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The Determination of Saturn's Gravity Field from Three Cassini Dedicated Flybys

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We present our current best results for Saturn's gravity field obtained by analyzing Cassini's data acquired during two flybys carried out during the nominal mission (September 2006 and May 2008) and the first flyby of the Equinox Mission (November 2008). An additional radio science flyby is planned in the Equinox Mission and more are under consideration for the End of Life mission, following the Solstice Mission. The Cassini Radio Science Team has already determined the coefficients J2, J4 and J6 with great accuracy using X-band Doppler data and the standard Earth tropospheric calibrations. In addition, during gravity field determination experiments, two and three-way Doppler data are acquired both at X- and Ka-band at the three complexes of the NASA's Deep Space Network, along with precise Earth tropospheric calibration data.
We show the three independent solutions for Saturn's gravity field obtained from each flyby and the combined, multiarc solution which allows the estimation of a single, consistent gravity field with smaller uncertainties in the harmonic coefficients.