Geophysical Research Abstracts,
Vol. 11, EGU2009-5236, 2009
EGU General Assembly 2009
© Author(s) 2009

Investigation of height combination schemes for sea surface topography determination in the presence of satellite gravimetry data

G.S. Vergos and I.N. Tziavos

Department of Geodesy and Surveying, Aristotle University of Thessaloniki, Thessaloniki, Greece (vergos@topo.auth.gr, 00302310995948)

With the advent of the recent and forthcoming gravity-field dedicated satellite missions the determination of the quasi-stationary part of the sea surface topography (QSST) has gained significant importance for both geodetic and oceanographic applications. The improved accuracy in geoid determination envisaged by these new missions allows for a more rigorous estimation of the QSST and its separation from altimetric observations towards marine geoid and ocean circulation determination. In geodetic applications, the QSST is needed to reduce altimetric observations from the sea surface to the geoid, while in oceanographic research it is used to derive the velocities of geostrophic currents. Optimal height combination employing all available input data with proper variance covariance propagation can lead in an improved estimation of both geoid heights and the QSST. This work focuses on the presentation of a detailed least squares collocation combination scheme for QSST determination, based on available satellite altimetry sea surface heights, shipborne free-air gravity anomalies, GPS ellipsoidal heights, and GOCE-type observables of the potential and its second order derivatives. Analytic equations for the input and output signals auto- and cross-covariance functions are derived while the necessary theoretical background for variance component estimation is outlined as well. Finally, the equations for the output signal estimation are given in detail along with a possible extension of the method to time-dependent oceanographic signals like the time-varying sea surface topography.