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# Gravity Fields and Interiors of the Saturnian Satellites

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The determination of the gravity fields of Saturn and its satellites is one of the main scientific goals and responsibilities of the Cassini Radio Science team. Our measurements allow the determination of the densities of the Saturnian satellites, the gravity fields of Rhea, Enceladus, Titan, and Saturn, and the dynamic Love number of degree 2 of Titan. We have acquired and analyzed radio tracking data of Enceladus, Dione, Rhea, Hyperion, and Iapetus, and determined the masses of these satellites as well as the gravity quadrupole moments of Rhea. At the time of the AOGS meeting we will also have acquired data during the first of the four Titan flybys of the nominal mission devoted to the study of its gravity. The determination of Enceladus' quadrupole field has been proposed for the extended mission. Our technique consists of using X-band and Ka-band coherent, two-way radio links to collect Doppler measurements in short data arcs. The Doppler data are fitted using a dynamical model that includes the gravitational accelerations from all Saturn system bodies, as well as non-gravitational accelerations from the spacecraft RTGs and from solar radiation pressure. Calibrations of the noise introduced by the Earth troposphere and charged particles in the solar corona and the Earth ionosphere are applied. The talk will discuss our gravity results as well as their geophysical interpretation. Non-differentiated and differentiated models consistent with the observations will be presented. Undifferentiated models are characterized by the mass fraction of silicate as a function of the silicate density. Differentiated models are characterized by the size of the core and the mass fraction of silicate in the core and in the mantle. All models either predict or are consistent with the quadrupole moments of the gravity field of the body considered.