CARBON MONOXIDE DISTRIBUTIONS FROM THE IASI/METOP MISSION: EVALUATION WITH OTHER SPACE-BORNE SENSORS

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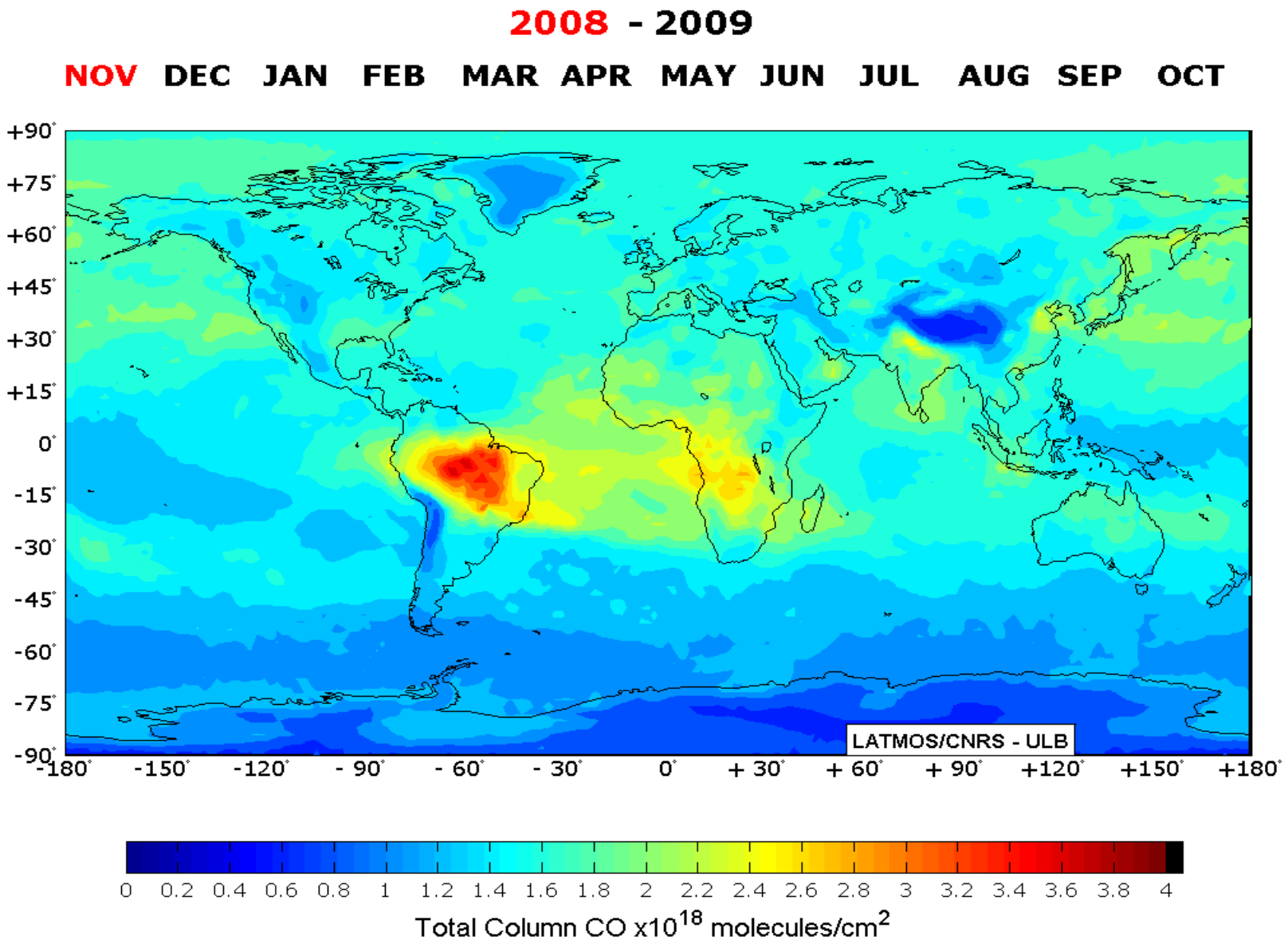
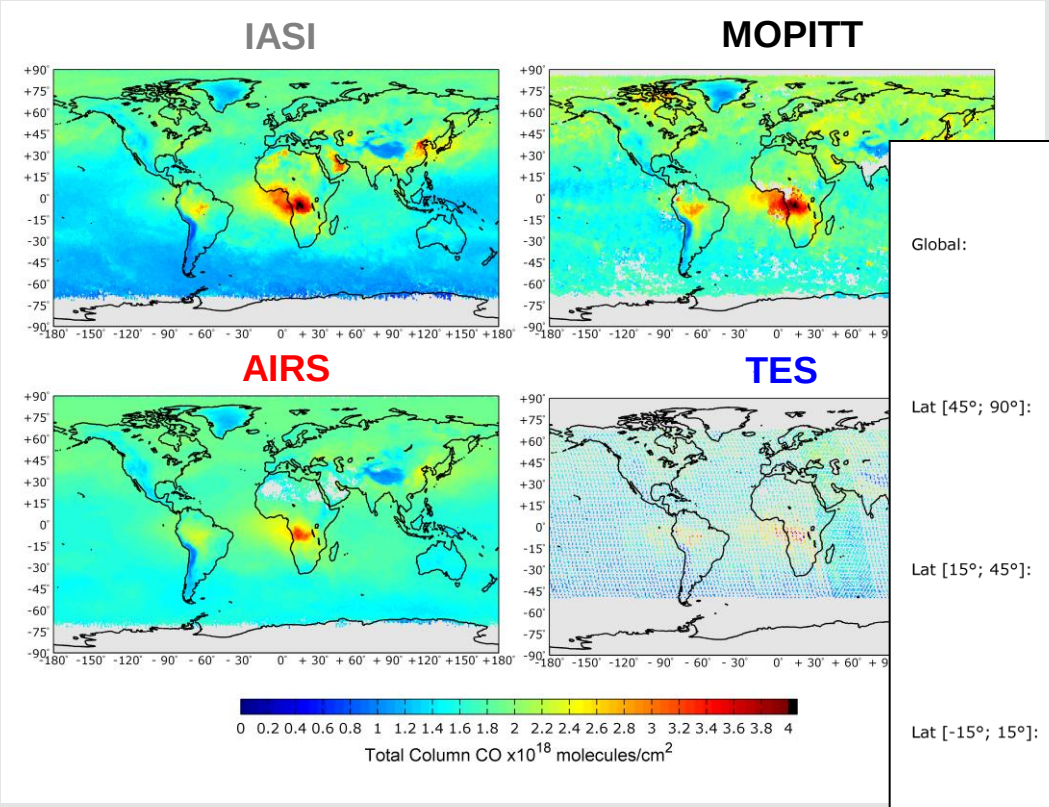
CO IASI, total columns, 1 year

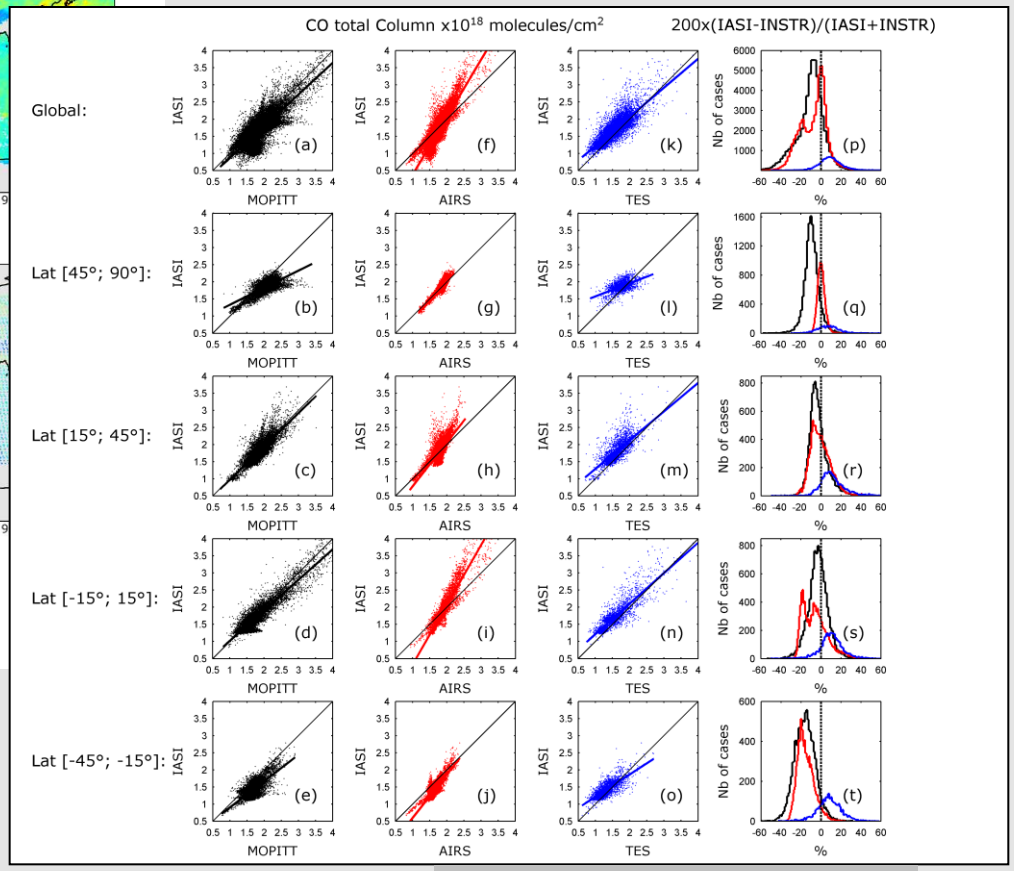


Comparisons with other satellite data; Preliminary cross-validation



AIRS

TES<IASI<MOPITT



1 Month average (August 2008)

CO columns, gridded 1°x1°

George et al., ACP, 2009

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POSTER #28

Carbon monoxide distributions from the IASI/METOP mission: Evaluation with other space-borne sensors

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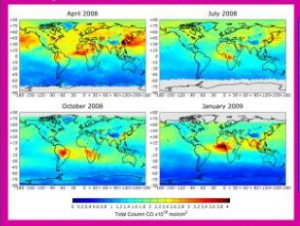
IASI CO total columns retrieved with FORLI

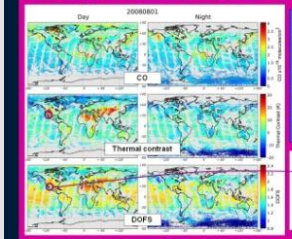
Monthly distributions of IASI CO total column:



Carbon monoxide retrieved from IASI radiance spectra using the FORLI-CO software (Fast Operational/Optimal Retrievals on Layers for IASI). This near real time processing code delivers atmospheric profiles of CO as well as total columns about three hours after the observation.

Seasonal variation of CO:
In the Northern Hemisphere, most of the pollution is associated with urban activity, with persistent high values above China and elevate levels over USA, Europe and Asia in spring. In the tropics and Southern Hemisphere, most of the CO is emitted where biomass burning occurs, such as in Africa, and Central and South America.

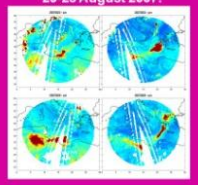
Total CO, thermal contrast and DOFS for one day:



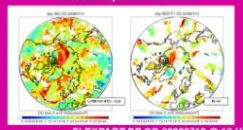
Left plot
The thermal contrast (difference between the surface temperature and the temperature of the first available atmospheric level) is more pronounced during the day than during the night and it reflects onto DOFS numbers that are larger over areas where the thermal contrast exceeds a few degrees.

Bottom plot
Measurement performed close to Los Angeles, on a morning orbit. The location is associated with a large thermal contrast and the averaging kernels corresponding to the lower layers exhibit a large sensitivity to the surface.

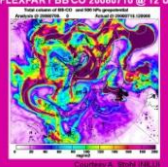
CO – Fires in Greece, 25-28 August 2007:



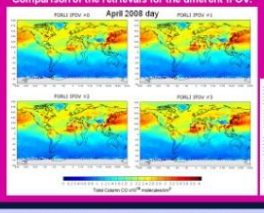
IASI and Mopitt CO 20080710:



FLEXPART BB CO 20080710 @ 12 UT

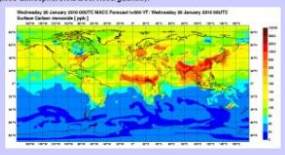


Comparison of the retrievals for the different IFOV:



The EU-funded **MACC project (part of the GMES initiative)** is developing comprehensive data analysis and modelling systems for monitoring the global distributions of atmospheric constituents important for climate, air quality and UV radiation, with a focus on Europe (http://www.gmes-atmosphere.eu/d/services/gac/nrt/).

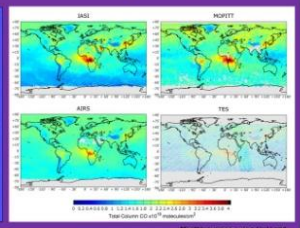
IASI CO products from ULB-LATMOS are now operationally assimilated in the MACC ECMWF project to produce chemical forecasts of CO fields:

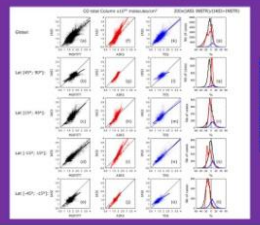


IASI CO total columns, compared to MOPITT, AIRS and TES for August 2008:

Global distributions of IASI column CO are evaluated with correlative observations available from other nadir looking TIR missions currently in operation: the Measurements of Pollution in the Troposphere (MOPITT) onboard TERRA, the Atmospheric Infrared Sounder (AIRS) onboard AQUA and the Tropospheric Emission Spectrometer (TES) onboard AURA.

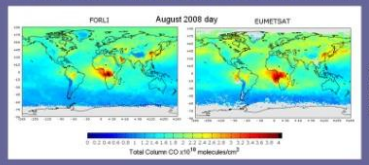
-Best horizontal coverage for IASI and AIRS
-IASI background data are lower than MOPITT, TES or AIRS
-Largest concentrations are observed by all four intruments, although with different magnitude, over China (pollution), Africa and South America (vegetation fires)
-Similar intensities for the African fires for IASI and MOPITT
-Problems above deserts in North Africa or in the Arabic Peninsula for IASI and AIRS





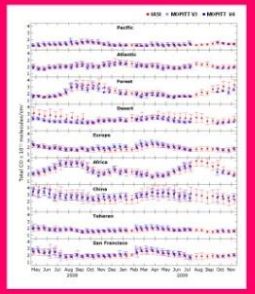
For data averaged over all latitudes, the correlation coefficient are 0.83 (IASI/MOPITT), 0.82 (IASI/AIRS) and 0.84 (IASI/TES) => good agreement
-very good in the equatorial region (0.92, 0.95, 0.89)
-MOPITT higher than IASI
-AIRS higher than IASI between 15S and 45S, in close agreement between 45N and 90N, larger for weak concentrations but lower for high concentrations
-TES lower than IASI

FORLI versus EUMETSAT CO total columns



A detailed comparaison of the LATMOS-ULB and Eumetsat L2 CO product is ongoing.

IASI and MOPITT TRENDS



Daily maps of CO and O_3 available on http://iasi-chem.aero.jussieu.fr

References

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C. Clerbaux, A. Boynard, L. Clarisse, M. George, J. Hadji-Lazaro, H. Herbin, D. Hurtmans, M. Pommier, A. Razavi, S. Turquety, C. Wespes, and P.-F. Coheur, Atmos. Chem. Phys., 9, 6041-6054, 2009.

Carbon monoxide distributions from the IASI/METOP mission: evaluation with other space-borne remote sensors
M. George, C. Clerbaux, D. Hurtmans, S. Turquety, P.-F. Coheur, M. Pommier, J. Hadji-Lazaro, D. P. Edwards, H. Worden, M. Luo, C. Rinsland, and W. McMillan, Atmos. Chem. Phys., 9, 8317-8330, 2009.

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S. Turquety, D. Hurtmans, J. Hadji-Lazaro, P.-F. Coheur, C. Clerbaux, D. Josset, and C. Tsamalis
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