

Interactive comment on “Minor effect of meltwater on the ocean circulation during deglaciation” by G. Lohmann et al.

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Preliminary answer to the Interactive comment of Referee #1

We thank the referee for the comments on the paper and we think that a preliminary answer in the discussion phase is useful. You said that the two biggest problems are that the experiments are not well described and it is not obvious what the authors' own contributions are and what is input from previous studies.

Indeed, we shall be more explicit in saying what we did. First we analyzed the ice sheet model output of the previously published work (Zweck and Huybrechts, 2005) with respect to the oceanic freshwater forcing. Second, we run a deglaciation scenario with an ocean circulation model which is coupled to an energy balance model. These

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model runs are completely new.

The model has been described elsewhere (e.g. Butzin et al., 2005) where we have simulated different glacial ocean circulation regimes. Here, we perform transient experiments where we implemented the entrainment process of deglacial freshwater (top or bottom layer, without or with hyperpycnal flow). Our model results indicate that freshwater when sneaking into the bottom layers (mimicking the extreme case of hyperpycnal flows) can sustain the AMOC to a certain amount. The ocean model runs were integrated over 6000 years. In the revised version, we would be more explicit on the model physics (energy balance and background state) as well as the description of the experiments.

We emphasized the precise timing of the freshwater forcing which is not necessary for the model sensitivity, but for the geological interpretation of MWP1a.

We will furthermore show surface, subsurface, and deep water salinity changes in the model runs in order to illustrate the sensitivities in the different experiments shown in Fig. 5.

Interactive comment on Earth Syst. Dynam. Discuss., 3, 801, 2012.

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