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Hitchhiking to the Moon and Beyond (8)

Author: Mr. Grant Bonin
Space Flight Laboratory (SFL), Canada, gbonin@utias-sfl.net

Dr. Robert E. Zee
University of Toronto, Canada, rzee@utias-sfl.net

MOMENT: MAGNETIC OBSERVATIONS OF MARS ENABLED BY NANOSATELLITE
TECHNOLOGY

Abstract

MOMENT (Magnetic Observations of Mars Enabled by Nanosatellite Technology) would be a very small Canadian Mars orbiter, dedicated to improving knowledge of Mars's magnetic field. Its primary mission would be high-resolution low-altitude magnetic mapping of the Cimmeria / Sirenum region, the one area of Mars's surface which has substantial local magnetic fields. Magnetometry is one of the very few remote-sensing techniques that can examine the deep interior of a planet. In the case of remnant fields, it can also provide direct information on the distant geological past of the planet. Better magnetic measurements of Mars are highly desirable for the understanding of the basic physical properties of the Martian crust and core, and also Mars's rotational dynamics. MOMENT would use a highly-elliptical near-polar orbit with a period of approximately one Martian day, with periapsis as low as possible (ideally below 100km) above the area of interest. MOMENT would be carried to Mars as a secondary payload on a larger Mars orbiter. It would separate just after the carrier spacecraft's insertion into Mars orbit, in the highest possible elliptical orbit (before any carrier aerobraking), and would make its own way to its mapping orbit. Some arrival times and initial orbits are better than others, but within limits, MOMENT could adapt to the plans of any convenient carrier. It is concluded that the MOMENT mission represents a unique opportunity for performing high quality planetary science at the smallest scale, commensurate with the modest resources of many smaller space programs.