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Effects of extratropical warming on ENSO amplitudes in an ensemble of MIROC5 coupled GCM

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El Niño-Southern Oscillation (ENSO) amplitudes in an ensemble of a coupled global climate model (GCM) in the Climate Model Intercomparison Project Phase 5 (CMIP5) 20th-century experiment were found to have a systematic relationship with the timing at which each ensemble member had been branched off from the pre-industrial control experiment. This relationship with respect to the timing of the branch-off also manifested in the time-averaged Southern Ocean sea surface temperature (SST) in the ensemble. That is, the Southern Ocean SST was progressively warmer in members initiated from later timepoints in the control experiment, demonstrating that the models were drifting. In this work, we postulate a mechanism that explains how the anomalous extratropical warming remotely affected the ENSO strength. First, the reduction in the equator-to-pole temperature gradient in the Southern Hemisphere gave rise to an anomalous northward heat transport by baroclinic eddies across the extratropics into the tropics. This induced an anomalous Hadley Cell that transported the anomalous heat northward within the tropics in its upper branch, whilst the lower branch transported moisture southwards, causing the intertropical convergence zone (ITCZ) to shift. This altered the location of precipitation in the equatorial Pacific Ocean. Finally, since the amount of precipitation over the eastern equatorial Pacific dictates the strength of ENSO through the shift in the zonal wind stress response, we conclude that there is an energy transport pathway through which the ENSO strength can be remotely affected by the anomalous heating in the extratropics.