



Comparison of CO₂ total column retrieved from IASI/MetOp-A using KLIMA algorithm and TANSO-FTS/GOSAT level 2 products

Lucia Maria Laurenza, Ugo Cortesi, Samuele DelBianco, and Marco Gai
IFAC-CNR

Carbon dioxide is a key constituent of the terrestrial atmosphere with both natural and anthropogenic sources. It is one of the primary forcing agents of the greenhouse effect, as well as from being the most mobile component of the global carbon cycle that is critically coupled to the Earth's climate system. In this study, one year of observations from the Infrared Atmospheric Sounding Interferometer (IASI), onboard of MetOp-A satellite, are used to retrieve the columnar abundance of atmospheric carbon dioxide, for a global geographical coverage and in clear-sky conditions. The dedicated software is based on the KLIMA inversion algorithm (originally proposed by IFAC-CNR for cycle 6 of ESA Earth Explorer Core Missions) and has been adapted into a non-operational inversion code to process Level-1 data acquired by the IASI instrument and to retrieve the CO₂ total column with a target accuracy of 1%. In order to obtain the a reasonable capacity to bulk processing IASI data, it was chosen to integrate the KLIMA code into the ESA grid based operational environment G-POD system (Grid Processing On-Demand). A series of approximations has been implemented in the radiative transfer code with the aim to achieve adequate features in term of program size and computing time necessary for the integration into G-POD system and to meet the requirements of comparison with TANSO-FTS/GOSAT SWIR Level-2 products. The KLIMA-IASI retrieval code integration on G-POD has been completed and considering the capacity of G-POD computing resources, it was decided to process, for global geographical coverage, one week per month of a complete year of IASI measurements, from March 1, 2010 to February 28, 2011. In this selected temporal range, TANSO-FTS SWIR Level-2 data were obtained from the GOSAT User Interface Gateway (GUIG), and data from selected stations covers a different latitudes of the Total Carbon Column Observing Network (TCCON) were collected from TCCON Data Archive. We performed an extensive comparison of column-average CO₂ dry air mole fraction (XCO₂) between values retrieved from IASI measurements by using the KLIMA/G-POD inversion code and operational Level-2 SWIR products (Version 01.xx and Version 02.xx) from collocated TANSO-FTS observations. We performed also a comparison of KLIMA products against the data provided by several TCCON ground stations. In this work, we describe the strategy adopted for the comparison and we show the results of the cross-validation activities.