

Characterizing the climatological composition and intraseasonal and interannual variability of the Asian summer monsoon anticyclone using Aura Microwave Limb Sounder measurements

M.L. Santee¹, G.L. Manney^{2,3}, N.J. Livesey¹, J.L. Neu¹, M.J. Schwartz¹, and L.F. Millán¹

¹ *Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA*

² *NorthWest Research Associates, Socorro, NM, USA*

³ *New Mexico Institute of Mining and Technology, Socorro, NM, USA*

The Aura Microwave Limb Sounder (MLS), launched in July 2004, makes simultaneous colocated measurements of trace gases and cloud ice water content (a proxy for deep convection) in the upper troposphere / lower stratosphere (UTLS) on a daily basis. With its dense spatial and temporal sampling, extensive measurement suite, and insensitivity to aerosol and all but the thickest clouds, Aura MLS is well suited to characterizing UTLS composition in the region of the Asian summer monsoon (ASM) and quantifying the considerable spatial and seasonal variations therein. In addition, the 13-yr MLS data record is invaluable for assessing interannual variability. Here we examine MLS measurements of cloud ice and both tropospheric (H₂O, CO, CH₃Cl, CH₃CN, CH₃OH, HCN) and stratospheric (O₃, HNO₃, HCl) tracers, along with meteorological reanalyses, to investigate the impact on the UTLS (350–410 K) of the ASM over the course of its complete lifecycle, from April through October. Links between observed trace gas behavior and variations in various meteorological factors, climate indices, and surface emissions are explored. In particular, we use MLS measurements to place the 2017 ASM observed in detail by the StratoClim field campaign into the context of other recent monsoon seasons.

Key words: Asian summer monsoon, Aura, MLS, remote sensing, UTLS composition