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In the upper troposphere (UT), Global Navigation Satellite System (GNSS) Radio Occultations (ROs) provide accurate air temperatures (<0.5 K) every ~200 m vertically. We use RO observations from 01/2002 until 12/2018 at 300, 250, and 200 hPa to quantify the tropical upper tropospheric amplification (defined as the ratio of temperature trends in the UT relative to the surface). We compare the RO-derived results against Atmospheric Infrared Sounder (AIRS), Coupled Model Intercomparison Project Phase 6 (CMIP6) Atmospheric Model Intercomparison Project (AMIP) models, Modern–Era Retrospective Analysis for Research and Applications version 2 (MERRA-2), and European Center for Medium-range Weather Forecasts Re-Analysis Interim (ERA-Interim) data. We find that CMIP6 AMIP models show excellent agreement with independent AIRS and RO observations on the magnitude of the UT warming and show warming that is significantly faster than both reanalyses above 250 hPa. AIRS v6 and CMIP6 AMIP present excellent agreement with the RO-measured tropical tropospheric amplification, although the absolute temperature difference between CMIP6 and RO suggest that models don't properly communicate the surface warming into the troposphere.
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