



Composition of the Asian summer monsoon anticyclone: Climatology and variability from 10 years of Aura Microwave Limb Sounder measurements

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Satellite measurements are invaluable for investigating the composition of the upper troposphere / lower stratosphere (UTLS) in the region of the Asian summer monsoon anticyclone, which has been sparsely sampled by other means. The Microwave Limb Sounder (MLS), launched as part of NASA's Aura mission in July 2004, makes simultaneous co-located measurements of trace gases and cloud ice water content (IWC, a proxy for deep convection) in the UTLS on a daily basis. Here we exploit the dense spatial and temporal coverage, long-term data record, and extensive measurement suite of Aura MLS to characterize the climatological composition of the ASM anticyclone and quantify its considerable spatial, seasonal, and interannual variability. We relate the observed trace gas behavior to various meteorological quantities, such as the size and strength of the ASM anticyclone, the extent and intensity of deep convection, and variations in the tropopause and the upper tropospheric jets in that region. Multiple species of both tropospheric and stratospheric origin are examined to help assess whether the observed variability arises from variations in transport processes or changes in the strength or location of surface emissions.