Homogenizing NOAA's Ozonesonde Data Set Improves Comparison with Satellite-derived Vertical Ozone Profiles

C.W. Sterling[1,2], B.J. Johnson[2], S.J. Oltmans[3], P. Cullis[1,2], A. Jordan[1,2], E. Hall[1,2] and D. Hubert[4]

[1]Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO 80309; 303-497-4291, E-mail: chance.sterling@noaa.gov
[2]NOAA Earth System Research Laboratory, Global Monitoring Division (GMD), Boulder, CO 80305
[3]Retired from NOAA Earth System Research Laboratory, Global Monitoring Division (GMD), Boulder, CO 80305
[4]Royal Belgian Institute for Space Aeronomy, Brussels, Belgium

NOAA recently completed a long and arduous process of 'homogenizing' the 50+ year record of vertical ozone profiles measured by the electrochemical concentration cell (ECC) ozonesonde. The homogenization effort fixed historical data processing errors and derived functions to correct sensing solutions and instrumental biases to an ozone photometer. In this analysis, the vertical ozone profiles of both the homogenized and unhomogenized data sets are compared to a suite of satellite instruments capable of making similar, lower resolution ozone profile measurements. The analysis determined that the three functions derived for the 1% Full Buffer Solution, 2% No Buffer Solution, and the 6A sonde type biases all improved the comparison between the ozonesondes and the satellites. Additionally, the methodology for the individual, unique uncertainty calculations added to each ozonesonde profile is presented here. NOAA's homogenization effort has removed the largest biases associated with changes in the ozonesonde record, improved comparisons with satellite measurements, and calculated the uncertainty in the ozone partial pressure with a bottom-up approach.

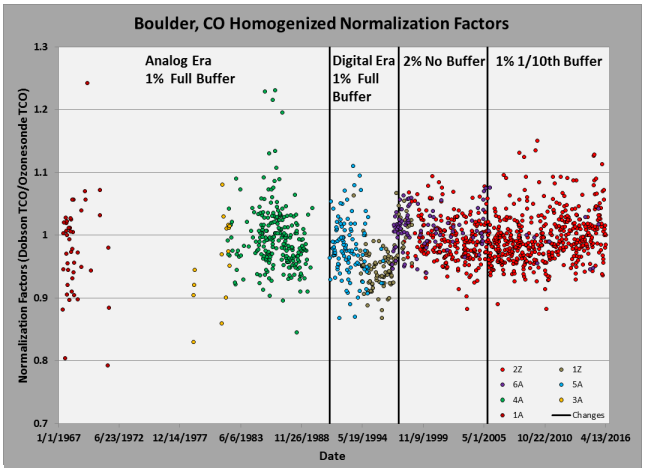

Figure 1. Normalization factors (Dobson Total Column Ozone/Ozonesonde Total Column Ozone) for the 50+ year ECC ozonesonde record in Boulder, Colorado.

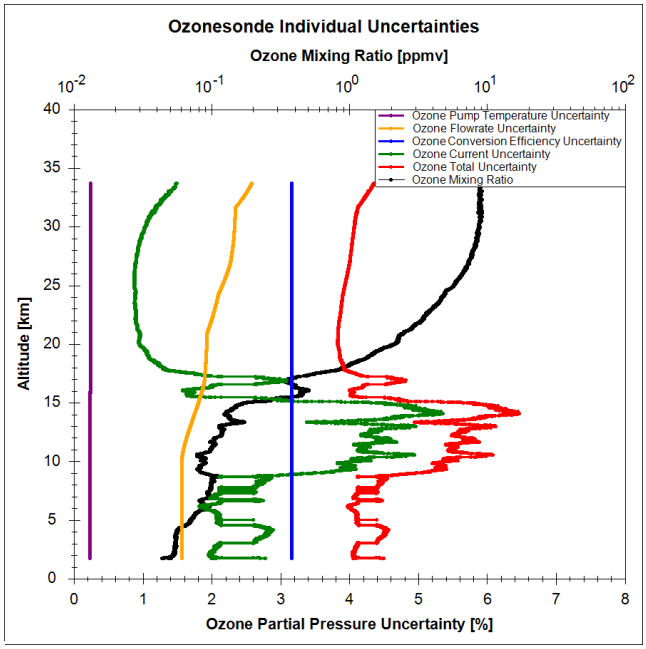

Figure 2. The total and individual components of the uncertainty in the ozone partial pressure vs. altitude.