



## **The gravity field of Titan from the first three Cassini flybys**

**L. Iess** (1), J.W. Armstrong (2), S.W. Asmar (2), A. Graziani (3), R. Mackenzie (4), P. Racioppa (1), N.Rappaport (2), P. Tortora (3)

(1) Universita' La Sapienza, Rome, Italy, (2) Jet Propulsion Laboratory, Pasadena, CA, USA, (3) Universita' di Bologna, sede di Forli', Italy, (4) ESA-ESOC, Darmstadt, Germany (luciano.iess@uniroma1.it/+39-06-44585670)

In the first two years of its tour of the Saturn system, the Cassini spacecraft has been used to determine the mass and gravity field of Titan and icy satellites. For Titan, the orbital fit of radiometric data acquired during three close flybys on February 27, 2006, December 28, 2006, and June 29, 2007 provided a first assessment of the gravity anomalies and geoid height. Global solutions have been obtained using a multi-arc technique applied to manoeuvre-free data arcs. The main observable quantities were the spacecraft range rate, obtained from dual frequency carriers at X and Ka-band (to mitigate the effects of interplanetary plasma). In addition, advanced water vapor radiometers were used when available to calibrate the wet path delay due to the earth troposphere. Thanks to the different geometries and location of the closest approach point, each flyby sampled different regions of the gravity field, thus allowing a good determination of the quadrupole coefficients. Thanks to the good accuracy of the tracking data, finer scales of the gravity field could also be detected. We present models based upon localized mass concentrations and higher degree harmonics.