

Supporting Information for “Antarctic ice-sheet meltwater reduces transient warming and climate sensitivity through the sea-surface temperature pattern effect”

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References

- Good, S. A., Martin, M. J., & Rayner, N. A. (2013). En4: Quality controlled ocean temperature and salinity profiles and monthly objective analyses with uncertainty estimates. *Journal of Geophysical Research: Oceans*, *118*(12), 6704–6716.
- Morice, C. P., Kennedy, J. J., Rayner, N. A., Winn, J., Hogan, E., Killick, R., ... Simpson, I. (2021). An updated assessment of near-surface temperature change from 1850: the HADCRUT5 data set. *Journal of Geophysical Research: Atmospheres*, *126*(3), e2019JD032361.
- Sadai, S., Condron, A., DeConto, R., & Pollard, D. (2020). Future climate response to Antarctic Ice Sheet melt caused by anthropogenic warming. *Science advances*, *6*(39), eaaz1169.

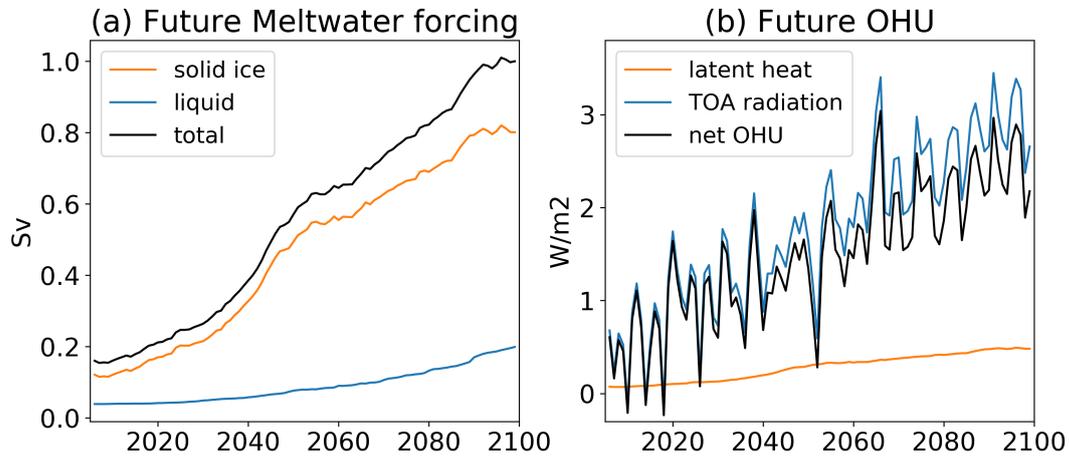


Figure S1. (a) The total freshwater forcing (unit: Sv) used in the Future Hosing simulation (black), with contributions of liquid meltwater (blue) and solid ice (orange). Data from the repository of Sadai et al. (2020) at <https://doi.org/10.15784/601449>. (b) The ocean heat uptake time series of the Future Hosing simulation (black), calculated by subtracting the latent heat (orange) from the net TOA radiation imbalance (blue). Unit: W/m².

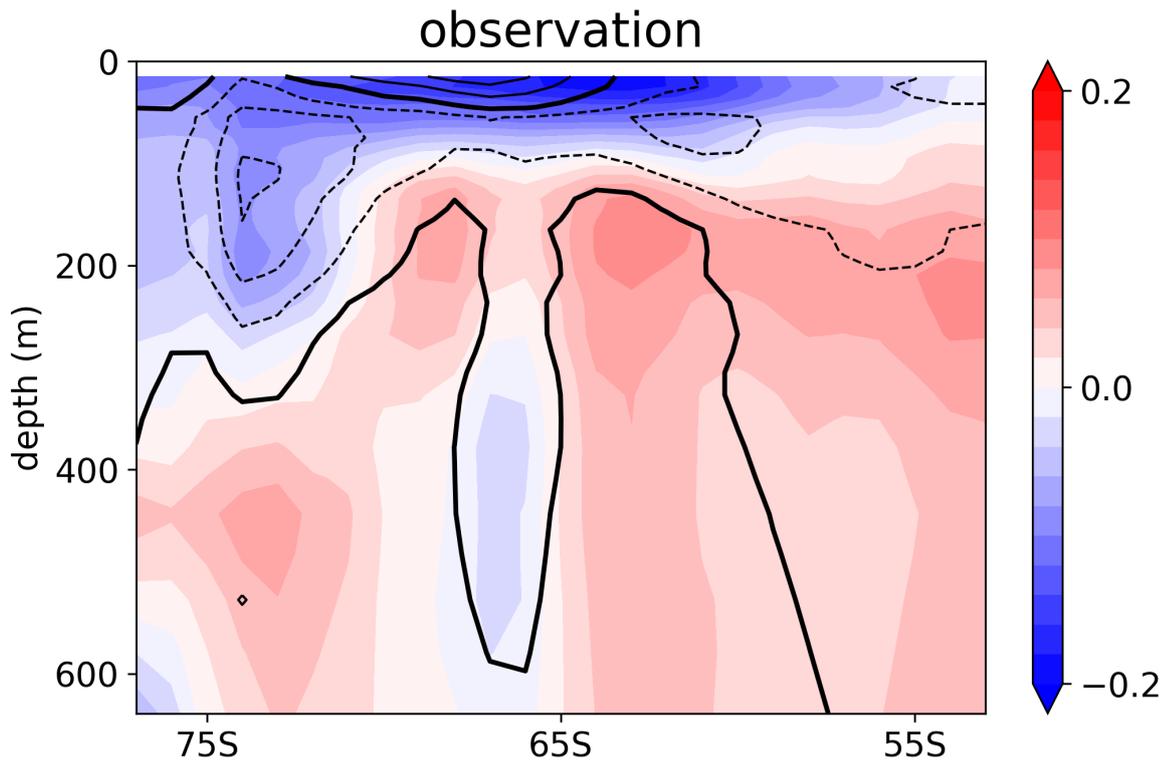


Figure S2. Observed Southern Ocean zonal-mean ocean potential temperature trends (K/decade; color) and salinity trends (g/kg/decade; contours) over 1980–2013 from EN4 observation (Good et al., 2013). Contour interval is 0.01 g/kg/decade.

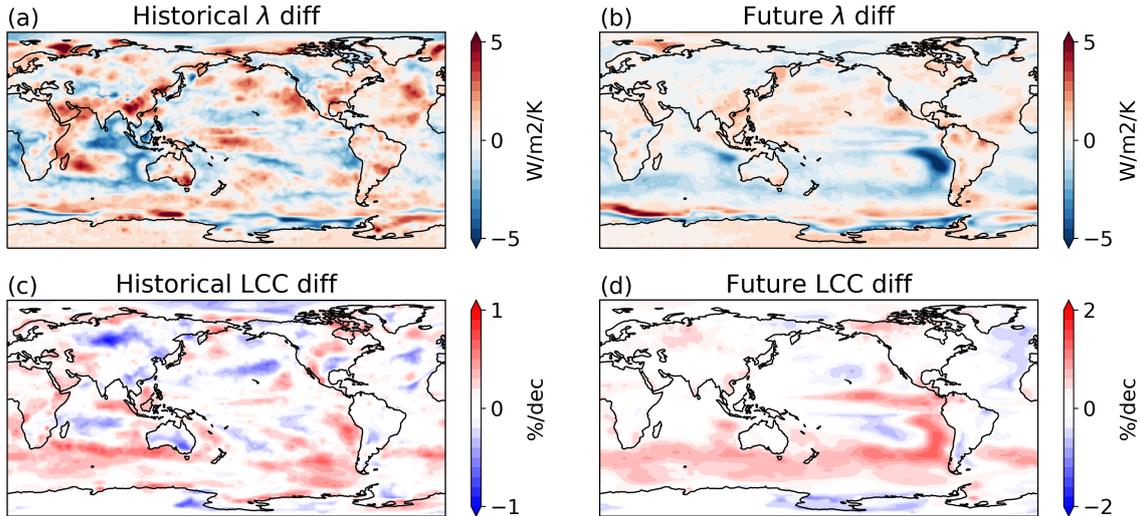


Figure S3. (a, b) Local λ changes ($\text{W}/\text{m}^2/\text{K}$) and (c, d) low-cloud cover (LCC) changes ($\%/decade$) in (left) the Historical Hosing ensemble and (right) the Future Hosing run. Changes are calculated as the difference between meltwater hosing runs and control.

Table S1. Global-mean, Northern Hemispheric (NH) mean and Southern Hemispheric (SH) mean historical surface warming rates (unit: $\text{K}/decade$) in HadCRUT5 (Morice et al., 2021) and the Historical Hosing ensemble, over 1980–2013.

	global mean	NH mean	SH mean	NH - SH
HadCRUT5	0.17	0.26	0.08	0.17
Historical control	0.2	0.23	0.17	0.06
Historical hosing	0.16	0.21	0.1	0.11