Sensitivity of SCIAMACHY XCO₂ to Aerosols and Cirrus Clouds

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Carbon dioxide (CO₂) is one of the most important greenhouse gases. Since pre-industrial times the CO₂ concentration has increased by more than 36%. The growth of CO₂ concentration results in a global warming and thereby in rising sea levels and extrem weather conditions. In this context, a good understanding of the sources and sinks of CO₂ is a pre-requisite for reliably predicting the future climate. Satellite instruments such as SCIAMACHY onboard ENVISAT can add important missing global information on regional CO₂ sources and sinks as ground-based or aircraft observations are sparse. This however requires a precision and accuracy of 1% or better. Especially biases, i.e., systematic errors, need to be avoided. Two potential error sources are aerosols and cirrus clouds. Here we present first results from a detailed analysis of three years of SCIAMACHY XCO₂, i.e., of the column-averaged mixing ratio of CO₂, with respect to possible retrieval errors caused by aerosols and thin clouds. In a first step, we have analyzed to what extent the differences between SCIAMACHY XCO₂ and global model data are correlated with aerosol optical thickness data sets as generated by the European GEMS project and using one year of CALIPSO cirrus optical thickness. In a second step, we perform simulations to investigate if the observed correlations can be reproduced using retrievals based on simulated radiances.