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Ocean Science Discussions

Interactive comment on "Controlling atmospheric forcing parameters of global ocean models: sequential assimilation of sea surface Mercator-Ocean reanalysis data" *by* C. Skandrani et al.

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We would like to thank the reviewer for his/her careful reading of the manuscript and for his/her appreciation of the work done in this paper. We did our best to take his/her remarks into account in a revised version of the manuscript (see explanations below).

Concerning the decision not to include the wind, it is true that our explanation was probably insufficient to justify the decision, which was also motivated by the necessity to proceed step by step to avoid introducing too many difficulties at the same time. We

did not even try to include the wind in the control vector and have thus no clue about the difficulties that would have arisen. (See also the answer to comment 8 of reviewer #2.)

In order to clarify this point, we have added the following explanation to our original justification: “The decision not to control this important source of model error results from the necessity of proceeding step by step to avoid unpredictable difficulties in the solution of the inverse problem. However, we must be aware that, as any uncontrolled error (like the localization of the boundary currents), this can introduce compensation problem in the parameter estimates (see section 4.3).”

Concerning the discussion of the results, it is not always easy to interpret everything.

- It is true that the corrections to C_E and C_H are almost identical. This results from the structure of the perturbations that were applied to the parameters in the ensemble forecasts. Their covariance is the covariance of the variability of the parameters in a free model simulation, and since they are modelled to vary almost together in the bulk formulation, the assimilation scheme can only compute almost equal corrections for these two parameters. The real error is certainly more complex, but more sophisticated assumption about model error would be necessary to go beyond this kind of correction. A word of explanation has been added in the paper to clarify this point: “On these maps, it is also interesting to see that almost identical corrections are computed everywhere for C_E and C_H consistently with there physical meaning. (Both are linear functions of the turbulent friction velocity.) Since the perturbations applied to the parameters in the ensemble forecast have the same covariance as a free model simulation, C_E and C_H can only be corrected in that way by the assimilation scheme.”
- Yes, cloud cover seems to be preferentially saturated. Again, this closely depends on our assumption about parameter errors. But it is difficult to say that this behaviour could be expected: it depends in a complex way on the relative vari-

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ance of the parameters variability, and on their relative impact on the observed quantities (SST and SSS).

In conclusion, we agree that this study represents only a first step towards a method that can be routinely applied in ocean forecasting or reanalysis system, but we hope that our experimental setups and results can serve as a useful basis for further developments.

Interactive comment on Ocean Sci. Discuss., 6, 1129, 2009.