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Understanding ozone-sonde trends and variability in UTLS: Using dynamical coordinates for consistent analysis of UTLS composition

One of the goals for the SPARC OCTAV-UTLS (Observed Composition Trends And Variability in the Upper Troposphere and Lower Stratosphere) activity is to quantify long-term changes in the UTLS ozone variability and identify the driving processes. The determination of atmospheric composition trends in the UTLS remains highly uncertain due to large atmospheric variability driven by chemistry, mixing, and dynamics (reflected in the tropopause and jet variations). Analyzing data in conventional coordinates (e.g. on pressure and latitude grids) does not account for the local and regional variability near the jets and tropopause that serve as the natural barriers for atmospheric composition distributions. Dynamical coordinates, which account for the variability of transport barriers, can be used to separate observed data into different atmospheric regimes before analyzing them for trends. This approach reduces the impact of short- and long-term atmospheric variability represented in the NOAA ozonesonde records. This presentation will assess reduction in trend uncertainty in ozonesonde records after an appropriate meteorological coordinate system is used for all data. The ozonesonde trends in traditional and dynamical coordinates will be compared. To test the advantage of using dynamical coordinates for the regionally combined records, we will compare trends derived from the NOAA ozonesondes from the Trinidad Head and the Tropospheric Ozone Lidar (TMTOL) from JPL's Table Mountain Facility in California.

Topic

Current and past limb and occultation instruments: algorithms, products, validation

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