Comparison of Ozone Retrievals from the Umkehr Reprocessing Version and Satellites

K. Miyagawa[1], I. Petropavlovskikh[2,3], G. McConville[2,3], A. McClure-Begley[2,3] and R.D. Evans[4]

[1]Guest Scientist at NOAA Earth System Research Laboratory, Global Monitoring Division (GMD), Boulder, CO 80305; 303-497-6679, E-mail: miyagawa.koji@noaa.gov
[2]Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, CO 80309
[3]NOAA Earth System Research Laboratory, Global Monitoring Division (GMD), Boulder, CO 80305
[4]Retired from NOAA Earth System Research Laboratory, Global Monitoring Division (GMD), Boulder, CO 80305

The long-term record of Umkehr measurement by the NOAA Dobson spectrophotometer has been reprocessed by updating calibration procedures and applying new quality-controlled tools under the updated Dobson automation software. In this study we present the comparison of Dobson Umkehr ozone profiles from three NOAA ozone network stations (Boulder, Mauna Loa and Lauder) against satellite overpass data, i.e. Aura Microwave Limb Sounder (MLS) and Ozone Mapping Profiler Suite (OMPS) overpasses. The satellite data are spatially (less than 200 km) and temporally (within 24 hours) matched with Dobson Umkehr measurements at the station. The retrieved individual Umkehr Averaging Kernels (AKs) are applied to smooth the overpass satellite profiles prior to comparisons. Comparisons show good agreement in the middle stratosphere (Umkehr layers 5–7) and in the upper stratosphere (layer 8 and combined layers 8, 9, and 10). However, in the lower stratosphere (Umkehr layers 2-4) a relatively large difference up to 20% is found. In addition, we discuss comparisons with the Suomi-NPP OMPS satellite and other co-located instruments at NOAA stations.

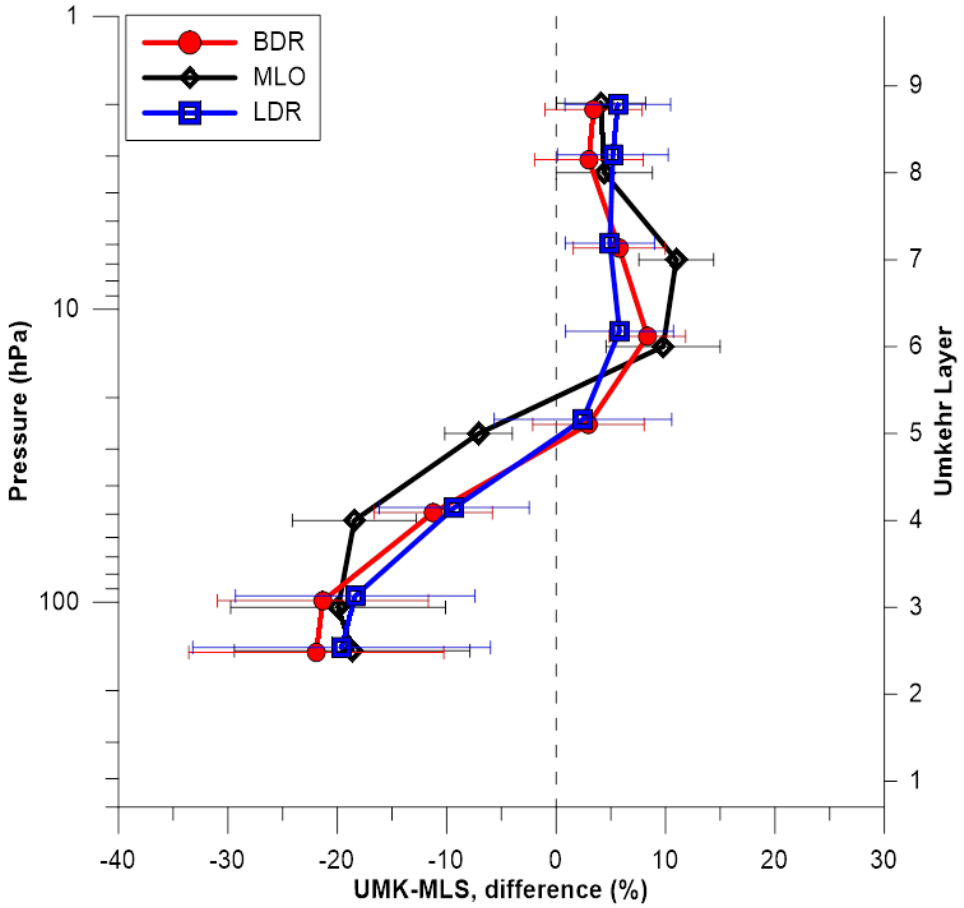

Figure 1. Shown are differences between Umkehr and Aura MLS data matched (200 km less than overpass distance and within 24 hours with Umkehr) from 2004 to 2016 at Boulder, Mauna Loa and Lauder station.