Ocean Science
Discussions

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Interactive comment on "Assessment of an ensemble system that assimilates Jason-1/Envisat altimeter data in a probabilistic model of the North Atlantic ocean circulation" *by* G. Candille et al.

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We thank Referee #1 for her/his careful reading of the submitted paper and for her/his comments which help to clarify some points in the paper. Note that many changes have been done to answer to comments from referee #2.

Specific comments

RC: In general, I'm happy with the paper as it is, but there is one detail in the analysis that could be improved, in my opinion, if the authors choose to. SSH statistics from a 6-month free run (Jan 2005 to Jun 2005) is compared with statistics from a 12-month assimilated run (Jul 2005 to Jun 2006). The comparisons they make between these

two runs make sense to me, but it would have been much easier (and safer) to make the comparisons if the two runs had overlapped, e.g. by extending the free run into 2006; see figures 6, 7, 9, 10, 12

AR: Concerning the main specific comment, we agree that a comparison between the free run and the analyzed run over 6 months overlapped period would be statistically more consistent. But in practice –for technical reasons- it is very difficult to extend the free run for another 6 month. We did the choice to perform a whole year for the assimilated run which already takes a long time and many computational resources (yearly request on supercomputer centre). On the other hand, the diagnostics on the free run suggest the global score (CRPS) and the ensemble dispersion (at least over the focused area) are saturated after 5-6 months. Actually, the CRPS –at least for the SSH- reaches its lower limit (in terms of skill): the uncertainty associated with the climatology. From there no change in the probabilistic skill of the ensemble system is expected. These are the 2 main reasons why we chose to not extend the free run integration.

Technical comments:

RC: P. 2651, l. 10-11: SSH is also one of the prognostic variables. Further, I believe the vertical velocity component is a diagnostic variable, not a prognostic.

AR: Right, the sentence has been changed:

"the prognostic variables are temperature, salinity, zonal and meridional velocities, and sea surface height."

RC: P. 2652, l. 20: It should be Levitus (1998) (wrong year)

AR: year changed.

RC: P. 2657, l, 22: spelling: "satisfy"

AR: corrected.

RC: P. 2658, l. 8: "...in terms of..." (the "s")

AR: corrected.

RC: P. 2661, l. 22: It says that "a negative bias is noticeable for salinity". I fail to see this from Figure 5. Could you please explain?

AR: Despite the 2 outlier bins seems pretty equal, the upper bins (right side of the histogram) are much more populated than the lower bins (left side of the histogram). This illustrates the negative bias: the verification observation tends to be systematically greater than the ensemble members, i.e. the ensemble underestimates the verification value.

We add the following text p2658 l25 to clarify the bias definition:

"Also, a positive (negative) bias is characterized by the fact that the bins of the left (right) side of the histogram are overpopulated compared to the bins of the right (left) side of the histogram, i.e. the ensemble tends to over(under)estimate the verification value."

RC: P. 2665, l. 6-7: "...is used for the assimilation..."

AC: corrected.

RC: P. 2670, l. p. 6: "...uncertainty of the model..."

AC: corrected.

Interactive comment on Ocean Sci. Discuss., 11, 2647, 2014.

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