

Diagnostics of the Agulhas eddies propagation in ocean reanalyses, OGCMs and satellite altimetry

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Agulhas eddies are known to transport hot and salty Indian Ocean waters into the Atlantic Ocean through the Agulhas leakage. The scope of this work is to qualitatively analyse the synoptic and subsynoptic ocean dynamics within the Agulhas Current. The main question addressed in this study is - how well modern high-resolution OGCMs (with respect to the satellite data) and reanalyses agree in resolving dynamics and structure of the Agulhas Current? To answer these question, we performed simulations (more than 50 years) with two OGCMs: FESOM (Finite-Element/volume Sea ice-Ocean Model) with unstructured mesh locally refined (up to ~4 km) over the Agulhas region and NEMO (Nucleus for European Modelling of the Ocean) with a nested configurations at different horizontal resolutions (up to 1/20°).

Validation of the Sea Surface Height (SSH) in model outputs and reanalyses against satellite altimetry data shows the good agreement between two models, reanalyses and satellite data in the size, shape and speed of the propagating patterns before the retroflexion point. Those patterns are mostly anticyclonic eddies in the Mozambique Channel and Agulhas Current, and meanders in the Agulhas retroflexion. Over the South Atlantic, models, however tend to put the anticyclonic eddies to much equatorward comparing to satellite altimetry data. In our study we investigate this issue with the analysis of the vorticity balance.