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## **Different AMOC Stabilization between Past Interglacials and Future**

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The excess freshwater in the Arctic due to global warming is causing a weakening the Atlantic Meridional Overturning Circulation (AMOC). The question of how the climate change will impact the stability of the AMOC, however, remains unclear. We address this uncertainty through a series of ensemble simulations (100 members) using freshwater hysteresis experiments, aiming to elucidate potential changes in AMOC stability across different interglacials. Our findings suggest that future increases in anthropogenic CO<sub>2</sub> emissions will bolster the AMOC's resistance to excess freshwater, though it exhibits less resilience compared to past interglacials. In future climate scenarios, warmer conditions lead to a notable delay in sea ice expansion, which aids in the preservation of deep water formation and AMOC strength. Concurrently, an intensification of freshwater convergence in the North Atlantic acts as a dampening factor during AMOC recovery under warmer climate background. The influence of orbital parameters on AMOC stability across different interglacials is found to be relatively minor. These results underscore the importance of considering background climate conditions, particularly CO<sub>2</sub> concentrations, when investigating future AMOC changes and making comparisons to past AMOC dynamics.