

## Martian Geodesy from Viking, Pathfinder, and Netlander

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Our current knowledge of Martian geodesy comes from Doppler and range measurements to the Viking and Mars Pathfinder landers. From these the precession of Mars' pole of rotation and the variation in Mars' rotation rate has been determined with enough accuracy to supply significant constraints on models of the Martian interior. Variations in annual and semiannual rotation variations have been observed and compared with models of seasonal mass exchange of carbon dioxide between the atmosphere and ice caps.

The Netlander mission will provide an opportunity to provide improved estimates of Martian rotation parameters. These improvement will be based on Doppler measurements between the Netlanders and a communications orbiter, and on Doppler measurements between the communications orbiter and the Earth. An analysis has been performed to determine the accuracy with which the Martian rotation parameters can be estimated. The analysis assumed weekly one-hour measurement tracks between three landers and an orbiter in a candidate Mars Express orbit. The analysis indicates that the precession constant may be determined with an improvement of a factor of 3 or more, and nutation variations due to a fluid Martian core may be detectable. These results depend on a very high precision in the orbiter-lander and orbiter-Earth Doppler measurements.