

MLS-related Scientific Publication

Scientific Theme: Atmospheric Chemistry

ATMOS Version 3 Water Vapor Measurements: Comparisons with Observations from two ER-2 Lyman- α Hygrometers, MkIV, HALOE, SAGE II, MAS, and MLS, H. A. Michelsen, G. L. Manney, F. W. Irion, G. C. Toon, M. R. Gunson, C. P. Rinsland, R. Zander, E. Mahieu, M. J. Newchurch, P. N. Purcell, E. E. Remsberg, J. M. Russell III, H. C. Pumphrey, J. W. Waters, R. M. Bevilacqua, K. K. Kelly, E. J. Hintsa, E. M. Weinstock, E.-W. Chiou, W. P. Chu, M. P. McCormick, and C. R. Webster, *J. Geophys. Res.*, **107**, 10.1029/2001JD000587, Feb. 2002.

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Summary and MLS contribution

This paper compares water vapor retrieved using the improved, Version 3 (V3), software from the Atmospheric Trace Molecule Spectroscopy (ATMOS) instrument with observations from other space-shuttle, satellite, balloon, and aircraft-borne instruments, including MLS. Agreement among all the instruments compared, as summarized in the figure, is generally within 15% in the middle to lower stratosphere and in the mesosphere, and within 10% in the middle to upper stratosphere; near 30 km altitude, all instruments agree to within 10%. Version 3 ATMOS retrievals are 7-14% higher than the "Version 104" (the most current version) retrievals from MLS throughout the stratosphere. The characterization of agreement amongst water vapor observations, and the generally good agreement in the stratosphere, is important for understanding and assessing possible trends in water vapor in the middle atmosphere that may be indicative of climate change.

This work benefits society by increasing our understanding of the quality of water vapor measurements throughout the stratosphere and mesosphere, and hence furthering our knowledge of the behavior of and trends in water in the atmosphere; this knowledge is intimately connected to climate change and its relation to stratospheric processes including ozone loss.

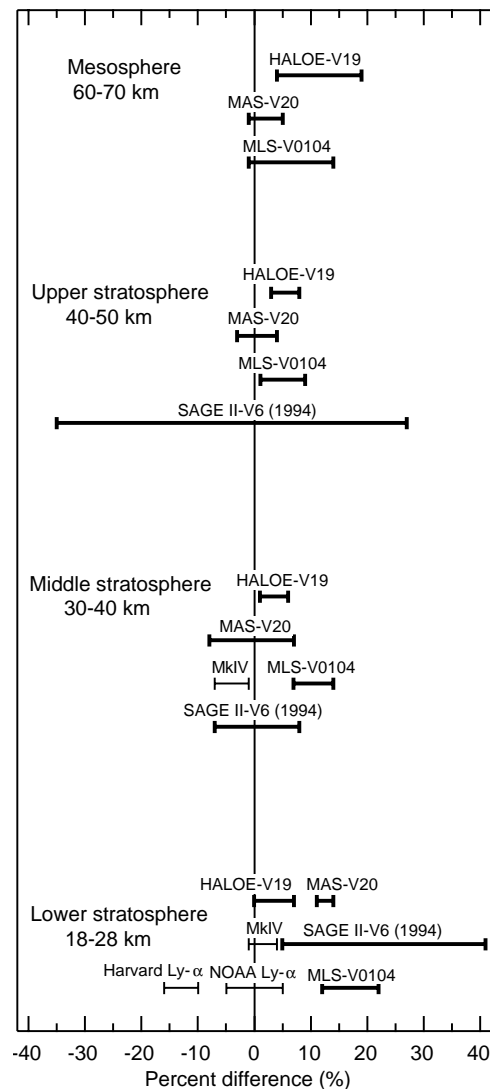


Figure 12. Percent differences between water vapor mixing ratios from ATMOS (V3) and other instruments. Ranges of average percent differences are shown for several altitude ranges. Thicker lines indicate comparisons in which the measurements were made within 6 days and 9° latitude of one another.