NEAR-REAL TIME PROCESSING OF IASI RADIANCES TO MEASURE CO

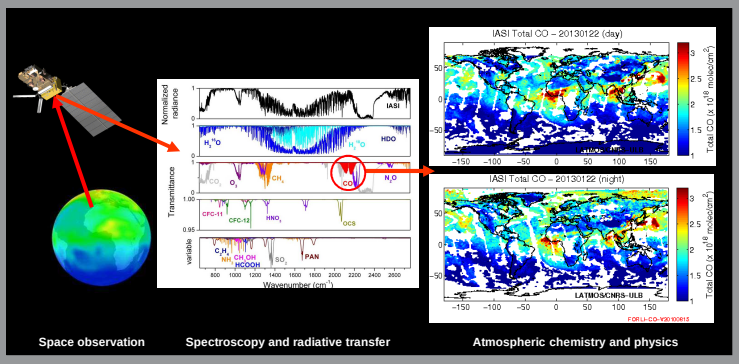
J. Hadji-Lazaro[1], M. George[1], D. Hurtmans[2], C. Clerbaux[1,2], P.-F. Coheur[2]

[1] UPMC Univ. Paris 06, Université Versailles St-Quentin, CNRS/INSU, LATMOS-IPSL, Paris, France

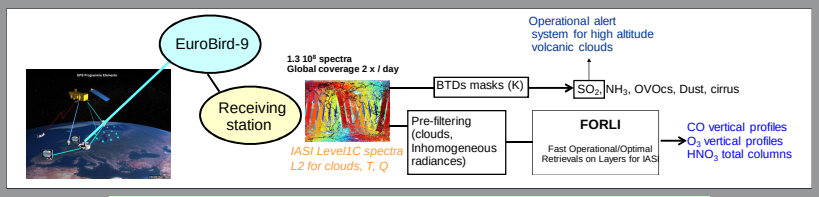
[2] Spectroscopie de l'Atmosphère, Service de Chimie Quantique et de Photophysique, Université Libre de Bruxelles, Brussels, Belgium

Contact : juliette.hadji-lazaro@latmos.ipsl.fr

Carbon monoxide (CO) is an important trace gas for the understanding of both air quality and atmospheric composition. It is a good tracer of pollution plumes and atmospheric dynamics. From the analysis of the IASI radiances, along with ancillary information on temperature and humidity profiles and emissivity, CO concentration products (total column and profiles) are obtained using the Fast Operational/Optimal Retrievals on Layers for IASI (FORLI) algorithm.
This poster provides an overview of the near-real time processing of the IASI level 1C data at ULB and LATMOS and of the results distribution to international scientific teams.
In the framework of the O3MSAF the FORLI CO processing is currently being implemented at Eumetsat. These CO products will be distributed through EumetCast in 2013.
This poster also illustrates how the data processed at ULB-LATMOS are currently assimilated in the MACC-II project to generate the CO pollution forecasts over Europe.



From IASI radiance spectra, at a given location (IASI ground pixel is circular with 12 km diameter at nadir) to global distributions of trace gases.



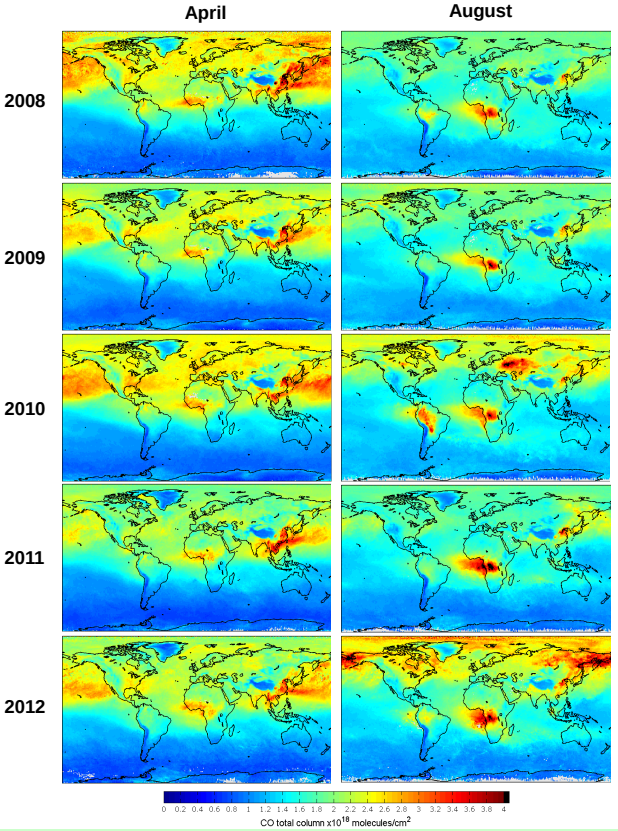
Overview of IASI processing chain at ULB and LATMOS
FORLI radiative transfer and retrieval code for IASI
D. Hurtmans et al., JQSRT, 2012.

FORLI products will be distributed in near real time by Eumetsat through the Eumetcast system distribution.

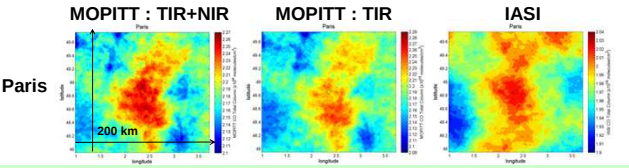
Code implementation calendar :
- CO in 2012
- SO_2 in 2013
- O_3 in 2014
- HNO_3 in 2015

O3M SAF Website:http://o3msaf.fmi.fi

FORLI CO applications at SPECAT/ULB and LATMOS/IPSL



Monthly averaged CO total columns for the months of April and August of the 5 year period 2008-2012
See George et al., ACP, 2009 and George et al., 2013
See oral presentation of M. George on comparisons of IASI and MOPITT v5 data



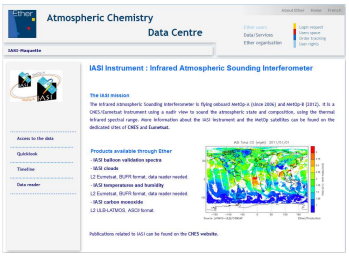
Daytime CO total columns averaged on the 4 year period 2008-2011 around Paris
See Pommier et al., 2013
See poster of M. Pommier for comparison of IASI and MOPITT data over megacities

FORLI CO results applications in international scientific teams

FORLI CO results distribution

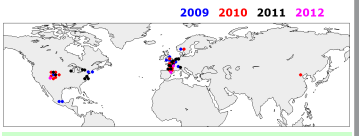
A 5 year continuous archive of CO total columns along with averaging kernels and error budget is available through the Ether database (http://www.pole-ether.fr/).

More than 60 registered users exploit this dataset to further study and understand the atmospheric composition and chemistry, air quality assessment or emission source estimations.



Validation works and applications

How much CO was emitted by the 2010 fires around Moscow?
M. Krol et al., ACPD, 2012.
Retrieval of MetOp-A/IASI CO profiles and validation with MOZAIC data
E. De Wachter et al., AMT, 2012.
Validation of IASI FORLI carbon monoxide retrievals using FTIR data from NDACC
T. Kerzenmacher et al., AMT, 2012.
Assimilation of IASI satellite CO fields into a global chemistry transport model for validation against aircraft measurements
A. Klonecki et al., ACP, 2012.
Satellite- and ground-based CO total column observations over 2010 Russian fires: accuracy of top-down estimates based on thermal IR satellite data
L.N. Yurganov et al., ACP, 2011.
Episodes of cross-polar transport in the Arctic troposphere during July 2008 as seen from models, satellite, and aircraft observations
H. Sodemann et al., ACP, 2011.

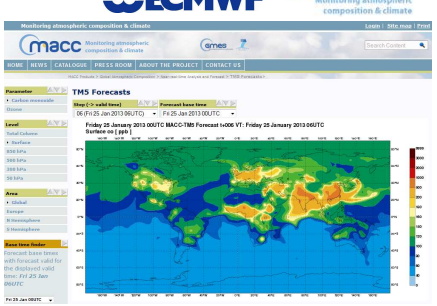


Geographical distribution of the FORLI-CO results users in April 2012

FORLI CO in MACC-II project

MACC-II - Monitoring Atmospheric Composition and Climate - Interim Implementation - is the current pre-operational GMES Atmosphere Service. MACC-II provides data records on atmospheric composition for recent years, data for monitoring present conditions and forecasts of the distribution of key constituents for a few days ahead.
MACC-II combines state-of-the-art atmospheric modelling with Earth observation data to provide information services covering European air quality, global atmospheric composition, climate forcing, the ozone layer, UV and solar energy, emissions and surface fluxes (http://www.gmes-atmosphere.eu).

IASI CO total columns from ULB-LATMOS are operationally assimilated in the MACC ECMWF near-real time analysis to produce chemical forecasts of CO global distributions.



MACC-II forecast of surface CO mixing ratio
http://www.gmes-atmosphere.eu/d/services/gac/nrt/nrt_fields_tm5

Hindcast experiments of tropospheric composition during the summer 2010 fires over western Russia
V. Huijnen et al., ACP, 2012.
The MACC reanalysis: an 8-yr data set of atmospheric composition
A. Inness et al., ACPD, 2012.