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Ocean Science Discussions

Interactive comment on "The assessment of temperature and salinity sampling strategies in the Mediterranean Sea: idealized and real cases" *by* F. Raicich

Anonymous Referee #2

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- An OSSE is carried out successfully based on a reduced order OI technique implemented by DeMey and Benkiran (2002) (SOFA).

- Order reduction is obtained by the computation of Model multivariate EOFs for temperature, salinity and SLA.

- The present work appears as an extension of a previous OSSE published by Raicich and Rampazzo (03) for the MFSPP which was limited to temperature observations.

General comments:

- Even if it is most often insufficient to demonstrate the validity of an assimilation

scheme, the twin experiment strategy clearly appears as a necessary step. To this extend the present work is very interesting and leads to conclusive remarks that shall be useful for any further realistic assimilation exercises.

- We could however regret that very little information is given about the way the initial conditions for the assimilation run are obtained. Figure 10 (commented page 139) is indeed the only piece of information. The author should give details about the added noise in so far as the way the mesoscale dynamics is perturbed seems to have a crucial influence on the success of the assimilation.

- The author should also give some hints about the limitations of the approach:

- We could indeed wonder if the performances of the assimilation scheme are very dependant on the initial conditions. The author should discuss this point and, if possible, give some proof of the generality of its results. If affordable in term of numerical cost, an Ensemble technique such as the one proposed by Evensen (94) could be pertinent: its applicability and/or necessity should be discussed at least for future works.

- The “undesired correction" obtained for tracks 2b and 3 together with the very small impact of the assimilation of track 4 could be surprising:

* [p 138 lines 17-19]: What is meant by “OI parameters" ? Are the Eofs used for the order reductions really adapted ? Is their total number (20) sufficient?

* Could it be that another strategy for perturbations would give different results?

* Which conclusions should be drawn from the present result for these tracks? Does this mean that this observation strategy cannot efficiently correct errors in the characteristics and/or position of the water masses ?

- p 131: The author chose to study standard deviation (as for the pilot project OSSE), In a previous paper, the author reported that the evolution of the “RMSm" (for mean RMS) was sensitive to the initial conditions. This point should be discussed in the context of the “multivariate OSSE" by indicating at least if the same comments can be made.

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- p 133: The reasons why the author chose two 7-day assimilation cycles separating T-S and SLA are not clear (to me).

- p 133: Was the sensitivity to the number of Eofs (20) tested ? Is this number based on physical background or on numerical cost? Are these Eofs dependant on the region?

Minor comments:

- Page 131 Line 7: the true ocean (...) provides temperature “and salinity" data...

- Page 134 Line 3: the data “errors" are uncorrelated with each other.

- Page 137 Lines 17-19 : the definitions of sig_a and sig_f should be given with the presentation of Figure 1 (page 132). Indeed the ratio sig_a over sig_f is plotted on this figure. The author should also briefly explain why temperature is shown for the eastern bassin and salinity for the western bassin.

- Page 143 lines 20-24 : the north-western Mediterranean is also a region with complex dynamics (northern current...) although tracks 2b, 3 or even 4 do not have a positive impact on the assimilation...

Figures:

- Figure 1: the label for the vertical coordinate has not been defined. It is defined at the beginning of section 4. The indications for L1 and L2 (as given for Figure 8) should be added to the caption.

- Figures 3, 4, 5 and 6 : labels and ticks are missing for latitude and longitude.

- Figures 8, 9, 12 and 13 : the curves are rather difficult to distinguish. The author should use some other plotting methods.

- Figures 12 and 13 : unlike the previous figures (a) is temperature and (b) salinity... which is misleading as all other figures are the other way round.

Interactive comment on Ocean Sci. Discuss., 3, 127, 2006.