Integrating methane satellite observations at different scales

J.D. Maasakkers (Thanks to many others)
We automatically detect large plumes in the TROPOMI data.

We find ~3000 plumes in 2021, related to various source sectors.

- 1031 Urban
- 720 Gas
- 612 Oil
- 581 Coal
- 30 Unclassified
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C-X GHGSat 25-m resolution
PRISMA, EnMap, EMIT
Sentinel-2, Landsat 8/9
And other (future) high-resolution instruments

Schuit et al. (2023)
Zooming in on hot spots with high-resolution observations

Guided by TROPOMI data, GHGSat reveals large emissions from a landfill in Buenos Aires.

\[ Q = 21.9 \pm 7.8 \text{ t h}^{-1} \]
Part of our MARS contribution, we have compiled a list of ~190 hot spots
We can also explore transient emissions using (mainly) land imagers.

TROPOMI-detected Methane Plumes 07/10/2023 - 13/10/2023

77 Plumes
- 10 tons hr$^{-1}$
- 100 tons hr$^{-1}$
Using Sentinel-3 together with Sentinel-5p and Sentinel-2

**TROPOMI (Sentinel-5P)**
- Daily global coverage
- Resolution: 7x5.5 km²

**Sentinel-3**
- Daily global coverage
- Resolution: 500x500 m²

**Sentinel-2**
- Global coverage every 5 days
- Resolution: 20x20 m²

Pandey et al. (2023)
Integration of information on different scales in inverse analyses

Diffuse sources (Scarpelli et al.)

Point sources (Sentinel-2)

Naus et al. (in press)
Integration of information on different scales in inverse analyses

Diffuse sources (Scarpelli et al.)

Simulated TROPOMI (prior)

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Diffuse sources (Scarpelli et al.)

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Analytical Emission

WRF

Naus et al. (in press)
Integration of information on different scales in inverse analyses

Diffuse sources (Scarpelli et al.)

Simulated TROPOMI (prior)

Simulated TROPOMI (posterior)

Analytical Emission

Point sources (Sentinel-2)

TROPOMI

2021 Hassi Messaoud results

Naus et al. (in press)
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