Second Review of the publication:

North Atlantic response to a quasi-realistic Greenland meltwater forcing in eddy-rich EC-Earth3P-VHR hosing simulations

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General comments

I thank the authors for their detailed responses and for the substantial revisions made to the manuscript. The revised version is significantly improved compared to the previous submission. In particular, I appreciate the additional information provided regarding the background freshwater fluxes in the control simulation, the clarification of the experimental design, and the expanded discussion of the mechanisms involved in the AMOC response. The distinction between the rapid high-latitude adjustment and the later response associated with Labrador Sea convection is now much clearer.

I believe that most of my previous concerns have been satisfactorily addressed. However, a few issues remain and should be clarified before publication.

Main comment

Interpretation of the freshwater forcing (l. 98–105): The manuscript now provides the total freshwater input applied around Greenland (~0.067 Sv), which is a substantial improvement. However, I still find it difficult to assess how this forcing relates to the observed increase in Greenland Ice Sheet freshwater discharge over recent decades. One of the motivations for freshwater hosing experiments is that many climate models do not fully capture the recent acceleration of Greenland mass loss and the associated freshwater input into the North Atlantic. Therefore, rather than only comparing the imposed flux with historical estimates from Bamber et al. (2018), I encourage the authors to discuss more explicitly how the imposed freshwater anomaly compares with the observed increase in Greenland freshwater discharge over recent decades. Such a discussion would help readers better understand the physical relevance of the chosen forcing and clarify which aspect of the recent increase in Greenland meltwater input this experiment is intended to represent. It would also help justify the use of the term quasi-realistic and clarify which aspects of the forcing are considered realistic (e.g. spatial distribution, seasonality, pathways) and which remain intentionally idealized (e.g. amplitude).

Minor comments

- l. 8: I suggest replacing "released together with the simulated model river runoff" by wording such as "released on top of the simulated model river runoff". The current wording may suggest that the imposed freshwater flux is part of the model runoff itself rather than an additional forcing.

- l. 13-14: I remain unconvinced by the statement that meltwater fluxes weaken the AMOC "via thermal wind balance". Thermal wind balance provides a diagnostic relationship linking density gradients and geostrophic shear, but it is not the physical mechanism itself. I recommend rephrasing this sentence in terms of salinity-induced density anomalies and the associated circulation adjustment.
- l. 18-20: The paragraph describing the AMOC response remains difficult to follow. The text combines a local reduction of ~3 Sv at 60.2°N, an average reduction of 1.3 Sv, a density interval, and a latitude interval without clearly explaining the relationship between these quantities. In addition, the reference to specific density classes appears unnecessarily technical for the abstract. I encourage the authors to simplify this paragraph and clearly distinguish local and basin-scale AMOC metrics.
- l. 29-30: The sentence beginning with "Previous studies have highlighted important global impacts..." appears incomplete and should be revised.
- l. 70-73: The statement that a uniform freshwater forcing "can result in an unrealistic spatial distribution" appears unnecessarily cautious. Such a forcing inherently produces a spatial distribution that is inconsistent with observed Greenland freshwater pathways and seasonality.
- l. 109-113: The manuscript states that freshwater is injected over depths ranging from less than 1 m to more than 240 m. However, no explanation is provided regarding the origin of this large spatial variability in the vertical distribution of the freshwater input. A brief clarification would be useful.
- l. 134-136: The manuscript refers to a "residual model drift", but no quantitative information is provided regarding its magnitude. A brief estimate, or a statement explaining why it is negligible compared to the forced signal, would strengthen the methodological description.