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Improved ozone absorption cross-sections in the Hartley-Huggins bands

Dr. Victor Gorshlev, Dr. Mark Weber, Prof. Dr. John P. Burrows

University of Bremen

gorshlev@iup.physik.uni-bremen.de

Both Brewer and Dobson spectrometers operate in the Huggins ozone absorption in the near UV (305-340 nm) with distinct absorption minima and maxima. This band is also the spectral region where ozone cross-sections have strong temperature dependence so that uncertainties in the assumed atmospheric temperatures add to the retrieval error.

One of the sources of uncertainty in the ozone retrieval by various methodologies is the selection of absorption cross-sections. Using different absorption coefficients means the results in ozone amounts can differ by up to 3 %.

In the WMO standard retrieval using the Brewer and Dobson spectrophotometers, the Bass-Paur (Bass and Paur 1985, Paur and Bass, 1985) ozone cross-sections from the 1980s are used. In the meantime, newer datasets like those from Brion (Daumont et al., 1992, Brion et al., 1993, Malicet et al., 1995) as well as the recent data from the University of Bremen group are available (Gorshlev et al., 2014, Serdyuchenko et al., 2011, 2014). The latter publication reports absorption cross-sections with estimated uncertainties of 2–3 %.

New and improved measurements of the ozone absorption cross-sections are currently being performed in the University of Bremen. The region of interest is in the Huggins band (300 nm to 350 nm) with targeted uncertainties of 1–2 %. The new data will allow for further reduction of the uncertainties in the derived total ozone column for both ground- and satellite-based retrievals.