BENCHMARKING MESOSCALE VARIABILITY IN GLOBAL EDDY-PERMITTING SIMULATIONS AGAINST SATELLITE-DERIVED DATA

Mesoscale turbulences have been mainly addressed through regional-dependent techniques and *ad-hoc* tuned simulations. Few and sparse information can be inferred from in-situ data, while recently available satellite maps monitor surface physics only, missing any detail of their vertical profiles.

We present a study of three-dimensional eddy structures throughout the whole ocean basin, coming from the eddy-permitting C-GLORS reanalysis dataset [1] that covers more than 30 years time-window. Thanks to assimilative procedure, eddy population is comparable in size with higher resolution run in literature [2]. We focus on a recent 10-year period (2004-2013) where a comparison with a global free-run and 2D eddies from satellite Sea Level Anomaly (SLA) maps, is assessed. The reanalysis is actually able to catch most of the variability shown in the surface satellite maps, furthermore allowing a vertical study of their features. A census of baroclinic/barotropic field anomalies trapped and dragged by eddies as function of eddy life-time is presented at a global level.

Results are constrained by two different eddy-detection methods. They both belong to the family of Sea Surface Height segmentation algorithms that are presently ameliorated by adding a simultaneous vortex detection in current field. The latter captures eddy vertical extension as long as filtering out too-shallow "spurious" eddy-like pattern. To identify the eddy, a parameter-less technique based on local SLA extreme [3], is employed and compared to a more physical algorithm based on a maximum eddy-size cutoff.

[1] Storto, A., S. Masina, and A. Navarra (2015), *Evaluation of the CMCC eddy-permitting global ocean physical reanalysis system (C-GLORS, 19822012) and its assimilation components*, Q. J. ROY. METEOR. SOC. , doi: 10.1002/qj.2673.

[2] Petersen, M. R., S. J. Williams, M. E. Maltrud, M. W. Hecht, and B. Hamann (2013), *A three-dimensional eddy census of a high-resolution global ocean simulation*, JGR:Ocean, doi:10.1002/jgrc.20155.

[3] Faghmous, J. H., I. Frenger, Y. Yao, R. Warmka, A. Lindell, and V. Kumar (2015), *A daily global mesoscale ocean eddy dataset from satellite altimetry*, Scientific Data 2, doi:10.1038/sdata.2015.28.