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Development of aerosol altitude retrieval from GOSAT observations of the oxygen A-band

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Aerosols are an important element of global climate. Their effect on the atmospheric radiation budget shows large regional differences. The Japanese satellite GOSAT is the first dedicated satellite to measure the greenhouse gases CO2 and CH4; and for an accurate determination of their total column, the light path is a critical parameter. Even in the case of cloud-free pixels, aerosols affect the mean path followed by the photons. With multi-spectral imagery by the Cloud and Aerosol Imager (CAI) present in 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 modeling we have found that it is possible to derive the altitude of aerosols both from polarization measurements and the specific shape of the intensity (at high resolution) in the O2 A-band. GOSAT is the first satellite spectrometer to measure two orthogonal polarization states in the O2-A band, as well as having a high resolution spectrometer. We plan to analyze and exploit the novel GOSAT polarization measurements to derive the altitude of aerosols in the O2 A-band. However, as a first step, we want to exploit the high resolution measurements of the O2 A-band intensity. This approach has the advantage that it is invariant on polarization rotation of the light. The results from a sensitivity study of the in-house Radiative Transfer model DAK will be discussed, and some case studies of aerosol plumes observed by GOSAT will be shown.