TRACE GASES VALIDATION AND QUALITY ASSESSMENT WITHIN THE AC SAF

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Introduction

Within the Continuous Development and Operations Project of **EUMETSAT's AC SAF** (Satellite Application Facility on Atmospheric Composition Monitoring) operational GOME-2 and IASI data products of well characterized precision, accuracy and stability are being delivered. The validation of new data products and the continuous monitoring of the quality of operational data sets are essential activities in the AC SAF. For **minor trace gases (NO_2, BrO, HCHO, SO_2, glyoxal, HNO_3 and OClO)**, validation and Quality Assessment (QA) activities are coordinated at BIRA-IASB and focus on sensors on board of the three EUMETSAT MetOp platforms.

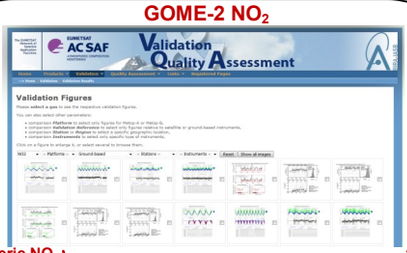
An end-to-end validation approach has been developed in compliance with international QA/QC standards, based on the verification and validation of each individual component of the level-1-to-2 retrieval chain. Evaluations are carried out using a suite of correlative observations performed by complementary ground-based and satellite instruments supported by radiative transfer and chemical-transport modelling tools. A validation and QA web portal (**www.cdop.aeronomie.be**) has been set up in order to gather all the validation results and ensure a global view of the quality of the operational products.

The current version of the validation web-portal is **operational for GOME-2/Metop-A and Metop-B sensors** and will be extended for Metop-C after launch. The validation results rely on ground-based measurements from remote-sensing instruments (**zenith-sky** and **direct sun DOAS**, **MAXDOAS**, and **FTIR** from selected NDACC stations) and on **satellite instruments** (GOME, SCIAMACHY and OMI). We present the status of the system and illustrate a number of validation cases for stratospheric and tropospheric NO_2, HCHO, SO_2, BrO and OClO from GOME-2 sensors and HNO_3 and SO_2 from IASI sensors.

www.cdop.aeronomie.be

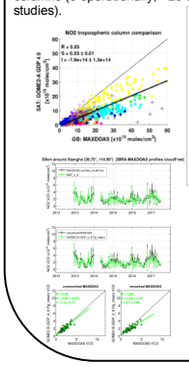
■ The trace gas validation and quality assessment web-portal is now operational for NO_2, BrO, HCHO and SO_2 from GOME-2 on Metop-A and Metop-B; GOME-2 OClO has just been declared operational (Sept 2017) and will be included asap; IASI SO_2 and IASI HNO_3 scientific validation is ongoing and will be included on the website once the products are operational.

GOME-2 NO_2



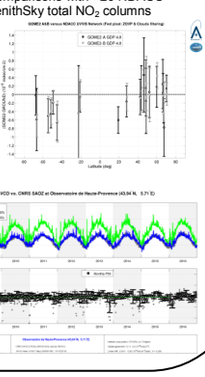
tropospheric NO_2

Comparisons with MAX-DOAS NO_2 columns (6 operationally, >20 case studies).

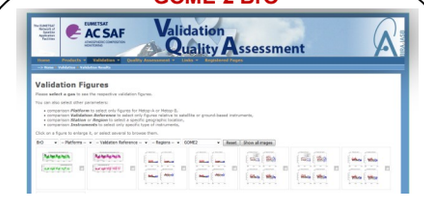


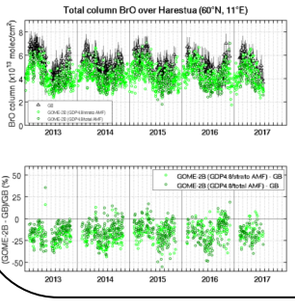
total NO_2

Comparisons with >20 NDACC ZenithSky total NO_2 columns



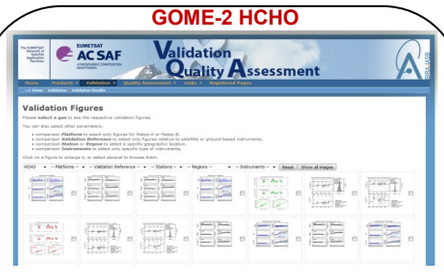
GOME-2 BrO

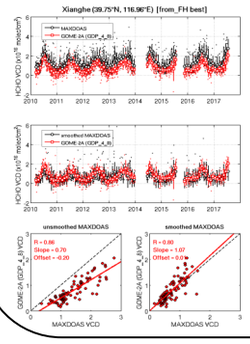




BrO columns over Harestua station, GOME-2B vs ground-based zenith sky.

GOME-2 HCHO





HCHO columns over Xianghe from MAXDOAS and GOME-2A. Time-series and scatter plots are shown with and without smoothing of the MAXDOAS profile by the satellite AVK.

IASI HNO_3

Atmos. Meas. Tech., 9, 4783–4801, 2016
www.atmos-meas-tech.net/9/4783/2016/
doi:10.5194/amt-9-4783-2016
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Atmospheric Measurement Techniques

First characterization and validation of FORLI-HNO_3 vertical profiles retrieved from IASI/Metop

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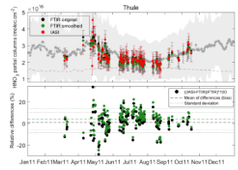
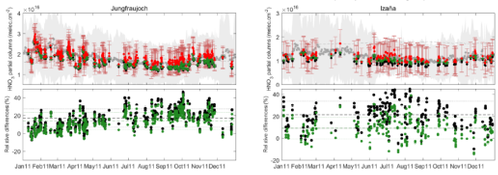
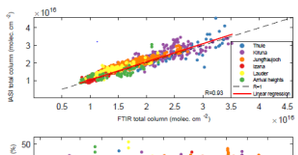
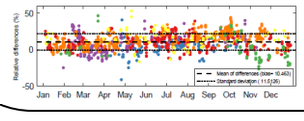
First validation in Ronsmans et al. 2016 with 6 NDACC FTIR stations, for 2011.
NDACC data smoothed with IASI AVK, to reduce the smoothing error in the comparison.







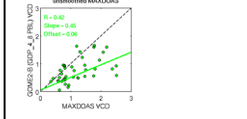
High correlation (R=0.93)
Overall bias of 10%



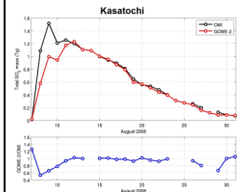
GOME-2 & IASI SO_2

anthropogenic SO_2

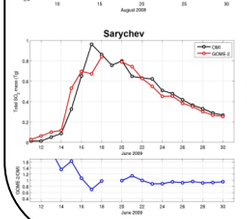
GOME-2 SO_2 PBL columns can be compared to MAXDOAS columns in China, focusing on anthropogenic contribution

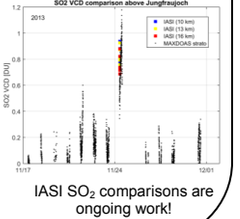


volcanic SO_2



GOME-2 and IASI SO_2 volcanic columns (provided for a few assumed SO_2 heights) can be compared to other satellites (e.g. OMI, Theys et al., 2015) and over a (few) ground-based stations.

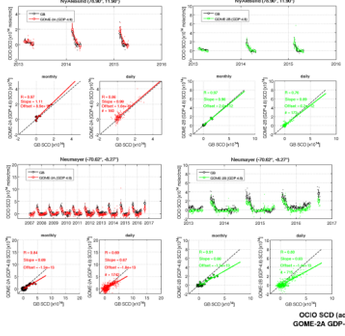




IASI SO_2 comparisons are ongoing work!

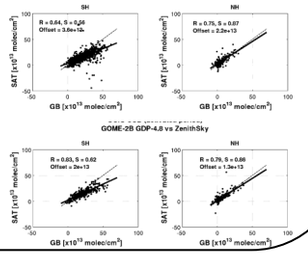
GOME-2 OClO

OClO Data Record has just been released (mid Sept), and validation has been performed by comparing to 8 ZenithSky ground-based stations in Arctic and Antartic over 2007-2016 (presentation n° 418)



Day-to-day fluctuations and annual cycle are captured consistently by GOME-2 and the ground-based instruments

Over the Southern Hemisphere both GOME-2 instruments report lower values (~40%) than ground-based; over the Northern Hemisphere the under-estimation is smaller (~15%)



Visit our website and see all the validation figures and reports for GOME-2 on Metop-A and on Metop-B!!

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