Mineralogical Association of Canada

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FROM THE PRESIDENT

Water on Mars: Our Role as Scientists to Help Nonscientists Understand Science in the News

On 28 September 2015, NASA issued a press release in which they "confirmed evidence that liquid water flows on today's Mars" (www.nasa.gov/press-release/nasa-confirms-evidence-that-liquid-water-flows-on-today-s-mars).

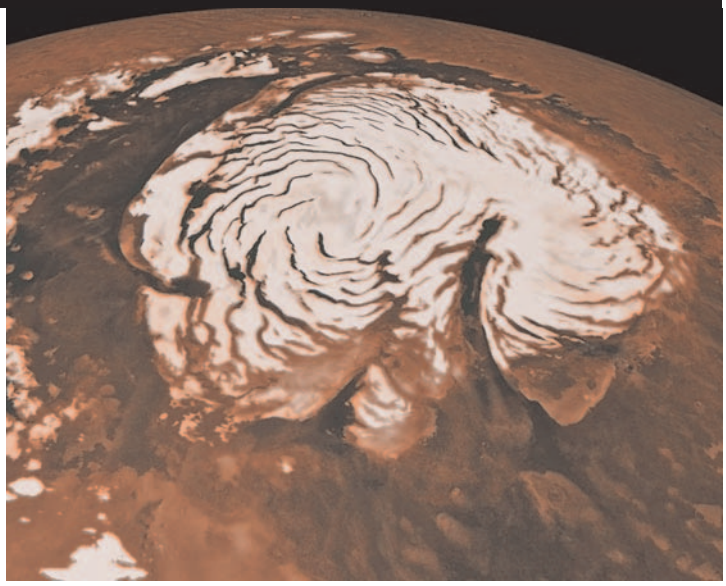
This announcement coincided with the publishing on the same day of a paper by Ojha et al. in *Nature Geoscience*. The Ojha et al. study presents spectroscopic data, measured from orbit, of regions on Mars where recurring slope lineae have been observed. These features are dark-colored streaks that form and disappear on a seasonal basis on the warm, equator-facing slopes of the planet. Ojha et al. conclude that these dark strips are the result of seasonal flow of supersaturated brines. This remarkable observation is a result of the careful work done by the Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) instrument team. The existence of a salty liquid on or near the surface increases the possibility that life may exist on or below the Martian surface. This evidence that a liquid exists at or near the surface during the warmer times of the Martian year is new and important.

During the press conference, the NASA team did an excellent job explaining their conclusions and the implications for future studies using existing spacecraft, for future missions, and for the possibility of life on the surface. What did not get effectively transferred to the public, however, was the fact that there is a great deal of water on Mars. Nonscientists asked me for my opinion on the fact that water has been discovered on Mars. I explained to them that it is well-known that there is a large amount of water in the form of ice at both the north and south poles, as well as under the Martian surface at the lower latitudes. If this ice were to melt, there would be a significant amount of water vapor in the atmosphere and liquid water on the surface of the planet. Carr and Head (2015), in their paper in *Geophysical Research Letters* (doi: 10.1002/2014GL062464), estimate that "a 34 m deep global equivalent water layer lies in the Martian polar-layered deposits and shallow ground ice."

In their enthusiasm to explain that "liquid" water has been found on the planet, the NASA scientists failed to explain, at least to my colleagues, that there is significant water-ice in reasonably accessible areas of the planet and that this ice could be used by colonists to generate oxygen for breathing, water for growing plants, and hydrogen for making fuels.

As scientists, we sometimes fail to explain the broader background details of our announcements that would allow a better understanding of the true significance. However, it is almost impossible to do this within the short "sound bite" length used in the popular press. It is our job as scientists to do our best to present the details of our work and try, in the brief time slots we get, to provide our listeners with a background understanding so that they can appreciate the implications. Not an easy thing to do in a short press conference.

What did come out very well in the NASA press conference was a discussion of the risks of sending a spacecraft to investigate these salty seeps. The risk is that a spacecraft from Earth cannot be guaranteed to be free of all life-forms: we risk inoculating Mars with life-forms that originated on Earth. COSPAR, the Committee on Space Research and Planetary Protection Activities, is the body that oversees the policies that ensure planetary protection is in compliance with the 1967 UN Space Treaty. If a spacecraft were to visit the recurring slope lineae sites, exceptional measures would need to be taken to ensure that there is no contamination of the site from organisms originating on Earth.



The ice-rich north polar cap on Mars (the quasicircular, white area at center), which is approximately 1,000 kilometers (621 miles) across. Image credit: NASA/JPL-Caltech; www.nasa.gov/mission _ pages/MRO/multimedia/pia13163.html.

The several spacecraft on the Martian surface and in orbit around the planet are giving us unprecedented information about the Martian system. Upcoming planned missions will add even more capabilities. Stay tuned.

Come to the Yukon!

The Yukon is the northwesternmost federal territory in Canada. It is home to the highest mountain in Canada, Mount Logan (5959 m), named after Sir William Logan, the founder of the Geological Survey of Canada. The famous Klondike Gold Rush happened here between 1896 and 1899, when 100,000 anxious prospectors descended on Dawson City. Just south of Dawson City is the capital, Whitehorse.

The annual national meeting of the Geological Association of Canada and the Mineralogical Association of Canada will take place 1–3 June 2016 in Whitehorse, Yukon (whitehorse2016.ca). This is a great opportunity for you to visit Canada's North (www.yukoninfo.com/whitehorse-yukon). Travel from Europe can be quite inexpensive, with direct flights from Frankfurt (Germany) to Whitehorse from under US$900 (www.condor.com).

The close proximity of Whitehorse to amazing geology allows for many interesting and diverse field trips. These are planned before and after the meeting (whitehorse2016.ca/program/field-trips):

- SED-Exhumed: Catch a rare glimpse into the belly of the Faro Mine Complex, one of Canada's most prolific past-producers of lead and zinc.
- From veins to valleys: The history of Klondike gold
- Overview of the geology of accreted terranes and the Whitehorse Trough
- Tour of the Keno Hill mining district
- History and geology of the Whitehorse copper belt
- VMS and orogenic gold deposits of the Chatham Strait, southeast Alaska

A list of the special sessions and symposia can be found at whitehorse2016.ca/program/talk-sessions. In addition, there is a short course planned on indicator minerals in till and stream sediments of the Canadian Cordillera.

Ron Peterson, MAC President

STUDENT TRAVEL/RESEARCH GRANTS

The Mineralogical Association of Canada awards travel and research grants to assist honors undergraduate and graduate students in the mineral sciences to:

- Present their research at a conference
- Visit a facility, laboratory, or field area to gather data for their research
- Pay for analyses that cannot be acquired at their university or for equipment needed for an independent research project

The maximum grant value is CDN$1200 per student. Grants will fund up to 50% of costs incurred for registration, travel, and subsistence, and up to 100% of other research costs (e.g. equipment, analyses).

Quotations and receipts may be requested for any equipment purchased.

For more information, see www.mineralogicalassociation.ca.
Deadline to apply: 15 January 2016

MAC FOUNDATION SCHOLARSHIPS

We congratulate Peter Crockford and Philippe Belley, the recipients of the 2015 MAC Foundation scholarships.

Peter Crockford received his BSc (2008) and MSc (2011) from the University of Victoria. His undergraduate work focused on balancing the mercury budget of the Earth, and he continued on through his master's to look at the response of carbonate-hosted saline aquifers to CO_2 injection. After his work at the University of Victoria, Peter spent time doing mineral exploration in the Arctic and hydrogeological consulting in Alberta. He then returned to academia in 2013 to pursue his PhD on Cryogenian glaciations, largely motivated by fieldwork in Namibia with Dr. Paul Hoffman.

Peter is currently at McGill University under the supervision of Dr. Boswell Wing and Dr. Galen Halverson. His PhD is on the isotope geochemistry of Proterozoic sulfate minerals and what these isotopic archives reveal about Earth's ancient biogeochemical cycles. Specifically, his work exploits triple oxygen and multiple sulfur isotopes as proxies to reconstruct the composition of the Proterozoic atmosphere.

Philippe Belley started his geology career as a serious mineral collector in high school. In 2014, he received a BSc with a specialization in geology from the University of Ottawa. As part of his undergraduate studies, he conducted research on boron isotope behavior during metamorphism and on metasomatic Mg–Al-spinel. His work was published in *Canadian Mineralogist* and in *Rocks & Minerals*. In 2014, Phil joined Lee Groat's lab (University of British Columbia) as an MSc student working on gem spinel occurrences in Nunavut. He recently transferred to the PhD program and broadened the scope of his research to assess gem potential in Canada on a regional scale. The first element of his research is to produce genetic deposit models for scapolite-hosted sapphire and spinel occurrences on Baffin Island, Nunavut. This will be achieved by detailed paragenetic determinations and the use of stable isotope geochemistry (e.g. boron, oxygen). He will use these new models, existing gem deposit models, data on known Canadian gem deposits, and additional field work to assess the distribution of colored-gem potential in the high-grade marble-rich Central Metasedimentary Belt (Grenville Province, Ontario and Quebec) and in the Lake Harbour Group (Baffin Island).