

Reduced interdecadal variability of Atlantic Meridional Overturning Circulation under global warming

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Interdecadal variability of the Atlantic Meridional Overturning Circulation (AMOC-IV) plays an important role in climate variation and has significant societal impacts. Past climate reconstruction indicates that AMOC-IV has likely undergone significant changes. Despite some previous studies, responses of AMOC-IV to global warming remain unclear, in particular regarding its amplitude and time scale. In this study, we analyze the responses of AMOC-IV under various scenarios of future global warming in multiple models and find that AMOC-IV becomes weaker and shorter with enhanced global warming. From the present climate condition to the strongest future warming scenario, on average, the major period of AMOC-IV is shortened from ~50 y to ~20 y, and the amplitude is reduced by ~60%. These reductions in period and amplitude of AMOC-IV are suggested to be associated with increased oceanic stratification under global warming and, in turn, the speedup of oceanic baroclinic Rossby waves.

Keywords: global warming, AMOC, interdecadal variability

