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Seasonal to multi-yaer predictability of tropical cyclone activity over the western North Pacific.

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The predictability of tropical cyclone (TC) activity over the western North Pacific (WNP) is examined in hindcast experiments by multi-model ensemble using three versions of the coupled atmosphere-ocean model MIROC. In these hindcast experiments, oceanic initial conditions are obtained from an anomaly assimilation procedure using the observed oceanic temperature and salinity. We directly detect TCs from 6-hourly model outputs following the procedure used in some previous studies. The hindcast experiments show that the prediction of interannual variability for TC genesis and occurrence frequency is skillful and the predictable components are found to be mainly associated with El Nino and Southern Oscillation (ENSO). Furthermore multi-year predictability of TC activity is explored, and it is found that an abrupt change in TC frequency associated with the Pacific climate shift during the late 1990s (Chikamoto et al. 2012) is also predictable.
Potential near-future change in TC activity over the WNP is also investigated using future (2016-2035) ensemble projection of global warming under the IPCC emission scenarios. It is revealed that all of the three models project a decreasing trend in total TC genesis numbers over the WNP and the TC genesis location slightly shifts eastward in the future. The later east-west contrast can be interpreted by analogy with interannual variability related to ENSO. This is because projected changes in SSTs and large-scale circulation fields exhibit an El Nino-like pattern. On the other hand, the El Nino-like SST warming pattern acts to weaken the Walker circulation. Consequently convection, upward velocity, and relative humidity are weakened over the WNP. The authors conclude that these unfavorable changes in environmental fields for TC genesis contribute to the reduction in total TC generation over the WNP.