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Role of salinity in AMOC weakening and recovery in a freshwater hosing simulation

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The Atlantic meridional overturning circulation (AMOC) is projected to weaken in the coming century due to anthropogenic climate change. Various studies have considered AMOC weakening and collapse, with less research focusing on the processes and timescales of the recovery phase. This study uses a coupled climate model to explore the roles of salinity and temperature in AMOC recovery after a weakening. The North Atlantic and Arctic region was hosed with freshwater for 200 years. The salinity reservoir increased strongly during recovery, and remained elevated for ∼600 years post hosing. The behaviour of the AMOC was well reconstructed by applying "rotated geostrophy" to meridional density gradient profiles between 50°N and 30°S. This makes it possible to determine the role of overturning, gyre, and surface fluxes in the North and South Atlantic. Changes at 50°N dominate the collapse and early recovery, while the overshoot to high AMOC transports in the recovery phase was caused by increased heat storage in the South Atlantic. Changes in gyre fluxes were as important as changes in overturning fluxes in the freshwater budget of the Atlantic Ocean.