First measurements of N_2O-self-broadening coefficients in the 00^01-00^00- and 00^02-00^00-bands

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The applicability of Fourier Transform Infrared (FTIR)-spectroscopy for high resolution gas phase measurements has been demonstrated for example by the NDACC [1] and the TCCON [2] atmospheric remote sensing networks. Nitrous oxide is an important analyte due to its contribution to global warming [3] and due to its relevance for the stratospheric chemistry [4]. Consequently precise spectral line data of this molecule are of high importance both for remote sensing, modelling of the earth atmosphere and the prediction of its future composition.
The European research project "EUMETRISPEC" (www.eumetrispec.org) aims to develop and validate a spectroscopic infrastructure based on a high-resolution FTIR-spectrometer for the determination of traceable spectral reference line data. This project concentrates on the major contributors to the atmospheric greenhouse effect like carbon dioxide, methane, nitrous oxide and water.
Up to now several measurements of spectral line parameters of nitrous oxide using different spectroscopic methods have been reported. However, to our knowledge, so far there were no direct measurements of the self-broadening coefficients of the $2\nu_3$–overtone band and even the ν_3–fundamental band was only partially covered using FTIR-spectroscopy measurements. Instead, modell based extra/interpolation of missing spectral parameters was used based on multiband fitting using an extensive set of measured band [5]. Nevertheless the modell-derived line data are to be validated in order to test the reconstruction procedure.

In this contribution we present the first measurements of nitrous oxide self-broadening coefficients in the 00^01-00^00-band at 2263-2267 cm^{-1} (R64e to R78e) and in the first overtone band (00^02-00^00) at 4418-4440 cm^{-1} (R0 to R40). The results are compared with self-broadening coefficients reconstructed and published in [5] and tabulated in HITRAN2008 [6]. The measured coefficients differ from the extra/interpolated data HITRAN2008 values slightly. However, uncertainties could be reduced.

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