Geophysical Research Abstracts, Vol. 7, 09484, 2005
SRef-ID: 1607-7962/gra/EGU05-A-09484

Concentration dependent effects on I_2 reference spectra in the context of atmospheric DOAS and quantitative spectroscopy

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The use of ro-vibronic spectra of I_2 in the region of 543nm to 578nm as reference spectra for atmospheric Differential Optical Absorption Spectroscopy DOAS is studied. Determination of column density from such I_2 spectra obtained under conditions typical for atmospheric DOAS are shown to be affected by instrumental artefacts of up to 9% depending on the conditions under which the reference spectra were recorded. Accurate determination of concentration is impeded. Under low pressure conditions relevant in laboratory studies the deviations may grow up to 11%. New reference spectra of I_2 were determined under conditions close to those expected for atmospheric measurement thereby avoiding the described systematic deviations . The spectroscopic conditions were typical for two standard configurations of DOAS instruments.