

Uncertainty in Near-Term Global Surface Warming Linked to Pacific Trade Wind Variability

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Abstract : Climate models generally simulate long-term reductions in the Pacific Walker Circulation with increasing atmospheric greenhouse gases. However, over two recent decades (1992-2011) there was a strong intensification of the Pacific Trade Winds that is linked with a slowdown in global surface warming. Using large ensembles of multiple climate models forced by increasing atmospheric greenhouse gas concentrations and starting from different ocean and/or atmospheric initial conditions, we reveal very diverse 20-year trends in the tropical Pacific climate associated with a considerable uncertainty in the globally averaged surface air temperature (SAT) in each model ensemble. This result suggests low confidence in our ability to accurately predict SAT trends over 20-year timescale only from external forcing. We show, however, that the uncertainty can be reduced when the initial oceanic state is adequately known and well represented in the model. Our analyses suggest that internal variability in the Pacific trade winds can mask the anthropogenic signal over a 20-year time frame, and drive transitions between periods of accelerated global warming and temporary slowdown periods.

Keywords : trade winds, walker circulation, hiatus in the global surface warming, internal climate variability

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