



Lack of bipolar see-saw in response to Southern Ocean wind reduction

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A cessation of the Atlantic meridional overturning circulation (AMOC) significantly reduces northward oceanic heat transport. In response to anomalous freshwater flux, this leads to the classic 'bipolar see-saw' pattern of northern cooling and southern warming in surface air and ocean temperatures. By contrast, as shown here in a coupled climate model, both northern and southern cooling are observed for an AMOC reduction in response to reduced wind stress in the Southern Ocean (SO). For very weak SO wind stress, not only the overturning circulation collapses, but sea ice export from the SO is strongly reduced. Consequently, sea ice extent and albedo increase in this region. The resulting cooling overcompensates the warming by the reduced northward heat transport. The effect depends continuously on changes in wind stress and is reversed for increased winds. It may have consequences for abrupt climate change, the last deglaciation and climate sensitivity to increasing atmospheric CO₂ concentration.