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Photoacoustic and direct absorption spectroscopy of NH_3 using a tuneable diode laser in the 1.5 μm region

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Photoacoustic spectroscopy (PAS) is a highly sensitive technique that is currently employed for *in-situ* measurements of atmospheric trace gas concentrations and in laboratory spectroscopy. In order to assess the potential of PAS using commercially available room-temperature tuneable diode-lasers operating in the near-infrared, we have conducted a study of photoacoustic and direct absorption spectroscopy of NH_3 in the 1.5 μm region. Line positions and intensities (1, 2) of NH_3 in this region have been published previously.

Comparison of both approaches not only provides detection limits for atmospheric measurements as a function of laser power, but also shows non-linear evolution of the photoacoustic signal as a function of total pressure, which will be discussed in detail. In particular, it was observed that the PAS signal varies significantly for different lines, i.e. with increasing total pressure, NH_3 lines with higher pressure broadening coefficients show stronger increase in the PAS signal.

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