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Comment

## ***Interactive comment on “Impact of hydrographic data assimilation on the Atlantic meridional overturning circulation” by G. C. Smith et al.***

**G. Smith**

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I would like to respond to the first comment made by the reviewer, that “any credible analysis of a hindcast simulation forced with such interannually varying surface forcing should be based on at least several cycles of such forcing”, as I believe there has been some misunderstanding of the intent and main findings of the submitted manuscript.

The aim of this study is not to analyze a hindcast simulation for its own sake, but rather to compare it to an assimilative simulation. In fact if more cycles of the forcing were run as suggested by the reviewer the control run would simply develop larger water mass errors due to errors in the model and forcing fields. These larger errors would be corrected for when data are assimilated, apart from in the deep ocean, below 2000m, where there is little data and larger biases with remain. The importance of

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initial conditions and of using a model that has not drifted too far are discussed in Section 5, where additional simulations are presented that differ in their initial condition to illustrate the degree to which the assimilation is able to constrain these deeper water masses.

I therefore strongly disagree with the reviewer in saying that a control simulation with at least 3-4 forcing cycles must be used in order to demonstrate the robustness of the results and would not change the main conclusion that: assimilation of upper layer density information projects mainly on the gyre circulation with little effect on the AMOC due to the absence of corrections to density gradients below 2000m.

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Interactive comment on Ocean Sci. Discuss., 6, 2667, 2009.

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