



The Effects of remote forcings on ENSO dynamics, variability and diversity

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Air-sea interactions with remote regions in the tropical Indian, tropical Atlantic and extra-tropical oceans can influence ENSO features in the tropical Pacific. In this study these effects are explored by using an AGCM coupled with slab ocean and a simple recharge oscillator ENSO model through switched on/off air-sea interaction in respective ocean area. It is shown that the decoupling in different remote regions has different impacts on ENSO dynamics, variability and diversity.

All remote regions provide stochastic forcings for the ENSO variability effectively and therefore increase the ENSO variability. The air-sea interactions with remote tropical oceans in particular provide a delayed negative feedback to ENSO similar to that of the tropical Pacific Ocean internal wave dynamics. Thus a central element of the ENSO dynamics is partly due to the interaction with other tropical ocean basins.

The influence from the remote regions also causes different patterns of sea surface temperature (SST) variability in the tropical Pacific, contributing to the diversity of the ENSO mode. In particular the extra-tropical Pacific regions force SST variability that is different from the equatorial ENSO mode of variability. The influence that the remote regions have on the ENSO dynamics and variability is significantly altered by the interaction between the equatorial recharge oscillator dynamics and the simple thermodynamic slab ocean processes.