XCO2 retrieval for GOSAT and GOSAT-2 based on the FOCAL algorithm

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Since 2009, the Greenhouse gases Observing SATellite (GOSAT) performs radiance measurements in the shortwave-infrared (SWIR) spectral region. Since begin of 2019 also data from GOSAT-2 are available. We present first results from a new method to derive column-average dry-air mole fractions of carbon dioxide (XCO2) from GOSAT and GOSAT-2 measurements. This approach is based on the Fast atmOspheric traCe gAs retrieval (FOCAL) algorithm, which has already been successfully applied to OCO-2 data. FOCAL is not only accurate but also numerically very fast. It is therefore well suited for the analysis of large amounts of spectral data as they are expected, e.g. from the forthcoming European anthropogenic CO2 Monitoring (CO2M) mission.

Main features of the new application of FOCAL to GOSAT/GOSAT-2 are the independent use of both S and P polarised spectra in the retrieval and the utilisation of multiple fit windows allowing for the retrieval of not only XCO2 but also XCH4 and water vapour total columns, with the potential for further atmospheric constituents and parameters like solar induced fluorescence (SIF), HDO and (in the case of GOSAT-2) also CO and potentially XN2O. However, this presentation concentrates on XCO2.