Earth System
Dynamics

Open Access

EGU

Supplement of

AMOC stability amid tipping ice sheets the crucial role of rate and noise

Sacha Sinet et al.

Correspondence to: Sacha Sinet (s.a.m.sinet@uu.nl)

S1 Sensitivity of the reference AMOC ON state to WAIS meltwater fluxes

In this section, we use numerical continuation to assess the sensitivity of the AMOC box model in the reference ON state ($F_N = F_S = 0$) when increasing the WAIS meltwater flux F_S. This is shown on Fig. S1, where the (stable) steady states of the AMOC model are shown in the (q_n, F_S) space. In particular, we find that the overturning strength increases by approximately 0.94 Sv when F_S increases from 0.00 to 0.06 Sv, representing an increase of q_n of about 6.65%. This can be compared to Li et al. (2023), where a freshwater flux was applied unifromly around Antarctica in the upper 200 m during 150 years, using the GISS-E2.1-G coupled climate model. There, they found that the maximum of the Atlantic overturning streamfunction at 45°N is increased by approximately 0.63 Sv when the freshwater flux increases by 0.06 Sv, representing an increase of about 2.84%. Hence, the sensitivity of the AMOC box model is higher but comparable to the one found in Li et al. (2023), a difference which is partly expected due to the different experimental setup.
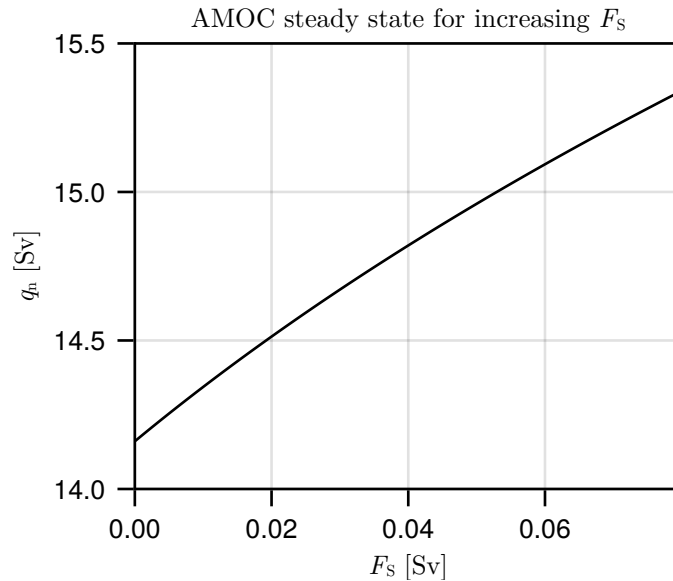

Figure S1. Steady states of the AMOC model in the (q_n, F_S) space, computed for $F_N = 0$.

References

Li, Q., Marshall, J., Rye, C. D., Romanou, A., Rind, D., and Kelley, M.: Global Climate Impacts of Greenland and Antarctic Meltwater: A Comparative Study, Journal of Climate, 36, 3571–3590, https://doi.org/10.1175/JCLI-D-22-0433.1, publisher: American Meteorological Society Section: Journal of Climate, 2023.