SPARC Water Vapor Assessment: Comparison of in situ and Aura MLS stratospheric water vapor measurements from 2004 through 2011

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During the time period covered by the Aura Microwave Limb Sounder (MLS) instrument (October, 2004 through present), there have been a number of high-altitude aircraft campaigns providing in situ measurements of stratospheric water vapor, as well as numerous balloon-borne frostpoint measurements of stratospheric humidity. The recent MidlAtitude Cirrus Properties EXperiment (MACPEX) included an comparison between a number of the airborne, frostpoint balloon and MLS measurements of lower-stratospheric water vapor concentration. The MACPEX preliminary measurements indicated significantly smaller discrepancies between different instruments than have been found in past comparisons. However, it is not clear what the implications of the improved agreement are for evaluation of past measurements of water vapor. With the assumption that the MLS water vapor measurements have not suffered from instrumental drift, we compare the differences between the in situ and MLS measurements to identify possible changes in the in situ measurements included in this study are the Harvard Water Vapor instrument, the JPL Laser Hygrometer (JLH), the NOAA Frostpoint Balloon Hygrometer (FPH/CFH), and the Fast In situ Stratospheric Hygrometer (FISH).