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## A quantitative test of infrared optical constants for supercooled sulphuric and nitric acid droplet aerosols

R. Wagner<sup>1</sup>, A. Mangold<sup>2</sup>, O. Möhler<sup>1</sup>, H. Saathoff<sup>1</sup>, M. Schnaiter<sup>1</sup>, and U. Schurath<sup>1</sup>

<sup>1</sup>Forschungszentrum Karlsruhe, Institute of Meteorology and Climate Research, Karlsruhe, Germany

<sup>2</sup>Forschungszentrum Jülich, Institute of Chemistry and Dynamics of the Geosphere I (ICG-I): Stratosphere, Jülich, Germany

**Abstract.** In situ Fourier transform infrared (FTIR) extinction spectra of supercooled H<sub>2</sub>SO<sub>4</sub>/H<sub>2</sub>O and HNO<sub>3</sub>/H<sub>2</sub>O solution droplets were recorded in the large coolable aerosol chamber AIDA (Aerosol Interactions and Dynamics in the Atmosphere) of Forschungszentrum Karlsruhe for a range of aerosol compositions and at temperatures extending down to 192 K. The measured spectra were quantitatively analysed in terms of aerosol composition and mass concentration by using Mie theory in combination with published refractive index data as input parameters. Simultaneously, total sulphuric acid and nitric acid mass concentrations from filter analysis and total water concentrations measured with the Lyman- $\alpha$  hygrometer of Forschungszentrum Jülich were used to calculate the aerosol composition at thermodynamic equilibrium inside the aerosol chamber. By comparing these measured aerosol parameters with those retrieved from the analysis of the FTIR spectra, the accuracy of the literature data sets of refractive indices could be assessed. In summary, four data sets were tested in the H<sub>2</sub>SO<sub>4</sub>/H<sub>2</sub>O system as well as two data sets in the HNO<sub>3</sub>/H<sub>2</sub>O system, partly revealing significant discrepancies in the retrieved aerosol properties. Potential explanations for these differences are discussed in this paper.

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