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Areas of re-emergence of sea surface temperature anomalies and its dynamics in the global ocean.

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Re-emergence is the mechanism through which Sea surface temperature (SST) anomalies formed in winter over a deep mixed layer are trapped beneath the shallow summer mixed layer and then re-entrained into the deepening mixed layer during the next fall or winter season. This persistence of winter-to-winter SST anomalies is mostly perceived in the midlatitude oceans, where the annual variability in mixed layer is deep. It thus contributes to the SST anomalies that are not forced by concurrent atmospheric fluxes.
We detect re-emergence areas of SST anomalies in the world oceans using ocean reanalysis datasets, CMIP model simulations and a single column mixed layer ocean model (KPP) coupled to an atmospheric general circulation model. It is revealed that re-emergence is far more widespread than previously thought. It exists most of the midlatitudes of the Southern and Northern hemisphere. This study, also, investigates the processes that control the re-emergence. We illustrate the impact of local air-sea interaction on the re-emergence of SST anomalies. We will show how the damping of SST anomalies influences the strength of the re-emergence. We also discus the dynamics of seasonally varying mixed layer depth (MLD) and the re-emergence mechanism. Results from the single-column mixed layer model indicate that re-emergence of SST anomalies occur in the regions of substantial seasonal varying MLD. We also find that effect of anomalous mixed layer for re-emergence are of secondary importance compared to the seasonal cycle of MLD.