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Ocean Science Discussions

Interactive comment on "Mediterranean subsurface circulation estimated from Argo data in 2003–2009" *by* M. Menna and P. M. Poulain

Anonymous Referee #2

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General This paper descriptively presents mean and variability of the subsurface Mediterranean currents estimated from Argo float trajectories. In order to obtain drifting distance of the floats at the parking depth, they use the Park et al. (2005) method to remove the complete surface trajectory. The main results are about general features of the subsurface currents based on rough statistics without any relevant physical processes. Although their analysis may be a kind of new observational results obtained from unprecedented float datasets, I recommend revising the paper before publication.

Comments

1. Error estimation of subsurface currents: According to the authors, the Argo floats in Mediterranean typically stay at the surface for 6 hours which seem quite short to accurately estimate the inertial strength (referring to Park et al., 2004). Higher uncertainty

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of inertial strength may lead to higher uncertainty of the extrapolation. Even though the authors use the measure “skill” as a fitting effectiveness to sort out the velocity estimates, the skill is not necessarily well correlated with the accuracy of extrapolation. You may be able to test the extrapolation method with actually known position and to show briefly whether the skill would be a good measure for the velocity accuracy or not.

2. Drift computation during ascending and descending: The authors actually tried to compute the drift during ascending and descending. However, it is possible to produce even more error in the subsurface current estimation in several points. First, since the surface velocity (u^{n-1}) may contain inertial current, subsurface currents can have very different direction with the surface current. Second, it should be clarified how author can assume that the velocity at parking depth is zero when computing drifts during ascending and descending. At last, the authors are dealing with ParkProfile floats which make the drift computation much difficult. The timings of DE, DPS, and AS have uncertainties especially unless they are directly measured. So, it would be the other source of error in estimating the drift. I recommend not increasing the error in your estimation by adding the drift during ascending and descending. It is totally necessary to quantify how much the drifter by velocity shear would be though. I recommend the authors should carefully check the formulation in Park et al. (2005) and find how the shear part should be treated.

3. Meaning of mean and variance in each bin: Many bins where to compute mean and variance of the velocities contain smaller samples of 30. Even with only two samples, mean and variance in the bin can be computed, but it would be hard to have any physical meaning like how the bin-averaged value is close to the true mean. Therefore, the authors should try to provide not only the bin-averaged velocities but also, at least, their errors in order to regard it as physical mean flows. The uncertainty of bin-averaged values may be a function of variance and degree of freedom in each bin.

4. Following bathymetry: At least you have to consider potential vorticity rather than

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simple topography. The section 4.3 is like scratching the surface. I recommend either removing the section or digging up a little more.

5. Linkage with water mass distribution: The authors claim that the currents obtained from the Argo float data may show the LIW circulation. I wish I could see the LIW property distribution along with the mean and variability of the currents. As describing in the introduction, it would be great if the authors tried to connect their velocity result to the LIW or other related water mass distribution.

6. Misspell: Correct " er then" to " er than" (2724.10 and many others).

Interactive comment on Ocean Sci. Discuss., 6, 2717, 2009.