



Internal Variability in Simulated and Observed Tropical Tropospheric Temperature Trends

Laura Suarez-Gutierrez (1), Chao Li (1), Peter W. Thorne (2), and Jochem Marotzke (1)

(1) Max-Planck-Institut für Meteorologie, Hamburg, Germany, (2) Maynooth University Department of Geography, Maynooth, Co. Kildare, Ireland

We revisit possible discrepancies between observed and simulated warming in the upper tropical troposphere, focusing on the role of internal variability. We compare all extant radiosonde-based estimates for the period 1958–2014 to simulations from the CMIP5 multi-model ensemble and the 100-realization ensemble with the climate model MPI-ESM-LR. We consider annual-mean temperatures and all available 30- and 15-year trends. Most observed trends fall within the ensemble spread for most of the record, with generally larger discrepancies for the older observational products. Trends calculated from least absolute deviations show better agreement than those based on ordinary least squares, and 15-year trends show better agreement than 30-year trends. The largest discrepancies occur for the amplification of tropospheric over surface warming, for 30-year trends in the second half of the period. We conclude that trend differences between observations and simulations of tropical tropospheric temperatures are dominated by observational uncertainty and chaotic internal variability.