A new approach for estimation of sea surface topography (SST) from combined altimetry and gravimetry data, by applying generalized Tikhonov method in Geoid computation

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This paper aims to estimate the Sea Surface Topography at selected areas through a dedicated combination of satellite altimetry and satellite gravimetry data. Knowledge of the sea surface topography is of particular interest for understanding the velocity field and the long-term evolution of mean sea level. In its initial phase the investigations are focused on estimation of MSL point values (dot) using the data of Topex/Poseidon and Jason satellite altimetry missions possibility of establishing a monitoring technique for sea level variations, so that from repeated observations at the footprints of the satellite along track a time series are constructed and after a time-wise procedure, MSL can be obtained. As precise determination of SST, in the second step, it is essential to attain a precise and accurate Geoid, thus Ardalan-Grafarend method has been used for this purpose. In this Geoid computation method, the incremental (or reduced) observational functionals are downward continued by inversion of the ellipsoidal Abel-Poisson integral which is a first kind Fred-holms integral equation. In this equation the incremental gravitational potential functionals as unknowns are under integral sign and the incremental gravitational observation functionals are in right hand side. In solving this problem, Instability makes it Ill-posed. Also the regularization methods are proposed to treat Ill-Posed problems. Generalized Tikhonov regularization method by Sobolev norm has been employed to downward-continue

the land-based data and marine Grace/Champ gravitational observation to reference ellipsoid. The downward continued incremental potential data on the surface of the Reference Ellipsoid are converted into geoidal undulations by means of the ellipsoidal Bruns transform (Bruns formula). Finally, SST will be simply reached from deviation of computed Geoid and MSL at supposed areas.