

SPACE EXPLORATION SYMPOSIUM (A3)  
Mars Exploration – Part 1 (3A)

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THE MARS HOPPER: AN IMPULSE DRIVEN, LONG-RANGE, LONG-LIVED MOBILE PLATFORM  
UTILIZING IN-SITU MARTIAN RESOURCES

**Abstract**

The NASA and European Mars exploration programs are based on a joint exploration philosophy leading to a network mission and Mars sample return. The requirements and performance of planetary probes will need to meet the challenges imposed by network and sample return missions and guarantee a greater scientific return on the financial investment in new ambitious enabling technologies and each launch. As a result of increasing cost, the desire to acquire geochemical and geophysical data over large areas and samples from multiple regions, missions that can provide mobile, long range and extended lifetime platforms are becoming more attractive. The CSNR is designing an instrumented platform to be placed on the surface of a planet that could repeatedly acquire highly detailed data from the surface and subsurface, travel large distances to multiple sites, extract and store multiple samples, and deploy instrumentation. The Mars Hopper will enable a planet to be mapped and sampled with a higher resolution than orbiting platforms. The platform will be able to “hop” with a degree of flexibility from one location to the next, e.g. one scenario examined includes a hop every 2-3 days with a separation of 10-20 km per hop. With a lifetime goal of 10 years, the entire surface of Mars can be mapped in detail by a few dozen platforms. The basic design of the hopper along with results of preliminary performance calculations will be discussed.