Koninklijk Nederlands
Meteorologisch Instituut
Ministerie van Infrastructuur en Waterstaat

Monthly NO_X emission estimates from space

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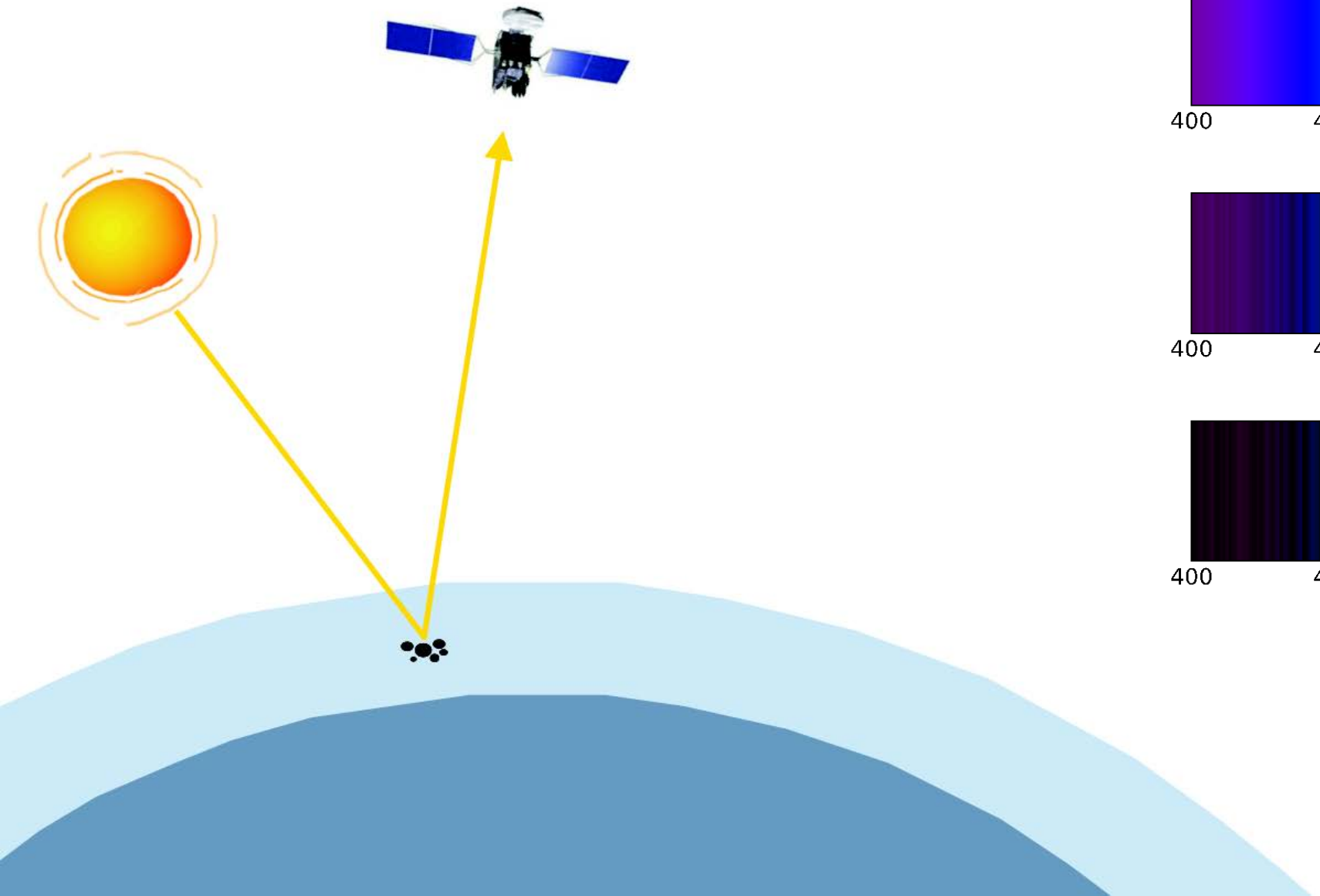
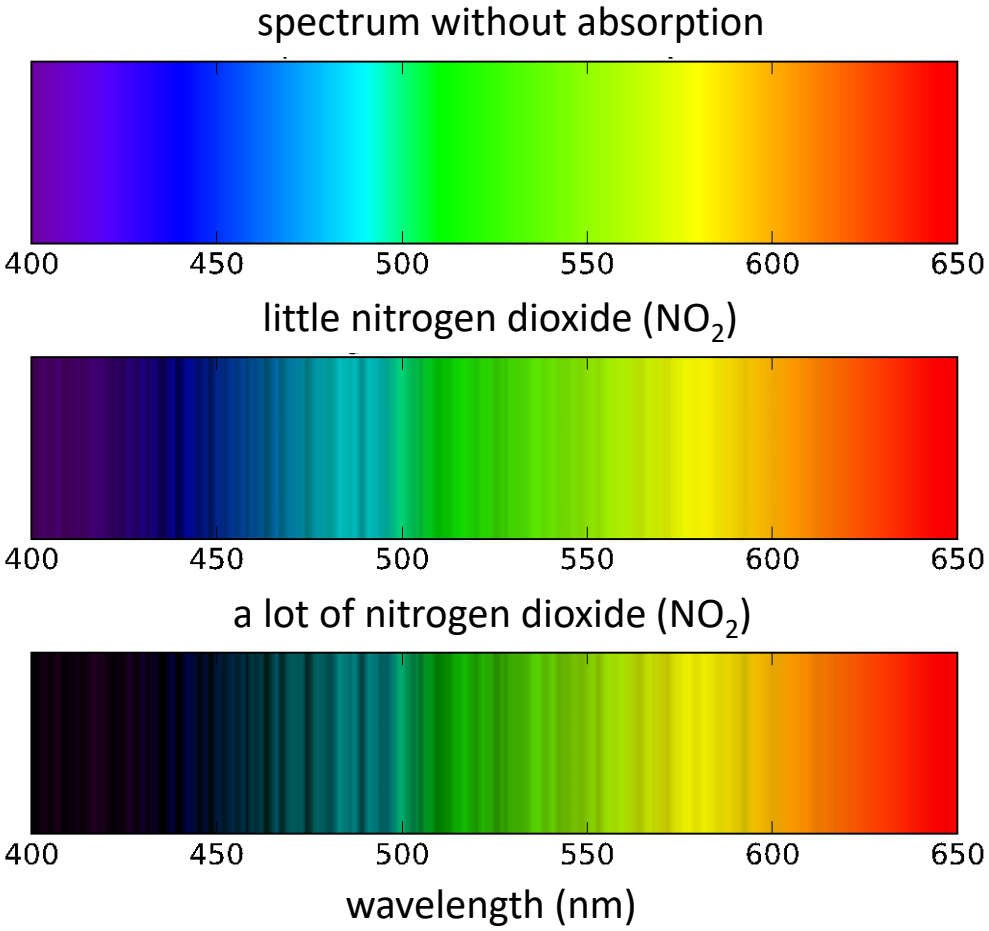
Earth Science from Space

KNMI plays an important role in developing earth observation satellites and in processing and interpreting their data. Forecasts for weather and climate, air pollution and solar radiation are largely made with data from these satellites.

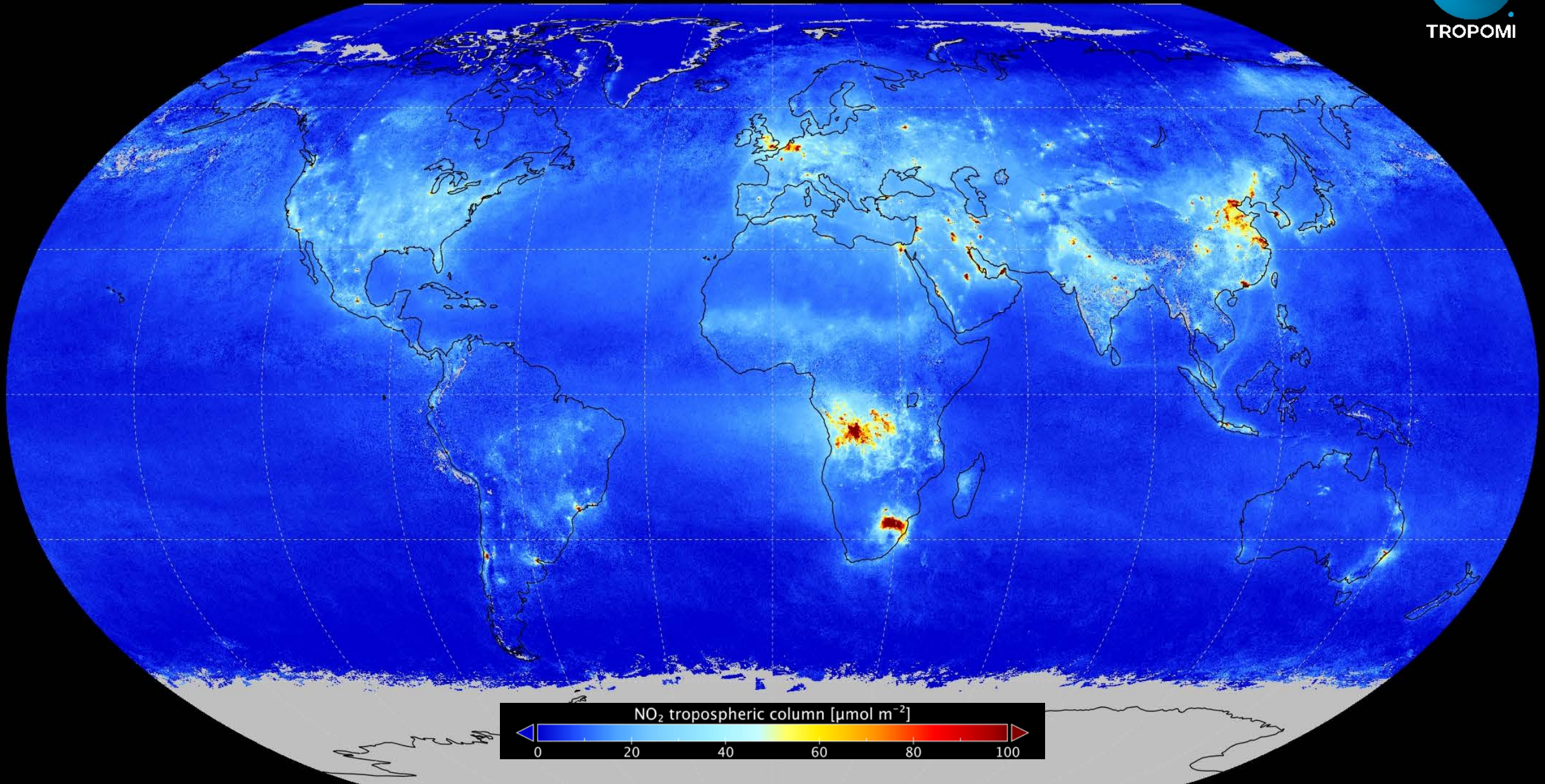
Measuring trace gases from space

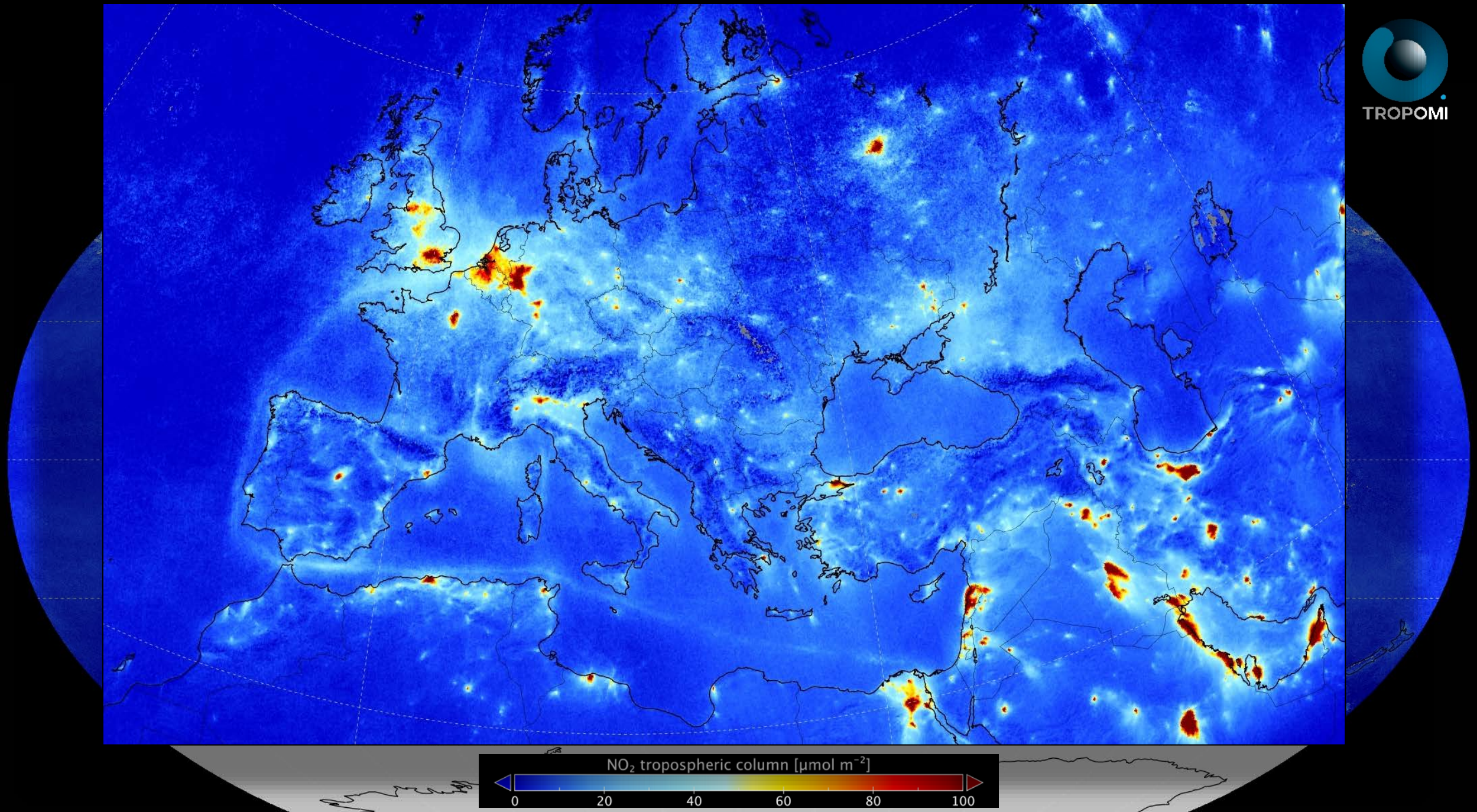




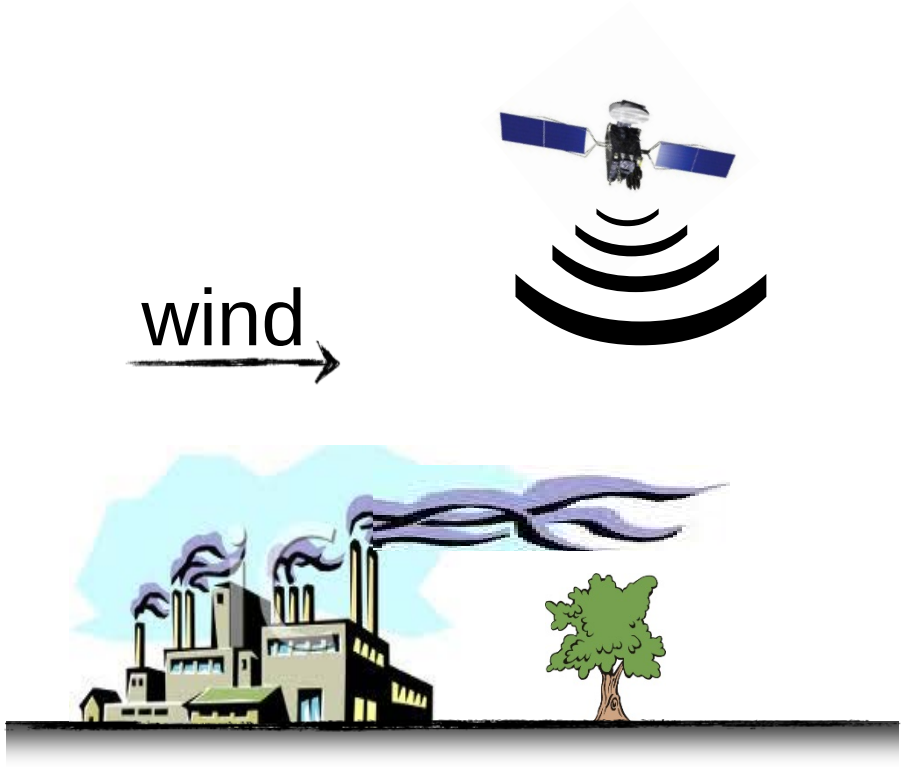
Global NO_2 tropospheric column, July 2018

TROPOMI




TROPOMI
NO_2 tropospheric column [µmol m^{-2}]
0
20
40
60
80
100

Emission estimation with the DECSO* algorithm



Calculation of the plume back to its source

Fast updates of regional emission inventories

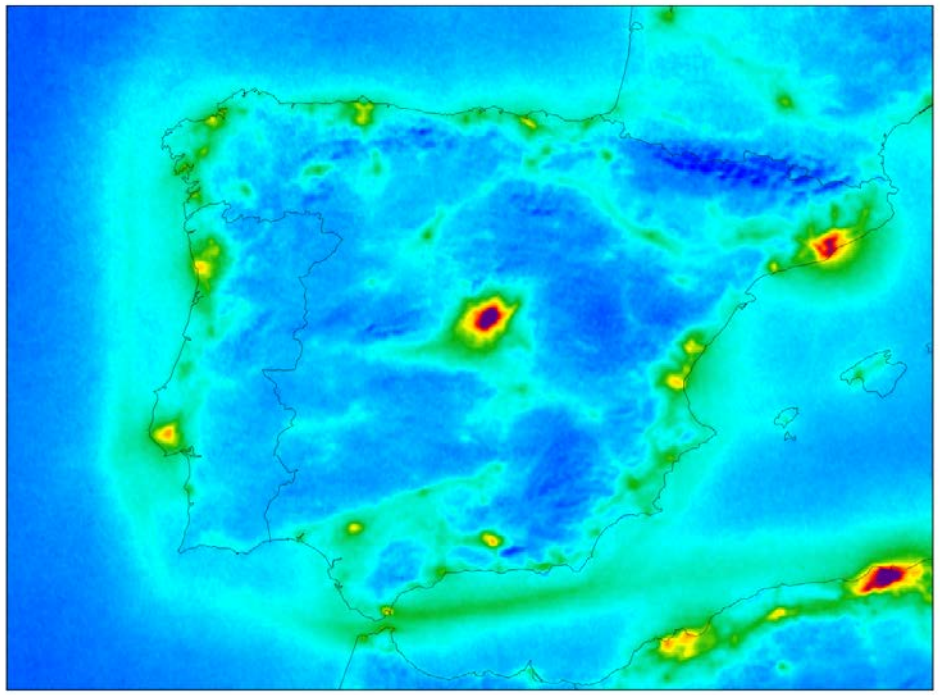
at relatively high resolution (~10×10 km^2)

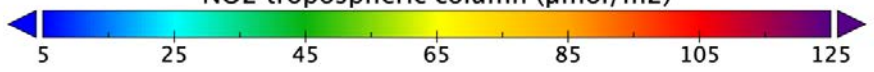
Algorithm can detect new hotspots / relocating existing hotspots

* **D**aily **E**mission estimates **C**onstrained by **S**atellite **O**bservations

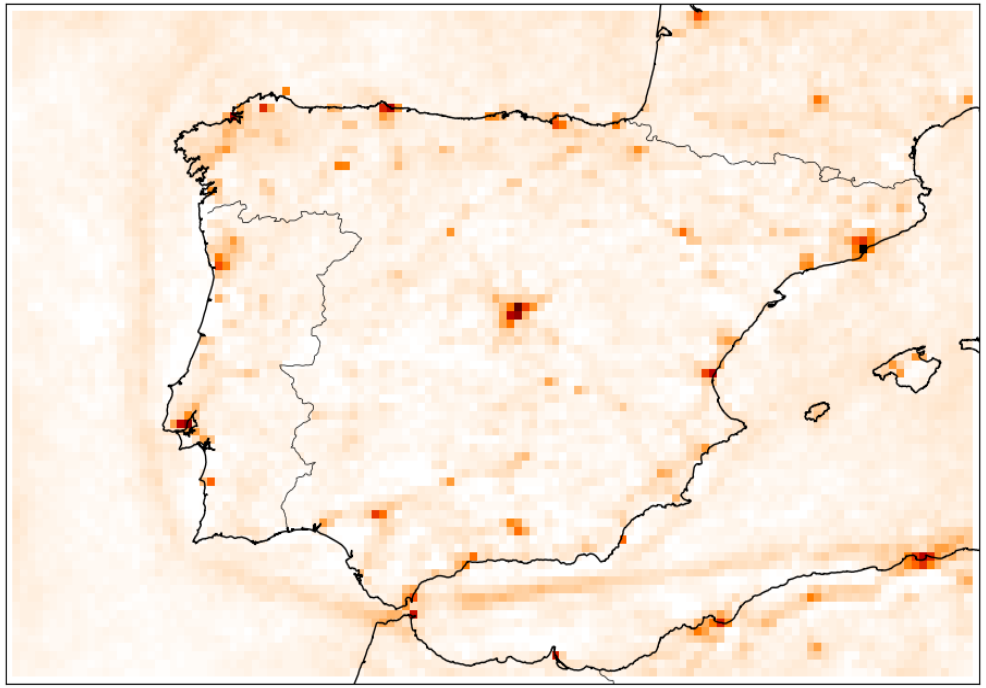
NO_X emission estimates from TROPOMI

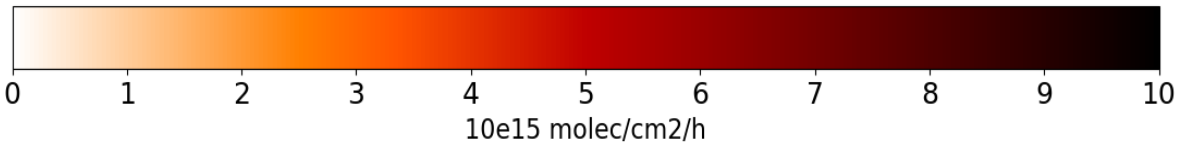
Sentinel-5P NO2, April 2018 – March 2019



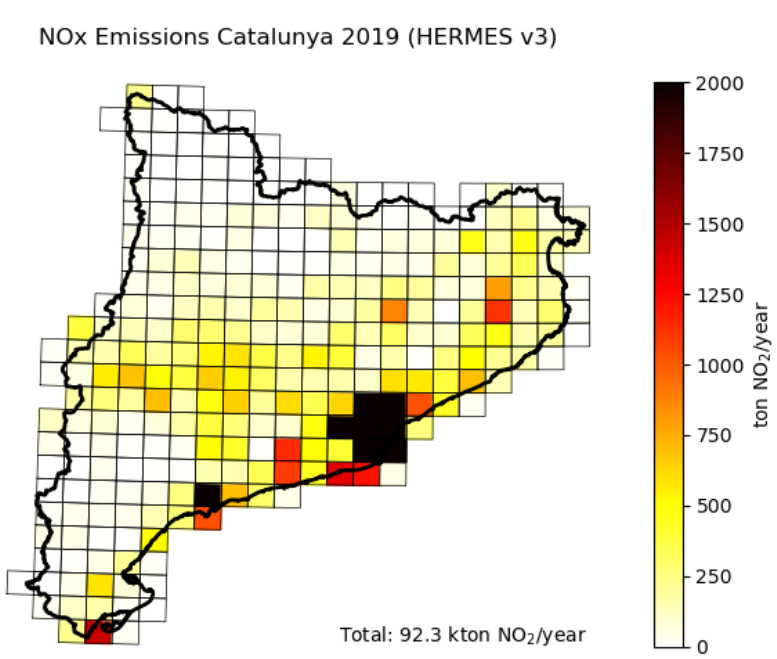


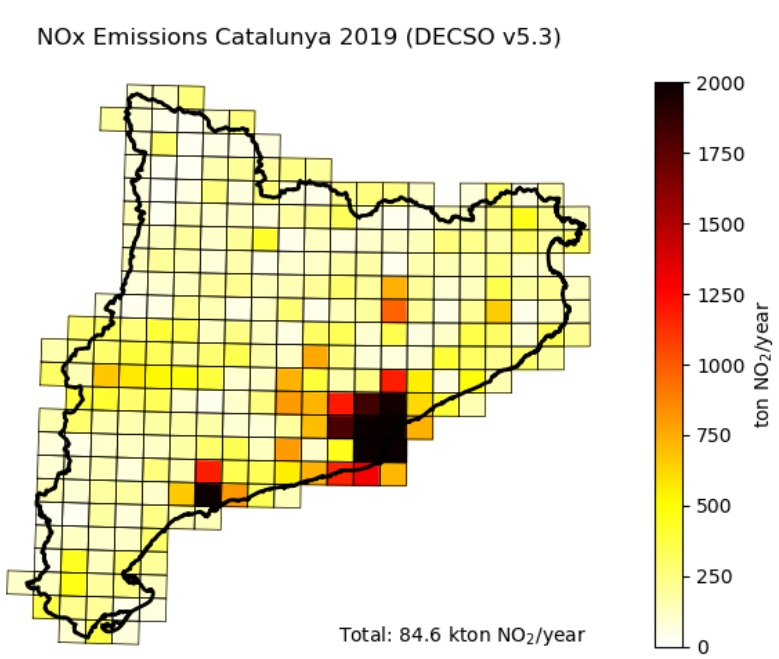
Emissions September 2018 (old algorithm)

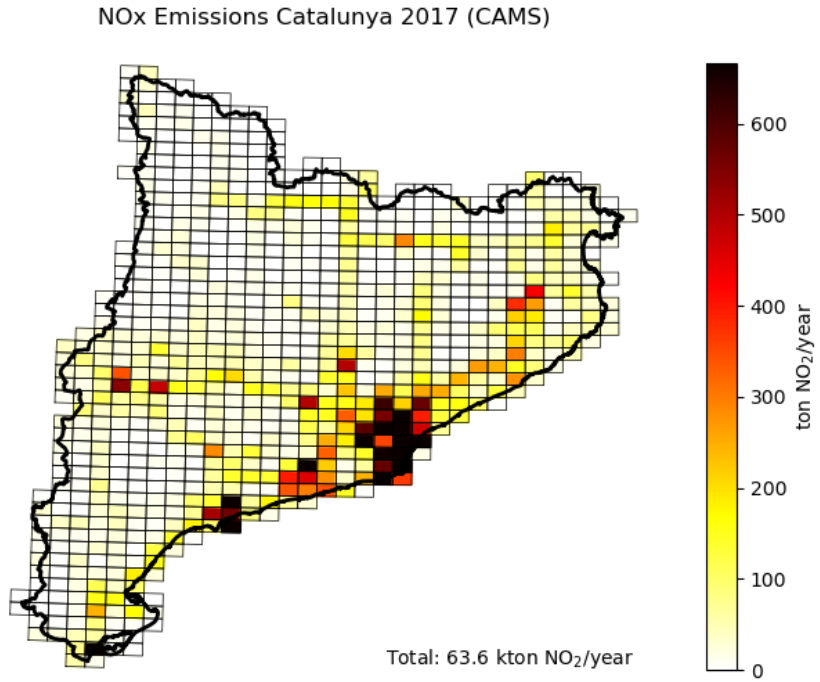




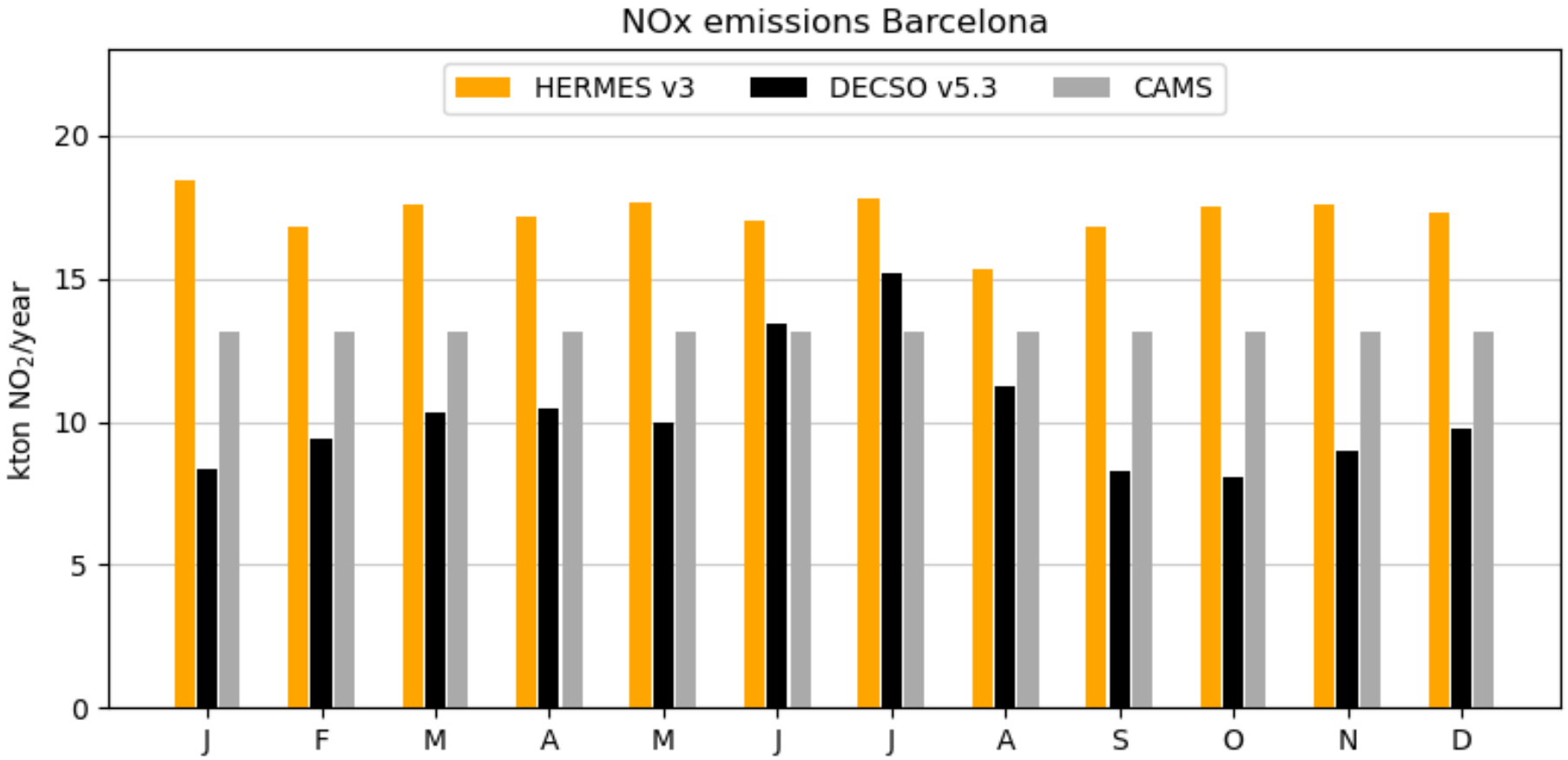
Total NO_X emissions Catalonia, 2019

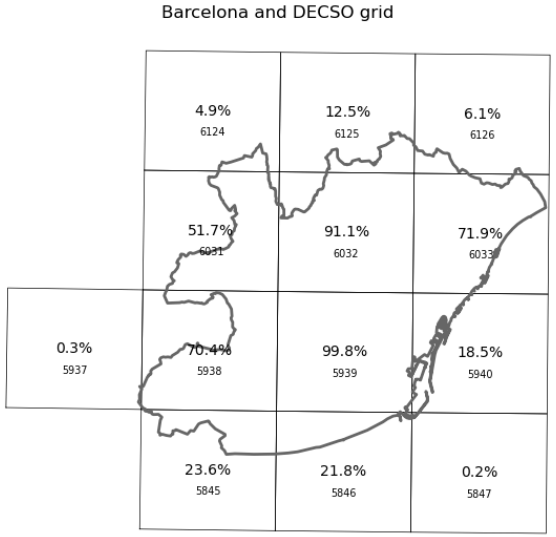






Monthly NO_X emissions Barcelona



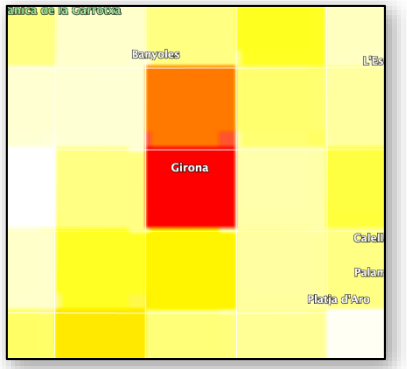


Total emissions

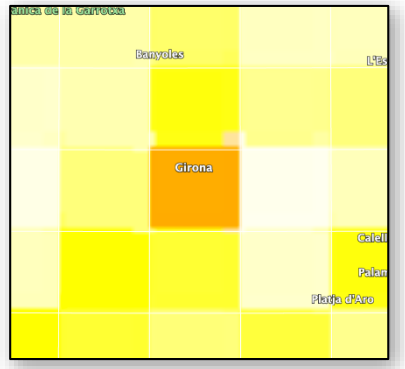
HERMES v3 (2019):	17.3 kton NO_2
DECSO v5.3 (2019):	10.3 kton NO_2
CAMS (2017):	13.2 kton NO_2

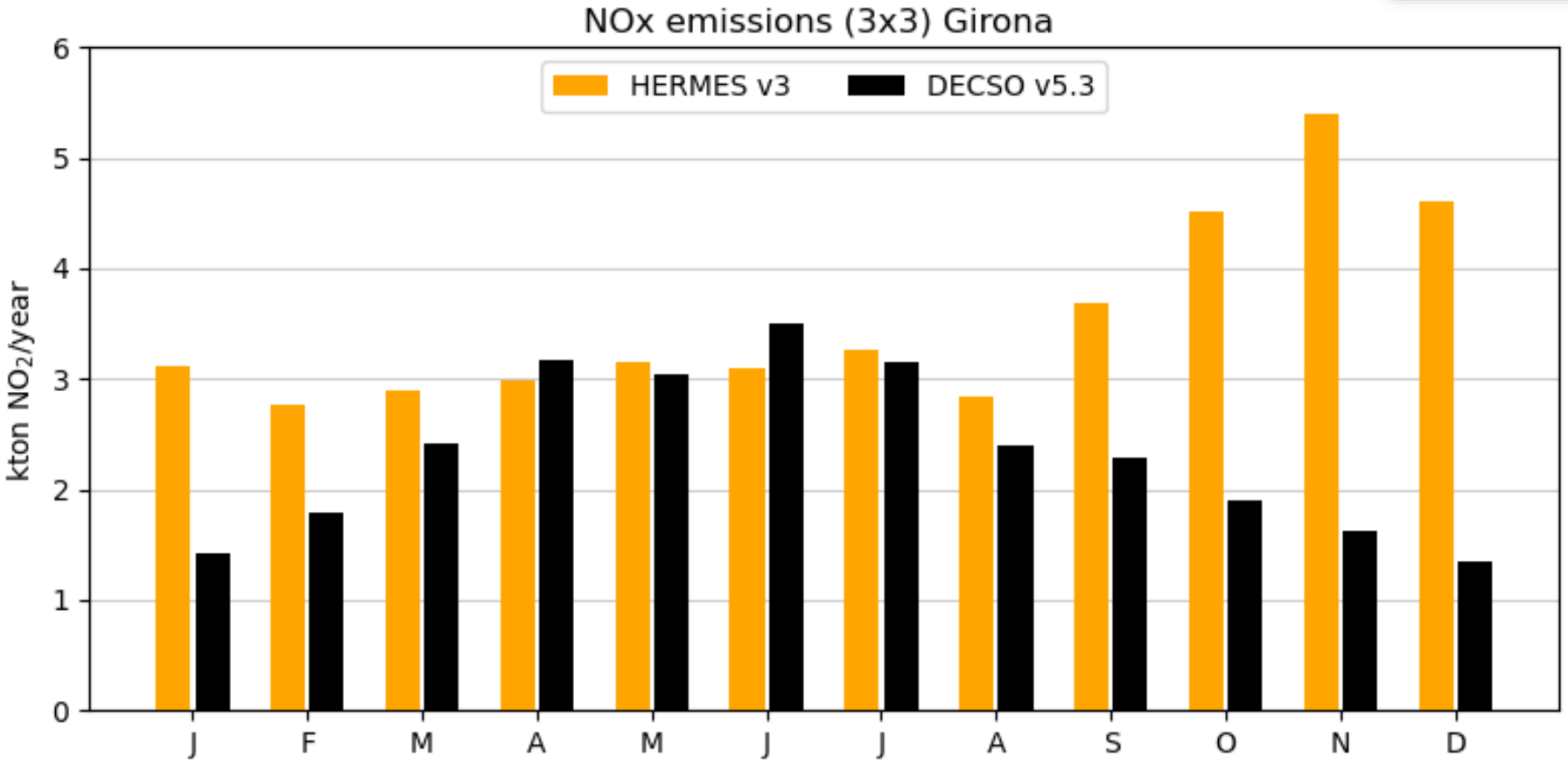
Monthly emissions Girona

HERMES



DECSO



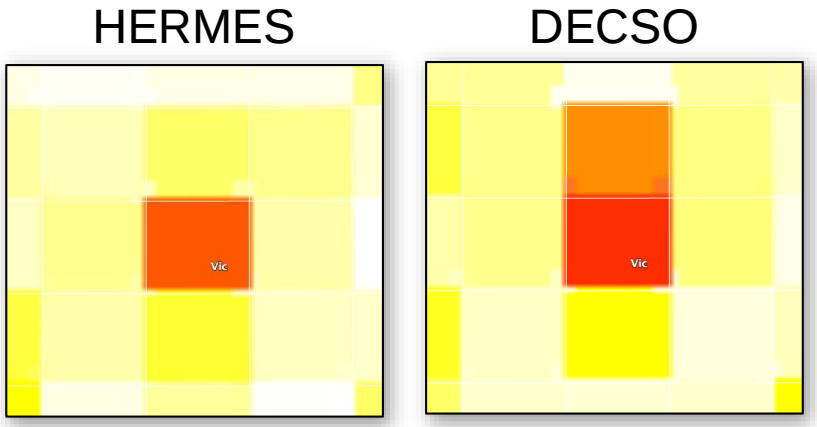


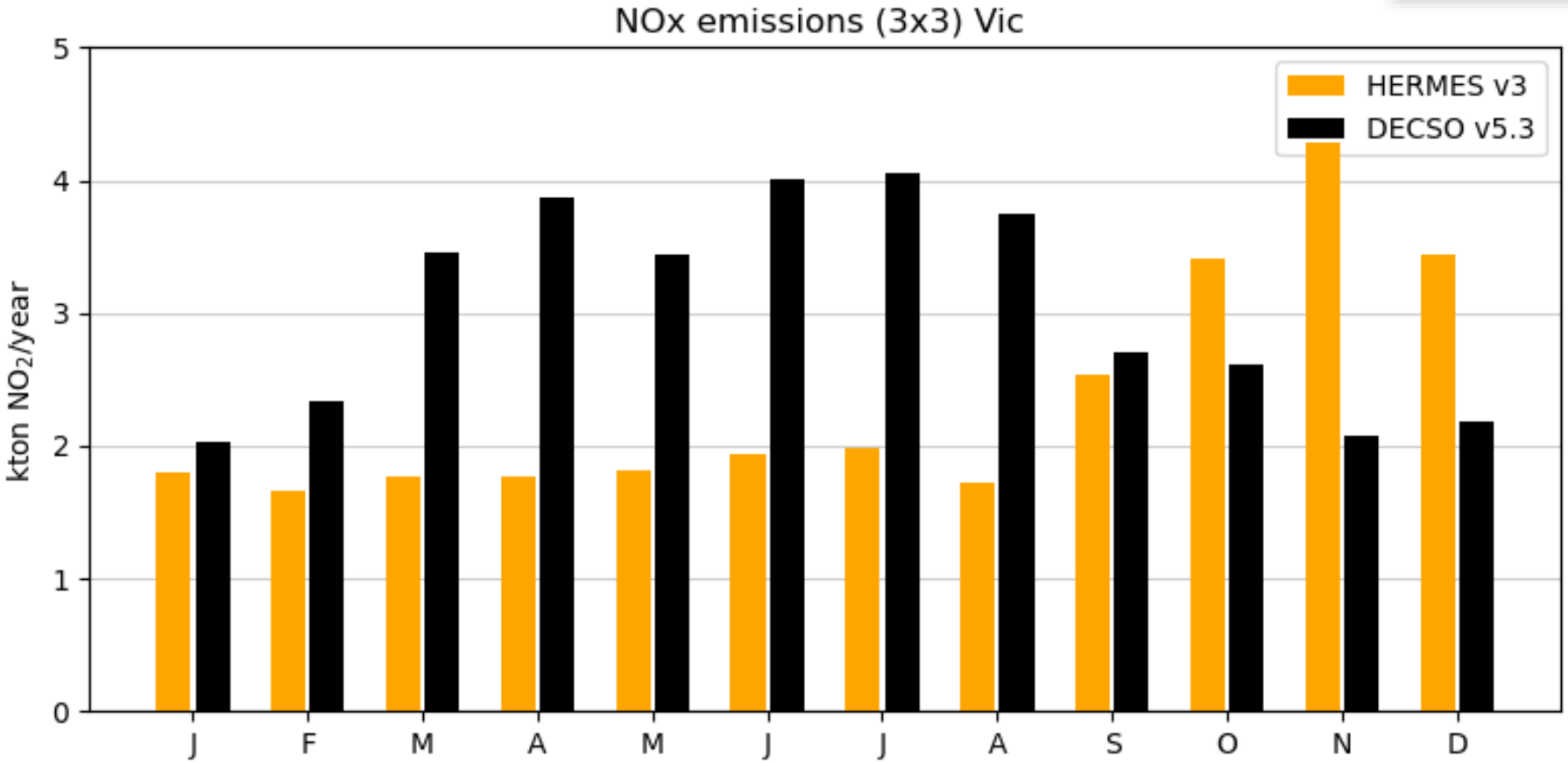
Total emissions (3x3)

HERMES v3 (2019): 3.5 kton NO_2

DECSO v5.3 (2019): 2.3 kton NO_2

Monthly emissions Vic





Total emissions (1x1)

HERMES v3 (2019): 0.88 kton NO_2

DECSO v5.3 (2019): 0.98 kton NO_2

Total emissions (3x3)

HERMES v3 (2019): 2.3 kton NO_2

DECSO v5.3 (2019): 3.1 kton NO_2

Conclusions

- NO_X emission estimates from space with DECSO algorithm
- Comparison over Catalonia with HERMES (2019) and CAMS (2017)

++ Good agreement of spatial locations and absolute regional emissions;

\+ At city level we see significant differences between HERMES and CAMS. DECSO is somewhere in the middle;

\- Seasonal variability of DECSO needs improvement (probably lifetime issue).

More info?
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