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Regional Enhancement of the Mean Dynamic Topography using GOCE Gravity Gradients

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The GOCE mapping of global variations in the gravity field has already made a great impact on the mapping of the mean dynamic topography (MDT). Initially, GOCE spherical harmonic models are combined with high resolution MSS models for deriving global MDT models. In this study a methodology for using GOCE gradients to extract more signal in local areas than recovered by GOCE global models. Subsequent analyses of the regionally enhanced geoid have determined the extent to which GOCE gradient data may improve the modelling of the ocean transport. For the regional geoid modelling a method based on reduced point masses is implemented. The Least Squares Collocation method (LSC) for regional gravity field modeling from satellite gravity gradiometer was chosen as an reference. LSC requires the solution of as many linear equations as the number of data, so GOCE gradient data needs to be thinned prior to applying the method. When RPM method is used, that is not the case. Thus, in the case of RPM method, it is possible to use all gravity gradients available.
The preliminary results presented here show good agreement in prediction of both gravity anomalies residuals and geoid height anomaly using both the RPM and the LSC methods. Though the results from the two methods are very similar, the inclusion of the full data sets in the RPM method yield improvements in wave lengths associated with harmonic degrees 120-240. The improvements may improve the estimation of the MDT subsequently.