

Current Events **Planetary Defense Conference**

A. A. JACKSON, PH.D., LUNAR AND PLANETARY INSTITUTE

The third International Academy of Astronautics (IAA) Planetary Defense [Conference](#) took place April 15-19, 2013, in Flagstaff, Arizona:

- Current state of knowledge on Near Earth Objects (how many, physical characteristics, orbits, current limitations, current risk).
- Consequences of an impact (tsunami, NEO size vs. consequence, economic impact, past events).
- Techniques for deflecting or mitigating a threatening NEO (kinetic impact, gravity tractor, explosive devices, others).
- NEO deflection mission and campaign design (launch require-

ments, cost, timelines, new tools).

- Political, policy, legal framework for planetary defense creating public awareness.
- Current national and international activities supporting planetary defense.



Above: *Gathering for Impact.* [Credit: IAA.](#)

NASA MSL Curiosity Update

DR. DOROTHY Z. OEHLER, MSL PARTICIPATING SCIENTIST

June 4, 2013.

The Mars Science Laboratory (MSL) science team is analyzing the data from our first hole drilled in Gale crater, which was located at the John Klein site in Yellowknife Bay (YKB). Results indicate that this site was a habitable environment where microbes could have existed at one time. That is, it was a site with liquid water, a supply of carbon in CO₂, and potential energy sources in chemical gradients provided in pairings of oxidized and reduced chemical species (such as sulfate and sulfide pairs). In addition, the early results suggest that this environment was only weakly saline, not harshly oxidizing, and near neutral in pH – all characteristics of mild, habitable environments. Specifically:

- The regional geology and fine-grained rock suggest that the John Klein site was at the end of an ancient river system or within an intermittently wet lake bed.
- The mineralogy indicates sustained interaction with liquid water that was not too acidic or alkaline, and low in salinity.

Further, conditions were not strongly oxidizing (Figures 1-2).

- Key chemical ingredients for life are present, such as carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur.
- The presence of chemical species in various states of oxidation would provide a source of energy for primitive organisms.

Mars entered solar conjunction on April 4, an approximately four-week period where the sun is between the Earth and Mars. During this period, no commands were sent to the rover, as a precaution against potential interference of the sun that could corrupt a command. The rover is back in communication now that conjunction is over and plans are being made to visit two key outcrops on the way to Mt. Sharp. These outcrops (called Point Lake and Shaler) were first encountered on the way to YKB. The science team felt that additional analyses of these particular deposits on the way out of YKB could be of value in understanding the history of the area. When the new analyses of these outcrops have been acquired, Curiosity will begin the long traverse to Mt. Sharp.

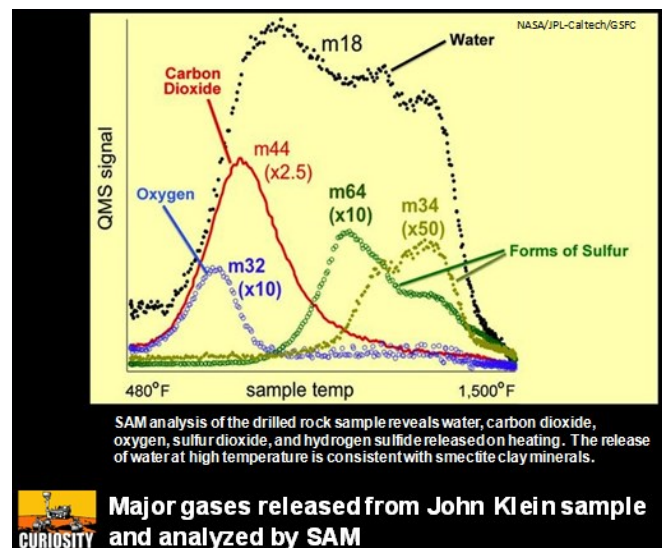
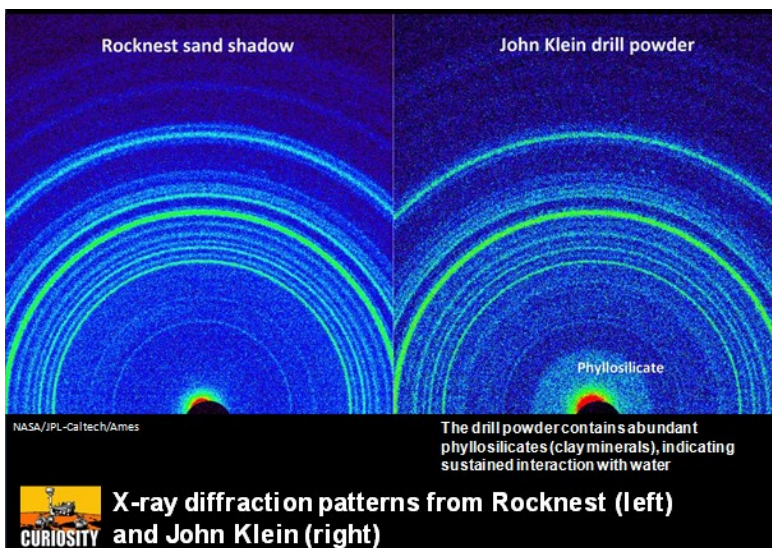


Figure 1. Comparative results from the Chemistry & Mineralogy instrument (CheMin) on Curiosity.

Figure 2. Recent results from the Sample Analysis at Mars instrument (SAM) on Curiosity.