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Improved Ozone Absorption Cross-Sections in the Huggins Band.

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Many ground based and satellite born remote sensing instruments utilize measurements in the near UV (305-340 nm) for ozone observations. This wavelength region contains the Huggins band, where ozone spectra demonstrate distinct absorption minima and maxima. Ozone absorption cross-sections in the Huggins band also have strong temperature dependence, and thus the uncertainties in the assumed atmospheric temperatures add to the retrieval error.

Selection of the absorption cross-sections is one of the sources of uncertainty in the ozone retrieval by various methodologies. Using different absorption coefficients results in the retrieved ozone amounts differing 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 (Gorshelev et al., 2014, Serdyuchenko et al., 2011, 2014). The latter publication reports absorption cross-sections with estimated uncertainties of 2–3 %.

New and improved experimental approach was used for the measurements of the ozone absorption cross-sections in the Molecular Spectroscopy Laboratory in the University of Bremen. High-resolution (0.01 nm @ 350 nm) broadband spectra were obtained at 11 temperatures between 193K and 293K. 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.