



Surface mass anomalies derived from GRACE observations using a regional approach. Comparison with classical global solutions.

G. Ramillien (1), S. Bourgogne (2,3), R. Biancale (2), J.-M. Lemoine (2)

(1) LEGOS, UMR 5566, Toulouse, France, (2) Geodesie Spatiale, DTP, UMR 5562, Toulouse, France, (3) NOVELTIS, Toulouse, France

A new approach based on the analysis of precise GRACE orbits is proposed to compute surface mass variations of continental water storage at regional scales and higher spatial resolution (~200 km). This strategy represents an interesting alternative to the classical global spherical harmonics-based method for recovering surface water mass variations. For validation, regional estimates were compared to classical 10-day and monthly global solutions compute using GINS software. Residual anomalies of gravitational potential along GRACE short arcs were estimated by: (1) solving the time-integrated energy balance equation with GINS-simulated measurements (positions and velocities by GPS, effects of non-conservative forces detected by on-board accelerometers, satellite-to-satellite tracking from K-Band ranging system), and (2) subtracting the effects of known periodic phenomena (i.e., atmosphere and oceanic tides mass changes) to isolate the contribution of surface hydrology. The differences of potential between the two GRACE satellites were inverted linearly to recover regional grids of surface mass anomalies expressed in terms of mm of equivalent-water thickness. This preliminary study was limited to satellite data simulations for making several tests taking different sources of error on input measurements and corrections into account.