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# The influence of a weakening of the Atlantic meridional overturning circulation on Pacific climate

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The influences of a substantial weakening of the Atlantic Meridional Overturning Circulation (AMOC) on the Pacific climate mean state and its variability are studied using five different Coupled General Circulation Models (CGCMs). In the CGCMs a substantial weakening of the AMOC is induced by adding freshwater flux forcing in the northern North Atlantic. In response, the well-known surface temperature dipole in the low-latitude Atlantic establishes, which re-organizes the large-scale tropical atmospheric circulation by increasing the northeasterly trade winds. This leads to a southward shift of the Intertropical Convergence Zone (ITCZ) in the tropical Atlantic and also the eastern tropical Pacific. Due to evaporative fluxes, mixing and changes in Ekman divergence a meridional temperature anomaly is generated in the northeastern tropical Pacific which leads to the development of a meridionally symmetric thermal background state. In four out of five CGCMs this leads to a substantial weakening of the annual cycle in the eastern equatorial Pacific and a subsequent intensification of ENSO variability due to the nonlinear frequency-entrainment mechanism.

Our analysis suggests that the atmospheric circulation changes forced by tropical Atlantic SSTs can easily influence the large-scale atmospheric circulation and even the intensity of the Aleutian Low, thereby modulating North Pacific climate.

Furthermore, we conclude that the existence of the present-day tropical Pacific cold tongue complex and the annual cycle in the eastern equatorial Pacific are partly controlled by the strength of the AMOC. The results may have important implications for the interpretation of global multidecadal variability, paleo-proxy data and future climate change.