

Thursday, March 10, 2011

**POSTER SESSION II: MARS INSTRUMENTS: METHODS AND CALIBRATIONS FOR THE
MARS SCIENCE LABORATORY AND THE MARS RECONNAISSANCE ORBITER**

6:00 p.m. Town Center Exhibit Area

Viviano C. E. Moersch J. E.

[*Using THEMIS to Address Discrepancies Between OMEGA/CRISM and TES Detections of Phyllosilicates*](#) [#2251]

We test the effects of THEMIS and TES spatial resolution using realistic temperatures and spatial distributions of clay to address discrepancies between OMEGA/CRISM and TES observations, and to estimate the increased sensitivity THEMIS may have.

King P. L. Izawa M. R. M. Vernazza P. McCutcheon W. A. Berger J. A. Dunn T.

[*Salt — A Critical Material to Consider when Exploring the Solar System*](#) [#1985]

Salts significantly affect the physical and chemical properties of planetary bodies. We examine reflectance infrared spectra of silicate mixtures with IR-transmissive salts and show that adding salt produces spectra with transmission features.

Arnold J. A. Glotch T. D.

[*Mid-IR Optical Constants of Anisotropic Minerals*](#) [#1923]

A method for deriving optical constants of minerals belonging to the monoclinic system is outlined.

Trang D. Lucey P. G. Gillis-Davis J. J.

[*The Optical Constants of Olivine in the Near-Infrared as a Function of Iron Content*](#) [#2745]

Optical constants are important to first-principles modeling of the spectral properties of planetary surfaces. We derived the optical constants of olivine as a function of Fo content into 22 parameters by using the modified Gaussian model.

Ehlmann B. L. Mustard J. F. Poulet F. Hiroi T.

[*Estimating Modal Mineralogy of Mixtures with Phyllosilicates Using Radiative Transfer Modeling of Visible/Near Infrared Spectra*](#) [#1704]

Nonlinear radiative transfer modeling enables remote quantification of surface composition using visible/near-infrared reflectance spectra. We test Hapke and Shkuratov model accuracy for phyllosilicate-bearing mixtures relevant to Mars and asteroids.

Stack K. M. Milliken R. E.

[*Reflectance Spectroscopy of Clay-Sulfate Mixtures: Implications for Quantifying Hydrated Minerals and Determining Depositional Environments on Mars*](#) [#2024]

We examine the spectral properties of a suite of binary mixtures containing hydrated magnesium sulfate mixed with varying proportions of Fe, Mg, or Al-smectite. Our results will aid in interpreting CRISM and OMEGA spectra of hydrated mineral deposits.

Pitman K. M. Noe Dobrea E. Z. Dalton J. B. III Jamieson C. S. Abbey W. J.

[*Reflectance Spectra and Optical Constants of Mars Alteration Products: Hydrated Magnesium Sulfates*](#) [#1458]

Reflectance spectra and optical constants are necessary to compare to spacecraft data and infer abundances of mixed minerals. We will present such VNIR data at T = 200 and 300 K for aqueous alteration products observed on Mars: hydrated Mg-sulfates.

Morris R. V. Graff T. G. Achilles C. N. Agresti D. A. Ming D. W. Golden D. C.

[Visible and Near-IR Reflectance Spectra of Mars Analogue Materials Under Arid Conditions for Interpretation of Martian Surface Mineralogy](#) [#2757]

Spectra for Mars analogue materials that result from thermal treatments at 25°C, 110°C, and 210°C in arid atmospheres for laboratory timescales provide reasonable surrogate spectra for simulating geologic timescales on Mars.

Daly T. Gavin P. Chevrier V.

[Effects of Thermal Alteration on the Near-Infrared and Mid-Infrared Spectra of Martian Phyllosilicates](#) [#1164]

We characterized how the NIR and MIR spectra of saponite, kaolinite, chlorite, serpentine, and prehnite change with thermal alteration. Based on these data, we determined that saponite found in a Mawrth Vallis crater is older than the impact crater.

Che C. Glotch T. D.

[Spectroscopic Study of Dehydrated and/or Dehydroxylated Phyllosilicates and Natural Zeolites: Implications for Martian Exploration](#) [#1393]

We present the attenuated total reflectance (ATR), mid- to far-infrared specular reflectance, mid- to far-infrared emissivity, and near-infrared diffuse reflectance spectra of incrementally heated clay and zeolite samples for future search for dehydrated or dehydroxylated clays on Mars.

Schmidt F. Ceamanos X. Douté S. Luo B. Jouannic G. Chanussot J.

[Spectral Unmixing for Planetary Exploration Applied to CRISM/MRO Hyperspectral Imagery](#) [#1772]

We perform blind spectral unmixing on CRISM hyperspectral image of the Russel dune on Mars. A comparison between the VCA and BPSS unsupervised algorithms and geomorphological classification is done to validate the methods.

Seelos F. P. Murchie S. L. Humm D. C. Barnouin O. S. Morgan F. Taylor H. W.

Hash C. CRISM Team

[CRISM Data Processing and Analysis Products Update — Calibration, Correction, and Visualization](#) [#1438]

The CRISM team has updated the radiometric calibration, implemented a custom hyperspectral filtering procedure, and augmented the browse product pipeline. The result is a set of high-level CRISM data products with enhanced scientific utility.

Parente M. Mustard J. F. Murchie S. Seelos F. P.

[Summarizing the Spectral Variability of CRISM Images with Endmember Extraction](#) [#2622]

This paper introduces an algorithm that extracts image endmembers of a hyperspectral scene, which can be used as the scene concise mineralogical representation. The algorithm is validated by comparison with manual detections performed by an expert.

Pommerol A. Beck P. Schmitt B. Montes-Hernandez G. Quirico E.

[Deciphering the Hydration State of the Martian Surface from Near-Infrared Spectroscopy](#) [#1890]

We characterize the hydration state of Mars' surface through comparison between laboratory simulations and remote-sensing data. The relative strength of the 1.9- and 3- μm features indicates the presence of an hydroxylated phase in the surface dust.

Morgan F. Mustard J. F. Wiseman S. M. Seelos F. P. Murchie S. L. McGuire P. C. CRISM Team

[Improved Algorithm for CRISM Volcano Scan Atmospheric Correction](#) [#2453]

A new technique for empirical removal of atmospheric absorption features in martian hyperspectral imagery acquired by CRISM on MRO reduces an artifact at 2.0 μm to avoid interference with surface mineralogical features.

Delamere W. A. McEwen A. S. Becker K. Bridges N. T. Eliason E. M. Herkenhoff K. E. Kestay L. Mattson S. Russell P. S. Milazzo M. Seelos F. Tornabene L. L. Wray J.

[*Understanding HiRISE Color Imaging of Mars — A Potential New Tool for Assisting in Mineral Identification at the Meter Resolution*](#) [#2402]

HiRISE camera has enabled the production of color ratio images that indicate mineral variability at HiRISE-scale resolution. Color ratio images will be compared with CRISM observations. An overview of the new HiRISE color ratio products will be given.

Thomson B. J. Bridges N. T. Cohen J. Hurowitz J. Lennon A.

[*Estimating Rock Strength Parameters from Rock Abrasion Tool \(RAT\) Grinds*](#) [#2567]

We have developed an empirical correlation between rock abrasion tool (RAT) grind energy and compressive strength. This correlation can be used to infer the physical properties of rocks ground by the MER rovers on Mars.

Baker L. L. Strawn D. G. McDaniel P. A. Nickerson R. D. Bishop J. L. Ming D. W. Morris R. V.

[*Poorly Crystalline Iron-Bearing Aluminosilicates and Their Importance on Mars*](#) [#1939]

We have synthesized Fe-substituted nanoaluminosilicates and characterized their structures using X-ray absorption spectroscopy. Measurement of these materials' reflectance spectra will enable detection of similar phases on Mars.

Jawin E. R. Dyar M. D. Lane M. D. Bishop J. L. Marchand G. J.

[*Inter-Relationships Among Mössbauer Parameters of Phosphate Minerals and Crystal Structures*](#) [#1259]

Mössbauer spectroscopy parameters for phosphate minerals are related to phosphate structure groups and the local environment around the Fe cations.

Wimmer-Schweingruber R. F. Martin C. Boehm E. Boettcher S. Kharytonov A. Koehler J.

Kuhnke M. Ehresmann B. Hasler D. M. Zeitlin C.

[*Measuring Neutrons and Gamma Rays on Mars — The Mars Science Laboratory Radiation Assessment Detector MSL/RAD*](#) [#1793]

We investigate methods for deriving separate statistical estimates for the neutron and gamma radiation on Mars from measurements to be performed by MSL/RAD.

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

Shvetsov V. N. Timoshenko G. N. Tretyakov V. Vostrukhin A. Varenikov A.

[*Studies of Layering Structure of Martian Subsurface by Active Neutron Experiment DAN Onboard MSL*](#) [#1776]

Results of DAN/MSL field tests and calibrations are presented.

Anderson R. B. Morris R. V. Clegg S. M. Bell J. F. III Humphries S. D. Wiens R. C.

[*A Comparison of Multivariate and Pre-Processing Methods for Quantitative Laser-Induced Breakdown Spectroscopy of Geological Samples*](#) [#1308]

We report on efforts to improve the accuracy of quantitative LIBS for geologic samples by comparing multivariate methods and by using feature selection, spectral averaging, and training set selection.

Dyar M. D. Carmosino M. L. Tucker J. M. Speicher E. A. Brown E. B. Clegg S. M. Wiens R. C.

Barefield J. E. Delaney J. S. Ashley G. M. Driese S. G.

[*Error Analysis for Remote Laser-Induced Breakdown Spectroscopy Analysis Using Combinations of Igneous, Sedimentary and Phyllosilicate Samples*](#) [#1258]

LIBS will be used by the ChemCam instrument on MSL to obtain chemical analyses. This study examines accuracies that result from using combinations of different rock types and minerals in the training set used for calibration by multivariate analysis.

Speicher E. A. Dyar M. D. Carmosino M. L. Clegg S. M. Wiens R. C.

[Single Variable and Multivariate Analyses of Remote Laser-Induced Breakdown Spectra for Prediction of Rb, Sr, Cr, Ba, and V in Igneous Rocks](#) [#2385]

Single variable (SLR) and multivariate (PLS-2 regression) techniques were employed for analyses of remote laser-induced breakdown spectra for determination of Rb, Sr, Cr, Ba, and V in igneous rock samples.

Cousin A. Forni O. Maurice S. Lasue J. Gasnault O. Wiens R.

[Independent Component Analysis Classification for ChemCam Remote Sensing Data](#) [#1973]

ChemCam is an instrument using the LIBS technique to analyze rocks on the martian surface. ChemCam shows the elemental compositions of rocks at several distances (1–7m), and ICA tool allows classification of these rocks.

Achilles C. N. Ming D. W. Morris R. V. Blake D. F.

[Detection Limit of Smectite by CheMin IV Laboratory Instrument: Preliminary Implications for CheMin on the Mars Science Laboratory Mission](#) [#2671]

Mineral mixtures of smectite and olivine were combined in varying proportions and measured with the CheMin IV laboratory instrument to estimate a preliminary detection limit of smectite in a simple two mineral system.

Wiens R. C. Maurice S. Bender S. Barraclough B. L. Cousin A. Forni O. Ollila A. Newsom H.

Vaniman D. Clegg S. Lasue J. A. Blaney D. DeFlores L. Morris R. V. ChemCam Team

[Calibration of the MSL/ChemCam/LIBS Remote Sensing Composition Instrument](#) [#2370]

We describe the MSL/ChemCam/LIBS calibration and characterization procedures and results, and present plans for final analyses during rover system thermal testing.