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# Enhanced near-term warming constrained by past trends in the equatorial Pacific sea surface temperature gradient

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## Abstract

The equatorial Pacific zonal sea surface temperature (SST) gradient, known to be a pace-maker of global warming, has strengthened since the mid-twentieth century. However, the cause is controversial because a majority of Coupled Model Intercomparison Project Phase 5 (CMIP5) models suggest weakening of the zonal SST gradient from the past to the future. Reconciling this discrepancy is important for the climate change attribution and climate sensitivity assessment. Here we use the CMIP5 ensemble and large ensemble simulations by four climate models to show that the intensifying SST gradient observed during 1951–2010 could arise from internal climate variability. Models and members that simulate historical strengthening of the SST gradient commonly exhibit reversed future trends. Using these models as a constraint, the rate of global-mean temperature rise is amplified by 9–30%, with higher values occurring in low-emission scenarios, because internal variability has a greater impact when the externally forced response is smaller.

**Keywords:** Pacific SST gradient, large ensembles, global warming

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