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Application of KLIMA/G-POD algorithm to CO_2 retrieval from IASI/METOP-A observations and comparison with GOSAT/TANSO-FTS products

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The ESA research project "Application of KLIMA algorithm to CO_2 retrieval from IASI/METOP-A observations and comparison with GOSAT/TANSO-FTS products" aims at the develop of a dedicated software, based on the KLIMA inversion algorithm (originally proposed by IFAC-CNR for the ESA Earth Explorer Mission), optimally suited for CO_2 retrieval and integrated into the ESA GRID-based operational environment G-POD (Grid Processing On-Demand) to processing Level-1 data acquired by the IASI instrument onboard the METOP-A satellite and to perform a comparison and cross-validation of GOSAT TANSO-FTS Level-2 data. Optimized versions of the KLIMA-IASI code have been investigated, aiming at developing a non-operation retrieval code with capabilities that meet the requirements of cross validation with GOSAT TANSO-FTS products and with adequate features for the integration on the G-POD system. For the performance of the retrieval a target accuracy of 0.3% (1 ppmv out of 370 ppmv) on regional scales (1000 x 1000 km) at monthly intervals, which is consistent with the requirements of the GOSAT mission for CO_2 products, was assumed as reference value. The required maximum program size was set to 1 Gbyte and the running time was limited with the aim of processing 1 orbit of IASI data in 1 day when using G-POD computing resources. The KLIMA-IASI retrieval code has been successfully completed and has been integrated on the G-POD operational environment and now the code is available to all interested users for bulk processing of IASI data. After the procurement of a consolidated version of the KLIMA-IASI/G- POD retrieval code it was possible to start the processing of IASI spectra and for comparison and cross-validation of KLIMA-IASI CO_2 products with GOSAT/TANSO-FTS operational products. Using the KLIMA inversion code integrated into the ESA G-POD, it was possible to perform an extensive inter-comparison and cross-validation of a selected set of IASI measurements collocated with GOSAT TANSO-FTS observations. The GOSAT CO_2 total column values were compared with the CO_2 total column retrieved from IASI Level-1C data. In this work we will describe in details the strategy adopted for the comparison and we will show the results of the cross-validation activity.