

CNRM, UMR 3589

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THE RESPONSE OF THE ANTARCTIC SHELF AND THE GLOBAL OVERTURNING CIRCULATION TO RECENT AND PROJECTED ANTARCTIC MELTWATER CHANGES

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Lien visio : <https://visio.numerique.gouv.fr/ekg-qucr-jdx>

Abstract:

The Antarctic ice sheet and ice shelves are losing mass and release freshwater to the ocean, affecting the ocean state. The response of ocean circulation to recent and projected increases in Antarctic meltwater is still uncertain, because of uncertainties in meltwater forcing and deficiencies in global ocean and climate models. Here, we use an equilibrated one-degree global ocean configuration that realistically represents Antarctic Bottom Water (AABW) formation and abyssal ventilation. We perform three meltwater hosing experiments covering the period 1990-2100: an 'Idealized' experiment in which exactly 0.1 Sv (1 Sv = 10^6 m³s⁻¹) of freshwater is released uniformly around the Antarctic coast; a 'Realistic' experiment, where reconstructed and projected freshwater anomalies are distributed in time and space based on recent estimates of melting rates and processes; and a 'Semi-realistic' experiment in which the same time-varying freshwater anomalies are released uniformly around the Antarctic coast. In this talk, we investigate the response of the Antarctic shelf by evaluating temperature changes and the feedback to meltwater injection. Further, we show changes in AABW transport and the Atlantic Meridional Overturning Circulation (AMOC). In all experiments, AABW transport decreases by 2100. The AMOC strengthens by approximately 2 Sv, driven by enhanced Southern Ocean upwelling. This upwelling increase results from weaker compensation between northward near-surface flow and southward mesoscale-induced flow in the stratifying upper Southern Ocean.

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