

SST anomalies in the northern tropical Atlantic as a negative feedback to ENSO development

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It has been known for some time that SST anomalies in the equatorial Pacific induce same-signed anomalies in the northern tropical Atlantic (NTA) through changes in the Atlantic trade winds. More recently, it has been suggested that the NTA, in turn, can influence the equatorial Pacific through changes in the surface zonal winds over the western part of the basin. The sign of these wind anomalies, however, would act to force equatorial Pacific SST anomalies that are opposite to those in the NTA. The present study takes a closer look at this apparent conundrum by conducting GCM experiments with prescribed SSTs for the period 1982-2014. In the control experiment, observed SSTs are prescribed globally, while in two sensitivity experiments SST anomalies are removed from either the tropical Atlantic or the tropical Pacific. For the control experiment, analysis suggests that NTA warming is accompanied by SST warming and westerly wind anomalies in the equatorial Pacific. When tropical Pacific SST anomalies are removed, on the other hand, NTA warming coincides with easterly anomalies. Moreover, when SST anomalies are removed from the tropical Atlantic, wind variability over the western equatorial Pacific is enhanced. These results suggest that SST anomalies in the NTA, which are strongly influenced by the tropical Pacific, act as a negative feedback to ENSO development. This interbasin link may be further complicated by other influences on the NTA, such as local air-sea coupling and the North Atlantic Oscillation.

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