Exploration of Mars (08)
Robotic Mars Exploration (1)

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SCIENCE ROVER & ROBOTIC PREPARATIONS FOR MARS SAMPLE RETURN

Abstract

The scientific exploration of Mars has been a persistent priority within the Canadian space exploration program almost since its inception a decade ago, under the leadership of the Canadian Space Agency (CSA). Three Canadian instruments have been launched to Mars so far: a thermal plasma analyzer (TPA) on Nozomi, the Phoenix MET lidar operated successfully on the Martian surface in 2009, and the APXS currently en route to Mars aboard the MSL Curiosity rover and due for initial operations later this year.

Mars Sample Return is consistently iterated by the CSA as a high priority mission interest, and for almost a decade now a broad program of preparation has been led spanning science research (in particular geology, atmospheres and astrobiology), technology development (from science instruments to robotic systems to full-scale rover vehicles) and mission preparations (concept studies, test operations infrastructure, analogue missions, and astromaterials sample curation facilities). Canada has been a contributor to the ESA-NASA ExoMars program since 2006, and this participation played a notable role in galvanizing Canadian exploration activities, including the development of multiple rover subsystem

developments and vehicle prototypes.

This paper provides an update concerning Canadian instrument, rover and robotic developments underway for Mars exploration, including concept development for a Mars Sample Fetch Rover, analogue mission deployments and mobility field testing for Mars Sample Return, ongoing Mars instrument prototype developments, and an update on a 4th generation Canadian Mars rover prototype being delivered to the CSA later this year. Consideration is given to the current Mars landscape and opportunities for further international collaboration within these preparatory activities are discussed.