What can be seen by the IASI infrared satellite-borne instruments in the Asian monsoon region?

Cathy Clerbaux, S. Safieddine, A. Boynard, J. Hadji-Lazaro, M. George, D. Hurthmans, P.-F Coheur

LATMOS/CNRS (Paris)
CQP (ULB, Brussels)
What can be seen by IASI?

H₂O  CH₄  CO₂
O₃  CO  SO₂
HNO₃  HDO  NH₃

PAN  HONO  C₄H₂O
C₂H₂  C₂H₄  C₃H₆
CH₃OH  HCOOH
CH₃COOH  CH₃CHO
CFC-11  CHC-12
HCN  OCS H₂S
+ particules

IASI/MetOp-A launched in 2006
IASI/MetOp-B launched in 2012
Pixel size 12km, global coverage
Spectral res 0.5 cm⁻¹

~ 13,500 interferograms /15 min
3 cases studies with IASI

**North China Plain (CO and SO$_2$)**
January 2013

**India (ozone)**
April-May 2015

**East summer monsoon (ozone)**
May-August
3 cases studies with IASI

North China Plain (CO and SO$_2$) January 2013
China : January 2013
CO and SO$_2$: January 2013

**Results:**

- **High thermal contrast** $\Rightarrow$ **high IASI sensitivity at the surface** combined with high CO and SO$_2$ concentrations

$\Rightarrow$ **IASI detects pollutants in the PBL**

Boynard et al, GRL 2014
3 cases studies with IASI

India (ozone)
April-May 2015
India: April - May 2015

IASI Surface Temperature

APRIL

IASI - 20150401 day time

IASI - 20150402 day time

IASI - 20150403 day time

MAY

IASI - 20150519 day time

IASI - 20150520 day time

IASI - 20150521 day time

Credit: A. Boynard 2015
India: April - May 2015

Thermal contrast

APRIL

MAY

Credit A. Boynard 2015
India: April - May 2015

IASI Surface-6km Ozone Column

APRIL

MAY

Credit A. Boynard 2015
3 cases studies with IASI

East summer monsoon (ozone)
May-August
East Asian Summer Monsoon

Credit S. Safieddine 2015
East Asian Summer Monsoon

Credit S. Safieddine 2015
East Asian Summer Monsoon

IAGOS ozone data

IAGOS vs IASI ozone data

R = 0.74

Credit S. Safieddine 2015
### Perspectives

<table>
<thead>
<tr>
<th>Year</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>é</td>
</tr>
<tr>
<td>2012</td>
<td>é .</td>
</tr>
<tr>
<td>2018</td>
<td>é .</td>
</tr>
<tr>
<td>2021</td>
<td>é</td>
</tr>
<tr>
<td>2026</td>
<td>é</td>
</tr>
<tr>
<td>2035</td>
<td></td>
</tr>
</tbody>
</table>

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

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

Consistent set of +15 years of CO and O₃ 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**