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Sensitivity of THC strength to variations in freshwater exchange between Atlantic and Pacific tropical ocean

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The coupled atmosphere-ocean climate model CLIMBER- 3α , which includes an oceanic general circulation model, is used for a series of sensitivity experiments. We investigate the response of the thermohaline circulation (THC) to anomalous freshwater transport between tropical Atlantic and Pacific. A net freshwater input into the tropical Atlantic has a weakening effect on the THC, whereas a net export causes a strengthening of the overturning. Salt anomalies created in the tropical Atlantic are transported northward by the Gulf Stream and the North Atlantic Current and reach the North Atlantic Deep Water formation regions after around 10 years. There, they change the density and influence the THC strength by modifying the deep water formation rate. By performing a large number of sensitivity experiments, we analyze this mechanism in detail and investigate the response to time-varying tropical freshwater anomalies. Finally, we discuss the results with respect to future changes in the El Nino/Southern Oscillation.