

Differences Between the Reprocessed Dobson Total Ozone and Satellite Observation Records

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The entire Level-Zero data record from the NOAA Dobson Ozone Spectrophotometer network has been reprocessed with a new software system, with updated quality control features. The reprocessed new data set from the 1960s will be provided to the World Ozone and Ultraviolet Radiation Data Centre (WOUDC) and Network for the Detection of Atmospheric Composition Change (NDACC) archives.

This study estimates the long-term record difference with various satellite observations for assessment of the reprocessed total ozone (O_3) in sixteen NOAA worldwide stations. For comparison we used the gridded data and overpass data from the NASA Goddard Space Flight Center (Nimbus-4 BUUV, Nimbus-7 SBUV, Nimbus 7 TOMS, Earth Probe TOMS, Aura OMI, NPP OMPS and NOAA SBUV/2). The daily O_3 on a station used the bi-linear interpolation algorithm from the gridded data. Additionally, we surveyed different correlations from the latitude (or longitude) of a station for gridded data matching. The official algorithm for retrieval of O_3 from Dobson measurements includes static absorption coefficients derived using Bass and Paur (1985) cross-sections. We estimated the impact of use of different O_3 absorption coefficients (DBM and IUP) and temperature dependent coefficients using McPeters and Labow 2011 climatology.

In this analysis, OMI (Gridded Level 3e) shows the high overall quality without latitude dependence. The time series comparisons show an agreement within 1% over the past 13 years (Fig. 1). Additionally, high altitude Mauna Loa, Hawaii has good agreement due to the O_3 below the station which the satellite sees.

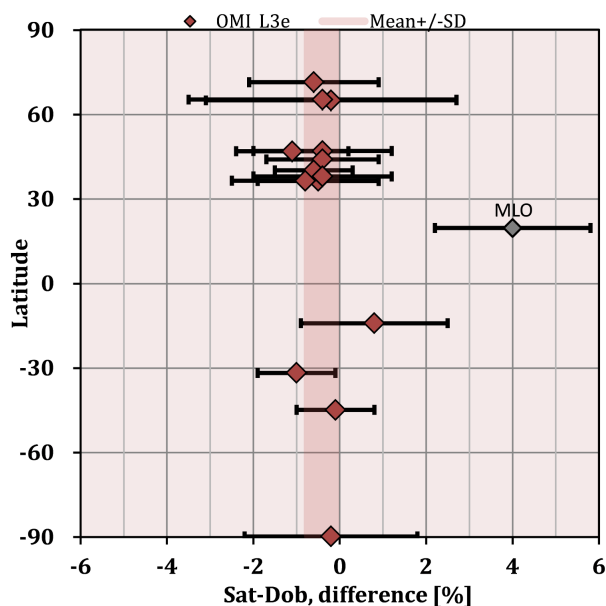


Figure 1. Difference of the total O_3 with Dobson (ADDS matched) and OMI Level 3e satellite (from 2004 to 2016). The error bar shows +/- 1 standard deviation.

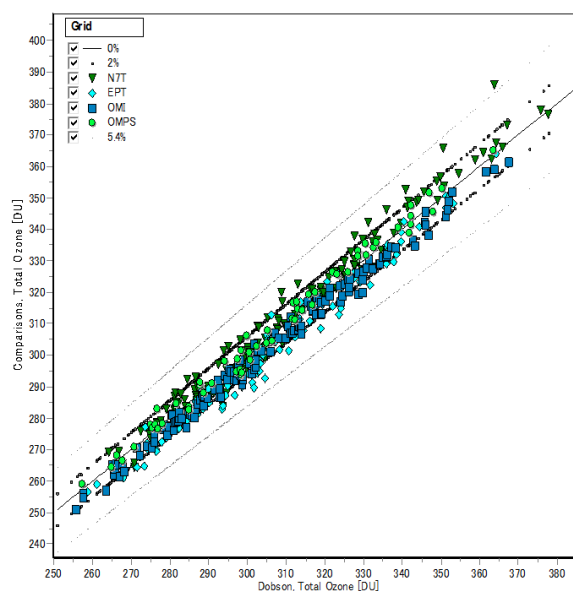


Figure 2. Monthly average scattering of the total O_3 of Dobson and gridded satellites at Boulder. Relation plot period 1979-2016.