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1 Merging Multi-Satellite Altimeter Missions to Monitor the Global Ocean

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Satellite altimetry is considered as one of the most important input datasets for operational applications, as it provides surface dynamic topography measurements, which constitute a strong constraint to estimate and forecast the three-dimensional ocean state through data assimilation. One requirement for satellite altimetry is that at least two altimeter missions are needed to resolve the main space and timescales of the ocean [*Koblinsky et al, 1992*]. However, *Pascual et al. (2004)* have recently shown that in the Mediterranean, the combination of two satellites fails to reproduce some intense signals that are properly recovered when four altimeters are merged. They have concluded that at least three, but preferably four, altimeter missions are needed for the correct monitoring of the Mediterranean mesoscale circulation.

In this work we extend the study carried out in the Mediterranean to a global ocean scale. We analyze one year of data combining five altimeter missions [Jason-1, ERS-2, TOPEX/POSEIDON interleaved with Jason-1, Geosat Follow-On and ENVISAT]. The sea level anomaly along track data are intercalibrated and merged in an objective analysis scheme and a mean dynamic topography is added in order to obtain absolute dynamic topography. Geostrophic velocities are computed through finite differences with the beta plane approximation in the Equator. The Ekman component, estimated following *Faugere and Larnicol (2004)*, is also included. Finally, we compare the multi-mission maps with other independent datasets such as drifters and tide gauges in order to verify the improvement with respect previous altimetric maps obtained from a combination of only one or two altimeters. We evaluate the impact by computing global and local statistics, focusing on different regions [e.g. Gulf Stream or Agulhas Rings] and selecting open or coastal sea areas.

References

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