Observed and hindcasted subdecadal variability of the tropical Pacific climate

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The tropical Pacific is highly responsible for controlling the tendencies of global climate. Here, we have found a subdecadal (i.e., 3-year-running means) variation that has been distinctively observed in the 2000s over the tropical Pacific. The warm water that originated from the positive ocean-heat-content (OHC) anomaly over the western Pacific in 2000 slowly extended eastward and stayed at the central equatorial Pacific between 2002-2005, rather than reaching the eastern edge. At the same time, an accompanying anti-cyclonic surface wind anomaly was observed in the off-equatorial North Pacific. This dynamical response of the upper ocean may have contributed to the subsequent warming in the western Pacific. In the preceding decades, in contrast, the observed OHC has usually represented a periodic fluctuation in the tropical Pacific, characterized by anomalous heat input/output in the meridional direction and slow eastward adjustment in the equatorial ocean thermocline. This subdecadal variation in the 2000s is quite distinct from our decadal hindcasts with initialization in Coupled Model Intercomparison Project Phase 5. The model predominantly simulates periodic-type fluctuations in any decade, and the resultant low predictability of the subdecadal variation in the 2000s can work to modulate the predictive skills at a lead time of several years.

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