L'apport du satellite IASI pour l'étude de la pollution

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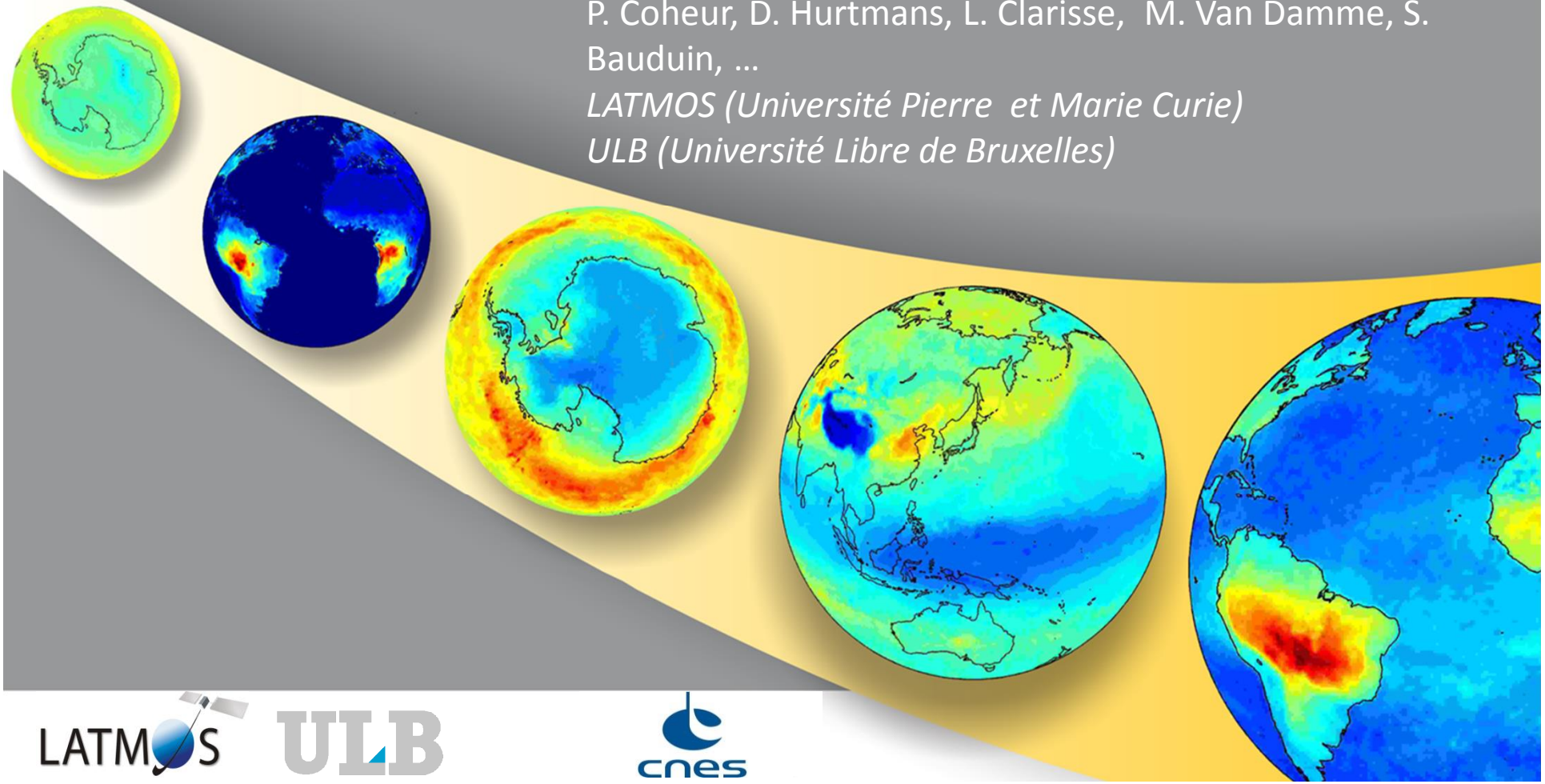
LATMOS (Université Pierre et Marie Curie)

ULB (Université Libre de Bruxelles)



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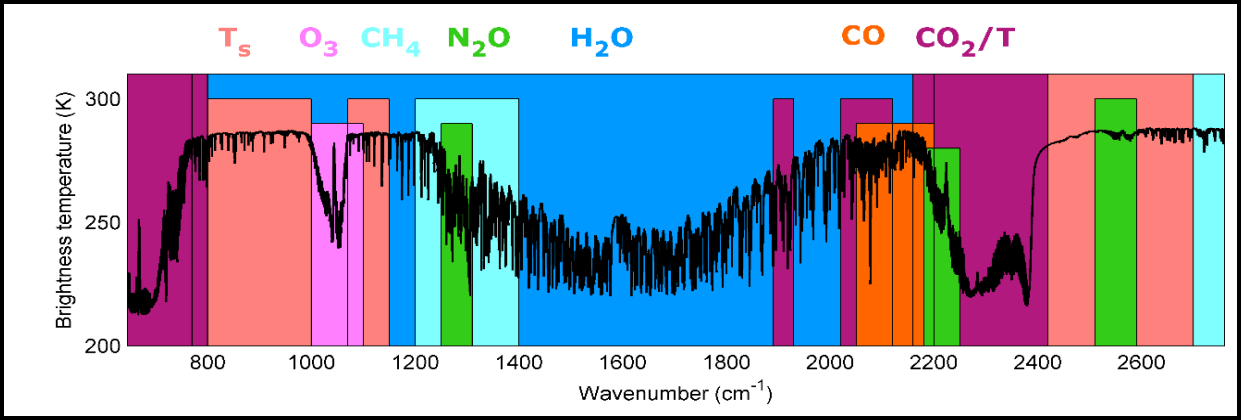
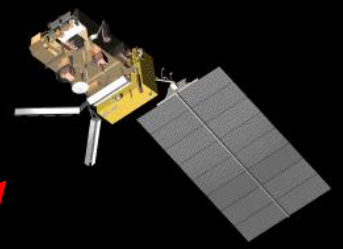
LATMOS / IPSL - ULB
METOP-A
METOP-B
IXION

How does IASI work ?

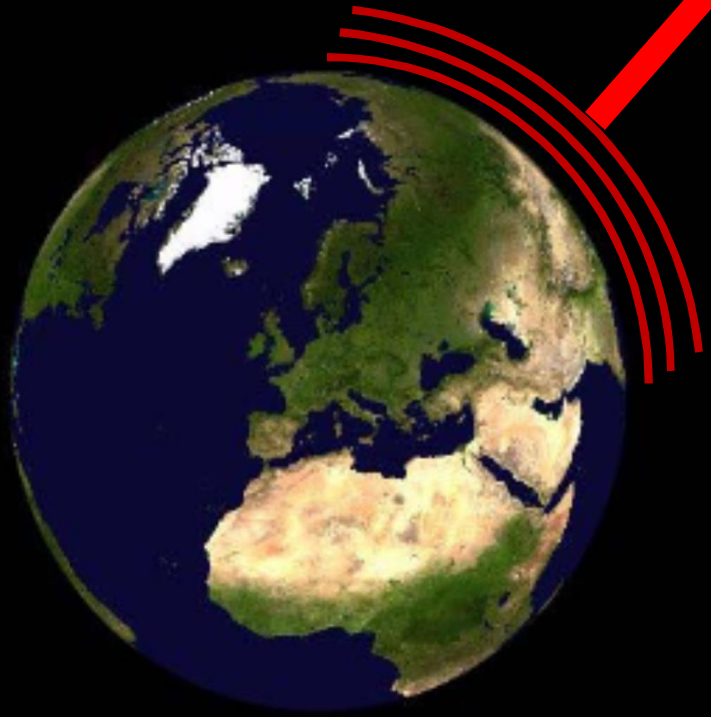
TEMPS REEL

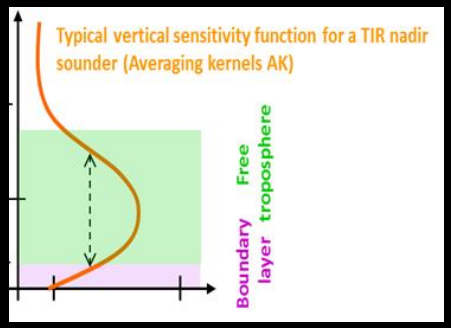




H_2O CH_4 (N_2O) CO_2
O_3 CO SO_2 NH_3
HNO_3 HDO

PAN HONO C_4H_4O
C_2H_2 C_2H_4 C_3H_6
CH_3OH HCOOH
CH_3COOH CH_3CHO
CFC-11 CHC-12
HCN OCS H_2S
+ particules



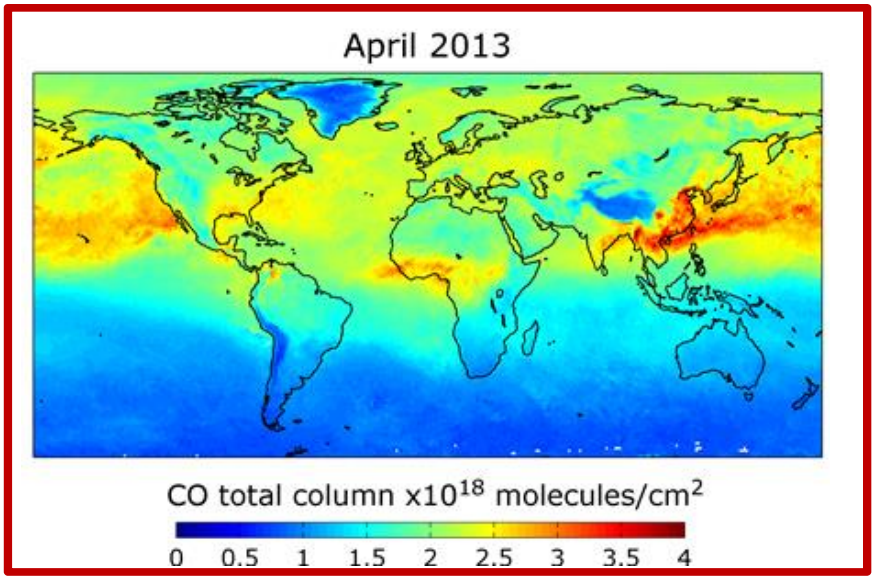


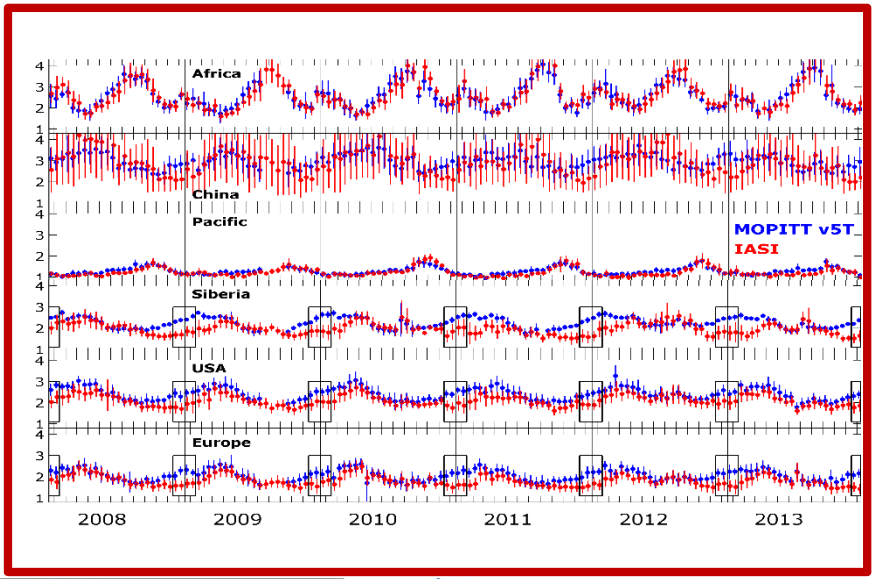
Pixel size 12km,
Global coverage
Spectral res 0.5 cm-1

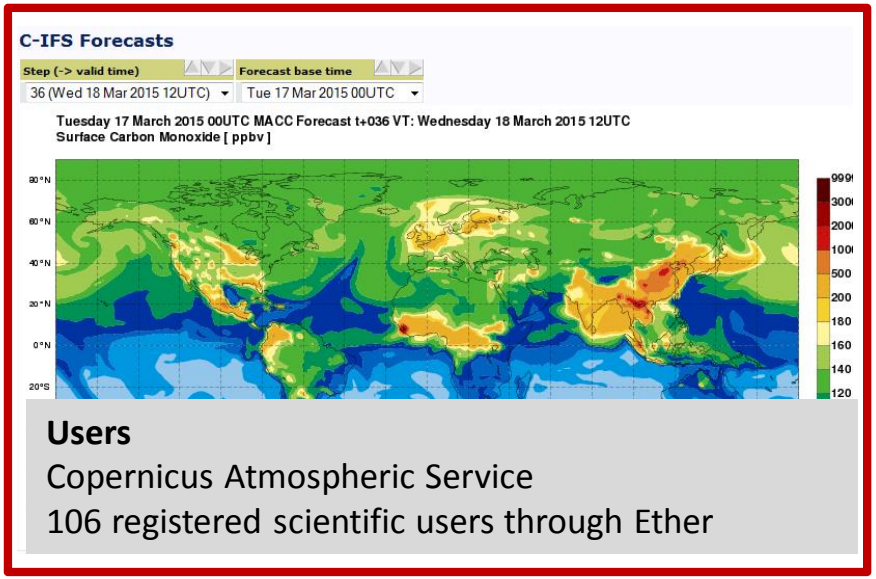
~ 50,000 interferograms /60 min

IASI ï pollution related species

Recent progress







Users

Copernicus Atmospheric Service

106 registered scientific users through Ether

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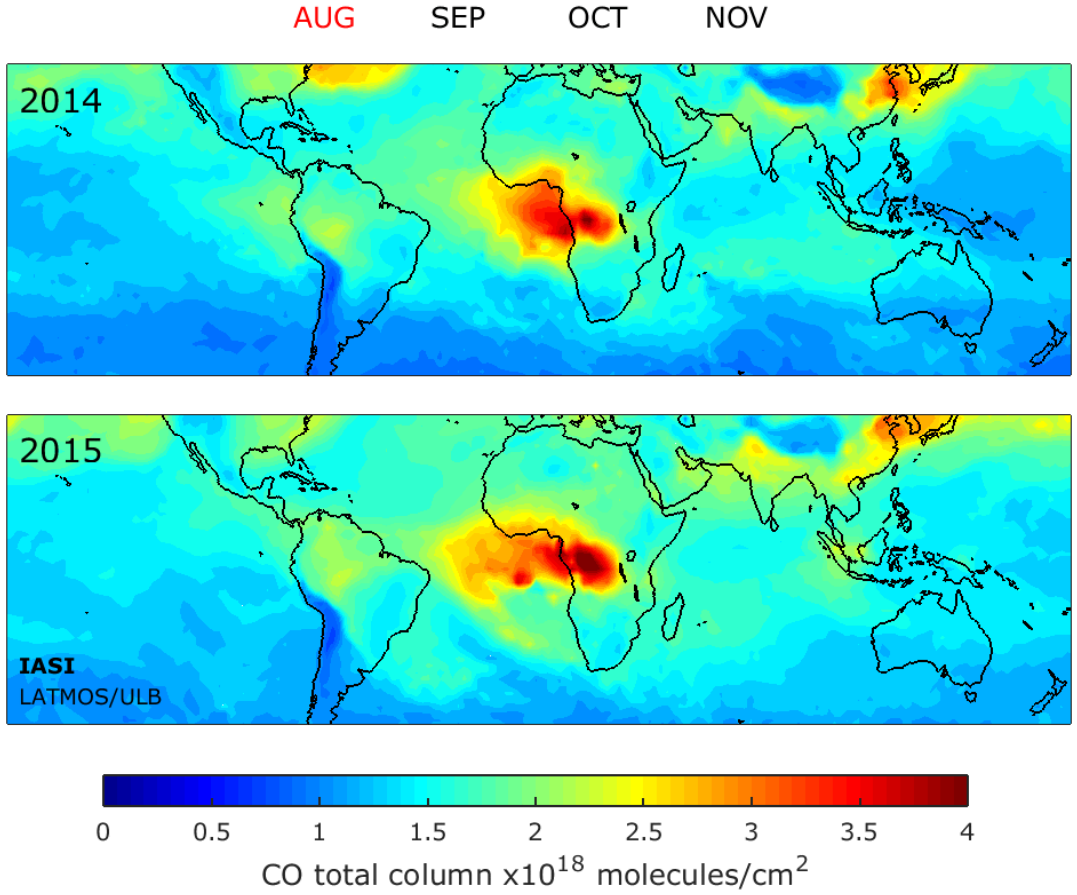
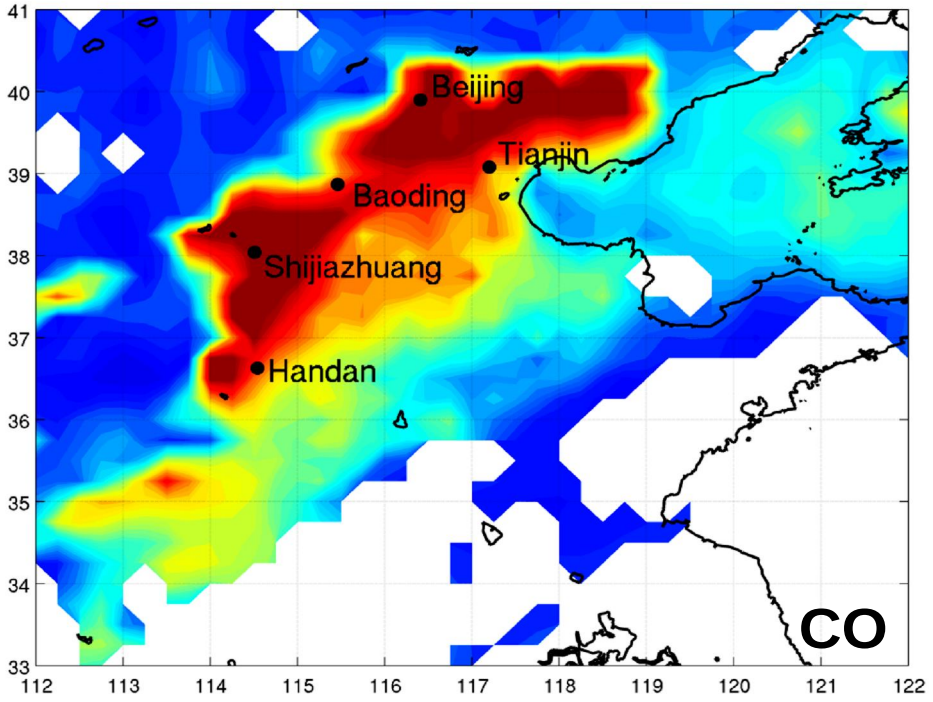
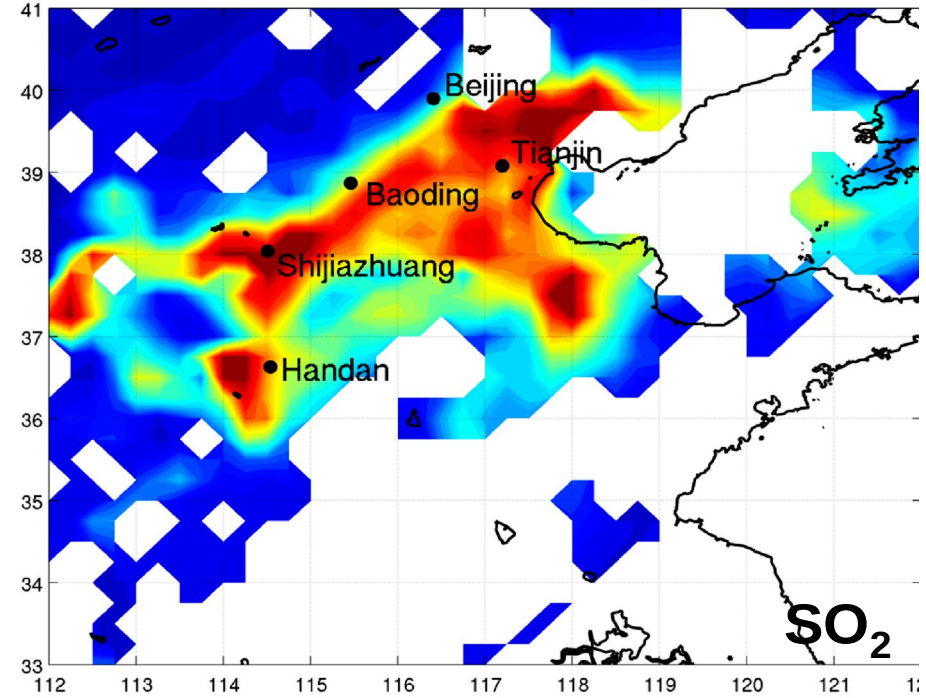
Carbon monoxide as observed by IASI during an El Niño event



Courtesy M. George/ C. Clerbaux (LATMOS)

CO and SO_2: January 2013

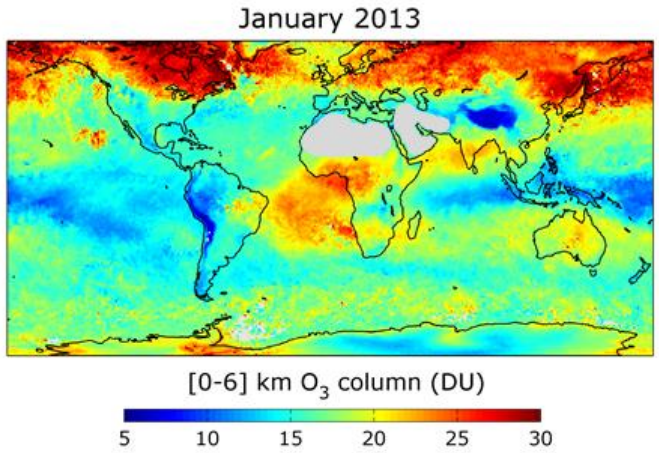




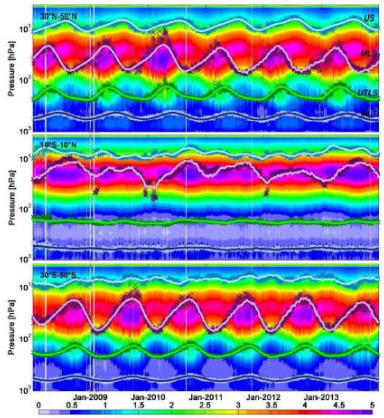
high thermal contrast
=> high IASI sensitivity at the surface
combined with high CO concentrations
⇒**IASI detects CO in the PBL**

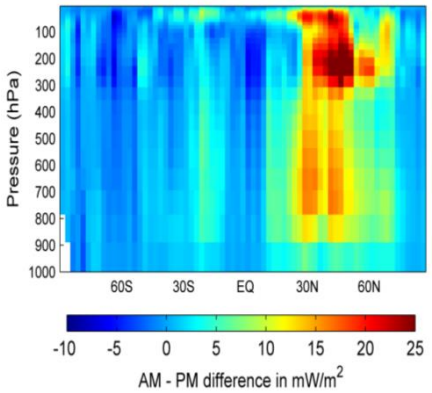
Recent progress

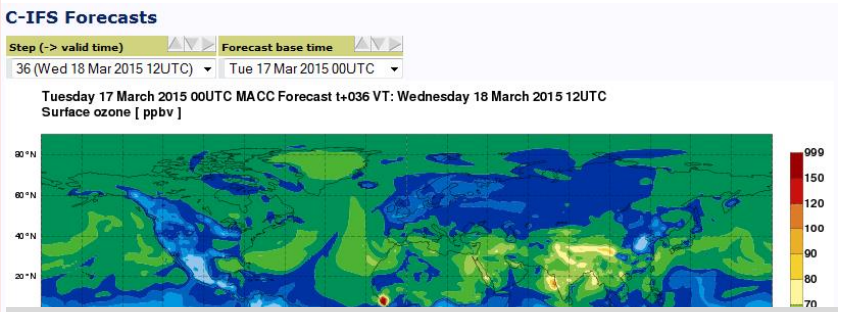
Validation & regional distribution studies



Variability & instantaneous radiative kernels







Users

Regional AQ models

Copernicus Atmospheric Service

Climate Change Initiative (CCI-ozone)

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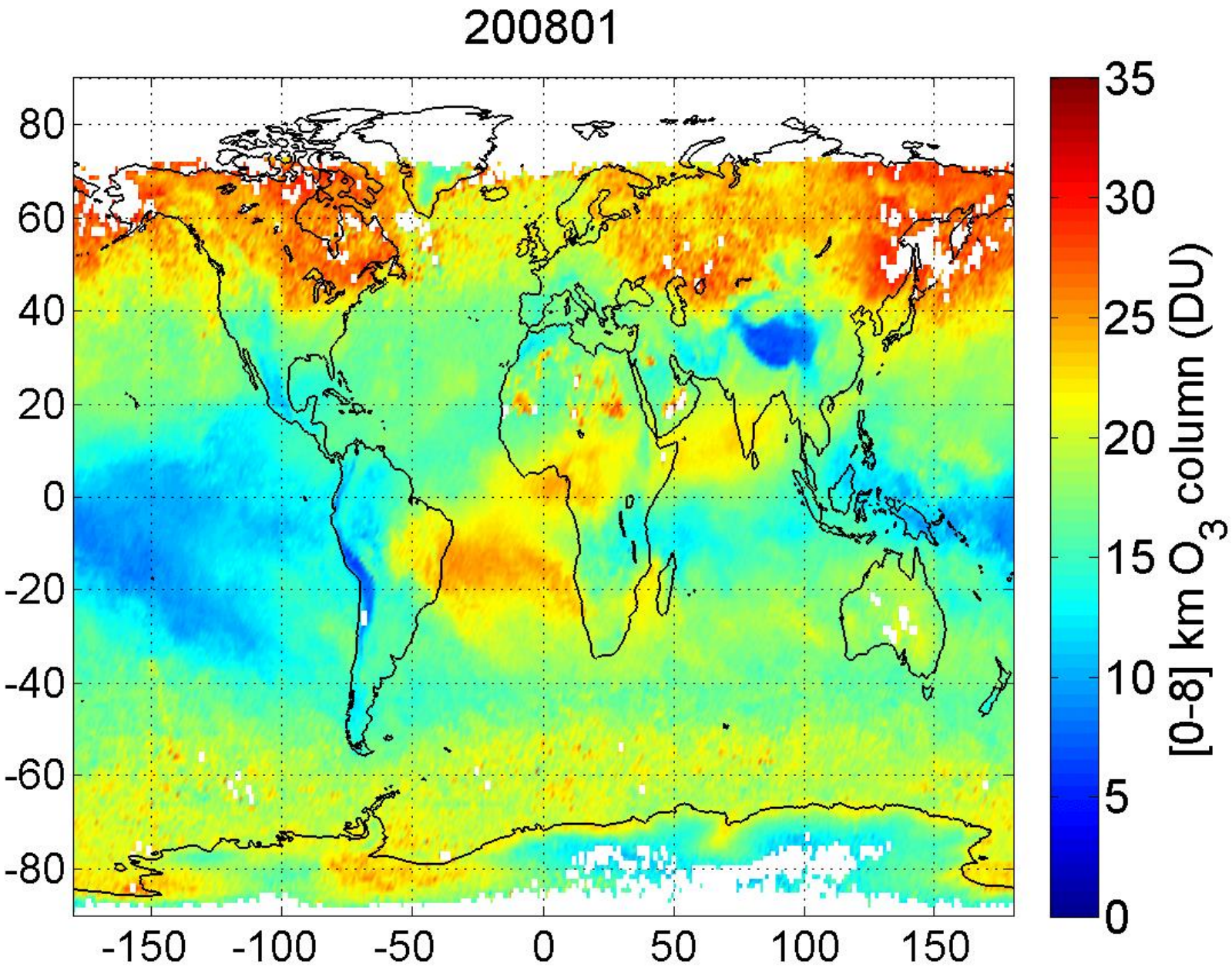
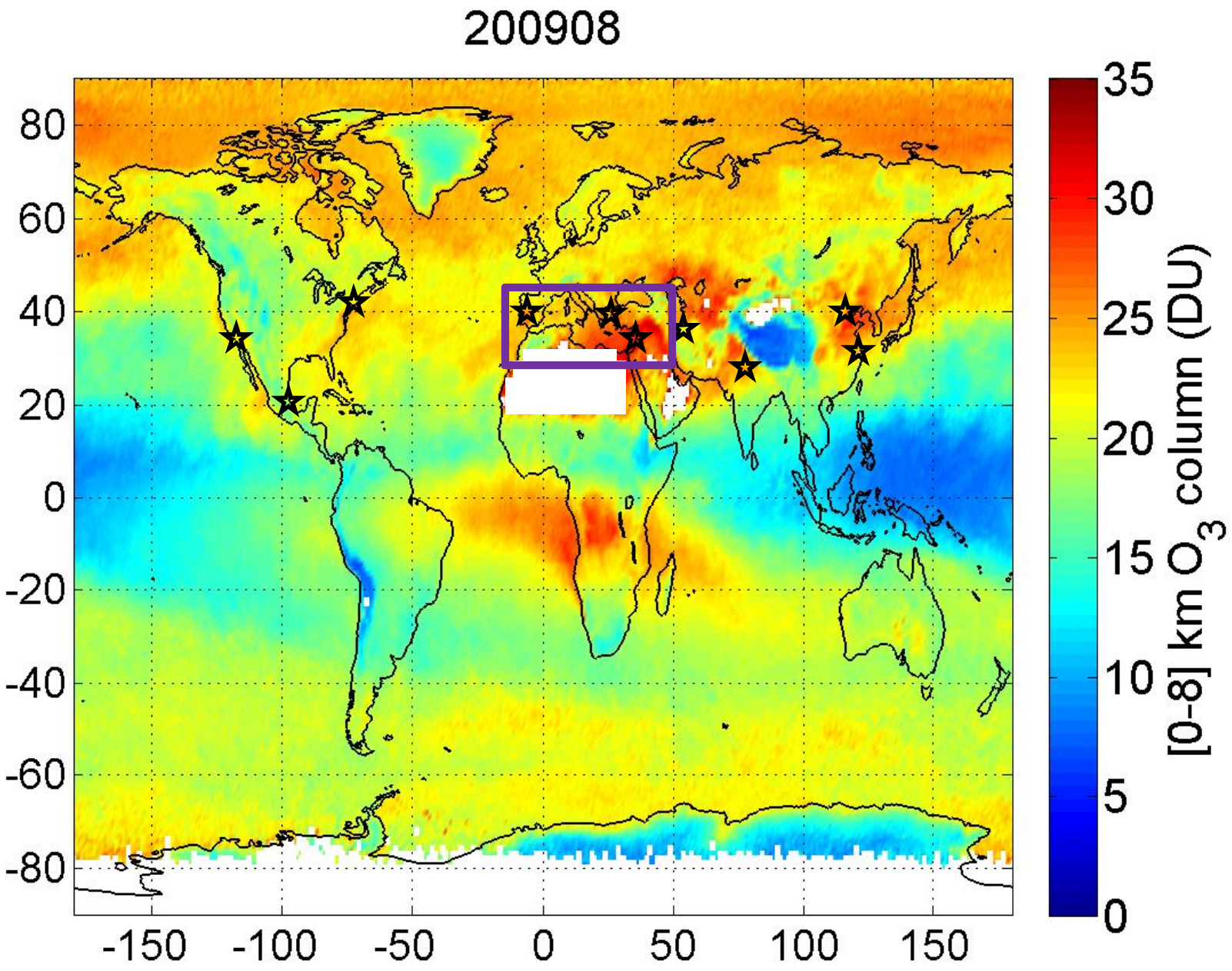
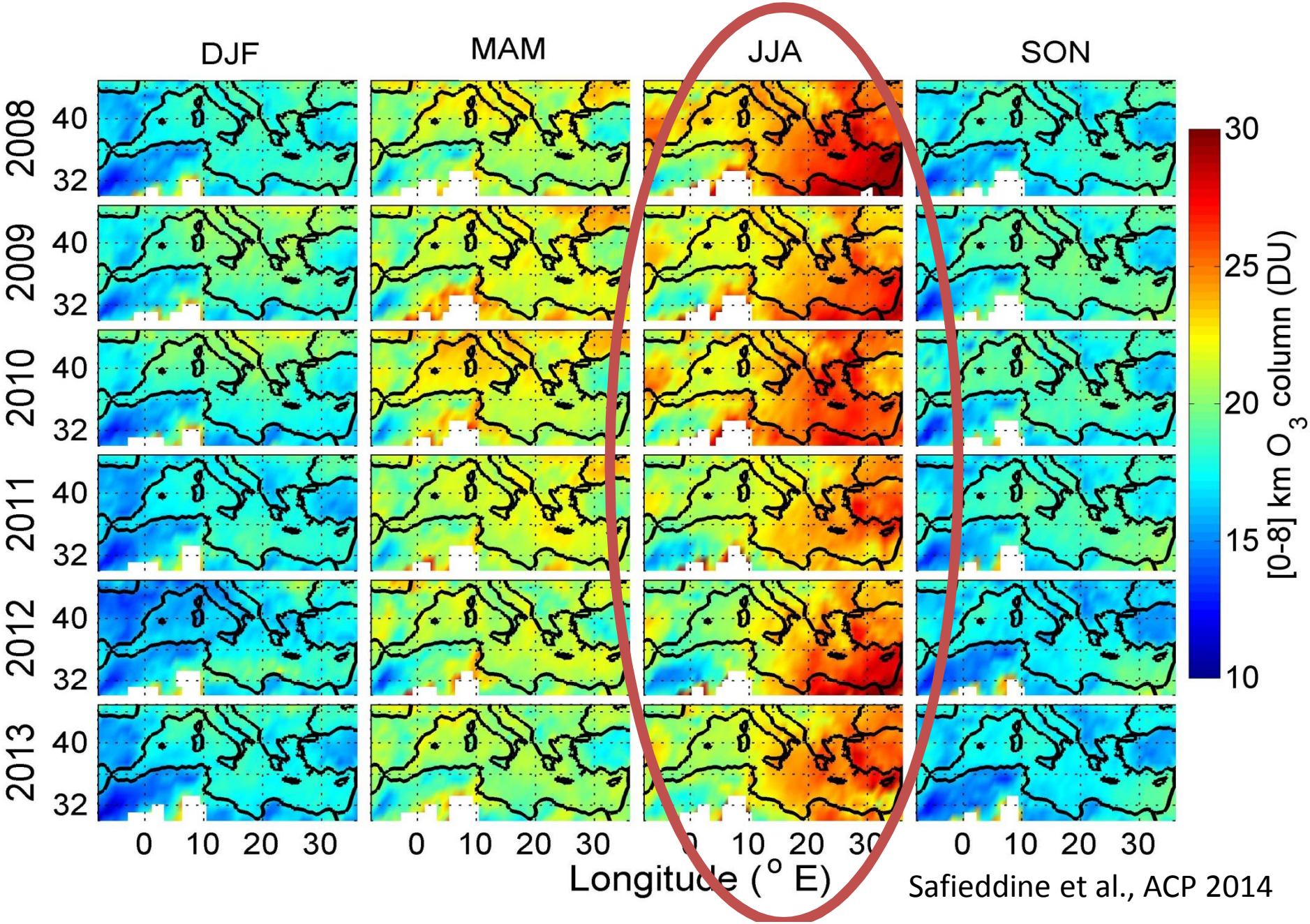
Ozone tropo (global) : 2008 to 2013 monthly



Ozone tropo (global) : 2008 to 2013 monthly

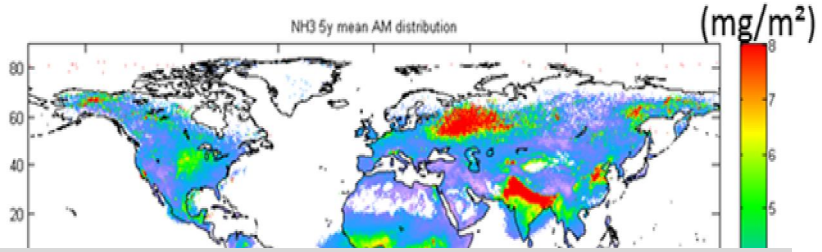


Ozone : seasonal variability over Mediterranean area



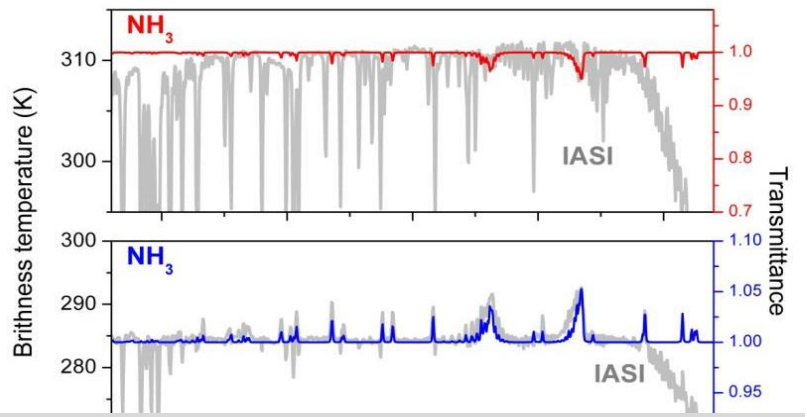
Safieddine et al., ACP 2014

Ammonia

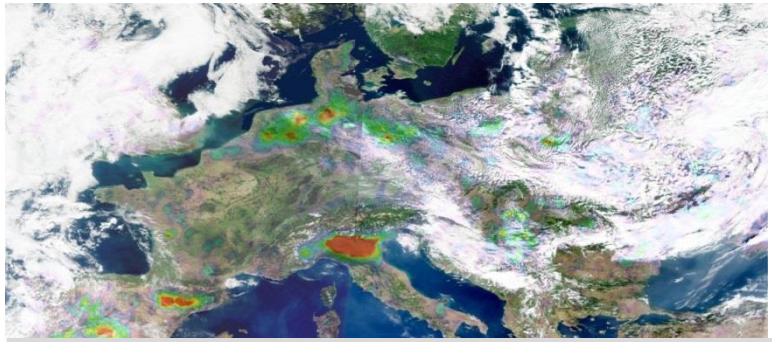


Fertilizers and catering
AQ (PM formation)
acidification/eutrophication ecosystems
Nitrogen cycle (climate…)

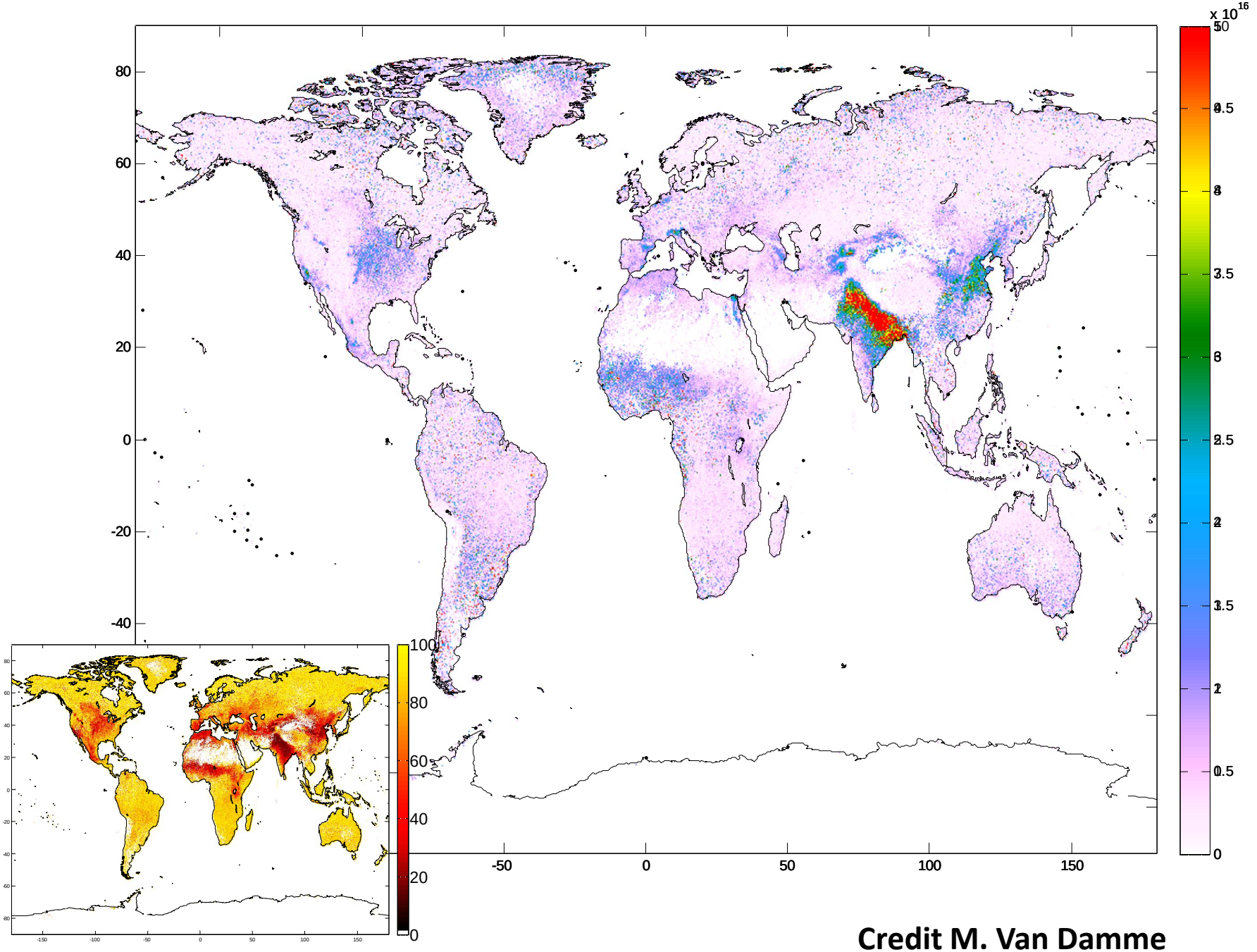
Emission sources



IASI: Global but limited to places with high Tc Sensitivity at the surface

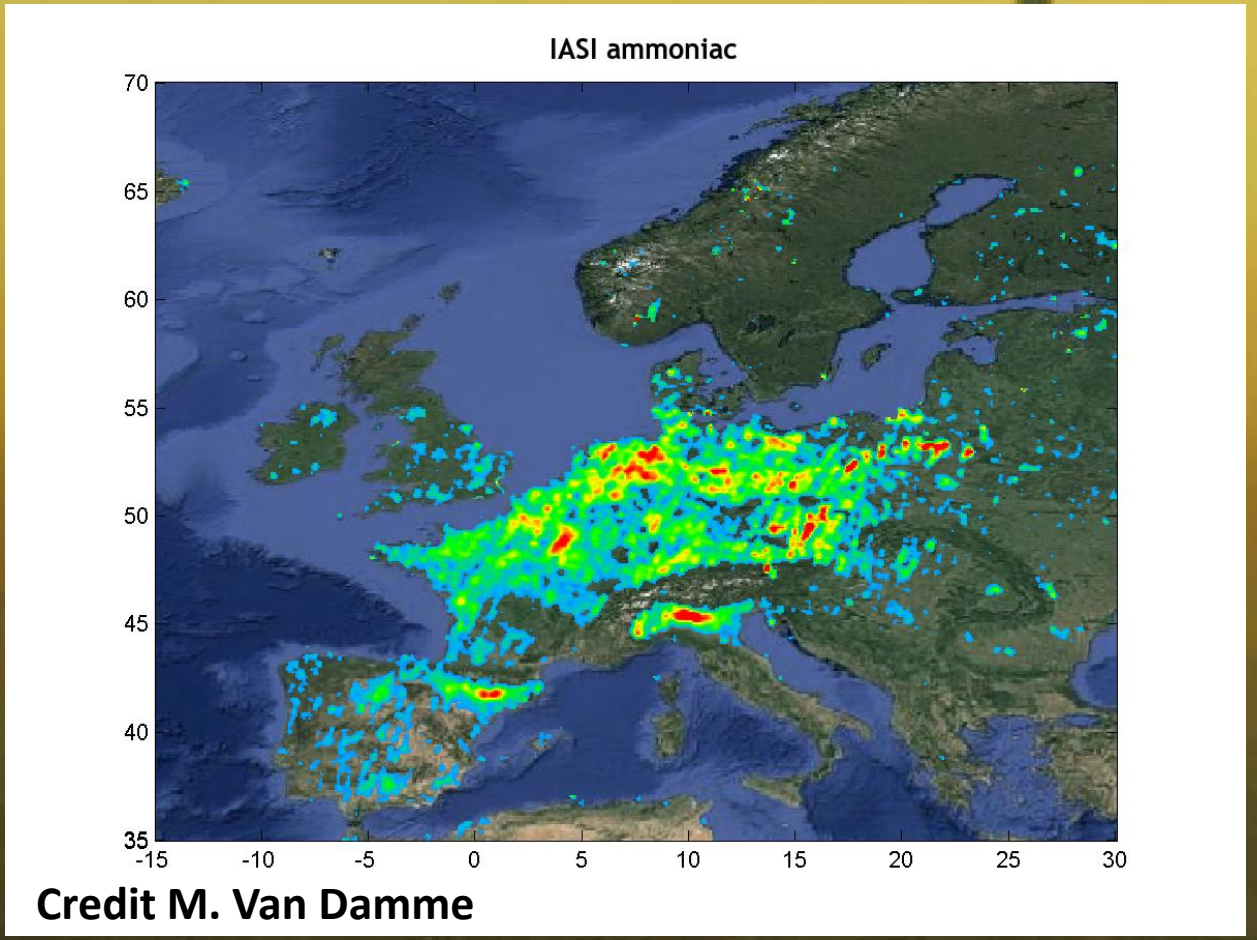


Users
A lot of scientific requests
Regional models for emission inventories
CCI as a precursor of aerosols (? Phase3)



Credit M. Van Damme

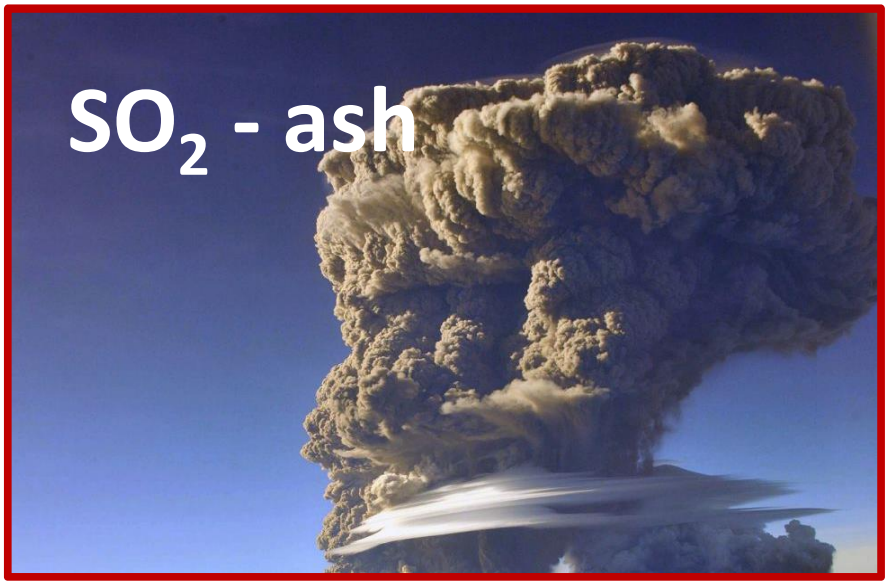
PM, April 2015

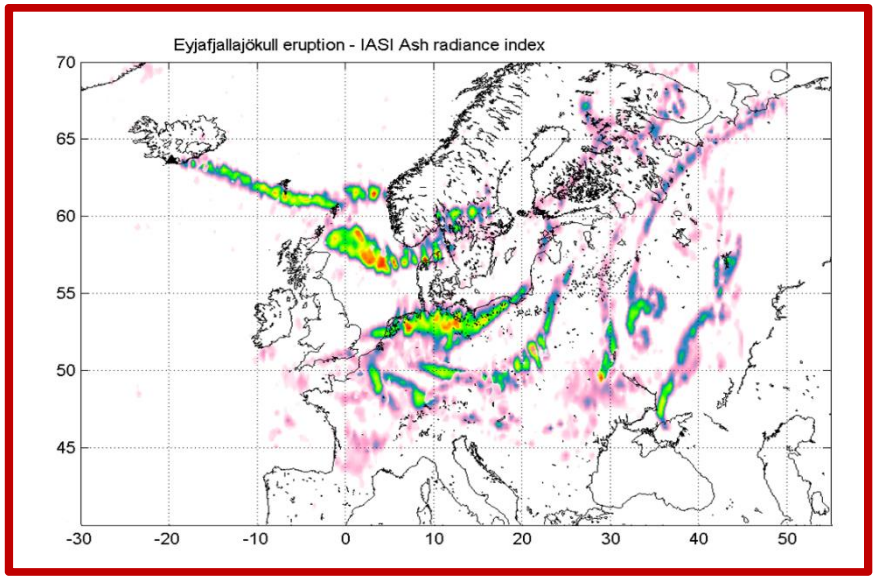


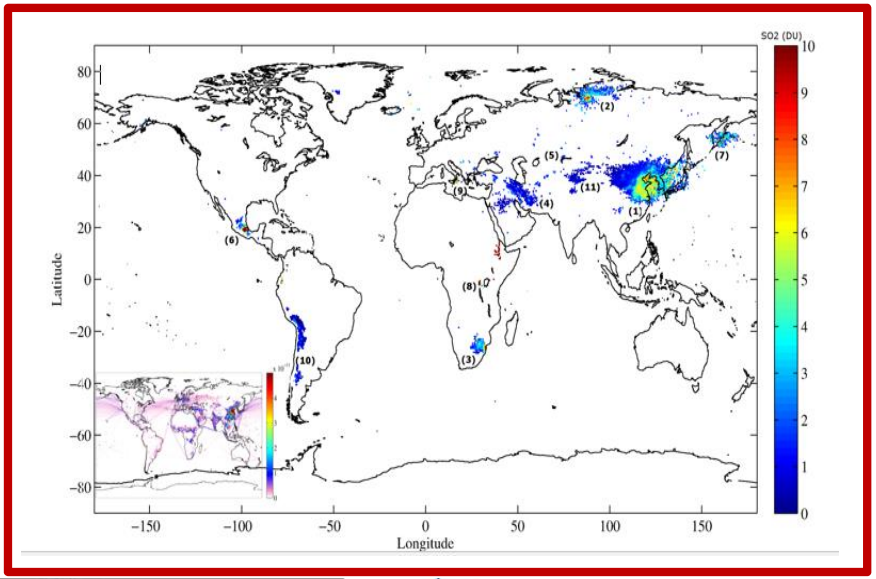
Credit M. Van Damme

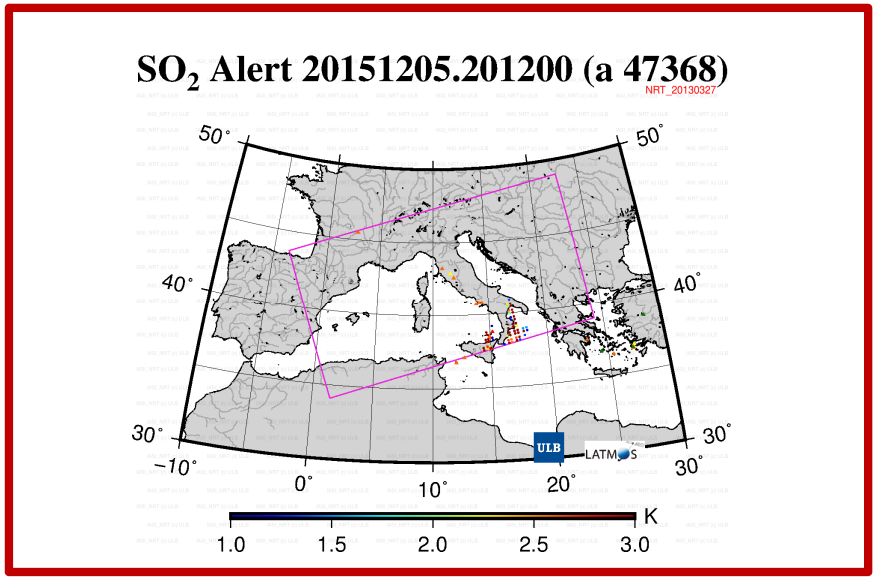
Fortems-Cheiney et al., Un-accounted variability in NH_3 agricultural sources detected by IASI contributing to European spring haze episode, 2015

Recent progress









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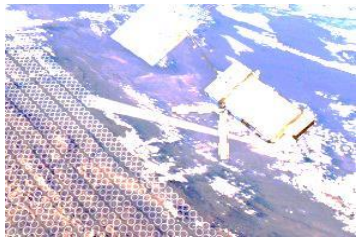
The IASI mission

2006 é 2012 é . 2018 é . 2021 é 2026 é

IASI-A/METOP-A

IASI-B/METOP-B



IASI-C/METOP-C

IASI-NG on METOP SG

IASI-A + IASI-B (+ IASI-C)

CO data available from the Ether database (http://www.pole-ether.fr)

Consistent set of +15 years of observation

IASI-NG in 2021, 2027, 2033

Spectral resolution x2 (0.25 cm^{-1})

Reduction of noise by a factor of 2

better assessment of the lower troposphere