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Error Reduction in GRACE+GOCE Geodetic MDT via Spectral Editing – Comparison to Ocean Models and Drifter Data

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The complementarity of the gravity missions GRACE (Gravity Recovery And Climate Experiment) and GOCE (Gravity Field and Steady-State Ocean Circulation Explorer) has led to a collection of GRACE+GOCE combination gravity fields. However, detailed quality analysis of this products reveals characteristic errors in gravity fields resulting in North-South striations, or even small-scale bumpy patterns over the ocean.

In the context of the Mean Dynamic Topography (MDT) computation, these errors can become so predominant that they prompted the community to apply heavy smoothing filters to the geodetic MDT models, therefore removing most mesoscale signals out of the resulting MDT. MDT based on satellite-only gravity models computed in such fashion are not appropriate to resolve mean spatial mesoscale ocean circulation patterns and geostrophic currents, putting in question their usefulness in the first place.

The focus of this study is to characterize the geoid error in GRACE+GOCE combination gravity models in the spatial domain and in the context of the determination of the MDT. By using spatial spectrum editing instead of a regular smoothing approach, we show that we can greatly reduce the geoid errors while causing much less damage to the MDT mesoscale signals and the subsequent mean geostrophic currents.