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Ocean Science
Discussions

Interactive comment on "Response to Filchner-Ronne Ice Shelf cavity warming in a coupled ocean–ice sheet model. Part I: The ocean perspective" *by* Ralph Timmermann and Sebastian Goeller

Anonymous Referee #1

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Review of

Response to Filchner-Ronne Ice Shelf cavity warming in a coupled ocean - ice sheet model. Part I: The ocean perspective

by Timmermann and Goeller

Summary and recommendation

This is an original paper describing the effect on ice shelf basal melt rates of coupling a dynamical ice sheet/shelf model with an ocean/sea ice model. The difference with

a fixed-geometry run is relatively small, with a small positive increase is allowance is made for dynamical adjustments. The physical processes responsible for the changes are described. The paper is well written and concise; the figures are of good quality. I suggest only minor revisions.

Major comments

p. 5, l. 2: "This ice model spin-up is forced by present-day surface temperatures (Comiso, 2000), accumulation rates (Arthern et al., 2006) and geothermal heat flux (Shapiro and Ritzwoller, 2004)." All these forcing datasets are somewhat outdated; please motivate your choice and discuss the impact it has on the simulated ice sheet.

p. 9, l. 4: It is not convenient to refer to figures that appear later in the paper; rather, include a map with all relevant names as Fig. 1 (or simply rename Fig. 9 to Fig. 1).

Fig. 6: Would it not be more logical if you comment on the slight drift that occurs in the RAnGO 20C control run (blue line) here, rather than later on page 14?

p. 11, l. 18: "In contrast to the former experiments, a water column thickness of only 120 m (90 m) southwest of Henry Ice Rise prevents the warm water from flushing even larger parts of the Ronne cavity in the RAnGO 20 (FESOM) simulations discussed here." Is the water column thickness so different from these former experiments, and if so, what causes this? What does this imply for the conclusions drawn in these studies when it comes to stability of the ice shelf?

Minor (textual) comments

p. 1, l. 15: Mass flux -> the Mass flux

p. 1, l. 17: any other process -> the other processes

p. 1, l. 19: grounding location -> grounding line location

p. 1, l. 19: grounded ice -> grounded ice above floatation

p. 3, l. 7: in a ramp-like shape -> by a ramp-like shape

p. 6, l. 9: as good as possible -> as well as possible

p. 8, l. 10: time are spent -> time is spent

p. 11, l. 8: With the beginning of the 21st century, but most notably after 2050, -> Most notably after 2050,

p. 11, l. 12: which corresponds to a factor of six -> a factor of six increase

p. 18, l. 22: indentical -> identical

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