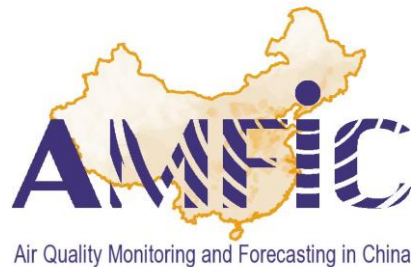




Royal Netherlands
Meteorological Institute
*Ministry of Infrastructure and the
Environment*

Daily emission estimates in China constrained by satellite observations

Bas Mijling, Ronald van der A



Overview

New inversion method for daily NO_x emission estimates

Results closed loop test

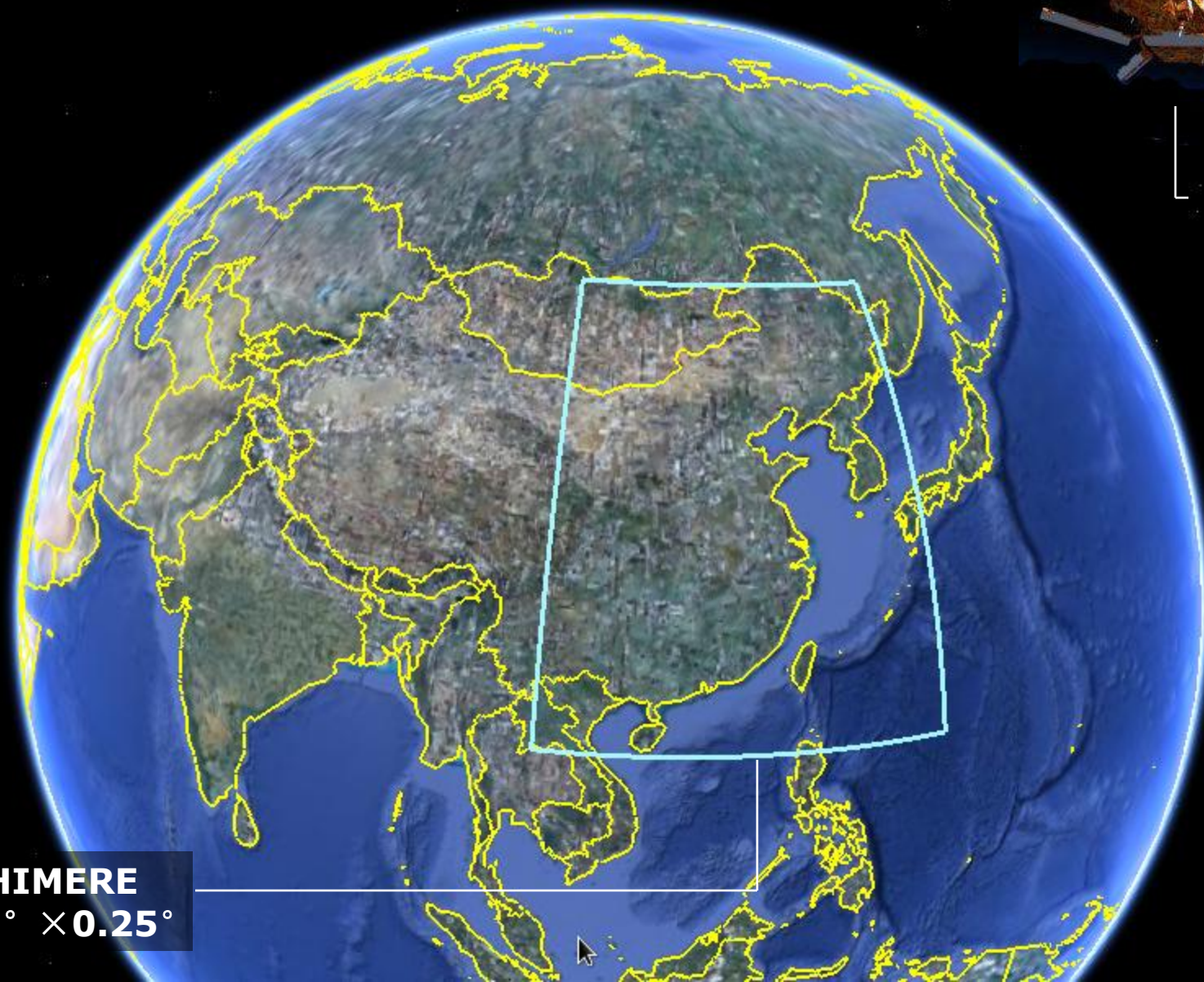
Results estimates with satellite data



Basic tools

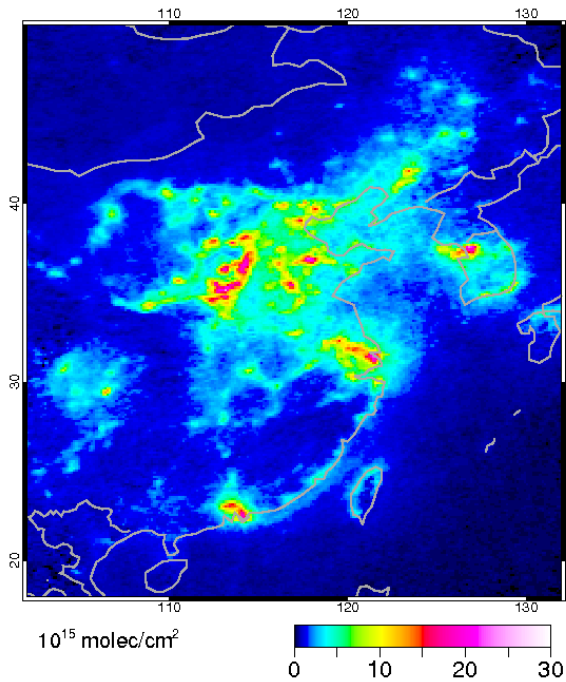
CHIMERE
0.25° × 0.25°

retrievals
from
OMI and
GOME2

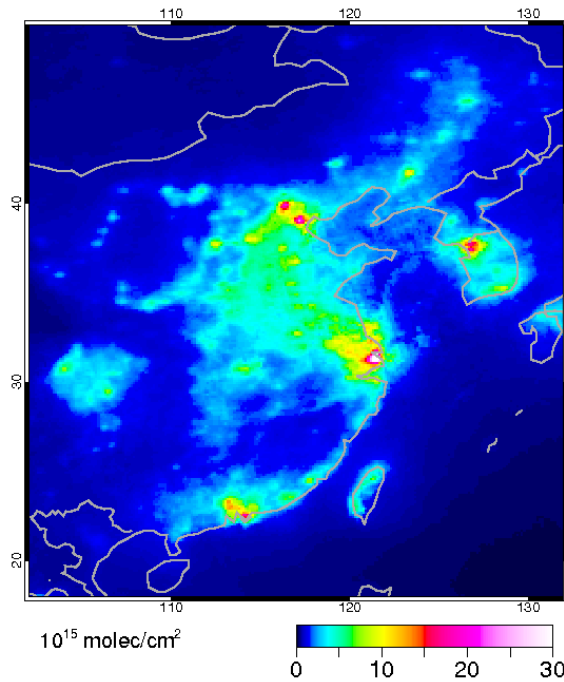


Difference between observations and model

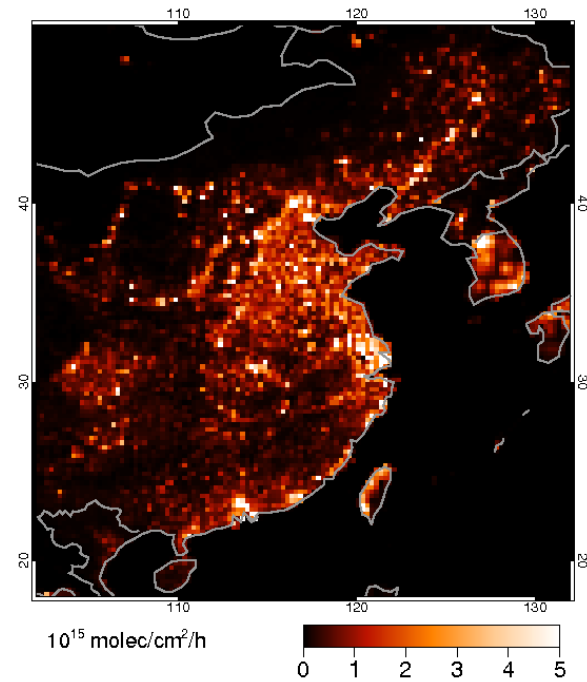
OMI tropospheric NO₂



CHIMERE tropospheric NO₂

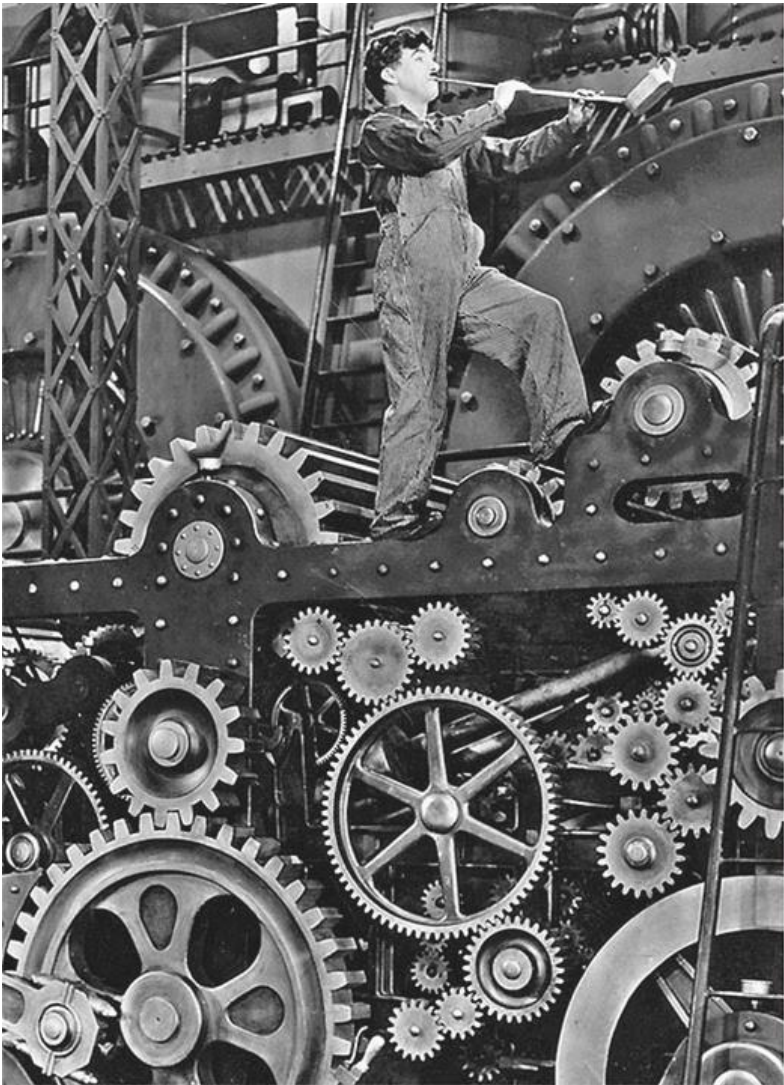


INTEX-B 2006



Average over June–August 2008

DECSO Algorithm



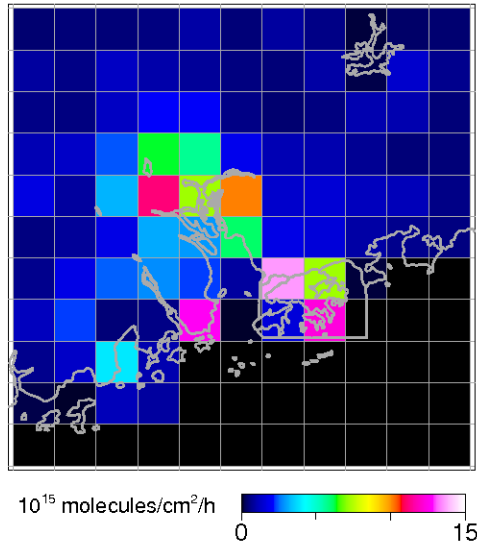
Daily Emission estimates Constrained by Satellite Observations

- On a 10–25 km resolution over regional domain
→ *Transport must be included!*
- Daily inversions of NO_x emissions from NO₂ observations
→ *Algorithm must be fast!*

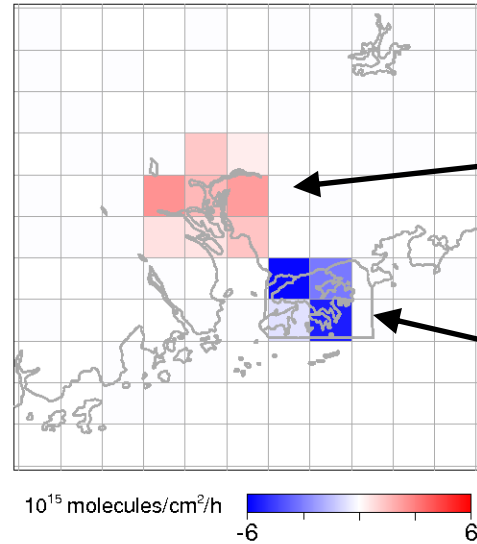
New algorithm which uses a simplified 2D transport scheme

Closed loop test: Pearl River Delta region

(a) True



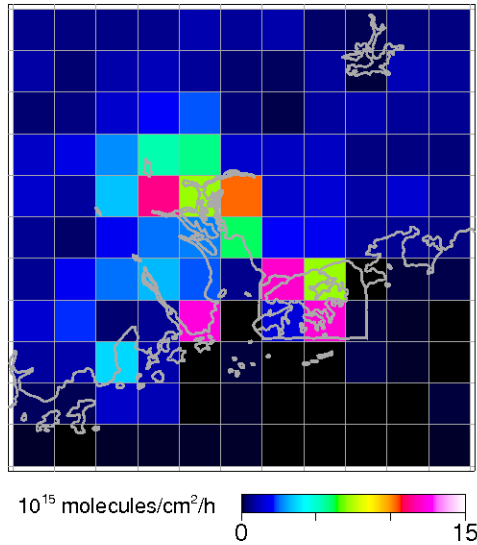
(b) True - Initial



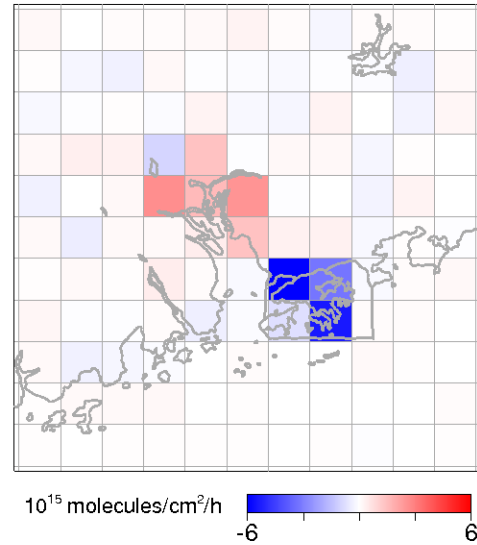
30% increase
Guangzhou

30% increase
Hong Kong

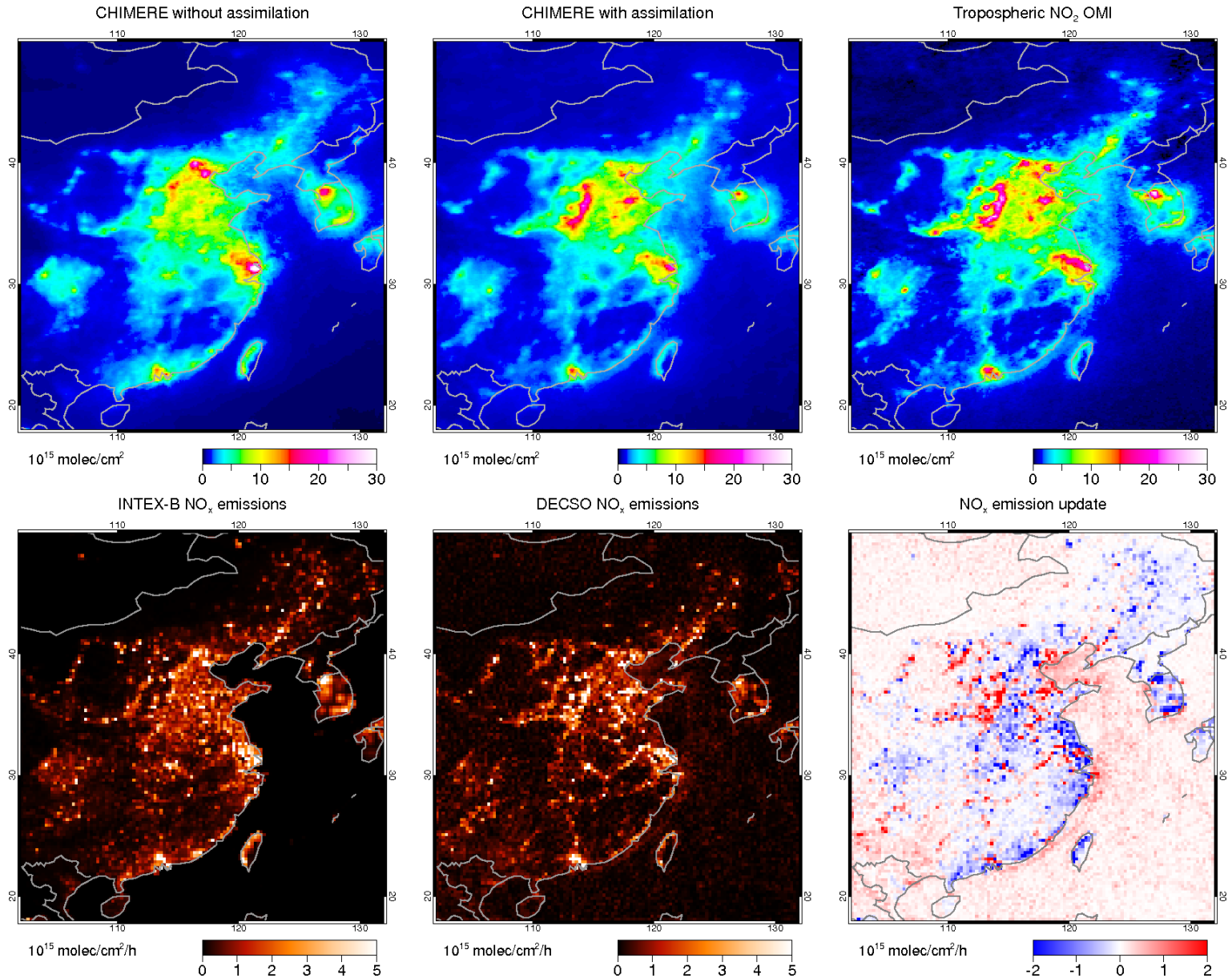
(c) Mean assimilated



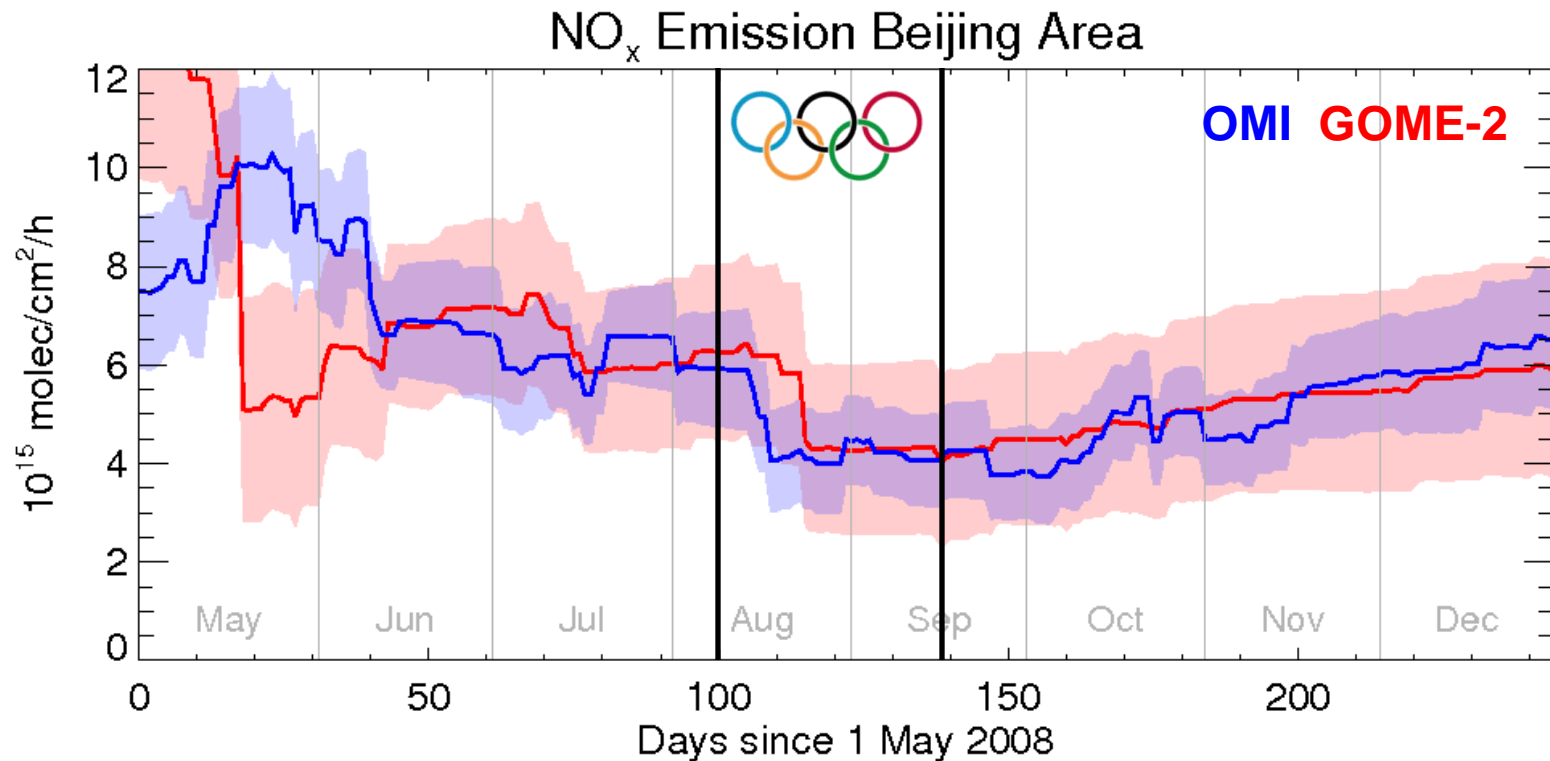
(d) Mean assimilated - Initial



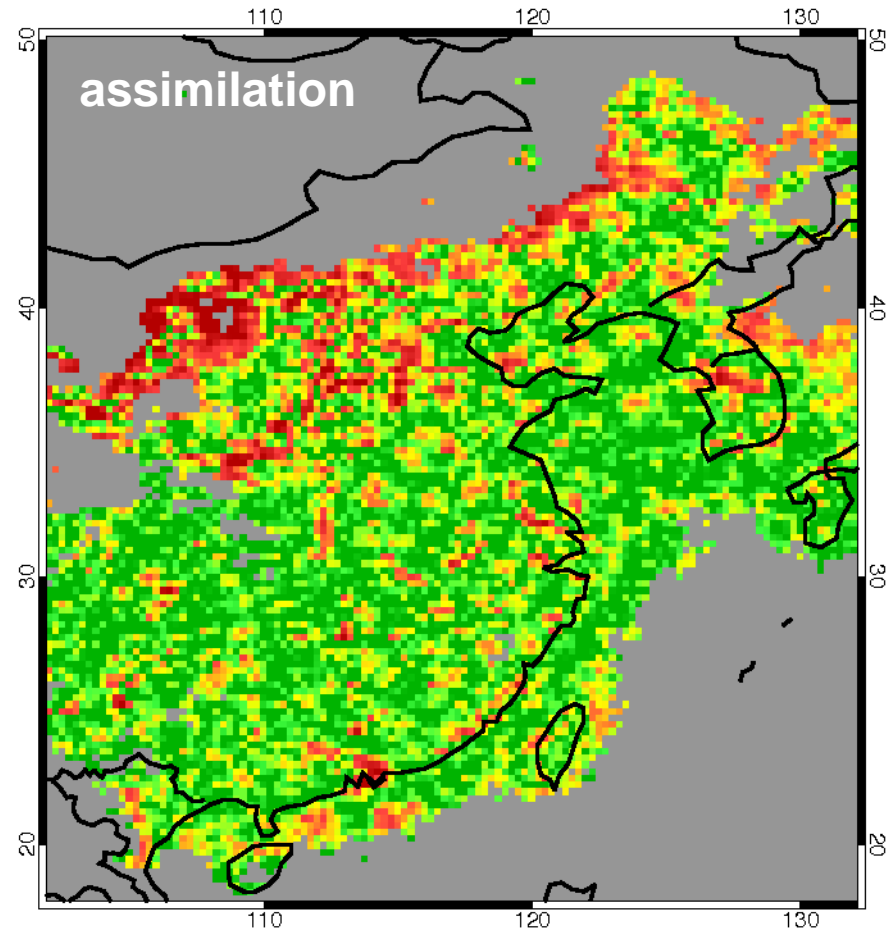
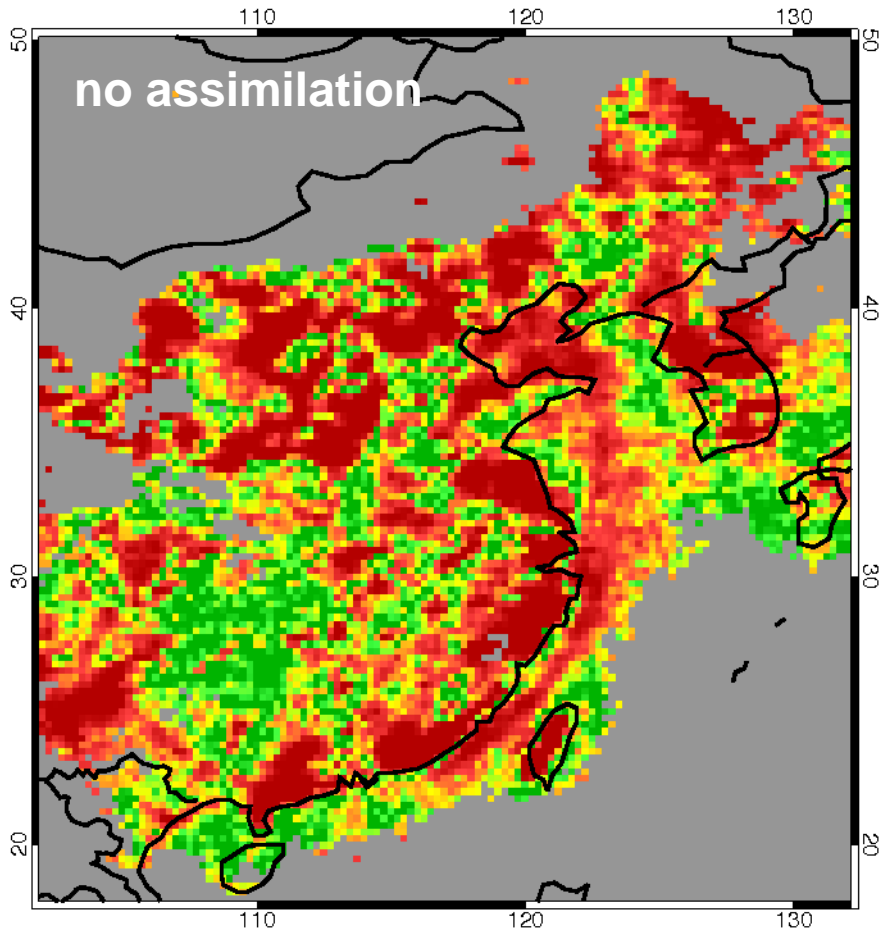
NO_x emission estimates for East China



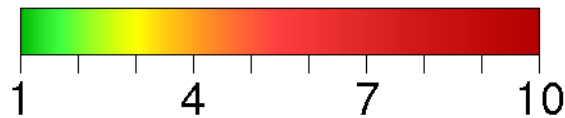
NO_x emission trend Beijing area



Agreement between observation and forecast



RMS error weighted OmF



Emission estimates
from OMI data
May-December 2008

Algorithm Summary

- The presented method is a promising new technique for top-down emission estimates from satellite observations.
- The algorithm is fast (<1h), enabling daily assimilation of satellite data.
- The algorithm needs only a forward CTM run; CTM is treated as a black box.
- The algorithm can be applied to other short lived species such as SO₂ and HCHO.

Outlook Dragon 3

- Constructing long time series for OMI and GOME-2 for emission trend analysis
- Validation:
 - Compare derived emission inventories with other (regional) bottom-up inventories
 - Compare forecasted surface concentrations with local measurements

That's it!