.
Deep Metastable Eutectic Condensation in Low-Silica Al-Fe-SiO-H₂-O₂ Smoke: Simple Experiments, Major Implications [#1121]
 Laboratory condensation of a low-silica Al-Fe-SiO-H₂-O₂ smoke found a ferroaluminate Deep Metastable Eutectic at 60 wt% FeO.
- 3:30 p.m. Heber V. S. * Baur H. Burnett D. S. Wieler R.
Helium and Neon Isotopic and Elemental Composition in Different Solar Wind Regime Targets from the Genesis Mission [#1894]
 He and Ne analysed in different solar wind (SW) regime targets from Genesis revealed differences in isotopic and elemental composition. As example, the slow SW is enriched in ³He (23%) and possible in ²⁰Ne (6±2‰) relative to ⁴He and ²²Ne, resp., and bulk SW.
- 3:45 p.m. Grimberg A. * Baur H. Burnett D. S. Bochsler P. Wieler R.
The Depth Distribution of Neon and Argon in the Bulk Metallic Glass Flown on Genesis [#1270]
 We present Ar and Ne data from the Genesis metallic glass, analyzed to investigate the depth-dependent elemental and isotopic composition of solar noble gases, which provides information about the dependence of the solar wind composition on energy.
- 4:00 p.m. Mabry J. C. * Meshik A. P. Hohenberg C. M. Marrocchi Y. Pravdivtseva O. V. Wiens R. C. Olinger C. Reisenfeld D. B. Allton J. Bastien R. McNamara K. Stansbery E. Burnett D. S.
Refinement and Implications of Noble Gas Measurements from Genesis [#2412]
 We report our refined results of light noble gases from Genesis collectors. We also discuss possible reasons for light isotopic enrichments in the outer layers of the collectors. One plausible explanation is the low-energy neutral component of the solar wind, and another is diffusion.
- 4:15 p.m. Marty B. * Zimmermann L. Burnard P.
Nitrogen Elemental and Isotopic Analysis of Genesis Targets [#1704]
 We report the elemental and isotopic analysis of nitrogen and light noble gases in gold-over-sapphire targets exposed in space to solar wind irradiation during 27 months by the Genesis spacecraft.
- 4:30 p.m. Huang S. * Humayun M. Burnett D. Jurewicz A. J. G.
Determination of Fe and Mg Fluences in Genesis SoS Wafer Fragments [#1891]
 Iron and Mg fluences in Genesis SoS wafer fragments were determined by LA-ICP-MS.

Thursday, March 15, 2007
POSTER SESSION II: OUTER SOLAR SYSTEM
6:30 p.m. Fitness Center

Hendrix A. R. Johnson R. E.

Callisto: New Insights from Galileo UVS [#2359]

The full Callisto dataset from the Galileo Ultraviolet Spectrometer has been analyzed. We find spectral variations across the surface and explore whether an absorption feature could be due to organic species.

Stephan K. Hibbitts C. A. Jaumann R.

Reduction of Instrument-dependent Noise in Galileo NIMS Data of the Jovian Satellite Ganymede Using the Principle Component Analysis [#1950]

Applying the PCA to Galileo-NIMS data was found to be effective to remove instrument-dependent noise from each individual NIMS spectrum in such a way that each spectrum is still quantitatively analyzable.

Filacchione G. Capaccioni F. Coradini A. Cerroni P. Tosi F. Bellucci G. Brown R. H.

Baines K. H. Buratti B. J. Clark R. N. Nicholson P. D. Nelson R. M. Cuzzi J. N. McCord T. B.

Hedman M. H. Showalter M. R.

Cassini-VIMS Observations of Saturn's Main Rings [#1513]

The rings of Saturn are one of the main scientific objectives of VIMS experiment aboard Cassini: we report here some preliminary results retrieved through the analysis of the main rings (C, B, A) hyperspectral data in the 350–5050 nm range.

Verbiscer A. J. Peterson D. E. Skrutskie M. F. Cushing M. Nelson M. J. Smith J. D. Wilson J. C.

Simultaneous Spatially-resolved Near-Infrared Spectra of Pluto and Charon [#2318]

We present spectra 0.8–2.5 μm of Pluto and Charon which suggest the presence of ethane on Pluto and confirm the presence of ammonia hydrate on Charon. We model the surface of Charon's trailing hemisphere with crystalline water ice at 50 K and ammonia hydrate.

Crawford Z. A. Mullen M. E. Pappalardo R. T.

SatStress: A Web-Accessible Model of Viscoelastic Tidal Stresses in Icy Satellites [#2326]

We develop a viscoelastic treatment of the membrane stresses present on the surfaces of icy satellites, based on the gravitational potential, and describe the benefits of making the model and its source code publicly available via the WWW.

Han L. Showman A. P.

Implications of Shear Heating and Fracture Zones for Ridge Formation on Europa [#2277]

We present preliminary numerical simulations of convection to test the role of fractures zones and shear heating on European ridge formation.

Bland M. T. Showman A. P. Tobie G.

Ganymede's Orbital and Thermal Evolution and Its Effect on Magnetic Field Generation [#2020]

We suggest that tidal heating of Ganymede during passage through a Laplace-like resonance insulated the core, delaying cooling and magnetic field generation until the current epoch. This scenario is explored via a coupled orbital-thermal model.

Mitri G. Showman A. P.

Thermal Convection in the Ice-I Shells of Titan and Enceladus [#1797]

We explore the hypothesis for Titan and Enceladus that in the presence of an internal ocean, a conductive-convective transition of the ice-I shell can produce geological activity.

Vance S. D. Brown J. M. Abramson E. H.

Aqueous Solution Chemistry in Binary and Multi-Component Systems to 700 MPa Using the Method of Impulsive Stimulated Scattering [#2272]

We present equation-of-state measurements for aqueous magnesium sulfate (MgSO_4) obtained by the method of impulsive stimulated scattering (ISS) and discuss a strategy for examining pressure's influence in multi-component systems.

Vance S. D. Brown J. M. Abramson E. H.

ISIS: An Apparatus with Optical Access for In-Situ Measurements to 700 Ppa [#2255]

We describe the equipment, principles of operation, and planned future applications of the Icy Satellite Interior Simulator (ISIS).

Dougherty A. J. Hogenboom D. L. Kargel J. S.

Volumetric and Optical Studies of High Pressure Phases of $\text{MgSO}_4\text{-H}_2\text{O}$ with Applications to Europa [#2275]

We use optical images of high-pressure phases of the $\text{MgSO}_4\text{-H}_2\text{O}$ system, coupled with measurements of pressure, temperature, and volume changes, to report eutectic transitions for pressures up to 200 MPa, with implications for modeling Europa's ocean.

Goldsby D. L.

Diffusion Creep of Ice: Constraints from Laboratory Creep Experiments [#2186]

Classical diffusion creep theory coupled with creep data for fine-grained ice samples are employed to estimate the rate of diffusion creep, a deformation mechanism of likely relevance for planetary ice flow.

McCarthy C. Goldsby D. F. Cooper R. F.

Transient and Steady-State Creep Responses of Ice-I/Magnesium Sulfate Hydrate Eutectic Aggregates [#2429]

The strength of ice-I/ MgSO_4 eutectic is ten times greater than that of pure ice, but transient creep is significant. Transformation of the creep curve allows estimation of the attenuation, which is much greater than predicted by a Maxwell model.

Hays C. C. Castillo J. C. Mitchell K. L. Barmatz M. B. Zhong F. Smythe W. D. Matson D. L.

Pappalardo R. T. Lopes R. M. C. Robshaw L. E. Neish C. Lunine J. I. Kargel J. S.

Thermophysical, Rheological, and Mechanical Measurements on Icy Compositions with Application to Solar System Ices [#1954]

We present the motivations and objectives of a new experimental cryo-ices initiative at JPL. This is a joint effort among experimentalists and theorists at JPL, in collaboration with specialists in ice properties.

Ganesan A. L. Brinckerhoff W. B. Coll P. Nguyen M-J. Raulin F. Cornish T. J. Ecelberger S. A.

Analysis of Titan Tholins by Laser Desorption Mass Spectrometry [#1948]

We present an analysis of Titan tholins by laser desorption time-of-flight mass spectrometry (LDMS). Included are analyses by a commercial instrument as well as a miniature LDMS instrument developed at APL.

Palmer E. E. Brown R. H.

Predictive Analysis for a Trace Carbon Dioxide Polar Cap on Iapetus [#1422]

We ran simulations showing the effect of insolation on CO_2 ice on Saturn's moon Iapetus. It establishes a limit of CO_2 that can be on the surface and its detectability. We also suggest a method to estimate polar cap ice thickness based on its width.

Benna M. Kasprzak W.

Modeling of the Interaction of Enceladus with the Magnetosphere of Saturn [#1759]

In this paper we present the latest results of the three-dimensional multi-fluid model of the interaction between Enceladus and the magnetosphere of Saturn. This model is based on the numerical code initially developed to simulate cometary atmospheres.

Dougherty M. K. Southwood D. J. Kivelson M. G. Russell C. T. Smith E. J. Burton M.
Rotation Rate of Saturn's Magnetic Field [#1675]

The work reports the latest results regarding Saturn's rotation rate from the Cassini magnetometer instrument.

Moses J. I. Liang M.-C. Yung Y .L. Shia R.-L.

Two-Dimensional Photochemical Modeling of Hydrocarbon Abundances on Saturn [#2196]

We have developed a two-dimensional (latitude/altitude) photochemical model to study meridional transport of hydrocarbons in Saturn's stratosphere. Results are compared with IR observations.

Thursday, March 15, 2007
POSTER SESSION II: PRESOLAR/SOLAR GRAINS
6:30 p.m. Fitness Center

Savina M. R. Pellin M. J. Davis A. M. Lewis R. S. Amari S.

p-Process Signature in a Unique Presolar Silicon Carbide Grain [#2231]

A type-B presolar silicon carbon grain containing strong enhancements in the *p*-process isotopes ^{92}Mo , ^{94}Mo , ^{96}Ru , and ^{98}Ru is described. Standard type II supernova models fall short of explaining the data.

Henkel T. King A. Lyon I.

Interstellar Matter Implanted in Presolar SiC Grains [#2351]

Depth profiles for several elements have been acquired for four presolar SiC grains from the Murchison KJG-fraction. The data corroborates previous results showing implanted interstellar matter in some of these grains.

Thursday, March 15, 2007
POSTER SESSION II: STARDUST MISSION
6:30 p.m. Fitness Center

Tsuchiyama A. Nakamura T. Okazaki T. Uesugi K. Nakano T. Akaki T. Jogo K. Iida Y. Suzuki Y.
Three-Dimensional Structures and Elemental Distributions of Stardust Impact Tracks [#1247]
We investigated quantitative 3-D structures and elemental distributions of Stardust tracks using SR-tomography and SR-XRF. The value of the Fe mass divided by the track volume correlates to the track shapes and probably to volatile materials.

Fernandes C. D. Bridges J. C. Grady M. M.
UV and Visible Wavelength Reflectance Spectroscopy of Aerogel and of Stardust Grains [#1727]
A new UV and visible reflectance microspectroscopy technique has been applied to cometary samples from the Stardust mission. The results have been compared with terrestrial minerals and aerogel.

Nakamura-Messenger K. Zolensky M. E. Bastien R. See T. H. Warren J. L. Bevill T. J. Cardenas F. Vidonic L. F. Horz F. McNamara K. M. Allen C. C. Westphal A. J. Snead C. Ishii H. A. Brownlee D.
Stardust Curation at Johnson Space Center: Photo Documentation and Sample Processing of Submicron Dust Samples from Comet Wild 2 for Meteoritics Science Community [#2191]
The Stardust curation team at NASA Johnson Space Center plays a major role in the photo documentation and sample preparations of comet 81P/Wild 2 precious samples. Come and see some cool facts at our poster, and visit our website at <http://curator.jsc.nasa.gov>.

Kearsley A. T. Ball A. D. Graham G. A. Burchell M. J. Ishii H. Cole M. J. Wozniakiewicz J. Hörz F. See T. H.
Aerogel Track Morphology: Measurement, Three Dimensional Reconstruction, and Particle Location Using Confocal Laser Scanning Microscopy [#1690]
CLSM can quantify aerogel track shape and particle location in keystones, quickstones, and cm-scale unprepared blocks. It is suitable for use at an early stage of curation and preparation of small features, e.g., Stardust interstellar grain tracks.

Brennan S. Ishii H. A. Luening K. Ignatyev K. Pianetta P. Bradley J. P.
Panning for Gold: A Case Study in Evaluating the Elemental Composition of Comet Wild 2 Dust in Aerogel [#1776]
We present the discovery of high levels of gold in the Stardust samples and establish that it is likely localized, near-surface contamination in the aerogel capture medium, sometimes intermixed with cometary material in the particle impact track.

Wozniakiewicz P. J. Kearsley A. T. Burchell M. J. Bland P. A. Cole M. J.
Constraining the Effect of Capture-Heating on Cometary Silicates and Sulfides Under Stardust Encounter Conditions [#1579]
We are studying effects of capture-heating on Stardust silicate (e.g. olivines and pyroxenes) and sulfide (Fe and Ni rich) materials caught on Al foil and in silica aerogel, to help us to re-calculate primary composition from residue analyses.

Sandford S. A. Aléon J. Alexander C. M. O'D. Araki T. Bajt S. Baratta G. A. Borg J. Bradley J. P. Brownlee D. E. Brucato J. R. Burchell M. J. Busemann H. Butterworth A. Clemett S. J. Cody G. Colangeli L. Cooper G. d'Hendecourt L. Djouadi Z. Dworkin J. P. Ferrini G. Fleckenstein H. Flynn G. J. Franchi I. A. Fries M. Gilles M. K. Glavin D. P. Gounelle M. Grossemy F. Jacobsen C. Keller L. P. Kilcoyne A. L. D. Leitner J. Matrajt G. Meibom A. Mennella V. Mostefaoui S. Nittler L. R. Palumbo M. E. Papanastassiou D. A. Robert F. Rotundi A. Snead C. J. Spencer M. K. Steele A. Stephan T. Tsou P. Tylliszczak T. Westphal A. J. Wirick S. Wopenka B. Yabuta H. Zare R. N. Zolensky M. E.

Overview of the Results of the Organics PET Study of the Cometary Samples Returned from Comet Wild 2 by the Stardust Mission [#1301]

This presentation will provide an overview of the efforts and results produced by the Organics Preliminary Examination Team during their studies of the samples returned from comet Wild 2 by the Stardust spacecraft.

Zolensky M. Zega T. Weisberg M. Velbel M. Tomioka N. Tomeoka K. Stroud R. Stephan T. Simon S. Rietmeijer F. Ohsumi K. Ohnishi I. Nakamura-Messenger K. Nakamura T. Mikouchi T. Matrajt G. Leroux H. Langenhorst F. Krot A. Kearsley A. Joswiak D. Ishii H. Hagiya K. Grossman L. Grossman J. Graham G. Gounelle M. Fakra S. Dai Z. R. Chi M. Brownlee D. Bridges J. Bradley J.

Wild-2 Déjà-Vu: Comparison of Wild-2 Particles to Chondrites and IDPs [#1481]

Comparison of Wild-2 olivine, low-Ca pyroxene and Fe-Ni sulfides to chondrite matrix and chondritic IDPs.

Craig J. Sedaghatpour F. Gucsik A. Sears D. W. G.

Fragments of Separated Opaque Matrix from the Semarkona Unequilibrated Ordinary Chondrite [#1095]

An ESEM analysis of matrix fragments from the unequilibrated ordinary chondrite Semarkona as an analog for Stardust particle analysis.

Sears D. Gucsik A. Craig J. Sedaghatpour F. Graupner W.

A Thermoluminescence Study of Semarkona Chondrite: An Application on Determination of Metamorphic History of Stardust Particles [#1055]

Natural and induced thermoluminescence measurements on Stardust grains are feasible and have the potential to provide unique information on radiation history and metamorphism experienced by the grains.

Gucsik A. Sears D. W. G. Craig J. Sadeghatpour F. Graupner W.

Cathodoluminescence Properties of the Semarkona Chondrite: An Implication for Mineralogy of Interstellar Dust Particles of the Stardust Mission [#1051]

We suggest that cathodoluminescence would be a means of quickly surveying Stardust particles to get a first order indication of their mineralogy and petrology.

Grossemy F. Borg J. Simionovici A. Djouadi Z. Lemelle L. Ferroir T. Bleuet P. Susini J. Gillet P.

The Slowing Down of Stardust Cometary Grains in Aerogel: The Fe-XANES Information [#1734]

In the framework of the Bulk Composition Preliminary Examination Team, we carried out a Fe-XANES study on five keystones extracted from Stardust aerogel collector, getting information on the slowing down of Wild 2 grains.

Li J.-Y. A'Hearn M. F. McFadden L. A.

Photometric Analysis of Comet 81P/Wild 2 from Stardust Data [#1853]

The photometric properties of Comet 81P/Wild 2 are analyzed using the images returned by Stardust.

Velbel M. A. Harvey R. P.

Sulfide-Metal Textural Relations in a Glassy Stardust Particle [#1700]

FeS in this Stardust sample occurs in capture-melted Fe-Ni-S droplets and as angular grains of likely cometary FeS. The distribution of Ni in droplets and angular crystals suggests this Stardust particle contained cometary Ni-bearing sulfides.

Westphal A. J. Bastien R. K. Borg J. Bridges J. Brownlee D. E. Burchell M. J. Cheng A. F. Clark B. C. Djouadi Z. Floss C. Franchi I. Gainsforth Z. Graham G. Green S. F. Heck P. R. Horányi M. Hoppe P. Hörz F. P. Huth J. Kearsley A. Leroux H. Marhas K. Nakamura-Messenger K. Sandford S. A. See T. H. Stadermann F. J. Teslich N. E. Tsitrin S. Warren J. L. Wozniakiewicz P. J. Zolensky M. E.

Non-Random Spatial Distribution of Impacts in the Stardust Cometary Collector [#1418]

We report the discovery that impacts in the Stardust cometary collector are not distributed randomly in the collecting media, but appear to be clustered on scales smaller than ~10 cm.

Hagiya K. Ohsumi K. Mikouchi T. Zolensky M. E.

Synchrotron X-Ray Diffraction Study of the Comet Wild 2 Particle (C2054,0,35,4) Returned by the NASA Stardust Mission [#2381]

The Comet Wild 2 particle (C2054,0,35,4) returned by the NASA Stardust Mission was analyzed by microarea diffraction equipment. Our purpose is to perform the structure refinement of olivine and pyroxene including site occupancies.

Leitner J. Stephan T. Kearsley A. T. Hörz F. Flynn G. J. Sandford S. A.

TOF-SIMS Analysis of Wild 2 Cometary Matter Collected by Stardust Aluminum Foil [#1591]

TOF-SIMS investigation of elements as well as of organic compounds in crater residues on Stardust Al foils reveals a quite heterogeneous composition of the dust of 81P/Wild 2. However, on average the residues show a CI-like composition.

Foster N. J. Burchell M. J. Creighton J. A. Kearsley A. T. Stardust Organics PET

Does Capture in Aerogel Change Carbonaceous Raman D and G Bands? [#1647]

Raman spectroscopy of carbon-rich meteorite samples is used. Spectra from raw grains are compared with those from grains fired into aerogel at 6 km/s. It is shown that there is little systematic change, but that some shifts can occur.

Lisse C. M. Deep Impact Spitzer Science Team

Updating the Results of the Deep Impact Compositional Modeling for Three Other Comet Spectra, YSO HD100546, and the Stardust PET Findings [#2259]

We have used the results from the Spitzer observations of Deep Impact to study the nature of the dust in other systems. We have found many common emission signatures, as well as major differences. There remain a number of issues still to be improved upon with the new Stardust results.

Thursday, March 15, 2007
POSTER SESSION II: INTERPLANETARY DUST
6:30 p.m. Fitness Center

Kimura Y. Saito M. Sakon I. Kaito C.

Laboratory Study on the Formation of PAH Clusters and Their UV Irradiation Effects Using Anthracene [#1511]

In order to elucidate the correlation between the plateau at 12 μm with UIR bands and the size of PAH clusters, anthracene clusters with various sizes were produced and measured their IR spectra. Radiation effect of UV is also presented.

Taylor S. Matrajt G. Lever J. H. Brownlee D. E. Joswiak D.

Types of Micrometeorites Accreting at the South Pole, Antarctica [#2168]

We have identified and mounted 3272 melted and unmelted micrometeorites from the South Pole water well. Here we describe the distribution of micrometeorite types found in the 2000 collection.

Engrand C. Duprat J. Maurette M. Gounelle M.

Fe-Ni Sulfides in Concordia Antarctic Micrometeorites [#1668]

We present the characterization of Fe-Ni sulfides in Concordia Antarctic micrometeorites. The sulfide population is dominated by troilite which is believed to be the first sulfur containing mineral to have formed in the solar nebula.

Davidson J. Genge M. J. Mills A. A. Johnson D. J. Grady M. M.

Ancient Cosmic Dust from Triassic Halite [#1545]

We describe the discovery of fossil micrometeorites in ancient Triassic rock salt; the first to be found in salt and the oldest complete micrometeorites found to date. We present an estimated flux rate of micrometeorites to Earth at this time.

Kehm K.

Predicted Abundances of Cosmogenic Noble Gases in Interplanetary Dust Particles from Different Parent Objects [#2376]

A numerical model is developed to test the idea that interplanetary dust particles from different parent objects can be distinguished based on the abundances of cosmogenic noble gases accumulated during transit from the parent object to the Earth.

Keller L. P. Christoffersen R.

Irradiation Effects in Forsterite and the Nature of Interstellar Grains: A Coordinated Infrared Spectroscopy and Electron Microscopy Study [#1995]

Heavy ion irradiation of forsterite destroys crystalline order as measured by electron diffraction, but residual crystalline order is detected by infrared spectroscopy. Implications for interstellar grains and ISM processing are discussed.

Jadhav M. Amari S. Marhas K. K. Zinner E. Maruoka T. Gallino R.

Ca and Ti Isotopic Ratios in High-Density Graphite Grains from Orgueil [#2256]

We report isotopic analyses (C, N, O, Si, Al-Mg, K, Ca, and Ti) for 44 new high-density graphite grains from Orgueil. Several grains have large Ca and Ti anomalies that indicate a supernova origin. Some grains with extreme Ca and Ti anomalies were also found to be enriched in ^{13}C .

King A. Henkel T. Lyon I.

Detailed Depth-Profiling of Presolar SiC Grains [#2145]

We are undertaking comprehensive, all-element analyses of presolar SiC grains by high resolution TOFSIMS depth profiling. This abstract looks at some experimental artifacts that limit the resolution and accuracy of data that can be obtained.

Thursday, March 15, 2007
POSTER SESSION II: GENESIS
6:30 p.m. Fitness Center

Burnett D. S. Woolum D. S. Jurewicz A. J. G. McKeegan K. D. Guan Y.

Solar Wind Elemental Abundances from GENESIS Collectors [#1843]

GENESIS bulk solar wind analyses were made by SIMS on Si, Sandia diamond-like-C, and epitaxial Si on sapphire (SoS). Preliminary Fe, Mg, Ca, Cr and Na fluences are calculated. The eventual goal is to test for fractionation (or lack thereof) of solar-wind elements with FIPs <9eV.

Pellin M. J. King B. V. Veryovkin I. V. Tripa C. E. Savina M. R. Burnett D. S.

The Depth Profile of Solar Wind Magnesium in Si and Diamond-like Carbon Collectors Returned by Genesis [#2181]

The samples returned to Earth by the Genesis Discovery Mission contain a record of the elemental and isotopic abundances of the solar wind. Because depth is the key parameter for isolating solar wind atoms from terrestrial contamination, it is important to understand the solar wind implant profiles.

Veryovkin I. V. Tripa C. E. Pellin M. J. Savina M. R. Burnett D. S.

The Elemental Abundance of Magnesium in Solar Wind Samples (Silicon and Diamond-like Carbon) Returned by Genesis [#2224]

The elemental abundance of Mg in the solar wind is measured using two separate Genesis flight samples.

Lyon I. Henkel T. Jurewicz A. J. G. Burnett D.

TOFSIMS Studies of Genesis Standards and Samples [#1673]

TOFSIMS analysis of Genesis samples and standards is described. The techniques are complementary to existing SIMS techniques.

Kitts K. Sutton S. Newville M.

Abundance and Charge State of Implanted Solar Wind Transition Metals in Individual Apollo 16 and 17 Lunar Soil Plagioclase Grains Determined In Situ Using Synchrotron X-Ray Fluorescence [#1106]

We report (1) a new method for determining the relative abundances *in situ* of Cr, Mn, Fe and Ni in implanted solar wind in individual Apollo 16 and 17 lunar plagioclases via synchrotron X-ray fluorescence and (2) the charge states of these metals.

Heber V. S. Wiens R. C. Reisenfeld D. B. Allton J. H. Baur H. Burnett D. S. Olinger C. T.

Wiechert U. Wieler R.

The Genesis Solar Wind Concentrator Target: Mass Fractionation Characterised by Ne Isotopes [#1917]

The concentrator caused fractionation of the implanted solar wind ions as function of the radial position at the concentrator target. This fractionation was measured using Ne and compared with simulations. Data will be important for eventual O isotope analyses on the concentrator targets.

Verchovsky A. B. Sestak S. Franchi I. A.

Towards the Isotopic Measurement of Solar Wind Carbon in the Genesis Silicon Target [#2061]

We report a current stage of the carbon isotope measurements in the Genesis Si target.

Calaway M. J. Rodriguez M. C. Stansbery E. K.

Genesis Silicon Carbide Concentrator Target 60003 Preliminary Ellipsometry Mapping Results [#1632]

Spectroscopic ellipsometry results and images are used to assess the amount of surface contamination on Genesis silicon carbide concentrator target 60003. Ellipsometry data show possible material substrate alteration by solar wind radiation.

Calaway M. J. Burnett D. S. Rodriguez M. C. Sestak S. Allton J. H. Stansbery E. K.

Decontamination of Genesis Array Materials by UV Ozone Cleaning [#1627]

XPS and spectroscopic ellipsometry are used to evaluate the effectiveness of UV ozone cleaning for removing a carbon based surface contaminate on silicon and sapphire semiconductor materials from NASA's Genesis solar wind sample return mission.

Kuhlman K. R. Burnett D. S.

Extraction Replica Cleaning of Genesis AuOS and AlOS [#1920]

Extraction replicas using cellulose acetate films are being investigated for the cleaning of delicate samples such as gold on sapphire (AuOS) and aluminum on sapphire (AlOS).

Allton J. H. Wentworth S. J. Rodriguez M. C. Calaway M. J.

Cleaning Genesis Solar Wind Collectors with Ultrapure Water: Residual Contaminant Particle Analysis [#2138]

Cleaning of Genesis solar wind array collector fragments using ultrapure water removes most particles $>5 \mu\text{m}$ and some particles $>0.5 \mu\text{m}$. Composition of remaining particles is primarily crushed collector material, not Utah or spacecraft component material.

Thursday, March 15, 2007
POSTER SESSION II: ASTEROIDS AND COMETS: MODELS, DYNAMICS, AND EXPERIMENTS
6:30 p.m. Fitness Center

Castillo-Rogez J. C. McCord T. B. Davies A. G.

Ceres: Evolution and Present State [#2006]

We develop thermal modeling of Ceres, using sophisticated models and new observational information in order to match the observed shape.

Stooke P. J.

Improved Cartography of Asteroid 433 Eros [#1167]

A new mosaic of NEAR images of asteroid 433 Eros is being compiled to provide improved base maps. The resulting mosaic in Simple Cylindrical Projection can be rectified to fit any of the projections now in use with irregular objects.

Buczowski D. L. Barnouin-Jha O. S. Prockter L. M.

433Eros Interior Structure and Formation History: An Analysis of Global Lineament Mapping [#1112]

Lineaments have been mapped on the Eros surface which suggest that different parts of the asteroid may have undergone different stress histories. We present different evolutionary scenarios based on interpretations of surface lineament formation.

Conrad A. R. Dumas C. Merline W. J. Drummond J. D. Campbell R. D. Goodrich R. W. Le Mignant D. Chaffee F. H. Kwok S. H. Knight R. I.

Comparison of Three Asteroid Limb Profiles [#1492]

Keck AO observations of three asteroids have been analyzed to extract limb profiles. We identify a large facet on 511 Davida that may be the signature of giant craters seen edge-on, reminiscent of those seen on Mathilde. Preliminary analysis shows that similar facets may exist on 52 Europa and 7 Iris.

Hiroi T. Abe M. Kitazato K. Abe S. Sasaki S. Ishiguro M. Takagi Y. Clark B. E.

Barnouin-Jha O. S. Nimura T.

Meteorite Analogs of Asteroid 25143 Itokawa: Seeing Beyond the Effects of Grain Size and Space Weathering [#1048]

As a result of applying the Modified Gaussian Model to data taken by the Near-Infrared Spectrometer (NIRS) onboard Hayabusa spacecraft and ordinary chondrite samples, it is suggested that Itokawa's surface is made of materials similar to LL6 chondrites.

Sasaki S. Ishiguro M. Hirata N. Hiroi T. Abe M. Abe S. Miyamoto H. Saito J. Yamamoto A. Demura H. Kitazato K. Nakamura R.

Origin of Surface Albedo/Color Variation on Rubble-Pile Itokawa [#1293]

S-type asteroid Itokawa is heterogeneous in albedo and color. Also from surface morphology and experiments, we conclude darker-redder zones experienced more space weathering than brighter-bluer. The variation may be produced by seismic shaking.

Miyamoto H. Yano H. Nakamura A. M. Scheeres D. J. Nakamura R. Ishiguro M. Abe S.

Hashimoto T. Hirata N. Kubota T. Michikami T. Nakamura T. Noguchi T. Saito J. Sasaki S.

Tsuchiyama A. Yokota Y.

Rock Piles on Itokawa Observed by the Highest Resolution Images [#1614]

During the later phases of the Hayabusa mission, we succeeded in obtaining close-up images of Itokawa with unprecedentedly high resolutions up to 6 mm/pixel. These images vividly reveal Itokawa's appearance that is considerably different from any other images previously obtained of asteroids.

Hirata N. Honda C. Nakamura R. Miyamoto H. Sasaki S. Demura H. Nakamura A. M. Michikami T. Barnouin-Jha O. S. Gaskell R. W. Saito J.

Survey of Craters and Impact Structures on the Asteroid Itokawa [#1572]

Craters on the asteroid 25143 Itokawa were surveyed. Their morphologies show a wide variation, including a saddle-shaped floor plan, lack of uplifting rim, both rough and smooth floor, exposure of un-weathered materials and lineaments.

Okada T. Shirai K. Yamamoto Y. Arai T. Ogawa K. Inoue T. Kato M.

Elemental Composition of Asteroid Itokawa by Hayabusa XRF Spectrometry [#1287]

Major elemental composition ratios of Ca/Si and Fe/Si as well as Mg/Si and Al/Si of the near-Earth asteroid 25143 Itokawa was investigated through X-ray spectrometry using X-ray spectrometer, XRS, onboard Hayabusa.

Abe M. Vilas F. Kitazato K. Abell P. A. Takagi Y. Abe S. Hiroi T. Clark B. E.

In-Flight Calibration of the Hayabusa Near Infrared Spectrometer (NIRS) [#2051]

We simulated NIRS spectra using Hapke parameter obtained by NIRS observation of asteroid Itokawa. Comparing simulated spectra with groundbased observational data, we obtained correction factor of NIRS spectra.

Abe M. Kitazato K. Sarugaku Y. Kawakatsu Y. Kinoshita D.

Ground-based Observation of Post-Hayabusa Mission Targets [#1638]

In 2006, we have observed 14 near-Earth asteroids as the candidate object of the post-Hayabusa mission, using Kiso and Lulin Observatory. Including our previous observation, we found that five asteroids are classified in C-type Group.

Hamada Y. Demura H. Hirata N. Asada N.

Preliminary Study of Stereo Vision with Fisheye Lens Cameras on Asteroids [#1519]

This research shows advantages of stereovision with fisheye lens cameras for close-observation missions to asteroids, and a method to determine three-dimensional locations of objects on the asteroid surface from stereo pair images taken by the camera.

Fujii Y. Hirata N. Demura H. Asada N.

Visualization Tool for 3D GIS Data [#1521]

We develop a tool for visualization of a 3D figure, which is modeled with polygons. Several kinds of physical values (e.g., slope) are attributed to the polygons. The displayed model can be rotated and moved by mouse operation.

Asphaug E.

Asteroid Surfaces as Expressions of Seismic Interiors [#2432]

Asteroid surface morphologies are expressions of the acoustic properties of their interiors. That is a hypothesis that, if proven true, might allow us to know how a particular small asteroid responds to collisions just by looking at it, and motivates some simple *in situ* experiments.

Durda D. D. Enke B. L. Asphaug E. Richardson D. C.

Examining the Formation of Satellites in Large Cratering Events Via Numerical Simulations with Accurate Shape Models [#1742]

We examine satellite formation in large cratering impacts by conducting SPH simulations of impacts into realistic, irregularly-shaped targets and computing the N-body phase of the simulations using a new code that preserves the irregular shapes of the reaccumulated fragments.

Takeda T. Ohtsuki K.

Angular Momentum Transfer Efficiency in Collisions Between Rubble Pile Objects [#1473]

We report the results of N-body simulations of oblique impacts of rubble-pile asteroids, showing that the spin-up efficiency during a collision is very low, because ejected fragments carry away large amount of angular momentum.

Bottke W. F. Vokrouhlický D. Chapman C. R. Nesvorný D.
Gaspra's Steep Crater Population Was Produced by a Large Recent Breakup in the Main Asteroid Belt [#2165]
The freshest craters on (951) Gaspra, which have a surprisingly steep size frequency distribution, were mostly produced by fragments from the nearby Baptistina family-forming event that took place ~150 Myr ago.

Tagle R. Goderes S. Claeys Ph.
On the Nature of S-type Asteroids and the Terrestrial Impactor Population [#2216]
Based on composition and abundance of projectiles in terrestrial craters, it could be suggested that a certain proportion of the S-type asteroids are parent bodies of non-NMI meteorites.

Setoh M. Nakamura A. M. Hiraoka K. Onose N. Hasegawa S. Michel P.
Impact Experiments of Sintered Glass Beads Targets at Low and High Velocities [#1263]
We performed impact disruption experiments of porous sintered glass beads targets. The results of these experiments and comparing with previous study suggested that not only the porosity but also the impact velocity strongly influence the outcome.

Malanoski S. A. Izenberg N. R.
Laboratory Simulations of Surface Alteration on Small Bodies Through Seismic Activity [#1947]
The experiments presented seek to clarify and explore the role of impact-induced seismic shaking in the process of surface modification on small solar system bodies. We present the basis, observations, and conclusions of current testing.

Murray J. B.
Alternative Explanation for the Clustering of Long-Period Comet Aphelion Distances [#2192]
The 50k clustering of comet aphelia is most simply explained as a predictable artifact of the limitation that known LP comets all have perihelion passage in the past few hundred years. This line of argument leads to a novel explanation for cometary origin.

Boice D. C. Wegmann R.
Cometary Water Chemistry in Support of Recent Spacecraft Missions [#1507]
Water chemistry is central to understanding physico-chemical mechanisms in comets. *In situ* measurements of comet Borrelly by the PEPE instrument onboard the Deep Space 1 spacecraft challenge our accepted notions of comet comae chemistry.

Byram S. M. Scheeres D. J. Combi M. R.
Implications of Outgassing Jets for the Comet Dynamical Environment [#1694]
We define and explore a simple model for an outgassing jet of a comet while considering its implications, define a methodology for the *in situ* estimation of jet structures, and investigate particle and rotational dynamics of comet 81/P Wild 2.

Grimes S.
Search for Planets in the M34 Open Cluster [#1465]
A search for extrasolar planets in the M34 Open Cluster using the transit technique. HD 209458b was used as a control as it has a known planet. The search turned up null, but this and other searches may show that planets do not form in open clusters.

Thursday, March 15, 2007
POSTER SESSION II: VENUS
6:30 p.m. Fitness Center

Törmänen T. Aittola M. Kostama V.-P. Raitala J.

Possible Formation Models of Venusian Multiple Coronae and Age Relationships Between Their Component Structures [#2125]

There are several formation models for the multiple coronae of Venus in the framework of the mantle diapir model. We attempt to constrain these models for multiple coronae and also to establish age relationships between their component structures.

Bleamaster L. F. III

Volcano-Tectonism of Helen Planitia, Venus [#2434]

Geologic mapping at 1:10M scale is used to evaluate relatively young volcanic-tectonic processes in the Helen Planitia region.

Ivanov M. A. Head J. W.

Geologic History of the Lavinia Planitia/Lada Terra Region, Venus: Results of Mapping in the V-55, V-61, and V-56 Quadrangles [#1032]

The geological history of three quadrangles in Lada Terra, Venus involved downwelling to create Lavinia Planitia, and coincident upwelling to create parts of Lada Terra; upwelling was accompanied by late stage rifting and associated extensive lobate plains volcanism.

Gilmore M. S. Saunders R. S.

Geologic Mapping of the Hestia Rupes Quadrangle (V-22), Northern Ovda Regio, Venus [#1936]

Latest mapping results for the V22 quadrangle, Venus.

Straley B. L. Gilmore M. S.

Mapping and Structural Analysis of SW Tellus Regio, Venus [#1657]

Detailed mapping of SW Tellus Regio, Venus shows that the region was assembled from at least three tessera units with distinct tectonic histories brought together by lateral crustal movement and preserved in the present-day plateau.

Basilevsky A. T. Head J. W.

Geology of the NW Part of the V-36 Thetis Regio Quadrangle [#1352]

In the NW of the Thetis Regio quad, nine material and three structural units are mapped. They are similar to those observed in other regions of the planet, but some have unusual areal abundance implying specifics of geologic history of this region.

Gupta V. Ernst R. E. Samson C. Desnoyers D. W.

Determining Flow History and Direction for a Possible 6000 km Long East-West Canali System Southeast of Aphrodite Terra [#1905]

Canali are narrow sinuous lava channels on Venus. We propose that, in our study area (144° to 216° E; 24° to 48° S), several east-west oriented canali segments actually represent a canali system extending for more than 6000 km.

Hurwitz D. M. Long S. M. Grosfils E. B. McGovern P. J.

A Revised Simple Elastic Model of Magma Reservoir Failure Beneath a Volcanic Edifice [#1220]

Axisymmetric finite element models of ellipsoidal magma reservoir failure within crust loaded by an edifice are used to challenge previously published characterizations of this fundamental volcanic situation.

Long S. M. Hurwitz D. M. Grosfils E. B. McGovern P. J.

Reproducing Volcanic Events on Venus Using Magma Reservoir Failure Models [#1502]

Axisymmetric finite element models of ellipsoidal magma reservoir failure beneath a volcanic edifice are employed to investigate whether elastic models are able to reproduce the observed stratigraphy of two volcanoes on Venus.

Rumpf M. E. McGovern P. J.

The Influence of Lithospheric Flexure and Volcano Shape on Magma Ascent at Large Volcanoes on Venus [#1374]

Flexural stresses induced by volcano loading can exert a strong influence on the ascent of magma through the lithosphere. Here we study these stresses to determine where magma would preferentially ascend beneath large edifices on Venus using analytic flexure modeling.

Thursday, March 15, 2007
POSTER SESSION II: MERCURY
6:30 p.m. Fitness Center

Dombard A. J. Hauck S. A. II

Despinning Plus Global Contraction and the Orientation of Lobate Scarps on Mercury [#2026]

We resurrect the idea that a N-S preference to the lobate scarps are the product of stresses due to an early phase of despinning plus global contraction, and use this concept as an additional constraint on our thermal models of Mercury.

King S. D.

A Possible Connection Between Convection in Mercury's Mantle and the Formation of Lobate Scarps [#1358]

I present calculations of convection in a 3D spherical-shell with temperature-dependent rheology. The planform is linear upwellings in the low latitudes with a hexagonal pattern near the poles. These are compared with the pattern of lobate scarps.

Riner M. A. Bina C. R. Robinson M. S.

Compressible Mercury – Insights into Its Composition and Interior Structure [#2361]

We have applied new results from high-pressure experiments to model Mercury's interior and found a mean decompressed density of 5.1 g/cc, significantly lower than the canonical value of 5.3 g/cc. We present implications for the composition and interior structure of Mercury.

Moroz L. V. Maturilli A. Helbert J. Sasaki S. Bischoff A. Jessberger E. K.

Mercury Analogue Materials: Spectral Reflectance, Its Comparison with TIR Spectral Emission, and a Space Weathering Simulation Experiment [#1741]

We present reflectance spectra of Mercury analog materials, compare the TIR reflectance spectra of the samples to their emission spectra to evaluate deviations from Kirchhoff's law, and report on a space weathering simulation experiment on feldspar.

Donaldson Hanna K. L. Sprague A. L. Kozlowski R. W. H. Boccafolo K. Warell J.

Mercury and the Moon: Initial Findings from Mid-Infrared Spectroscopic Measurements of the Surface [#2291]

Mid-infrared spectroscopic measurements from 8.2–12.7 μm of Mercury and the Moon obtained with MIRSI (Mid-Infrared Spectrometer and Imager) at the NASA Infrared Telescope Facility (IRTF) are presented.

Blewett D. T. Burbine T. H.

Angrites as Samples of Mercury?: A Spectral Perspective [#1203]

We perform a comparison between laboratory spectra of angrites and telescopic spectra of Mercury, and discuss geologic considerations that bear on the question of a mercurian origin for angrites.

Andre S. L. Watters T. R.

Mercury Stereo Topography: Construction of Regional Topographic Maps Derived from Mariner 10 Images [#2155]

We present the current status of the Mariner 10 stereo topography project.

Benkhoff J.

MPO — The BepiColombo Mercury Planetary Orbiter [#2169]

BepiColombo is an interdisciplinary mission to explore the planet Mercury through a partnership between ESA and Japan's Aerospace Exploration Agency (JAXA). The launch is foreseen for August 2013 with arrival in August 2019.

Margot J.-L. Peale S. J. Jurgens R. F. Slade M. A. Holin I. V.

Mercury Librations Measured with Earth-based Radar [#2337]

An 88-day period libration signature is clearly revealed by the data and indicates that the core of Mercury is liquid.

Thursday, March 15, 2007
POSTER SESSION II: LABORATORY INSTRUMENTS, METHODS, AND
TECHNIQUES TO SUPPORT PLANETARY EXPLORATION
6:30 p.m. Fitness Center

Huss G. R. Nagashima K. Keil K. Krot A. N. Taylor G. J. Scott E. R. D.

The Cameca ims 1280 Ion Microprobe at the University of Hawai'i [#2128]

This poster describes the new Cameca ims 1280 ion microprobe and the analyses that have been carried out since its installation. Details of oxygen-isotope measurements, Mn-Cr measurements, and Fe-Ni measurements will be presented.

Rauschenbach I. Lazic V. Jovicevic S. Jessberger E. K. Fantoni R.

LIBS in the Cold: Laser Induced Breakdown Spectroscopy of Soils, Rocks and Ice Under Simulated Martian Conditions [#1284]

LIBS (Laser Induced Breakdown Spectroscopy) is proposed for the *in situ* analysis of Mars. We found that LIBS signals from martian analogue materials not only depend on martian environmental conditions but also strongly vary with surface temperature.

Niles P. B. Socki R. A. Hredzak P. L.

A New Method for Evaluating the Carbon Isotope Characteristics of Carbonate Formed Under Cryogenic Conditions Analogous to Mars [#2157]

This study demonstrates an innovative new method for studying the kinetic isotopic effects caused by rapid freezing of transient water on the martian surface which may explain the very high $\delta^{13}\text{C}$ values of carbonates found in the martian meteorites.

Baldrige A. M. Christensen P. R.

A Laboratory Technique for Thermal Infrared Measurement of Hydrated Samples [#2407]

Laboratory thermal infrared spectroscopy has been utilized for comparison to planetary surfaces. The sample is usually heated well above room temperature. At this temperature hydrated samples can lose water. This study describes the method for measuring the TIR spectra of hydrated samples.

Pommerol A. Schmitt B. Brissaud O.

Effects of Surface Texture and Observation Geometry on the Near-Infrared Water-of-Hydration Absorption Bands [#1774]

We use laboratory experiments and radiative transfer modeling to determine the effects of materials texture and measurement geometry on the near-infrared absorption bands due to water-of-hydration.

Fries M. D. Steele A.

Methods of Extraterrestrial Materials Analysis Using Raman Spectroscopic Imaging [#2195]

With recent advancements in instrumentation, Raman spectroscopic imaging is an emerging technique in the characterization of extraterrestrial materials. This paper discusses application and methods of this new technique.

Chemtob S. M. Glotch T. D.

Linear Deconvolution of Attenuated Total Reflectance Infrared Spectra of Fine-grained Mineral Mixtures [#1097]

ATR-IR spectroscopy has potential as an *in situ* method for determining mineralogy on future planetary lander missions. We test deconvolution algorithms on ATR spectra of mineral mixtures, confirming linear mixing and identifying sources of error.

Glotch T. D. Chemtob S. M. Rossman G. R.

Attenuated Total Reflection as an In Situ Infrared Spectroscopic Method for Mineral Identification [#1731]

Attenuated total reflection (ATR) is an infrared spectroscopic method that is useful for determining the mineralogy of fine particulates and has potential as a future *in situ* mineralogic analysis instrument on a planetary mission. We describe the results of initial laboratory ATR experiments.

Maruyama Y. Ogawa K. Okada T. Kato M.

Particle Size Effect in X-Ray Fluorescence and Its Implication to Planetary XRF Spectroscopy [#1186]

We performed laboratory experiments to investigate particle size effect in X-ray fluorescence. Powdery specimens of rocks are used to simulate the planetary surface regolith. This effect was found to be notable at higher phase angles.

Dyar M. D. Sklute E. C. Schaefer M. W. Bishop J. L.

Mössbauer Spectroscopy of Clay Minerals at Variable Temperatures [#2282]

Quantification of fundamental Mössbauer parameters for low-temperature spectra of clay minerals is critical to proper interpretation of their ferric and ferrous iron contents. Recoil-free fractions for nontronite, montmorillonite, biotite, zinnwaldite, and glauconite are presented here.

Thursday, March 15, 2007
POSTER SESSION II: INSTRUMENTS, TECHNIQUES, AND
ENABLING TECHNOLOGIES FOR PLANETARY EXPLORATION
6:30 p.m. Fitness Center

Clark P. E. Kessel S. Rilee M. L. Brown G. Cooperrider C. Curtis S. A.

Extreme Mobility: Gaits for Tetrahedral Rovers [#1172]

For Prototype 3 addressable reconfigurable high mobility rover, a light 12Tet Walker with 5:1 extension ratio and double sided struts expandable in two directions, we present efficient “amoeboid gaits” inspired by naturally-occurring 3D locomotion.

Fink W. Tarbell M. A.

Tier-Scalable Reconnaissance Mission Test Bed: Implementation of Ground-Tier [#2410]

We report on the implementation of the ground-tier of an Earth-based test bed for tier-scalable reconnaissance that enables the development and field-testing of remote planetary exploration strategies and tools, ranging from algorithms to hardware.

Haldemann A. F. C. McHenry M. C. Petras R. Ali K. Bornstein B. Castano R. Cameron J. M.

Estlin T. A. Farr T. G. Gaines D. Jain A. Lim C. Nesnas I. A. Pomerantz M.

Powell M. W. Volpe R. A.

Simulation to Evaluate Autonomous Behaviors for Mobile Planetary Surface Science Missions [#1732]

Testing autonomous robotic technologies as they might be used for scientific exploration of planetary surfaces can effectively be achieved using advanced simulation capabilities.

Fennema A. M. Bode R. Swindle T. D.

A Method for Finding the Mass of a Milligram-sized Rock Sample Without Using a Scale, with Possible Spacecraft Applications [#1772]

Experiments on samples of six different compositions show that it is possible to determine a mass to within 10% by measuring the volume of a melted sample and calculating its density.

Helbert J. Müller N.

SurVenTIS — Surface of Venus Thermal Imaging System [#2201]

SurVenTIS is a near-IR imager with six filters taking advantage of the spectral windows in the atmosphere of Venus. It will allow the study of the surface composition of Venus on spatial scales intermediate between orbital and *in situ* data.

Mungas G. S. Peters G. H. Smith J. A. Bearman G. H. Beegle L. W. Struthers C. Glucoft J.

H₂O Sublimation Alteration of Icy Martian Samples Due to Mechanical Work, Heat and Mass Transport [#2002]

Sample acquisition processes that excavate material generate heat through friction that can thermally alter samples. We discuss relevant heat and mass transport experiments for ultimately estimating sublimation mass loss during acquisition of icy samples.

Nehéz I. Varga T. Darányi I. Bérczi Sz.

Gas Storing in Martian Atmospheric Environment Using Nil Diffusion Covering Technology [#1367]

Nil Diffusion (ND) covering is used for long term storing of gases in the martian atmosphere. ND covering consists of several separated material layers treated with active isolation, with one or more separator spaces between the layers.

Castano R. Estlin T. Anderson R. C. Gaines D. Bornstein B. Chouinard C. Burl M.

Castano A. Judd M.

Onboard Rover End-of-Day and Traverse Science [#1971]

The Onboard Autonomous Science Investigation System (OASIS) was used to demonstrate onboard science in a formal demonstration of closed loop opportunistic detection and reaction during a rover traverse as well as end-of-day science on the FIDO rover.

Hardgrove C. J. Moersch J. E. Drake D. M.

Simulations of Rover Based Neutron Remote Sensing of Periglacial Features on Mars [#1786]

Neutron spectrometers will be included as part of future rover instrument suites. Traverses toward periglacial polygonal cracks are simulated using MCNPX. The observed hydrogen content can be used to suggest a method of formation or past martian climate and ground ice conditions.

Anderson F. S. Whitaker T. J. Pilger E. Sherman S. Miller G. Young D. Peterson B. Mahoney J. Norman M.

Mars Age Experiment (MAX) [#2153]

We show initial results from a miniature laser ablation resonance ionization mass spectrometer (LA-RI-MS) for *in situ* rubidium and strontium (Rb-Sr) geochronology and geochemical measurements on Mars.

McKay C. P. Hecht M. H. Stoker C. Briggs G. Clark B. Cooper G. A. Glass B. Gulick V. Lambert J. Zacny K. Nakagawa R. Chadbourne P.

Science Goals for Deep Drilling in Ice-rich Permafrost on Mars [#1468]

In this paper we consider the scientific rationale for a deep drilling mission (~4 m depth) as a followup to the Phoenix lander.

Zacny K. Paulsen G. Davis K. Glass B.

Drilling and Automation for Mars Exploration — 3rd Field Test on Devon Island [#1765]

The third Drilling Automation for Mars Exploration field test took place inside the Haughton Crater on Devon Island in the Canadian High Arctic in July 2006. This season's objective was to demonstrate autonomous drilling capabilities while drilling with a peak power of less than 150 W.

Smythe W. D. Foote M. Johnson E. Daly J. Loges P. Puscasu I. Gorevan S. Chu P. Granahan J.

The Mars Borehole IR Spectrometer [#2238]

A report on the implementation and testing of the Mars Borehole IR spectrometer. This spectrometer is designed to fit within a Mars drill, providing near real-time monitoring of the composition of the borehole wall.

Dreyer C. B. Mungas G. S.

Integrated Micro-LIBS, Raman Spectroscopy, and Microscope for Space Exploration [#2307]

Micro-LIBS on oolitic hematite samples at <20 μm spot diameter with micro-joule laser pulse energy (<200 microjoule) is investigated to demonstrate the feasibility of incorporating micro-LIBS in the Raman/CHAMP instrument.

Sharma S. K. Misra A. K. Lucey P. G. Wiens R. C. Clegg S. M.

Combined Remote LIBS and Raman Spectroscopy of Minerals Using a Single Laser Source [#1208]

This work explores the use of a single pulsed laser operating at dual wavelengths of 1064 and 532 nm for exciting both remote Raman and LIBS spectra of minerals by adjusting the laser power electronically.

Corrigan C. M. Brinckerhoff W. B. Cornish T. Ganesan A. Ecelberger S.

In-Situ Laser Desorption Mass Spectrometer Development Guided by Planetary Analog Sample Analysis [#1475]

We present progress on the development of a miniaturized laser desorption mass spectrometer and discuss the results of analyses of planetary analogs by comparable laboratory instrumentation.

Buehler M. G. Anderson R. C. Chen K. B. Seshadri S. Keymeulen D.

Using Impedance Spectroscopy to Measure Water/Ice Content of Simulated Martian Soils [#1250]

The electrical conductivity of coarse silica sand is $\sigma(\text{S/cm}) = 8 \times 10^{-11} + 2.7 \times 10^{-5} \cdot C^*(M) \cdot [\theta_g(\text{wt.}\%)]^{1.8}$ where C^* concentration of ions in solution or defects in ice and θ_g is the water/ice content with a detection limit of > 0.05 wt.% water and > 0.5 wt.% ice.

Dreyer C. B. Mungas G. S.

Development Progress of Pulsed Cavity Ringdown Laser Absorption Spectroscopy in a Hollow Waveguide for Trace Gas Detection [#2369]

We present progress on the development of the hollow waveguide pulsed cavity ringdown spectroscopy instrument for trace gas detection. An experiment using a waveguide at 1.66 μm for trace methane detection is in development.

Urgiles E. Wilcox J. Z. Toda R. Crisp J.

Progress in the Development of the Atmospheric Electron-induced X-Ray Spectrometer (AEXS) Instrument [#1181]

The progress in the development of AEXS and the results of the determination of mapping surface elemental composition of inhomogeneous samples with 1 mm spatial resolution are described.

Kitts K. Sutton S. Newville M.

A New In Situ Method of Determining Relative Abundances and Charge States of Implanted Transition Metals in Individual Grains Using Synchrotron X-Ray Fluorescence [#1128]

We report on a new *in situ* method of determining relative abundances and charge states of implanted transition metals in individual grains using synchrotron X-ray fluorescence.

Ogawa K. Okada T. Kato M.

A Portable Miniaturized X-Ray Tube for In-Situ Geological Analyses [#1302]

A miniaturized X-ray tube specialized for *in situ* geological and petrological X-ray analyses of lunar rocks and powder samples is being developed. We report the current status of the developments.

Austin D. E. Manning H. L. K. Beauchamp J. L.

A Miniature Mass Spectrometer for High-Flux Cosmic Dust Analysis [#1099]

We designed a novel mass spectrometer for *in situ* characterization of micro-particulates in regions of high concentration, such as a comet fly-by, planetary ring, or impact-generated plume. This device is based on novel ion optics that allow high performance on a small instrument.

Kozyrev A. S. Gurvitz L. I. Litvak M. L. Mitrofanov I. G. Rogozhin A. A. Sanin A. B. Schulz R. Schvetsov V. N. Tretyakov V. I.

Gamma-Ray and Neutron Spectrometers for Exploration of Mercury and Fobos On-Board BepiColombo and Fobos-Grunt Missions [#1589]

This abstract contains details about two similar neutron and gamma spectrometers selected for BepiColombo and Fobos-Grunt planetary missions.

Starr R. D. Evans L. G. Parsons A. M. Trombka J. I. Groves J. Akkurt H. Floyd S. R. Namkung M. Perkins L. Wraight P. Ziegler W. Schweitzer J.

Combined Gamma-Ray Spectrometer and Pulsed Neutron Generator System for In-Situ Planetary Geochemical Analysis [#1919]

A combined pulsed neutron/gamma-ray system can be used on planetary surfaces to provide valuable geochemical analysis of surface materials to depths of ~ 1 m. We describe experimental results that demonstrate the capabilities of such a system.

Bearman G. H. Johnson W. R. Fink W. Wilson D. W.

An Intelligently Reconfigurable Snapshot Imaging Spectrometer for Planetary Exploration [#1103]

We report a snapshot imaging spectrometer with a smart option which can dynamically reconfigure the spectral resolution from 50 bands to 300 bands. Lower spectral resolution is used for target identification and prioritization with the higher mode for increased science and target discrimination.

Fink W. Mahaney W. C. Kuhlman K. R.

Adapter-based Microscopic and Wide-Angle Imaging Capability for Digital Cameras for Planetary Exploration and Astrobiology [#2397]

An adapter-based microscopic and wide-angle imaging capability for digital cameras is introduced. A prototype currently achieves a resolution of about 5 μm per pixel with optical zoom and about 1.2 μm with additional digital zoom across a 5 MP image.

Nikzad S. Jones T. J. Hoenk M. E.

Curved Focal Plane Arrays for Compact, Wide Field of View Optical Systems [#2436]

We present two approaches for making curved focal plane arrays that reduce the optical complexity of instruments by substantially reducing the number of optical elements required.

Manohara H. M. Bronikowski M. J. Wong E. W. Toda R. Lin R. H. Luong E. M. Wilcox J. Z.

Carbon Nanotube-based Vacuum and Semiconducting Devices for Micro-Instrumentation and Electronics [#1436]

This work describes the development of high current density carbon nanotube field emitters and nanotube electronics for advanced planetary *in situ* instrumentation for X-ray, mass, and THz spectroscopies.

Biswas S. Stamatakos J. Grimm R. Hood L.

Magnetic Anomaly Analysis to Determine Parameter Space for an Airborne Magnetometer on Mars [#1021]

Martian magnetic anomalies observed by MGS from 150–400 km altitudes have relatively low resolution. Higher resolution magnetic anomaly observations from airborne platforms (2–8 km altitudes) could lead to better characterization of martian sources.

Ciarletti V. Le Gall A. Berthelier J. J. Corbel Ch. Dolon F. Ney R. Reineix A. Guiffaud Ch.

Clifford S. Heggy E.

Bi-Static Deep Electromagnetic Soundings for Martian Subsurface Characterization: Experimental Validation in the Egyptian Western Desert [#1838]

A bi-static version of the HF GPR TAPIR developed for martian deep soundings has been operated in the Egyptian Western Desert. The study presented focuses on the retrieval of the direction of arrival of the observed echoes on both simulated and measured data.

Blankenship D. D. Peters M. E. Young D. A. Holt J. W.

Radar Sounding of Europa's Icy Shell: The View After New Results from Mars and Antarctica [#2409]

Disintegrating. Iceberg sounded by radar. Informs Europa?

Thursday, March 15, 2007
POSTER SESSION II: LUNAR MISSIONS AND INSTRUMENTS
6:30 p.m. Fitness Center

Yue Z. Xie H. Liu J. Ouyang Z.

An Introduction of Chinese Lunar Exploration Program [#2082]

China has established a strategy plan to carry out a three-stage plan for “orbiting the Moon,” “landing on the Moon,” and “returning back” in 13 years.

Leshin L. A. Morgan T. H.

Science Opportunities in NASA's Lunar Architecture [#1832]

The Science Capability Focus Element of NASA's Lunar Architecture Team has assessed the suitability of NASA's Lunar Architecture for accomplishing a wide range of potential science objectives. A large number of scientifically interesting objectives can be accomplished.

Chin G. Bartels A. Brylow S. Foote M. Garvin J. Kaspar J. Keller J. Mitrofanov I. Raney K. Robinson M. Smith D. Spence H. Spudis P. Stern S. A. Zuber M.

Update on the Lunar Reconnaissance Orbiter: The Instrument Suite and Mission [#1764]

This presentation updates the progress of the development of NASA's Lunar Reconnaissance Orbiter (LRO) mission, scheduled for launch in October 2008.

Sanin A. Boynton W. Evans L. Harshman K. Kozyrev A. Litvak M. Malakhov A. Milikh G. Mitrofanov I. Mokrousov M. Sagdeev R. Shevchenko V. Schvetsov V. Starr R. Trombka J. Vostrukhin A.

Lunar Exploration Neutron Detector (LEND) for NASA Lunar Reconnaissance Orbiter [#1648]

This presentation is about the LEND instrument which has been selected for the NASA LRO mission to provide the global search of hydrogen distribution in 1–2 meters of lunar soil with spatial resolution up to 5 km from 50 km circular polar orbit.

Cooper B. L.

Mafic Materials in Scott Crater? A Test for Lunar Reconnaissance Orbiter [#1377]

Clementine 750 nm and multispectral ratio data, along with Lunar Orbiter and radar data, were used to study the crater Scott in the lunar south polar region. The multispectral data provide evidence for mafic materials, impact melts, anorthositic materials, and a small pyroclastic deposit.

Heldmann J. L. Colaprete T. Wooden D. Asphaug E. Schultz P. Plesko C. S. Ong L. Korycansky D. Galal K. Briggs G.

Lunar Crater Observation and Sensing Satellite (LCROSS) Mission: Opportunities for Observations of the Impact Plumes from Ground-based and Space-based Telescopes [#1369]

The LCROSS mission will impact the Moon and create an ejecta plume whose properties, including water ice and vapor content, will be observed by a shepherding spacecraft (S-S/C) plus Earth- and space-based telescopes.

Pieters C. M. Boardman J. Buratti B. Clark R. Green R. Head J. W. Lundeen S. Malaret E. McCord T. B. Mustard J. F. Runyon C. Staid M. Sunshine J. Taylor L. Tompkins S. Varanasi P.

M3 on Chandrayaan-1: Strategy for Mineral Assessment of the Moon [#1295]

The Moon Mineralogy Mapper on Chandrayaan-1 will characterize the mineral character across the Moon with global and targeted data. Measurement strategy is designed to optimize science return and integration with other international instruments.

Green R. O. Pieters C. Mouroulis P. Sellars G. Eastwood M. Geier S. Shea J.

The Moon Mineralogy Mapper: Characteristics and Early Laboratory Calibration Results [#2354]

We describe the characteristics and early calibration results for the NASA Moon Mineralogy Mapper (M3) to be launched in 2008 onboard the Chandrayaan-1 Mission.

Bussey D. B. J. Spudis P. D. Nozette S. Lichtenberg C. L. Raney R. K. Marinelli W. Winters H. L.
Mini-RF: Imaging Radars for Exploring the Lunar Poles [#1610]

In 2008 two imaging radars will fly to the Moon to map the polar regions. They will use a new hybrid architecture to search for ice.

Yamada R. Yamada I. Shiraisi H. Kobayashi N. Takeuchi N. Murakami H. Tanaka S. Fujimura A.
Seismic Observation by the Seismometer on Board the Penetrator for Lunar Exploration [#1503]

The seismic observation has been made by the seismometer on board the penetrator and two references; the same type of the seismometer without the penetrator and L-4 geophone. These observed waveforms show good correlation with each other.

Kato M. Takizawa Y. Sasaki S. SELENE Project Team
The SELENE Mission: Present Status and Science Goals [#1211]

This is the mission summary of the SELENE lunar orbiter upcoming launch of summer 2007.

Iwata T. Namiki N. Hanada H. Minamino H. Takano T. Kawano N. Matsumoto K. Sasaki S.
SELENE Small Sub-Satellites for Lunar Gravity Observation [#1557]

Lunar gravity model will be improved by combining four-way Doppler measurements and differential VLBI observations using two small sub-satellites of SELENE: the Relay Satellite (Rstar) and the VLBI Radio Satellite (Vstar).

Asada N. Kimura K. Hodokuma T. Demura H. Hirata N. Ohtake M. Haruyama J. Matsunaga T.
Detection Possibility of Mantle Materials by Multi-Band Imager [#1261]

Multi-band Imager on SELENE is possible to detect or separate the outcrop of the mantle substance at the crater walls or the crater central peaks from regoliths.

Ohtake M. Haruyama J. Matsunaga S. Morota T. Yokota Y. Honda C. Yamamoto A.
Arai T. Takeda H.

Objectives of the SELENE Multiband Imager and Spectral Study of Dho489 [#1829]

One of the important scientific goals of SELENE Multiband Imager is to explore most primitive lunar crustal materials. To achieve that goal we study reflectance spectra of Dho 489 to establish analytical methods to identify magnesian anorthosite.

Haruyama J. Ohtake M. Matsunaga T. Morota T. Honda C. Torii M. Yokota Y. Kawasaki H.
Pre-Launch Operation Planning of Lunar Imager/Spectrometer (LISM) on SELENE [#1136]

In this presentation, we introduce Lunar Imager/Spectrometer on the Japanese Moon orbiter SELENE that will be launched in this year, focusing on the planned operation.

Honda C. Morota T. Yokota Y. Haruyama J. Ohtake M. Matsunaga T. Ogawa Y. Demura H.
Hirata N. Iwasaki A. Kodama S. Hara S. Hioki K.

Preliminary Test of Accuracy of Digital Terrain Model Derived from SELENE/LISM/TC Data [#1899]

We evaluated the standard deviation of difference between DTMs produced from SELENE/LISM/TC data and true value of DTM which is simulated at 5–16 m and 5–25 m for highland and mare terrain, respectively.

Yokota Y. Haruyama J. Ohtake M. Matsunaga T. Honda C. Morota T. Demura H.
Hirata N. LISM Working Group

Kilometer Scale Roughness Analysis of Lunar Digital Terrain Model [#2430]

We demonstrate the root mean square deviation method as an indicator of topographic roughness on a kilometer scale, using stereo images from an Apollo Mapping Camera in a Digital Terrain Model, and compare three regions in the lunar highlands.

Kring D. A. Rademacher J.

Initiating the Surface Ops Phase of the Lunar Exploration Architecture with Robotic Landers and Rovers [#1595]

The Lunar Reconnaissance Lander and Lunar Surface Explorer provide low-cost, science- and exploration-rich solutions for multiple mission objectives in a strategy that maximizes the efficiency of the lunar exploration initiative and provides access to the greatest number of sites on the Moon.

Gibson E. K. McKay D. S. Pillinger C. T. Wright I. P. Sims M. R. Richter L.

Beagle to the Moon: An Experiment Package to Measure Polar Ice and Volatiles in Permanently Shadowed Areas or Beneath the Lunar Surface [#1306]

The Beagle Science Package is a flight qualified set of instruments which should be deployed to the lunar surface to answer the questions about water and volatiles present in permanently shadowed regions and/or beneath the surface.

Fagan A. Neal C. R. Salvati L. Sakimoto S. Nakamura Y. Weinberg J.

The Case for a Long-lived Global Lunar Geophysical Network — 1: Seismic Data [#2416]

Global seismic data along with resonant column tests on samples are required from the Moon for scientific and exploration reasons.

Neal C. R. Hood L. Huang S. Sakimoto S. Kiefer W. Weinberg J.

The Case for a Long-lived Global Lunar Geophysical Network — 2: Magnetic and Heat Flow Data [#2428]

A long-lived geophysical network will include a seismometer, heat-flow probe(s), and a magnetometer to investigate the lunar interior. Rationale for magnetic and heat flow data is given here.

Stillman D. E. Grimm R. E.

Dielectric Spectroscopy Mapping of Subsurface Ice on the Moon and Mars [#1944]

Ice has a characteristic electrical signature at low frequency that allows it to be distinguished from regolith at about 1% volumetric accuracy. Ice concentration can also be estimated as a function of depth by changing the electrode geometry.

Urquhart M. L. Mellon M. T.

A New Model for Determining Lunar Rock Abundance and Landing Hazards [#2171]

We present a new lunar thermal model using temperature dependent thermal inertia and an accurate ephemeris that, if coupled with anticipated data from LRO, can assist in the determination of rock abundances and associated hazards to lunar landers.

Thursday, March 15, 2007
POSTER SESSION II: LIVING AND WORKING ON THE MOON
6:30 p.m. Fitness Center

Liu Y. Schnare D. Park J. S. Hill E. Eimer B. Taylor L. A.

Shape Analyses of Lunar Dust Particles for Astronaut Toxicological Studies [#1383]

This abstract reports the shape distributions of five lunar samples and the simulant JSC-1Avf, for particles both $<1 \mu\text{m}$ and $> 1 \mu\text{m}$.

Qiao Y. Chen J. Han A.

Developing Cementitious Materials Using Lunar Soil Simulant [#1038]

An organic-inorganic nanohybrid of high flexure strength and low permeability is developed using lunar soil simulant. This technique has great potential in developing high-performance space infrastructural materials using locally harvestable resources.

Eimer B. C. Taylor L. A.

Dust Mitigation: Lunar Air Filtration with a Permanent-Magnet System (LAF-PMS) [#1654]

Returning to the Moon requires new ways to control the dust that is pervasive on the lunar surface. The LAF-PMS is a filter system that uses magnetic fields to remove the toxic lunar dust from pressurized areas.

Clark P. E. Curtis S. A. Minetto F. A. Keller J.

Finding a Dust Mitigation Strategy that Works on the Lunar Surface [#1175]

We discuss electrostatic dust control in the context of other methods. We propose compact, low power dust control based on electrostatic principles incorporating variable phase EMF electrostatic surfaces and reconfigurable particle guns.

Eimer B. C. Taylor L. A.

Lunar Regolith, Soil, and Dust Mass Mover on the Moon [#1662]

The LSMAC is able to collect/transport large amounts of lunar regolith without generating the large amount of dust that is "kicked up" with normal methods, preventing interference with equipment on the lunar surface, i.e., Moon based observatories.

Kókány A. Koltai D. Varga T. Szilágyi I.

Practical Questions of the Moving of Lunar Soil Materials on the Conditions of the Lunar Surface [#1395]

Loading the lunar moving equipment with local materials compensates the decrease of the necessary pushing force due to the smaller lunar gravity. The pushing force ensured by the lunar moving equipment increases, while the sticking friction remains the same.

Boldoghy B. Kummert J. Varga T. Szilágyi I. Bérczi Sz.

Practical Realization of Covering Lunar Buildings for Ensured Levelled Temperature Environment [#1380]

Lunar regolith packed in bags is used for covering buildings of levelled temperature to be created in lunar ditches, valleys or craters. Pre-packed regolith in uniform size and controllable quality can be applied for covering the buildings.

Thursday, March 15, 2007
POSTER SESSION II: METEOROID IMPACTS ON THE MOON
6:30 p.m. Fitness Center

Cudnik B. M.

The Status of Lunar Meteor Research (and Applications to the Rest of the Solar System) [#1115]

Since the first confirmed video recordings of lunar meteor impacts in 1999, the field of hypervelocity impact research has greatly expanded. Findings from this research have implications for NASA's plans to return astronauts to the Moon by 2020.

Cooke W. J. Suggs R. M. Suggs R. J. Swift W. R. Hollon N. P.

Rate and Distribution of Kilogram Lunar Impactors [#1986]

Twenty potential lunar impactors — shower and sporadic — are identified and potential non-impact causes are investigated. Rates and distribution of impactors are briefly discussed.

Thursday, March 15, 2007
POSTER SESSION II: LUNAR REMOTE SENSING
6:30 p.m. Fitness Center

McClanahan T. P. Trombka J. I. Mitrofanov I. G. Sagdeev R. Z.
*Application of Image Restoration (Jansson Van-Cittert) Planetary Remote Sensing Neutron
Count Rate Maps* [#2408]

This paper evaluates Jansson Van-Cittert's (JVC) image restoration transform for possible application to neutron maps for planetary remote sensing.

Prettyman T. H. Hagerty J. J. Elphic R. C. Feldman W. C. Finnegan T. E. Lawrence D. J.
McKinney G. W. Vaniman D. T.

Analysis of Low-Altitude Lunar Prospector Gamma Ray Spectra [#2214]

Results of the analysis of low-altitude gamma ray spectroscopy data acquired by Lunar Prospector are presented along with implications to lunar science.

Hagerty J. J. Lawrence D. J. Hawke B. R. Elphic R. C. Prettyman T. H. Feldman W. C.
*Did a KREEP-like Component Exist on the Far Side of the Moon?: Insights from the Thorium Abundance
Distribution in South Pole-Aitken Basin* [#1697]

We use new data from forward modeling of the Th abundance distribution in South Pole-Aitken basin, as well as newly deconvolved Th data, to suggest that a KREEP-like component may have once existed on the far side of the Moon.

Srivastava N.

Geochemical Estimation of Iron and Titanium for Central Peaks of Lunar Craters [#2188]

Central peaks of 26 lunar craters have been observed for average FeO and TiO₂ concentration using Clementine UVVIS data. The results have shown a distinct correlation with lithological assemblage obtained earlier by Tompkins and Pieters (1999).

Staid M. I. Stone T. C.

Remote Sensing of Lunar Basalts Using ROLO Telescopic Data and Clementine Images [#1951]

The mineralogy of several nearside lunar maria are investigated using complementary spectral measurements from the USGS Robotic Lunar Observatory and the Clementine UVVIS and NIR cameras.

Yamamoto A. Arai T. Takeda H. Miyamoto M.

Spectroscopy of Nearside Highland in Relation to Apollo 16 Rock Samples [#1590]

We measured UV/VIS/NIR reflectance spectra of five anorthosite samples from Apollo 16 landing site, and examine the spectral result with their petrology and mineralogical compositions.

Giguere T. A. Hawke B. R. Blewett D. T. Campbell B. A. Gillis-Davis J. J. Lucey P. G. Peterson C. A.
Runyon C. Taylor G. J.

Cryptomare and Pyroclastic Deposits in the Gassendi Region of the Moon [#1132]

Clementine multispectral images and Lunar Prospector elemental abundance data were used to identify and investigate unusual cryptomare deposits in the interior of Gassendi crater and the highlands to the west.

Nicholas J. B. Purucker M. E. Sabaka T. J.

The Reiner Gamma Albedo Marking on Earth's Moon: Old or Young? [#1027]

A minimum magnetization necessary to explain the Reiner Gamma albedo feature was determined, and estimates made of spatial distribution of magnetization, depth of source and magnetization direction. The evidence suggests that the albedo feature arises from retarded ageing under a mini-magnetosphere.

Hawke B. R. Giguere T. A. Gaddis L. R. Campbell B. A. Blewett D. T. Boyce J. M. Gillis-Davis J. J. Lucey P. G. Peterson C. A. Robinson M. S. Smith G. A.

Remote Sensing Studies of Copernicus Rays: Implications for the Copernican-Eratosthenian Boundary [#1133]

The mere presence of bright rays is not a reliable indicator that a crater was formed during the Copernican Period because compositional rays can persist for 3 Ga or more. The optical maturity parameter should be used to define the C-E boundary.

Morota T. Haruyama J. Honda C. Yokota Y. Ohtake M. Matsunaga T.

Lunar Cratering Chronology: Statistical Fluctuation of Crater Production Frequency and Its Effect on Age Determination [#1750]

In this paper, we evaluate errors in age determination due to statistical fluctuation of crater production frequency by a simple numerical simulation.

Shevchenko V. V. Pinet P. C. Chevrel S. Daydou Y. Skobeleva T. P. Kvaratskhelia O. I. Rosemberg C. *The Avalanche Deposits in Lunar Crater Reiner* [#1066]

Avalanching appears to be a major means of the current erosion on steep lunar slopes. The age of the observed lunar slope degradation is very young. However, the lunar triggering mechanism of the down slope movement of the material remains unclear.

Thompson T. W. Campbell B. A. Ghent R. R. Hawke B. R.

70-cm Radar Properties as a Guide to Mega-Regolith Differences Across the Moon's Southern Highlands [#1102]

Differences in the number of small (1–16 km diameter) craters with radar-bright ejecta is not uniform across the southeastern nearside lunar highlands indicating deep megaregoliths associated with the South Pole Aitken and Australe impact events.

Dhingra D.

Radial Mineralogical Trends in Fresh Impact Craters on Moon — Formation Processes & Significance [#1600]

Radial mineral trends in fresh lunar craters on floors of pre-existing craters as well as outside are reported. Similar radial patterns in different settings possibly need different explanations. Excavation of a crystallized melt sheet or pre-existing ejecta pile seems probable.

Carter L. M. Campbell B. A. Hawke B. R. Campbell D. B.

Radar Remote Sensing Studies of Lunar Pyroclastic Deposits [#1855]

We use ground-based radar observations to study the distribution and physical properties of lunar pyroclastic deposits. Our images have resolutions of 20–60 m/pixel and include Aristarchus, Taurus-Littrow, and the Apollo 17 landing site.

Byrne C. J.

Interior of the Near Side Megabasin of the Moon [#1248]

The proposed Near Side Megabasin explains the surface topography of the far side of the Moon, but the interior of the basin presents puzzling features. These features are described and possible origins are proposed.

Thursday, March 15, 2007
POSTER SESSION II: LUNAR SAMPLES AND EXPERIMENTS
6:30 p.m. Fitness Center

Rodriguez Durand S. Longhi J.

Pressure Calibration and the Mare Basalt Source Region [#2443]

New pressure calibrations according to [1] indicate that the multi-saturation pressures may be considerably higher than previously reported.

Liang Y. Thacker C. Peng Q. Hess P. C.

The Stability of Armalcolite and Ilmenite During Lunar Cumulate Mantle Overturn [#1076]

Ilmenite is thermodynamically unstable in the presence of opx and transforms into armalcolite at $P < 1.4$ GPa. Isolated regions of armalcolite-bearing harzburgite may be present in the lunar mantle and serve as a source for armalcolite assimilation.

Grove T. L. Krawczynski M. J. Medard E.

Experimental Investigation of the Depth of Origin for the Apollo 15 Red Glass: Evidence for a f_{O_2} Control on Olivine-Opx Multiple Saturation [#1236]

Experiments on the Apollo 15 red glass have shown the olivine-orthopyroxene multiple saturation point is sensitive to oxygen fugacity. Our work implies a shallower origin within the Moon for the Apollo 15 red glass than originally believed.

Neal C. R.

Mining the Literature for "New" Data: Expanding the Apollo 14 High-Alumina Basalt Isotope Database [#2398]

Existing Rb-Sr isotope data from A-14 high-alumina basalts are used to place constraints on the age and composition of the different basalt groups.

Schnare D. W. Taylor L. A. Norman M. D. Day J. M. D.

Single Source Origin for Apollo 15 Olivine- and Quartz-Normative Basalts [#1379]

We used mineral trace-element data from the Apollo 15 olivine- and quartz-normative mare basalts, combined with partition coefficients, to model their parental- and evolved-melt compositions, and to address the relationships between these suites.

Herzog G. F. Moynier F. Albarède F.

Isotopic and Elemental Abundances of Copper and Zinc In: Lunar Basalts, Glasses, and Soils, a Terrestrial Basalt, Pelé's Hairs, and Zagami [#1222]

Isotopic abundances of Zn and/or Cu in terrestrial basalts, Zagami, and lunar materials, which include micrometeorites, indicate that Zn and probably Cu in all of them come from a common set of reservoirs linkable by mass-dependent fractionation.

Treiman A. H.

Rhönite in Luna 24 Pyroxenes: First Find from the Moon, and Implications for Water in Planetary Magmas [#1244]

The mineral rhönite has been recognized for the first time in a lunar rock. Had water, F, or Cl been present, the amphibole kaersutite would probably have formed instead.

McCubbin F. M. Nekvasil H. Lindsley D. H.

Is There Evidence for Water in Lunar Magmatic Minerals? A Crystal Chemical Investigation [#1354]

Published data on volatile-bearing lunar minerals have been assessed through crystal chemical methods for the potential presence of lunar magmatic water. These data suggest the need for further analysis of water in volatile-bearing lunar minerals.

James O. B. Ash R. D. McDonough W. F. Puchtel I. S. Walker R. J.
*Fractionation and Volatile Redistribution of Siderophile Elements in Metal Grains from Lunar
Impact-Melt Breccia 76215* [#1094]

LA ICP-MS data for metal globules and a metal crystal in vesicles in melt breccia 76215 show that the globules (molten relicts of the impactor) fractionated as they crystallized, and the vapor in the vesicles was rich in Fe and volatile siderophiles.

Oshrin J. Neal C. R.
Crystal Size Distributions and Mare Basalts [#2365]
Crystal size distributions can be used to identify petrogenetic processes.

Thursday, March 15, 2007
POSTER SESSION II: LUNAR ATMOSPHERE
6:30 p.m. Fitness Center

Berezhnoy A. A.

Meteorite Bombardment as a Source of Lunar Atmosphere [#1047]

Based on quenching theory the chemical composition of gas-phase species released to the lunar atmosphere during micrometeorite impacts has been estimated. NaOH, KOH, Ca, Mg, Al, Fe, and Ti oxides are produced during such collisions.

Larignon B. L. Pierazzo E. Goldstein D. B.

Simulation of Low Density Atmospheric Flow on the Moon Following a Comet Impact [#2121]

The present work examine the flow of expanding gaseous material after a comet impact on the Moon by coupling the Direct Simulation Monte Carlo (DSMC) code to the output of a SOVA hydrocode simulation of an impact event.

Wilson T. L.

The Lunar Atmosphere as a Cosmic-Ray Detector [#1790]

The recent discovery of an Na atmosphere on the Moon raises the question of its use as a fluorescent spectrometer for the detection of cosmic rays. Though tedious and technically demanding, the feasibility of such a concept is addressed.

Starukhina L. V.

Meteorite Swarm Encounters as a Source of Magnetic Anomalies on the Lunar and Mercurian Surfaces [#1299]

The impact of a dense meteorite swarm on an airless body can produce swirl-like albedo patterns and magnetic anomalies over them. Surface material is magnetized due to compression and enhancement of interplanetary magnetic field between impact plasma clouds.

Thursday, March 15, 2007
POSTER SESSION II: MOON: SOILS, POLES, AND VOLATILES
6:30 p.m. Fitness Center

Schultz R. A. Siddharthan R.

Strength of Lunar Soil Using the Cam Cap Approach [#1127]

We use a standard Cam Cap approach to model the strength of returned Apollo 12 lunar soil. Cohesion, friction, and volumetric changes (dilatational and compactional) are well captured by the model.

Crawford I. A. Fagents S. A. Joy K. H.

The Survival of Ancient Solar Wind, Galactic Cosmic Ray Particles and Samples of the Early Earth in Lunar Palaeoregolith Deposits [#1323]

Ancient lunar regoliths (palaeoregoliths) may contain a vital record of early solar system history if they can survive the thermal consequences of burial by overlying lava flows. We investigate the preservation potential of this record.

Christoffersen R. Keller L. P.

Space Plasma Ion Processing of Ilmenite in the Lunar Soil: Insights from In-Situ TEM Ion Irradiation Experiments [#1969]

Radiation processing of lunar ilmenite grains was studied using a tandem ion accelerator-transmission electron microscope. The ilmenite maintains a crystalline structure up to one order of magnitude higher dose of 1 MeV Kr ions compared to pyroxene.

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

The Role of Reaction of Disproportionation in the Redox Behavior of Iron During Impacts [#1597]

Reduction of iron in a hot and dense impact-induced plume can proceed under control of reaction of disproportionation of oxygen and provide simultaneous formation of such strange assemblage as native iron, wustite, and magnetite.

Elphic R. C. Lawrence D. J. Eke V. R. Teodoro L. F. A. Taylor G. J. Bussey D. B. J.

What Do Hydrogen Abundances at the Moon's South Pole Imply for Ice Prospecting in Shackleton Crater? [#2193]

Analysis of Lunar Prospector neutron data yields ~0.4 wt% water-equivalent hydrogen in Shackleton crater. A large number of sample sites (>10) would be needed to confirm the presence of randomly distributed icy deposits within the crater.

Crotts A. Austin D. Barclay A. Bergier A. Chutjian A. Cseresnjcs P. Darrach M. Ebel D. Gorevan S. Hickson P. Hummels C. Joner M. Kratochvil J. Lukic D. Marka S. Marka Z. Nakamura Y. Radebaugh J. Savin D. W. Scharf C. Spiegel E.

Probing Lunar Volatiles: Initial Ground-based Results [#2294]

We describe several results from a large program to locate, explore and characterize lunar volatiles using techniques from the Earth, orbit and *in situ* at the Moon.

Crider D. H. Vondrak R. R.

Understanding Stratigraphy in Lunar Polar Cold Traps [#2225]

We present results from a Monte Carlo model of the evolution of water ice in lunar polar cold traps from gardening and weathering. We interpret them in terms of understanding existing data and planning for future lunar missions.

Thursday, March 15, 2007
POSTER SESSION II: LUNAR TOPOGRAPHY AND GEOPHYSICS
6:30 p.m. Fitness Center

Rosiek M. R. Cook A. C. Robinson M. S. Watters T. R. Archinal B. A. Kirk R. L. Barrett J. M.
A Revised Planet-Wide Digital Elevation Model of the Moon [#2297]
Work in progress on revising a lunar DEM that was generated from Clementine UVVIS along track stereo coverage. The 1 km/pixel "planet-wide" (35% coverage) DEM can supply local topographic details and profiles to ± 100 m relative height accuracy within a regional area of the Moon.

Weller L. Becker T. Archinal B. Bennett A. Cook D. Gaddis L. Galuszka D. Kirk R.
Redding B. Soltesz D.
USGS Lunar Orbiter Digitization Project: Updates and Status [#2092]
We report on the Lunar Orbiter global mosaic construction progress and provide updates on the very high resolution data digitization effort.

Archinal B. A. Rosiek M. R. Kirk R. L. Hare T. L. Redding B. L.
Final Completion of the Unified Lunar Control Network 2005 and Topographic Model [#1904]
A new Unified Lunar Control Network has been completed and released, unifying the previous ULCN and the Clementine LCN. Since point locations were solved for in three dimensions, this also comprises a new global topographic model for the Moon.

Mest S. C.
Updated Geologic and Geomorphic Maps of the Lunar North and South Poles [#1842]
Updated digital geologic maps of the lunar north and south polar regions (poleward of 70°) are being produced at 1:1M scale using post-Lunar Orbiter data. The scientific results of this study will be useful in planning future missions to the Moon.

Williams J. G. Boggs D. H. Ratcliff J. T.
Lunar Mantle and Fluid Core Results and Inner Core Possibilities [#2004]
New data improves lunar science results. A fluid core and tidal dissipation are inferred from dissipation effects on rotation. Detection of core-mantle boundary flattening gives additional evidence for a fluid core. An inner core may be detectable.

Hikida H. Wiczorek M. A.
Crustal Thickness of the Moon: New Constraints from Gravity Inversions Using Polyhedral Shape Models [#1547]
A new method is presented for estimating crustal thickness from gravity and topography on the Moon. Analytically calculating the exterior gravitational field for a set of arbitrarily shaped polyhedra inverts relief along the crust-mantle interface.

Bulow R. C. Johnson C. L. Bills B. G.
Tidal Stress and Deep Moonquake Occurrence [#1479]
We investigate the relationship between tidal stress and deep moonquakes by performing a search over possible failure plane orientations to determine the stress state that best fits moonquake occurrence. We consider shear and normal stress and rates, demeaned stress, and ambient stress.

Nakamura Y.
Within-Nest Hypocenter Distribution and Waveform Polarization of Deep Moonquakes and Their Possible Implications [#1160]
Cross-spectral analysis of deep moonquake signals from 27 selected nests all show highly restricted distribution of hypocenters in each nest. Signal polarization for some nests suggests varying slip direction with changing tidal stress.

Cahill J. T. Lucey P. G. Le Mouelic S.

Apollo 17 Landing Site: Evaluating a Joint UVVIS-NIR FeO Algorithm that Nullifies Topographic Shading Effects on Lunar Reflectance Spectra [#1967]

Apollo 17 landing site FeO maps are computed from Clementine image cubes with corrected and uncorrected photometry using UVVIS (Lucey et al., 2000) and UVVIS-NIR (Le Mouelic et al., 2000) algorithms to quantify the statistical correlation between them.

Williams D. R. Schultz A.

Lunar Data Project — Interim Report on Restoration of Apollo Data [#1357]

The Lunar Data Project is an ongoing effort at NSSDC to put relevant, scientifically important Apollo data into accessible digital form for use by researchers and mission planners. We report on the progress made since last year and future plans.

Thursday, March 15, 2007
POSTER SESSION II: LUNAR METEORITES
6:30 p.m. Fitness Center

Takeda H. Arai T. Yamaguchi A. Otuki M. Ishii T.
Mineralogy of Dhofar 309, 489, and Yamato-86032 and Varieties of Lithologies of the Lunar Farside Crust [#1607]
Dhofar 489 and Yamato(Y)-86032 are keys to understanding the lunar farside crust. Mg-rich anorthosites were found in Dhofar 309, as well as Dhofar 489. Fe-rich anorthosite with negative ϵ_{Nd} in Y-86032 requires the crustal formation process of farside distinct from that for nearside.

Kuehner S. M. Irving A. J. Korotev R. L. Hupé G. M. Ralew S.
Zircon-Baddeleyite-bearing Silica+K-Feldspar Granophyre Clasts in KREEP-rich Lunar Breccias Northwest Africa 4472 and 4485 [#1516]
These paired lunar meteorites contain clasts of Si-K-Zr-rich granophyre and have KREEP-rich bulk compositions similar to Apollo "LKFM" mafic impact melt breccias.

Hill E. Taylor L. A. Liu Y.
LaPaz 04841: Comparative Petrology and Textural Study of a New Lunar Mare Basalt Meteorite [#1399]
We present the first textural description, mineralogy, and mineral chemistry of LAP 04841, and confirm similarities with the other LaPaz basalts. Impact-shock effects show the range of pressures is encountered within a few millimeters, and suggest complex controls on pressure dissipation.

Hallis L. H. Joy K. H. Anand M. Russell S. S.
Compositional Analysis of the Very Low-Ti Mare Basalt Component of NWA 773 and Comparison with Low-Ti Basalts LAP 03632 & 02436 [#1703]
This project is a study of petrological and mineralogical similarities of LAP 03632, LAP 02436 and specific mare-basalt clasts within the regolith breccia portion of NWA 773. The aim is to investigate the relationship between these young lunar basalts.

Zeigler R. A. Korotev R. L. Jolliff B. L.
Petrography, Geochemistry, and Pairing Relationships of Basaltic Lunar Meteorite Stones NWA 773, NWA 2700, NWA 2727, NWA 2977, and NWA 3160 [#2109]
We discuss the petrography, geochemistry, and pairing relationships of the cumulus olivine gabbro, porphyritic olivine basalt, and regolith breccia lithologies in the meteorites: NWA 773, NWA 2700, NWA 2727, NWA 2977, NWA 3160, and an unpaired stone.

Joy K. H. Anand M. Crawford I. A. Russell S. S.
Petrography and Bulk Composition of Miller Range 05035: A New Lunar VLT Gabbro [#1867]
MIL 05035 is a new holocrystalline lunar mare gabbroic meteorite. We report investigations into the sample's mineralogy and bulk composition.

Liu Y. Hill E. Patchen A. Taylor L. A.
New Lunar Meteorite MIL 05035: Petrography and Mineralogy [#2103]
Characterization of new lunar meteorite MIL05035 and its abundant break-down assemblages.

Spicuzza M. J. Day J. M. D. Taylor L. A. Valley J. W.

Oxygen Isotope Similarities and Differences Between the Earth and Moon: Can Oxygen Isotopes Distinguish Meteorites on the Moon [#2025]

We report and evaluate high-precision three oxygen isotope data for lunar mare basalts, lunar meteorites, and SNC meteorites. The variability of $\Delta^{18}\text{O}$ in lunar igneous rocks is small. With care, $\Delta^{18}\text{O}$ could be used to identify meteorites on the Moon.

Haloda J. Gabzdyl P. Tycova P. Fernandes V. A.

Lunar Meteorite Northeast Africa 003-A: Microstructures, Crystallization Modeling and Possible Lunar Source Areas [#1768]

Lunar meteorite NEA 003-A is a low-Ti olivine-rich mare basalt with recently determined young Ar-Ar age of 2.377 Ga. The microstructures in the rock together with crystallization modeling indicate relatively stable magma crystallization conditions. Possible sources of the NEA 003-A are discussed.

Thursday, March 15, 2007
POSTER SESSION II: CHONDRITES: SECONDARY PROCESSES
6:30 p.m. Fitness Center

Izawa M. R. Flemming R. L. McCausland P. J. A.

Investigation of the Tagish Lake Carbonaceous Chondrite by X-Ray Microdiffraction [#1923]

We present the preliminary results of an investigation of the Tagish Lake carbonaceous chondrite using X-ray microdiffraction and conventional powder X-ray diffraction. An attempt to determine modal abundances by Rietveld refinement shows promise.

Herd R. K. Herd C. D. K.

Towards Systematic Study of the Tagish Lake Meteorite [#2347]

The pristine samples of the Tagish Lake carbonaceous chondrite have been acquired by a consortium of Canadian institutions. Long-term curatorial and collaborative, systematic analytical plans are being developed. In spite of much preliminary research, this meteorite is little understood.

Bullock E. S. Grady M. M. Gounelle M. Russell S. S.

Fe-Ni Sulphides as Indicators of Alteration in CM Chondrites [#2057]

This study looks at the sulphide abundance and composition of Fe-Ni sulphide grains in 12 CM chondrites to determine an alteration sequence for these chondrites.

Tyra M. A. Farquhar J. Guan Y. Leshin L.

Using SIMS to Evaluate Oxygen Isotopes in CM Chondritic Carbonate [#1471]

SIMS carbonate oxygen isotope analysis has been performed on a set of paired CM2 Antarctic chondrites. Results are compared to carbonate type and bulk values and show that different carbonate populations possess distinct isotopic values.

Sakamoto N. Itoh S. Kuramoto K. Nagashima K. Krot A. N. Yurimoto H.

An Extreme ^{17}O - ^{18}O -rich Material from Acfer 094 [#1644]

We report a material having extremely large oxygen mass-independent isotope fractionation (MIF) enriched in ^{17}O and ^{18}O of +180‰ relative to SMOW. The material is a new end member of solar system MIF of oxygen isotopes.

de Leuw S. Rubin A. E. Wasson J. T.

Manganese-rich Alteration Phases in CM Chondrites of Different Petrographic Subtypes: Implications for the Timing of Aqueous Alteration [#1361]

SEM and electron probe studies were performed on several thin sections of CM chondrites of different petrographic subtypes in order to identify manganese-rich alteration phases that are suitable for studying the Mn-Cr systematics.

Yamamoto Y. Nakamura T. Noguchi T. Nagao K.

Alkalinity Dependence on Mineralogical and Noble Gas Compositional Changes in the Ningqiang Carbonaceous Chondrite During Experimental Aqueous Alteration [#1746]

Experimental aqueous alteration on Ningqiang with neutral water and alkaline solution suggest that the composition of the liquid during alteration in hydrous asteroids has greatly influenced on the mineralogical and noble gas compositional changes.

Palguta J. Travis B. J. Schubert G.

Hydrothermal Convection and Aqueous Alteration in Chondritic Parent Bodies [#1370]

Heterogeneous fluid flow in carbonaceous chondrite parent bodies suggests hydrothermal alteration of minerals could vary with location in the body. We use numerical simulations to explore the resulting hydrothermal-mineral alteration.

La Croix L. M. McCoy T. J.

Shock Classification of Antarctic Ordinary Chondrites [#1601]

Shock classification of 91 ordinary chondrites from the ALHA 76-77 meteorites supports a paucity of most- and least-shocked meteorites, an absence of heavily shocked type 3 chondrites, and a possible difference between H and L chondrites.

Kohout T. Kletetschka G. Pesonen L. J.

Identification of the Shock Effects in the the Avanhandava H4 Chondrules Based on the Coercivity Spectra of the Remanent Magnetization [#1773]

The new method to identify the shock in the coercivity spectra of the remanent magnetization has been applied on chondrules of Avanhandava H4 chondrite. The past shock events have been identified. The method was also tested experimentally with the same material giving similar results.

Xie Z. Sharp T. G. DeCarli P. S.

Partially Shock-Transformed Olivine in the S6 Chondrite Tenham: Mechanisms of Solid-State Transformation [#2302]

Here we document the complexity of ringwoodite lamellae in partially transformed olivine in Tenham, and discuss the likely transformation mechanisms and the role of temperature and deformation.

Thursday, March 15, 2007
POSTER SESSION II: CHONDRITES
6:30 p.m. Fitness Center

Ciesla F. J.

Cooling Off the Solar Nebula: The Origin of Moderately Volatile Element Depletions in Chondritic Meteorites [#1387]

Here we track the elemental depletions in planetesimals that form as the solar nebula cools by mass and angular momentum transport. The conditions needed to match chondrite depletions are compared to other constraints on solar nebula evolution.

Fischer-Gödde M. Wombacher F. Becker H.

Rhodium, Gold and Other Highly Siderophile Elements in Chondrites [#1625]

The abundances of Rh, Au, and other highly siderophile elements are reported for a set of chondrites from all major classes.

Tagle R. Berlin J.

Complementary Element Patterns — Is There a Genetic Relationship Between Carbonaceous and Enstatite Chondrites? [#2131]

We discuss bulk chemical element patterns of carbonaceous and enstatite chondrites and show that two chondrite groups (EH and CK) with very different petrographic characteristics have “complementary” patterns (=mirror images).

Bendersky C. Weisberg M. K. Connolly H. C. Jr. Ebel D. S.

Olivine and the Onset of Thermal Metamorphism in EH3 Chondrites [#2077]

We studied olivine in five EH3 chondrites. During metamorphism Cr is redistributed from olivine into metal and sulfide that form exsolution features. Olivine compositions in EH3s are useful for characterizing the most primitive E chondrites and classifying them into petrologic sub-types.

Rai V. K. Thiemens M. H.

Sulfur Isotopic Study of Primitive Carbon Phases from Meteorites [#1494]

Here we report high precision sulfur isotopic studies of primitive carbon phases (such as phase Q and ureilitic diamonds) from meteorites.

Garvie L. A. J. Baumgardner G. Buseck P. R.

Cross-Sectional Analysis of Carbonaceous Nanoglobules from the Tagish Lake (C2) Meteorite [#1924]

Focused ion beam thinning is used to reveal the inner structure of carbonaceous nanoglobules.

McCanta M. C. Treiman A. H. Alexander C. M. O'D. Dyar M. D.

Mineralogy and Petrography of the Amphibole-bearing R-Chondrite LAP 04840 [#2149]

We present a comprehensive study of the mineralogy of LAP 04840, discuss the similarities and differences with the other R-chondrites, and consider the implications for metamorphism on the parent body.

Dyar M. D. McCanta M. C. Treiman A. H. Sklute E. C. Marchand G. J.

Mössbauer Spectroscopy and Oxygen Fugacity of Amphibole-bearing R-Chondrite LAP04840 [#2047]

Mössbauer spectra of olivine, amphibole, mica, and whole rock from amphibole-bearing R-chondrite LAP 04840 are presented. All three minerals and the whole rock are rich in ferric iron, suggesting an oxygen fugacity of QFM+0.75 (± 0.75) log units.

Mikouchi T. Ota K. Makishima J. Monkawa A. Sugiyama K.

Mineralogy and Crystallography of LAP04840: Implications for Metamorphism at Depth in the R Chondrite Parent Body [#1928]

We report mineralogy and petrology of the LAP 04840 R chondrite by emphasizing crystallography of hornblende in this unusual chondrite. The presence of hornblende suggests high pressure and aqueous metamorphism at depth in the parent body.

Klima R. L. Pieters C. M. Sunshine J. M. Hiroi T. Bishop J. L. Lane M. D. Dyar M. D. Treiman A. H.
Coordinated Spectroscopic and Petrologic Investigation of LAP 04840: First Results of Infrared, Thermal and Raman Spectroscopy [#1710]

We present IR and Raman spectra of the amphibole-bearing R-chondrite LAP 04840 as part of a coordinated petrographic and spectroscopic investigation. Bulk spectra are dominated by olivine; amphibole can be distinguished in the near and thermal IR.

Thursday, March 15, 2007
POSTER SESSION II: MARTIAN METEORITES
6:30 p.m. Fitness Center

Schwenzer S. P. Colindes M. Herrmann S. Ott U.

Cold Desert's Fingerprints: Terrestrial Nitrogen and Noble Gas Signatures, Which Might be Confused with (Martian) Meteorites Signatures [#1150]

Terrestrial residence times for Antarctic meteorites can be quite long. Here we present data on terrestrial samples from a moraine at Sandford Cliffs to evaluate characteristics of possible influence on the nitrogen and noble gas budget of meteorites.

Schwenzer S. P. Herrmann S. Ott U.

Hot Deserts' Fingerprints in Nitrogen and Noble Gas Budgets of (Martian) Meteorites — Continued. . . [#1143]

Our studies on nitrogen and noble gases in terrestrial samples from the hot desert of Sayh al Uhaymir (Oman) revealed signatures that can easily mimic martian interior signatures. Here we add evidence from the Dar al Gani region to the data set.

McCubbin F. M. Nekvasil H. Lindsley D. H.

Late-Stage Volatile Evolution in Martian Magmas: Inferences from Maskelynite-hosted Apatite of the Chassigny Meteorite [#1347]

Chemical differences in interstitial and melt inclusion apatite and maskelynite in the Chassigny meteorite record differences in late-stage magmatic volatile evolution in these environments, providing new insights into martian magmatic processes.

Varela M. E. Zinner E. Kurat G.

Trace Element Abundances of Glass-bearing Inclusions in Chassigny [#1139]

The results of a SIMS study on glass-bearing inclusions in Chassigny olivines seems to support the non-classical scenario view.

Greenwood J. P. Itoh S. Sakamoto N. Vicenzi E. P. Yurimoto H.

Hydrogen Isotopography of Apatite in Los Angeles, Shergotty, and ALH 84001: New Constraints on Martian Water History and SNC Petrogenesis [#2134]

Ion and electron beam analysis of hydrous apatite in SNCs are higher than previously reported for these meteorites and provide new constraints on the evolution of martian water.

Boctor N. Z. Alexander C. M. O'D.

Volatile Abundances and H Isotope Signature of Feldspathic Glass and Clinopyroxene in the Shergottites Zagami, EETA 79001, Shergotty, and ALHA 77005 [#1801]

We measured volatile abundances and H isotope signatures of feldspathic glass and clinopyroxene in the shergottites Zagami, EETA 79001, Shergotty, and ALHA 77005.

Irving A. J. Kuehner S. M. Korotev R. L. Hupé G. M.

Petrology and Bulk Composition of Primitive Enriched Olivine Basaltic Shergottite Northwest Africa 4468 [#1526]

A fresh olivine-rich basaltic shergottite containing large pyroxene oikocrysts crystallized from a primitive "enriched" martian magma.

Mellin M. J. Taylor L. A. Norman M. D. Patchen A. D. Schnare D. W.

Mineralogical and Petrological Comparisons of Dual-Lithology EETA 79001 [#2179]

Detailed mineralogy and petrography on five polished thin sections of shergottite EETA 79001 composed of two lithologies, A and B, are presented.

Mellin M. J. Taylor L. A. Norman M. D. Patchen A. D. Schnare D. W.
In-Situ Mineral Trace-Element Analysis of Dual-Lithology Shergottite EETA 79001 [#2324]
New *in situ* mineral trace-element chemistry is presented for EETA 79001, lithologies A and B. Using this new dataset, possible relationships between the two lithologies are discussed.

Valley J. W. Ushikubo T. Kita N. T.
In Situ Analysis of Three Oxygen Isotopes and OH in ALH 84001: Further Evidence of Two Generations of Carbonates [#1147]
In situ three-oxygen isotope analyses (CAMECA-1280) show no difference in $\delta^{17}\text{O}$ ($\pm 0.11\%$) on Earth from 0.1 Ga–4.4 Ga, but SIMS $\delta^{17}\text{O}$ is distinct for Mars carbonates vs. Earth. Water is zoned in ALH 84001 carbonates suggesting low T globules and high T clots.

Gaffney A. M. Borg L. E. Asmerom Y.
Disturbance of Sm-Nd, Rb-Sr and U-Pb Isochrons During Shock and Thermal Metamorphism — An Experimental Approach [#1424]
In Rb-Sr and Sm-Nd systems, both heating and shock result in ages that are concordant with control ages, although in general, the ages derived from the metamorphosed samples have larger uncertainties. Age information is lost from the ^{238}U - ^{206}Pb system in the heated sample.

Walton E. L. Herd C. D. K.
Dynamic Crystallization of Shock Melts in Allan Hills 77005: Implications for Melt Pocket Formation in Martian Meteorites [#2177]
A series of crystallization experiments have been conducted in order to investigate the heterogeneous nucleation potential of a shock melt pocket in ALH 77005. This melt pocket cooled at a fast rate from a melt containing few nucleation sites at the onset of cooling.

Debaille V. Yin Q.-Z. Brandon A. D. Jacobsen B. Treiman A. H.
Lu-Hf and Sm-Nd Isotopic Studies of Shergottites and Nakhrites: Implications for Martian Mantle Sources [#1903]
This abstract presents a new Lu-Hf and Sm-Nd isotope systematics study of four shergottites and three nakhrites in order to further understand processes occurring during the early differentiation of Mars and the crystallization of its magma ocean.

Makishima J. McKay G. Le L. Miyamoto M. Mikouchi T.
Oxidation State of Nakhrites as Inferred from Fe-Ti Oxide Equilibria and Augite/Melt Europium Partitioning [#1834]
We report Fe-Ti oxide equilibria and augite/melt Eu partitioning of nakhrites. We found that studied nakhrites showed f_{O_2} of ~QFM-1 and there is generally good agreement between the two estimates from each method.

Matsuda N. Gucsik A. Nishido H. Ninagawa K. Okumura T. Kayama M.
Cathodoluminescence Microscopy and Spectroscopy of Apatite of the Y-000593 Nakhrite from Antarctica [#1061]
The main purpose of this CL study is to provide detailed mineralogical information on apatite in the nakhrite meteorites emphasizing the fluid-rock-atmospheric interactions in the martian environment.

Park J. Garrison D. Bogard D.
 ^{39}Ar - ^{40}Ar Ages of Two Nakhrites, MIL 03346 and Y 000593: A Detailed Analysis [#1114]
MIL 03346 and Y 000593 were analyzed for ^{39}Ar - ^{40}Ar ages. The both whole rock and mineral separates of plagioclase (plus mesotaxis) Ar-Ar ages are older than other radiometric ages. It seems that most excess ^{40}Ar is located in the plagioclase.

Grady M. M. Anand M. Gilmour M. A. Watson J. S. Wright I. P.

Alteration of the Nakhlite Lava Pile: Was Water on the Surface, Seeping Down, or at Depth, Percolating Up? Evidence (Such as It Is) from Carbonates [#1826]

We present carbon and oxygen isotope data on carbonates in five nakhlites and use the results to interpret the martian weathering processes.

Kuebler K. Jolliff B. L. Treiman A.

A Survey of Alteration Products and Other Secondary Minerals in Martian Meteorites Recovered from Antarctica [#2228]

A survey of Antarctic martian meteorites is underway to improve our understanding of the secondaries present, distinguish Antarctic alteration products from martian, characterize the conditions of formation, and compare the data to MER observations.

Thursday, March 15, 2007
POSTER SESSION II: MARS CRATERING
6:30 p.m. Fitness Center

Ghosh S. Stepinski T. F. Vilalta R.

Automatic Mapping of Martian Landforms Using Segmentation-based Classification [#1200]

We use terrain segmentation and classification techniques to automatically map landforms on Mars. The method is applied to six sites to obtain geomorphic maps geared toward rapid characterization of impact craters.

Novosel H. Salamunićcar G. Lončarić S.

Crater Detection Algorithms Based on Pixel-Difference, Separated-Pixel-Difference, Roberts, Prewitt, Sobel and Frei-Chen Gradient Edge Detectors [#1351]

Implementations of six different crater detection algorithms based on six different well-known gradient edge detectors are presented. They are analyzed and compared using free-response receiver operating characteristics.

Stepinski T. F. Mendenhall M. P. Bue B. D.

Robust Automated Identification of Martian Impact Craters [#1202]

Robust automatic identification of martian craters is achieved by a computer algorithm acting on topographic data. The algorithm outperforms manual counts; derived crater sizes and depths are comparable to those measured manually.

Salamunićcar G. Lončarić S.

From Cross-Analysis Using Ground Truth Catalogue of Martian Craters Towards New Generation of Catalogues of Craters [#1088]

Cross-analysis using ground truth catalogue of martian craters, assembled for evaluation of crater detection algorithms, is presented. Capability to detect and correct errors is a good basis for new generation of catalogues of craters.

Salamunićcar G. Lončarić S.

From Evaluation of Ground Truth Catalogue of Martian Craters Towards Estimation of Possible Improvements of Catalogues of Craters [#1087]

Evaluation of ground truth catalogue of martian craters, assembled for evaluation of crater detection algorithms, is presented. Based on this evaluation, estimation of possible improvements of catalogues of craters is given.

Barlow N. G.

Martian Central Pit Craters: Characteristics, Distribution, and Comparison with Central Pit Craters on Ganymede [#1242]

Central pits are found in martian impact craters between 5 and 57 km in diameter and between 51°N and 69°S. Both crater and pit tend to be smaller than central pit craters on Ganymede.

Valentour N. R. Barlow N. G.

Identification of Nested Craters on Mars [#1777]

Observations of marine target impacts on Earth show that they often display a nested crater appearance. This study examines the topography and morphology of potential candidates in the northern hemisphere of Mars.

Suzuki A. Baratoux D. Kurita K.

The Ejecta of Martian DLE Craters in Utopia Planitia: First Report on the Study of Thermal Properties and New Methods for Measuring Volume Ratio [#1974]

This is the first report on the study for establishing new methods to measure the volume ratio of martian DLE craters. This also include the preliminary result of the thermal properties of martian DLE.

McGowan E. M. McGill G. E.

Distribution of Rampart Craters, in Utopia Planitia, Mars [#1022]

This paper describes the statistical analysis of features in the northern lowlands of Mars whose formation may be related to the presence of water.

Barnouin-Jha O. S. Buczkowski D. L.

Comparing the Runout of Fluidized Ejecta on Mars with Mass Movements on Earth [#1304]

We compare the runout of fluidized ejecta for over 100 martian craters, with the runout of landslides on Earth and Mars to broadly assess the importance of volatiles and an atmosphere during the emplacement of fluidized ejecta.

Komatsu G. Ori G. G. Di Lorenzo S. Rossi A. P. Neukum G.

Impact-induced Liquefaction in Water-rich, Unconsolidated, Near-Surface Sediments on Mars? [#1189]

Impact-induced liquefaction in water-rich, unconsolidated, near-surface sediments may have contributed at least partially to the formation of some landforms associated with impact craters on Mars.

de Villiers G. King D. T. Jr. Marzen L. J.

Shallow Marine Impact Craters on Mars [#2233]

The objective of this study is to locate, map, and describe impact structures in Arabia Terra. The study of shallow-marine impact craters on Mars is still in an early stage, thus the results of this study could be useful in the general characterization of these craters.

Boyce J. M. Garbiel H.

Depth to Diameter Relationships of Pristine Martian Complex Impact Craters: Implication to Crater Mechanics, Surface Properties and Surface Process Studies [#1931]

The d_r/D relationship for fresh craters on Mars has been used as a standard for erosion, target material properties, and crater mechanics studies. A significantly better estimate of this d_r/D function has been derived by using only pristine crater in a size bin from a global population.

Gehrke S. Köhring R. Barlow N. G. Gwinner K. Scholten F. Lehmann H. Albertz J.

A Topographic Image Map of the Sabrina Valles Region Including Information on Large Martian Impact Craters [#1583]

The Catalog of Large Martian Impact Craters provides detailed information on 42,283 craters >5 km; it is planned to be integrated in the Topographic Image Map Mars 1:200,000 series. Such an update is shown in a special target map, based on HRSC data.

Morrison S. J. Frey H. V.

Crater Densities in Noachis Terra: Evidence for Overlapping Ejecta from Argyre and Hellas [#1355]

The cumulative frequency distribution of visible and buried craters in Noachis Terra provide evidence for effects of overlapping ejecta and secondary cratering in the area between Hellas and Argyre.

Frey H. V. Edgar L. A.

Very Large Diameter Impact Basins on Mars: Contributions from Crustal Thickness Data [#1716]

Stretched crustal thickness data suggest a half-dozen very large (>1000 km diameter) Circular Thin Areas (CTAs) which may be giant impact basins not previously recognized as QCDs. One may be the oldest large basin on Mars.

Thursday, March 15, 2007
POSTER SESSION II: MARS SURFACE PROCESSES AND EVOLUTION
6:30 p.m. Fitness Center

Chicarro A. F.

Mars Express — Discoveries After More than Three Years in Orbit [#1029]

After more than three years in orbit, the latest discoveries from the ESA Mars Express mission will be presented, including surface morphology, geology and mineralogy, subsurface sounding and gravity anomalies, as well as atmospheric circulation, composition and escape.

White O. L. Stofan E. R. Plaut J. J. Safaeinilli A. Gim Y. Picardi G. MARSIS Team

MARSIS Radar Sounder Observations in the Vicinity of Ma'adim Vallis [#1541]

Reflections seen in MARSIS radargrams over Ma'adim Vallis region are described. It is suggested that they are indicative of sediment-filled basins. Alternatively, they may be produced by ionospheric interference.

Watters T. R. Campbell B. A. Carter L. M. Leuschen C. J. Plaut J. J. Picardi G. Safaeinili A.

Clifford S. M. Farrell W. M. Ivanov A. B. Phillips R. J. Stofan E. R. MARSIS Science Team

MARSIS Subsurface Radar Sounding of the Medusae Fossae Formation, Mars [#1661]

The MARSIS radar sounder instrument has detected nadir echoes in orbits over units of the Medusae Fossae Formation in Elysium Planitia. These echoes are interpreted to be from the subsurface interface between the Medusae Fossae Formation material and the underlying lowlands plains.

Allen J. G. Gregg T. K. P.

Using Pedestal Craters Around the Medusae Fossae Formation, Mars, to Constrain Erosion Rates [#2016]

We analyze locations, diameters, and heights of pedestal craters around the Medusae Fossae Formation to constrain the paleo-extent of this formation as well as erosion rates.

Islam F. Cooke M. L. McGill G. E.

Boundary Element Modelling of the Polygonal Fault Networks of Utopia Planitia, Mars [#1738]

The overlap in scale between terrestrial sedimentary basins polygonal terrains and the polygonal terrains of Utopia Planitia suggest they may have similar origins. Models that simulate volumetric contraction will produce martian and earth scale spacing between fractures.

Griffes J. L. Grant J. Arvidson R. E. McEwen A. HiRISE Team

Geomorphic Analysis of Northern Meridiani Planum Using HiRISE Imaging [#2073]

A detailed geomorphic study was done in Northern Meridiani Planum using HiRISE, THEMIS, MOLA and OMEGA to characterize the morphology of five geologic units and study superposition relationships between kieserite and polyhydrated sulfates.

Murray J. B. Balme M. R. Muller J.-P. A. L. Kim J.-R.

Stratigraphical Evidence of Elysium Sea Ice from HiRISE Images [#2247]

A HiRISE image of Elysium plains shows features indicating both sea and ground ice. Size-frequency crater distributions show that some areas between ice rafts are several times older, discounting lavas and indicating complete sublimation of sea ice.

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

Measuring Platy Textures of Putative Martian Frozen Sea and/or Lava Surfaces Using THEMIS and MOLA Data [#2384]

Platy textures on Mars that are remnants of suspected frozen seas, lava flows, or mud flows can be measured using THEMIS and MOLA data; this can perhaps give us some insight into how these structures formed.

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

Western Promethei Terra, Mars: Preliminary View of the Geological History [#1980]

The last major geological episode of the study region (35°–45°S, 90°–110°E) was a period of late resurfacing. Localised channels (with no apparent sources), possible lag deposits, and esker-like features imply that one possibility for this was a glacier.

Oehler D. Z. Allen C. C. Venechuk E. M. Paris K. N.

Layered Sediments, Rampart Craters, and Potential Fluvio-Lacustrine Activity in S.W. Arabia Terra, Mars: Support for a History of Aqueous Conditions [#1057]

Rampart craters, along with possible fluvio-lacustrine sediments in Vernal Crater (S.W. Arabia Terra), add to regional considerations and spectroscopic data suggesting that this region has had a considerable history of aqueous conditions.

Crown D. A. Berman D. C. Gregg T. K. P.

Geologic Diversity and Chronology of Hesperia Planum, Mars [#1169]

The distribution and nature of sedimentary and volcanic units within southern Hesperia Planum is examined and new constraints on the formation and modification of Hesperia Planum are provided from crater statistics.

Chuang F. C. Crown D. A.

Modification of the Ancient Highland Plateau Along the Dichotomy Boundary, Deuteronilus Mensae, Mars [#1455]

We present a synthesis of recent work that highlights our geologic mapping results, discusses collapse of plateau materials, and preliminary reconstruction modeling of apron and valley fill materials.

Peet V. M. Ramsey M. S. Crown D. A.

Remote Sensing Analyses of Small Terrestrial Volcanic and Impact Craters: A Mars Analog for Formation, Morphology, and Erosional Processes [#2330]

Small terrestrial volcanic and impact craters are analyzed using remote sensing techniques to determine formation and erosion processes. Ejecta are mapped and apparent thermal inertia is generated for application to martian datasets.

Forsberg-Taylor N. K. Phillips R. J.

Oh Where, Oh Where Has the Crater Rim Gone? A Quantitative Look at Hellas Basin Rim Erosion [#1245]

Where? Probably onto the basin floor. A quantitative study of Hellas Basin shows the volume of material removed from the rim over time may have resulted in layer of sediment at least 2.4 km thick on the basin floor.

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

Mesas and Related Features on the Eastern Rim of the Hellas Basin, Mars [#1671]

The slope between Reull-Teviot Vallis and Hellas basin has a set of unique flat-topped E-W elongated mesas with scalloped flanks. They show evidence of long-lasting intense erosion, indicating that they are remnants of a large regional massif.

Coleman K. S. A. Tullis J. A.

Classification of Depression Types on Mars [#1156]

Objective of the study is to create improved classification of closed depressions found on the martian surface in an attempt to identify solution-dominated features.

Cushing G. E. Titus T. N. Wynne J. J. Christensen P. R.

THEMIS Observes Possible Cave Skylights on Mars [#1371]

Here we report the discovery of seven candidate skylight entrances into subterranean caverns. All seven are located in a region with widespread collapse pits and grabens which may indicate an abundance of subsurface void spaces.

Thursday, March 15, 2007
POSTER SESSION II: MARS SEDIMENTS AND GEOCHEMISTRY:
REGOLITH, SPECTROSCOPY, AND IMAGING
6:30 p.m. Fitness Center

Hurowitz J. A. Yen A. S. Kim S.

Experimental Constraints on Oxygen Gas Release and Mobility of Adsorbed Superoxide in Martian Soils [#2041]
We report on new experiments designed to further examine the role of superoxide adsorbed on silicate mineral surfaces as an oxidant in martian soils.

Mellon M. T. Putzig N. E.

The Apparent Thermal Inertia of Layered Surfaces on Mars [#2184]
We examine the effects of shallow layering in the martian subsurface on the diurnal and seasonal surface temperatures, and on the apparent thermal inertia as has been derived from temperature measurements and assuming soil homogeneity.

Osterloo M. M. Anderson F. S. Hamilton V. E. Glotch T. D.

Analysis of a Spectrally Distinct Surface Feature in the Terra Sirenum Region of Mars from THEMIS and TES [#1814]

We investigate a spectrally distinct region in the southern highlands of Terra Sirenum which was located during a survey of Mars Odyssey Thermal Emission Imaging System (THEMIS) daytime infrared (IR) decorrelation stretched (DCS) images.

Demidov N. E. Boynton W. V. Gilichinsky D. A. Litvak M. L. Kozyrev A. S. Mitrofanov I. G. Sanin A. B. Saunders R. S. Smith D. E. Tretykov V. I. Zuber M. T.

Searching for Correlation Between Neutron Albedo and Near-IR Albedo of Mars Surface Using HEND/Odyssey and MOLA/MGS Data [#1640]

Strong negative correlation between HEND neutron albedo and MOLA near-IR albedo is found within two broad latitude belts: 40°N–80°N and 40°S–60°S. Interpretation: water ice in these belts is buried below the dry skin layer, which thickness is determined by heating of subsurface material by sunlight.

Maurice S. Feldman W. Prettyman T. Diez B. Gasnault O.

Reduction of Mars Odyssey Neutron Data [#2036]

First presentation of overall processing of neutrons data collected by the Los Alamos built spectrometer onboard the Mars Odyssey spacecraft.

Vincendon M. Langevin Y. Poulet F. Bibring J.-P. Gondet B.

Retrieval of Surface Lambert Albedos and Aerosols Optical Depths Using OMEGA Near-IR EPF Observations of Mars [#1650]

We have analyzed five EPF sequences acquired by OMEGA/Mars Express in the near-IR over ice-free and ice-covered surfaces to retrieve simultaneously the Lambert albedo of the surface and the optical depth of aerosols.

Maturilli A. Helbert J. Moroz L.

The Berlin Emissivity Database (BED): A Collection of Emissivity Spectra for Planetary Analogue Minerals [#1281]

The Berlin Emissivity Database contains spectra of feldspars, pyroxenes, olivine, sulphur, martian analogues, volcanic soils in the range 7–22 μm as a function of particle size. For each sample four particle size separates from <25 to 250 μm are measured, with a spectral resolution of 4 cm^{-1} .

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

Straightforward Results from a Mars Analog Site (Alunite, Nevada): Learning to Combine Near- and Thermal-Infrared Spectral Interpretations for Mars [#2232]

We combine reflectance and emission airborne spectra to identify minerals. The results illustrate a case that worked well in using different parts of the remote sensing spectrum to identify Mars analog materials, e.g., alunite and gypsum.

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

Hard Lessons from a Mars Analog Site (Mineral Park Copper Mine): Learning to Combine Near- and Thermal-Infrared Spectral Interpretations for Mars [#2200]

We combine reflectance and emission airborne spectra measured of a mine site that has jarosite. The results help identify issues in using different parts of the remote sensing spectrum to identify materials on Mars, with jarosite as the example.

Lane M. D. Dyar M. D. Bishop J. L.

Spectra of Phosphate Minerals as Obtained by Visible-Near Infrared Reflectance, Thermal Infrared Emission, and Mössbauer Laboratory Analyses [#2210]

We will present a multi-technique spectroscopic survey of phosphate minerals using visible-near infrared reflectance, thermal infrared emission, and Mössbauer spectroscopies.

Benedix G. K. Hamilton V. E.

Infrared (2.5 to 14 μm) Reflectance Microspectroscopy of Meteoritic Minerals in Thin Section [#1805]

We present microspectroscopy of martian meteorite minerals acquired in thin section. The technique provides addition of endmembers to the available spectral libraries with specifically martian or other non-terrestrial mineralogy to help understand the geology of the surface of Mars.

Minitti M. E. Hamilton V. E. Wyatt M. B.

Deconvolution of Martian Thermal Infrared Spectra Using a Simplified, Glass-rich Library [#2099]

We deconvolved two global and eleven regional Mars surface spectra utilizing a library that includes six glasses from basaltic to rhyolitic in composition but excludes carbonates, amphiboles, alkali feldspars and almost all clays and phyllosilicates.

Rampe E. B. Kraft M. D. Sharp T. G. Michalski J. R.

The Effects of Small Amounts of Chemical Weathering on Thermal Infrared Spectral Models: Implications for Martian Surface Mineralogy [#2227]

Modeled mineralogy of TIR spectra of physical mixtures containing secondary silicates show secondary silicates affect modeled primary mineralogy and cause identification of primary glass. These results support Surface Type 2 as a weathered basalt.

Ashley J. W. Ruff S. W. Christensen P. R. Leshin L. A.

Metallic Iron in Meteorites as a Sensitive Tracer of Surface-Volatile Interactions on Mars — A Progress Report [#2264]

We report on studies designed to address whether alteration products in meteorites on Mars might be useful in assessing paleoclimatic conditions on the planet. Laboratory work is used in concert with Mini-TES on the MERs to identify meteorite candidates and evaluate their spectral emissivity.

Kraft M. D. Sharp T. G. Michalski J. R. Rampe E. B.

Combined Thermal and Near Infrared Spectra of Hydrous Silica Coatings: Implications for Surface Type 2 Mineralogy and Recent Liquid Water on Mars [#2241]

Basalt coated by hydrous silica shows large effects on thermal-IR laboratory spectra but little effect on near-IR spectra. TES type 2 surfaces are consistent with such coatings, perhaps indicating liquid water on Mars has been recent and widespread.

Combe J.-Ph. Adams J. B. McCord T. B.

Methodology to Investigate Mars's Surface Properties and Composition Using HRSC Data: First Results [#2367]

The objective is to investigate the geological units of the surface of Mars by analysing the Mars-Express/HRSC data. A simulation of the effects of the surface roughness and the complex geometry of acquisition is performed prior to spectral analysis.

Pommerol A. Schmitt B. Bibring J.-P. OMEGA Team

Origins of the Spatial Variations of the Water-of-Hydration Near-Infrared Absorption Bands Observed by OMEGA/Mars Express on the Martian Surface [#1787]

We try to determine the origins of the spatial variations of the water-of-hydration near-infrared absorption bands observed by the OMEGA instrument on the martian surface. We compare OMEGA measurements with results from laboratory experiments and radiative transfer modeling.

Calvin W. M.

Hydration on Mars: A New Method for Rapid Assessment of Extremes [#1390]

A new method to determine variation in the 3- μ m absorption feature is demonstrated with ISM. Increased hydration is seen in the Valles Marineris in areas that correlate well with exposures of hematite and sulfates identified by TES and OMEGA.

Wyatt M. B. McSween H. Y. Jr.

TES and GRS Compositions of the Martian Surface: Evidence for Igneous and Secondary Chemical Fractionation Processes [#2258]

We examine TES derived major oxide abundances of low-albedo surface materials and compare global distributions to GRS derived element abundances to constrain the relative roles of igneous and alteration processes on Mars.

Koeppen W. C. Hamilton V. E.

Geologic Setting of the Olivine-bearing Materials in Terra Tyrrhena [#1134]

We discuss the occurrence and mineralogic and geologic settings of materials in Terra Tyrrhena that contain different compositions of olivine.

Gondet B. Bibring J.-P. Langevin Y. Poulet F. OMEGA Science Team

Global Inventory of Olivine-rich Sites at the Surface of Mars as Determined by the OMEGA/Mars Express Imaging Spectrometer [#1681]

A global inventory of Mars olivine-rich sites has been achieved from the OMEGA/Mars Express mapping of the entire surface of Mars. We will discuss the occurrence of the variety of olivine-rich spots, in the framework of the Mars magmatic evolution.

Knudson A. T. Roach L. H. Arvidson R. E. Christensen P. R. Murchie S. L. Mustard J. F.

The Geologic Context of Hematite in Valles Marineris: Comparison of CRISM Data to Results from TES, THEMIS and OMEGA [#2333]

Analysis of CRISM images in Valles Marineris indicates a consistency with previous analyses from TES, THEMIS, and OMEGA but reveals details of relationships between hematite and sulfates that will provide insight into genetic relationships.

McDowell M. L. Hamilton V. E.

Phyllosilicate Detection and Uncertainty from Thermal Infrared Data in the Vicinity of the Nili Fossae [#1872]

We examine TIR data from THEMIS and TES in areas identified by OMEGA as containing phyllosilicates. Our investigation will help to constrain phyllosilicate detection limits in TES data and likely surface abundances on Mars.

Bishop J. L. Lane M. D. Dyar M. D. Brown A. J.

Multi-Spectral Study of Phyllosilicates and Applications to Mars [#1815]

We are investigating several high-purity phyllosilicates in a multi-spectral study in order to compare spectral features across several techniques and to enable analyses of current martian data.

Limaye A. Tanaka K. L. Skinner J. A. Jr. Hare T. M.
Mapping Finely Layered Highland Rocks (FLHR) for Mars Science Laboratory Landing Site Selection [#2433]
Finely layered highland rocks are being mapped to contribute to a GIS interface for evaluation of Mars Science Laboratory landing sites.

Hamilton V. E. Osterloo M. M. McGrane B. S.
THEMIS Decorrelation Stretched Infrared Mosaics of Candidate 2009 Mars Science Laboratory Landing Sites: Evidence for Significant Spectral Diversity [#1725]
We produced $3^\circ \times 3^\circ$ decorrelation stretched IR mosaics of 33 candidate landing sites for the 2009 MSL mission. These mosaics are available to the community, and we are compiling a database of surface composition variations for further study.

Rossi A. P. Zegers T. Pondrelli M. Gwinner K. Hauber E. Neukum G. Velasco E. Stesky R. Fueten F. Chicarro A. Foing B.
HRSC-based Mapping and Internal Architecture of Gale Crater (Mars) [#1553]
New observations on the geomorphology and internal geometry of Gale crater central bulge are presented. We used a new HRSC stereo-derived DTM in order to better define morphology and layering attitude within bulge deposits.

Russell P. S. Weitz C. Lefort A. Thomas N. McEwen A. HiRISE Team
Mars Crater Interior Layers Viewed by HiRISE [#2394]
Comparison of equatorial and high-latitude crater-interior layers using HiRISE high-resolution, stereo, and color data to determine modes of formation and roles of volatiles.

Lucchitta B. K.
Multiple Erosional and Depositional Episodes in West Candor Chasma, Mars [#2093]
Deposits of diverse origins overtopped mesas capping Ceti Mensa and were eroded in turn. Layered deposits in adjacent lowlands overlie landslides and are inclined and disrupted near chasma walls. Sinuous ridges in the lowlands suggest former fluvial activity.

Lahtela H. Korteniemi J. Baratoux D. Vaucher J. Raitala J.
History of Water in a Martian Crater in Northern Arabia Terra [#1863]
The focus of the study is a highly modified crater in Arabia Terra, Mars. It has undergone complex post-formation evolution and there is multitude of evidence of water-related processes.

Thursday, March 15, 2007

POSTER SESSION II: MARS SEDIMENTS AND GEOCHEMISTRY: ANALOGS AND MINERALOGY
6:30 p.m. Fitness Center

Osburn M. R. Fernández-Remolar D. C. Arvidson R. E. Morris R. V. Ming D. Prieto-Ballesteros O. Amils R. Stein T. C. Heil-Chapdelaine V. Friedlander L. R. Herndon B. Marlow J. Rosenberg S. Schepker K. Steiner A.

Geomorphic and Aqueous Chemistry of a Portion of the Upper Rio Tinto System, Spain [#1740]

We present results from a study of a portion of the Rio Tinto, Spain, focusing on geomorphology, clastic sediment transport, and acidic aqueous processes, and lay out lessons-learned for understanding sulfate formation and alteration on Mars.

Fernández-Remolar D. C. Prieto-Ballesteros O. Osburn M. R. Gómez-Ortíz D. Arvidson R. E. Morris R. V. Ming D. Amils R. Friedlander L. R.

Mars Sulfate Formation Sourced in Sulfide-enriched Subsurface Fluids: The Río Tinto Model [#1580]

In this work we suggest a new scenario for the extensive generation of sulfates in Mars based on the observation of seasonal changes in the redox and pH of subsurface waters enriched in sulfur that supply the acidic Mars process analog of Rio Tinto.

Sutter B. Golden D. C. Amundson R. Chong-Diaz G. Ming D. W.

Calcium Sulfate in Atacama Desert Basalt: A Possible Analog for Bright Material in Adirondack Basalt, Gusev Crater [#1775]

Calcium sulfate that occurs in vesicles of Atacama Desert basalt will be discussed as a potential analog to the bright material observed in Adirondack basalt at Gusev Crater.

Chavdarian G. V. Sumner D. Y.

Cracks as Evidence for Water Evaporation and Condensation Associated with Temperature Changes in Hydrous Sulfate Sands [#2246]

Mineral-atmospheric water cycling promotes crack formation in the hydrous sulfate (gypsum) sands at White Sands National Monument, New Mexico. A similar water cycling process may promote crack formation in sulfate outcrops on Meridiani Planum, Mars.

Chan M. A. Seiler W. M. Ford R. L. Yonkee W. A.

Polygonal Cracking and "Wopmay" Weathering Patterns on Earth and Mars: Implications for Host-Rock Properties [#1398]

Terrestrial analogs exhibit shallow polygonal crack patterns interpreted as weathering features. Similar polygonal crack patterns on Wopmay rock and at Endurance Crater suggest tensile stresses in porous host rock, subjected to weathering conditions on the surface of Mars.

Vaniman D. T. Chipera S. J. Bish D. L.

Geochemical and Mineralogical Analysis of a "Simple" Evaporite with Organic Carbon Associations: A Rover's-Eye View of the Todilto Formation [#1404]

The Todilto formation of New Mexico and Colorado provides a setting with chemical and mineralogical characteristics relevant to what may be found by the 2009 Mars Science Laboratory rover, including an association with bituminous organic material.

Crowley J. K. Kargel J. S. Marion G. M. Hook S. J. Thomson B. J. de Souza Filho C. R. Bridges N. T. Brown A. J.

Detecting Reduced Zones in Oxidized Fe-rich Sedimentary Rocks: Spectral Clues to Organic Matter Concentrations? [#1274]

This paper outlines the mineralogical and spectral characteristics of terrestrial red bed sedimentary rocks and considers their possible utility as an analog for martian sedimentary deposits.

Tosca N. J. McLennan S. M.

An Experimental Approach to Evaporation Processes at the Martian Surface [#1893]

Results from experimental evaporation studies are described. Solid solution behavior in evaporite minerals is quantified to better understand mineral chemistry at the martian surface.

Halevy I. Zuber M. T. Schrag D. P.

A Sulfur Dioxide Climate Feedback on Early Mars [#1173]

We describe an early martian SO₂ climate feedback, providing a mechanistic explanation for the existence of liquid surface water on early Mars, for the observed mineral assemblage and for the transition to a cold, arid, acidic Mars ~3.5 Ga.

Nelson M. J. Newsom H. E. Bullock M. Moore J.

Chemical Results for Minerals Reacted in Mars Aqueous Laboratory [#2112]

Minerals reacted in aqueous chambers under martian conditions for up to one year have been investigated for evidence of alteration. Small spherules on altered surfaces, and evidence for dissolution were found along with S-rich coatings.

McAdam A. C. Zolotov M. Yu. Mironenko M. V. Sharp T. G.

Acid Weathering of Basaltic Lithologies: Equilibrium Modeling and Applications to Mars [#2198]

Comparisons of equilibrium weathering models with Mars observations suggest alteration of martian materials in a broad range of pH.

McAdam A. C. Zolotov M. Yu. Mironenko M. V. Sharp T. G.

Preferential Low-pH Dissolution of Pyroxene in Plagioclase-Pyroxene Mixtures and Implications for Martian Low-Albedo Regions [#1871]

Acid weathering could be responsible for elevated plagioclase/pyroxene ratios and high silica phases observed in northern low-albedo regions.

Rao M. N. Nyquist L. E. Wentworth S. J. Garrison D. H. Herrin J. S.

Salt-Formation by Progressive Evaporation of Brine Waters in the Endurance Crater Basin at Meridiani [#1348]

The sulfate/chloride vs. Cl and chloride/bromide vs. Br relationships in the salt-assemblages on Meridiani (RAT) rock-rinds indicate that these salts likely formed by progressive evaporative concentration of brine waters filling the Endurance Crater basin at Meridiani.

Xu W. Tosca N. J. McLennan S. M. Parise J. B.

Relative Humidity-induced Phase Transitions of Fe-Sulfate Minerals: In-Situ X-Ray Diffraction Studies [#1860]

In situ X-ray diffraction studies investigating relative humidity induced phase transitions of Fe-sulfate minerals are described.

Chipera S. J. Vaniman D. T. Bish D. L.

The Effect of Temperature and Water on Ferric-Sulfates [#1409]

Ferric-sulfates subjected to variable temperatures, humidity, and liquid water, were found to produce numerous crystalline phases, an amorphous phase, and extremely viscous and gelatinous forms that could be problematic to rovers and instruments.

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

Surface Composition of Terra Meridiani and Western Arabia Terra from OMEGA [#1219]

We use OMEGA hyperspectral data to provide mineralogical inferences for the surface of Terra Meridiani and Arabia Terra.

Barge L. M. Petruska J.

Iron Precipitation Patterns in Gels: Implications for the Formation of Hematite Concretions at Meridiani Planum, Mars [#1676]

Iron diffusion experiments in gels produce precipitation patterns that are dependent on the conditions under which they were formed; this has implications for the interpretation of the hematite spherules discovered at Meridiani Planum.

Schneider A. L. Mittlefehldt D. W. Gellert R. Jolliff B.

Compositional Constraints on Hematite-rich Spherule (Blueberry) Formation at Meridiani Planum, Mars [#1941]

The Opportunity rover APXS data is used to model the composition of hematite-rich spherules found at Meridiani Planum.

Jolliff B. L. Gellert R. Mittlefehldt D. W. Athena Science Team

More on the Possible Composition of the Meridiani Hematite-rich Concretions [#2279]

Compositional trends among concretion-rich soil targets at Meridiani Planum measured with Opportunity's APXS indicate the maximum amount of hematite in the spherules to be 65–70 wt%, consistent with a replacive-inclusive growth mechanism.

Upadhyay C. Klingelhöfer G. Fleischer I. Schröder D. Rodionov D. Panthöfer M. Jung-Pothmann R. Tahir N. Hager T. Tremel W.

Classification of Martian Jarosite [#1835]

For the classification of Jarosite identified on Mars by Mössbauer spectroscopy we studied natural and synthetic Jarosite samples. The results indicate that the martian jarosite probably is a mixed phase jarosite, and may have a well developed zoned composition of two end members.

Podratz L. A. Gunter M. E. Williams T. J. Dyar M. D. Tosca N. J.

Refinement of the Jarosite-Alunite Cell Parameters as a Function of Compositional Variance [#2274]

The main goal of this project is to determine whether the cell parameters in the alunite mineral group vary systematically as a function of composition and if that variation is conclusive enough to use as a method for precise mineral identification.

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

Trace Element Crystal Chemistry of Jarosite: An Ion Microprobe Pilot Study [#1985]

In this study, we document the major, minor, trace and REE composition of two terrestrial jarosites using EMP and SIMS. Results will help increase our understanding of martian surface processes, and our ability to interpret current martian datasets.

Robertson K. Bish D.

The Dehydration Kinetics of Gypsum: The Effect of Relative Humidity on Its Stability and Implications in the Martian Environment [#1432]

Gypsum shows a sluggish response to dehydration due to its high thermal stability. Results are presented that revise the dehydration behavior of gypsum under varying relative humidity, suggesting a resistance to desiccation in the present diurnal relative humidity cycle on Mars.

Wang A. Freeman J. J. Jolliff B. L.

Formation Rate of Amorphous Magnesium Sulfates at Low Temperatures Approaching the Current Surface Conditions on Mars [#1195]

Low-T experiments on the dehydration of Mg-sulfate under current martian surface water-vapor pressures indicate extremely low rates of amorphization. The amorphization half life is on the order of two months to ten years at current surface temperatures, and crystalline starkeyite may form instead.

Freeman J. J. Wang A. Jolliff B. L.

MgSO₄•11H₂O — Powder XRD, Raman, and VIS-NIR Spectroscopic Characterization [#1197]

Raman and VIS-NIR characterizations were done on MgSO₄•11H₂O samples, confirmed by powder XRD. This phase can be a major Mg-sulfate stable at low temperatures on Mars, especially in polar regions. The distinct NIR features can help its identification based on OMEGA and CRISM spectra.

Gavin P. Chevrier V. Rochette P.

Thermally Transformed Nontronite as a Component of the Red Dust Layer on Mars [#2295]

Thermal treatment of nontronite shows the formation of red iron oxides and exotic magnetic phases both relevant to the properties of the martian red dust. Associated cristobalite and sillimanite could contribute to the properties of the dust.

Burt D. M. Knauth L. P. Wohletz K. H.

Sedimentary Concretions vs. Impact Condensates: Origin of the Hematitic Spherules of Meridiani Planum, Mars [#1922]

The uniform spherical shape, severe size limitation (about 5 mm), wide distribution, and Ni-enrichment of Meridiani hematitic spherules far more resemble characteristics of typical products of impact vapor condensation than they do characteristics of sedimentary concretions.

Aubrey A. D. Parker E. Chalmers J. H. Lal D. Bada J. L.

Ironstone Concretions — Analogs to Martian Hematite Spherules [#2053]

We report herein physical and chemical characterization of a new terrestrial analog to the martian “blueberries” found throughout San Diego County.

Potter S. L. Chan M. A.

Textural Characteristics of Spheroidal Iron Oxide Concretions: Terrestrial Analogues for Mars [#1896]

Terrestrial analog iron oxide concretions of the Navajo Sandstone are classified by internal structure as rind, layered or solid. These represent likely end members in the formation process.

Thursday, March 15, 2007
POSTER SESSION II: MARS: MAGNETICS AND ATMOSPHERE
6:30 p.m. Fitness Center

Langlais B. Thébault E. Quesnel Y.

Magnetic Signature of Demagnetized Impact Craters: Tools to Time the Shutdown of the Dynamo on Mars? [#1573]

Large impact craters modified the properties of the magnetized lithosphere on Mars. A 100-km wide crater will have a 1 nT signature at 100-km altitude. This allows correlation between weakly magnetized areas and craters to be studied, which should better constrain the dynamo shutdown time on Mars.

Lawrence K. P. Paty C. Johnson C. L. Harnett E. Milbury C.

Possible Shielding of the Martian Atmosphere by a Crustal Magnetic Field [#1453]

We investigate the possibility that magnetic field pressure from a strong crustal magnetic field on Mars may be sufficient to balance early solar wind pressure, thereby protecting an atmosphere capable of sustaining surface flow throughout the Noachian after cessation of an internal dynamo.

Milbury C. A. Johnson C. L. Schubert G.

Insights from Magnetic and Geologic Observations in Mars' Southern Hemisphere Crust [#2080]

In this paper we extend the analysis of Johnson and Phillips (2005) to the ancient crust in Mars' southern hemisphere to test for differences in the distributions of the observed magnetic field from that predicted by a dipolar magnetic field model.

Espley J. R. Farrell W. Brain D. A. Morgan D. D. Acuña M. H. Cantor B. Plaut J. Picardi G.
Martian Ionospheric Variability as Observed by MARSIS: The Effects of Solar Energetic Particles, Ionizing Radiation, Meteors, and Dust Activity [#2043]

We present evidence for time variability in the martian ionosphere due to solar energetic particles. We also discuss possible ionospheric effects from meteoric material, dust storms, the diurnal ionization cycle, and crustal magnetic fields.

Nazarava K. Sephton M. A. Bland P. A.

An Assessment of the Meteoritic Contribution to the Methane Component of the Martian Atmosphere [#1624]

Methane has been detected in the martian atmosphere at an average concentration of 10 ± 5 ppbv. In the current work, we estimate the amount of methane obtained due to ablation of meteoroids in Mars' atmosphere.

Altieri F. Zasova L. Grassi D. Bellucci G. Bibring J. P.

OMEGA Observation of a Double Ozone Layer in the Southern Hemisphere of Mars [#2152]

In this work we retrieved the vertical profiles for an OMEGA limb observation in the southern hemisphere where a double ozone layer is clearly visible.

Bergstrahl J. T. Natarajan M. Tolson R.

Density Variations in the Martian Middle and Lower Atmosphere [#1025]

Atmospheric density variations will be the major source of uncertainty for landing MSL. We compare empirical density profiles, derived from MGS-TES temperature profiles, with model predictions for some proposed MSL landing sites.

Wagner P. Xie H. Zhu M. Guan H.

Using OMEGA Data to Determine the Optical Depths of Water Vapor Absorption Bands in the Martian Atmosphere [#2065]

By examining the optical depths of four selected water vapor absorption bands from OMEGA image, we demonstrate that all four bands have potential to retrieve vertical and horizontal (across latitudes) distribution of water vapor abundance on Mars.

Tamppari L. K. Smith M. D. Bass D. S. Hale A. S.

Water Vapor Behavior in the North Polar Region of Mars as Seen by MGS TES [#1320]

Understanding the water vapor behavior through time in the north-polar region will lend insight to the atmospheric dynamics that control the transport of water. We will show the water vapor behavior in the North Polar Region of Mars for the MGS TES era.

Thursday, March 15, 2007
POSTER SESSION II: MARS AEOLIAN GEOMORPHOLOGY
6:30 p.m. Fitness Center

Greeley R. Pinet P. Williams D. A. Butler-Freeman C. Neakrase L. D. V. Neukum G.
Detection of Martian Variable Features as a Function of Image Filter: HRSC Comparisons [#1376]
Variable features were defined for albedo patterns on Mars that appeared, disappeared, or changed shape as a function of time, as seen on Mariner 9 images.

Hayward R. K. Mullins K. F. Fenton L. K. Titus T. N. Bourke M. C. Colaprete T.
Hare T. Christensen P. R.
Mars Digital Dune Database: Progress and Application [#1360]
The Mars Digital Dune Database provides a comprehensive and quantitative view of the geographic distribution of dune fields between 65°N to 65°S latitude. The database encompasses ~550 dune fields, covering ~70,000 km².

Fenton L. K. Hayward R. K. Mullins K. F. Titus T. N. Colaprete T.
Mars Digital Dune Database: More Preliminary Science Results [#1486]
Preliminary results from compiling the Mars Digital Dune Database show that 1) terrestrial deserts are far greater in size than martian deserts and 2) Ames GCM wind stresses correlate to many, but not all, measured dune and dune field orientations.

Shockey K. M. Zimbelman J. R.
Sand Dunes Across the Dichotomy Boundary of Mars [#1328]
MOC images were searched for aeolian ripples or dunes in a region from 60°S to 60°N latitude and 0° to 10°W longitude. The majority of dunes were observed to be close to the dichotomy boundary between the northern and southern hemispheres.

Kereszturi A. Sik A. Horvath A. Reiss D. Jaumann R. Neukum G.
Season-dependent Behavior of Dark Dune Spots on Mars [#1864]
Based on HRSC, MOC, and TES data, we identified two phases of Dark Dune Spot development: diffuse spots with carbon dioxide, and confined spots with probably water ice cover.

Neakrase L. D. V. Greeley R. Scire A. Zink A. Abel M. Shakkottai P.
Particle Threshold as a Function of Surface Type: Preliminary Laboratory Experiments [#1397]
Laboratory experiments examining the role of surface type in aeolian particle detachment threshold. Experiments focus on the removal of particles from surrogate spacecraft materials for use in biocontamination scenarios.

Neakrase L. D. V. Greeley R. Iversen J. D. Eddlemon E. E.
Dust Devils in the Laboratory: Effects of Surface Roughness on Vortex Parameters [#1402]
Laboratory experiments investigating the effects of roughness on dust devil vortices and implications for Earth and Mars.

Chittenden J. D. Sears D. W. G. Chevrier V.
Effect of Wind on the Stability of Water Ice Under Martian Conditions [#1253]
In order to quantify the effect of wind on the stability of water ice, we have measured the effect of low velocity winds (0–2.5 m/s) under martian conditions.

Thursday, March 15, 2007
POSTER SESSION II: MARS DATA PROCESSING AND ANALYSES
6:30 p.m. Fitness Center

Bornstein B. Fukunaga A. Castano A. Biesiadecki J. Castano R. Chien S. Greeley R. Whelley P. Neakrase L. Lemmon M.

Onboard Science on the Mars Exploration Rovers: Cloud and Dust Devil Detection [#2420]

We have developed algorithms that analyze images onboard rovers to identify the presence of dust devils and clouds. This code is now running on the Mars Exploration Rovers.

Bue B. D. Wagstaff K. L. Castano R. Davies A. G.

Automatic Onboard Detection of Planetary Volcanism from Images [#1717]

A computationally efficient algorithm for detecting volcanic plumes from image data has been developed and tested using several widely used image datasets. The algorithm is currently able to correctly detect 78% of plumes in test images.

Gehrke S. Haase I.

HRSC Data Processing by Matching in Object Space: Joint Derivation of DTM and Orthoimage for an Impact Crater on Mars [#1496]

DTM and orthoimage derivation from HRSC data is combined by matching in object space. Thus, interconnections between these surface models are implicitly regarded. The flexible approach is the basis for future BRDF integration (e.g., Hapke's model).

Dulova I. A. Skuratovsky S. I. Bondarenko N. V. Kornienko Yu. V.

Photometric Method of Topography Reconstruction: Mars Relief from a Single Image [#1464]

We present a new rigorous photometric method of topography reconstruction. Here we validate the method in application to topography reconstruction from a single image. HRSC images are used as examples.

Spiegel M. Schmidt R. Stilla U. Neukum G.

Improvement of Exterior Orientation of Mars Express HRSC Imagery Using a Photogrammetric Block [#1608]

The HRSC imaged neighboring strips forming a block. The exterior orientation of this data is investigated for using the nominal orientation, the improved orientation with single strips, and the improved orientation adjusted in a block.

Kim J. R. Muller J.-P. Blame M. Murray J. B.

Geometric Ground Control of Very High Resolution Imagery Using HRSC Intersection Points and a Non-Rigorous Camera Model [#1811]

For geodetic control of high resolution optical sensors on Mars, we developed non-rigorous sensor modelling. A HRSC-MOC-NA matching scheme has been also developed which uses SPICE kernel together with conjugate tie points as the GCPs for the establishment of a non-rigorous camera model.

Albertz J. Gehrke S. Lehmann H. Wählisch M. Neukum G. HRSC Co-Investigator Team

An Overview of HRSC Map Products [#1517]

A variety of maps has been generated from HRSC data since 2004, mainly the sheets of the Topographic Image Map Mars 1:200,000 series but also related products including thematic maps.

Zender J. Heather D. Barthelemy M. Arviset C. Witasse O. Rossi A.

The ESA Planetary Science Archive [#1271]

ESA's Planetary Science Archive (PSA) will be presented. An overview of missions for which data is available is given. The individual online services of the PSA will be presented and an outlook to next data ingestions, new services and activities is given.

Eliason E. M. Castalia B. Espinoza Y. Fennema A. Heyd R. Leis R. McArthur G. McEwen A. Milazzo M. Motazedian T. Schaller C. Spitale I.

HiRISE Data Processing and Standard Data Products [#2037]

Data processing activities at the HiRISE Operations Center (HiROC) are presented.

Bornstein B. Gilmore M. Castano R. Greenwood J.

Automated Mineral Detection in Visible/Near-Infrared Spectra for Focus-of-Attention [#2339]

We are developing automated supervised algorithms that will rapidly classify hyperspectral data and identify geologically important minerals. These detectors will provide a mechanism to search full data sets for targets of interest.

Douté S. Deforas E. Schmidt F. Oliva R. Schmitt B.

A Comprehensive Numerical Package for the Modeling of Mars Hyperspectral Images [#1836]

We present a system that implements and integrates all the elements needed to achieve the modeling of Mars hyperspectral images. Processing of an image provides physical and structural maps of the surface.

Hughes C. G. Ramsey M. S. Tonooka H.

Super-Resolving THEMIS Data for Improved Temperature, Composition, and Spatial Resolution [#1810]

The current study investigates the applicability of a super-resolution algorithm to the fusion of THEMIS visible and infrared data, to enhance image interpretation and aid in the search for sub-pixel scale temperature and/or compositional anomalies.

Thursday, March 15, 2007
POSTER SESSION II: ASTROBIOLOGY
6:30 p.m. Fitness Center

Amashukeli X. Pelletier C. C. Kirby J. P. Willis P. A. Grunthner F. K.
Subcritical Water Extraction of Amino Acids from Arid Atacama Desert Soils: Laboratory Study in Support of In Situ Urey Instrument Suite [#1802]

We developed a subcritical water extractor (SCWE) for compounds with dissimilar properties. Data demonstrates successful extraction of amino acids and is used to miniaturize SCWE. Our studies support ESA ExoMars mission Urey instrument development.

Kotler J. M. Hinman N. W. Yan B. Stoner D. L. Scott J. R.
Jarosite as a Storage Mineral for Small Organic Molecules: Investigations of Natural Samples Using an 'In Situ' Laser Desorption Fourier Transform Mass Spectrometry Technique [#1858]

The use of laser desorption Fourier transform mass spectrometry has revealed the presence of organic matter in several jarosite samples from various locations worldwide including jarosite precipitated in the lab by *acidithiobacillus ferroxidans*.

Denson J. Ivey D. M. Sears D. W. G. Gusik A. Vidéki R.
Cathodoluminescence and Its Application for Biosignature Analysis of Mn-containing Biogenic Minerals: A Review [#1009]

Cathodoluminescence could provide a novel analytical methodology for differentiating biogenic vs. abiogenic minerals, providing a new tool for both astrobiologists and biogeochemists alike.

Léveillé R. J. Konhauser K. O.
Geomicrobiology of Clay Minerals: Implications for Life on Early Mars [#1444]

Clay-rich materials on Mars indicate areas where liquid water was once present and where life could have existed. If life did indeed exist on Mars at the time of their formation, these clay minerals may contain traces of past martian life.

Schieber J. Glamoclija M. Thaisen K.
Experiments on Fossilization of Iron Microbes — A Preliminary Report [#1626]

We tested preservation potential of iron microbes. In anoxic sulfidic environments the sheaths of filamentous iron microbes become encrusted with pyrite and have good preservation potential. Enclosure in growing halite crystals affords preservation with high morphological fidelity.

Walton A. W.
Formation, Modification, and Preservation of Microbial Endolithic Borings in Hyaloclastite from Hawaii: Clues for Petrographic Recognition of Microbial Traces in Basalt Glass of Any Provenance and Stage of Alteration [#1975]

Microorganisms that bore into basalt glass leave distinctive trace fossils that might be recognizable in basalt glass from any source where such organisms exist or once did. Borings in Hawaiian basalt glass may be a guide to such features.

Pócs T. Horvath A. Ganti T. Bérczi Sz. Kereszturi A. Sik A. Szathmary E.
Comparison of Surface Mineral Crusts and Cryptobiotic-Crusts: How Can They Help Life Support Mechanisms; Implications to Living Organisms on Mars [#1144]

We compare surface mineral crusts (SMC) and cryptobiotic crusts (CBC) occurring on the surface of the soil or rocks in various soil environment types of Earth in order to approach understanding their life support abilities and mechanisms on Mars.

Glamoclija M. Schieber J. Reimold W. U.

Microbial Signatures from Impact-induced Hydrothermal Settings of the Ries Crater, Germany; A Preliminary SEM Study [#1989]

Life signatures from hydrothermal impact induced environments. A preliminary SEM study, and Ti-related bacteriomorphs associated with zeolite clinoptilolite.

Harris R. S. Schultz P. H.

Impact Amber, Popcorn, and Pathology: The Biology of Impact Melt Breccias and Implications for Astrobiology [#2306]

We present evidence that superheated impact melts can trap and preserve both floral and faunal remains forming “impact amber.” We discuss terrestrial occurrences of impact amber and the strategy it suggests in searching for evidence of past life on other planetary surfaces.

Miura Y.

Formations of Calcium-Carbonates by Natural and Artificial Shock Wave Impacts: New Type Formation of Carbonates [#1277]

Shocked calcium carbonates are formed by explosion in air with surface materials (including limestone and human body). These are found in artificial and natural impacts on limestone and melt fragments by Hiroshima A-bomb explosion.

Wilson R. C. Pearson V. K. Morgan G. H. Franchi I. A. Turner D. C. Wright I. P. Gilmour I.

Experimental Simulation of Volatile Organic Contributions to Planetary Atmospheres and Surfaces [#1799]

We present the results of a new simulation of the atmospheric entry heating experienced by extraterrestrial dust particles, quantifying their volatile loss into the early Earth atmosphere and characterising their organic volatile components.

Léveillé R. J. Datta S.

Basaltic Caves and Lava Tubes: Astrobiological Targets on Earth and Mars [#1446]

Cave minerals on Earth provide a record of aqueous processes and microbial activity. Caves, especially lava tubes, likely occur on Mars as well, and the minerals they contain may provide useful information on past aqueous activity and perhaps even martian life.

Schulze-Makuch D. Dohm J. Fairen A. Fink W. Fan C. Rodriguez A. Baker V.

Prioritizing Putative Hydrothermal Sites on Mars [#1735]

We assembled a list of martian sites that exhibit indications for endogenic- and exogenic-driven hydrothermal activity based on a set of selection criteria to aid in the prioritization of future target sites for Mars exploration.

Schulze-Makuch D. Houtkooper J. M.

Martian Extremophiles? — The H₂O₂-H₂O Hypothesis and Its Implications for the Mars Phoenix Mission [#1171]

The Mars Phoenix Mission will land in the northern latitudes where microbes might exist that adapted to the harsh martian conditions by employing a H₂O₂-H₂O-mixture as intercellular fluid. This mission provides a unique chance to detect life on Mars.

Houtkooper J. M. Schulze-Makuch D.

Detecting Life on Mars: Reanalysis of the Viking Life Detection Experiments and the Role of H₂O₂ as a Possible Biological Agent [#1187]

The results of the Viking Lander life detection experiments are not easily explainable. The hypothesis that organisms might use a mixture of H₂O₂ and H₂O in their intracellular fluid sheds new light on the absence of organics and the production of O₂.

Furfaro R. Dohm J. M. Fink W. Kargel J. S. Schulze-Makuch D. Fairén A. G. Ferre P. T.

Tarbell M. A. Hare T. M. Komatsu G. Palmero-Rodriguez A. J. Baker V. R. Miyamoto H.

Searching for Life on Extraterrestrial Bodies: Fuzzy Autonomous Systems for Planetary Reconnaissance [#1372]

A two-layer fuzzy-based system capable of autonomously assessing potential for life habitability has been designed. This system assumes that life is tied to water and energy availability and uses the fuzzy logic framework to search for prime locales of elevated life-containing habitability.

Thursday, March 15, 2007
POSTER SESSION II: ENGAGING STUDENT EDUCATORS AND
THE PUBLIC IN PLANETARY SCIENCE
6:30 p.m. Fitness Center

Stockman S. A.

The Lunar Reconnaissance Orbiter Education and Public Outreach Program [#2331]

The Lunar Reconnaissance Orbiter E/PO program includes individual instrument E/PO projects, partnerships with organizations that reach formal and informal audiences. There is also an international component that focuses on collaboration with several upcoming international lunar missions.

Runyon C. R. Shipp S. Balch K. Tuthill G. Garver K. Gutbezahl J.

An Overview of the Moon Mineralogy Mapper/Chandrayaan-1 E/PO Program [#1812]

A robust education and outreach program is planned for M3. Three themes unify the M3 science, engineering, technology and E/PO: (1) Geology of the Earth-Moon System, (2) Properties of Lunar Materials, and (3) Science and Technology of Lunar Resources. Each theme may stand alone or support the others.

Gulick V. C. Deardorff G. Kanefsky B. Davatzes A.

Student and Public Participation in Acquiring and Analyzing HiRISE Images [#2248]

HiRISE provides an innovative education and public outreach program with a variety of educational activities. The centerpiece is HiWeb, which allows the public to submit suggestions for HiRISE images and help to categorize features found in HiRISE images.

Anderson S. W. Libarkin J. C.

Alternative Planetary Science Conceptions Exhibited by College-Educated Americans: Results from Questionnaires and the Geoscience Concept Inventory [#1396]

Alternative planetary science conceptions have been revealed through college student testing and questionnaires. Students exhibit non-scientific conceptions about the planets, and many of these ideas persist even after college-level instruction.

Fauerbach M. Mon M. J. Ueda T.

Understanding Astrobiology Through Realistic Laboratory Experiences [#1053]

Exploiting the multidisciplinary aspect of astrobiology, we developed a course that focuses on hands on experiences, giving the students a realistic research laboratory environment as part of their general science education.

Roark J. H. Zimbelman J. R. Williams S. H. Masuoka C. M.

Interactive Education Focused Computer Simulations for the Visualization and Analysis of Topography Data [#1692]

The goals of the simulations are to provide teaching tools that will aid instructors and be useful to students who are getting their first exposure to topographic mapping and the concepts of contouring and data resolution.

Miller J. P. Davis J. W. Pennypacker C. R. White G. L.

Asteroid Search Campaign: A Pilot Program for High School & College Students [#1003]

High school and college students from the United States and Europe participate in an asteroid search campaign. Using real-time images they identify unknown asteroids, make follow-up image requests, report their findings to the Minor Planet Center, and receive official recognition for discoveries.

Croft S. K. Pompea S. M.

Getting Space Science into the K-12 Curriculum [#1792]

Description of a practical method for getting space science research into the K-12 classroom, with an ongoing asteroid project as an example.

Valderrama Graff P. Grigsby B. Taylor W. Christensen P. R. Bandfield J. Ferguson R.
Bender K. C. Klug S. L.

The Mars Student Imaging Project: Using Distance Learning Strategies to Enhance STEM Education by Connecting Scientists and STEM-focused Content to the Classroom [#2187]

The Mars Student Imaging Project has evolved since its beginnings in 2002 to now incorporate distance learning opportunities to augment STEM content and classroom connectivity to science experts.

Boice D. C. Asbell H. E.

A Mentorship Program for Young Engineers & Scientists (YES 2K6) [#1506]

The YES Program is a community partnership between SwRI and local high schools in San Antonio, Texas, consisting of a three-week summer workshop at SwRI and a year-long mentorship during the academic year to bridge classroom instruction and the real-world, research environment.

Urquhart M. L.

Outcomes of Embedded Space Science E/PO Workshops in Long-Term Professional Development for Teachers [#2094]

Results on teacher learning and transfer of NASA E/PO activities into K–12 classrooms are presented for space science E/PO workshops embedded in long-term professional development programs at UT Dallas. Implications for NASA E/PO will be discussed.

Buxner S. R. Keller J. M. Shaner A. J. Bitter C. F.

MARSFEST (Martian Arctic Regions Science Field Experience for Secondary Teachers) Professional Development Workshop and Teacher Ambassador Program [#2050]

The MARSFEST workshop took 20 teachers to Alaska to learn about Earth and Mars polar science, experience scientific inquiry, and model Mars mission curriculum. Program planning, enactment, evaluation, and follow-up ambassador program are discussed.

Shaner A. J. Buxner S. R. Keller J. M. Bitter C.

MARSFEST Workshop Evaluation and Outcomes [#1865]

This poster discusses the types of evaluation instruments created and used for evaluation of the MARSFEST teacher program and initial findings.

Kadel S. D. Williams D. A.

Worlds of Fire: A Field- and Classroom-based Educational Outreach Program for High School Teachers [#2132]

This presentation discusses a new, web-based educational exercise that we are developing that compares volcanism on Earth and Jupiter's moon, Io.

Levine A. S.

Bringing Lunar and Planetary Science and Exploration to Underrepresented and Underutilized Student Populations [#1234]

In order to reach the nation's best talent and brainpower, NASA must inform and inspire all populations including those that have been underutilized and underserved in the past, such as females, African-Americans and Native Americans.

Grier J. A. Pierazzo E. Chuang F. C. Osinski G. Crown D. A.

Exploring Impact Craters Using Interactive Web Tools and Rock Samples [#2011]

We will display our enhanced interactive website "The Explorer's Guide to Impact Craters" and our "Impact Crater Rock Kits."

Brooks V. Greenwood R. C. Bridges J. Watson J. Pearson V. K.

The Rocks from Space Initiative and the Space Safari [#1852]

This paper reports the successes of a new initiative in the UK using electronic resources, such as virtual learning environments and e-classrooms, for planetary and space science public engagement activities.

Gaboardi M. Humayun M. Dixon P.

Student Teacher Astronomy Resource (STAR) Program: Inspiring the Imagination of Florida Citizens [#1335]

Our E/PO program, STAR, connects a national research facility (NHMFL) with its North Florida community through a series of outreach efforts created around the Genesis and Stardust missions.

Aubele J. C. Stanley J.

Informal Science Education + Planetary Missions = Increased Public Support and Space Science Literacy [#2334]

Planetary missions provide a ready-made audience for successful science education public programming.

Museums/science centers provide informal science education that links the mission to a wide and diverse audience.

Richmond N. C. Van Wijk J. W.

A Meeting for Young Scientists in Earth and Planetary Sciences: Solar System Magmatism [#1420]

We propose holding a meeting for young scientists in planetary sciences, covering fieldwork, career development skills and scientific discussion. In this presentation, we describe the key features of the meeting and the motivation behind it.

Friday, March 16, 2007
MARS CRATERING: COUNTS AND CATASTROPHES?
8:30 a.m. Crystal Ballroom A

Chairs: J. M. Boyce
H. V. Frey

- 8:30 a.m. McEwen A. S. * Grant J. A. Tornabene L. L. Byrne S. Herkenhoff K. E. Bridges N. T. HiRISE Team
HiRISE Observations of Small Impact Craters on Mars [#2009]
HiRISE observations of small impact craters on Mars are providing striking new results relevant to hard-hitting debates about chronology.
- 8:45 a.m. Aharonson O. *
The Modern Impact Cratering Flux at the Surface of Mars [#2288]
The recent discovery of 20 new impact craters on Mars by Malin et al. allows, for the first time, a direct determination of the modern impact flux on the surface of a solar system body and therefore the dating of younger surfaces than previously possible.
- 9:00 a.m. Hartmann W. K. *
Mars: Toward Resolution of the Controversy About Small Craters [#1060]
The Malin et al. (2006) discovery of newly formed craters on Mars matches my production function with implications for the “small crater controversy,” aired at recent LPSC meetings.
- 9:15 a.m. Calef F. J. III * Sharpton V. L. Herrick R.
Investigating the Spatial Distribution of Small Rayed Crater on Mars: How Long Do They Retain Their Rays? [#1483]
We compared a global sample of rayed craters to current measurements of the <1 km diameter crater flux to generate rayed ejecta retention ages. Possible secondary crater contamination was evaluated. A correlation of retention age to %WEH is suggested.
- 9:30 a.m. Boyce J. M. * Mougini-Mark P.
Single and Multi-layered Ejecta Craters: Characterization of Morphology and Assessment of Possible Mechanisms of Ejecta Emplacement [#1912]
New observations based on recently collected THEMIS, and MOC images shows details of ejecta blankets of fluidized ejecta craters types not previously seen. These new details imply processes of emplacement for each type of fluidized ejecta craters.
- 9:45 a.m. Chappelow J. E. * Herrick R. R.
A Double, Oblique Impact on Mars: Asteroid or Moonlet? [#1419]
The form of a double impact feature on Mars strongly suggests that it was formed by a moonlet and not by an extra-martian asteroid.
- 10:00 a.m. Herrick R. R. *
Details of the Most Oblique Martian Impact Craters [#1415]
MOLA and THEMIS observations are presented of oblique impacts relevant to understanding the cratering process and the crustal properties of Mars.
- 10:15 a.m. Boutin D. B. * Arkani-Hamed J. A. H.
Elliptical Craters on Mars: Evidence for Polar Wander of Mars [#1249]
We examine the usefulness of elliptical craters as a tool to estimate paleo equator, and polar motion path, of Mars. The paleo-poles obtained in this study spread roughly over the entire surface of the planet, indicating that the elliptical craters do not reveal the polar motion path.

- 10:30 a.m. Rosenberg M. A. * Kiefer W. S. Frey H. V.
Morphometry of Quasi-Circular Depressions in the Southern Hemisphere of Mars: Implications for QCD Formation and Resurfacing History [#1460]
The post-impact fill thickness on the floors of large quasi-circular depressions (QCDs) on Mars is virtually independent of the distance from the Hellas and Argyre impact basins. This implies that ejecta from these basins is not the dominant source of QCD floor fill material.
- 10:45 a.m. Edgar L. A. * Frey H. V.
Buried Impact Basin Distribution on Mars: Contributions from Crustal Thickness Data [#1344]
A large population of Circular Thin Areas seen in crustal thickness data may represent additional buried impact basins on Mars. If so, the highlands, lowlands and Tharsis are older than previously thought based on Quasi-Circular Depressions alone.
- 11:00 a.m. Frey H. V. * Edgar L. A.
Implications of a Much Larger Population of Buried Impact Basins on Mars as Revealed by Crustal Thickness Anomalies [#1353]
A larger than previously believed population of buried impact craters on Mars suggests the highlands and lowlands are the same age and older than previously thought. Tharsis is older than thought, but may not be built on ancient highland basement.
- 11:15 a.m. Solomon S. C. * Head J. W. III
If the Late Heavy Bombardment of the Moon Was a Terminal Cataclysm, What are Some Implications for Mars? [#1636]
The inference that the lunar late heavy bombardment was a terminal cataclysm, if correct, has important implications for Mars, including the timing of the dynamo, the source of Late Noachian water, and the origin of Early Hesperian ridged plains.
- 11:30 a.m. Neukum G. * Basilevsky A. T. Chapman M. G. Werner S. C. van Gasselt S. Jaumann R. Hauber E. Hoffmann H. Wolf U. Head J. W. Greeley R. McCord T. B. HRSC Co-Investigator Team
The Geologic Evolution of Mars: Episodicity of Resurfacing Events and Ages from Cratering Analysis of Image Data and Correlation with Radiometric Ages of Martian Meteorites [#2271]
Cratering age analyses show that the martian surface was resurfaced episodically from >4 Ga ago until today. The resurfacing events are coincident in time with age groups found in the martian meteorites.

Friday, March 16, 2007
CHONDRITES: SECONDARY PROCESSES
8:30 a.m. Crystal Ballroom B

Chairs: A. J. Brearley
R. E. Grimm

- 8:30 a.m. Grimm R. E. *
Fluid Flow on Carbonaceous Chondrite Parent Bodies [#1327]
Isotopic data require that fluid flow occurred on carbonaceous chondrite parent bodies. Reaction heat can be dissipated by hydrothermal convection.
- 8:45 a.m. Rubin A. E. *
Progressive Alteration of CM Chondrites: Effects on Refractory Inclusions [#1230]
QUE 97990, the least-altered CM chondrite, contains 1.8 vol.% CAIs and a number density of ~80 CAIs/cm². More-altered CM chondrites contain lower modal abundances and number densities of CAIs. Progressive whole-rock alteration forms melilite-free spinel inclusions from melilite-bearing inclusions.
- 9:00 a.m. Brearley A. J. * Burger P. V.
Hydrothermal Alteration Behavior of Kainsaz (CO₃) at Low Temperatures Under Reducing Conditions: Insights into Incipient Aqueous Alteration of Carbonaceous Chondrites [#1687]
We have altered samples of the CO₃ chondrite Kainsaz under reducing conditions at 100° and 200°C for time periods of 7 to 180 days. All samples show evidence of reaction including the precipitation of calcite and phyllosilicates on sample surfaces.
- 9:15 a.m. Ford R. * Brearley A. J.
Phyllosilicates in Two Coarse-Grained Allende CAIs: Evidence for Advanced Hydration [#2411]
We present the findings from two CAIs within the CV3 chondrite Allende. These CAIs have experienced extensive aqueous alteration and may represent parent body alteration.
- 9:30 a.m. Palmer E. E. * Laurretta D. S. Domanik K. J.
Variation in Aqueous Alteration in the Murray CM Chondrite [#1416]
We studied metal grains in the Murray CM chondrite to determine its alteration history. Some assemblages showed no alteration including small metal grains in the matrix. Other assemblages had major alteration though less than a centimeter apart.
- 9:45 a.m. Zolotov M. Yu. * Mironenko M. V.
Hydrogen Chloride as a Source of Acid Fluids in Parent Bodies of Chondrites [#2340]
We argue that early low-pH fluids in asteroids have been presented by HCl-rich aqueous solutions formed through eutectic (~186 K) melting of HCl hydrate(s).
- 10:00 a.m. Perronnet M. * Berger G. Zolensky M. E. Toplis M. J. Kolb V. M. Bajagic M.
The Aqueous Alteration of CR Chondrites: Experiments and Geochemical Modeling [#1110]
Laboratory alteration experiments were performed on mineralogical assemblages having the unaltered CR composition. The mineralogy of reaction products was compared to that of Renazzo and GRO 95577 and to predictions of geochemical modeling.
- 10:15 a.m. Sharp T. G. * Xie Z. Soignard E. DeCarli P.
An Experimental Simulation of Shock-Vein Crystallization Using the Multi-Anvil Apparatus [#1364]
We are conducting L-chondrite melting experiments in the multi-anvil apparatus to investigate the mineralogy and mineral textures produced by rapid quench from superliquidus conditions at pressure from 17 to 22 GPa. Our experimental products are very similar to natural shock veins.

- 10:30 a.m. Sokol A. K. * Bischoff A. Marhas K. K. Mezger K. Zinner E.
Early Solar System Chronology: Simultaneous Accretion of Differentiated and Metamorphosed Asteroidal Clasts and Chondrules? [#1296]
 Some very primitive chondrites contain unusual fragments that seem to be either of metamorphic or igneous origin. These objects may represent clasts of precursor planetesimals. Al-Mg isotope data for several of these fragments are presented.
- 10:45 a.m. Abreu N. M. * Brearley A. J.
Unique Graphite and Amphibole-rich Clast in QUE 99177: An Extensively Metamorphosed Xenolith in a Pristine CR3 Chondrite [#2419]
 CR chondrites are primitive carbonaceous chondrites, recording variable degrees of aqueous alteration and negligible thermal metamorphism. QUE 99177 contains a unique clast that shows signs of high-temperature processing. Here, we present SEM and quantitative EMPA observations.
- 11:00 a.m. Treiman A. H. * Alexander C. M. O'D. Essene E. J. McCanta M. C.
The Amphibole-Phlogopite R-Chondrite LAP 04840: Hot Hydration by Heavy H₂O [#1309]
 Amphibole and biotite in LAP 04840 have very heavy H ($\delta D \sim -3660\text{‰}$). Mineral compositions imply equilibria at 655°C, 100–700 bars H₂O. Textures suggest that LAP formed as water entered a hot dry rock — the source of the water was likely macromolecular carbons in chondritic precursors.
- 11:15 a.m. Le Guillou C. * Rouzaud J. N.
Nanodiamonds Graphitization Under Temperature: Implications on Their Evolution During Chondrites Parent Body Metamorphism [#1578]
 We study the nanodiamond graphitization under temperature (Raman spectroscopy, HRTEM) to understand why the nanodiamond amount in chondrites decreases with increasing metamorphic grade. We also try to constrain the reaction kinetic parameters.
- 11:30 a.m. Yabuta H. * Cody G. D. Alexander C. M. O'D.
Chondritic Organic Matter as an Indicator of Nebular and Parent Body Processing: Extended Pyrolysis Studies for CM, CI, CR, CO, CV, Ordinary, and Tagish Lake Group Meteorites [#2304]
 The pyrolysis gas chromatography-mass spectrometry technique has been extended to 23 kinds of insoluble organic matter from CI, CM2, CR2, CO, CV, OC, and Tagish Lake chondrites. A variety of pyrolysis product molecules are discussed as indicators of the parent body processing.

Friday, March 16, 2007
MARS SEDIMENTS AND GEOCHEMISTRY: ATMOSPHERE, SOILS, BRINES, AND MINERALS
8:30 a.m. Marina Plaza Ballroom

Chairs: N. J. Tosca
G. J. Taylor

- 8:30 a.m. Soare R. J. * Osinski G. R.
Periglacial Evidence (Using HiRISE, MOC and THEMIS Imagery) in Utopia and Western Elysium Planitia, for a Recent Wet and Warm Mars [#1440]
Here we identify and discuss an assemblage of landforms in Utopia and western Elysium Planitia that is consistent with past and perhaps recent periglacial activity.
- 8:45 a.m. Mitrofanov I. G. * Boynton W. V. Demidov N. E. Gilichinsky D. A. Litvak M. L. Kozyrev A. S. Sanin A. B. Saunders R. S. Smith D. E. Tretykov V. I. Zuber M. T.
Layering Structure of Water Ice Martian Permafrost: The Evidence from HEND/Odyssey and MOLA/MGS Data [#1548]
Significant effect of strong negative correlation is studied between neutron data from HEND/Odyssey and MOLA/MGS radiometry data at 1064 nm, which is observed within two broad latitude belts at north (40°–80°N) and at south (40°S–60°S) on Mars.
- 9:00 a.m. Ostrowski D. R. * Chevrier V. Chastain B. K. Sears D. W. G.
Experimental Study of the Water Vapor Interaction with Clay Regolith During Ice Sublimation on Mars [#2097]
The sublimation rate of ice through montmorillonite is experimentally investigated under martian conditions. In addition the adsorption properties are studied to further understand the sublimation process.
- 9:15 a.m. Taylor G. J. * Baloga S. M.
Regolith Evolution on Mars: The Preservation of Ancient Aqueous Alteration Products [#1485]
A simplified model of regolith evolution involving aqueous alteration, volcanism, and impact gardening suggests that the weathering products in the current martian regolith were produced primarily during the period of early heavy bombardment.
- 9:30 a.m. Bryson K. L. * Chevrier V. Sears D. W. G.
The Effect of a Fine-grained Basaltic Layer on the Evaporation of Ice Under Martian Conditions [#1246]
Diffusion of water vapor through a fine-grained basaltic layer is experimentally investigated under martian conditions. It is shown to be similar to that through palagonite, but it is not strongly dependent on adsorption and/or desorption of water.
- 9:45 a.m. McMenamin D. S. * McGill G. E.
Martian Glacial Morphology, Geomorphology, and Atmospheric Methane [#1161]
Methane clathrate hydrate in martian glacial ice is the major reservoir for modern atmospheric methane, and also explains the existence of ancient glacial melt morphology.
- 10:00 a.m. Zolotov M. Yu. *
Origin of Acid Fluids on Mars: Impacts vs. Volcanism [#1343]
Impact generation of oxidants (O₂, SO₃, NO₂) caused formation of strong acids and Fe(II) oxidation, the processes that are not efficient during O₂-poor periods of volcanism. MER and TES data could be explained by impact-generated acid rainfalls.

- 10:15 a.m. Mironenko M. V. Zolotov M. Yu. *
Timing of Acid Weathering and Oxidation on Mars [#1594]
Numerical kinetic-thermodynamic modeling of aqueous acid weathering show that martian surface could have been affected by multiple short-time episodes of acid alteration that limited oxidation of Fe(II) and rarely led to neutralization of solution.
- 10:30 a.m. Tosca N. J. * McLennan S. M.
Fe-Oxidation Processes at Meridiani Planum and Implications for Secondary Fe-Mineralogy on Mars [#1880]
Fe-oxidation experiments in high ionic strength solutions were conducted. Implications of the results to diagenesis at Meridiani Planum and general surface geochemistry are discussed.
- 10:45 a.m. Morris R. V. * Klingelhöfer G. Agresti D. G. Schröder C. Rodionov D. Yen A. Ming D. Athena Science Team
Identification of Iron-bearing Phases on the Martian Surface and in Martian Meteorites and Analogue Samples by Mössbauer Spectroscopy [#1881]
The iron-bearing phases on the martian surface and in martian meteorites and analogue samples, according to Mössbauer spectroscopy, are discussed.
- 11:00 a.m. Chipera S. J. * Vaniman D. T. Peterson R. C. Fittipaldo M. M.
Can Sulfates Besides Those of Mg Form Low-Temperature Hyper-Hydrates? [#1408]
Sulfates of Na, K, Fe, Mg, Mn, and Zn were dissolved in excess water and frozen at -30° and -50°C to see if they would form extra-hydrated phases. Mg is presently the only sulfate observed to form an extra-hydrate not commonly observed on Earth.
- 11:15 a.m. Prieto-Ballesteros O. * Fernandez-Remolar D. Mateo-Martí E. Fernandez-Sampedro M. Kargel J. S. Friedlander L. R. Martín-Gago J. A.
Phase Stability Experiments of Hydrated Magnesium Sulfates at Environmental Conditions of Martian Surface [#1512]
Experiments with different sulfates using conditions of the martian surface (T, P, radiation, atmospheric composition) have been performed to constrain the stability of the hydrated phases and detect any modification from their standard spectra.
- 11:30 a.m. Freeman J. J. * Wang A. Jolliff B. L.
Pathways to Form Kieserite from Epsomite at Mid to Low Temperatures, with Relevance to Mars [#1298]
One hundred and twenty-six experiments on hydration and dehydration of Mg-sulfates were done at 5°C , 21°C , and 50°C , using 10 humidity buffers. We found two pathways of forming kieserite from the dehydration of epsomite/hexahydrate at mid-low temperatures.

Friday, March 16, 2007
LUNAR INTERIOR AND DIFFERENTIATION
8:30 a.m. Amphitheater

Chairs: L. L. Hood
Y. Liang

- 8:30 a.m. Khan A. Connolly J. A. D. * Olsen N. Mosegaard K.
Constraining the Composition and Thermal State of the Moon from an Inversion of Electromagnetic Lunar Day-Side Transfer Functions [#1086]
We present a general method to constrain planetary composition and thermal state from an inversion of long-period electromagnetic sounding data. As an example of our approach, we reexamine the problem of inverting lunar day-side transfer functions to constrain the internal structure of the Moon.
- 8:45 a.m. Saito Y. * Tanaka S. Takita J. Horai K. Hagermann A.
Lost Apollo Heat Flow Data Suggest a Different Lunar Bulk Composition [#2197]
Lunar surface heat flow values were measured on the Apollo missions between 1971 and 1977. However the late-term data have been lost. We succeeded in archiving the data after March 1, 1976. We will introduce the new set of archived data.
- 9:00 a.m. Hood L. L. * Artemieva N. A. Purucker M. E. Sabaka T. J.
Antipodal Seismic Effects of Lunar Basin-forming Impacts: Enhanced Magnetic and Geochemical Anomalies Peripheral to the South Pole-Aitken Basin [#1381]
In addition to being concentrated antipodal to young large basins, lunar magnetic anomalies are also concentrated along the northwestern periphery of the SPA basin. The origin of these anomalies and related geochemical anomalies is discussed.
- 9:15 a.m. Frohlich C. * Nakamura Y.
Geographic Variations in the Tidal Control of Deep Moonquake Nests and Speculation About Their Mechanical Origin [#1749]
We group nests of deep moonquakes into categories depending on how their occurrence depends on the anomalistic or draconic month. For well-located nests having 20 or more individual events, we show that epicenters of some categories are geographically separated from one another on the Moon.
- 9:30 a.m. Richmond N. C. * Hood L. L. Blewett D. T.
A New Analysis of the Lunar Prospector Magnetometer Data: Application to the Study of Reiner Gamma-type Swirls [#1410]
We present new mapping results using the low altitude Lunar Prospector magnetometer measurements obtained in 1999. Maps of the improved coverage will be presented and the results applied to the study of high albedo swirls of the Reiner Gamma-type.
- 9:45 a.m. Garrick-Bethell I. * Weiss B. P.
Early Lunar Magnetism [#2405]
We present new paleomagnetism results for some of the oldest rocks in the Apollo collection. We find evidence for strong magnetic fields before 4.1 Ga, making this the oldest paleointensity determination for a large, differentiated body.
- 10:00 a.m. Krawczynski M. J. * Grove T. L.
A Common Depth of Origin for Lunar High-Ti Glasses [#1235]
Recent experiments have revealed a similar depth of origin for the Apollo 14 black glass, Apollo 15 red glass, and Apollo 17 orange glass. Implications for similar multiple saturation points of lunar high-Ti glasses on magma ocean processes is discussed.

- 10:15 a.m. Barr J. A. Grove T. L. *
Experimental Petrology of Apollo 15 Group A Ultramafic Green Glasses: In Search of a Primordial Lunar Interior [#1194]
The Apollo 15 Group A glasses may represent melts of primordial lunar mantle. These glasses are close to multiple saturation with olivine, orthopyroxene and garnet at 1520°C and 2.5 GPa.
- 10:30 a.m. Saal A. E. * Hauri E. H. Rutherford M. J. Cooper R. F.
The Volatile Contents (CO₂, H₂O, F, S, Cl) of the Lunar Picritic Glasses [#2148]
We present the first report of magmatic water in lunar basalts using the primitive lunar volcanic glasses from Apollo 15 and 17 landing sites. We complement the data with new data on Cl, F, S. Our new technique improve the detection limit for volatiles by almost an order of magnitude.
- 10:45 a.m. Liang Y. * Lo Cascio M. Hess P. C.
Preferential Assimilation of Armalcolite and Ilmenite During Melt Migration and Melt-Rock Reaction in the Lunar Mantle: An Experimental Study [#1075]
Armalcolite and ilmenite can be preferentially dissolved during melt transport and melt-rock reaction in the lunar harzburgitic mantle, selectively assimilating TiO₂, FeO, and SiO₂ to the reacting low TiO₂ magma.
- 11:00 a.m. Touboul M. * Kleine T. Bourdon B. Palme H.
The Duration of Magma Ocean Crystallization on the Moon — Evidence from New W Isotope Data for Metals from High-Ti and Low-Ti Mare Basalts [#2385]
We obtained new W isotope data for metals from low- and high-Ti mare basalt. These data are used here to assess the duration of LMO crystallization and to address the issue why the Hf-W ages of the LMO (30–50 Myr) is inconsistent with its ¹⁴⁶Sm-¹⁴²Nd age (~215 Myr).
- 11:15 a.m. Taylor D. J. * McKeegan K. D. Harrison T. M. McCulloch M.
¹⁷⁶Lu-¹⁷⁶Hf in Lunar Zircons: Identification of an Early Enriched Reservoir on the Moon [#2130]
We analyzed ~80 Apollo 14 zircons for Lu-Hf isotopes, U-Pb ages and Ti/REE concentrations. Ages range from 3.9 Ga to 4.4 Ga, with ε_{Hf} values as low as -7, indicating that the zircons crystallized from an early enriched reservoir.
- 11:30 a.m. Edmunson J. * Nyquist L. E. Borg L. E.
Sm-Nd Isotopic Systematics of Troctolite 76335 [#1962]
Samarium-neodymium isotopic systematics of mineral fractions from lunar Mg-suite troctolite 76335 yield a crystallization age of 4278 ± 60 Ma and an initial ε_{Nd} of 0.06 ± 0.39.

Friday, March 16, 2007
MARS MAGNETICS AND ATMOSPHERE: CORE TO IONOSPHERE
1:30 p.m. Crystal Ballroom A

Chairs: R. J. Lillis
J. T. Bergstralh

- 1:30 p.m. Arkani-Hamed J. * Seyed-Mahmoud B. Aldridge K.
Tidal Excitation of the Core Dynamo of Mars [#1430]
Because the giant basins trace a great circle on Mars and the core dynamo ceased to exist at about the time of large impacts, we propose that the core dynamo of Mars was excited by elliptical instability of martian core excited by a large asteroid.
- 1:45 p.m. Kuang W. * Jiang W.
Numerical Simulation of Historical Martian Dynamo: Onset and Annihilation of the Dynamo Action [#2212]
Martian dynamo that generates and maintains a strong internal field stopped in the early evolution period. Our numerical simulation results suggest that the martian dynamo could be sustained at subcritical energy levels (lower than that for the onset of dynamo) and be terminated abruptly.
- 2:00 p.m. Lillis R. J. * Frey H. V. Manga M. Mitchell D. L. Lin R. P. Acuña M. H.
Basin Magnetic Signatures and Crater Retention Ages: Evidence for a Rapid Shutdown of the Martian Dynamo [#1515]
Crater retention ages and magnetic signatures of nine old, large martian impact basins are used to imply that the global magnetic field likely went from being significant to nonexistent over a geologically short period of time.
- 2:15 p.m. Espley J. R. * Connerney J. E. P. Jurdy D. M. Acuña M. H.
Downward Continuation of the Martian Magnetic Field [#2019]
By downward continuing the MGS mapping orbit magnetic field measurements to lower altitudes, we present highly accurate regional maps of magnetic fields at Mars with high spatial resolution.
- 2:30 p.m. Hood L. L. * Richmond N. C. Harrison K.
Magnetic Anomalies in the Terra Cimmeria/Sirenum Region of Mars: A Magnetization Model and Possible Sources [#1389]
A new analysis of MGS aerobraking data indicates that anomaly sources in this region have a fairly random distribution and are not elongated by more than ~500 km in any direction. Sources most probably consist of magmatic (e.g., dike) intrusions.
- 2:45 p.m. Milbury C. A. * Raymond C. A. Smrekar S. E. Kulikov I. K. Schubert G.
Regional Correlation of Magnetic and Gravity Anomalies on Mars [#2067]
We observe an apparent correlation of magnetic and gravity anomalies in several regions on Mars. We invert magnetic and gravity field data to better understand the origin and evolution of Mars and structure of the crustal remanent magnetization.
- 3:00 p.m. Langlais B. * Tobie G. Quesnel Y. Robuchon G.
Magnetic Paleopole Associated with Apollinaris Patera, Mars, and Polar Wander [#1570]
A magnetic anomaly is associated with Apollinaris Patera, Mars. This correlation with a tectonic structure allows magnetization directions to be accurately determined. The magnetic paleopole is close to the current rotation pole, which means that polar wander occurred prior to the dynamo shutdown.

- 3:15 p.m. Litvak M. L. * Boynton W. V. Golovin D. Kozyrev A. S. Mitrofanov I. G. Sanin A. B. Saunders R. S. Tretyakov V. I. Varenikov A.
Global Mapping of Northern Martian Seasonal Cap with HEND Instrument During 2002–2007 Years [#1567]
This abstract contains results of observations of martian northern seasonal cap from 2002 to 2007 years from HEND instrument onboard Mars Odyssey including estimations of CO₂ deposit column density, mass, volume density, search of inter-annual variations and comparison with other studies.
- 3:30 p.m. Vincendon M. * Langevin Y. Poulet F. Bibring J.-P. Gondet B.
Aerosols Above the South Polar Cap of Mars as Observed by OMEGA: A Progress Report [#1665]
We have analyzed the contribution of atmospheric dust in OMEGA near-IR observations of southern regions of Mars covered with CO₂ ice. The signal at 2.6 μm observed above surfaces of CO₂ ice free of dust is used to map the optical depth of aerosols.
- 3:45 p.m. Levine J. S. *
A Search for Potential Biogenic and Volcanic Gases Emanating from Point Sources on Mars [#1233]
Small, localized areas on the surface of Mars may be sources of potential biogenic gases (e.g., methane and ammonia), potential volcanic gases (e.g., sulfur dioxide and hydrogen sulfide) and water vapor resulting from possible present-day ground water seepage and surface run-off.
- 4:00 p.m. Ulrich R. * Chevrier V. Chittenden J. D. Kral T. Roe L.
Comparison of Numerical Modeling and Temperature Records from the Mars Pathfinder Landing Site [#1166]
Model predictions of martian temperatures on both diurnal and annual time scales were compared to two sets of data for the Mars Pathfinder landing site. Strong agreement was obtained indicating that the assumptions and computational approaches are reasonably valid.
- 4:15 p.m. Meslin P.-Y. * Sabroux J.-C. Chassefière E. Pineau J.-F.
Radon-222 and Polonium-210 in the Martian Atmosphere: A New Insight into the Exchange of Volatiles and the Dust Cycle [#1308]
We expose how ²²²radon and ²¹⁰polonium can be used as geochemical probes to characterize the subsurface (water and ²³⁸U content, gas exchange) and the dust cycle. We present the first evidence of ²¹⁰Po on Mars and make comparisons with the Moon.
- 4:30 p.m. Sprague A. L. * Boynton W. V. Kerry K. E. Janes D. M. Reedy R. C. Metzger A. E. Nelli S. M. Murphy J. R.
Measurements by the GRS on Mars ODYSSEY of Argon in Mars' Atmosphere: Two Full Mars Years and More [#2400]
Atmospheric argon measurements made by the gamma sensor (one part of the gamma ray spectrometer) on Mars Odyssey are presented. The measurements span slightly more than two Mars years. Seasonal and latitudinal variations are described with some discussion.

Friday, March 16, 2007
METAL-RICH CHONDRITES
1:30 p.m. Crystal Ballroom B

Chairs: D. S. Lauretta
J. Zipfel

- 1:30 p.m. Lauretta D. S. * Goreva J. S. Hill D. H. Killgore M.
Bulk Compositions of the CB Chondrites Bencubbin, Fountain Hills, MAC 02675, and MIL 05082 [#2236]
We have determined bulk compositions of four CB chondrites and discuss implications for volatility-related controls.
- 1:45 p.m. Perron C. * Mostefaoui S.
Heavy Nitrogen in Hydrated Clasts in a CH Chondrite [#2319]
We find nitrogen highly enriched in ^{15}N in hydrated clasts in a CH chondrite, implying genetic links between these materials and the high temperature materials that make up the CHs.
- 2:00 p.m. Jones R. H. * Goldstein J. I.
Thermal Histories of CH Chondrites: Reconciling the Silicate and Metal Phases [#1984]
Thermal histories recorded by metal grains and silicate components in CH chondrites provide constraints on different processes. We attempt to reconcile the different components into a coherent model for formation of the entire chondrite.
- 2:15 p.m. Zipfel J. * Weyer S.
In Situ Analyses of Fe Isotopes in Zoned Metal Grains of Hammadah Al Hamra 237 [#1927]
We present *in situ* measurements of Fe isotope profiles in metal grains in Hammadah al Hamra 237 by LA-MC-ICPMS. Ni-rich cores are enriched in light Fe in comparison to rims. In addition, Fe isotopes of metal separates and silicate fractions in CB chondrites are reviewed.
- 2:30 p.m. Petaev M. I. * Ivanova M. A. Krot A. N. Meibom A. Jacobsen S. B.
Different Zoning Patterns in Metal Grains from the CH and CB_b Chondrites: Evidence for a Complicated Cooling History of Their Nebular Source Regions [#1641]
We describe different zoning patterns in a suite of more than a hundred metal grains from the NWA 470, HaH 237 and QUE 94411 CH and CB chondrites and discuss their implications for physicochemical variations in the nebular source regions of these chondrites.
- 2:45 p.m. Krot A. N. * Nagashima K. Ulyanov A. A.
Oxygen Isotopic Compositions of Calcium-Aluminum-rich Inclusions and Chondrules in the CB/CH-like Carbonaceous Chondrite Isheyevo [#1888]
Oxygen isotopic compositions of the Isheyevo CAIs are similar to CAIs in CH chondrites: ^{16}O -rich CAIs are dominant whereas ^{16}O -depleted CAIs are rare. The latter most likely formed by remelting of the originally ^{16}O -rich inclusions in an ^{16}O -poor gaseous reservoir during chondrule melting.

Friday, March 16, 2007
ORGANICS IN CHONDRITES
3:00 p.m. Crystal Ballroom B

Chairs: L. A. J. Garvie
S. Pizzarello

- 3:00 p.m. Garvie L. A. J. *
Using Electron Energy-Loss Spectroscopy to Reveal the Bonding of Carbon in Clay from Primitive Meteorites [#1907]
EELS shows abundant C in clays from Ivuna, Orgueil, and Tagish Lake meteorites. This C is present as aromatic, aliphatic, carboxylic acid, and carbonate.
- 3:15 p.m. Kebukawa Y. * Ishikawa M. Nakashima S. Nakamura T. Zolensky M. E.
Infrared Microspectroscopic Mapping of Organic Matter in Tagish Lake Meteorite for Studying Organic Evolution During Aqueous Alteration [#1450]
Mapping analyses of Tagish Lake meteorite were conducted using FTIR and SEM-EDS together with XRD. Three organic rich positions were recognized with different organic and mineral compositions.
- 3:30 p.m. Pizzarello S. * Garvie L. A. J.
The Organic Composition of a CR2 Chondrite: Differences and Similarities with the Mighei-type Meteorites [#1393]
The GRA 95229 (CR2) meteorite contains a large amount of amino acids, whose molecular distribution, relative abundances, and chiral asymmetry differ from those seen in CMs.
- 3:45 p.m. Pearson V. K. Morgan G. H. Turner D. Perronnet M. Gilmour I. *
Identification of Trace Organic Components in the CR Chondrites by 4D TOFMS [#1833]
This paper reports preliminary results of a 4D TOFMS study of CR chondrite organic material, highlighting the low-level organic species that may further reveal the complexity of parent body modification of interstellar precursors.
- 4:00 p.m. Greenwood R. C. Pearson V. K. Verchovsky A. B. Johnson D. Franchi I. A. * Roaldset E. Raade G. Bartoschewitz R.
The Moss (CO3) Meteorite: An Integrated Isotopic, Organic and Mineralogical Study [#2267]
The recent Moss meteorite fall presents a unique opportunity to investigate the processes that operated on the CO3 parent body. The results of an integrated study indicate that alteration on the CO3 asteroid was more complex than previously envisaged.
- 4:15 p.m. Delpoux O. * Gourier D. Vezin H. Binet L. Derenne S. Robert F.
Evidence for Extreme Deuterium Enrichment in Radicals of the Insoluble Organic Matter of Orgueil by Pulsed Electron Paramagnetic Resonance [#1138]
Electron paramagnetic resonance of the insoluble organic matter of Orgueil shows that radical moieties are characterized by a very high deuterium content (D/H>1%), much larger than the average bulk value D/H=0.035%.

Friday, March 16, 2007
LUNAR IMPACTS AND METEORITES
1:30 p.m. Marina Plaza Ballroom

Chairs: M. D. Norman
B. A. Cohen

- 1:30 p.m. Norman M. D. * Shih C.-Y. Nyquist L. E. Bogard D. D. Taylor L. A.
Early Impacts on the Moon: Crystallization Ages of Apollo 16 Melt Breccias [#1991]
New geochemical and petrologic data for Apollo 16 crystalline breccia 67955 document a lunar impact-melt breccia with an age of 4.2 Ga.
- 1:45 p.m. Cohen B. A. * Symes S. J. Swindle T. D. Weirich J. Isachsen C.
Ages of Impact-Melt Clasts in Apollo 16 Breccias [#1006]
Feldspathic clasts in several Apollo 16 feldspathic breccias have trapped Ar ratios indicating exposure ~3.5–4 Gyr ago and ages ~3.83 Ga, consistent with the inferred age of the youngest nearside basins.
- 2:00 p.m. Zellner N. E. B. * Delano J. W. Swindle T. D. Whittet D. C. B.
Geochemistry and Impact History at the Apollo 17 Landing Site [#1007]
Impact glasses from regolith 71501,262 show diverse compositions and ages. Together with orbital data, they can provide geochemical constraints on the local and regional geology of the Moon.
- 2:15 p.m. Lawrence S. J. * Taylor G. J. Norman M. D. Keil K.
Trace Element Geochemistry of Apollo 17 Mafic Impact Melt Breccias [#1696]
We discuss new trace element geochemical data from Apollo 17 Serenitatis impact melt breccias.
- 2:30 p.m. Puchtel I. S. * Walker R. J. Kring D. A. James O. B.
Further Study of $^{187}\text{Os}/^{188}\text{Os}$ and Highly Siderophile Element Systematics of Lunar Impact Melt Rocks [#2040]
 $^{187}\text{Os}/^{188}\text{Os}$ and Ru, Pd, Re, Ir, Os, and Pt abundances are reported for Apollo 17 impact melt breccias 73215, 73255, and 76215, and for lunar meteorite NWA 482. The data indicate that some of the lunar rocks diverge from the known chondrite groups.
- 2:45 p.m. Korotev R. L. * Zeigler R. A.
Keeping Up with the Lunar Meteorites [#1340]
We report compositional data for numerous “new” lunar meteorites, summarize the compositional distribution of lunar meteorite types, compare data for lunar meteorites and Apollo rocks, and present some astute observations and speculations.
- 3:00 p.m. Arai T. * Misawa K. Kojima H.
Lunar Meteorite MIL 05035: Mare Basalt Paired with Asuka-881757 [#1582]
MIL 05035 is a new lunar meteorite that is a crystalline mare basalt. With remarkable similarity in mineralogy and bulk TiO_2 content, it is likely paired with Asuka 881757, which is 3.87 Ga-aged mare basalt.
- 3:15 p.m. Zeigler R. A. * Korotev R. L. Jolliff B. L.
Miller Range 05035 and Meteorite Hills 01210: Two Basaltic Lunar Meteorites, Both Likely Source-Crater Paired with Asuka 881757 and Yamato 793169 [#2110]
We present the petrography, geochemistry, and pairing relationships of Miller Range 05035 (an Fe-rich lunar basalt) and Meteorite Hills 01210 (a basaltic regolith breccia), which are likely paired with lunar meteorites Yamato 793169 and Asuka 881757.

- 3:30 p.m. Nyquist L. E. * Shih C.-Y. Reese Y. D.
Sm-Nd and Rb-Sr Ages for MIL 05035: Implications for Surface and Mantle Sources [#1702]
Sm-Nd and Rb-Sr ages of MIL 05035 are 3.80 ± 0.05 and 3.90 ± 0.04 Ga, resp., the same as for Asuka 881757. Sr, Nd, and Sm isotopic compositions also are the same. Assuming launch-pairing, an origin in the maria Australe or Humboldtianum is suggested.
- 3:45 p.m. Jolliff B. L. * Zeigler R. A. Korotev R. L.
Compositional Characteristics and Petrogenetic Relationships Among the NWA 773 Clan of Lunar Meteorites [#1489]
The NWA 773 “Clan” includes compositionally distinctive olivine-gabbro-cumulate and olivine-phyric-basalt lithologies among related breccia components. These lithologies can be related by origin from a common source similar to Apollo 14 green glass.
- 4:00 p.m. Burgess R. * Fernandes V. A. Irving A. J. Bunch T. E.
Ar-Ar Ages of NWA 2977 and NWA 3160 — Lunar Meteorites Paired with NWA 773 [#1603]
Ar-Ar ages are presented for lunar basaltic meteorites NWA 3160, a porphyritic olivine basalt, and NWA 2977, an olivine gabbro cumulate. Results are indistinguishable from the breccia and cumulate lithologies of NWA 773 indicating that these meteorites are all from the same source region on the Moon.
- 4:15 p.m. Fernandes V. A. * Burgess R. Bischoff A. Sokol A. K. Haloda J.
Kalahari 009 and North East Africa 003: Young (<2.5 Ga) Lunar Mare Basalts [#1611]
Ar-Ar age determination of lunar mare basalts Kalahari 009 and NEA 003. Kal 009 and NEA 003 have low-Ti content and are the two youngest basalts dated to now, 1.70 ± 0.04 Ga and 2.38 ± 0.04 Ga, respectively.
- 4:30 p.m. Hudgins J. A. * Walton E. L. Spray J. G.
Mineralogy, Petrology, and Shock History of Lunar Meteorite Sayh Al Uhaymir 300: A Crystalline Impact Melt Breccia [#1674]
A summary of the mineralogy, petrology, and shock history of the lunar meteorite SaU 300. Previously described as an anorthositic regolith breccia, we interpret it to be a polymict, crystalline impact melt breccia that has undergone at least two episodes of brecciation and shock metamorphism.

Friday, March 16, 2007
PRESOLAR/SOLAR GRAINS
1:30 p.m. Amphitheater

Chairs: B. S. Meyer
H. Busemann

- 1:30 p.m. Meyer B. S. * Wang C.
s-Process Branching at ^{186}Re , the Abundance of ^{186}Os , and Presolar Grains [#2055]
Current *s*-process models overproduce ^{186}Os while *s*-process carrying presolar grains apparently have lower $^{186}\text{Os}/^{188}\text{Os}$ abundance ratios than *s*-process models predict. We explore possible resolutions to these two puzzles.
- 1:45 p.m. Reisberg L. C. Dauphas N. * Luguet A. Pearson D. G. Gallino R.
Large s-Process and Mirror Osmium Isotopic Anomalies Within the Murchison Meteorite [#1177]
Leachates of the Murchison carbonaceous chondrite reveal *s*-process and mirror osmium isotopic anomalies. The bulk Os composition of Murchison is very close to that of most chondrites and of Earth, despite the extreme heterogeneity of the individual leachates.
- 2:00 p.m. Yokoyama T. * Rai V. K. Alexander C. M. O'D. Lewis R. S. Carlson R. W. Shirey S. B. Thiemens M. H. Walker R. J.
Nucleosynthetic Os Isotopic Anomalies in Carbonaceous Chondrites [#1151]
Precise Os isotope analyses revealed the presence of substantial *s*-process enriched and depleted components in some primitive meteorites, yet also provides complementary data indicating homogeneity for bulk samples.
- 2:15 p.m. Croat T. K. * Stadermann F. J. Bernatowicz T. J.
Isotopic and TEM Investigations of Variations in Presolar Graphite Morphology [#1484]
Variations in morphology and degree of graphitization among Murchison presolar graphites are seen in microstructural studies. Trends in the isotopic ratios, O content, and properties of internal grains are examined in more disordered graphites.
- 2:30 p.m. Heck P. R. * Amari S. Hoppe P. Lewis R. S. Baur H. Wieler R.
Neon-22, Oxygen-18, and Aluminum-26 Excesses in Single Presolar Graphite Grains from Murchison: A Combined Rare Gas and NanoSIMS Study [#1645]
We present new He, Ne, C, O and Mg-Al isotope analyses of single presolar graphite grains from Murchison. We found excesses in ^{22}Ne , ^{18}O and ^{26}Al and one very gas-rich grain with detectable amounts of nucleosynthetic ^{20}Ne ; He was not detected.
- 2:45 p.m. Amari S. * Zinner E. Lewis R. S.
Search for Extinct Radioactivities in Low-Density Presolar Graphite [#2024]
Extinct radioactivities in low-density graphite have been investigated. Evidence of ^{60}Fe has not been found due to huge errors. Isotopic signatures of Si and Ca in the grains indicate that they were decoupled in the Si/S zone in supernovae.
- 3:00 p.m. Hynes K. M. * Croat T. K. Bernatowicz T. J.
Microstructure of Silicon Carbides Found Within Presolar Graphite [#1693]
Composite presolar grains (e.g., silicon carbide within graphite) can place constraints on circumstellar environments in which both of these phases form. We present results from a TEM study of rare Murchison graphites that contain internal SiCs.
- 3:15 p.m. Gyngard F. * Amari S. Zinner E. Gallino R. Lewis R. S.
Lithium, Boron, and Sulphur Isotopic Ratios in Large Presolar SiC Grains from Murchison [#1963]
We report here Li, B, and S isotopic ratios in nine large, up to 60 μm , presolar SiC grains from the Murchison L series.

- 3:30 p.m. Nittler L. R. * Hoppe P. Stroud R. M.
Elemental Heterogeneity in an Isotopically Homogeneous SiC Aggregate from a Supernova [#2321]
NanoSIMS imaging of an aggregate-structure SiC X grain reveals a sub-grain with lower abundances of N, Mg, Al, Ca and Ti than the rest of the grain, but similar isotopic composition. Implications for supernova dust formation will be discussed.
- 3:45 p.m. Marhas K. K. * Amari S. Gyngard F. Zinner E. Lewis R. S.
Fe Isotopic Composition of Presolar SiC Grains [#2124]
Iron isotopes have been measured in type X and mainstream SiC grains from Murchison with the NanoSIMS. Clear excesses in ⁵⁷Fe from the X grains have been detected and possible scenarios for ⁵⁷Fe excesses are discussed.
- 4:00 p.m. Stroud R. M. * Nittler L. R. Alexander C. M. O'D. Zinner E.
Transmission Electron Microscopy and Secondary Ion Mass Spectrometry of an Unusual Mg-rich Presolar Al₂O₃ Grain [#2203]
We report here on the first TEM study of a Group 2 presolar Al₂O₃ grain.
- 4:15 p.m. Busemann H. * Zega T. J. Alexander C. M. O'D. Cody G. D. Kilcoyne A. L. D. Nittler L. R. Stroud R. M. Yabuta H.
Secondary Ion Mass Spectrometry and X-Ray Absorption Near-Edge Structure Spectroscopy of Isotopically Anomalous Organic Matter from CR1 Chondrites GRO 95577 [#1884]
We located interstellar organics from a CR1 chondrite with NanoSIMS and analyzed FIB-extracted sections with XANES. D-rich material appears not associated with a functional group, whereas ¹⁵N-rich matter shows some affinity to nitrile functionality.
- 4:30 p.m. Vollmer C. * Hoppe P. Brenker F. E. Holzapfel C.
A Presolar Silicate Trilogy: Condensation, Coagulation and Transformation — New Insights from NanoSIMS/TEM Investigations [#1262]
We report on new results of a combined NanoSIMS/TEM study of presolar silicates in the Acfer 094 meteorite. Sixth-five grains have been detected giving a matrix-normalized abundance of ~175 ppm. Two of these grains were prepared by FIB and analyzed by TEM.

PRINT ONLY: OUTER PLANETS/SATELLITES

Bray V. J. Smith D. E. Turtle E. P. Perry J. E. Rathbun J. A. Barnash A. N. Helfenstein P. Porco C. C.
Impact Crater Morphology Variations on Enceladus [#1873]

We have conducted mapping and measurement of craters on Enceladus. We have recorded their locations, diameters and morphological characteristics so that crater morphology variations in the different geological units can be assessed.

Greenberg R. Hurford T. A. Foley M. A. Varland K.
Precision and Accuracy of Topography Measurements on Europa [#1850]

Reports of the death of the melt-through model for chaotic terrain on Europa have been greatly exaggerated, to paraphrase Mark Twain. They are based on topographic maps of insufficient quantitative accuracy and precision.

Illés-Almár E.
On the South Polar Vortex on Saturn [#1135]

An attempt is made to interpret the recent discovery of the South Polar Vortex (SPV) on Saturn.

Kochemasov G. G.
Calculating Size of the Saturn's "Leopard Skin" Spots [#1040]

An IR image of the saturnian south (PIA08333) shows huge storm ~8000 km across containing smaller storms about 300 to 600 km across. Assuming a wave nature of this phenomena calculations with wave modulation give diameters of small forms ~400 km.

Nimmo F. Matsuyama I.
Reorientation of Icy Satellites Due to Impact Basins [#1237]

Large impact basins produce geoid anomalies sufficient to cause satellite reorientation, with implications for tectonics, crater distribution and models of interior structure.

Perov N. I. Medvedev Yu. D.
The New Models of the Central Configurations for the Secondary Planets Systems and Their Stability [#1026]

Plane central configurations from 4 to 19 bodies and their stability, based on the methods of A.M. Lyapunov, are considered. In the frames of these dynamical models motion of some satellites of the giant planets are partially explained.

Preblich B. Greenberg R. Norton-Riley J. O'Brien D. P.
Strike-Slip on Europa: Viscoelastic Modeling of Tidally Driven Displacement [#1766]

Tidal walking for strike-slip displacement on Europa is modeled using a finite-element numerical simulation of the behavior of viscoelastic material. Except under special assumptions, the process seems to require cracks penetrating to the liquid ocean. In no case is much heat produced.

Prentice A. J. R.
Titan's Physical and Chemical Structure: Predictions for a Capture Origin [#2402]

I report calculations for the bulk chemical composition and internal structure of Titan in readiness for measurements from the gravity flypasts by the Cassini spacecraft. The calculations are based on the idea that Titan is a captured moon of Saturn.

Shalygina O. S. Starukhina L. V. Marchenko G. P. Korokhin V. V.
Polar Aerosol Haze in Jupiter's Stratosphere [#1441]

Components of jovian stratospheric haze (crystal naphthalene, phenanthrene) may be formed by homogeneous nucleation, benzene does not condense at $T > 120$ K. Cosmic rays may affect aerosol haze by production of molecules for aerosol formation.

Stern S. A. Mutchler M. J. Weaver H. A. Steffl A. J.

The Positions, Colors, and Photometric Variability of Pluto's Small Satellites from HST Observations: 2005-2006 [#1722]

We report a self-consistent set of magnitudes, colors, and positions for Pluto's small satellites Nix and Hydra. We find Nix and Hydra to be neutrally colored and we find no evidence as yet for lightcurve variability.

Veeder G. J. Matson D. L. Davies A. G. Johnson T. V. Castillo-Rogez J. C.

Io: Heat Flow from Dark Paterae [#1331]

We focus on the heat flow contribution from the small dark paterae relative to that from the large dark paterae on Io. We have estimated the dark areas of over 100 small paterae and use effective temperatures to derive their total power.

PRINT ONLY: EARLY SOLAR SYSTEM

Canup R. M.

Moon-Forming Impacts Involving Pre-Impact Spin [#2137]

Results of SPH simulations of potential lunar-forming impacts including pre-impact spin are presented.

Makalkin A. B. Dorofeeva V. A.

Models of Saturn's Subnebula: Conditions for Titan's Formation [#2421]

The model of Saturn's subnebula is presented that takes into account the new chemical constraints obtained from the Cassini mission and Huygens probe.

Maurette M. Fortuna F. Montmerle Th.

Stability of Refractory Minerals in "T-Tauri" Ion Implanters Around Young Suns [#1869]

The accumulation of short-lived isotopes in refractory minerals irradiated by solar energetic particles near the young T-Tauri Sun was severely disturbed by concomitant ion implantation effects, ranging from ion beam "slicing" to vaporization.

Minton D. A. Malhotra R.

Evaluating the Massive Young Sun Hypothesis to Solve the Warm Young Earth Puzzle [#2375]

We calculate the time-evolution of the solar mass that solves the faint young Sun paradox. There were no unambiguous tests of this hypothesis in solar system dynamics, and required mass histories disagree with measurements from solar analogs.

Ward Wm. R.

A Streamline Model of Horseshoe Torque Saturation [#2289]

A streamline model of the saturation of the torque exerted on a planet by particles occupying its horseshoe zone is developed by tracking the phase mixing of individual streamlines due to their differing libration periods.

PRINT ONLY: INTERPLANETARY DUST

Fisenko A. V. Semjonova L. F.

The Ne-A2 Component in Nanodiamond of Meteorites: A Possible Origin [#1037]

It's supposed the Ne-A2 in nanodiamonds may be one of possible versions of Ne-X, which is formed in result of mixing of the neon from helium (He/C) (or hydrogen) zone of supernova with the spallation neon, formed at explosion of supernova.

Ustinova G. K.

A Radiation Criterion of CAI Condensation Reservoir and Origin of the Carbonaceous Chondrites [#1159]

The high radiation in the CAI condensation reservoir testifies to their origin in the supernova environment.

PRINT ONLY: COMETS AND KUIPER BELT OBJECTS

Filonenko V. S. Churyumov K. I.

New Peculiarity of Absolute Brightness Secular Variations of Short-Period Comets [#1509]

We found an influence of the 90-year solar activity cycle upon the secular variations of absolute magnitude for short-period comets. This phenomenon can explain the observational fact of non-monotone secular fading of short-period comets.

Juhl R. A. Mardon E. G. Mardon A. A.

Documentary Evidence for the Apparition of a Comet in Late 593 and Early 594 AD [#1184]

This presentation uses documentary evidence in an attempt to establish a prima facie case for two apparitions of a comet in the sixth century. This comet may also have made apparitions in the seventh century and later.

Kobunov A. S.

Searching for Cometary Belts in the Exoplanetary Systems [#1078]

A model of origin of comets in the exosolar systems and a method of localizing of short-period comets in these systems are considered. The maximal ratio of periods of the planet and the comet (after interacting with the planet) is equal to 2.13268.

Slyuta E. N.

Self-Gravity and Rheology of Kuiper Objects by the Example of Cometary Nuclei and Phoebe [#1056]

Kuiper objects are characterized by the lowest value of yield strength among solar system bodies. This is one more example of dependence of transition parameters between small and planetary bodies on composition.

PRINT ONLY: ASTEROIDS AND METEOROIDS

Busarev V. V. Prokof'eva V. V. Bochkov V. V.

21 Lutetia as a Possible Binary System [#1016]

We have analyzed spectra (0.4–0.9 μm) of 21 Lutetia and discovered periodic splitting of them on three nights (4/5, 5/6 and 7/8) in November 2004 at extremely small aspect angle ($\sim 43^\circ$). We suggested that Lutetia is a binary asteroid.

Golubeva L. F. McFadden L. A. Shestopalov D. I. Khomenko V. M. Gasanova L. M.

Olivines on Vesta-like Asteroids [#1223]

We attribute the faint absorption band near 630 nm in the spectra of some vestoids to olivine on their surface.

Holsapple K. A.

Formation of Binary Asteroids by Spin Fission [#2440]

An analysis of spin fission of asteroids suggest that large asteroids and rubble-pile asteroids of any size are unlikely to form binary pairs by spin fission. Instead, only those with some but small cohesion will do so, and roughly equal-sized pieces are indicated.

Kawakami K. Nakamura A. M.

Near Infrared Opposition Surge of Carbonaceous Chondrite Meteorites [#1531]

We measured the opposition surge of carbonaceous chondrite meteorites with changing particle size and degree of surface compaction, and we compared these data with reflectance phase curve of C-type asteroid, Mathilde.

Shestopalov D. Golubeva L. McFadden L. Lazzaro D. Khomenko V. Gasanova L.

Systematics of Vestoid Reflectance Spectra by 600- and 650-nm Bands [#1224]

The spectra of the vestoids, which we examined, can be sorted into five groups in accordance with properties of the faint absorptions near 600 and 650 nm.

Shilova K. G. Perov N. I.

A Method of Space — Time Localizing of Undiscovered Hazardous Bodies with Hyperbolic Orbits [#1273]

A non-traditional celestial-mechanical analytical model based on the hypothesis of interaction of minor bodies, initial orbits of which are parabolic, and the giant planets of the solar system is used for the construction of a method of determination of ephemerides of undiscovered hazardous bodies.

Tikhomirova E. N.

A Method of Discovery of Meteor Streams' Parent Bodies [#1042]

The new integrals of motion of the averaged perturbed two-body problem are used for identification of parent bodies of meteor streams. The Poynting-Robertson effect is taken into account. The model shows the comet 177P is the parent body of meteor stream k-Cygnids.

Trigo-Rodríguez J. M. Madiedo J. M. Castro-Tirado A. J. Ortiz J. L. Gural P. S. Llorca J. Fabregat J. Vitek S. Pujols P. Troughton B.

Spanish Meteor Network: 2006 All-Sky and Video Monitoring Highlights [#1584]

First results of the Spanish Meteor Network (SPMN) 2006 all-sky meteor and fireball monitoring are presented. Earth's encounters with 7 P/Pons-Winnecke, 1P/Halley and 55P/Tempel-Tuttle meteoroid streams were remarkable. We also include the heliocentric orbit of a bright α . Capricornid bolide.

PRINT ONLY: CHONDRITES

Cole K. J. Schultz L. Sipiera P. P. Welten K. C.

Kilabo and Bensour, Two LL6 Chondrite Falls from Africa with Very Similar Mineralogical Compositions but Different Cosmic-Ray Exposure Histories [#1477]

In 2002 two LL6 chondrites fell five months apart from each other in Africa. Mineralogically they are similar and raise the possibility that they are from the same meteoroid stream. To answer this question the meteorites were analyzed for their cosmogenic nuclides and their metallic compositions.

Cooper R. F.

Redox Dynamics in Silicate Melts: The Semiconductor Condition and Its Impact on Texture [#2182]

Electronic defects in silicate melts allow redox reactions to be dominated by the chemical diffusion of cations. The reactions create “non-equilibrium” textures that have implications regarding, e.g., the evolution of metal-bearing chondrules.

Huber L. Hofmann B. Gnos E. Welten K. C. Leya I.

Another Meteorite with a Complex Exposure History: JaH 073 [#1294]

Noble gases and radionuclides of the large strewnfield meteorite JaH 073 confirm a complex exposure history with a possible first stage exposure on the parent body.

Ivliev A. I. Alexeev V. A. Kuyunko N. S.

Research of the Shock Metamorphism of Ordinary Chondrites by the Thermoluminescence Method [#1043]

The collision processes obviously played a leading role in the formation of meteorites. Shock and thermal metamorphism accompanying the collisions is considered therefore as the most fundamental process in the evolution of the primordial matter.

Kalinina G. V. Kashkarov L. L.

Results of Track Investigation for the Chondrites Barwell L6, Kilabo LL6, Tugalin Bulen H6 and Bukhara CV3 [#1067]

VH-nuclei cosmic-ray track study in olivine and pyroxene grains from the chondrites Barwell L6, Kilabo LL6, Tugalin Bulen H6 and Bukhara CV3 has been performed.

Llorca J. Trigo-Rodriguez J. M.

Normative and Modal Mineralogy in Ordinary Chondrites: A Comparative Study Between Chemical Analysis, EPMA, XRD, Mössbauer, FTIR, and Raman Spectroscopy [#1148]

A fresh meteorite fall is used to compare normative mineralogy values obtained by chemical analysis and EPMA with band areas obtained by XRD, Mössbauer, FTIR, and Raman spectroscopy.

Moggi-Cecchi V. Pratesi G. Salvadori A. Franchi I. A. Greenwood R. C.

Textural and Mineralogical Features of NWA 1807 and 2180, Two New CV3 Chondrites from Northwest Africa [#2338]

A textural and mineralogical study has been performed on NWA 1807 and 2180 chondrites in order to determine sizes and typologies of chondrules, relative abundances of mineral phases, compositions of main phases and bulk oxygen isotope composition.

PRINT ONLY: ACHONDRITES

Ammannito E. Coradini A. De Sanctis M. C. Garoli D. Naletto G. Pelizzo M. G. Russell C. T.
UV-VIS-NIR Reflectance Spectroscopy of Vesta Analogs: The Case of Millbillillie [#1659]

We have collected reflectance spectra in the spectral range 190–2500 nm of the Millbillillie meteorite. Then we have studied the spectra acquired using the MGM software. We have found some differences in the total iron content along the sample.

Ammon K. Masarik J. Leya I.

The Relevance of Noble Gases in Iron Meteorites [#1275]

Troilite and schreibersite inclusions significantly affect the cosmogenic Ne concentrations in Grant and Carbo. A correction of Ne has a direct influence on the interpretation of the long-term variation of the GCR.

Bellucci J. J. Ash R. D. McDonough W. F. Walker R. J.

Standard Addition Analysis of Rh and Au in IVB Iron Meteorites [#2013]

Here we show that standard addition of Rh and Au can yield precisions of 5–7% (at 2 s.d.) to help constrain the nebular condensation condition and to improve fractional crystallization models used to explain the HSE patterns observed in the IVB irons.

Lavrentjeva Z. A. Lyul A. Yu. Kolesov G. M.

Trace Element Distribution in the Pallasite Omolon [#1036]

The elemental abundances Na, Ca, Cr, Sc, Fe, Co, Ni, Au, Ir, Hf, Zn, Cs and REEs have been measured in separated fractions from Omolon pallasite. Trace element distribution in meteorite confirms that phase, formed at olivine-metal boundaries, is the dominant REE carrier.

Lyul A. Yu. Lavrentjeva Z. A. Kolesov G. M.

Trace Element Fractionations in Metal of Aubrites [#1059]

According to the trace element contents, the two generations of metal occur in aubrites: the individual particles with roughly chondritic abundance patterns of elements and the fine-grained inclusions in silicate strongly depleted in refractory Ir.

Zinovieva N. G. Pletchov P. Yu. Latyshev N. P. Granovsky L. B.

P-T Parameters of Magmatic Replacement in Ureilites [#1041]

Our thermo- and barometric results obtained on ureilites indicate that their pyroxene-olivine material was replaced by diamond-bearing graphite-kamacite veinlets at temperatures of 1280°–1466°C and pressures of 0–5.7 kbar.

PRINT ONLY: METEORITE-RELATED

Corti G. Deponti A. Zeoli A.

Numeric and Analogue Modelling of Ice Flow Model: A Preliminary Comparison Study [#1283]

One of the main goals of present glaciological studies is the investigation of ice flow in relation to the presence and characteristics of bedrock obstacles using numerical and analog modelling techniques.

Povenmire H. Burrer B. Davis D.

The First Bediasite Tektites from Washington County, Texas [#1071]

This abstract announces Washington County, Texas as the newest and 10th Bediasite county in Texas with the recovery of a specimen in Washington County. This is the first new county to be discovered in 55 years adding to the size of the overall strewn field.

Zeoli A. Corti G. Folco L. Belmaggio P.

Physical Modeling of Glaciodynamics at Frontier Mountain, Antarctica: Testing the Importance of Ablation on Ice Flow and Meteorite Exhumation [#1282]

The large data set available for the frontier mountain meteorite trap was used to constrain boundary conditions for performing a set of physical experiments designed to reproduce the main glaciodynamics characteristics of the region.

PRINT ONLY: MARS RECONNAISSANCE ORBITER

Thompson D. R. Wettergreen D.

Spatial Point Process Models for the Clustering Behavior of Northern Plains Boulders [#2166]

We use spatial point process diagnostics to describe clustering patterns for approximately 500,000 boulders in a HiRISE orbital image. Summary statistics indicate varying degrees of aggregation at different image locations. This variation is well-described by a small handful of archetypes.

PRINT ONLY: MARS

Capitan R. D.

Three Phases of Landscape Evolution in Gorgonum and Atlantis Basins, Mars [#1318]

Three periods of landscape evolution are identified in Gorgonum and Atlantis basins, Mars. Volcanism, tectonic processes and climate change are the main controlling mechanisms which differentiated the surface evolution.

Coleman N. M. Baker V. R.

Evidence that a Paleolake Overflowed the Rim of Juventae Chasma, Mars [#1046]

We report evidence that a paleolake filled Juventae Chasma until it overtopped the northern canyon rim at an elevation of 1180 m. Fluvial erosion from the overflow triggered the formation of Baetis Chaos and carved the Maja Valles outflow channels.

de Pablo M. A. Komatsu G.

Pingo Fields in the Utopia Basin, Mars: Geological and Climatic Implications [#1278]

We describe dome, cone, and ring features distributed in the Utopia Basin. We interpret them as pingos, and that their formation may have involved heat from a possible magma chamber under the surface in this basin.

Maxe L. P.

Use of FTIR-Spectra of CO₂ to the Analysis of Martian Dust Spectra [#1961]

Modulated spectra of CO₂ (new peak at ~900 cm⁻¹) have been received and analyzed with the purpose of comparison with spectra of martian dust and soil. It is assumed that molecules of CO₂ surround the dust particles that influence on absorption and emission spectra.

Mizser A. Kereszturi A.

Climatic Planetomorphology: Hypothetical Synthesis from Available Data [#1523]

We review some elements of climatic planetomorphology, a possible tool to connect changes of surface structures to different climatic periods on Mars.

Morgenstern A. Hauber E. Reiss D. van Gasselt S. Grosse G. Schirrmeister L.

Deposition and Degradation of a Volatile-rich Layer in Utopia Planitia, Mars [#1691]

We investigate a region in western Utopia Planitia, where several morphological features like polygons and pits or depressions in a mantling deposit show close similarities to terrestrial permafrost structures.

Morris R. V. Arvidson R. E. Murchie S. Bell J. F. III Humm D. Lichtenberg K. Seelos F. IV
Wolff M. CRISM Science Team

Initial Results from the MRO-CRISM Hyperspectral Imaging Spectrometer for the Columbia Hills in Gusev Crater on Mars [#1469]

MRO-CRISM hyperspectral data for a transect through the Gusev Columbia Hills are dominated by variable proportions of a bright Fe³⁺- and probably H₂O-bearing component and a dark, spectrally-neutral component.

Papike J. J. Karner J. M. Shearer C. K.

Sulfate-rich Scapolite on Mars? [#1152]

Sulfate-rich scapolite may occur in Mars as a primary igneous occurrence or as a metasomatic replacement assemblage caused by hot sulfate-rich brine interactions with previously formed plagioclase assemblages.

Pina P. Barata T. Saraiva J. Bandeira L. P. C.

Automatic Identification of Polygonal Patterns on Mars [#1315]

In this paper we present a methodology for automatic polygonal patterns identification on images of the surface of Mars.

Presley M. A. Craddock R. A. Zolotova N.

The Effect of Salt on the Thermal Conductivity of Particulate Materials Under Martian Atmospheric Pressures [#2379]

A fluvial sample with a salt content of 1.1 g/kg has a thermal conductivity approximately 3× greater than that of the same sample with the cement bonds broken. Due to the cement bonds that were broken during collection and transport, this effect represents a minimal effect of the salt.

Saraiva J. Bandeira L. P. C. Pina P.

Automatic Crater Detection in 'Ridged Plains' Areas of Mars [#1311]

We present the results of a methodology for automated crater detection applied to four areas of the surface of Mars that belong to the cartographic unit "Ridged Plains Material."

Sprenke K. F.

Magnetic Anomalies, Hot Spot Tracks, and Polar Wander on Mars [#1080]

The linear magnetic anomalies on Mars may represent hot spot tracks along the small circles of a martian surface since reoriented by polar wander.

PRINT ONLY: ASTROBIOLOGY

Bowden S. A. Parnell J. Lingdren P. Wilson R. Cooper J. M. Lee P.

Degradation of Biological Components of a Microbial Crust in a Mars Analogue Environment [#1555]

A study of the footprint created by the weathering of microbial habitat in a Mars analogue environment.

Davila A. F. Winklhofer M. McKay C.

Multicellular Magnetotactic Prokaryote as a Target for Life Search on Mars [#1495]

Recent studies conducted on a multicellular magnetotactic organism on Earth suggest that a complex level of multicellular organization may have evolved on Mars.

Dias F. Maurette M.

"Mer D'huile" on Panthalassa: An Additional Conjecture for the Birth of Giant Macromolecules on the Young Earth [#1268]

A new conjecture is presented that concerns the synthesis of the billions atoms macromolecules of precellular life from the small molecules of cosmic chemistry. It is rooted in Panthalassa, its winds, waves, tsunamis and recyclable petroleum "skin."

PRINT ONLY: PLANETARY DIFFERENTIATION

Gupta G. Sahijpal S.

Planetary Differentiation of Planetesimals Due to Radioactive Heating [#1191]

Planetary differentiation of planetesimals due to radioactive heating of ^{26}Al and ^{60}Fe has been simulated with the formation of crust prior to the Fe-FeS core.

Harrison T. M. Project MtREE

The Hadean Earth [#2033]

The Hadean Eon (4.5–4.0 Ga) is the dark age of Earth history; there is no known rock record from this period. However, detrital zircons as old as nearly 4.4 Ga from the Jack Hills, Western Australia, offer unprecedented insights into this formative phase of Earth history.

PRINT ONLY: IMPACTS

Hietala S. Moilanen J.

Keurusselkä — Distribution of Shatter Cones [#1762]

Mapping distribution of shatter cones in Keurusselkä impact structure has revealed that traces of impact can be seen in 14 km wide area. Keurusselkä is an old and deeply eroded impact structure where no rim or depression is left.

Ivanov B. A.

Lunar Impact Basins — Numerical Modeling [#2003]

The work presents the reconnaissance numerical modeling study of a giant basin formation on the Moon close to the South Pole-Aitken size scale. The differentiation of the deep impact melt pool is predicted.

Vishnevsky S. A.

The Kurai Basin, Altai Mountains (Russia): First Evidences of Impact Origin [#1044]

First evidences (macroscopic: shock slickensides, and microscopic: PFs and PDFs in quartz) of impact origin of the crater-like Kurai Basin (Altai Mountains, Russia) are presented.

PRINT ONLY: MERCURY

Pugacheva S. G. Shevchenko V. V.

Identification and Composition of the Ejecta Mercurian Terrains with Mariner-10 [#1050]

This paper investigates the structure of the surface layer of Mercury. A main material of the research is the data of the images from Mariner-10. The model of the bi-directional reflectance was applied for the estimation of the surface roughness.

PRINT ONLY: LUNAR SAMPLES AND MODELING

Hsu W. Zhang A. Guan Y. Ushikubo T. Bartoschewitz R.

Sayh Al Uhaymir 300: Petrology, Mineralogy, and Trace Element Geochemistry [#1149]

We report the petrology, mineralogy, and trace element geochemistry of the lunar meteorite SaU 300.

Opanasenko A. N. Shkuratov Yu. G. Opanasenko N. V.

Topography of Three Localities on the Moon from Combined Clementine and Hubble Space Telescope Images [#1564]

We present topographic maps of the Moon for localities imaged by the Hubble Space Telescope in 2005. Topography was derived by the photogrammetric method from HST and Clementine image pairs.

Petrova N. Gusev A.

Core-Mantle Dissipation and Free Libration in the Two-layer Moon [#2199]

In this report we present the results of calculation of the free libration periods for different values of the dissipation coefficient R, which is connected to the qualitative parameter Q.

Slyuta E. N. Abdrakhimov A. M. Galimov E. M.

The Estimation of Helium-3 Probable Reserves in Lunar Regolith [#2175]

This abstract presented our estimation of total ³He probable reserves in lunar regolith.

Wöhler C. Lena R. Pau K. C.

The Lunar Dome Complex Mons Rümker: Morphometry, Rheology, and Mode of Emplacement [#1091]

This contribution discusses spectral and new morphometric data about the lunar volcanic complex Mons Rümker. Based on a digital elevation map of Rümker, rheologic properties and feeder dike geometries of individual domes on the plateau are inferred.

Zhang A. Hsu W.

A KREEP Clast in the Lunar Meteorite Dhofar 1180 [#1108]

KREEP rocks are important to understand the composition of the Moon's surface. In this study, we report a KREEP clast observed in the lunar meteorite Dhofar 1180 and describe its character and discuss its significance.

PRINT ONLY: VENUS

Kryuchkov V. P. Raitala J. Törmänen T.

Singularities in Distribution of Elliptical Coronae on the Surface of Venus (Preliminary Results) [#1630]

Most of venusian coronae have an elliptical shape which reflects the tectonics of the area they are located in.

Öhman T. Aittola M. Leitner J. Raitala J.

Venusian Polygonal Impact Craters [#2299]

This study showed that there are polygonal-shaped impact craters on Venus and they do show some correlations with local tectonics and that the diameter affects their abundance.

Ruiz J.

Heat Flow During the Formation of Ribbon Terrains on Venus [#1313]

Heat flows calculated from ribbon spacing are consistent with venusian hotspots if the surface temperature, at the time when ribbons terrain were formed, was ~100–150 K hotter than today, maybe because of climate forcing due to massive volcanism.

PRINT ONLY: MISSIONS AND INSTRUMENTS

Korokhin V. V. Shkuratov Yu. G. Stankevich D. G. Kaydash V. G.

Prognosis of TiO₂ Abundance in Lunar Soil Using Clementine and LSCC Data: A Nonlinear Approach [#1155]

New nonlinear method for prognosis of TiO₂ abundance based on the ANN approach is proposed. The results could be useful for the strategy in analysis of lunar data obtained with spacecrafts especially for the Chandrayaan mission.

Qiao Y. Karbhari V. M. Hegemie G. A.

Developing Moonquake-Proof Structures Based on Locally Harvestable Resources [#1039]

Based on findings of moonquake science and lunar regolith study in the past a few decades, it is now feasible to develop technology of moonquake-proof structures using raw lunar soils.

Vago J. L. Kminek G. Baglioni P. Gardini B. McCoy D. Gianfiglio G. ExoMars Project Team

Upcoming Science Activities in Support of ESA's ExoMars Mission [#1001]

ExoMars 2013 is presently the only approved astrobiology mission. Its objective is to search for traces of past and present life on the Red Planet, on surface rocks and in the subsurface. This paper describes upcoming activities to further define the ExoMars mission's scientific capabilities.

Young S. M. M. Kounaves S. P. Hecht M. H. Tufts MECA-WCL Team Phoenix Science Team

Wet Chemistry Analysis of Evaporites, Red-Ox Couples, and Dissolved Sulfate on the 2007 Phoenix Mars Scout Mission [#1084]

The 2007 Phoenix Mars Scout lander will explore the history of martian water, the geochemistry of the regolith, and bio-habitability, using the MECA-WCL instrument, of which the design, use, and first response library samples are presented.

PRINT ONLY: GLOBAL WARMING

Alexeev V. A.

Global Warming: 0.6°C or Less? [#1035]

The peculiarities of global warming on the Earth during the last century are discussed.

PRINT ONLY: EDUCATION AND PUBLIC OUTREACH

Prabhat Forsberg A. S. Head J. W. III Petro N. Morgan G.

A 3D Geoscience Data Visualization System for Mars Applied to Undergraduate Laboratories [#1297]

ADVISER, an Immersive Virtual Reality tool for taking planetary geologists “into the field,” is also used for teaching; students highly prefer IVR to desktop, and both to standard 2D presentations, indicating that 3D visualization is a valuable teaching tool in planetary geoscience.

Williams D. A. Whelley P. L. Bleacher J. E. Cave S. R. Zabala-Aliberto V. A. Zabala A. A. Greeley R.

Kissing Mars Rocks with the Rover’s RATs: An Educational Exercise to Understand Drilling Rocks on Mars [#1713]

This abstract discusses an E/PO exercise we created for elementary school children that uses Hershey Kisses and straws to simulate the drilling of different rocks on Mars by the MER Rock Abrasion Tool.