

Dear reviewer#1,

Thank you for your carefully reading the new version of the article.

We addressed the question you pointed out about the under-determination of the assimilation system and the dependence of the assimilation solution on the choice of the first guess. We made two additional experiments which assimilate complete daily fields of SSH. They differ with respect to the initial conditions, which show us at which extend the solutions of both methods are dependent on the first guess. Of course the used observation network is not enough to determine the system from the mathematical point of view. However, it avoids the use of spatial covariance to update the SSH variable and sample the unstable structures that are connected to the SSH dynamics. Nonetheless, we still rely on the variables covariance to update velocity, temperature and salinity. The results concerning the new set of experiments are shown in Sect. 6.2.2.

For sake of simplicity the ensemble of lines where we have modified the article are listed below:

lines(l)16-17

l109-111

l164

l178-181

l188-195

l340-364

l451-452

l456-463

l482-486

l519

l567-613

l634-639

We would like to say that the observation of complete daily fields of SSH is quite favorable and in a real ocean assimilation system the observations are along-track sea surface height sampled with periods varying from 10 to 30 days. Additional information comes from satellite-based measurements of sea surface temperature, which may give information about the mixed-layer, and ARGO buoys which are sparse (there are 3000 buoys in the ocean) and sample the water column between the surface and 1500m. Therefore, real ocean assimilation systems are very often undetermined and the quality and regularity of the analysis strongly rely on the quality of the model errors statistics.

Finally, we would like to reinforce the fact that we are not looking to draw definitive conclusions about which method works best, our main objective is “to study the possibility of applying the BFN in realistic models and evaluate its performance compared to the 4Dvar”. We think we have reached this goal with the article in its new form.