



Impacts of the tropical Indian and Atlantic Oceans on ENSO

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The impacts of the tropical Indian and Atlantic Oceans on the El Niño Southern Oscillation (ENSO) phenomenon are studied using a series of 500 years long coupled ocean-atmosphere general circulation model (OAGCM) simulations, in which the tropical Indian and/or Atlantic Ocean sea surface temperatures (SSTs) are prescribed from climatology. The model results indicate that the variability over the tropical Indian and/or Atlantic Oceans substantially influence the coupling over the equatorial Pacific. In the absence of SST variability in the tropical Indian and/or Atlantic Ocean, the main ENSO period is shifted by almost one year from about 34 months to about 45 months in the model, along with a general increase of longer time scale variability and a decrease of sub-ENSO variability. The total SST variance in the equatorial Pacific region is reduced if either Indian or Atlantic Ocean variability is present, indicating a net damping by the SST variability of these two tropical oceans. At the same time the atmospheric ENSO teleconnections are damped more strongly than the SST.

The results can be understood in the context of the simple recharge oscillator model. However, it is difficult to verify the feedback of the Indian and/or Atlantic Oceans onto ENSO from just statistical analysis of the coupled model or the observations.