

Tuesday, March 24, 2009
POSTER SESSION I: MARTIAN PHYLLOSILICATES:
IDENTIFICATION, FORMATION, AND ALTERATION
6:30 p.m. Town Center Exhibit Area

Maturilli A. Helbert J. D'Amore M.

[*Identification of the Surficial Component from Martian Remote Sensing Infrared Spectra: Application to Mars Express PFS Measurements*](#) [#1257]

Target transformation and factor analysis techniques are applied to PFS LWC observations of the Nili Fossae region, where previous instruments detected phyllosilicates. PFS spectra are interpreted using the Berlin Emissivity Database (BED) spectral library.

Carter J. Poulet F. Bibring J.-P. Murchie S. Langevin Y. Mustard J. F. Gondet B.

[*Phyllosilicates and Other Hydrated Minerals on Mars: 1. Global Distribution as Seen by MEx/OMEGA*](#) [#2028]

This abstract presents the global spatial distribution of the phyllosilicate-bearing deposits on Mars as seen by MEx/OMEGA.

Makarewicz H. D. Parente M. Bishop J. L.

[*Determining the Composition of Phyllosilicates Using Automated Gaussian Modeling of Spectral Features*](#) [#1358]

Kaolinite-montmorillonite and nontronite-ferrihydrite mixture spectrawere analyzed using automated modified Gaussian modeling in order to relate relative band depths with endmember composition in lab spectra, and eventually in CRISM spectra on Mars.

Amador E. A. Bishop J. L. McKeown N. K. Parente M. Clark J. T.

[*Detection of Kaolinite at Mawrth Vallis, Mars: Analysis of Laboratory Mixtures and Development of Remote Sensing Parameters*](#) [#2188]

Laboratory mixtures and spectral parameters were created to better characterize and detect kaolinite in the Mawrth Vallis region of Mars where Al-phyllosilicates, including kaolinite and montmorillonite, have been detected.

Tosca N. J.

[*Clay Mineral Assemblages Derived from Experimental Acid-Sulfate Basaltic Weathering*](#) [#1543]

Basaltic weathering experiments lasting 295 days have yielded a variety of clay mineral assemblages. Linking clay mineral chemistry to aqueous chemistry provides insight into major controls on clay formation through basaltic weathering.

Hurowitz J. A.

[*Clay Mineral Formation and Evolution in an Experimental Basaltic Weathering Profile*](#) [#2083]

This work reports on a new experimental approach aimed at understanding basaltic weathering profile chemical evolution processes using a unique packed-bed flow through reactor design that enables *in situ* analysis of undisturbed alteration minerals.

Che C. Glotch T. D.

[*The Infrared Spectra Study of Dehydrated and Dehydroxylated Phyllosilicates*](#) [#1482]

We report the results of changes in the infrared spectra of thirteen phyllosilicates with exposure to increasingly higher temperatures. We hope this will increase the understanding of possible processes affecting phyllosilicate evolution on Mars.

Fairén A. G. Davila A. F. Marzo G. A. Roush T. L. McKay C. P.

[*Recent Liquid Water on Mars Inferred from Shock Decomposition Analysis of Phyllosilicates Within Impact Craters*](#) [#1156]

The analysis of the stability of phyllosilicates against shock pressure and temperature after an impact reveal recent water activity on Mars.

Altheide T. S. Chevrier V. F.

[Acidic Weathering of Martian-Relevant Phyllosilicates](#) [#1012]

Acidic weathering of phyllosilicates with varying pHs of sulfuric acid solutions demonstrates potential relationship between sulfates and phyllosilicates, and may also help explain recent observations of phyllosilicate layered deposits on Mars.

Gavin P. Chevrier V. Ninagawa K. Gucsik A. Hasegawa S.

[Experimental Investigation of the Effect of Meteoritic Impacts on Clays on Mars](#) [#2069]

Analysis of shock pressures and temperatures reached during impact experiments, as well as XRD and NIR spectral analysis, help determine whether clays found in association with impact craters on Mars were pre-existing or formed during the impact.

Tuesday, March 24, 2009
POSTER SESSION I: ASTROBIOLOGY
6:30 p.m. Town Center Exhibit Area

Kurosawa K. Sekine Y. Sugita S. Ohkouchi N. Ogawa N. O. Ishibashi K. Kadono T.
Ohno S. Matsui T.

[Cyanide Production by Chemical Reactions Between Impactor Material and an Ambient Atmosphere After Oblique Impacts](#) [#1636]

We conducted laser ablation experiments in redox-neutral gas mixtures using graphite and Murchison meteorite. The results suggest that CN radicals generated by interactions between impactor material and an atmospheric N₂ are fixed into the condensates efficiently.

Hasenkopf C. A. Beaver M. R. Freedman M. A. Tolbert M. A. Toon O. B.

[Optical Growth Measurements of Titan and Early Earth Organic Aerosol Analogs](#) [#1417]

We report optical growth factors measured for Titan and early Earth aerosol analogs. Water uptake is observed for both analogs. This has important implications for the direct and indirect effects of aerosol that may have existed on Archean Earth.

Cooper G. Sant M. Asiyu C.

[Anomalous Enantiomer Ratios in Meteoritic Sugar Derivatives](#) [#2537]

The enantiomer (mirror-image) ratios of sugar acids in carbonaceous meteorites have been measured. D-enantiomer excesses are found in all acids measured thus far. This includes rare as well as common compounds.

Foucher F. Westall F. Bény J.-M. Brandstätter F. Demets R.

[STONE-6 Experiment: Testing the Survival of Microfossils in Martian Analogues Rocks During Entry into the Earth's Atmosphere](#) [#1583]

The aim of the STONE-6 experiment was to determine if martian sedimentary rocks, and the hypothetical microfossils they could contain, can survive the Earth's atmospheric entry.

LeVoci G. Burchell M. J. Tepfer D.

[Survival of Seeds in Impacts at 1 km s⁻¹ and Above](#) [#1239]

Survival of viable seeds in impacts at 1 km/s is demonstrated in laboratory experiments using a light gas gun. Work is continuing to determine the upper limit on impact speeds for seed survival. The implications for Panspermia are discussed.

Edwards L. Huang Y. Schultz P. H.

[Preservation of Organic Materials During Hypervelocity Impact Experiments](#) [#2524]

Experiments at the AVGR explore the survivability of organic materials trapped within glasses produced by oblique and vertical hypervelocity impacts.

Howe K. L. Gavin P. Goodhart T. Kral T. A.

[Methane Production by Methanogens in Perchlorate-supplemented Media](#) [#1287]

Perchlorates, found on the martian surface, create a harsh environment. Methanogens are familiar with harsh environments and their growth was tested in perchlorate salt media. All four species of methanogens produced methane at all concentrations of each salt tested.

Conrad P. G. Fogel M. L. Glamoclija M. Kerr L. Mogensen C. Eigenbrode J. Mahaffy P. R. Steele A.

[Metrics for Habitability Assessment](#) [#1384]

We report an approach to evaluation of habitability potential on another planet, with special relevance to Mars Science Laboratory. We are developing a tool for optimizing the most critical measurements for extraterrestrial environmental assessment.

Vítek P. Jehlička J. Bezdek J. Francu E.

[*Degradation of \$\beta\$ -Carotene Under UV-rich Irradiation Conditions: Implications for Martian Environment*](#) [#1970]

In this work, degradation of beta-carotene was studied, depending on exposure to the light obtained by metal halide lamp in order to simulate Mars irradiation mainly in the UV region. The protective role of the mineral matrix was also studied and is further discussed.

Allen C. C. Oehler D. Z. Baker D. M.

[*Mud Volcanoes — A New Class of Sites for Geological and Astrobiological Exploration of Mars*](#) [#1749]

Mud volcanoes are a unique low-T window into the Earth's subsurface and may prove to be significant sources of atmospheric methane. We report new work suggesting that features in Acidalia Planitia are most consistent with their being mud volcanoes.

Westall F. Foucher F. Cavalazzi B.

[*No Stromatolites on Mars?*](#) [#1759]

Easily identifiable microbial traces such as stromatolites are not to be expected on Mars because they could not have evolved before climate change. Martian life will be subtle and difficult to detect *in situ*.

Androes D. L. Dixon J. C. Zachry D. L.

[*The Evolution of Astronomically-forced Siliclastic Rhythmites of the Ancient Earth and their Correlation to Banded-Iron Formations*](#) [#2323]

Although the bulk of past research presumes that metamorphism, Milankovitch or climatic events have annihilated or overprinted any small-scale, orbitally-influenced, ubiquitous BIF laminations, recent research suggests preservation of small scale patterns is possible.

Socki R. A. Niles P. B. Blake W. Jr. Leveille R.

[*Covariant C and O Isotope Trends in Arctic Carbonate Crusts and ALH 84001: Potential Biomarker or Indicator of Cryogenic Formation Environment?*](#) [#2218]

Covariant C and O micro-scale isotope trends in arctic carbonate crusts mimic, to a lesser extent, those in ALH 84001 and are ideal terrestrial analogs for the isotopic composition of the ALH 84001 carbonates, implying a similar formation environment.

Lemelle L. Salome M. Westall F. Susini J. Simionovici S.

[*In Situ Search for Traces of Life in Extraterrestrial Samples Using X-Ray Spectromicroscopy at the Sulfur K-Edge*](#) [#1842]

Two selected case studies (Stardust keystones and Draken's Neoproterozoic cells) exemplify the relevance of micro-X-ray fluorescence at the S K-edge performed at the ID21 beamline of the ESRF to search for traces of life in extraterrestrial samples.

Jimenez-Lopez C. Romanek C. Rodriguez-Navarro A. Perez-Gonzalez T. Rodriguez-Navarro C.

[*Magnetites Formed from Thermal Decomposition of \(Ca,Mg,Fe\)CO₃: "Foreign" Cation Incorporation into the Structure of Magnetite*](#) [#1255]

Pure magnetites are obtained from ankerite thermal decomposition. Chemical purity is typical of bacterial origin magnetites. Chemical purity of magnetites produced by thermal decomposition of ankerites containing different cations was analyzed.

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

[*Ideal Microhabitats on Mars: The Astrobiological Potential of Polar Dunes*](#) [#1618]

Astrobiological potential of polar Dark Dunes: they may hold less oxidants, trap water-ice, mm layer of them shields UV radiation, allows light income for photosynthesis. Water uptake in nighttime, temperature in daytime is favorable for metabolism.

Banerjee N. R. Bridge N. J. Izawa M. R. M. Anderson L. D. Bebout G. E. Flemming R. L.

[*Glassy Subaqueous Lavas as a Habitat for Life on Earth, Mars, and Elsewhere?*](#) [#1331]

Biogeochemical and mineralogical traces of life preserved in modern and ancient terrestrial subaqueous lavas suggest basaltic rocks on Mars and other rocky bodies may represent an underappreciated habitat for life in the solar system.

Kong F. J. Zheng M. P. Wang A. L. Ma N. N.

[*Endolithic Halophiles Found in Evaporite Salts on Tibet Plateau as a Potential Analog for Martian Life in Saline Environment*](#) [#1216]

Mg-sulfates were found within salt deposits of the Da Langtan playa on Tibet plateau, similar as those found on Mars. Halophiles were isolated from the evaporative salts in the environment for analogs of the search for martian life in subsurface.

Cabrol N. A. Grin E. A. Wynne J. J.

[*Detection of Caves and Cave-bearing Geology on Mars*](#) [#1040]

Regions on Mars likely to contain caves and/or cave-bearing geology are identified using multispectral imagery from orbital missions and the exploration of terrestrial analogs for the characterization of associated thermal, and geo-signatures.

Tuesday, March 24, 2009
POSTER SESSION I: INSTRUMENT CONCEPTS, SYSTEMS,
AND PROBES FOR INVESTIGATING ROCKS AND REGOLITH
6:30 p.m. Town Center Exhibit Area

El Shafie A. Ulrich R. Roe L.

[*Penetration Forces for Subsurface Regolith Probes*](#) [#1205]

Penetration and withdrawal forces have been measured for a variety of sizes and tip angles of penetrometers designed to carry instrumentation beneath the surface of a planetary body.

Pilgrim R. Ulrich R. Leftwich M.

[*Subsurface Spectroscopic Probe for Regolith Analysis*](#) [#1219]

A subsurface penetration probe is being developed for *in situ* FTIR analysis of the first 1/2 m of planetary bodies. The work describes the optical configuration.

Paulsen G. Zacny K. Maksymuk M. Wilson J. Mumm E. Craft J. Davis K. Kumar N.

[*Drilling in Ice Bound Lunar Regolith Simulant*](#) [#1138]

We describe drilling tests in frozen, water saturated lunar regolith simulant and present designs of the 3 m tall Mars chamber dedicated to 1 meter drilling tests.

Glass B. Thompson S. Hanagud S. Statham S. Cohen J. Lee P. Osinski G. Huffman S.

[*Planetary Drill Prototype Testing at an Impact Structure Palaeo-Hydrothermal Site*](#) [#2197]

A July 2008 field test effort updated and tested DAME drilling automation in a relevant planetary analog environment (a palaeo-hydrothermal chimney in permafrost inside Haughton Crater). Cores and cuttings were successfully retrieved and archived.

Johnson J. B. Mungas G. S. Zacny K. Albert D. G. Banerdt B. Buehler M. Elphic R. C. Lambert J. Sturm M. Johnson K.

[*A Lunar Regolith Characterization Kit \(LROCK\)*](#) [#1987]

The Lunar Regolith Characterization Kit (LROCK) project is a concept study to define a semi-autonomous instrument package for use by astronauts during future human lunar sortie missions.

Zacny K. Mungas G. Chu P. Craft J. Mumm E. Hedlund M. Paulsen G. Davis K.

[*MarsVac: A Two Step Regolith Sampling System*](#) [#1068]

A system for acquiring regolith consists of tubing embedded inside each leg of a lander. After landing, the tube will be pushed into regolith. With one puff of gas, the trapped regolith can be lifted/guided inside the tubing into a sample chamber.

Simionovici A. S. Lemelle L. Beck P. Ferroir T. Westphal A. Chazalnoel P. Debus A. Fihman F.

[*Methodology and Sample Holder for Analyses Under Quarantine of Martian Return Samples*](#) [#2543]

A method and a sample holder for analysis in quarantine conditions of Mars return samples is presented.

Scheeres D. J. Sánchez P. Dissly R. W. Asphaug E. I. Housen K. R. Swift M. R. Yano H.

Roark S. E. Soto J. C.

[*Extra Low-Gear: A Micro-Gravity Laboratory to Simulate Asteroid Surfaces*](#) [#2447]

The conceptual design and application of a low-speed centrifuge for carrying out milli to micro-G gravity experiments to simulate the granular nature of the surface and interiors of asteroids and comets is described.

Bartlett P. W. Heys S. Drozdowski Z. Kennedy T. Wagner M.

[*Vertical Exploration Using Tethers*](#) [#2146]

Unobserved geologic features and epochs on multiple planetary bodies could be accessed using robotic tethers. Recent technology development shows the promise of tethers enabling steep slope mobility, downhole measurements and *in situ* sensing from aerial platforms.

Curtis S. A. Clark P. E. Minetto F. A. Calle C. I. Keller J. Moore M.
[SPARCLE: Creating an Electrostatically Based Tool for Lunar Dust Control](#) [#1128]

Here we present the results of our ongoing efforts to design and develop tools to remove dust on the lunar surface based on our characterization of the nature of dust particles and forces affecting them.

Anderson R. C. Peters G. H. Beegle L. Pounders E. Manatt K. Solitt L. Fleming G.
[Particle Transport on the Mars Science Laboratory Mission: Effects of Triboelectric Charging](#) [#1648]

One of the major challenges facing the 2009 Mars Science Laboratory (MSL) onboard analysis system is the ability to successfully transfer fine-grained powders from the sample acquisition unit to the analytical instruments that make the scientific measurements.

Brinckerhoff W. B. Zacny K. ten Kate I. L. Kusack A. Conrad P. G. Franz H. B. Eigenbrode J.
Mahaffy P. R. Corrigan C. M. Onstott T. C.

[Precision Subsampling System for In Situ Analysis at Mars \(and Beyond\)](#) [#2240]

A new MIDP-supported effort seeks to develop a precision subsampling system (PSS) for Mars and other planetary bodies. The PSS will enable localized chemical and isotopic analyses of drill core layers and other small features in rock samples.

Dreyer C. Zacny K. Skok J. Steele J. Paulsen G. Szczesiak M. Nakagawa M. Schwendeman J.
[Progress on the Development of a Thin Section Sample Preparation Device for Space Exploration](#) [#2463]

We are researching the component step for thin section preparation with the aim of producing a device for space exploration. We show results of a prototype system that has produced a thin section adequate for petrographic analysis.

Furutani K. Ikeda E. Okada T. Saiki K. Ohue H.

[Prototype of Cutting Machine by Wire-sawing in Vacuum for In-Situ Investigation of Rocks](#) [#1044]

Cutting characteristics of rocks in air and vacuum were investigated for the preprocess of the scientific inspection. The machining amount of basalt with a wire saw in vacuum was saturated in a short time due to loading of pulverized debris.

Tuesday, March 24, 2009
POSTER SESSION I: SEEING IS BELIEVING:
UV, VIS, IR, X- AND GAMMA-RAY CAMERA AND SPECTROMETER INSTRUMENTS
6:30 p.m. Town Center Exhibit Area

Nuñez J. I. Farmer J. D. Sellar R. G. Gardner P. B.

[*The Multispectral Microscopic Imager \(MMI\) with Improved Spectral Range and Resolution*](#) [#1830]

The MMI advances the capabilities of current and planned microimagers, such as Phoenix' Robotic Arm Camera and Mars Science Laboratory's Mars Hand Lens Imager, by extending the spectral range into the infrared and increasing the number of spectral bands.

Michael G. Neukum G.

[*Image Enhancement of the Super Resolution Channel \(SRC\) of the Mars Express HRSC Experiment*](#) [#1851]

The poster describes and shows the application of the Richardson-Lucy algorithm to recover degraded images from the super resolution channel (SRC) of Mars Express HRSC.

Weinberg J. D. Dissly R. Nicks D. Miller K. L.

[*Applications and Field Testing of a Flash LIDAR System for Future Planetary Missions*](#) [#2078]

A flash LIDAR instrument is being developed by Ball Aerospace. This instrument enables multiple applications for planetary missions such as topographic mapping, ranging, surface mobility, autonomous rendezvous and docking, and descent and landing.

Istenes Z. Hargitai H. Tepliczky I.

[*The Information System of the HUNVEYOR-10 on the MDRS*](#) [#2435]

We created a portable and autonomous meteorological station, called HUME/HUNVEYOR-10, for the 71st. mission of the Mars Desert Research Station (MDRS), to measure continuously meteorological data, to take videos and to transmit them.

Bramall N. E. Stoker C. R. Price P. B. Allamandola L. J.

[*Detecting Organics In Situ Using Fluorescence*](#) [#2470]

Fluorescence spectroscopy is a powerful tool for the detection of a wide class of organics. We will discuss instruments we have developed and are developing.

Sharma S. K. Misra A. K. Acosta T. Bates D. Lucey P. G.

[*Compact Portable Remote Raman System for Planetary Exploration and Rapid Detection of Water and Hydrous Minerals*](#) [#2398]

We present a compact remote Raman system utilizing only a 85 mm Nikon camera lens for measuring good quality Raman spectra of various minerals, water, water-ice, CO₂-ice, organic and inorganic chemicals to a distance of 9-m with 1-s integration.

Vance S.

[*Mars Analog Tunable Laser Spectroscopy at a Site of Active Serpentinization*](#) [#2005]

We discuss measurements of isotope compositions from spring samples collected at The Cedars, a site of active serpentinization and possibly an analog for the Nili Fossae, using tunable laser spectroscopy with instrumentation similar to TLS on MSL.

Helbert J. Maturilli A. D'Amore M.

[*Mercury in a Box — In the Planetary Emissivity Laboratory \(PEL\) at DLR Berlin*](#) [#1560]

Analyzing the surface composition of Mercury is a challenging task. In support of MESSENGER and BepiColombo the upgraded Planetary Emissivity Laboratory can obtain emissivity measurement for fine grain sizes and at temperatures typical for Mercury's low-latitude dayside.

Bowles N. E. Calcutt S. Reininger F. Green S. F. Mortimer H.

[*The Asteroid Thermal Mapping Spectrometer: An Imaging Mid-IR Spectrometer for the Marco Polo NEO Sample Return Cosmic Vision Candidate Mission*](#) [#1591]

We describe the Asteroid Thermal Mapping Spectrometer (ATMS) instrument, a compact imaging mid-IR Fourier transform spectrometer currently being developed at the University of Oxford for NEO remote sensing applications.

Sobron P. Freeman J. J. Wang A.

[*Field Test of the Water-Wheel IR \(WIR\) Spectrometer on Evaporative Salt Deposits at Tibetan Plateau*](#) [#2372]

A new NIR reflectance spectrometer (WIR) was tested at the field sites on the Tibetan Plateau, a potential analog for the precipitation sequence and subsequent dehydration/degeneration of martian salts. Hydrated sulfates were identified.

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

[*Gamma-Rays and Neutron Spectrometers NS HEND — Tool for Study of Phobos Surface Composition*](#) [#1865]

NS HEND instrument, as the part of “Phobos-Grunt” mission, will be able to provide observational data for composition of Phobos regolith and content of natural radioactive elements K, U and Th, and also for content of hydrogen or water ice in the Phobos subsurface.

Elam W. T. Kelliher W. C. Shuler R. L. McLennan S. M. Carlberg I. A.

[*Improvements in X-ray Spectrometry for Planetary Surface Exploration*](#) [#1820]

There have been dramatic advances in X-ray spectrometry (XRS) hardware in recent years. Together they permit construction of XRS units with very low mass, power, and size yet have performance comparable to that of terrestrial laboratory units.

Grunthaner P. J. Bryson C. Gill D. Grunthaner F. Kelly M. DeFlores L. White V. Quinn R.

[*Ambient-Pressure X-Ray Photoemission Spectrometer for Surface Analysis of Planetary Surfaces*](#) [#2294]

Ambient-pressure X-ray photoemission offers the possibility of probing the surface chemistry of martian soils, rocks, and ices, including the atmospheric species interacting with these surfaces, to study geochemical surface processes.

Chemtob S. M. Yen A. Blake D. F.

[*The X-Ray Fluorescence Capabilities of CheMin IV: Data Reduction and Calibration*](#) [#2171]

CheMin, the primary instrument on the MSL rover for determining mineralogy, also features XRF capabilities. Here we present data reduction and calibration methods for determining composition of geologically relevant materials from CheMin XRF spectra.

Flemming R. L. McCausland P. J. A. Gellert R.

[*In Situ X-Ray Diffraction on the Moon, Mars and Asteroids*](#) [#1888]

In situ XRD can directly determine mineralogy of samples on planetary surfaces via crystal structural information, to complement chemical data (e.g. APXS), with no need for sample extraction/pulverization. Lab-based e.g. are given using meteorites.

Sarrazin P. Dera P. Downs R. T. Blake D. F. Bish D. Gailhanou M.

[*Hybrid X-ray Diffraction for Planetary Mineralogical Analysis of Unprepared Samples*](#) [#1496]

A new type of X-ray diffraction (XRD) planetary instrument is being developed based on an innovative hybrid concept that allows performing both powder and single-crystal XRD measurements, making it possible to analyze minerals with limited or no sample preparation.

Tuesday, March 24, 2009
POSTER SESSION I: UP CLOSE AND PERSONAL: IN SITU ANALYSIS WITH
LASER-INDUCED BREAKDOWN SPECTROSCOPY AND MASS SPECTROMETRY
6:30 p.m. Town Center Exhibit Area

Maurice S. Wiens R. Parès L. Bender S. le Roch N. Dalmau J. Berthé M. Langevin Y.
Herkenhoff K. Bridges N. Saccoccio M. ChemCam Team

[Characterization of the ChemCam \(MSL\) Imaging Capability](#) [#1864]

The ChemCam instrument comprises a Remote Micro-Imager (RMI) to place the LIBS analyses in their geomorphologic context. We present RMI flight unit test results, including the characteristics and performances of this imaging capability on MSL.

Forni O. Clegg S. Wiens R. C. Maurice S. Gasnault O.

[Multivariate Analysis of ChemCam First Calibration Samples](#) [#1523]

We present a multivariate analysis of the first calibration of the ChemCam LIBS instrument on board MSL. We use two methods PCA and ICA on the same data set and compare them.

Mungas G. S. Dreyer C. B. Bauer A. J.

[Elemental Abundance Measurement Using Micro-LIBS for Space Exploration](#) [#2264]

LIBS elemental measurements suffer from inaccuracies we believe are fundamentally tied to uncertainty in the LIBS plasma thermal history. We propose a method to decode plasma temperature history with elemental abundance from observed emission lines.

Perkins J. J. Sharma S. K. Clegg S. M. Misra A. K. Wiens R. C. Barefield J. E.

[Remote Laser-induced Breakdown Spectroscopy \(LIBS\) Analysis of Hydrated Sulfates](#) [#1397]

We report here the use of remote LIBS for determining degree of hydration in sulfate minerals. With LIBS onboard MSL it will be possible to glean information about the degree of hydration along with major and minor elements on the surface of Mars.

Fabre C. Maurice S. Sautter V. Wiens R. Dubessy J. Boiron M. C. CHEM-CAM Team

[Onboard Calibration Silicate Targets for the Chemcam LIBS Instrument \(MSL Rover\)](#) [#1502]

The MSL rover lander will carry rover-mounted calibration targets. The chemical compositions of the basaltic targets were checked using electron microprobe. The homogeneity is very good at the micrometric scale, even for the trace elements.

Rauschenbach I. Jessberger E. K. Hübers H. W. Pavlov S. G.

[Miniaturized Laser-induced Breakdown Spectroscopy for Planetary Surface Analysis](#) [#1563]

LIBS is currently under development for future lander missions to Mars and other planets and moons. Here we report on our study of different parameters that are of importance for a lightweight LIBS instrument specifically in the martian environment.

Cousin A. Maurice S. Parot Y. Michel Y. Le Roch N. Dalmau J. Parès L. Perez R. Cros A.
Wiens R. ChemCam Team

[ChemCam \(MSL\) Autofocus Capabilities](#) [#1684]

ChemCam is a remote instrument to investigate martian geochemistry, using the LIBS technique, a board of the MSL rover. The aim of this work is to present the initial calibration of ChemCam, and to investigate the effect of the rocks' parameters on the autofocus function.

Laan E. C. van Westrenen W. Wielders A. Heiligers J. MoonShot Partners

[MoonShot: A Combined Raman/LIBS Instrument for Lunar Exploration](#) [#1836]

A consortium led by the Dutch Organisation for Applied Scientific Research with partners from Dutch industry and academia aims to provide a combined Raman/LIBS instrument as scientific payload for lunar and planetary exploration missions.

Vaniman D. T. Clegg S. Lanza N. Newsom H. Wiens R. C. ChemCam Team
[*Fabrication of Sulfate-bearing Ceramic Calibration Targets for the ChemCam Laser Spectroscopy Instrument, Mars Science Lander*](#) [#2296]

A need for sulfur-bearing calibration targets for LIBS analysis by ChemCam on the Mars Science Lander required development of low-fire ceramics. A range of sulfur contents can be obtained that mimic soil or rock at the potential landing sites.

Tucker J. M. Dyar M. D. Clegg S. M. Schaefer M. W. Wiens R. C. Barefield J. E. II
[*LIBS Analysis of Minor Elements in Geologic Samples*](#) [#2024]

The first investigation of minor element detection by LIBS for ChemCam calibration shows promise for identification and quantification of minor elements by statistical techniques.

Anderson F. S. Nowicki K.
[*In-Situ LDRIMS Geochronometry for the Moon and Mars*](#) [#2290]

Latest progress on the development of a Laser Desorption Resonance Ionization Mass Spectrometer (LDRIMS) instrument for *in situ* rubidium-strontium (Rb-Sr) geochronology.

Strashnov I. Blagburn D. J. Gilmour J. D.
[*Resonant Photoionization Mass Spectrometer for Determination of Isotopic Compositions of Krypton in Extraterrestrial Samples*](#) [#1645]

An ultra sensitive MS for determination of Kr has been developed. A four wave mixing in Xe is used for generation of vuv light necessary for the first resonant step of three color ionization scheme. Kr isotopic ratios of air samples and Stannern meteorite determined.

Mahaffy P. R. Hodges R. R. Benna M. Harpold D. N. Kasprzak W. K. Kellogg J. W. King T. T.
[*Neutral Mass Spectrometer Under Development for the Lunar Atmosphere and Dust Environment Explorer \(LADEE\) Mission*](#) [#1217]

Description of the Neutral Mass Spectrometer that is one of three instruments under development for the Lunar Atmosphere and Dust Environment Explorer (LADEE) Mission.

Nagashima K. Huss G. R. Kosaka K. Kunihiro T. Keil K. Krot A. N. Taylor G. J. Yurimoto H.
[*Development of Isotope Imaging System with Two-Dimensional Ion Detector SCAPS for ims-1280 Secondary Ion Mass Spectrometer*](#) [#2066]

We are developing a new imaging detector system using the SCAPS in combination with the University of Hawaii Cameca ims-1280 SIMS instrument. We present results of initial tests of the system as well as details of the system.

Davis A. M. Stephan T. Veryovkin I. V. Pellin M. J. Savina M. R.
[*The Ion Nanoprobe: A New Instrument for Studying the Isotopic and Elemental Composition of the Solar System and Beyond at the Few-Nanometer Scale*](#) [#2472]

The ion nanoprobe is a new instrument designed for isotopic, chemical, and possibly molecular analysis at lateral resolutions of a few nanometers. This instrument, now under construction, will be applied to a broad range of problems in cosmochemistry.

Hilchenbach M. Lang T. Hornung K. Thirkell L. Briois C.
[*UV-Laser Desorption Ion Source Applied to a Secondary Ion Mass Spectrometer*](#) [#1162]

We were focusing on using a new UV laser ion desorption source combined with a SIMS laboratory time-of-flight mass spectrometer, the latter being very similar to the COSIMA flight instrument onboard Rosetta.

Greer F. Fisher A. Corso T. MacAskill J. Willis P. A.
[*Nanospray Ionization for Coupling Capillary Electrophoresis with Mass Spectrometry for In Situ Titan Exploration*](#) [#2200]

This paper will present the status of our effort to develop a Lab-on-a-Chip instrument coupling microCE to MS via nanospray ionization enabling *in situ* detection and analysis of target compounds on Mars or the moons of the outer solar system.

Tuesday, March 24, 2009
POSTER SESSION I: JUPITER AND INSCRUTABLE IO
6:30 p.m. Town Center Exhibit Area

Visscher C. Sperier A. D. Moses J. I. Keane T. C.

[*Phosphine and Ammonia Photochemistry in Jupiter's Troposphere*](#) [#1201]

A photochemical model is developed for Jupiter's troposphere using updated constraints. The results suggest that diphosphine is an important aerosol component and that coupled ammonia-acetylene photochemistry is inhibited in Jupiter's atmosphere.

Williams D. A. Keszthelyi L. P. Crown D. A. Geissler P. E. Schenk P. M. Yff J. Jaeger W. L.

[*Volcanism on Io: Insights from Global Geologic Mapping*](#) [#1403]

We discuss latest insights into the volcano-tectonic evolution of Io based on global geologic mapping.

Bunte M. K. Williams D. A. Greeley R. Jaeger W. L.

[*Geologic Mapping of the Hi'iaka and Shamsu Regions of Io*](#) [#1468]

We present regional geomorphologic maps of the Hi'iaka and Shamsu regions of Io. The regions are characterized by varied volcanic and tectonic activity as well as progressional degradation. Volcano-tectonic interactions formed the Hi'iaka complex.

Barth B. Radebaugh J. Christiansen E. H.

[*Classification of Io's Paterae: Active vs Inactive*](#) [#2397]

On Io, the proportion of paterae with active volcanism, as judged from the presence of dark deposits within their margins, correlates with the total number of paterae in a longitudinal band and is highest in the sub-jovian and anti-jovian regions.

Allen D. Radebaugh J.

[*Ionian Volcanoes Reveal Their Temperatures*](#) [#1475]

Color temperature analyses were conducted on three hotspots using Cassini ISS data of the surface of Io in eclipse by Jupiter. The data for Pillan, Loki, and Wayland will be presented.

Keszthelyi L. P. Davies A. G. McEwen A. S.

[*Optimal Wavelengths for Studying Thermal Emission from Active Volcanoes on Io*](#) [#1943]

Eruption temperature of Io lavas can be constrained by new observations at ~0.8 and ~1 microns. Eruption style and heat flow are best studied at 2, 3, 4, 6, 8, 15, and 20 microns with 2, 5, and 8 microns being the most essential.

Rathbun J. A. Spencer J. R.

[*Ground-based Observations of Io in Support of the New Horizons Flyby*](#) [#2177]

We observed Io on 21 nights in 2006–2007 in support of the February, 2007 New Horizons flyby. We found that Tvashtar had been volcanically active for at least a month prior to the flyby and that at least four volcanoes were active on the Jupiter-facing hemisphere.

Borer N. Chen E. M. A. Choi D. S. Kraft K. L. Fortenberry R. Harben J. Issacson P. Johnson A. Jones I. Mabry J. McDunn T. Millham R. A. Pankine A. Prater A. Cowardin H. M. Smith D. J. Snowden D.

[*Argus: A New Frontiers Mission to Observe Io*](#) [#1062]

A proposal to study Io, the most volcanically active solar system body. Study of volcanic activity, composition, tidal heating, atmospheric composition, mass wasting and magnetosphere interactions furthers understanding of dynamic planetary process.

McDoniel W. J. Goldstein D. Varghese P. Trafton L. Stewart B.

[*DSMC Modeling of 3D Vent Geometries for Ionian Plumes*](#) [#2223]

We study the effects of vent asymmetry on Io's volcanic plumes, with a focus on the difference between a disk source and a half annulus source, and show how the half annulus source can still lead to a fairly symmetric deposition ring.

Tuesday, March 24, 2009
POSTER SESSION I: TANTALIZING TITAN
6:30 p.m. Town Center Exhibit Area

Hayne P. McCord T. B. Barnes J. W.

[*Titan's Near Infrared Atmospheric Transmission and Surface Reflectance from the Cassini Visual and Infrared Mapping Spectrometer*](#) [#1863]

Using a ground calibration target method, we calculate Titan's atmospheric transmission and surface albedo in the 0.8 - 5.0 micron wavelength range. Two of Titan's most interesting features, Tui Regio and Hotei Regio, are depleted in water ice.

Rodriguez S. Crapeau M. Le Mouelic S. Paillou P. Barnes J. W. Brown R. H. Sotin C. Wall S.

[*Cassini VIMS and RADAR Altimeter Joint Study of Titan Surface*](#) [#1596]

Correlations between Cassini/Altimeter data and VIMS underlying images of Titan's surface suggest the presence of very local enrichments in water ice linked with smooth depressions, maybe hinting an ancient channel connected to a large basin.

Langhans M. Jaumann R. Stephan K. Brown R. H. Buratti B. J. Clark R. Baines K. H.

Nicholson P. D. Lorenz R. D.

[*Fluvial Valleys on Titan — A Global Perspective*](#) [#1681]

Fluvial valleys on Saturn's largest moon, Titan, are investigated in this study. A global overview about the arrangement of fluvial channels is given. Spectral properties of fluvial regions were analysed based on Cassini-VIMS-data.

Burr D. M. Aliaga-Caro J. F. White B. R. Marshall J. R. Greeley R. Bridges N. T.

[*Numerical Modeling of Titan Aeolian Sediment Transport: Preliminary Threshold Wind Speed and Trajectory Results*](#) [#2098]

Preliminary numerical modeling of aeolian sediment transport parameters under Titan conditions is provided, for future testing in wind tunnel experiments.

Savage C. J. Radebaugh J.

[*Titan as a Laboratory for Linear Dune Formation*](#) [#1005]

We present results of a detailed morphological study of Titan's linear dunes showing sediment induration by liquids may be causing differences in dune width and interdune spacing between northern and southern hemispheres.

Neish C. D. Lorenz R. D. Kirk R. L.

[*Out of Africa: Radarclinometry of the Sand Seas of Namibia and Titan*](#) [#1071]

Far from the Namib; Dunes of organic solids; Mimic quartz cousins.

Stofan E. R. Farr T. Kirk R. L. Lopes R. M. Lorenz R. Lunine J. I. Mitchell K. L. Paillou P.

Radebaugh J. Wall S. W. Wood C. A. Cassini Radar Team

[*Morphology of Four Flow Fields on Titan: Implications for Modes of Origin*](#) [#1043]

We describe four flow fields associated with channels that have been observed in Cassini Radar data of Titan.

Wood C. A. Stofan E. R. Paganelli F. Lorenz R. D.

[*Fluctus and Virgae of Titan*](#) [#2277]

Fluctus are bright flows on Titan with lobate margins and linear sources. If they are volcanic features they are evidence for tectonic control. Shiwanni Virgae is dune material that diverts around obstacles. They are not tectonic.

Janssen M. A. Le Gall A. Wye L. C. Zebker H. A. Lorenz R. D. Paillou P.

Paganelli F. Cassini Radar Team

[*Anomalous Radar Backscatter from Titan's Xanadu*](#) [#1916]

We use simultaneously measured radar reflectivity and microwave emission from the Cassini Radar instrument to show that the radar backscattering seen across Titan's Xanadu region is too high to be explained by any known surface model.

Le Gall A. Janssen M. A. Lorenz R. D. Zebker H. Wye L. Paillou P.

[Radar-Bright Channels on Titan](#) [#1533]

The Cassini SAR observed channels in the Xanadu region of Titan which exhibit very large radar cross-sections. We propose the presence of (transparent) rounded, icy rocks with size larger than the radar wavelength (2.18 cm) to explain observations.

Lorenz R. D. Hayes A. Callahan P. Gim Y. Janssen M. Wall S. Le Gall A. Mitchell K. Zebker H. Wye L. Lunine J. Aharonson O. Kirk R. Wood C. Alberti G.

[Ontario Lacus: Brilliant Observations of a Titan Lake by the Cassini Radar Altimeter](#) [#1990]

Radar altimetry, Ontario, truly flat, Glints like a mirror..

Jaumann R. Neukum G.

[The Surface Age of Titan](#) [#1641]

Although the statistical precision of the Titan cratering results is not very high it is obvious that Titan's surface is partly as old as the other saturnian satellites and has been partly modified and heavily resurfaced .

Zahnle K. Korycansky D.

[Some Possible Consequences of Menvra Impact on Titan](#) [#2390]

The energy released by the Menvra impact was marginally large enough to melt and evaporate significant amounts of water, and thus cause rain. The energy of this and other impacts was large enough to evaporate significant amounts of methane.

Fukuzaki S. Sekine Y. Kurosawa K. Sugita S. Kadono T. Matsui T.

[Impact Devolatilization of Ammonium Sulfate: Implications for the Origin of N₂ in Titan's Atmosphere](#) [#1575]

We assess the role of devolatilization of (NH₄)₂SO₄ in Titan's crust by cometary impacts for the origin of N₂ by laboratory experiments. Our results suggest that the N₂ production for 4.5 Gyr reaches ~2.5–10 times that in the present atmosphere.

Berezhnoy A. A.

[Nitrogen on Early Titan](#) [#1077]

An early NH₃-rich Titan's atmosphere can be converted into the N₂-rich atmosphere without significant changes in the isotopic composition of N and H. The dissociative fractionation factor and the initial atmospheric mass of Titan are estimated.

Tuesday, March 24, 2009
POSTER SESSION I: ENIGMATIC ENCELADUS AND INTRIGUING IAPETUS
6:30 p.m. Town Center Exhibit Area

Hanna B. J. Yeoh S. K. Goldstein D. B. Varghese P. L. Trafton L. M.
[*Free-Molecular and Collisional Studies of Enceladus' Water Vapor Plumes*](#) [#2389]

The free-molecular and the direct simulation Monte Carlo (DSMC) codes are used to simulate the water vapor plumes observed on the south pole of Enceladus during the three orchestrated flybys in 2005 by Cassini.

Lisse C. M. Weaver H. A. Perry M. E. Turtle E. P. Hibbits C. A. Dello Russo N.
[*Comparing Enceladus to Comets: Implications for Their Outgassing Activity*](#) [#2299]

Using results from Voyager and Cassini observations, we investigate the compositional similarities between Enceladus' plumes and cometary comae and compare the physical properties (densities, speeds, collimation) of the plumes and cometary jets.

Boice D. C. Goldstein R.
[*Is Enceladus a Comet? A Cometary Perspective*](#) [#1506]

The discovery of icy plumes emanating from Saturn's moon, Enceladus, by the Cassini spacecraft has raised questions about its cometary nature. Enceladus represents a transitional object, intermediate to the atmospheres of large satellites and the extended comae of comets.

Barr A. C.
[*Limits on Heat Transport and Resurfacing Rates Due to Mobile Lid Convection Beneath Enceladus' South Polar Terrain*](#) [#2378]

The high heat flux and intense surface deformation at Enceladus' south pole suggests that convective plumes reach close to the surface. I derive limits on the heat flux and resurfacing rate due to mobile lid convection.

Patthoff D. A. Kattenhorn S. A.
[*Establishing a Long-Term Fracture History of the South Polar Terrain on Enceladus*](#) [#2513]

Fracture mapping of the SPT on Enceladus will help to resolve the history of the tiger stripes and the surface of the moon through detailed analysis of the fracture types, orientations, and relative ages.

Hurford T. A. Bills B. G. Helfenstein P. Greenberg R. Hoppa G. V. Hamilton D. P.
[*Using Geological Implications of a Physical Libration to Constrain Enceladus' Libration State*](#) [#1631]

We describe how a physical libration might affect eruption variability, tidal shear heating and crack formation. These effects might be observable with Cassini data and allow the libration state to be constrained.

Morito H. Kimura J. Kawamura T. Morota T. Honda C. Kobayashi Y. Okada T.
[*Sublimation Impact for the Temporal Change of Albedo Dichotomy on Iapetus*](#) [#1621]

In this work, we evaluate the effect on icy sublimation and temporal change of surface albedo, and we try to reconstruct the original distribution the dark material on Iapetus.

Galuba G. G. Denk T. Neukum G.
[*Dark Crater Surfaces in Bright Areas on the Saturn Moon Iapetus*](#) [#1792]

The explanation why the Cassini Regio on Iapetus is dark is supplemented by an explanation why on the bright trailing side there are dark crater bottoms.

Tuesday, March 24, 2009
POSTER SESSION I: ICY SATELLITES: CRYPTIC CRATERS
6:30 p.m. Town Center Exhibit Area

Kirchoff M. R. Schenk P.

[*Impactor Populations in the Saturnian System: Constraints from the Cratering Records*](#) [#2067]

We use the cratering records of heavily cratered terrains of Mimas, Tethys, Dione, Rhea, and Iapetus to help constrain characteristics of impactor populations in the saturnian system.

Karpes B. A. Stoddard P. R.

[*The Cataloging of Craters on Enceladus*](#) [#1306]

We catalog craters of Enceladus, using publicly available images, and make some preliminary analysis.

Yozzo J. E. Kirchoff M. R. Schenk P.

[*Apex-Antapex Asymmetry of Impact Crater Density on Ganymede's Dark Terrain*](#) [#2214]

This abstract focuses on the asymmetry of impacts between Ganymede's apex and antapex of motion using the dark terrain of Ganymede and attempts to provide an explanation for the lack of a large predicted asymmetry.

Mukherjee P. Barlow N. G.

[*A Catalog of Impact Craters on Ganymede*](#) [#2071]

We are compiling a catalog of all impact craters on the jovian moon Ganymede which are larger than 3 km in diameter. We discuss preliminary results regarding interior morphologies associated with these craters.

Alzate N. Barlow N. G.

[*Analysis of Central Pit Craters on Ganymede and Implications for Pit Formation Models*](#) [#1921]

We have completed our survey of central pit craters on Ganymede. We discuss the characteristics and distributions of these central pit craters and the implications for central pit formation models.

Tuesday, March 24, 2009
POSTER SESSION I: ICY SATELLITES: GELID GEOLOGY/GEOPHYSICS
6:30 p.m. Town Center Exhibit Area

Schulson E. M.

[*Frictional Sliding of Cold Ice*](#) [#1795]

This paper reviews current knowledge of frictional sliding in water ice Ih, a fundamental process underlying tectonic activity within the icy crusts of Enceladus and Europa, and raises a number of questions.

Bland M. T. McKinnon W. B. Showman A. P.

[*Forming Ganymede's Grooves: Producing Large-Amplitude, Complex Deformation*](#) [#1690]

We present the first numerical simulations that realistically reproduce the complex deformation observed in Ganymede's grooved terrain. This deformation results from the inclusion of strain weakening effects in the ice rheology.

Dampz A. L. Dombard A. J.

[*Time-dependent Flexure on the Icy Satellites of Jupiter and Saturn*](#) [#1316]

In this work we explore the "static" assumption of models of lithospheric flexure that have been used on these icy satellites. We find that creep within the lithospheres is non-negligible, leading to progressive thinning of the lithosphere.

Goff-Pochat N. Collins G. C.

[*Strain Measurement Across Fault Scarps on Dione*](#) [#2111]

In this presentation we display the calculated surface strain over fault sets on Dione, and provide an analysis of the overall surface strain accommodated on Dione.

Wagner R. J. Neukum G. Stephan K. Roatsch T. Wolf U. Porco C. C.

[*Stratigraphy of Tectonic Features on Saturn's Satellite Dione Derived from Cassini ISS Camera Data*](#) [#2142]

Cassini ISS images were used to derive a stratigraphic sequence of tectonic landforms (troughs, ridges, scarps, lineaments) on Saturn's icy satellite Dione.

Kay J. P. Kattenhorn S. A.

[*Searching for Evidence of Active Tectonics on Europa*](#) [#2454]

Evidence of recent tectonic activity on Europa logically starts with the geologically young, ridgeless surface fractures. The temporal relationship between young fractures and their orientations could yield information about recent tectonic activity.

Coulter C. E. Kattenhorn S. A. Schenk P. M.

[*Topographic Profile Analysis and Morphologic Characterization of Europa's Double Ridges*](#) [#1960]

Ridges on Europa have very low slopes and limiting values of height/width that suggest viscoplastic gravitational collapse over time. Variability between ridges may point to disparate formation kinematics.

Singer K. N. McKinnon W. B.

[*Pits, Spots, Uplifts, and Small Chaos Regions on Europa: A Search for Regional Variations*](#) [#2336]

Mapping of a sample region illustrates how data obtained in ArcMap can be used to investigate the spatial and size frequency distribution of small features on Europa. We hope further mapping will shed light on the physics of feature formation.

Rodriguez N. J. Rathbun J. A. Spencer J. R.

[*Europa's Thermal Surface from Galileo PPR*](#) [#2166]

We present Galileo Photopolarimeter-Radiometer data of Europa and, from these, model the thermal inertia and bolometric albedo of the surface. We also derive an upper limit for detection of endogenic activity.

El Maarry M. R. Sierks H.

[*Geological, Geochemical and Engineering Considerations for Choosing a Landing Site on the Jovian Moon Europa*](#) [#2014]

Geological, geochemical, and engineering constraints on choosing a suitable landing site for lander on the jovian moon, Europa, are discussed briefly.

Stryk T. Stooke P. J.

[*Triton Crescent Imaging Revisited: Cartography and Geology*](#) [#1710]

Voyager 2 images of the outbound crescent of Triton are specially processed, added to a global map and interpreted geologically. Plains, hills, cantaloup-type areas and possible flows are mapped.

Tuesday, March 24, 2009
POSTER SESSION I: ICY SATELLITES:
COOL CHEMISTRY AND SPECTACULAR SPECTROSCOPY
6:30 p.m. Town Center Exhibit Area

Hansen G. B. Apple S. K. Shin-White E.-J. Z.

[*Water Ice Abundance and Grain Sizes, and Non-Ice Materials on the Saturnian Satellite Phoebe from Cassini/VIMS Observations*](#) [#2227]

We are modeling Cassini-VIMS spectra from an observation of the Saturn satellite Phoebe with water ice and non-ice components, assuming linear mixing, to find abundances and grain sizes.

Stephan K. Jaumann R. Wagner R. Clark R. Cruikshank D. P. Hibbitts C. A. Roatsch T. Brown R. H. Buratti B. J. Filacchione G. Hansen G. B. McCord T. B. Baines K. H. Nicholson P. D.

[*VIMS Coverage of Saturn's Icy Satellite Rhea*](#) [#1377]

The present status of observing Saturn's satellite Rhea by the Cassini VIMS spectrometer will be presented showing that the derived spatial variations of Rhea's spectral properties appear to be similar to the neighboring satellite Dione.

Filacchione G. Cuzzi J. N. Clark R. N. Buratti B. J. Capaccioni F. Tosi F. Coradini A. Cerroni P. Adriani A. Cruikshank D. P. Jaumann R. Stephan K. Brown R. H. Nicholson P. D. Baines K. H. Nelson R. M. McCord T. B.

[*Revised Full-Disk Spectra by Cassini-VIMS of the Saturnian Minor Icy Moons*](#) [#1780]

This abstract concern with a detailed re-analysis of the disk-integrated spectra of the minor moons of Saturn (Atlas, Prometheus, Pandora, Janus, Epimetheus, Calypso and Telesto) obtained by Cassini-VIMS.

Hendrix A. R. Buratti B. J.

[*Multi-Wavelength Photometry of the Icy Saturnian Satellites: A First Look*](#) [#2438]

We present results from analyses of phase curves of Enceladus and Dione made using data from Cassini UVIS and VIMS. The investigation provides critical insight into the evolution of the moon regoliths and an understanding of their current environments.

Phillips C. B. Dalton J. B.

[*Combining Galileo SSI and NIMS Spectra for Europa*](#) [#1367]

We are combining spectral information from visible-wavelength color Galileo SSI images of Europa with multi-spectral near-infrared data from Galileo NIMS. These combination spectra will help us understand the composition of Europa's surface.

Collins G. C. Hibbitts C. A. Hansen G. B.

[*Investigation of Carbon Dioxide Distributions on Saturnian and Galilean Satellites Through Fusion of Spectrometer Data with Geological Maps*](#) [#2327]

We have converted spectrometer data from Cassini VIMS and Galileo NIMS into GIS layers that can be queried along with geological map data. This presentation shows examples from CO₂ band depth mapping on Dione and Ganymede.

Dupire C. Le Menn E. Grasset O. Le Mouélic S.

[*In Situ Infrared Studies of Water and CO₂ Frost Between 1 and 5 \$\mu\$ m: From the Grain to the Icy Surfaces Signatures*](#) [#1242]

In situ infrared spectra and images of well controlled water and carbon dioxide ice grains have been experimentally acquired in the laboratory. The spectral influence of gaseous CO₂ in an icy matrix is discussed.

Palmer E. E. Brown R. H.

[*Carbon Dioxide on the Surface of Iapetus, Its Stability and Production*](#) [#2442]

CO₂ has been found on Iapetus, where it should be thermally unstable. We generate CO₂ using water ice and carbon grains using UV light as a source for Iapetus. We evaluate how CO₂ can be trapped on the surface.

Cook J. C. Olkin C. B. Desch S. J. Mastrapa R. M. Roush T. L. Verbiscer A. J.

[*Examination of the K-Band Spectrum of Charon: Possible Evidence for Multiple Ammonia Ices*](#) [#2222]

We present a new K-band (1.9–2.4 microns) spectrum of Charon and show there is evidence that the surface has different forms of ammonia ice.

Peeters Z. Hudson R. Moore M.

[*Carbonic Acid Stability in Solar System Ices*](#) [#2561]

We have investigated spectral properties and the stability of carbonic acid (H_2CO_3) at different temperatures upon irradiation with MeV protons. The results are extrapolated to life times in outer solar system bodies.

Choukroun M. Barmatz M. Castillo-Rogez J. C. Sotin C.

[*New Growth Setup of Planetary Clathrate Hydrate Analogs for Physical Properties Measurements*](#) [#2313]

We present a new high pressure – low temperature setup for the synthesis of large clathrate hydrate samples. We are ready to grow CO_2 clathrates, and to conduct initial measurements of their mechanical properties, with applications to Enceladus.

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

[*Volumetric and Optical Studies of High Pressure Phases of \$\text{Na}_2\text{SO}_4\$ - \$^{10}\text{H}_2\text{O}\$ with Applications to Europa*](#) [#2033]

We use optical images of high-pressure phases of the Na_2SO_4 - H_2O system, coupled with measurements of pressure, temperature, and volume changes, to report eutectic transitions for pressures up to 325MPa, with implications for modeling Europa's ocean.

Tuesday, March 24, 2009
POSTER SESSION I: ASTEROIDS AND COMETS
6:30 p.m. Town Center Exhibit Area

De Sanctis M. C. Lasue J. Magni G. Capria M. T. Turrini D. Coradini A.
[*Models of ROSETTA Target Comet 67P/Churyumov-Gerasimenko*](#) [#1510]

We will present the results of a new quasi three-dimensional comet evolution model for non-spherically shaped cometary nuclei. We applied this model to comet 67P/Churyumov-Gerasimenko.

Emery J. P. Cruikshank D. P. Burr D. M.

[*Near-Infrared Spectroscopy of Trojan Asteroids: Evidence for Two Compositional Groups*](#) [#1442]

We present near-infrared spectra of ~70 Trojan asteroids. No clear absorption features are detected, but the data reveal two spectral groups. These results are in agreement with other observational evidence, and we suggest the groups indicate distinct compositions.

Hibbitts C. A. Jauhari S. Hagaman S. Lisse C.

[*Near-Far IR Spectra of Refractory Minerals Relevant to Comets*](#) [#1932]

We present our results for transmission spectra from ~2–200 μm and derived absorption constants for these and other materials relevant to comets, including pyrrhotite, other sulfides, carbonates, and several clay minerals.

Zolotov M. Yu.

[*Ceres: A Case for Porous, Undifferentiated, and Non-Icy Hydrated Body*](#) [#2329]

As opposed to previous deductions, this work argues for a porous internal structure of Ceres without a dense core and water mantle.

Li J.-Y. McFadden L. A. A'Hearn M. F. Feaga L. M. Russell C. T. Coradini A.

De Sanctis C. Ammannito E.

[*UV Absorption Features of Asteroid 1 Ceres*](#) [#2101]

New images and spectra of asteroid Ceres at UV were obtained with HST/ACS/SBC. The absorption feature at about 280 nm in the spectrum of Ceres is confirmed.

Milliken R. E. Rivkin A. S.

[*Spectral Evidence for a Brucite-Carbonate Alteration Assemblage on Ceres*](#) [#1481]

We present a new interpretation for the 3 μm hydration feature in Ceres' reflectance spectrum. The features in this wavelength region are consistent with brucite and Mg carbonate, suggesting alteration on Ceres is distinct from the chondrites.

Ostrowski D. R. Sears D. W. G. Gietzen K. M. Lacy C. H. S.

[*An Investigation of Phyllosilicates, C Chondrites, and C Asteroids Using Continuum Slopes of Near Infrared Spectra*](#) [#1136]

We have measured the near-IR spectra of five phyllosilicates heated in 100°C intervals to 1100°C. We conclude that the surfaces of C asteroids are essentially amorphous, being impact-dehydrated phyllosilicates.

Reynolds C. M. Reddy V. Gaffey M. J.

[*Compositional Study of 51 Nemausa: A Possible Carbonaceous Chondrite-like Asteroid*](#) [#1285]

This is a compositional study on the main-belt asteroid 51 Nemausa.

Cloutis E. A. Hardersen P. S. Reddy V. Gaffey M. J. Bailey D. T. Craig M. A.

[*Metal-Orthopyroxene and Metal-Olivine Mixtures: Spectral Reflectance Properties and Implications for Asteroid Spectroscopy*](#) [#1332]

The spectral reflectance properties of metal + mafic silicate mixtures indicate that mafic silicate band centers can be successfully recovered, and mafic silicate compositions derived, from analysis of the spectra.

Gietzen K. M. Lacy C. H. S. Ostrowski D. R. Sears D. W. G.

[Low-Calcium and Calcium-Free Clinopyroxene Spectra and the Implications for UOC Material on Asteroids](#) [#1348]

Many S asteroids have spectral bands for Ca-rich clinopyroxene, which distinguish them from most ordinary chondrites. Five low-Ca clinopyroxenes have the same spectral feature and this likens the asteroids to unequilibrated ordinary chondrites.

Burbine T. H. Buchanan P. C. Dolkar T. Binzel R. P.

[Pyroxene Mineralogies of Near-Earth Vestoids](#) [#1922]

We determine the mineralogies of seven near-Earth asteroids that have reflectance spectra similar to howardites, eucrites, and diogenites (HEDs). All of these observed near-Earth V-type asteroids have pyroxene mineralogies consistent with eucrites or howardites.

Chapman C. R. Enke B. Merline W. J. Nesvorný D. Tamblyn P. Young E. F.

[Reflectance Spectra of Members of Very Young Asteroid Families](#) [#2258]

We present SpeX infrared spectra for members of the dynamically young Datura, Iannini, Karin, and Veritas asteroid families (plus Koronis and Themis family controls). S-types are space-weathered on timescales of a few million years.

Fauerbach M. Marks S. A. Behrend R. Bernasconi L. Bosch J.-G. Conjat M. Rinner C. Roy R.

[Shape Models of Minor Planets 242 Kriemhild and 287 Nephthys](#) [#1279]

Lightcurve inversion of photometry has been shown to be a viable source to obtain information about physical attributes like rotation period, shape and spin axis orientation for asteroids. We will present results for 242 Kriemhild and 287 Nephthys.

Takeuchi H. Miyamoto H. Oku M.

[Distributions and Morphological Characteristics of Bright Spots on Boulders Covering the Surface of Asteroid Itokawa](#) [#1566]

We scrutinized the highest-resolution images of the asteroid Itokawa to identify 387 bright spots on the surfaces of 123 boulders. Our preliminary results indicate ~90% of these bright spots are formed as results of micrometeoroid impacts.

Dachev Ts. P. Semkova J. V. Maltchev S. Tomov B. Matviichuk Yu. N. Koleva R. Benghin V. Chernykh I. Shurshakov V. Petrov V. Angelis G. De.

[Radiation Environment Study During Phobos Sample Return Mission by Charged Particle Telescope Liulin-Phobos](#) [#1297]

This paper describes the Liulin-Phobos experiment, which will be flown onboard the future Phobos – Soil sample return mission to the satellite of Mars – Phobos. The main goal is the investigation of the radiation environment and doses on the path and on Phobos surface.

Hamelin M.

[Surface and Near Surface Dynamics on Phobos: Possible Grooves Formation by Impact Ejecta](#) [#1764]

The motion of a test mass on an ellipsoidal model of Phobos is computed and compared with the grooves patterns around Stickney. It is shown that trajectories are not generally down slope and that a gliding mass can take off over some distance.

Ipatov S. I. A'Hearn M. F.

[Deep Impact Ejection from Comet Tempel 1 as a Triggered Outburst](#) [#1022]

Results of our studies of velocities and rates of ejection testify that the Deep Impact collision with Comet 9P/Tempel 1 was a trigger of a large outburst that had a local peak of ejection at about 10 seconds and a sharp decrease at ~60 s.

Doressoundiram A. Roques F. Boissel Y.

[Probing the Radial Distribution of the Kuiper Belt Using Stellar Occultations](#) [#1074]

We conducted a survey for serendipitous occultations. We report on 19 hours of fast-photometry data. We run a complex procedure to analyse the lightcurve. The results bring strong constraints on the Kuiper Belt structure.

McEachern F. M. Cuk M. Stewart S. T.

[*Dynamical Evolution of the Hungaria Asteroids*](#) [#2554]

In this study we investigate some 30 of the largest Hungaria asteroids for which taxonomic classes have been assigned, specifically to shed light on their possible dynamical histories.

Bradley P. A. Plesko C. S. Weaver R. P. Clement R. R. C. Guzik J. A.

Pritchett-Sheats L. A. Huebner W. F.

[*Modeling the Dynamic Response of an Asteroid or Comet to a Nuclear Deflection Burst*](#) [#2314]

The most technically feasible method of deflecting a Potentially Hazardous Object is a nuclear stand-off burst. We show results from our initial models that use bursts ranging from 1 to 1000 kt on 100 meter diameter targets of various compositions.

Tuesday, March 24, 2009
POSTER SESSION I: COMET WILD 2: MINERALOGY AND MORE
6:30 p.m. Town Center Exhibit Area

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

[*Study of Aerogel Surface Exposed to the Particle Flux of Comet Wild 2: An Update*](#) [#2480]

Surfaces of Stardust aerogel have been analyzed with latest technology ToF-SIMS, utilising a beam of 40kV C60 ions, most suitable to measure heavy organic compounds at high lateral resolution.

Stephan T.

[*TOF-SIMS Analysis of Cometary Fragments Extracted from a Stardust Aerogel Track*](#) [#1698]

TOF-SIMS of cometary fragments from Stardust aerogel show that terminal particles are less mixed with aerogel than material from bulbous cavities. For a comprehensive picture of Wild 2 matter, all material from along the tracks needs to be analyzed.

Stodolna J. Jacob D. Leroux H.

[*Mineralogy and Petrology of Stardust Particles Extracted from the Walls of Track 80*](#) [#1762]

We report a TEM examination of a compressed wall piece extracted from track 80. The sample shows a large diversity of mineralogy suggesting that the incident particles was a complex fine grained aggregate.

Stodolna J. Jacob D. Leroux H.

[*ATEM Study of Four Thermally Modified Stardust Particles from Track 80*](#) [#1754]

We compare the microstructure and composition of thermally modified particles extracted from track 80. Elements distribution attests for capture induced reduction process. No evolution of the thermal alteration is observed along the track.

Ogliore R. C. Butterworth A. L. Fakra S. C. Gainsforth Z. Marcus M. A. Westphal A. J.

[*Fe-bearing Mineral Groupings in Stardust Fragments*](#) [#2215]

The Fe-bearing minerals in 193 micron-sized fragments from 11 Stardust tracks are shown to cluster into five groups, giving clues to the heterogeneity scale of comet Wild2.

Schmitz S. Brenker F. E.

[*Microstructural Indications for Protoenstatite Precursor of Cometary MgSiO₃ Pyroxene: A Further High Temperature Component of Comet Wild 2*](#) [#1580]

We investigated samples from comet Wild 2 using the TEM. Here we present evidence for the former existence of the high temperature MgSiO₃ polymorph protoenstatite as a precursor for the formation of clino- and minor orthoenstatite.

Leroux H.

[*Mineralogy of Track 77 \(PUKI\): Toward the Understanding of the Fine-Grained Components of Wild 2*](#) [#1809]

Using TEM we show that samples from track 77 display a combination of non-equilibrated crystalline silicates and amorphous material, the latter originates from a fine-grained material thermally altered during the capture in the aerogel.

Joswiak D. J. Brownlee D. E. Matrajt G.

[*Mineralogical and Textural Changes of a Wild 2 Terminal Particle Pentlandite from Capture Heating in Aerogel*](#) [#2150]

A ~3 μm pentlandite grain observed in Stardust track 59 and derived from comet Wild 2 was disaggregated and thermally modified (partially) to monosulfide solid-solution (MSS) and heazlewoodite from heating during capture in silica aerogel.

Price M. C. Kearsley A. T. Burchell M. J. Hörz F. Cole M. J.

[Comet 81P/Wild 2: The Updated Stardust Coma Dust Fluence Measurement for Smaller \(Sub 10-Micrometre\) Particles](#) [#1564]

Presented is an updated coma dust fluence measurement for comet 81P/Wild 2 for sub-10 micron particles based upon new experimental data. We show this brings the cumulative particle size distribution closer to that measured by the DFMI.

Ishii H. A. Joswiak D. Bradley J. P. Teslich N. Matzel J. Hutcheon I. D. Brownlee D. Matrajt G. MacPherson G. McKeegan K. D.

[Enabling Al-Mg Isotopic Measurements on Comet Wild 2's Micro-CAIs](#) [#2288]

In order to enable Al-Mg isotopic measurements otherwise not possible on the micro-CAIs returned by Stardust from comet 81P/Wild 2, we combined TEM mineral mapping and precise and selective removal of interfering minerals by focused ion beam milling.

Leroux H. Jacob D. Cordier P.

[Fine-grained Material Trapped in Stardust Track Walls](#) [#1785]

Using TEM we describe micro-tracks in the Stardust aerogel medium. The size and composition of the cometary material present as discrete patches along these micro-tracks suggest that it originates from an ultrafine matrix, CI-like in composition.

Khodja H. Raepsaet C. Burchell M. J. Flynn G. J. Gainsforth Z. Herzog G. F. Keller L. P. Lanzirotti A. Rao W. Sutton S. R. Taylor S. Westphal A.

[Characterization of 81P/Wild 2 Particles C2103,1,98,1,0, C2103,1,98,2,0, and C2065,1,97,1,0](#) [#1746]

Three aerogel-coated Stardust grains have organics and CI-like Cr/, Mn/, Ni/, and Zn/Fe ratios. Some flight aerogel has 5 wt% C. C and N in $30 \times 30 \mu\text{m}$ areas of Alais and Orgueil match CI values to within a factor of two. Coal shot into aerogel left a track but no terminal particle.

Tuesday, March 24, 2009
POSTER SESSION I: HYPERVELOCITY IMPACTS: STARDUST MODELS, LDEF, AND ISPE
6:30 p.m. Town Center Exhibit Area

Dominguez G. Wilkins G.

[*Temperatures and Time Evolution of Hypervelocity Impact Generated Tracks in Aerogel*](#) [#2535]

I present a novel method for calculating the temperatures and dynamics of track in aerogel that are generated by the capture of hypervelocity projectiles.

Anderson W. W. Cherne F. J.

[*Material Models for Aerogel Dust Collectors*](#) [#2549]

A new material model is being developed for shocked aerogel that will significantly improve description of the effects of capture. The model takes into account chemistry and ionization of the silica and also provides estimates of transport properties.

Price M. C. Kearsley A. T. Burchell M. J.

[*Hydrocode Simulations of Aggregate Dust Particle Impacts Onto Stardust Al Foils*](#) [#1617]

3-D measurements of complex craters on Stardust foils allows models of their aggregate impactors to be constructed. Hydrocode modelling is used to validate these models. Its ability to recreate the morphology and formation of such craters is shown.

Stadermann F. J. Floss C. Brownlee D. E. Rodruck M.

[*Revisiting LDEF: High Resolution Elemental and Isotopic Characterization of Hypervelocity Impacts*](#) [#2120]

We have studied impact craters from the Long Duration Exposure Facility (LDEF) satellite which was flown in low Earth orbit for a duration of 69 months from 1984 through 1990.

Westphal A. J. Allen C. Bajt S. Basset R. Bastien R. Bechtel H. Bleuet P. Borg J. Brenker F. Bridges J. Brownlee D. E. Burchell M. Burghammer M. Butterworth A. L. Cloetens P. Cody G. Ferroir T. Floss C. Flynn G. J. Frank D. Gainsforth Z. Grün E. Hoppe P. Kearsley A. Lemelle L. Leroux H. Lettieri R. Marchant W. Mendez B. Nittler L. R. Ogliore R. Postberg F. Sandford S. A. Schmitz S. Silversmit G. Simionovici A. Srama R. Stadermann F. Stephan T. Stroud R. M. Susini J. Sutton S. Tieloff M. Tsou P. Tsuchiyama A. Tyliczszak T. Vekemans B. Vincze L. Warren J. Zolensky M. E.

[*Stardust Interstellar Preliminary Examination \(ISPE\)*](#) [#1786]

The Stardust Interstellar Preliminary Examination (ISPE) is a three-year effort to characterize the Stardust interstellar dust collection and collector using non-destructive techniques. We summarize the status of the ISPE.

Tuesday, March 24, 2009
POSTER SESSION I: PRESOLAR GRAINS
6:30 p.m. Town Center Exhibit Area

Zinner E. Gyngard F.

[*FIB in the NanoSIMS*](#) [#1046]

The O and Mg isotopic analysis of small presolar spinel grains in the NanoSIMS is substantially improved if nearby grains of isotopically normal composition are sputtered away with the finely focused Cs primary ion beam.

Leitner J. Hoppe P. Zipfel J.

[*NanoSIMS Investigation of Presolar Silicates and Oxides in Primitive Solar System Materials*](#) [#1512]

Impact residues in 76 small Stardust craters were investigated, as well as 12500 μm^2 of matrix of the CR chondrite NWA 852, for their O isotopes. All residues are isotopically normal, and 27 presolar silicates and oxides were found in NWA 852.

Tachibana S. Nagahara H. Ozawa K. Tamada S. Ogawa R.

[*Condensation Experiments of Mg-rich Crystalline and Amorphous Silicates in Vacuum*](#) [#2512]

We compare results of two types of kinetic condensation experiments of Mg-silicates; “quench” and “cooling” experiments. Highly non-equilibrium condensates can be obtained in quench-type experiments at very low pressures.

Takigawa A. Tachibana S. Nagahara H. Ozawa K.

[*Condensation Anisotropy of Corundum Around AGB Stars and Its Effect on Infrared Spectra*](#) [#1731]

In order to understand the forming processes of refractory dust, we conducted condensation experiments of corundum at high and low supersaturation and investigated the effects of condensation conditions on the shape of dust and infrared spectra.

Verchovsky A. B. Fisenko A. V. Semjonova L. F. Wright I. P.

[*Preparations and Analysis of a New Set of Grain-size Fractions of Nanodiamonds from Kainsaz*](#) [#1908]

A new set of grain-size fractions of nanodiamonds from Kainsaz have been prepared and analysed. A three populations of nanodiamonds with different carbon isotopic compositions have been identified.

Kashiv Y. Kratz K.-L.

[*The \$\alpha\$ -Process in Supernova Presolar SiC Grains*](#) [#2534]

Preliminary results of the new High Entropy Winf model of nucleosynthesis in SN Type II are presented. It is shown that the Mo isotopic composition measured in SiC X grains could be explained by the primary α -process.

Levine J. Savina M. R. Dauphas N. Davis A. M. Isselhardt B. H. Knight K. B. Lewis R. S.

Pellin M. J. Stephan T.

[*First Four-Isotope Measurements of Chromium in Presolar SiC Grains*](#) [#1982]

We report measured abundances of all four chromium isotopes in presolar SiC grains, obtained by resonance ionization mass spectrometry.

Fujiya W. Sugiura N. Hiyagon H. Takahata N. Sano Y.

[*Ion Probe Analysis of \$^{54}\text{Cr}\$ Isotopic Compositions of an Organic Residue from Murchison CM2 Chondrite*](#) [#1486]

We measured $^{54}\text{Cr}/^{52}\text{Cr}$ ratios of Cr bearing grains contained in an organic residue from Murchison CM2 chondrite using the NanoSIMS 50 to search for carriers of ^{54}Cr isotopic anomalies found in bulk carbonaceous chondrites.

Yokoyama T. Walker R. J. Alexander C. M. O'D. MacPherson G. J.

[*Osmium Isotope Anomalies in Chondrite Components: Refractory Inclusions, Chondrules, Metal and Presolar Grains*](#) [#1489]

We present precise Os isotope data for chondrite components (CAIs, chondrule, metal and IOMs). None of the CAIs, chondrule or metal show Os isotopic anomalies that are resolvable from the solar, while the IOMs possess large nucleosynthetic anomalies.

Jagoutz E. Jagoutz O. E. Ott U.

[A Rb O isotopic Shift Due to Nucleosynthesis \(S-Process\)?](#) [#1815]

We describe experimental procedures for high-precision measurements of Rb isotopes and briefly discuss evidence for a component in meteorites that may be due to enhanced abundance of Rb from the weak s-process.

King A. Henkel T. Chapman S. Rost D. Lyon I.

[First Analysis of Gently Separated Presolar Graphite](#) [#2501]

A gentle separation procedure has been used to isolate presolar graphite grains from the Murchison meteorite. This provides pristine samples with which to study stellar environments. We report the the first TOFSIMS analyses of a gently separated presolar graphite grain.

Davidson J. Busemann H. Alexander C. M. O'D. Nittler L. R. Schrader D. L. Orthous-Daunay F. R. Quirico E. Franchi I. A. Grady M. M.

[Presolar SiC Abundances in Primitive Meteorites by NanoSIMS Raster Ion Imaging of Insoluble Organic Matter](#) [#1853]

We present results obtained with NanoSIMS raster ion imaging to determine the abundance of presolar SiC in the insoluble organic matter (IOM) extracted from a number of different classes of chondrites (both carbonaceous and ordinary).

Gilmour J. D.

[Late Loss of "Planetary" \(Actually Presolar\) P3 Gases from Nanodiamonds](#) [#1603]

The relationship between Xe and Kr in the solar wind and P3 suggests P3 is presolar and includes a contribution from ¹²⁹I that was alive in the early solar system, constraining the timing of trapping of P3.

Hynes K. M. Gyngard F.

[The Presolar Grain Database: http://presolar.wustl.edu/~pgd](http://presolar.wustl.edu/~pgd) [#1198]

We present a website containing a compilation of the available presolar grain isotopic data. The database is available for use by the entire cosmochemistry community and all data is available for download.

Hoppe P. Huth J. Ott U.

[NanoSIMS Studies of Presolar Graphite Grains: Are C-Isotopic Ratios Grain-Size-Dependent?](#) [#1010]

We performed C, N, O, and Si isotope measurements on presolar graphite grains with the NanoSIMS. While micrometer-sized graphite grains have predominantly isotopically light C, most of submicrometer-sized graphite grains have heavy C.

Tuesday, March 24, 2009
POSTER SESSION I: EARLY NEBULAR PROCESSES: MODELS AND ISOTOPES
6:30 p.m. Town Center Exhibit Area

Perret B. Timmes F. X. Desch S. J.

[*Supernova Bullets Impinging Upon Molecular Clouds*](#) [#1999]

We present preliminary results of the contamination of molecular clouds by supernova ejecta in the form of bullets.

Muralidharan K. Stimpfl M. de Leeuw N. H. Deymier P. A. Runge K. Drake M. J.

[*Some - Perhaps Most - Water in the Earth Must Result from Adsorption on to Grains in the Accretion Disk*](#) [#1882]

We show that adsorption of water onto grains in the accretion disk must be a significant source of Earth's water. Using density functional theory we show that HDO may be preferentially retained relative to H₂O in adsorption/desorption kinetics.

Nielsen S. G. Prytulak J. Halliday A. N.

[*Vanadium Isotope Ratios in Meteorites: A New Tool to Investigate Planetary and Nebular Processes*](#) [#1549]

This abstract presents the first method that produces high precision vanadium isotope data for terrestrial rocks and meteorites. Vanadium isotope ratios may be used as a tool to test the X-wind model or as an indicator of planetary core formation.

Birck J. L. Petitat M. Luu T. H. Gounelle M.

[*⁵⁴Cr Anomalies in the Tagish Lake and Orgueil Carbonaceous Chondrites*](#) [#1683]

In this study we extend the survey of meteorites exhibiting Cr anomalies to Tagish Lake. We report the highest ⁵⁴Cr excess so far for the silicate fraction of this meteorite.

Chakrabarti R. Jacobsen S. B.

[*A Combined Silicon and Magnesium Isotopic Study of Bulk Meteorites and the Earth*](#) [#2089]

Si and Mg isotope ratios in bulk chondrites, Earth, Mars and achondrites are identical and suggests that the solar nebula was homogeneous with respect to Si and Mg isotopes.

Shi X. Yin Q.-Z. Ng C.-Y.

[*Testing "Self-Shielding" Model with Laboratory Experiment for the Oxygen Isotope Evolution in the Early Solar Nebula*](#) [#2251]

We point out weaknesses in recent experiments by Chakraborty et al (2008), and propose to use high-resolution VUV laser for photodissociation and photoionization of CO to directly test the self-shielding model under relevant temperature condition.

Barr A. C. Canup R. M.

[*Constraints on an Outer Solar System Late Heavy Bombardment from Callisto's Interior State*](#) [#1309]

A recent theory for the origin of late heavy bombardment impactors suggests an outer solar system source. Limits on the size of rocky core in Jupiter's moon Callisto are used to constrain the contribution of outer solar system impactors to the LHB.

Cuzzi J. N. Hogan R. C. Bottke W.

[*Primary Accretion: The Birth Population in the Asteroid and KBO Regions*](#) [#2418]

We explore the implications of a new theory of primary accretion, in which chondrule-sized objects are transformed directly into 10–100km size bodies in nebula turbulence, for the "birth function" of primitive bodies in the asteroid and Kuiper Belt regions.

Futó P. Gucsik A.

[*Compaction and Sticking of Planetesimals due to Porosity*](#) [#1008]

It was estimated using numerical methods that numbers, sizes and masses of planetesimals are ranging from 1016–1020 kg in the boundary of the early inner solar system.

Ipatov S. I.

[*Formation of Binaries at a Stage of Rarefied Preplanetesimals*](#) [#1021]

The angular momentum of two identical collided rarefied preplanetesimals exceeded the angular momentum of the corresponding present binary that could be formed as a result of contraction of the rotating preplanetesimal originated at the collision.

Ciesla F. J. Collins G. S. Davison T. M.

[*The Thermal Evolution of Post-Impact Planetesimals*](#) [#1086]

We investigate the thermal evolution of energy that is deposited after the collision of two porous planetesimals. Regions of planetesimals can be shock heated to temperatures >1000 K, with the subsequent cooling lasting hundreds of thousands of years.

Korycansky D. G.

[*Modeling Rubble-Pile Impacts: Spheres vs. Polyhedra*](#) [#1124]

Rubble-pile collisions: spherical elements vs. polyhedra: does it make a difference?

Korycansky D. G. Asphaug E.

[*Some Further Results from Rubble-Pile Impact Calculations*](#) [#1320]

We present results on energy scaling and axis ratios of fragments from impact simulations of rubble-pile planetesimals.

Holland G. Ballentine C. J. Cassidy M.

[*Primordial Krypton in the Terrestrial Mantle is Not Solar*](#) [#1824]

Analysis of Kr isotopes in terrestrial well gas samples indicate the Earth's mantle contains a primitive component identical to the average value for carbonaceous chondrites, distinctly different from solar.

Tang H. Dauphas N. Craddock P. R.

[*High Precision Iron Isotopic Analyses of Meteorites and Terrestrial Rocks: ⁶⁰Fe Distribution and Mass Fractionation Laws*](#) [#1903]

We present a new method for high precision Fe isotope analysis of bulk meteorites and terrestrial rocks to examine the ⁶⁰Fe distribution in the protoplanetary disk and assess Fe mass fractionation laws among geo- and cosmochemical processes.

Burkhardt C. Kleine T. Oberli F. Bourdon B.

[*Search for Mass-independent Molybdenum Isotope Anomalies in Iron Meteorites*](#) [#2482]

We present improved analytical techniques for the precise measurement of Mo isotope compositions of meteorites. Our first results for magmatic iron meteorites do not show any resolvable mass-independent Mo isotope anomalies. Further analyses are in progress.

Sanders I. S.

[*CAIs Made by Giant Impact*](#) [#2275]

Since CAIs in metal-rich chondrites may have formed in an impact plume, a case is made for CAIs in CV chondrites originating in a very early impact between planetary embryos.

Tuesday, March 24, 2009
POSTER SESSION I: SOLAR WIND AND GENESIS:
MEASUREMENTS AND INTERPRETATION
6:30 p.m. Town Center Exhibit Area

Yamada A. Nanbu S. Hiraki Y. Seta T. Kasai Y. Ozima M.

[*Mass Independent Isotopic Fractionation of Oxygen in Earth Wind \(EW\) with Relevance to Exotic Oxygen in Lunar Metals*](#) [#1478]

To test suggestion by Ozima et al. (2008), we calculate photodissociation cross sections of O₂ for isotopomers using quantum chemistry method and estimate isotopic ratios at the altitude of 300–400 km.

McKeegan K. D. Kallio A. P. Heber V. Jarzebinski G. Mao P. H. Coath C. D. Kunihiro T. Wiens R. Allton J. Burnett D. S.

[*Oxygen Isotopes in a Genesis Concentrator Sample*](#) [#2494]

Oxygen isotopic compositions of solar wind collected by the Genesis concentrator sample are reported.

Heber V. S. Wiens R. C. Jurewicz A. J. G. Baur H. Vogel N. Wieler R. Burnett D. S.

[*Isotope Fractionation of Solar Wind Implanted into the Genesis Concentrator Target Determined by Neon in the Gold Cross and Implantation Experiments*](#) [#1485]

All four arms of the concentrator gold cross were analyzed for Ne, proving that the entire concentrator target was radially homogeneously irradiated. An implantation experiment showed, however, that backscatter loss of Ne from AuSS is not controllable.

Mabry J. C. Meshik A. P. Hohenberg C. M. Burnett D. S.

[*Real-Time Diffusive Losses of Light Noble Gases from Genesis Aluminum Collectors*](#) [#1783]

Genesis collector pieces were baked for an extended time in order to quantify the effect that diffusive losses of light noble gases from the Genesis collector materials have on the measured isotopic and elemental ratios.

Cetina C. Dr. Grabowski K. S. Dr. Knies D. L.

[*SIMS-AMS Method for Measuring Solar Wind Silicon in DLC Genesis Collectors*](#) [#2550]

We are illustrating the use of the NRL facility to determine the amount of solar wind silicon retained in DLC collectors. We are encouraging the Genesis science community to consider this method as an alternate solution in other cases.

Humayun M. Huang S.

[*Low-Level Magnesium Isotopic Analysis for the Genesis Mission*](#) [#1272]

A method for multicollector ICP-MS analysis of Mg isotopic composition on 1E12 atoms of Mg with 1‰ precision is presented, together with initial results.

Rodriguez M. C. Calaway M. C. Allton J. H. McNamara K. M. Hittle J. D.

[*Status of Reconstruction of Fragmented Diamond-on-Silicon Collector from Genesis Spacecraft Solar Wind Concentrator*](#) [#1337]

The Genesis concentrator was comprised of four quadrants: two of SiC, one of ¹³C diamond and one of DLC on silicon (this target did not survive the hard landing). This is a report on identifying the DLC pieces and finding their initial orientation.

Burkett P. J. Rodriguez M. C. Calaway M. C. Allton J. H.

[*Genesis Solar Wind Array Collector Cataloging Status*](#) [#1373]

A focused characterization task was initiated in May 2008 to document the largest array fragments in the Genesis solar wind collection. To date, the collection consists of 3460 samples. By area, total percentage of cataloged array material is 18%.

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

[*Decontaminating Solar Wind Samples with the Genesis Ultra-Pure Water Megasonic Wafer Spin Cleaner*](#) [#1183]

The cleaning efficiency of the Genesis Ultra-pure Water Megasonic Wafer Spin Cleaner will be presented. Results show the effectiveness of the new cleaner removing particle contamination from Genesis silicon wafers implanted with solar wind.

Tuesday, March 24, 2009
POSTER SESSION I: EDUCATION AND PUBLIC OUTREACH
6:30 p.m. Town Center Exhibit Area

Hsu B. C. Weir H. M. Bleacher L. V.

[Using Web 2.0 to Disseminate Information About NASA's Lunar Reconnaissance Orbiter](#) [#2280]

The Lunar Reconnaissance Orbiter (LRO) is NASA's first step in establishing a permanent human presence on the Moon. In order to capitalize on the excitement of the mission, the LRO team makes use of social media networking and Web 2.0 platforms.

Davidson J. Bartlett S. Carter A. Cornwall M. A. Dryer B. J. Fernandes C. D. Harrison S. K. Janmohamed I. H. S. Mason J. P. Masteika V. Morris A. K. R. Otter S. Tomkinson T. Wilkinson P. T.

[The European Student Moon Orbiter and its Biological Lunar Experiment: A Unique Outreach Mission to the Moon](#) [#2182]

The ESMO mission provides an ideal opportunity to increase public awareness of lunar missions and to train the current generation of space/planetary science students whilst also conducting novel science via the BioLEx scientific payload.

Terazono J. Tanaka S. Sakamoto S. Watanabe J. Wakabayashi N.

[Ten Years in Lunar and Planetary Exploration Outreach: "The Moon Station" Challenge](#) [#1231]

This presentation summarizes the website for public outreach on Japanese lunar and planetary exploration. We will address the status, lessons and future prospects based on our ten years' web operation.

Runyon C. Shipp S. Tuthill G. Garver K.

[What's New with the Moon Mineralogy Mapper/Chandrayaan-1 E/PO Program?](#) [#1725]

The Moon Mineralogy Mapper (M3) team is actively engaged in E/PO activities that provide educators with exposure to lunar geology and experience with spectroscopy as a means of exploring and understanding the composition of the lunar surface.

Bérczi Sz. Gucsik A. Hargitai H. Józsa S. Kereszturi A. Nagy Sz. Szakmány J.

[Concise Atlas of the Solar System \(11\): Petrographic Textures and Evolutionary Processes from the Chondritic Parent Bodies, Moon and Mars](#) [#1718]

The 11th atlas of the Solar System helps students in a systematic approach to petrographic textures of planetary materials of processes on asteroids, Moon and Mars, arranged in their igneous units of their geological settings in the parent body.

Boros-Olah M. Hargitai H. Hirsch T. Kereszuti A. Muhi A. Tepliczky I.

[HungaroMars2008: Analog Research in the Education of Planetary Science](#) [#1492]

Between 13–26 of April 2008 a Hungarian crew worked at Mars Desert Research Station. The planetary science related educational aspects are summarized from the meteorological station, Husar-2D autonomous rover, geologic and geomorphologic analysis.

Gulick V. C. Deardorff G. Davatzes A. E. K. Kanefsky B.

[Education and Public Outreach With the Mars Reconnaissance Orbiter's High-Resolution Imaging Science Experiment: A Virtual Science Team Experience](#) [#2354]

Looking back over one Mars year, we report on the accomplishments of the HiRISE EPO program during the primary science phase of MRO.

Grigsby B. Capages C. Christensen P. R. Murchie S. Turney D. Beisser K. Seelos F. Seelos K. Harvel C. Barnouin-Jha O. Patterson W. McGovern A. Buczkowski D. Malaret E. Hash C. Ehlmann B. Roach L.

[*Involving Students in Authentic Research: First Year Results from the Mars Exploration Student Data Teams Project*](#) [#2185]

The Mars Exploration Student Data Teams (MESDT) program, created by Arizona State University's Mars Education Program, focuses on immersing teams of high school students in an authentic research Science, Technology, Engineering and Mathematics (STEM) based experience.

Bitter C. Buxner S. R.

[*Martian Multimedia: The Agony and Ecstasy of Communicating Real-Time, Authentic Science During the Phoenix Mars Mission*](#) [#2172]

The Phoenix Mars Mission faced robust communication challenges requiring real-time solutions. Managing the message from Mars and ensuring the highest quality of science data and news releases were our top priorities during mission surface operations.

Hines R. Stopar J. Taylor W. Minitti M. E. Wadhwa M.

[*Enhancing and Expanding Educational Outreach Programs at the Center for Meteorite Studies, Arizona State University*](#) [#1875]

New outreach and education programs are being developed at ASU's Center for Meteorite Studies, in conjunction with an improved and expanded web presence, to impact a broader local and international audience of students, educators, scientists and interested individuals.

Kolb K. J. Keller J. M. Novodvorsky I.

[*Investigating Alternative Conceptions about Water on Mars Held by Middle School Science Teachers*](#) [#2143]

We report on alternative conceptions about water on Mars that are held by middle school science teachers in AZ and CA.

Urquhart M. L.

[*Designing Standards-driven Space Science Educational Outreach for Formal Education*](#) [#2408]

Space science is an exciting topic for many students, but research is rarely on the specific topics typically found in K-12 standards. This paper discusses the importance of standards-based approaches to outreach intended for formal education.

Bleamaster L. F. III Crown D. A. Canizo T. L. Lebofsky L. A.

[*Planets are Places Too: Professional Development Workshops for K-8 Teachers*](#) [#1695]

The Planetary Science Institute, in partnership with the Tucson Regional Science Center, is offering a series of professional development workshops targeting elementary and middle school teachers within the Tucson, Arizona region.

Kadel S. D. Williams D. A.

[*Carrying the Fire: Classroom and Field-based Teacher Training Using a Newly Institutionalized E/PO Product*](#) [#2448]

The Worlds of Fire E/PO is institutionalized as a college course, GLG231AA Special Topics in Geology: Volcanoes of Northern Arizona, providing a classroom overview of volcanism on Earth and Io and a field excursion to volcanoes around Flagstaff, AZ.

Hegyí S. Göcze Z. Hegyí A. Kovács P. Baksa L. Bérczi Sz.

[*Field Trip Tasks and Simulations with Husar-2 Rover at the Mars Analog Desert Station, Utah, USA*](#) [#1163]

Husar-2d rover was used by Hungarian Crew No. 71 at MDRS, Utah, USA, 2008 April in surface activities in their high relief movements with high car-chassis, material collecting plate, geological, geographical, chemical measurements.

Boice D. C. Asbell H. E. Reiff P. H.

[*Engaging Students in Research — Young Engineers and Scientists \(YES\)*](#) [#1507]

Young Engineers and Scientists (YES) is a community partnership between SwRI and local high schools in San Antonio, Texas. It provides high school students a bridge between classroom instruction and real world, research experiences in science and engineering.

McCoy T. J. Baldwin D. W. Olm W. Ironstrack G. M. Yingst R. A. Doudrick S. R.

[*Myaamiaŋki: Ašiihkiwi Neehi Kiišikwi \(The Place of the Miami: Earth and Sky\)*](#) [#1283]

We report on a workshop and summer camp held within the Miami Tribe of Oklahoma to examine the overlap between science (planetary science, geology, and astronomy) and traditional ways of knowing derived from myaamia culture, including lessons learned.

Toyota T. Kasahara S. Narita N. Hirasawa T. Watanabe M. Kodera C. Homma N.

Kaburagi Y. Yokoyama H.

[*Interdisciplinary Collaboration for Outreach by Young Scientists in a Japanese University*](#) [#1606]

In this paper, we introduce our activities for inter-disciplinary communication of young scientists in a Japanese university. We also report an educational activity of the astrobiology class at an elementary school in Japan.

Wednesday, March 25, 2009
ANCIENT MARTIAN CRUST: PRIMARY MINERALOGY AND AQUEOUS ALTERATION
8:30 a.m. Waterway Ballroom 1

Chairs: Joseph Michalski
Janice Bishop

- 8:30 a.m. Mustard J. F. * Murchie S. L. Ehlmann B. L. Milliken R. E. Bibring J.-P. Poulet F. Head J. W.
[*Stratigraphy of Noachian-aged Crust in the Nili Fossae-Syrtis-Isidis Region*](#) [#2115]
A section of well-exposed Noachian crust exists surrounding the Isidis Basin. Over thousands of km it is largely a breccia consisting of blocks of sedimentary and primary igneous rocks in a phyllosilicate-bearing matrix, and capped by impact melt.
- 8:45 a.m. Skok J. R. * Mustard J. F. Murchie S. L.
[*Identification of Primary Noachian Crustal Blocks on Mars with CRISM Observations*](#) [#2180]
The early Noachian crust of Mars has been obscured by impacts, alteration, and resurfacing, resulting in the earliest crust exposed as breccia blocks across the planet. We use spectral observations to constrain the mineralogy of these crustal blocks.
- 9:00 a.m. Tosca N. J. * Knoll A. H.
[*Juvenile Chemical Sediments and the Duration of Aqueous Activity on Ancient Mars*](#) [#1538]
A general lack of diagenetic maturation among martian chemical sediments suggests that liquid water could not have persisted at these localities much beyond initial precipitation.
- 9:15 a.m. Chevrier V. F. *
[*Early Martian Surface Conditions from Thermodynamics of Phyllosilicates*](#) [#2515]
Thermodynamic equilibria are used to determine the geochemical conditions during the Noachian era. Results show that CO₂ pressure and temperature can explain observations of various phyllosilicates and carbonates.
- 9:30 a.m. Velbel M. A. *
[*Mechanisms of Pyroxene Alteration to Smectite: Implications for Inferring Elemental Mobility in Martian Paleoenvironments*](#) [#1415]
Pyroxene and smectite compositions are an observational basis for inferring former chemical conditions that facilitated differential elemental mobility in systems in which the water that mediated the weathering reactions is no longer present.
- 9:45 a.m. Carter J. * Poulet F. Bibring J.-P. Murchie S. Langevin Y. Mustard J. F. Gondet B. Seelos F.
[*Phyllosilicates and Other Hydrated Minerals on Mars: 2. Detailed Analysis*](#) [#2058]
This abstract focus on the spectral diversity and the geological setting of phyllosilicate-bearing deposits detected on Mars.
- 10:00 a.m. Michalski J. R. * Poulet F. Bibring J.-P. Mangold N.
[*Combined Visible/Near Infrared and Thermal Infrared Analyses of the Nili Fossae Region, Mars*](#) [#1365]
We present evidence for two main classes of phyllosilicate minerals in the Nili Fossae region of Mars based on the combined use of TES and OMEGA data. Both dioctahedral Fe³⁺ and trioctahedral Fe/Mg²⁺ clay minerals exist together.

- 10:15 a.m. Bishop J. L. * McKeown N. K. DesMarais D. J. Noe Dobrea E. Z. Parente M. Seelos F. Murchie S. L. Mustard J. F.
[*The Ancient Phyllosilicates at Mawrth Vallis and What They Can Tell Us About Possible Habitable Environments on Early Mars*](#) [#2239]
Phyllosilicates observed at Mawrth Vallis indicate a wide range of past aqueous activity. The phyllosilicate stratigraphy, possible formation scenarios, and possible links to prebiotic chemistry and biosignatures are presented.
- 10:30 a.m. Ruff S. W. * Hamilton V. E.
[*New Insights into the Nature of Mineralogical Alteration on Mars from Orbiter, Rover, and Laboratory Data*](#) [#2160]
TES spectra now appear to support the identification in some places of phyllosilicates observed by OMEGA/CRISM. Enigmatically, spectra from Mini-TES in Gusev crater show no such phases on rocks that clearly are altered. Amorphous phases are implicated.
- 10:45 a.m. Gavin P. * Chevrier V.
[*Thermal Alteration of Nontronite and Montmorillonite: Implications for the Martian Surface*](#) [#1027]
We investigate the spectral properties of thermally altered nontronite and montmorillonite and compare them to those of clays detected in impact crater ejecta on Mars.
- 11:00 a.m. Dyar M. D. * Murad E. Sklute E. C. Bishop J. L. Muirhead A. C.
[*Mössbauer and Reflectance Spectroscopy of Iron Oxide Mixtures*](#) [#2209]
Mössbauer spectroscopy is used to identify and quantify abundances of iron oxide and hydroxide minerals in mixtures that are analogs for martian rocks and soils.
- 11:15 a.m. Ehlmann B. L. * Mustard J. F. Murchie S. L.
[*Detection of Serpentine on Mars by MRO-CRISM and Possible Relationship with Olivine and Magnesium Carbonate in Nili Fossae*](#) [#1787]
Reports the first orbital detection of serpentine on Mars' surface, made by CRISM in the Thaumasia and Nili Fossae regions. Evidence for serpentinization of an olivine-magnesium carbonate-serpentine bearing rock unit in Nili Fossae is discussed.
- 11:30 a.m. Glotch T. D. * Rogers A. D.
[*Reexamination of Global Carbonate Abundances Using TES Data*](#) [#1605]
In this study, we reexamine global carbonate abundances in the TES data set. Results of the study generally support previous work indicating that carbonates are not widely present on Mars at the outcrop scale.

Wednesday, March 25, 2009
SPECIAL SESSION: MESSENGER AT MERCURY:
A GLOBAL PERSPECTIVE ON THE INNERMOST PLANET
8:30 a.m. Waterway Ballroom 4

Chairs: Sean C. Solomon
Brett Denevi

- 8:30 a.m. Solomon S. C. * Freed A. M. Hauck S. A. II Head J. W. III Kerber L. Phillips R. J. Robinson M. S. Watters T. R. Zuber M. T.
[MESSENGER's Newly Global Perspective on Mercury: Some Implications for Interior Evolution](#) [#1750]
MESSENGER's first two flybys of Mercury have revealed a planet with a richer history of magmatism, deformation, and impact basin modification than heretofore appreciated, placing new constraints on the planet's formation and interior evolution.
- 8:45 a.m. Purucker M. E. * Johnson C. L. Anderson B. J. Korth H. Uno H. Blewett D. T. Sabaka T. J. Solomon S. C. Head J. W.
[Mercury's Internal Magnetic Field from MESSENGER](#) [#1277]
The internal magnetic field at Mercury is overwhelmingly of core origin, although small-scale fields of crustal origin may yet be shown to exist. None of the craters profiled during the MESSENGER flybys exhibit any magnetic signature.
- 9:00 a.m. Zurbuchen T. H. * Raines J. M. Gloeckler G. Slavin J. A. Krimigis S. M. Killen R. M. Sprague A. L. McNutt R. L. Jr. Solomon S. C.
[First Ion Plasma Measurements in the Mercury Magnetosphere](#) [#2141]
This paper discusses results from the two 2008 MESSENGER flybys. It addresses the relative importance of surface sputtering, chemical sputtering and micrometeoroid impact for the creation of Mercury's ionized exosphere.
- 9:15 a.m. Vervack R. J. Jr.* McClintock W. E. Bradley E. T. Killen R. M. Sprague A. L. Mouawad N. Izenberg N. R. Kochte M. C. Lankton M. R.
[MESSENGER Observations of Mercury's Exosphere: Discoveries and Surprises from the First Two Flybys](#) [#2220]
The MESSENGER flybys have provided excellent opportunities to probe the tenuous exosphere of Mercury, have led to the discovery of magnesium, and have revealed unexpected and puzzling structure in the spatial distributions of several species.
- 9:30 a.m. Lawrence D. J. * Feldman W. C. Goldsten J. O. Solomon S. C.
[Identification of Neutron Absorbing Elements on Mercury's Surface Using MESSENGER Neutron Data](#) [#1761]
Thermal neutrons provide a sensitive measure of elements such as Fe, Ti, Gd, and Sm. We present MESSENGER Neutron Spectrometer data along with an initial modeling analysis; implications for the abundance of neutron absorbing elements are described.
- 9:45 a.m. Izenberg N. R. * McClintock W. E. Holsclaw G. M. Blewett D. T. Helbert J. Solomon S. C. MESSENGER Team
[Resolved Ultraviolet to Infrared Reflectance Spectroscopy of Mercury from the Second MESSENGER Flyby](#) [#1663]
MESSENGER's MASCS instrument obtained resolved reflectance spectra from the ultraviolet to near-infrared (115–1450 nm) during the second Mercury flyby, sampling a variety of geologic terranes and units.

- 10:00 a.m. Denevi B. W. * Robinson M. S. Blewett D. T. Domingue D. L. Head J. W. III McCoy T. J. McNutt R. L. Jr. Murchie S. L. Solomon S. C.
[MESSENGER Global Color Observations: Implications for the Composition and Evolution of Mercury's Crust](#) [#2247]
 A near-global view of Mercury from MESSENGER provides the first opportunity to perform a planet-wide assessment of Mercury's major geologic units and their significance.
- 10:15 a.m. Ernst C. M. * Murchie S. L. Barnouin-Jha O. S. Robinson M. S. Denevi B. W.
[Exposure of Red Material by Impact Craters on Mercury: Implications for Buried Plains Material](#) [#1900]
 Occurrences of the red unit associated with impact craters on Mercury are examined using MESSENGER data to determine their extent, burial depth, and origin. The examination of one small area on Mercury reveals a complex local stratigraphy.
- 10:30 a.m. Blewett D. T. * Kerber L. Head J. W. Denevi B. W. Robinson M. S. Murchie S. L. Gillis-Davis J. J. Solomon S. C.
[Mercury Pyroclastics: Color, Morphology, and Volatile Content](#) [#1793]
 We examine potential pyroclastic deposits with Mariner 10 and MESSENGER images. The best candidates have high reflectance and red spectral slope. Eruption physics calculations place constraints on magma volatile content, and suggest 1000s of ppm CO.
- 10:45 a.m. Zuber M. T. * Farmer G. T. Hauck S. A. II Ritzer J. A. Phillips R. J. Solomon S. C. Smith D. E. Head J. W. III Neumann G. A. Robinson M. S. Watters T. R. Johnson C. L. Oberst J. Barnouin-Jha O. McNutt R. L. Jr.
[Observations of Ridges and Lobate Scarps on Mercury from Messenger Altimetry and Imaging and Implications for Lithospheric Strain Accommodation](#) [#1813]
 Ridges and scarps profiled by the Mercury Laser Altimeter on MESSENGER display offsets that significantly exceed those of martian wrinkle ridges. The structures can be used to constrain the early lithospheric structure and thermal state of Mercury.
- 11:00 a.m. Smith D. E. * Zuber M. T. Phillips R. J. Solomon S. C. Lemoine F. G. Neumann G. A. Head J. W. III Torrence M. H.
[Does Mercury Have Lunar-like Mascons?](#) [#1802]
 In 2008 MESSENGER conducted two flybys of Mercury and experienced greater perturbation than expected. We investigated the possibility of gravity anomalies associated with surface features being the cause.
- 11:15 a.m. Prockter L. M. * Watters T. R. Chapman C. R. Denevi B. W. Head J. W. III Solomon S. C. Murchie S. L. Barnouin-Jha O. S. Robinson M. S. Blewett D. T. Gillis-Davis J.
[The Curious Case of Raditladi Basin](#) [#1758]
 Raditladi Basin was imaged by MESSENGER during its flyby of Mercury. The basin appears to be very young – perhaps less than 1 Ga – and exhibits unusual extensional troughs. The presence of the troughs is at odds with Raditladi's apparent youth.
- 11:30 a.m. Head J. W. III* Solomon S. C. McNutt R. L. Jr. Blewett D. T. Chapman C. R. Domingue D. L. Gillis-Davis J. J. Hawkins S. E. III Helbert J. Holsclaw G. M. Izenberg N. R. McClintock W. E. Merline W. J. Murchie S. L. Phillips R. J. Prockter L. M. Robinson M. S. Denevi B. W. Sprague A. L. Strom R. G. Vilas F. Watters T. R. Zuber M. T.
[The MESSENGER Mission to Mercury: New Insights into Geological Processes and Evolution from the First Two Encounters](#) [#2198]
 The first two Mercury MESSENGER mission encounters imaged much of the surface unseen by Mariner 10, establishing the widespread nature of volcanism, the presence of pyroclastic deposits, and the volcanic filling of impact craters and basins.

Wednesday, March 25, 2009
CAIs AND CHONDRULES: RECORDS OF EARLY SOLAR SYSTEM PROCESSES
8:30 a.m. Waterway Ballroom 5

Chairs: Kim B. Knight
Harold C. Connolly Jr.

- 8:30 a.m. Simon S. B. * Sutton S. R. Grossman L.
[First Ti-XANES Analyses of Refractory Inclusions from Murchison](#) [#1626]
Ti valence in refractory phases is an important recorder of redox conditions in the early solar nebula. We report the valence of Ti in pyroxene, spinel and hibonite in spinel-hibonite and spinel-pyroxene inclusions and in a coarse hibonite grain.
- 8:45 a.m. Ma C. * Beckett J. R. Rossman G. R.
[Allendeite and Hexamolybdenum: Two New Ultra-Refractory Minerals in Allende and Two Missing Links](#) [#1402]
We report here two newly discovered ultra-refractory minerals from Allende: Allendeite, $\text{Sc}_4\text{Zr}_3\text{O}_{12}$, a new Sc- and Zr-rich oxide; and hexamolybdenum, (Mo,Ru,Fe), a Mo-dominant alloy.
- 9:00 a.m. Knight K. B. * Kita N. T. Davis A. M. Richter F. M. Mendybaev R. A.
[Mg and Si Isotope Fractionation Within Three Type B Ca-Al-rich Inclusions](#) [#2360]
Isotopic profiles of Mg and Si in melilite were measured within three Type B Ca-Al-rich inclusions from the CV3 chondrites Allende (USNM-3529.16 and AL-4884) and Leoville (USNM-3535.1) by secondary ion mass spectrometry.
- 9:15 a.m. Mendybaev R. A. * Richter F. M. Georg R. B. Davis A. M.
[Evaporation Kinetics of Forsterite-rich Melts and Thermal Histories of FUN CAIs](#) [#2461]
We present the results of our experiments on evaporation kinetics of forsterite-rich melts in vacuum. The results are used to place constraints on the thermal history of FUN CAIs.
- 9:30 a.m. Krot A. N. * Nagashima K.
[Isotopically Uniform, \$^{16}\text{O}\$ -Depleted CAIs in Metal-Rich Carbonaceous Chondrites.](#) [#1036]
The metal-rich carbonaceous chondrites (CH, CB, and Isheyevo) contain a population of igneous CAIs, which are isotopically uniform and ^{16}O -depleted [$\Delta^{17}\text{O} \sim -7\%$] compared to CAIs from other chondrite groups ($\Delta^{17}\text{O} \sim -23.5\%$), suggesting a unique origin.
- 9:45 a.m. Petaev M. I. * Jacobsen S. B.
[Nebular History of the Allende FoB CAI SJ101](#) [#1388]
We compare petrologic and chemical characteristics of a unique FoB CAI SJ101 with the results of thermodynamic modeling of condensation of its precursors in a system of solar composition and speculate about nebular formation history of this CAI.
- 10:00 a.m. Richter F. M. * Mendybaev R. A. Christensen J. Gaffney A. Ebel D.
[Elemental and Isotope Fractionation of Chondrule-like Liquids by Evaporation into Vacuum](#) [#2321]
The talk will present new experimental data on the evaporation kinetics of Na and K from a chondrule-like melt, and new isotopic data on the K isotopic fractionation of the evaporation residues.
- 10:15 a.m. Kropf A. Huss G. R. Krot A. N. Pack A. *
[Closed System Behavior of Alkalis in Type-I Chondrules — Understanding Chondrules as Igneous Systems](#) [#2464]
New SIMS and high-current EPMA data on type-I chondrules from Semarkona show that they behaved as chemically closed systems during melting and olivine crystallization.

- 10:30 a.m. Weisberg M. K. * Ebel D. S. Connolly H. C. Jr. Kita N. T. Ushikubo T.
[*Petrologic-Geochemical Study of Chondrules in Enstatite Chondrites*](#) [#1886]
Chondrules in E3 chondrites differ markedly from chondrules in other chondrites. They are records of a highly reducing nebular environment and/or precursor assemblage. Oxygen isotope data is being collected to better constrain their history.
- 10:45 a.m. Ushikubo T. * Kimura M. Kita N. T. Valley J. W.
[*Oxygen Isotopic Compositions of Phenocrysts in Chondrules from the Primitive Carbonaceous Chondrite Acfer 094*](#) [#1383]
We measured O isotopic compositions of 29 chondrules from Acfer 094. We found ¹⁶O-poor relict olivine from 3 chondrules, suggesting that their precursors formed in a ¹⁶O-poor environment and were processed in a relatively ¹⁶O-rich environment.
- 11:00 a.m. Berlin J. * Jones R. H. Brearley A. J.
[*Identification of FeO-rich Relict Olivines in Type IIA Chondrules Using Fe-Mn Systematics*](#) [#2399]
We identified FeO-rich relict olivines in type IIA chondrules from Kainsaz (CO3.2) and Semarkona (LL3.0). Host chondrule olivines show linear trendlines in a Mn vs. Fe diagram, while relict grains plot in different regions of the diagram.
- 11:15 a.m. Nakashima D. * Matsuda S. Iio H. Bajo K. Nagao K.
[*Solar Wind Like Noble Gases in a Chondrule in the NWA 852 CR2 Chondrite*](#) [#1674]
We found through laser extraction noble gas analysis of the NWA 852 CR2 chondrite that a chondrule contains solar wind like noble gases in its interior, suggestive of solar gas acquisition before/during the chondrule formation.
- 11:30 a.m. Hezel D. C. * Armytage R. M. G. Georg R. B. Keren E. Russell S. S.
[*Combined Fe- and Si-Isotope Measurements of CV Chondrite Chondrules and CAIs*](#) [#1772]
Chondrules have variable Fe-isotopic, but similar Si-isotopic compositions. 3D tomography revealed 1–7 vol% sulfide/metal in Allende. We conclude that isotopic and chemical variabilities among chondrules were established during chondrule formation.
- 11:45 a.m. Schrader D. L. * Zega T. J. Lauretta D. S. Connolly H. C. Jr.
[*Microstructure of Sulfide-Assemblages in a Renazzo Type-II Chondrule as Revealed by Transmission Electron Microscopy*](#) [#2181]
We report on a combined focused ion beam scanning electron microscopy and transmission electron microscopy analysis of the microstructure of sulfide-assemblages in a type-II chondrule from Renazzo.

Wednesday, March 25, 2009
SMALL BODIES: SHAPES OF THINGS TO COME
8:30 a.m. Waterway Ballroom 6

Chairs: **Al Conrad**
 Debra Buczkowski

- 8:30 a.m. Conrad A. R. * Merline W. J. Drummond J. D. Carry B. Dumas C. Campbell R. D.
 Goodrich R. W. Chapman C. R. Tamblyn P. M.
 [Recent Results from Imaging Asteroids with Adaptive Optics](#) [#2414]
 We report results from recent high-angular-resolution observations of asteroids using adaptive optics (AO) on large telescopes.
- 8:45 a.m. Marchis F. * Descamps P. Durech J. Emery J. P. Harris A. W. Kaasalainen M. Berthier J.
 [The Cybele Binary Asteroid 121 Hermione Revisited](#) [#1336]
 The combination of adaptive optics, photometric and Spitzer mid-IR observations of the 121 Hermione binary asteroid system allowed us to confirm the bilobated nature of the primary derived a bulk density of 1.4 g/cc implying a rubble-pile interior.
- 9:00 a.m. Schmidt B. E. * Thomas P. C. Bauer J. M. Li J. -Y. Radcliffe S. C. McFadden L. A.
 Mutchler M. J. Parker J. Wm. Rivkin A. S. Russell C. T. Stern S. A.
 [The 3D Figure and Surface of Pallas from HST](#) [#2421]
 We present Pallas in three dimensions and surface maps.
- 9:15 a.m. Besse S. * Groussin O. Jorda L. Lamy P. Gesquiere G. Remy E.
 [3-Dimensional Reconstruction of Asteroid 2867 Steins](#) [#1545]
 The OSIRIS imaging experiment has imaged asteroid Steins. We have combined three methods to retrieve the shape: limbs, Point of Interest and light curves. The mean radius of Steins is 2.7 ± 0.3 km, for a volume of 78 ± 30 km³ and a surface of 98 ± 25 km².
- 9:30 a.m. Burchell M. J. * Leliwa-Kopystynski J.
 [The Large Crater on Asteroid Steins: Is it Abnormally Large?](#) [#1525]
 Comparison of the large crater on asteroid Steins (observed during the recent Rosetta fly by) to large craters on other small rocky bodies, shows that, whilst large, it is not abnormally so and follows an already established trend.
- 9:45 a.m. Heggy E. * Kataria T. Clifford S. M. Lasue J. Kofman W.
 [Dielectric Model of Comet 67P/Churyumov-Gerasimenko in Support of the CONSERT Radar Tomography Experiment On Board Rosetta](#) [#1944]
 We present parametric dielectric model of Comet 67P/Churyumov-Gerasimenko and corresponding radar wave propagation through the comet in Support of the CONSERT Radar Tomography Experiment on Board Rosetta.
- 10:00 a.m. Sánchez P. * Scheeres D. J.
 [Granular Mechanics in Asteroid Regolith: Simulating and Scaling the Brazil Nut Effects](#) [#2228]
 The simulation and scaling of granular mechanics flows in asteroid regolith is studied to interpret observations of asteroid surfaces and topography. We focus on the “Brazil Nut Effect” in gravitational fields of different magnitudes.
- 10:15 a.m. Asphaug E. *
 [Shattered Dirt: Surface Fracture of Granular Asteroids](#) [#1438]
 The fracture grooves prevalent on Eros, Phobos and other small bodies cannot be indicators of a competent rocky bedrock. They are expressions of soil cohesion exceeding the minuscule gravitational overburden in the upper meters.

- 10:30 a.m. Richardson J. E. *
[*The Seismic Effect of Impacts on Asteroid Surface Morphology: Three-Dimensional Modeling Results*](#) [#2144]
We investigate impact-induced seismic effects on cratered asteroid terrain, utilizing a two-stage modeling process: a numerical shake-table to compute regolith motion, which is then applied to a three-dimensional model of cratered terrain evolution.
- 10:45 a.m. Durda D. D. *
[*Constraining Source Crater Regions for Boulder Tracks and Elongated Secondary Craters on Eros*](#) [#2173]
Dynamical models of reaccretion of impact ejecta on asteroids are used to 'back track' the derived landing trajectories of selected boulders on Eros, placing constraints on the source regions for the primary impact craters.
- 11:00 a.m. Buczkowski D. L. * Barnouin-Jha O. S. Wyrick D. Prockter L. M.
[*Further Analyses of the 433Eros Global Lineament Map*](#) [#1187]
While some linear features identified on Eros are clearly formed by impact, others do not obviously follow any model predictions of lineation formation by impact and possibly represent a pre-existing internal structure. New analyses are presented.
- 11:15 a.m. Scheeres D. J. * Jacobson S. A.
[*Fission and Stability of Ellipsoidal Contact Binary Asteroids*](#) [#2040]
The initial relative equilibrium state for contact binary asteroids spun to fission are always unstable. Thus their initial evolutionary phase should be strongly unstable and the application of classical tidal results may not be correct.
- 11:30 a.m. Holsapple K. A. *
[*The Deformation of Asteroids from YORP Spin-Up*](#) [#2053]
YORP spin-up is a candidate for forming binary asteroids. Results of an analytical study of the deformation of a spinning ellipsoidal body with imposed increasing angular momentum are presented, and compared to a numerical N-body study.

Wednesday, March 25, 2009
SULFUR ON MARS: ROCKS, SOILS, AND CYCLING PROCESSES
1:30 p.m. Waterway Ballroom 1

Chairs: **Scott McLennan**
Deanne Rogers

- 1:30 p.m. McLennan S. M. * Grotzinger J. P.
[*Sulfur and the Sulfur Cycle on Mars*](#) [#2152]
Elevated S in martian mantle/crust and absence of plate tectonics results in a S-enriched sedimentary mass. The S-cycle of Mars is analogous to the Earth's C-cycle, with long-term storage in the rock record and shorter-term S-recycling processes.
- 1:45 p.m. Milliken R. E. * Edgett K. S. Swayze G. Clark R. N. Thomson B. J.
Anderson R. Bell J. F. III
[*Clay and Sulfate-bearing Rocks in a Stratigraphic Sequence in Gale Crater*](#) [#1479]
CRISM reflectance spectra of a >5 km thick sequence of strata in Gale Crater reveal the presence of diverse mineralogy, including clay-bearing rocks interbedded with sulfate-bearing rocks. Gale is one of four final MSL candidate landing sites.
- 2:00 p.m. Wiseman S. M. * Arvidson R. E. Morris R. V. Murchie S. L. Seelos F. P.
Andrews-Hanna J. C. CRISM Team
[*Hydrated Sulfate Deposits Detected Within Schiaparelli Crater, Mars*](#) [#1798]
Hydrated sulfate deposits are detected within Schiaparelli crater using CRISM spectral data. The hydrated sulfate deposits occur in association with likely sedimentary outcrop and may be related to hydrated sulfate deposits in Meridiani.
- 2:15 p.m. Niles P. B. * Michalski J.
[*The Origin of the Meridiani Sediments: The Key for Understanding the Formation of Sulfates and Layered Deposits on Mars*](#) [#1972]
The provenance of the Meridiani deposits is best explained by reworking of acid-weathered sublimation residue from a large scale ice/dust deposit. The acid weathering is hypothesized to have occurred inside of the ice powered by solar radiant energy.
- 2:30 p.m. Lichtenberg K. A. * Arvidson R. E. Morris R. V. Murchie S. L. Bishop J. L. Glotch T. D.
Noe Dobrea E. Mustard J. F. Andrews-Hanna J. Roach L. H. CRISM Team
[*Stratigraphy and Relationship of Hydrated Minerals in the Layered Deposits of Aram Chaos, Mars*](#) [#2326]
Hydrated minerals such as hematite and monohydrated, polyhydrated, and Fe-OH sulfates in Aram Chaos, Mars show stratigraphic relationships indicative of their formation history as a depositional unit in an aqueous environment.
- 2:45 p.m. Roach L. H. * Mustard J. F. Murchie S. L. Bishop J. L. Ehlmann B. L. Milliken R. E.
Lichtenberg K. Parente M.
[*Hydrated Mineral Stratigraphy in Ius Chasma, Valles Marineris*](#) [#1834]
Kieserite, a polyhydrated sulfate, hydrated silica, Fe/Mg phyllosilicate, and a hydrated silicate (possibly consistent with an acid-leached phyllosilicate) are found in light-toned units within Ius Chasma, Valles Marineris.
- 3:00 p.m. Flahaut J. * Quantin C. Allemand P.
[*Geology and Mineralogy of the Interior Layered Deposits in Capri/Eos Chasma \(Mars\), Based on CRISM and HiRISE Data*](#) [#1639]
We studied HiRISE and CRISM data over Capri Chasma, a small canyon of Valles Marineris. Layered Deposits in this area show various hydrated minerals signatures, as abundant sulfates, implying a strong past water activity there.

- 3:15 p.m. Rogers A. D. * Reeder R. J. Glotch T. D.
[*Infrared Spectroscopy of Amorphous Sulfate Phases*](#) [#1202]
Stability experiments have indicated that amorphous sulfate phases may be important constituents of martian surface materials. IR spectral properties of X-ray amorphous Mg- and Fe-sulfate phases are described and compared with their crystalline counterparts.
- 3:30 p.m. Freeman J. J. * Wang A. Ling Z. C.
[*Ferric Sulfates on Mars: Mission Observations and Laboratory Investigations*](#) [#2284]
A change was observed in the Pancam spectra of Tyrone salty soils after 190 sols exposure at Gusev. Based on the results of laboratory experiments, we suggest dehydration, amorphization, and phase transition of copiapites to be the potential causes.
- 3:45 p.m. Hausrath E. M. * Golden D. C. Galindo C. Sutter B. Morris R. V. Ming D. W.
[*Column Experiments to Interpret Weathering in the Columbia Hills, Mars*](#) [#2423]
Column dissolution experiments were performed to interpret weathering in the Columbia Hills, Mars. Results suggest that the formation of an amorphous aluminum phosphate and gypsum are likely, and that Si and Ti are relatively immobile.
- 4:00 p.m. Golden D. C. * Ming D. W. Sutter B. Clark B. C. Morris R. V. Boynton W. V.
Hecht M. H. Kounaves S. P.
[*Sulfur Mineralogy at the Mars Phoenix Landing Site*](#) [#2319]
The sulfur mineralogy of the soils at Phoenix lander site was derived using Thermally Evolved Gas Analyzer (TEGA) data in combination with known geochemistry of the martian polar regions. The most likely S mineral phase at the Phoenix site is anhydrite.
- 4:15 p.m. Vaniman D. T. * Bish D. L. Chipera S. J.
[*Bassanite on Mars*](#) [#1654]
There are several ways to desiccate gypsum on Mars and form bassanite but rehydration in presence of ice at cold, dry conditions tends to form only bassanite or gypsum plus bassanite. This product may provide a paleoclimate or paleogeothermal marker.
- 4:30 p.m. Halevy I. * Schrag D. P.
[*Experimental Inhibition of Carbonate Precipitation by Sulfite Minerals*](#) [#1030]
Experiments show that sulfite minerals inhibit carbonate precipitation at pH ~7, consistent with the presence of clays and absence of carbonates on early Mars. Subsequent oxidation of these sulfites yields acid and mixtures of sulfates and Fe-oxides.

Wednesday, March 25, 2009
MERCURY: EVOLUTION AND TECTONICS
1:30 p.m. Waterway Ballroom 4

Chairs: Thomas Watters
Mark Wieczorek

- 1:30 p.m. Robuchon G. * Tobie G. Choblet G. Cadek O. Mocquet A.
[*Thermal Evolution of Mercury: Implication for Despinning and Contraction*](#) [#1866]
Mercury's surface exhibits specific features, lobate scarps, that suggest that Mercury has experienced a change of shape during its history. We perform 3D simulations to evaluate: evolution of the temperature, despinning, shape and stress field.
- 1:45 p.m. Wieczorek M. A. * Le Feuvre M. Rambaux N. Laskar J. Correia A. C. M.
[*Evidence for a Pre-Caloris Synchronous Rotation of Mercury*](#) [#1276]
The distribution of ancient impact basins on Mercury is decidedly non-uniform. Both the magnitude and direction of this asymmetry are consistent with this planet having been in a state of synchronous rotation when the ancient basins formed.
- 2:00 p.m. Watters T. R. * Murchie S. L. Robinson M. S. Head J. W. Chapman C. R. Solomon S. C. Denevi B. W. André S. L. Fassett C. I. MESSENGER Team
[*A Newly Discovered Impact Basin on Mercury Revealed by MESSENGER*](#) [#1817]
Images obtained from the second MESSENGER flyby of Mercury in October 2008 have revealed a large, previously unrecognized impact basin in the southern hemisphere.
- 2:15 p.m. Freed A. M. * Solomon S. C. Watters T. R. Phillips R. J. Zuber M. T.
[*Could Pantheon Fossae be the Result of the Apollodorus Crater-forming Impact within the Caloris Basin, Mercury?*](#) [#1362]
We use finite element models to explore the idea that the Apollodorus crater-forming impact induced the formation of the radially oriented graben of the Pantheon Fossae complex near the center of the Caloris basin, Mercury.
- 2:30 p.m. Klimczak C. * Nahm A. L. Schultz R. A.
[*Evaluation of the Origin Hypotheses of Pantheon Fossae, Mercury*](#) [#1251]
By means of a detailed study of the graben pattern on MESSENGER image PIA10397, a strain analysis along five concentric traverses, and an analysis of the loading of the mercurian lithosphere, different origin hypotheses of the Pantheon Fossae structure are evaluated.
- 2:45 p.m. Rothery D. A. * Massironi M.
[*Beagle Rupes — Evidence for a Basal Decollement of Regional Extent in Mercury's Lithosphere*](#) [#1702]
Beagle Rupes is a thrust bounded by transpressive lateral ramps. To remain in the elastic lithosphere, the dip of the fault must become shallower at depth. This is evidence for thin-skinned tectonics, with out-of-sequence thrusts, on Mercury.

Wednesday, March 25, 2009
VENUS GEOLOGY, VOLCANISM, TECTONICS, AND RESURFACING
3:00 p.m. Waterway Ballroom 4

Chairs: David Senske
Martha Gilmore

- 3:00 p.m. Kreslavsky M. A. * Ivanov M. A. Head J. W.
[*The Geological History of Venus: Constraints from Buffered Crater Densities*](#) [#1096]
We apply buffered crater density technique to a new global geological map of Venus (Ivanov, 2008) and obtain robust constraints on relative timing of resurfacing history. We show that the atmospheric mass in the past was not significantly different.
- 3:15 p.m. Hansen V. L. * López I.
[*Venus Preserves a Rare Record of Early Terrestrial Planet Processes*](#) [#2064]
Geologic relations and thermal modeling indicate that ribbon tessera terrain (rtt) records a unique and ancient era of Venus evolution. A new global geologic map of rtt preserves a rare record of early terrestrial planet evolution processes.
- 3:30 p.m. Basilevsky A. T. * Raitala J. Head J. W.
[*Venus: Estimates of Absolute Time Duration of Corona Activity*](#) [#1827]
In the representative sample of coronae of Venus (55 coronae) we have found six coronae whose activity lasted for several hundred million years. Four of them which, represent the evolution of individual mantle plumes have astrum-like components.
- 3:45 p.m. Senske D. A. * Plaut J. J.
[*Geologic Evidence for a Thick Volcanic Crust in Part of Tellus Tessera, Venus*](#) [#1707]
Geologic mapping is performed to provide insight into the make-up of part of Tellus Tessera and suggests that some of this terrain may be a thick sequence of volcanic deposits.
- 4:00 p.m. Gilmore M. S. *
[*Tellus Regio, Venus: Evidence of Tectonic Assembly of Tessera Terrain and Implications for Exploration*](#) [#2015]
SW Tellus Regio is formed from the collision of distinct tessera units and plains materials.
- 4:15 p.m. White O. L. * Stofan E. R. Guest J. E.
[*A New Survey of Intermediate Volcanoes on Venus*](#) [#1148]
A new catalogue of intermediate volcanoes on Venus broadly incorporates four volcano types: cones, domes, shields and calderas. Frequency, size, altitude, latitudinal distribution and total areal cover statistics are presented for each type.
- 4:30 p.m. Aubele J. C. *
[*Shield Fields and Shield Plains on Venus: Contrasting Volcanic Units Exemplified in Shimti Tessera \(V-11\) and Vellamo Planitia \(V-12\) Quadrangles*](#) [#2396]
Shield fields and shield plains appear to represent different volcanic styles and may represent different temporal associations in Venus geologic history.

Wednesday, March 25, 2009
ASTEROID–METEORITE CONNECTIONS
1:30 p.m. Waterway Ballroom 5

Chairs: Andrew Rivkin
Phil Bland

- 1:30 p.m. Hildebrand A. R. * Milley E. P. Brown P. G. McCausland P. J. A. Edwards W. Beech M. Ling A. Sarty G. Paulson M. D. Maillet L. A. Jones S. F.
[*Characteristics of a Bright Fireball and Meteorite Fall at Buzzard Coulee, Saskatchewan, Canada, November 20, 2008* \[#2505\]](#)
A bright fireball was widely observed across Alberta, Saskatchewan and Manitoba from 17:26:40 to 17:26:45 MST during late twilight on November 20, 2008.
- 1:45 p.m. Bland P. A. * Spurný P. Towner M. C. Bevan A. W. R. Singleton A. T. Chesley S. R. Bottke W. F. Jr. Shrubny L. Borovička J. McClafferty T. Vaughan D. Benedix G. K. Deacon G. Hough R. M.
[*A Euclite Delivered from an Aten-type Orbit: The Last Link in the Chain from 4 Vesta to Earth* \[#1664\]](#)
A likely scenario is that our meteorite is a fragment of a Vestoid, derived from the innermost region of the main belt, delivered from the ν_6 resonance, evolving onto an Aten-type orbit, before entering the atmosphere over south-western Australia.
- 2:00 p.m. Gaffey M. J. *
[*Identifying Asteroidal Ordinary Chondrite Assemblages and Petrographic Types from VNIR Spectra* \[#1412\]](#)
Existing spectral calibrations are sufficient to identify asteroidal ordinary chondrite assemblages from VNIR (~0.7–2.5 μm) spectra, but have limitations due to systematic mineralogical variations between and within the H-, L-, and LL-types.
- 2:15 p.m. Beck A. W. * McSween H. Y. Jr.
[*Interpretation of the Origin of Olivine in Diogenite Breccias* \[#1127\]](#)
This study proposes that the presence of olivine in diogenites is caused by the brecciation and incorporation of harzburgite fragments. This is based on textural observation and chemical analyses of olivine and two distinct orthopyroxene phases in ten diogenite breccias.
- 2:30 p.m. Lim L. F. * Emery J. P. Moskovitz N. A.
[*Diogenite-like Features in the Spitzer IRS \(5–35 \$\mu\text{m}\$ \) Spectrum of 956 Elisa* \[#2204\]](#)
We report preliminary results from the Spitzer IRS (Infrared Spectrograph) observations of the V-type asteroid 956 Elisa. Several features of this spectrum suggest the presence of diogenitic material at a relatively coarse particle size.
- 2:45 p.m. Delaney J. S. *
[*The Surface of 4 Vesta: A Petrologist's View* \[#1600\]](#)
Vesta has provinces with distinct spectral characteristics. The regolith is best represented by howardites. The howardite meteorites provide the optimum sample suite for constraining the Dawn spectral data.
- 3:00 p.m. McFadden L. A. * Ammonito E. Cloutis E. A. Coradini A. deSanctis M. C. Fulchignoni M. Hadamcik E. Hiroi T. Kolokolova L. Lvasseur-Regourd A. C. Psarev V. Renard J. -B.
[*Coordinated Laboratory Studies of Meteorites Supporting Rosetta Mission's Asteroid Flyby Target: 2867 Steins* \[#2287\]](#)
Aubrite ALH7 8113,82 is studied to support Rosetta flyby of Steins, an E-type asteroid. Two questions are, what is the spectrally active material in Steins at 500 nm? Is Steins a fragment from an aubrite?

- 3:15 p.m. Bottke W. F. * Nesvorný D. Vokrouhlický D. Morbidelli A.
[*The Gefion Family as the Probable Source of the L Chondrite Meteorites*](#) [#1445]
 Fragments from the Gefion asteroid family-forming event 470 My ago are the probable source of the tiny fossil L-chondrite meteorites found in an marine limestone quarry in Sweden as well as the larger L-chondrites reaching Earth today.
- 3:30 p.m. Rivkin A. S. * Thomas C. A. Trilling D. E. Enga M. T. Grier J. A.
[*Small Koronis-Family Objects as a Probe of Space Weathering: Broadband Spectrophotometry from Magellan and Kitt Peak*](#) [#1774]
 Broadband spectrophotometry of 1–5 km Koronis family objects shows them spanning the range from S-class to Q-class colors. This is consistent with space weathering rather than composition as the cause for similar findings in the NEO population.
- 3:45 p.m. Roth A. S. G. * Baur H. Heber V. S. Reusser E. Wieler R.
[*Cosmic-Ray-produced Helium and Neon in Chondrules in Allende and Murchison*](#) [#1838]
 Most chondrules in Allende and Murchison show nearly identical cosmic ray exposure ages. Six chondrules in Murchison show large cosmogenic gas excesses, most likely acquired during tens of Ma of exposure in a parent body regolith.
- 4:00 p.m. Fieber-Beyer S. K. * Gaffey M. J. Hardersen P. S.
[*Near-Infrared Spectroscopy of 3:1 Kirkwood Gap Asteroids 1379 Lomonosawa and 974 Lioba: Plausible Parent Bodies of L- and LL-Chondrites*](#) [#1115]
 We present a mineralogical assessment of 3:1 Kirkwood Gap asteroids, 1379 Lomonosawa and 974 Lioba, using data obtained May 19 and 20, 2008 UT using the NASA Infrared Telescope Facility.
- 4:15 p.m. Sunshine J. M. * Day J. M. D. Ash R. D. McCoy T. J. Bus S. J. Klima R. L. Hiroi T.
[*Searching for the Evolved Crust of Oxidized Asteroids*](#) [#1965]
 The spectral properties of the unique GRA 06128/9 meteorites are examined so similar asteroids can be recognized. Giving the geochemical links to brachinites, they may occur near previously identified brachinites-like asteroids.
- 4:30 p.m. Sasso M. R. * Macke R. J. Britt D. T. Rivers M. L. Ebel D. S. Friedrich J. M.
[*Physical Properties of Incompletely Compacted Equilibrated Ordinary Chondrites: Implications for Asteroidal Structure and Impact Processing*](#) [#1670]
 We detail our synchrotron x-ray microtomographic investigations into the 3D nature of pore spaces in several unusual chondrites. Implications for asteroidal structures and the historical mechanical processing of these materials will be discussed.

Wednesday, March 25, 2009
IMPACTS I: MODELS AND EXPERIMENTS
1:30 p.m. Waterway Ballroom 6

Chairs: Kai Wünnemann
Keith Holsapple

- 1:30 p.m. Hammond N. P. * Nimmo F. Korykansky D.
[Hydrocode Modeling of the South Pole Aitken Basin-forming Impact](#) [#1455]
We model vertical lunar impacts to investigate whether the formation of the South Pole Aitken Basin excavated lunar mantle.
- 1:45 p.m. Plesko C. S. * Asphaug E. Weaver R. P. Wohletz K. H. Korycansky D. G.
[Initial Conditions of an Impact-generated Greenhouse Event from Hydrocode Models of Large Impacts on Noachian Mars](#) [#2167]
We model impacts into Mars-like stratigraphies to constrain initial conditions and energy partitioning of hypothesized impact-generated greenhouse events. Early results show impactors as small $d = 50$ km may trigger a greenhouse event.
- 2:00 p.m. Senft L. E. * Stewart S. T.
[The Role of Phase Changes During Impact Cratering on Icy Satellites](#) [#2130]
We conducted simulations of impacts onto the Jovian satellite Ganymede using a new EOS for H₂O. We find that including the high-pressure solid phases produces more complex crater formation phenomenology.
- 2:15 p.m. Collins G. S. * Davison T. Elbeshausen D. Wünnemann K.
[Numerical Simulations of Oblique Impacts: The Effect of Impact Angle and Target Strength on Crater Shape](#) [#1620]
Impact craters are asymmetric if the impactor's trajectory is below a threshold angle of incidence. Lab experiments and 3D numerical simulations show that the threshold angle is higher if target strength is high and cratering efficiency is low.
- 2:30 p.m. Stöffler D. * Meyer C. Reimold W. U. Artemieva N. A. Wünnemann K.
[Ries Crater and Suevite Revisited: Part I Observations](#) [#1504]
A reevaluation of the geologic setting and properties of suevite at the Ries Crater reveals a new hypothesis based on "phreato-magmatic"-like explosions of a clast-laden impact melt sheet induced by surficial water.
- 2:45 p.m. Artemieva N. A. * Wünnemann K. Meyer C. Reimold W. U. Stöffler D.
[Ries Crater and Suevite Revisited: Part II Modelling](#) [#1526]
Presented numerical models can not reproduce the previous hypotheses on suevite origin as plume-related non-ballistic ejecta. We suggest an alternative explanation.
- 3:00 p.m. Kimberley J. * Ramesh K. T. Barnouin-Jha O. S. Swaminathan P. K. Ernst C. M.
[Visualization of High- and Low-Rate Compressive Failure of Quartz](#) [#2337]
Quasistatic and dynamic compression experiments were performed on single crystal quartz specimens. In cases where the specimens were loaded below catastrophic failure crack propagation was observed only during the unloading of the specimen.
- 3:15 p.m. Mikouchi T. * Ohsumi K. Ichiyangi K. Adachi S. Nozawa S. Koshihara S. Zolensky M.
[Nano-Second Time-Resolved Synchrotron X-Ray Diffraction Study of Olivine Under Laser-induced Shock Compression](#) [#2250]
We performed *in situ* nano-second time-resolved synchrotron X-ray diffraction analysis of olivine by synchronization of X-ray and laser pulses. We could successfully obtain 0–30 ns Laue diffraction images at the shock pressure of 1.2–6.5 GPa.

- 3:30 p.m. Bell M. S. *
[*Relative Shock Effects in Mixed Powders of Calcite, Gypsum, and Quartz: A Calibration Scheme from Shock Experiments*](#) [#1321]
A systematic experimental shock study of calcite, gypsum, and quartz powders mixed 1:1:1 was carried out in order to calibrate shock pressures in naturally shocked carbonates and sulfates to shock effects in quartz.
- 3:45 p.m. Ishibashi K. * Yagi T. Matsui T.
[*Determination of the Decomposition Boundary of CaCO₃ at High Temperature: Implications for Impact-induced Degassing of CaCO₃*](#) [#1569]
We experimentally determined the decomposition boundary of CaCO₃ up to ~5000 K and ~10 GPa with a technique of laser-heated diamond-anvil cell. Then, impact-induced degassing of CaCO₃ is discussed using the newly determined decomposition boundary.
- 4:00 p.m. Hermalyn B. * Schultz P. H. Heineck J. T.
[*Early-Stage Ejecta Velocity Distribution*](#) [#2492]
This study investigates high speed early-time departures from the accepted power-law relationship of ejecta velocity over a range of projectile diameters by utilizing a new high speed 3D-Particle Imaging Velocimetry technique.
- 4:15 p.m. Kraus R. G. * Stewart S. T.
[*Thermodynamics of Impacts onto Icy Mixtures: Peak and Post-Shock Temperature Measurements in an Ice-Sand Mixture*](#) [#2508]
We present the first experimental shock and release temperature data on ice-sand mixtures.
- 4:30 p.m. Schultz P. H. * Anderson J. L. B. Hermalyn B.
[*Origin and Significance of Uprange Ray Patterns*](#) [#2496]
Arcuate uprange crater rays occur on the Moon, Mercury, and Mars. This pattern reflects depends on the evolution of initial coupling that depends on both impactor (density, speed and angle) and target (porosity).

Wednesday, March 25, 2009
SOLAR WIND AND GENESIS: MEASUREMENTS AND INTERPRETATION
1:30 p.m. Montgomery Ballroom

Chairs: **Kathy Kitts**
Nadia Vogel

- 1:30 p.m. Meier M. M. M. * Schmitz B. Baur H. Wieler R.
[*A Regolith Pre-Exposure Signature in Fossil Micrometeorites from an Asteroid Collision 470 Million Years Ago*](#) [#1153]
Some 25% of fossil micrometeorites (MM) from an asteroid collision 470 Myrs ago have Ne-21 CRE ages of 10–50 Myrs due to regolith preexposure, requiring to revisit the cometary origin interpretation of a similar pattern observed in recent MM and IDP.
- 1:45 p.m. Vogel N. * Heber V. S. Baur H. Burnett D. S. Wieler R.
[*Preliminary Genesis Bulk Solar Wind Ar, Kr, and Xe Abundances in Comparison to Young Lunar Regolith and Solar Photosphere Data*](#) [#1964]
We present preliminary Genesis bulk solar wind Ar, Kr, and Xe isotope and element compositions. These are compared to SW abundances inferred from young lunar regoliths and to photospheric data to rule on fractionation between the Sun and the SW.
- 2:00 p.m. Grimberg A. * Bühler F. Wieler R. Bochsler P.
[*Comparison of Solar Wind Noble Gas Data from Genesis with Apollo/SWC — New Results from Implantation Experiments*](#) [#1537]
We will show new results from extensive implantation experiments to address differences of isotopic and elemental solar wind noble gas data between Genesis and Apollo/SWC.
- 2:15 p.m. Heber V. S. * Wiens R. C. Bochsler P. Wieler R. Burnett D. S.
[*Fractionation Processes in the Solar Wind Revealed by Noble Gases Collected by Genesis Regime Targets*](#) [#2503]
Significant differences in isotopic and elemental compositions of noble gases among the different SW regimes were found. Here we discuss fractionation processes in the solar wind.
- 2:30 p.m. Meshik A. P. * Hohenberg C. M. Pravdivtseva O. V. Mabry J. C. Allton J. H. Burnett D. S.
[*Relative Abundances of Heavy Noble Gases from the Polished Aluminum Solar Wind Collector on Genesis*](#) [#2037]
Here we report the results of our Ar-Kr-Xe analysis of solar wind captured by the Genesis Polished Aluminum Collector.
- 2:45 p.m. Kitts K. * Choi Y. Eng P. Sutton S. R.
[*X-Ray Standing Wave Based Internal Reference Method for Quantification of Implanted Fe in Genesis Samples*](#) [#1439]
We present a new internal reference method for XSW and XRF that does not require a separate standard and compare that directly to the implant standard method and present the absolute Fe solar wind abundance in Genesis sapphire 50722.
- 3:00 p.m. Veryovkin I. V. * Tripa C. E. Zinovev A. V. Pellin M. J. Burnett D. S.
[*Solar Wind Calcium and Chromium in GENESIS Bulk Silicon Collector: Simultaneous Measurements by RIMS*](#) [#2422]
First results for simultaneous RIMS measurements of solar wind Ca and Cr in Genesis collectors are reported.

- 3:15 p.m. Pepin R. O. * Becker R. H. Schlutter D. J.
[*Solar Wind Nitrogen in Genesis Gold-on-Sapphire \(AuOS\) Collectors*](#) [#2103]
We report direct measurements of the isotopic composition of solar wind nitrogen in nitrogen extracted from Genesis gold-on-sapphire (AuOS) collectors by a low-temperature amalgamation technique. The measured $\delta^{15}\text{N}$ value is $\sim +325\%$.
- 3:30 p.m. Marty B. * Zimmermann L. Burnard P. G. Burnett D. L. Heber V. S. Wieler R. Bochsler P. Wiens R. C. Sestak S. Franchi I. A.
[*In Search of Solar Wind Nitrogen in Genesis Material: Further Analysis of a Gold Cross Arm of the Concentrator*](#) [#1857]
We have analysed nitrogen and noble gases in another gold cross arm of the Genesis concentrator by laser ablation - static MS. Results define a correlation that points to a light N isotope composition within the range of Jupiter atmospheric value.