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Towards an accurate light path correction of GOSAT greenhouse gas remote sensing, using polarized O2 A-band measurements

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The Japanese satellite GOSAT, successfully launched in January 2009, is the first dedicated satellite to measure the greenhouse gases CO2 and CH4. For an accurate determination of the total column of CO2 and CH4, the light path (i.e. the mean path followed by the photons) is a critical parameter. Even in the case of cloudfree pixels, aerosols affect the light path. With multi-spectral imagery by the Cloud and Aerosol Imager (CAI) on board GOSAT the horizontal distribution of aerosols can be determined. However, the vertical distribution of aerosols, which also affects the light path, cannot be determined in this way. From detailed radiative transfer modelling we have found that it is possible to derive the altitude of aerosols from polarization measurements in the O2 A-band at 760 nm. The TANSO instrument on board GOSAT is the first satellite spectrometer to measure two orthogonal polarization states in the O2-A band, as well as in the CO2 absorption bands at 1.6 and 2 microns. We plan to analyse and exploit these novel GOSAT polarization measurements to derive the altitude of aerosols from GOSAT polarization measurements in the O2 A-band, and to contribute to an accurate CO2 and CH4 column retrieval from GOSAT by reducing the aerosol altitude uncertainty. As a first step, we will compare the measured polarization in the O2 and CO2 bands to model results. First preliminary results will be shown.