

Highlights of the New Multi-spectral Brewer Umkehr Ozone Profile Retrieval

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The Dobson Umkehr network has been a key data set for stratospheric ozone trend calculations and has earned its place as a benchmark network for stratospheric ozone profile observations. The Umkehr data has also been used to provide a long-term reference to the merging of the satellite ozone records, estimate the seasonal influence of an 11-year solar signal in the vertical distribution of stratospheric ozone, and to assess the ability of several remote and *in situ* sensing systems in capturing ozone variability. It was found that Dobson Umkehr measurement errors were often comparable to errors derived for satellite and ozone-sounding methods. In 2005, the Dobson Umkehr algorithm (UMK04) was modified to retrieve ozone profile data from Brewer Umkehr measurements taken at two spectral channels [Petropavlovskikh et al, 2011]. The PC version of the Brewer algorithm was implemented at the NEUBrew network for operational processing of Umkehr data (<http://www.esrl.noaa.gov/gmd/grad/neubrew/>). The most recently developed Brewer ozone retrieval algorithm (MSBU) utilizes Umkehr measurements at multiple wavelength channels (similar to the satellite BUV method) and significantly reduced range of solar zenith angles. Intercomparisons against ozone climatology, sounding, satellite overpasses and Dobson ozone datasets for NASA/Goddard, Boulder, CO and Mauna Loa Observatory, HI sites show reduction in ozone profile retrieval noise by as much as 30% in stratosphere and by about 50% in troposphere as compared to the single pair ozone retrieval. Tropospheric ozone retrievals also appear to be very promising. The intra-annual tropospheric ozone variability captured by the MSBU algorithm is comparable to variability found in collocated ozone sonde data.

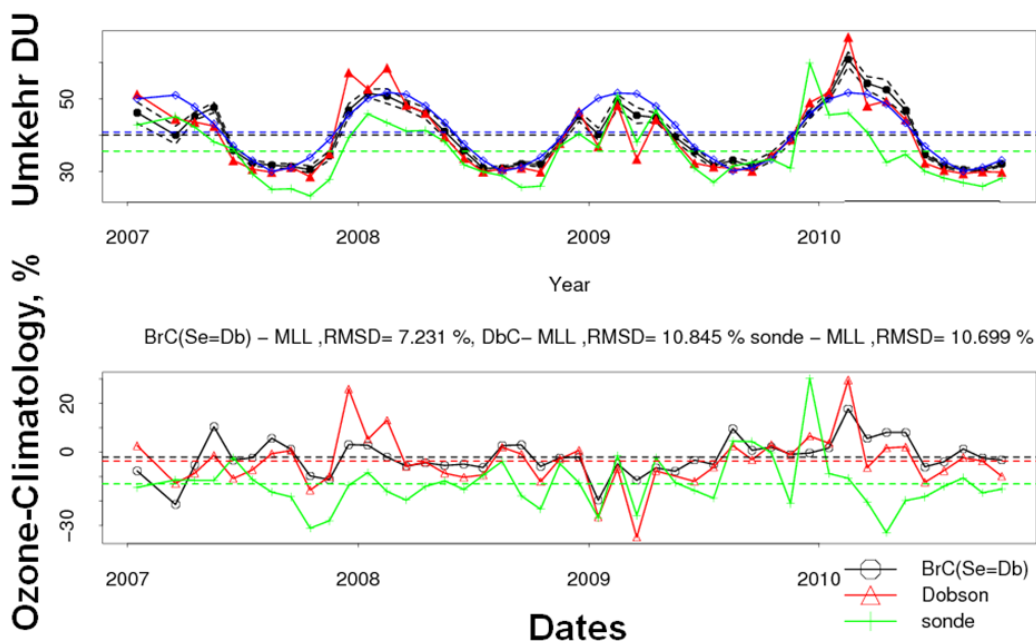


Figure 1. Ozone at 63-250 hPa (~10-15 km) measured by Brewer in Boulder, CO. Dobson (red), ozone sounding (green) and climatology (blue) data are shown for comparisons. Limited (once a week) temporal sampling in sounding data can instigate apparent differences in month-to-month variability when compared to Dobson or Brewer monthly averaged data.