Nature of the Surface Materials

Bishop J. L.  Drief A.  Dyar M. D.
*Physical Alteration of Martian Dust Grains, Its Influence on Detection of Clays and Identification of Aquous Processes on Mars* [3008]
This study involves detailed characterization of changes in clay mineral grains resulting from grinding and assesses the influence of physical processes on clays and how to detect them on Mars. Clays may provide links to aqueous processes on Mars.

Bishop J. L.  Schiffman P.  Southard R. J.  Drief A.  Verosub K. L.
*Constraints on Martian Surface Material from a Study of Volcanic Alteration in Iceland and Hawaii* [3009]
Volcanic alteration is studied on Hawaii and Iceland in order to provide information about alteration of volcanic material on Mars. Palagonitic, pedogenic and solfataric alteration products include differences in mineralogy and chemistry.

Murchie S.  Barnouin-Jha O.  Barnouin-Jha K.  Bishop J.  Johnson J.  McSween H.  Morris R.
*New Insights into the Geology of the Mars Pathfinder Landing Site from Spectral and Morphologic Analysis of the 12-Color Superpan Panorama* [3060]
The Pathfinder landing site contains a second lithology in addition to gray rock, consistent with highlands excavated from beneath a veneer of northern plains. Many rocks have cemented coatings that formed during an early, probably wetter climate.

Becker K.  Johnson J. R.  Gaddis L.
*ISIS Processing Tools for Thermal Emission Spectrometer Data* [3097]
Additions to the USGS ISIS package provide useful tools for extracting and projecting TES data (particularly mosaics) for use with other ISIS programs to process and visualize these data in geometric projections compatible with other Mars data sets.

Poulet F.  Erard S.
*The Composition of Martian Low Albedo Regions Revisited* [3110]
The ISM data are processed using new calibration method and taking in account geomorphologic characteristics of low albedo regions using MOC and THEMIS data. Results show alternative compositions to pure basaltic material proposed by TES in Syrtis Major.

Wagstaff K.  Bell J. F. III
*Automated Analysis of Mars Multispectral Observations* [3120]
Automated data analysis can quickly identify trends and focus attention on interesting subsets of large data sets. In experiments on two Mars data sets, we find that the data clustering results are largely consistent with manual analysis results.

Johnson J. R.  Grundy W. M.
*Two-Layer Visible/Near-Infrared Radiative Transfer Modeling Using Bloomsburg University Goniometer (BUG) Observations of Dust-coated Rocks* [3150]
Visible/near-infrared observations of SP basalt coated with varying amounts of JSC-1 palagonite acquired under various incidence, emission, and azimuth geometries are being modeled using a two-layer Hapke algorithm.
Stopar J. D. Taylor G. J. Hamilton V. E. Browning L. Pickett D.

*Maximum Rates of Olivine Dissolution on Mars [#3151]*

We constrain the residence time of olivine in contact with water using rate equations for olivine dissolution. By calculating the minimum times until complete dissolution, we can place limits on the longevity and extent of aqueous alteration on the surface of Mars.

Tosca N. J. McLennan S. M. Lindsley D. H. Schoonen M. A. A.

*Low-Temperature Aqueous Alteration on Mars: Insights from the Laboratory [#3178]*

Recent results of aqueous alteration experiments with synthetic basaltic material will be evaluated and their relevance to the martian surface will be discussed.

Glotch T. D. Morris R. V. Sharp T. G. Christensen P. R.

*Fine-grained Goethite as a Precursor for Martian Gray Hematite [#3188]*

Detailed comparison of the TES hematite spectrum and laboratory spectra indicate that thermal oxidation of magnetite is not a likely process for the formation of the martian hematite regions. Instead, a process involving low temperature dehydroxylation of goethite is proposed.

Hansen G. B.

*Infrared Optical Constants of Martian Dust Derived from Martian Spectra [#3194]*

Optical constants for martian dust have been extracted from Mariner 9 IRIS spectra to study sensitivity to particle opacity and size distribution. Now, a large number of IRIS spectra over dusty areas is being analyzed using full surface emissivity, in search of variations in the dust properties.

McAdam A. C. Leshin L. A. Harvey R. P.

*Characterization of the Weathering Products of Antarctic Martian Meteorite Analog Materials and Implications for the Formation of Martian Surface Fines [#3203]*

We performed preliminary characterization of the mineralogical and spectral properties of fines produced from an Antarctic martian meteorite analog material, to gain insight into potential martian surface weathering processes in advance of returned samples.

Herkenhoff K. E. Johnson J. R. Weller L. A.

*The Imager for Mars Pathfinder Insurance Pan [#3224]*

The losslessly-compressed IMP Insurance Pan, taken in four filters before mast deploy on Sol 2, has been processed to high-fidelity multispectral mosaics.

Thomson B. J. Schultz P. H.

*Carbonates on Mars: Probably Occurrences, Spectral Signatures, and Exploration Strategies [#3229]*

We propose that the evolution of carbonates in Martian dust may be similar to the evolution of carbonates in Argentine loess deposits. Post-depositional modification of the loess can result in the reprecipitation of carbonate as concretions and as layers of calcrete in the subsurface.

Hurowitz J. A. McLennan S. M. Lindsley D. H. Schoonen M. A. A.

*The Hydrothermal Soil Formation Mechanism: Relevant Conditions and Implications of Experimental Results [#3234]*

Hydrothermal conditions relevant to the martian soil formation mechanism are reviewed, and results of experimentation under such conditions discussed.

Bridges N. T. Laity J. E. Greeley R. Phoreman J. Jr. Eddlemon E. E.

*Studies of Rock Abrasion on Earth and Mars [#3235]*

We report on wind tunnel and field studies of aeolian abrasion with application to Mars. It is shown that roughness and rock shape exert important control on the rate of abrasion on both planets, with Martian abrasion rates 2–3× higher than on Earth.

*High Spatial Resolution Visible Color Units on Mars from the Mars Odyssey THEMIS/VIS Instrument [#3238]*

This presentation describes the calibration and new results from the Mars Odyssey THEMIS/VIS instrument, which is obtaining five-color visible wavelength images from Mars orbit at scales of 18–72 m/pixel.

Hamilton V. E.

*Constraints on the Composition & Particle Size of High Albedo Regions on Mars [#3239]*

We place constraints on the composition and effective mean particle size of fine particulate mineralogies on the martian surface via comparisons with laboratory analogue samples.

Wrobel K. E. Schultz P. H.

*Accumulation of Distal Impact Ejecta on Mars Since the Hesperian [#3242]*

Cumulative deposits of glass-rich distal ejecta from a series of Hesperian-aged (and younger) craters could supply a plausible source for an ejecta-based origin of the enigmatic dark materials found on Mars.

Catling D. C. Moore J. M.

*A Case for Hydrothermal Gray Hematite in Aram Chaos [#3245]*

Mars Global Surveyor data suggests that high concentrations of hematite were formed in planar strata in Aram Chaos and have since been exposed by erosion of an overlying light-toned, caprock. Geochemical and geomorphological inferences suggest a hydrothermal formation.

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

*Investigating the Role of Glass in Martian Spectra [#3246]*

We have investigated the compositions and spectral properties of glasses relevant to interstitial melts in mafic martian lithologies in an effort to expand the range of glasses available to interpret martian remote sensing data.