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Validating geostrophic currents of a dynamic ocean topography estimate with data of ARGO floats and surface drifters

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Improvements in both, satellite altimetry and Earth gravity field modelling allows today to significantly estimate the deviations between the sea surface and a geopotential reference surface, known as dynamic ocean topography (DOT). The DOT estimate used in the present investigation is based on the „profile-approach“ developed and documented by Bosch & Savcenko (2010) and Bosch et al. (2012). While other geodetic methods use a long-term mean sea surface and estimate a mean dynamic topography the profile approach provides DOT estimates on individual altimeter ground tracks and allows to study the temporal variation of the DOT on spatial scales, close to meso-scale structures.
In the present study we validate the time-variable DOT by gridding the DOT-profiles, computing the associated geostrophic velocity field and comparing this with gridded surface currents observed by ARGO floats and surface drifters, both corrected for wind and Ekman drift. It can be shown that both velocity fields agree quit well on a quaterly basis, choosen in order to have a sufficient density of the in-situ data. In order to avoid any unneccessary smoothing we also perform a pointwise comparison, where the geodetic DOT and the geostrophic velocity components are interpolated to individual observations of ARGO floats and surface drifters. Results are presented for a number of study areas covering above all the strong western boundary currents.