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A new Mean Dynamic Topography of the Mediterranean Sea based on model outputs, drifter data, hydrological profiles and altimeter measurements

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A new estimate of the Mediterranean Mean Dynamic Topography has been computed. The methodology used is similar to the previous work by (Rio et al, 2007). A first guess solution based on the Mediterranean Forecasting System 7 years (1993-1999) model mean is improved using information from oceanographic in-situ measurements and altimeter anomalies.
Altimeter data used are the Level Anomalies computed specifically for the Mediterranean Sea by the SSALTO-DUACS center and distributed by AVISO. In addition, two types of in-situ measurements are used: on one hand, dynamic heights relative to 350m are computed from T/S profiles measured by CTD (IBAMar database covering the period 1993-2010), gliders (Socib-Imedea database for 2011) and different other casts, including ARGO floats from the EN3 database for the period ranging from 1993 to 2012. The missing barotropic and deep baroclinic components were estimated and added to the dynamic heights relative to 350m in order to compute the absolute dynamic topography. On the other hand, surface currents were deduced from drifting buoy trajectories and processed to extract the geostrophic component.
Altimeter sea level (resp. velocity) anomalies were then subtracted from the instantaneous in-situ measurements of the absolute dynamic topography (resp. ocean surface geostrophic current) to obtain estimates of the mean dynamic topography (resp. mean geostrophic currents).
These estimates were then used to improve the model first guess through a multivariate objective analysis and map the Mediterranean Mean Dynamic Topography on a 1/8° regular grid.
The obtained MDT was validated against independent in-situ observations. A specific validation was carried out in the Balearic Sea.