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SCIAMACHY WFM-DOAS XCO_2: Improvements and comparison with FTS measurements

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Carbon Dioxide (CO_2) is the most important anthropogenic greenhouse gas contributing to global climate change. Column-averaged dry air mole fractions of CO_2 (XCO_2) as retrieved from SCIAMACHY on-board ENVISAT (launch 2002) have the potential to provide important missing global information on regional CO_2 surface fluxes. This however requires to satisfy challenging accuracy requirements. Here, we present results of an inter-comparison of seven years (2003 - 2009) of SCIAMACHY XCO_2 retrievals obtained with version 2.1 (WFMDv2.1) and an updated version (WFMDv2.2) of the WFM-DOAS retrieval algorithm with FTS measurements from TCCON sites. An improved cloud filtering method has been applied to the WFMDv2.2 retrievals because scattering by unaccounted clouds, especially thin cirrus clouds, is an important error source. The filter is based on a threshold technique using radiances from the saturated water vapour absorption band at 1.4 μm which is mostly sensitive to thin clouds. The inter-comparison of the SCIAMACHY WFM-DOAS XCO_2 versions with FTS measurements shows overall better agreements for WFMDv2.2. These results show that the cloud filtering method successfully improves the SCIAMACHY WFM-DOAS XCO_2 data set.