

Netlander Positioning with the Mars Infrastructure Constellation and Its Impact on Martian Geodesy

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In the past, investigation of Martian geodesy has been relying on observations of Viking and Mars Pathfinder landers from Earth Deep Space tracking network. The proposed Mars Express Geodesy Experiment (MEGE) will improve the accuracy of Mars geodesy by 1 to 2 orders of magnitude with doppler measurements between Mars Express orbiter and Netlanders. These landers will be placed on Mars surface separated by a few thousand kilometers.

As part of NASA's ambitious Mars exploration program in the new millennium, the Mars infrastructure constellation of low-altitude Microsats will be built up to provide planetary communication and navigation needs. The first orbiter of this constellation will be put into Mars orbit in 2003, and two more in each of 2005, 2007 and 2009, respectively. The final constellation will consist of 6 Microsats. (The first will be replaced in the build-up process). During the period 2006–2008 when the MEGE take place, 3 Microsat orbiters will be available. Doppler measurements from these orbiters would potentially strengthen the positioning for Netlander and, in turn, would further improve Martian geodesy parameters.

In this paper, we will present the results of a simulation analysis assessing the potential capability of infrastructure Microsats for improving Netlander positioning and Martian geodetic parameter determination. The effects of different constellation configurations on the level of enhancement capability will be investigated.