Ozone total and partial column amounts comparison between satellite-based MetOp-IASI and ground-based NDACC FTIR

E. Sepúlveda[1,2], O.E. García[2], M. Schneider[3], T. August[4], C. Clerbaux[5,6], F. Hase[3], T. Blumenstock[3], T. Hultberg[4], E. Sanromá[2], V. Carreño[2], E. Mahieu[7], M. De Mazière[8], C. Vigouroux[8], D. Griffith[9], N. Jones[9], D. Smale[10], J. Notholt[11], M. Palm[11], A. M. De Frutos[1]

(1) Optic Applied Group, University of Valladolid, Valladolid, Spain.
(2) Izaña Atmospheric Research Centre, State Agency of Meteorology (AEMET), Santa Cruz de Tenerife, Spain.
(3) Institute for Meteorology and Climate Research (IMK-ASF), Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany.
(4) EUMETSAT, Darmstad, Germany.
(5) UPMC Univ. Paris 06; Université Versailles St-Quentin, LATMOS-IPSL, Paris, France.
(6) Spectroscopie de l'Atmosphère, Service de Chimie Quantique et Photophysique, Université Libre de Bruxelles (ULB), Brussel, Belgium.
(7) University of Liège, Liège, Belgium.
(8) Belgian Institute for Space Aeronomy, Belgium.
(9) University of Wollongong, Wollongong, Australia.
(10) National Institute of Water and Atmospheric Research (NIWA), Lauder, New Zealand.
(11) University of Bremen, Bremen, Germany.

esepulveda@goa.uva.es, ogarciar@aemet.es

Abstract

Satellite-based (s-b) sensors have the advantage of monitoring the Earth's atmosphere at global scale and at high frequency and, therefore, increasing the temporal and spatial coverage of the ground-based (g-b) sensors networks. However, the quality and consistency of the satellite-sensor datasets have to be assessed prior to any scientific use. In this context, the g-b high-quality Fourier Transform Infrared (FTIR) spectrometers that take part in the NDACC (Network for the Detection of Atmospheric Composition Change) have proved to be suitable to perform this task.

This study analyzes the capability of the s-b MetOp-A IASI (Infrared Atmospheric Sounding Interferometer) sensor of monitoring global ozone distributions (total and partial column amounts) by comparing with eight globally distributed g-b NDACC-FTIR sites. Both, s-b and g-b, instruments use similar measuring technique, FTIR spectrometry, but while the g-b FTIR instrument observes the direct solar middle infrared absorption [0.005 cm^{-1} spectral resolution], the s-b IASI sensor observes the thermal infrared emission reflected by Earth [0.5 cm^{-1} spectral resolution]. From the s-b IASI observations two retrieval codes are considered: the EUMETSAT IASI level 2 (L2) generated by the EPS Core Ground Segment (version 5 and version 6) and the Fast Optimal Retrievals on Layers for IASI (FORLI) from LATMOS. From the g-b FTIR observations a common retrieval strategy for all sites involved in this study is carried out. As preliminary results, both s-b retrieval codes are consistent with respect to the g-b NDACC-FTIR, showing no latitudinal dependence and giving a precision for IASI between (2.5-3)% for the total column amounts and for the partial column amount less than 7% and 13 % in the stratosphere and troposphere, respectively.