

Interactive comment on “Short-term impacts of enhanced Greenland freshwater fluxes in an eddy-permitting ocean model” by R. Marsh et al.

Anonymous Referee #2

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In this paper the authors study the short-term response to an enhanced influx of freshwater from the Greenland ice sheet. To that end, they compare a perturbed integration of an eddy-permitting ocean model with a control integration.

It is unfortunate that the run is of such a short duration, as this limits the value and importance of the study. Still, there are some interesting results, especially regarding the around-Greenland circulation, that merit eventual publication. However, my main concern is that the paper leaves several issues unexplained that are important, and might be clarified with some additional analysis. A few of these issues are:

p. 2917, l. 10: “This may be...” This seems like an important response, and I wonder if this suggestion can be substantiated. The area of enhanced mixed layer depth seems awfully small compared to the spatial scale of the warming. Besides, the positive salin-

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ity anomaly that the authors mention is visible all the way up Baffin Bay, and seems hard to explain by the suggested mechanism.

p. 2917, l. 24: “...less obviously explained...” Maybe a simple salinity budget in the area could elucidate this freshening?

I think the paper would benefit from a more in-depth analysis of these issues, and would therefore recommend the paper to be returned for major revisions.

Minor issues:

One concern with the experimental set-up is the continued use of restoring boundary conditions. Obviously, when comparing the response of the perturbed simulation with a control run, it is the combined effect of the explicit and implicit freshwater flux anomalies that should be taken into account. It would therefore be helpful if the authors could show the spatial distribution of total freshwater flux anomalies between the two runs, maybe in annually-averaged form.

p. 2917, l. 11: Figure 9 is referenced before Fig. 8.

p. 2918, l. 7: Are these integrals over the entire water column?

p. 2919, l.3: It may be helpful to explain why Godfrey’s rule is dynamically relevant here (apart from the fact that it deals with around-island circulation).

Interactive comment on Ocean Sci. Discuss., 6, 2911, 2009.