Role of the Indian Ocean SST variability in ENSO transition

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In the tropics, the SST variability in Indian Ocean (IO) is tightly coupled with the ENSO. To a large extent, the modulation of the Walker circulation via atmospheric teleconnection is a key mechanism linking the ENSO and IO SST variability. Although the impacts of ENSO on the IO SST variability is dominant, previous studies suggested that the IO SST warming may affect to a fast transition to La Nina in the Pacific. The IO SST warming leads the easterly wind anomalies in the western edge of Pacific during the mature phase of El Nino. Therefore the anomalous easterlies induce a fast transition to La Nina by generating oceanic upwelling Kelvin waves, which propagate into the eastern Pacific and offset the warming by enhancing vertical cold advection. This anomalous easterly wind in the western Pacific during the El Nino mature phase may come from the anomalous easterly wind in the IO accompanying the eastward extension of the anomalous Walker circulation during the boreal fall of El Nino developing years. In addition, the relationship of IO SST variability and easterly wind anomalies in the western Pacific are statistically significant. In this study the convectively coupled equatorial waves are investigated to show the interactive feedback between IO SST variability and ENSO transition by explaining the role of easterly wind anomalies in the western Pacific.

Key words: Indian Ocean, ENSO, transition, Kelvin waves