Wednesday, June 13, 2012
TECHNOLOGY AND ENABLING CAPABILITIES:
REGOLITH SAMPLE ACQUISITION, HANDLING, ANALYSIS, AND STORAGE
1:00 p.m. Lecture Hall

Brinckerhoff W. B. * Paulsen G. Mellerowicz B. ten Kate I. L. Zacny K. Conrad P. Corrigan C. M. Li X. Mahaffy P. R.
Precision Subsampling System for Mars Surface Missions **[#4292]**
We present details on the MIDP-developed precision subsampling system (PSS) that enables mm-scale sample acquisition from layered and other heterogeneous samples, transport to and analysis by analytical instruments, and caching for MSR.

Backes P. * Younse P. Ganino T.
A Sample Acquisition and Caching Architecture Applicable to a MER-Class Rover for Mars Sample Return **[#4143]**
The Minimum Scale Sample Acquisition and Caching (MinSAC) architecture could enable sample acquisition and caching from a MER-class rover for a proposed Mars Sample Return caching mission.

Zacny K. * Conrad P. Mahaffy P. Brinckerhoff W. Steele A. Blake D. Anderson S.
Drill Mission with 5 Bits: Brushing and Abrading Bit, Powder and Regolith Bit, PreView Bit, and Caching Bit: Precursor to the Mars Sample Return **[#4282]**
We present an approach to core acquisition and caching as well as a suite of drill bits that will enable sample interrogation prior to sample selection for caching.

Zacny K. * Paulsen G. McKay C. Glass B. Marinova M. Davila A. Dave A.
The Icebreaker: One Meter Class Mars Drill and Sample Delivery System **[#4259]**
We describe a Rotary-Percussive drill that was tested to 1 m depth in Mars chamber, and two sample delivery approaches (verified via testing): pneumatic (point-to-point) and drill based (drill is pulled out of a hole and placed over an instrument).

Bhartia R. * Hug W. F. DeFlores L. P. Fries M. D. Reid R. D. Allwood A. Abbey W. Salas E. C. Beegle L.
Finding the Organics: A Compact Non-Conact, Non-Invasive Trace Organic and Mineralogical Mapping Arm Instrument **[#4188]**
GORILA (Geochemical and Organic analysis by Raman Imaging and Laser Autofluorescence):
a low mass, arm-mounted instrument capable of non-contact, high sensitivity analysis of organic/inorganic compounds without the complexity of current methods.

Glass B. * McKay C. Stoker C. Zacny K.
Automated 3-Meter-Class Mars Drill Prototypes **[#4184]**
Exploring the shallow subsurface of Mars will require some form of excavation and penetration, with drilling the most mature. A series of 0.5–5 m automated rotary and rotary-percussive drills developed over the past decade provide a TRL 6 capability.

Zacny K. * Paulsen G. White J.
Shallow-Borehole Array For Measuring Greenland Emission of Trace Gases as an Analogue for Methane on Mars (GETGAMM) **[#4257]**
We are developing a method for measuring concentration and isotopic composition of methane
in the subsurface.

Zacny K. * Conrad P. Steele A.
A Low Cost, Low Mass Architecture for Mars Sample Step One: Target Selection, Coring and Caching **[#4280]**
We describe an architecture that represents a compromise between analytical and sampling capabilities, so that enough can be learned about the rocks to ensure good representation of martian diversity, and the hardware can fit the MER class rover.

Darrach M. R. * Kidd R. Shiraishi L.
An Arm Mounted "Scratch and Sniff" Sample Triage Sensor **[#4247]**
A sample triage system based on the detection of volatiles released by mechanical abrasion is proposed. The instrument will be capable of detecting trace compounds found in Mars rock and soils. The instrument mass will be approximately 2.8 kg.

Grunthaner F. J. * Aubrey A. D. Sherrit S. Lee M. C. Quinn R. C. Bada J. L.
Integrated End-to-End Sampling System with Real Time Inorganic and Organic Biomarker Analyzer **[#4303]**
An end-to-end chemical analyzer that generates a powder sample from a solid target, extracts and detects all inorganic anions, cations and trace organic biomarkers. At just 3 kg it can be a hand tool for human exploration or part of an *in situ* rover.

Blake D. F. * Sarrazin P. Zacny K.
Quantitative Mineralogy, Sample Acquisition and Analysis on Smaller and More Capable Rovers and Landers in the Post-MSL ERA **[#4071]**
A post-MSL landed Mars exploration program will feature smaller spacecraft, but not a reduction in science capability. Fully capable mineralogical instruments and sample preparation and delivery systems suitable for small rovers will be discussed.

Beegle L. W. * Soto J. C. Lasnik J. Roark S.
Sample Handling and Processing on Mars for Future In Situ Missions **[#4252]**
We describe a Wet-chemistry Automated Sample Processing (WASP) system to TRL-5 that processes sample and distributes samples to multiple different analytical instruments for identification of organic and inorganic species.

Davé A. Thompson S. J. McKay C. P. * Stoker C. R. Zacny K. Paulsen G. Mellerowicz B. Glass B. Willson D. Bonaccorsi R.
The Sample Handling System for the Mars Icebreaker Life Mission: From Dirt to Data **[#4186]**
We describe a sample handling system that can sample sticky ice-rich regolith augured up by the Icebreaker drill in a way consistent with planetary protection requirements.

McGee M. S. * Smith N. G. Bierhaus E. B.
Lockheed Martin Space Systems Mars Abstract 1 Challenge Area 3 **[#4215]**
Innovative sample handling and contamination control concepts are discussed, including bio-barriers, asceptic transfer, and heat sterilization. Key lander subsystems are summarized, such as encapsulated landers, ASRGs, thermal control and avionics.

Strange N. J. * Klesh A. T. Marrese-Reading C. M. Oh D. Y. Ziemer J. K. McElrath T. P. Landau D. F. Grebow D. J.
Interplanetary Sample Canister for Mars Sample Return **[#4277]**
We propose the development of an Interplanetary Sample Canister (ISC) for the Mars Sample Return (MSR) mission using CubeSat and Microfabricated Electrospray Propulsion (MEP) technology to enable a lower cost MSR mission.

PANEL DISCUSSION