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Interaction between Tropical Pacific and Tropical Indian Ocean through the Windstress "Bridge"

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Intermediate tropical atmospheric and oceanic models were used to study the interaction between tropical Pacific and Indian Ocean through the windstress "bridge". In the control run, observed SST for 1958-1998 was used to force the atmospheric model generating the surface windstress, which was then used to force the oceanic model with the surface heat flux taken from NCEP reanalysis to reproduce the SST. Two parallel sensitivity runs are the same as the control run except for the SST used to force the atmospheric model which was prescribed with climatology in the tropical Pacific and in the tropical Indian Ocean, respectively. The difference between the control and sensitivity runs indicates effect of the SST anomaly (SSTA) in a specific oceanic basin on the other basin through the windstress bridge. Such numerical experiments suggest following results. A positive (negative) SSTA in a basin generally produces a westerly (easterly) anomaly in the west and an easterly (westerly) anomaly in the east of the basin. A positive SSTA in the tropical Pacific induces an easterly anomaly in tropical Indian Ocean, which results in a weak positive interannual SSTA and a weak negative interdecadal SSTA in the tropical Indian Ocean; and vice versa. A positive SSTA in the tropical Indian Ocean induces an easterly anomaly in tropical Pacific Ocean, which results in a negative SSTA on both the interannual and interdecadal timescales in the tropical Pacific; and vice versa. Considering the observational fact that the SSTA in the tropical Indian Ocean is more influenced by the tropical Pacific and that the SSTA with the same polarity in the former basin always follows the latter basin, the results from the present study suggest a negative feedback role of the tropical Indian Ocean in the tropical Pacific SSTA, which is more obvious on the interdecadal timescale.