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Error assessment of dynamic ocean topography profiles

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The geodetic way to estimate the dynamic ocean topography is to subtract geoid heights of one of the most recent satellite-only gravity fields (e.g. GOCO02S) from sea surface heights observed by satellite altimetry. Both, geoid and sea surface heights, are to be consistently filtered. We follow an approach performing the filtered differences along individual altimeter ground tracks in order to avoid an initial gridding and to maintain as much sea surface height details as possible. The method results in instantaneous dynamic ocean topography (iDOT) profiles which exhibit not only the well-known large scale gyres of the ocean topography but also meso-scale eddies along with their temporal evolution.

In order to assess the quality of the iDOT profiles and to assimilate them into numerical models an utmost realistic error estimate should be provided. In this paper we assess the accuracy of our approach and propagate the errors of both, the geoid and the sea surface heights. For the sea surface heights, an auto-covariance function derived from a multi-mission cross-calibration is taken into account. In order to estimate the geoid error we consider various strategies for a propagation of the full variance-covariance matrix of the satellite-only gravity field.