EGU25-10704, updated on 30 Apr 2025
https://doi.org/10.5194/egusphere-egu25-10704
EGU General Assembly 2025

Diagnosis of near-surface horizontal momentum balance from SWOT altimetry, drifter trajectories and wind reanalysis in the Western Mediterranean Sea.

Margot Demol, Aurélien Ponte, and Pierre Garreau
IFREMER, LOPS, Brest, France (margot.demol@ifremer.fr)

By giving a highly resolved 2D view of sea level (down to submesoscales), the recently launched SWOT altimetric satellite is revealing a brand new view on upper ocean dynamics. The signatures of ageostrophic processes (e.g. submesoscale, internal gravity waves) on SWOT SSH is nevertheless expected to complicate the estimation of the upper ocean circulation from SWOT altimetry. An improved knowledge of the relative importance of these signatures is thus required. From April to July 2023, SWOT flew over the Western Mediterranean sea daily. Meanwhile, three different in-situ campaigns of the SWOT-Adac Consortium (C-SWOT-2023, FaSt-SWOT and BIOSWOT-Med) deployed numerous in situ instruments, including drifters, to sample the upper ocean underneath the satellite tracks. We combine here these in-situ observations with wind reanalysis and SWOT sea level data to reconstruct the near-surface horizontal momentum balance. For given observation sources, an original statistical method enables us to not only quantify contributions from the different dynamical terms involved (e.g. inertial acceleration, coriolis acceleration, pressure gradient and wind stress vertical divergence) but also identify different dynamical regimes. This analysis reveals in particular limits of the geostrophic approximation and the dominance of inertial balance. We also present a detailed error budget including SWOT noise and comparisons between analyses with Pre-SWOT L4 gridded and SWOT sea levels.