



Intercomparison of Dobson and Brewer Total Ozone measurements from Arosa (Switzerland)

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Dobson and Brewer spectrophotometers are the standard instruments for ground-based Total Ozone Monitoring in the World Meteorological Organization's Global Atmospheric Watch program (WMO, 2003). Distinct differences in the seasonal cycles of total ozone have been reported from many sites, where both types of instruments are simultaneously operating (Kerr et al., 1988; WMO, 2003; Vanicek, 2006), and these differences are attributed to the different wavelengths used in Dobson and Brewer instruments. At Arosa (Switzerland, 46.8N/9.6E 1820 m a.s.l.), two Dobson (D101 installed in 1968, and D62 in 1992), two single Brewer (B40 in 1992 and B72 in 1994) and one double Brewer (B156 in 1998) instruments are co-located. These data allow a direct comparison for quality control and for studying the differences between the two types of spectrophotometers. As Arosa is above the inversion layer of the Swiss plateau, direct sun observations are possible during 70% of the days of the year. In order to make best use of the redundancy of the Dobson and Brewer measurements, transfer functions of the column ozone measurements of both types of instruments are required. In this study only quasi-simultaneous measurements of both instruments are allowed. Taking into account that a long term variation of TOZ in the midlatitudes is of the order of magnitude of a few percent, the elimination of instrumental differences has a fundamental role in understanding ozone depletion. A multiple regression model is used to derive Total Ozone transfer functions. Several explanatory variables are tested in the model, including stratospheric temperature (ozone temperature, temperature measurements at different altitudes), air mass and Ozone slant path. Their influences on ozone observations are estimated employing stepwise regression. The stratospheric temperature at the ozone layer is the parameter that influences the differences most strongly.

References:

Kerr, J. B., Asbridge, I. A., and Evans, W. F. J.: Intercomparison of Total Ozone Measured by the Brewer and Dobson Spectrophotometers at Toronto, *Journal of Geophysical Research-Atmospheres*, 93, 11 129{11 140, 1988. Vanicek, K.: Differences between ground Dobson, Brewer and satellite TOMS-8, GOME-WFDOAS total ozone observations at Hradec Kralove, Czech, *Atmos. Chem. Phys. Discuss.* www.atmos-chem-physdiscuss.net/6/5839/2006/, 6, 58395865, 2006. WMO, G.: Comparison of total ozone measurements of Dobson and Brewer spectrophotometers and recommended transfer function, 149, 2003.