

Possible influence of the Indian Ocean on decadal changes of the Pacific climate

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We have explored possible influence of the Indian Ocean on decadal changes of the Pacific climate, by performing ensembles of the so-called partial data assimilation experiments during the recent two decades. In these experiments, using an atmosphere-ocean coupled climate model, we have assimilated anomalies of ocean temperature and salinity only in a specific area (e.g., the Indian Ocean, the equatorial Pacific Ocean, and so on) rather than in the global ocean. On decadal timescales, since the sea surface temperature (SST) in the equatorial Pacific largely controls the zonal winds over the maritime continent, the SST variations in the Indian Ocean can be well reproduced even when assimilating the anomalies only in the Pacific Ocean. On the other hand, the assimilation using a gridded analysis of the Indian Ocean hardly shows significant impacts on the equatorial Pacific SST variation probably due to the internal decadal fluctuation with large amplitudes. We have also performed a partial data assimilation experiment using the detrended anomalies in the Indian Ocean, toward discussion focusing on decadal trends (i.e., trends in ten years) which show a decadal-scale modulation rather than steady warming. The changes in the zonal winds over the maritime continent associated with the Indian Ocean SST trends can modify the equatorial Pacific SST trends and these impacts of the Indian Ocean are significantly large in some periods of the recent two decades.