Team MIROC: Predictability of a stepwise shift in Pacific climate during the late 1990s in hindcast experiments by MIROC

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Sea surface temperature (SST) predictability in the Pacific on decadal timescales is examined in hindcast experiments by a coupled atmosphere-ocean model MIROC with low, middle, and high resolution. In these hindcast experiments, initial conditions are obtained from an anomaly assimilation procedure using observed oceanic temperature and salinity with prescribing the natural and anthropogenic forcing based on the IPCC emission scenarios. Our hindcast experiments show the predictive skills for SST in the western subtropical Pacific, Indian Ocean, and tropical-to-North Atlantic. Previous studies have examined the SST predictability in the Indian Ocean and Atlantic, while SST predictability in the western subtropical Pacific has not been assessed. In the western Pacific, the observed SST anomalies in the subtropics of both hemispheres increase rapidly from the early 1990s to the early 2000s. While these SST warming in the western subtropical Pacific are partly explained by global warming signals, our model predictions initialized in 1995 and 1996 tend to simulate the pattern of SST increase and associated precipitation changes. This large climate change around the late 1990s may be related to phenomena such as the recent typhoon frequency increase in the Taiwan and the weakened East Asian monsoon examined by recent studies.