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Influence of reorganization of the tropical hydrologic cycle on Atlantic salinity and meridional overturning at the end of the last interglacial.

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In this study, we examine the state of the Atlantic thermohaline circulation at the end of the last interglacial (129ka to 116 ka). In particular, we consider the effect of shifts in tropical precipitation patterns driven by changes in orbital parameters in modulating the salinity of the North Atlantic. We assess the role of salinity changes in controlling the persistence of the thermohaline circulation during the formation of extensive Northern hemisphere glaciation. We utilize a combination of terrestrial precipitation reconstructions and modeling scenarios to investigate the teleconnection between the tropics and North Atlantic. We use geochemical records obtained in marine sediment cores from the South American margin to characterize terrestrial climate conditions in regions where terrigenous material originates and infer past changes in South American precipitation. Paleoclimate reconstructions compare favorably with model simulations using the Community Climate System Model (CCSM) from a similar period (130ka to 115ka). Both reconstructions and simulations identify a shift a decrease in lowland precipitation and increase in highland precipitation. We report the results of two primary sets of model experiments. First we compare transient and equilibriated paleoclimate simulations using CCSM to the marine sediment records. Second, we report the results of an ensemble of sensitivity experiments in which we investigate the role of modeled and reconstructed tropical precipitation changes on the North Atlantic salinity and deep water formation. More specifically, we report how modifications to the precipitation the ocean receives in the tropics propagate to the North Atlantic and in turn impact the deep water formation. By using this model environment we are able to determine the implications of the tropical region on the North Atlantic circulation.