

# Anticipated Results of the MRO Radio Science Gravity Experiment

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The objectives of the Radio Science Gravity investigation on the Mars Reconnaissance Orbiter mission are to improve knowledge of the static structure and temporal variability of the Martian gravity field as relevant to internal dynamics, the structure and dynamics of the atmosphere, and the orbital evolution of spacecraft at Mars. The investigation will utilize X-band and Ka-band Doppler tracking observations and measurements of spacecraft range. Analyses will include improving the global gravity field by adding MRO observations to those from Mars Global Surveyor and Mars Odyssey. The utilization of data from three spacecraft will be useful in decorrelating errors in spherical harmonic coefficients. The low orbital periapsis of the MRO spacecraft ( $\sim 255$  km) will also enable gravity maps of high spatial resolution appropriate for study of regional structure. Measurements of spacecraft drag will be used to estimate density variations in the atmosphere relevant to weather patterns as well as aerobraking of future spacecraft. In addition, changes in the low degree spherical harmonic coefficients of the Martian gravity field will be used to measure the seasonal cycle of CO<sub>2</sub> exchange with the surface. Finally, the observations will be used to improve the ephemeris of Mars and the masses of the Martian moons Phobos and Deimos.