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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.

Anonymous Referee #1

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General Comments

I have reviewed the paper "Assessment of an ensemble system that assimilates Jason-1/Envisat altimeter data in a probabilistic model of the North Atlantic ocean circulation" by Candille, Brankart and Brasseur. The paper describes a probabilistic ensemble forecast system covering the North Atlantic. It employs stochastic perturbations in the equation of state to simulate uncertainties in the model system. The system is evaluated in terms of SSH (sea surface height) using along-track altimeter data (that are assimilated into the model) as well as T/S (temperature/salinity) profiles from Argo floats (that are not assimilated). They show that without data assimilation, the system is comparable to climatology in terms of SSH and better than climatology when along-

track SSH data are assimilated. For T/S profiles, however, the result is inconclusive as to whether the assimilation of SSH helps or not; in one test region it does, in one region it does not (actually becomes worse).

The paper is very well written and easy to read. They have made a careful analysis using methods originally developed for meteorological applications. They make a rightful claim that the SSH forecasts are improved using data assimilation and are honest to state that the T/S structure is not improved. The analysis method in combination with the stochastic perturbations in the equation of state is interesting and I think the paper deserves to be published after minor technical corrections.

Specific comments

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.

Technical comments

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.

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

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

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

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?

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

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

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