



# TRACE GAS VALIDATION AND QUALITY ASSESSMENT SYSTEM FOR ATMOSPHERIC SENSORS ON METOP

G. Pinardi<sup>\*1</sup>, M. Van Roozendael<sup>1</sup>, J.C. Lambert<sup>1</sup>, J. Granville<sup>1</sup>, M. De Mazière<sup>1</sup>, H. De Backer<sup>2</sup>, A. Delcloot<sup>2</sup>, I. De Smedt<sup>1</sup>, F. Hendrick<sup>1</sup>, H. Yu<sup>1</sup>, T. Wang<sup>3</sup>, C. Lerot<sup>1</sup>, N. Theys<sup>1</sup>, J. van Gent<sup>1</sup>, F. Tack<sup>1</sup>, C. Gielen<sup>1</sup>

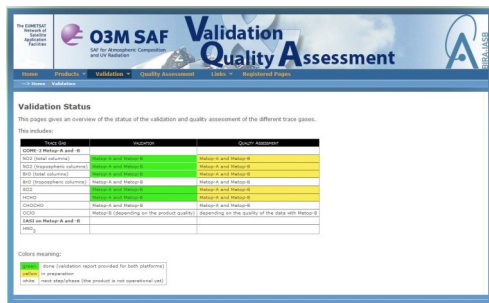
(1) BIRA-IASB, Belgium, (2) RMI, Belgium, (3) IAP, China  
<sup>\*</sup>gaia.pinardi@aeronomie.be

## Introduction

As part of the EUMETSAT's Satellite Application Facility on Ozone and Atmospheric Chemistry Monitoring (O3M-SAF), BIRA-IASB has been responsible for the validation and Quality Assessment (QA) of a number of trace gases products. For the second phase of the Continuous Development and Operations Project (CDOP-2) a new **Trace Gas Validation and Quality Assessment (TGV-QA) web-portal** has been set-up, which **aims at providing in near-real-time complete information on the status of the operational data products from GOME-2 and IASI on the successive Metop platforms**. The current version of the TGV-QA portal ([www.cdop.aeronomie.be](http://www.cdop.aeronomie.be)) is **operational for NO<sub>2</sub>, BrO and HCHO total and tropospheric column measurements of GOME-2/Metop-A and Metop-B**. For the current phase of the CDOP project (until 2017), the system will be developed to cover a number of additional gases measured by the GOME-2 and IASI sensors (NO<sub>2</sub>, BrO, HCHO, SO<sub>2</sub>, glyoxal, HNO<sub>3</sub> and OClO) on board of the three EUMETSAT MetOp platforms. The validation approach is based on an **end-to-end methodology** where individual components of the level-1-to-2 retrieval chain are addressed. Evaluations are carried out using a suite of **correlative observations** performed by **complementary ground-based remote sensing instruments (zenith-sky and direct sun DOAS, MAXDOAS, and FTIR** from selected NDACC stations) and **satellite instruments (GOME, SCIAMACHY and OMI)** supported by radiative transfer and chemical-transport modelling tools. We present a demonstration of the system and focus on selected regions where correlative ground-based measurements are currently available, with a particular emphasis on the MAXDOAS stations operated by BIRA-IASB at Observatoire de Haute Provence in South of France and Beijing/Xianghe in China.

## [www.cdop.aeronomie.be](http://www.cdop.aeronomie.be)

- The trace gas validation and quality assessment web-portal is now operational for NO<sub>2</sub>, BrO and HCHO validation part from GOME-2 on Metop-A and Metop-B:



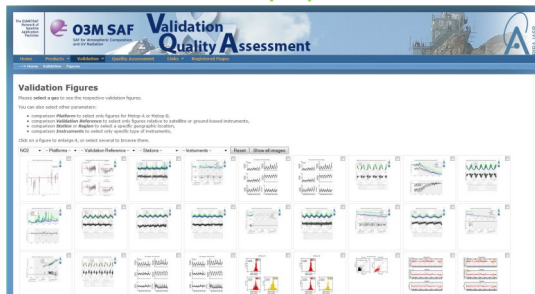
**Validation:** full validation exercise for new products before reaching operational status (e.g., new gases and Metop-B products)

**Quality Assessment (QA):** regular online monitoring of operational products, in order to ensure their stability (internal verification by the developer institutes + regular comparisons to correlative datasets, performed by the validation groups)

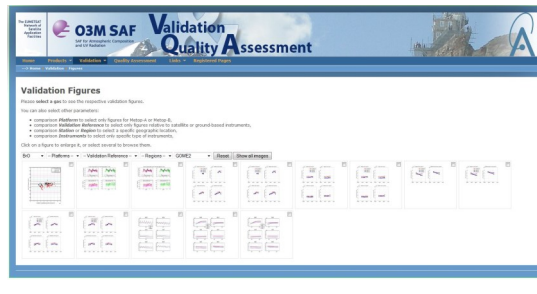
The quality assessment part will follow soon, with regular comparisons with other satellite datasets and available ground-based measurements.

- Examples of the validation tab for NO<sub>2</sub>, BrO and HCHO:

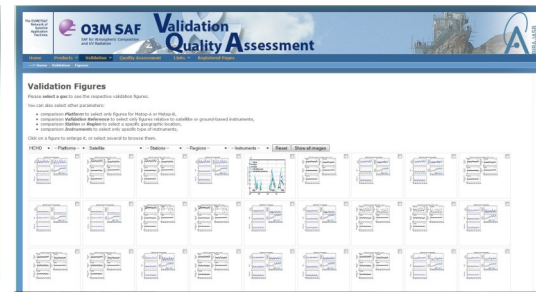
### NO<sub>2</sub>: total and tropospheric columns



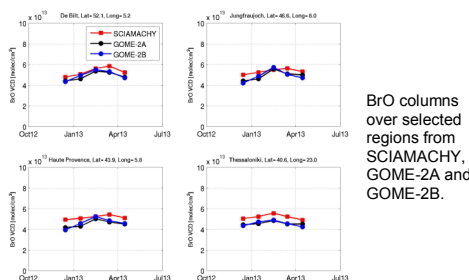
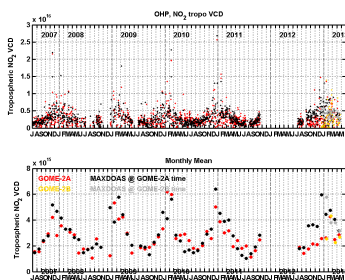
### BrO columns



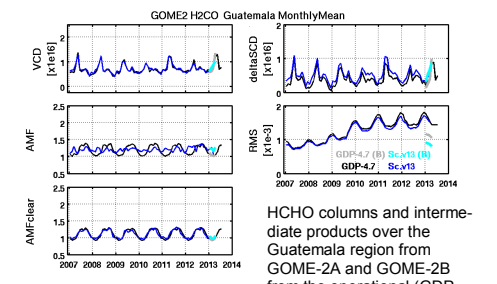
### HCHO columns



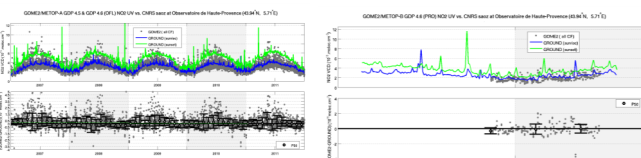
Tropospheric NO<sub>2</sub> columns at OHP from MAXDOAS, GOME-2A and GOME-2B.



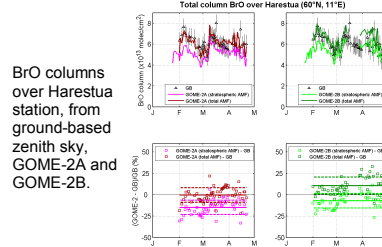
BrO columns over selected regions from SCIAMACHY, GOME-2A and GOME-2B.



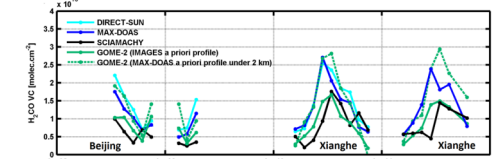
HCHO columns and intermediate products over the Guatemala region from GOME-2A and GOME-2B from the operational (GDP-4) and the scientific product (Sc.v.13).



Total NO<sub>2</sub> columns at OHP from SAOZ, GOME-2A and GOME-2B.



BrO columns over Harestua station, from ground-based zenith sky, GOME-2A and GOME-2B.



HCHO columns over Beijing and Xianghe from MAXDOAS, Direct Sun, SCIAMACHY and GOME-2A with different choices of a-priori profile for the retrieval of HCHO columns.

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

## Next steps

- In the next months: online Quality Assessment figures and extension to 1-year data of Metop-B validation.
- In the next years: extension to other trace gases measured by the GOME-2 and IASI sensors, such as glyoxal, HNO<sub>3</sub> and OClO.
- The validation system will largely benefit from harmonization and automatization of the ground-based remote-sensing data within the NORS project (Demonstration Network Of ground-based Remote Sensing Observations in support of the GMES Atmospheric Service).

**Acknowledgements:** Part of this work is funded by EUMETSAT through the O3M-SAF Continuous Development and Operation Project (CDOP), and by ProDEX and the Belgian Science Policy via A3C. PI and staff at NDACC UV-VIS stations are acknowledged for data provision and continuous support.