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## Intensified Atlantic Multidecadal Variability in a warming climate

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The Atlantic Multidecadal Variability (AMV) is a basin-scale natural mode of the sea surface temperature (SST) in the North Atlantic, exerting a global impact, including contribution to the multidecadal Sahel drought and subsequent recovery and the post-1998 global warming hiatus. How greenhouse warming affects AMV remains unclear. Here, using models with multi-century-long outputs of future climate, we find an intensified AMV under greenhouse warming. Surface warming and freshwater input from sea ice melt increase surface buoyancy, leading to a slowdown of Atlantic Meridional Overturning Circulation (AMOC). Reduced vertical mixing associated with the suppressed oceanic deep convection results in a thinned mixed layer and its variability, favoring stronger AMV SST variability. Further, a weakened AMOC and associated meridional heat advection prolong the lifespan of the AMV, providing a long time for the AMV to grow. Thus, multidecadal global surface fluctuations and the associated climate extremes are likely to be more intense.