Poster 00346

Introduction to the Halogen Occultation Experiment 4th Public Data Release

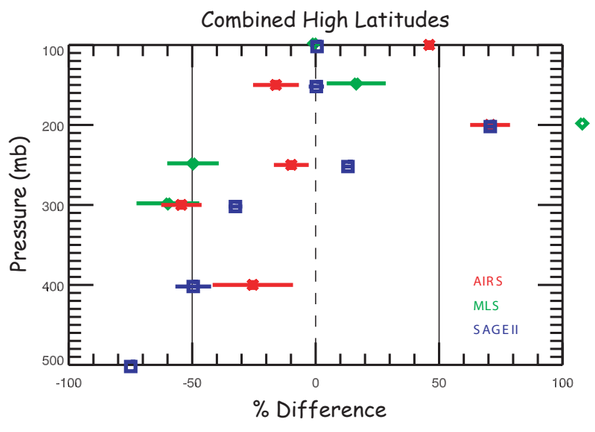
J. Anderson[1], J. M. Russell III[1], R. E. Thompson[2], L. L. Gordley[2], M. McHugh[2], and B. R. Magill[2]
[1]Hampton University, Hampton, VA [2]GATS, Inc. Newport News, VA

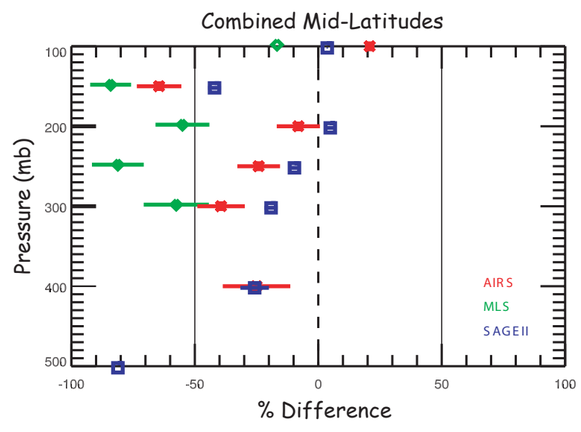
SPARC 4th General Assembly, August 31 - September 5, 2008, Bologna, Italy

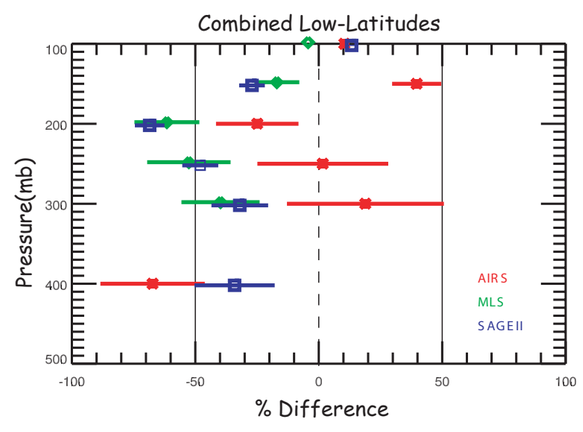
Introduction

The Halogen Occultation Experiment (HALOE) operated essentially without flaw on the Upper Atmosphere Research Satellite since it was first turned on in orbit October 11, 1991, until it was turned off in November 2005. HALOE measured temperature and a suite of atmospheric constituent vertical profiles including O_3, HCl, HF, CH_4, H_2O, NO, NO_2 and aerosol extinction at four wavelengths. Measurements of some of these parameters, i.e. O_3, H_2O, NO and temperature versus pressure, extend from the upper troposphere to well into the mesosphere and/or lower thermosphere. This study focuses on the HALOE 4th public release (v20). This algorithm provides the first HALOE H_2O vertical profile data in the mid-to-upper troposphere. We present results of initial validation studies using mainly satellite correlative measurements and summary's of the inter-comparison's of all species with the previous data version, highlighting the changes and improvements in the latest public release. The satellite correlative measurements used include the Atmosphere Infrared Sounder, the AURA Microwave Limb Sounder, and the Stratospheric Aerosol and Gas Experiment II. In addition, we will show comparisons of zonal averages, coincident measurements, and probability density functions.

Upper Tropospheric Water Vapor Comparisons

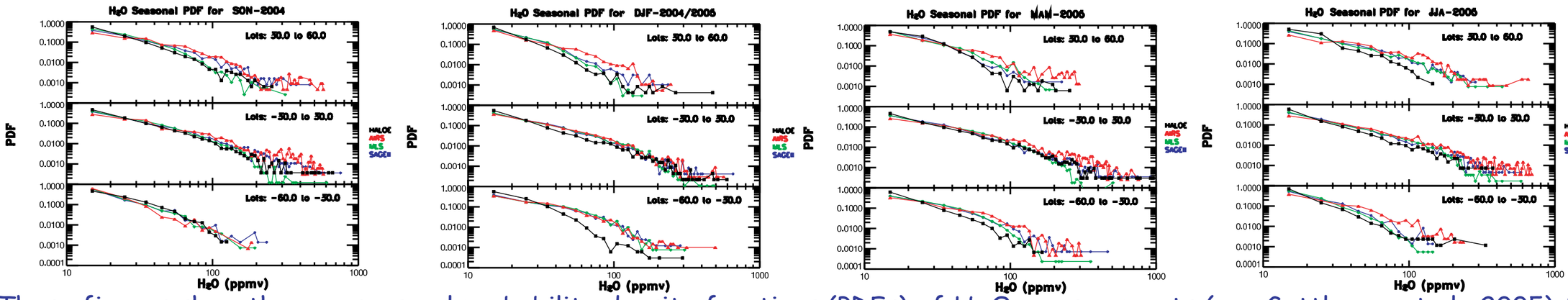






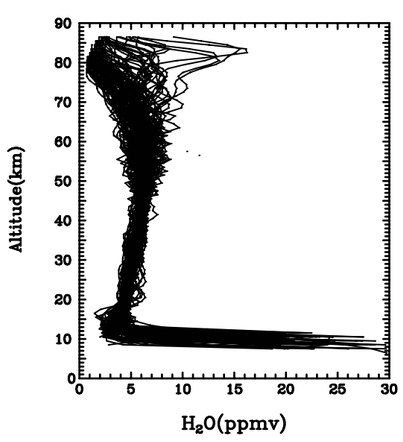
These figures show the vertical structure of the combined hemispheric mean-percent-difference for each instrument (100x[HALOE-Correlative]/Average of the 2). The horizontal bars represent 1 standard-error ($\sigma/N^{1/2}$) of the mean difference, where σ is the standard deviation and N is the total number of coincident profiles at that particular level.

Upper Tropospheric Water Vapor Probability Density Functions

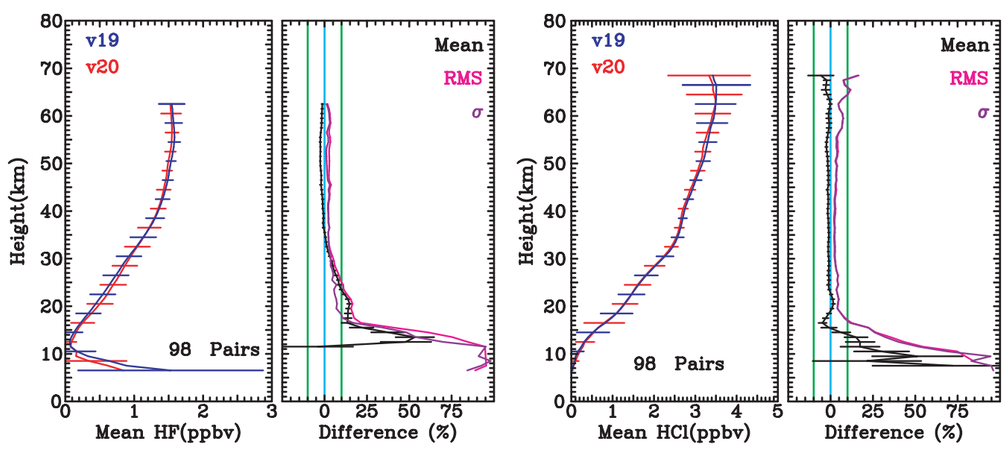


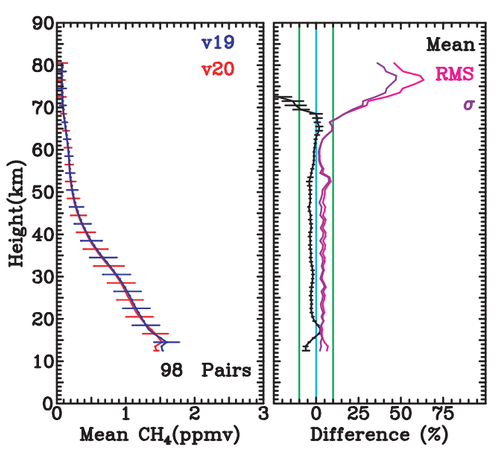
These figures show the raw seasonal probability density functions (PDFs) of H_2O measurements (e.g. Gettleman et al., 2005) for each individual data set over the course of 1 year. Use of PDFs significantly aids comparisons of highly variable data reducing the importance of spatial coincidence. Only data that falls within the pressure range between 100-300 mbar with H_2O values ranging between 10-1000 ppmv were used and subsequently grouped in 10 ppmv wide size bins.

New H_2O Profiles

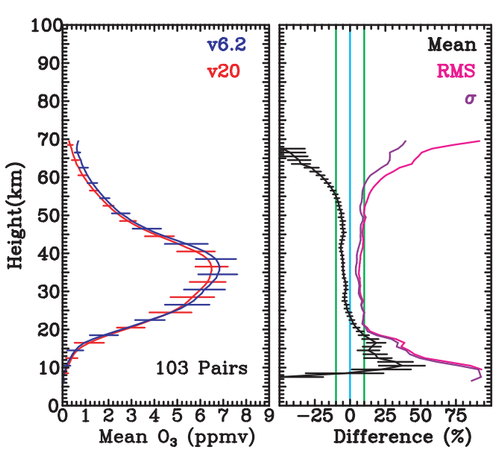


Increased Vertical Resolution in the HF, HCl, and CH_4 Profiles





New O_3 Retrievals



Summary

This algorithm provides the first HALOE H_2O vertical profile data in the mid-to-upper troposphere and higher accuracy O_3 in the lower stratosphere. It also increases the vertical resolution of CH_4, HCl, HF and NO in the middle atmosphere by nearly a factor of two to ~ 2.5 km. In addition, the use of newer line parameter data for many of the HALOE gases will increase the accuracy of the data set. The strategy for extending the H_2O retrievals into the troposphere is to use the HF delta V signals below the altitudes where HF contributes significantly to the signal. The delta V signals, unlike the radiometer signals used in the v19 H_2O retrievals, extend well into the troposphere and are virtually insensitive to aerosol absorption The stratospheric, mesospheric and tropospheric retrievals are merged into a single profile covering the entire altitude range.The release of this data set is anticipated to be during December 2008.

Acknowledgements

The authors would like to thank the MLS processing team, the SAGE II processing team, and the AIRS processing team for their years of hard work culminating in these excellent data sets. This study is supported by NASA grant NNG04GE42G.