

SPACE EXPLORATION SYMPOSIUM (A3)
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MARS ANALOGUE ROVER OPERATIONS IN THE ASBESTOS MINES OF QUEBEC.

Abstract

In this review of work performed in support of micro-rover operations at Mars analogue sites, we describe visits to the Jeffrey Mine in Asbestos, Québec, and to the Norbestos Mine near Asbestos, Québec, a modelling study to predict and interpret methane concentrations on the Martian surface, and support for an entry into the University Rover Challenge. As part of the Canadian Space Agency's micro-rover program we participated in two field deployments: to Jeffrey Mine in 2011 with a Pioneer 3 robot, and to Norbestos Mine in 2012 with University of Ottawa's Kapvik rover. A follow-up trip was made to Jeffrey Mine in 2013 to acquire a more rigorous set of water and gas samples to analyse carbon and oxygen isotopic ratios in water, CO₂ and methane. We present our experience at the sites, science objectives, instruments deployed, and campaign highlights. Our experience has led to involvement with the University of Toronto rover team's entry into the Mars Society's 2014 University Rover Challenge. We introduce the instruments and methods used to meet science objectives and results. In light of recent Earth-based observations of methane plumes on Mars, we present a novel study of small-scale plume dispersion on the Martian surface to answer the question of how close to the downwind trajectory of a point-source release a Mars rover must be to detect a methane plume.