This manuscript investigates the impact of enhanced meltwater associated with dynamic mass loss from the Antarctic ice sheet on Antarctic sea ice. The authors assess the response to a 0.1 Sv meltwater input applied uniformly at the ocean surface, using a new suite of simulations from 11 models comprising 43 ensemble members. The results show that, although the imposed freshwater forcing is substantially larger than the present-day observed increase in ice sheet and ice shelf meltwater, the simulated sea ice response exhibits a wide inter-model spread. This spread is influenced by differences in model mean-state sea ice area and volume, the prevalence of open-ocean deep convection, and the background ocean stratification. Overall, this is a well-written and interesting study that provides useful insights into the role of Antarctic meltwater in shaping sea ice variability. But several aspects need clarification before publication.

Major:

Line 176-181. The reduction in sea ice concentration is primarily attributed to open-ocean deep convection. It may be helpful to further discuss whether the response of near-surface atmospheric circulation to the freshwater forcing could also contribute to the spatial pattern of sea ice concentration anomalies.

Line 195-197. In CanESM5 and GFDL-ESM4, regions of increased salinity appear to coincide with regions of increased sea ice concentration. However, in EC-Earth3 and FOCI, sea ice decreases at the north and northeast of the Weddell Sea, while salinity increases in these regions. This suggests that the salinity increase may not directly linked to sea ice formation. It would be helpful to clarify this inconsistency by additional analysis or discussion of whether the sea ice reduction is driven by atmospheric or ocean dynamical processes.

Minor：

1. Line 93-94. Is the analysis for both the piControl and the antwater experiments based on the last 30 years of the simulations? Also, for the time series analyses of sea ice area and volume, are the changes in the antwater experiment calculated relative to the corresponding years of the piControl simulation, or relative to a 100-year mean?
In general, it is more common to use a longer-term mean of the piControl simulation (e.g., Chen et al., 2023; Beadling et al., 2024; Xu et al., 2025), as this can help reduce the influence of inter-annual and decadal variability and improve the robustness of the response. While this choice is unlikely to substantially affect the main results, but it needs a proper explanation of the choice.

2. Line131. It is difficult to identify the period used in this study (years 50–70) in Fig. 5 of Beadling et al.. Please clarify how the years analyzed here correspond to those shown in Fig. 5 of that study.

3. Line 170-171. According to Fig. 1b–c and 3b–c, it is difficult to directly compare ensemble spread and model spread. It would be helpful to quantify these spread (e.g., using standard deviation) and present them in a table. In addition, I suggest adding the

multi-model mean to Fig. B1 and B2 to facilitate comparison with Fig. 1 and 3.

4. Line 241-242. The statement that “models with the thinnest mean-state sea ice in their piControl runs have the largest percentage changes” may not apply in all cases; for example, EC-Earth3 appears to be an exception. It may be helpful to either qualify this statement or briefly discuss such deviations.

5. Line 268-270. “Furthermore, in the EC-Earth3, FOCI, and HadGEM3-GC31-LL models, regions of deep convection form near the end of the antwater simulation, explaining the reduction in sea ice area observed in those models.” However, based on Fig. 1, there does not appear to be a clear decreasing trend in sea ice area during the final 30 years of the antwater simulation in these models. A clearer explanation of this point would be helpful. The correspondence between reduced sea ice and enhanced deep convection seems most evident in EC-Earth3 and FOCI, particularly in the northern and northeastern Weddell Sea.

6. Line 273-278. Based on aforementioned analysis, the relatively weak response in AWI-ESM-1-REcoM may be related to its use of a fixed freezing point and relatively strong stratification. It may be helpful to briefly conclude this interpretation.

7. Line 286-289. A recent study (Zhu et al., 2026) using spatially distributed freshwater forcing suggest that the atmospheric response associated with Southern Ocean air–sea interactions can also have a significant impact on sea ice. This aspect may deserve some discussion.

Reference:

Beadling, R. L., Lin, P., Krasting, J., Ellinger, W., Coomans, A., Milward, J., et al. (2024). From the surface to the stratosphere: Large-scale atmospheric response to Antarctic meltwater. Geophysical Research Letters, 51, e2024GL110157. https://doi.org/10.1029/2024GL110157
Chen, J.-J., Swart, N. C., Beadling, R., Cheng, X., Hattermann, T., Jüling, A., et al. (2023). Reduced deep convection and bottom water formation due to Antarctic meltwater in a multi-model ensemble. Geophysical Research Letters, 50, e2023GL106492. https://doi.org/10.1029/2023GL106492
Xu, X., Martin, T., Beadling, R. L., Liu, J., Bischof, S., Hattermann, T., et al. (2025). Robustness and mechanisms of the atmospheric response over the Southern Ocean to idealized freshwater input around Antarctica. Geophysical Research Letters, 52, e2024GL113734. https://doi.org/10.1029/2024GL113734
Zhu, Z., Liu, J., Liu, Y., Martin, T., Song, M., Yang, C.-Y., et al. (2026). Implications of realistic Antarctic ice shelf basal melting during 2006–2016 on Southern Ocean climate. Geophysical Research Letters, 53, e2025GL119237. https://doi.org/10.1029/2025GL119237

Grammar:

Line 68: Please delete one “evenly”