Project Title: An Analogue Mission to Discover the Genesis of Methane on Mars

Researcher's name and affiliation: The project lead is Dr. Michael Daly from York University, collaborating with Dr. Gordon Osinski from the University of Western Ontario and Dr. Timothy Barfoot from the University of Toronto Institute for Aerospace Studies. The project is funded through the Canadian Space Agency's Analogue Mission program.

Location: Lost Hammer spring on Axel Heiberg Island, Nunavut (79° 4'32"N, 90° 12'34"W).

Time Frame: From July 4, 2012, to July 18, 2012.

Project Description: The recent discovery of methane on Mars has generated much excitement in the scientific community. This is due to the fact that, on Earth, the vast majority of methane is from biogenic sources, leading to the unsubstantiated conclusion that the same is true for Mars. In addition, the localization of the methane leads to the conclusion that the production (or release) of methane is a current process.

In order to validate appropriate mission scenarios, measurement approaches, detailed science objectives, instruments and complementary measurements for an eventual mission to Mars, it is beneficial to study a local source of methane in an analogue site.

The site chosen for this project is the Lost Hammer spring on Axel Heiberg Island, Nunavut, a perennial cold hypersaline spring which seeps a significant amount of methane gas. This site is unique as it is the only documented methane seep in a cryoenvironment on Earth. It also demonstrates a possible analogous mechanism for the formation of methane plumes on Mars.

Transportation to the site will be by Twin Otter to a landing strip at Strand Fiord. A helicopter will then transport all personnel, gear and equipment to the Lost Hammer spring site.

A temporary camp will be erected consisting of 2 Longhouse tents and several small personal tents.

Methodology: A robotic rover will be outfitted with several sensors to enable autonomous navigation around obstacles in the terrain. The rover will also carry the methane detection instrument and will use this to localize the source to then obtain samples. Methane and rock samples will be collected by hand for later laboratory analyses.

Additionally, shallow geophysical surveys will be conducted by means of Ground Penetrating Radar and Electromagnetic Induction. Collection of these consists of manually dragging instruments over the area of interest.

Data/Reporting: Data collected during this project will be used to complete reports to the Canadian Space Agency. It will also likely result in publications and presentations to be presented at various scientific and technical conferences around the world.