UTLS water vapor and ozone evaluation during the NASA POSIDON mission using WB-57F high-altitude research aircraft and balloons

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Water vapor is an important greenhouse gas that contributes to many processes and feedback mechanisms in the atmosphere. Accurate measurements of UTLS water vapor concentrations are essential for understanding the radiative forcing of our climate. Even though water vapor in the stratosphere has a relatively high concentration (>1 ppmv) compared to other trace gases, it has proven to be deceptively hard to measure accurately.

Previous aircraft and balloon intercomparisons have shown differences between 15 and 60% when comparing water vapor in the UTLS. The NASA Pacific Oxidants, Sulfur, Ice, Dehydration, and cONvection (POSIDON) experiment conducted from Guam during October 2016 using the WB-57F aircraft was equipped with state-of-the-art instrumentation measuring water vapor, ozone, aerosol particles, sulfur, and a meteorological measurement suite. Balloons carrying NOAA FPH water vapor and ozonesondes were launched during four of the aircraft science flights to match up with the WB-57F aircraft descending back into Guam International airport.

We intercompare the measurements between the instruments on the aircraft and balloons and show the results for water vapor, ozone, and air temperature.