



Astromaterials Research and Exploration Science Directorate

Newsletter - April 2, 2009

The ARES Newsletter is a snapshot of current events within the Directorate. Each newsletter highlights a small sample of the remarkable breadth and variety of the research activity and facilities in ARES and the people who do the work.

You have a story to tell, we want to hear it. Send your Newsletter inputs, images and comments to Greg Byrne

LPSC Roundup

This past month saw a flurry of activity within the Directorate in preparation for the annual Lunar and Planetary Science Conference. As in past years, ARES research was well represented at this year's LPSC; 47 of our research staff served as either first author or co-author on over 70 separate abstracts. The breadth and variety of our astromaterials research and involvement in NASA's science missions are manifested in the stats - ARES research staff were authors on 15 science papers on the Mars Phoenix lander mission results, 11 papers on the Stardust mission samples, and 4 papers on the Genesis mission. We authored papers using data from the Mars Reconnaissance Orbiter and Mars Exploration Rover missions, and we contributed to a paper on instrumentation for the upcoming Mars Science Laboratory mission. ARES staff contributed 12 papers on sample analysis of Martian meteorites and a dozen or so on analyses of other meteorites or interplanetary dust particles. ARES staff also contributed 4 astrobiology papers, specifically addressing the question of potential life on Mars.

One LPSC paper by **Carl Allen** and **Dorothy Oehler** caught the eye of a BBC reporter and got some press. Using remote sensing data from the Mars Reconnaissance Orbiter, Carl and Dorothy reported on what appear to be mounds of old, dried mud on the surface of Mars, hundreds of meters in diameter. Similar features called "mud volcanoes" commonly exist on Earth; they form pretty much the way you would imagine from their name - overpressured gases and liquids at depth bubble up to breach the surface, oozing slurries of mud and rocks. The Mars features do not appear to be currently active, but even if they are extinct analogs to mud volcanoes on Earth, they would still present an exciting target for future Mars exploration.

Our old Apollo lunar rock collection continues to provide new research results - ARES staff contributed 3 papers at this year's LPSC on analyses of those samples. The first LPSC in 1970, known then simply as the Lunar Science Conference, was all about the moon rocks, specifically those returned by Apollo 11 a few months earlier. "Planetary" was added to the conference in

1978 to include the growing range of extraterrestrial topics. Organizers of this year's LPSC put out a call to see who had attended all 40 of the conferences since its beginning, and included in that short list are four ARES researchers, **Don Bogard, Everett Gibson, Gary Lofgren, and Larry Nyquist.**



The LPSC 40-year club members - Everett, Don, Gary (front row), Larry (back row, 2nd from right), and some other guys, 2009.

In the Labs

Getting some media attention and also providing the quote of the month was the announcement of a paper published in the journal *Nature* describing a meteorite found in Sudan by a NASA team. What makes this meteorite extraordinary is that it is the first one in the history of mankind to be recovered after first being observed and tracked as an asteroid in space! Asteroid 2008 TC3, described as “SUV sized”, was telescopically detected and observed for 19 hours last October before it entered the atmosphere as a fireball, exploded at high altitude, and the surviving fragments fell to the Nubian desert of Sudan. Some of the recovered fragments were sent to the **ARES Meteorite Curation Facility.**

This unique event allows for the first time a correlation of the material composition of the meteorite with the spectral signature of its parent asteroid. The meteorite's composition itself is also apparently unique to our collection; a previously undiscovered combination of metals, such as iron and nickel, and organics such as graphites. **Mike Zolensky**, coauthor of the *Nature* paper, participated in the meteorite's analysis and described one of its most interesting features, an abundance of nano-scale diamonds that make the rock glitter like a geode. The quote of the month belongs to Mike Z who deftly put the scale of these diamonds in layman's terms with, "*If bacteria had engagement rings, these would be the right size for them.*"

Also gaining some media press was a *Nature Geoscience* paper coauthored by **Paul Niles**, theorizing on the formation of large deposits of salty minerals on Mars discovered by the *Opportunity* Rover on the plains of Meridiani Planum. The deposits are similar to those found on Earth, such as at White Sands. But unlike the Earth analogs, which formed through evaporation of briny lake water, the Meridiani deposits could not have formed from standing water; there is no basin there to hold it. Rather, Paul et al.'s theory employs yet another Earth analog process to explain the deposits, "acid snow." See Paul for further details.

In another first in history, two intact man-made vehicles accidentally collided in orbit. The February 10 collision occurred over Siberia at an altitude of 790 km between two communications satellites; an active 560-kg Iridium commercial satellite, and a 900-kg Cosmos non-operational Russian government satellite. Needless to say, the incident caught the attention of our **Orbital Debris Program Office** – it is one of the worst space debris-generating events of all time - and it caught the attention of the press. **Nick Johnson, Gene Stansbery, and Mark Matney** were deluged with requests for interviews and information from the media. Hundreds, if not thousands, of debris particles were generated by the collision to add to the fast-growing and increasingly problematic shroud of space debris circling our planet. The ODPO continues to assess the new, unwelcome additions to the debris population. A close second for quote of the month is from Nick, describing the fate of the two doomed satellites as, "*It was a bad day for both of them.*"

Our **Crew Earth Observations** team had a face-to-face chat with International Space Station astronaut Mike Fincke, sort of. Fincke, Commander of the current ISS Expedition 18, requested a video teleconference from space to convey his appreciation for the work of the CEO team and to ask a "few questions". So **Josh DuBois, Will Stefanov, Mike Trenchard, Justin Wilkinson** and **Kim Willis** dialed up the ISS for an amazing and very rare 45-minute space-to-ground teleconference. Fincke relayed to the team that he really enjoyed participating in the CEO payload and that he appreciated the efforts of the CEO staff in helping the ISS crew find and photograph the Earth targets. He and fellow Expedition 18 crewmember Sandy Magnus find enough time to take an average of 1200 images of the Earth per week. Sandy has a nice online journal entry on the subject - take a look at [NASA - Our Amazing Planet – Views From Space](#). Fincke also gave the CEO team a special treat - a quick video view of the Earth out of one of the windows of the Kibo Japanese Experiment Module. Both the CEO staff and the Expedition 18 crew were "energized" by this unusual opportunity to chat informally about a subject they all love; observing the Earth from space.

Comings and Goings

Brian McCann joins ARES as our new Facility Engineer. Brian will be concentrating on the Curation facility renovations, but also overseeing all major facility systems within ARES. He has an extensive career in mechanical building services gathered from over 20 years working for a major UK/USA based design/build contractor as a project manager. He also worked in the mechanical systems department of a Michigan architecture and engineering consulting company representing facility owners such as GM and Chrysler.

Retiring from civil service is **Ed Barker**. Ed has served for the past 5 years as the Orbital Debris Program Office's lead for measuring the orbital debris environment with optical instrumentation. He has spent a good part of that time in the mountains of Chile on long observing runs at Cerro Tololo Interamerican Observatory. He will continue working with the Office but on a part time basis remotely from his new home in Santa Fe, NM, where the fly fishing is good.

Congratulations are in Order

Freeman Bertrand of the Hypervelocity Impact Technology group received a Space Flight Awareness, Silver Snoopy Award—the Astronaut Office award for professional excellence and outstanding individual performance in contributions to our nation's space program. Astronaut Jose Hernandez traveled to Southwest Research Institute (SwRI) in San Antonio to present the Silver Snoopy pin, which was flown on the STS-120 mission. Freeman, the lead of NASA's impact testing efforts at SwRI, helped in the design and preparation of more than 1,000 impact tests that allowed for the better understanding of the environment under which damage can occur to the space shuttle's thermal protection system.

A newly published book, "The Solar System Beyond Neptune" has been awarded 1st place in the cosmology/astronomy category of the American Publishers Awards for Professional and Scholarly Excellence (PROSE Awards). **Jer-Chyi Liou** of the Orbital Debris Program Office wrote a chapter for this book on "Structure of the Kuiper Belt Dust Disk."

On March 11, the United States House of Representatives unanimously adopted a resolution celebrating the success of NASA's Mars Exploration Rover (MER) missions. House Resolution 67 begins with

"Whereas the Mars Exploration Rovers Spirit and Opportunity successfully landed on Mars on January 3, 2004, and January 24, 2004, respectively, on missions to search for evidence indicating that Mars once held conditions hospitable to life"

And after several more whereas' ends with

"Now therefore be it Resolved, that the House of Representatives--

(1) commends the engineers, scientists, and technicians of the Jet Propulsion Laboratory and Cornell University for their successful execution and continued operation of the Mars Exploration Rovers, Spirit and Opportunity; and

(2) recognizes the success and significant scientific contributions of NASA's Mars Exploration Rovers."

Congratulations to the 3 ARES members of the MER Science Team, working principally with the Mossbauer Spectrometer and Alpha Particle X-ray Spectrometer instruments; **Doug Ming**, **Dick Morris**, and **Dave Mittlefehldt**, strangely all having the initials "D.M."