



Use of satellite gravimetry for estimating recent solid Earth changes

Guillaume Ramillien

CNRS, France (guillaume.ramillien@get.obs-mip.fr)

Since its launch in March 2002, the Gravity Recovery & Climate Experiment (GRACE) satellite mission provides a global mapping of the time variations of the Earth's gravity field for the recent period. Official centers such as Center of Space Research (CSR) in Austin, TX, Jet Propulsion Laboratory (JPL) in Pasadena, CA and Geo-ForschungZentrum (GFZ) in Potsdam, Germany, provide 10-day and monthly solutions of Stokes coefficients (i.e. spherical harmonic coefficients of the geopotential) up to harmonic degree 50-60 (or, equivalently, a spatial resolution of 300-400 km) for the timespan 2002-2012. Tiny variations of the gravity measured by GRACE are mainly due to the total water storage change on continents. Therefore, these solutions of water mass can be used to correct other datasets, and then isolate the gravity signatures of large and sudden earthquakes, as well as of the continuous Post Glacial Rebound (PGR) rate. As these measured seasonal variations of continental hydrology represent the variations of water mass load, it is also possible to derive the deformation of the terrestrial surface associated to this varying load using Love numbers. These latter numbers are obtained by assuming an elastic Earth model. In the center of the Amazon basin, the seasonal displacements of the surface due to hydrology reach amplitudes of a few centimeters typically. Time-series of GRACE-based radial displacement of the surface can be analysed and compared with independent local GPS records for validation.