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CryoSat-2-only gravity model of the Mediterranean: topographic effects and validation

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The long repeat cycle of the Cryostat-2 provides dense cross track coverage. Combined with the better along track resolution and precision, the 6 years of CryoSat-2 data can be potentially used to extract the high frequency components of the Earth gravity field beyond the Global Geopotential Models (GGMs) which corresponds to a resolution of 9.2 Km at the degree 2160. The high resolution bathymetry models, e.g., SRTM30, correspond to the spatial resolution of around 1 Km. High resolution bathymetry data is used to account for the strong correlation in the short wavelength (1$\sim$10 km) gravity features with topography and bathymetry.
In this work, with remove-restore technique and Residual Terrain Model (RTM) reduction (using SRTM30), the topographic contribution to the geoid undulation will be examined in several patches ($2^\circ \times 3^\circ$) in the Mediterranean. The covariance function of the residual height anomalies with and without the RTM reduction will be estimated and a proper covariance fitting algorithm will introduced when the assumption of isotropy and homogeneity is fulfilled. Then the Least Square Collocation (LSC) algorithm is used to derive the residual gravity anomalies over the ship tracks from the CryoSat-2-only height anomalies. The "full wavelength" true gravity measurement along the ship tracks then will be used to evaluate the final results and performance of the LSC solutions. Alternatively, the FFT method will also be tested, provided that the height anomalies are gridded. The CryoSat-2 altimetry data is retracker and operation mode dependent. Since different retrackers and operation modes (e.g., LRM or SAR) could produce altimetry products with different precision and accuracy, different altimetry datasets, e.g., from RADS and GPOD, will be tested and compared.