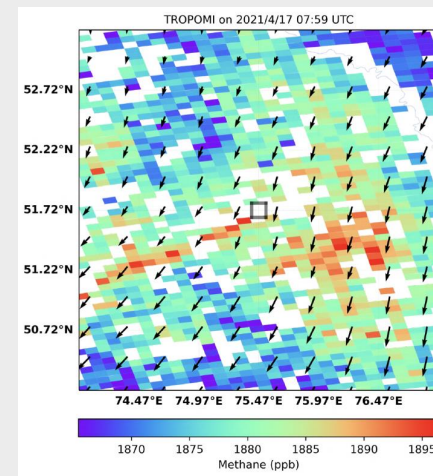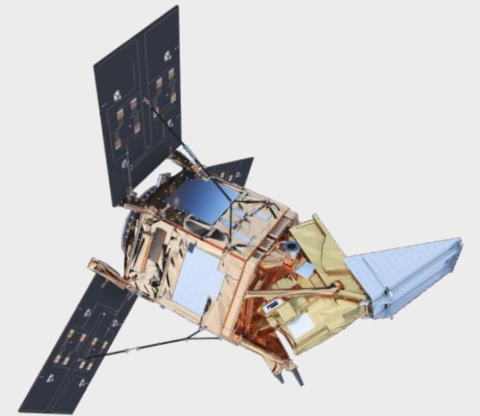# TROPOMI : methane emission from coal mines

Ilse Aben
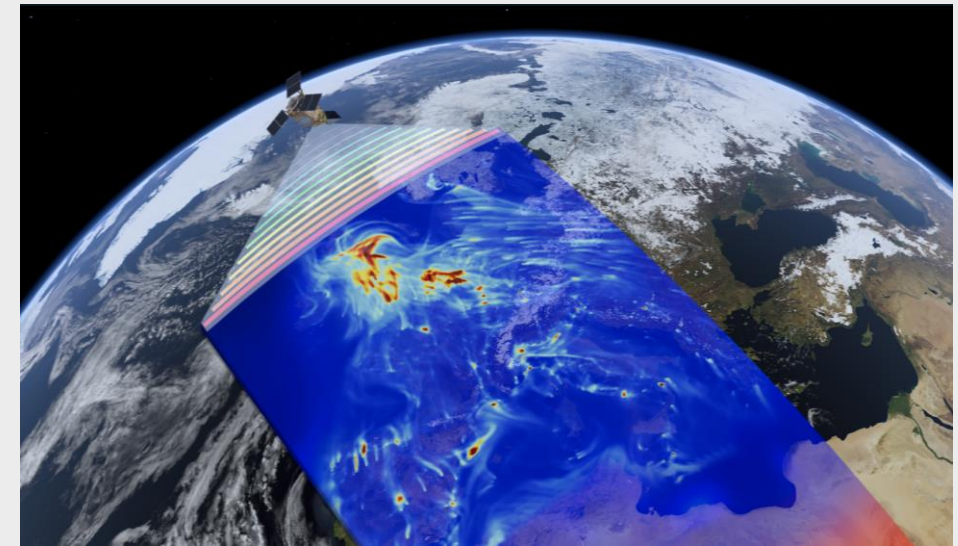
SRON Netherlands Institute for Space Research

Vrije Universiteit Amsterdam

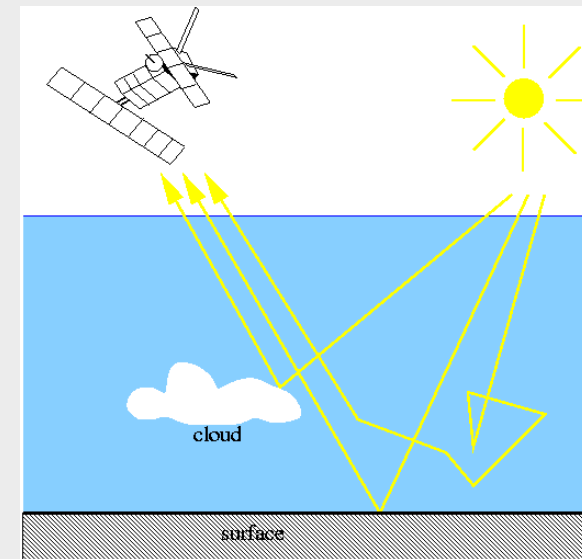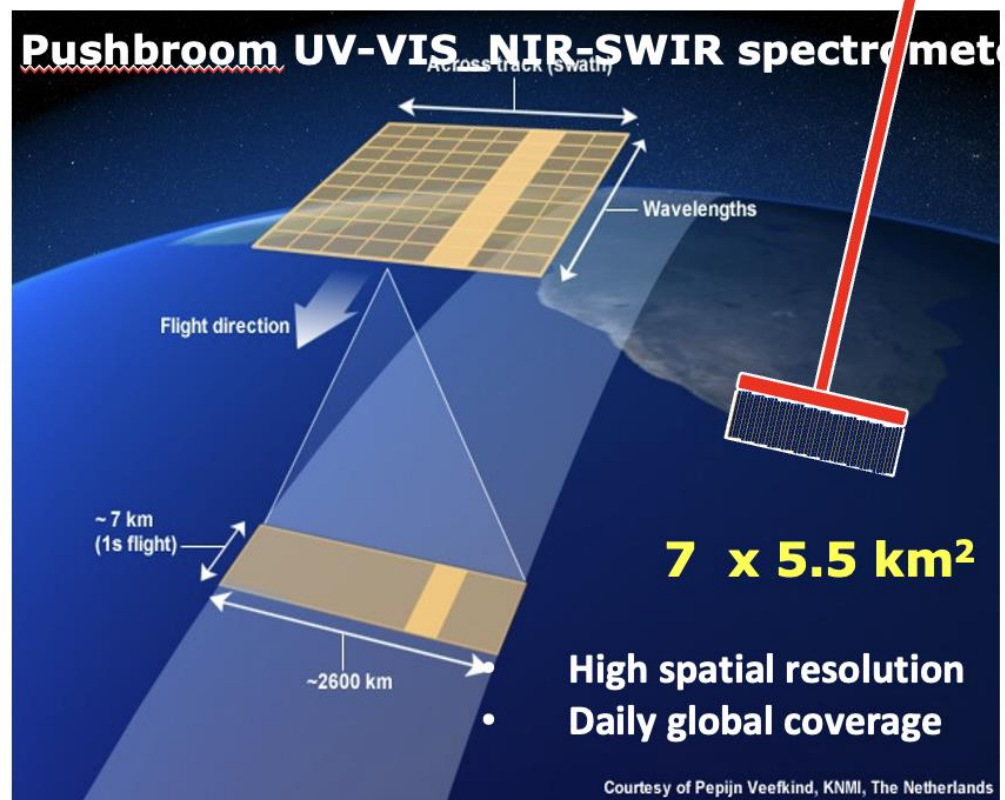- Launched Oct. 2017, precursor Sentinel-5
- Collaboration between the Netherlands and ESA
- Measures many species : O3, NO2, SO2, HCHO, CO, **CH4**, …
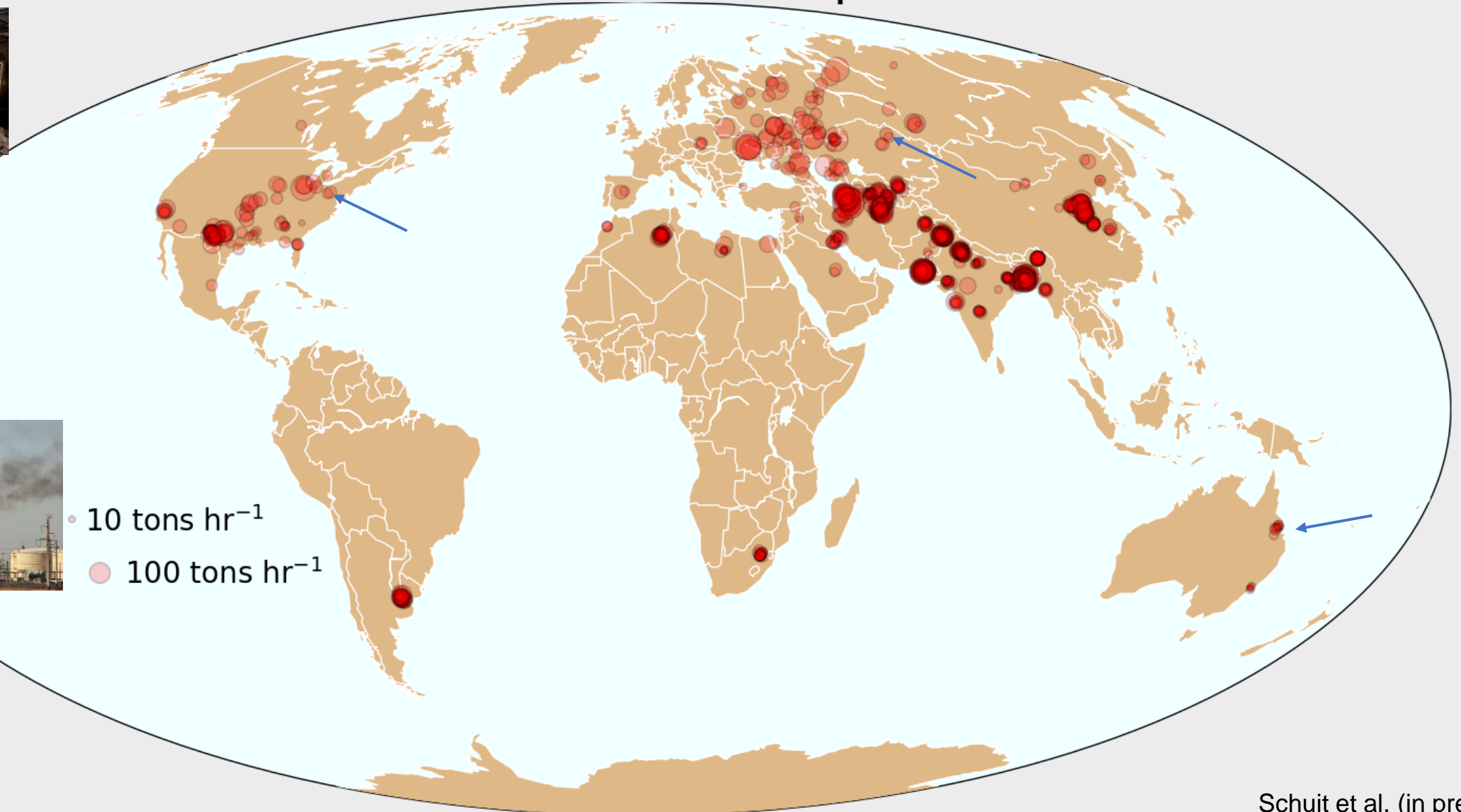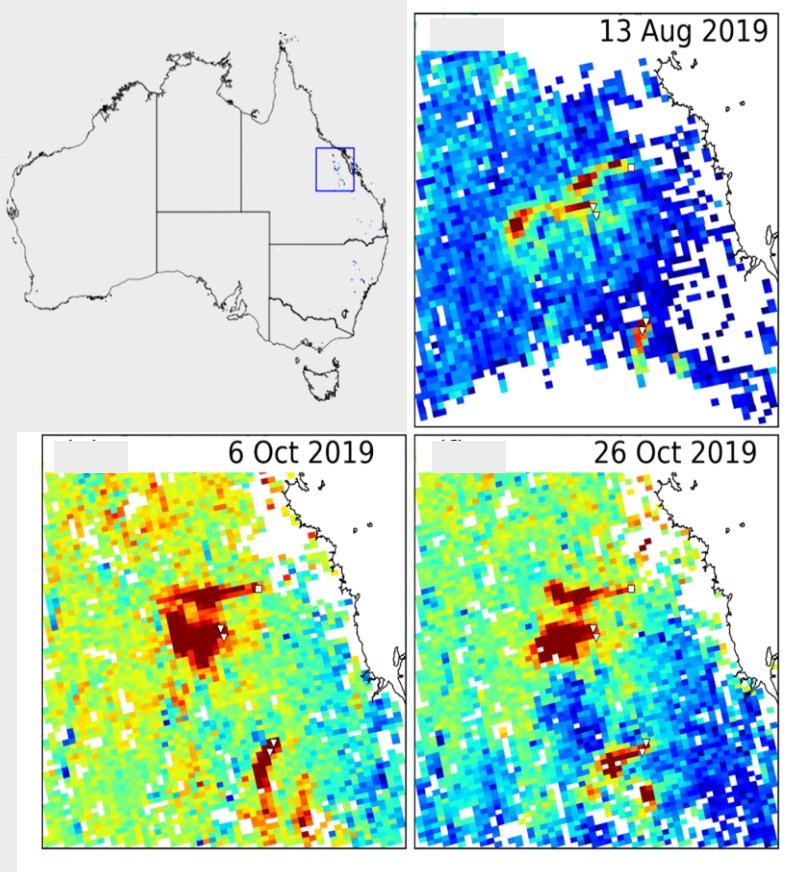- Part of EU Copernicus programme, data publicly available (free)

Veefkind et al, 2012

Pushbroom UV-VIS, NIR-SWIR spectrometer

Across track (swath)

Wavelengths

Flight direction

~7 km
(1s flight)

~2600 km

7 x 5.5 km²

High spatial resolution
Daily global coverage

Courtesy of Pepijn Veefkind, KNMI, The Netherlands

cloud

surface

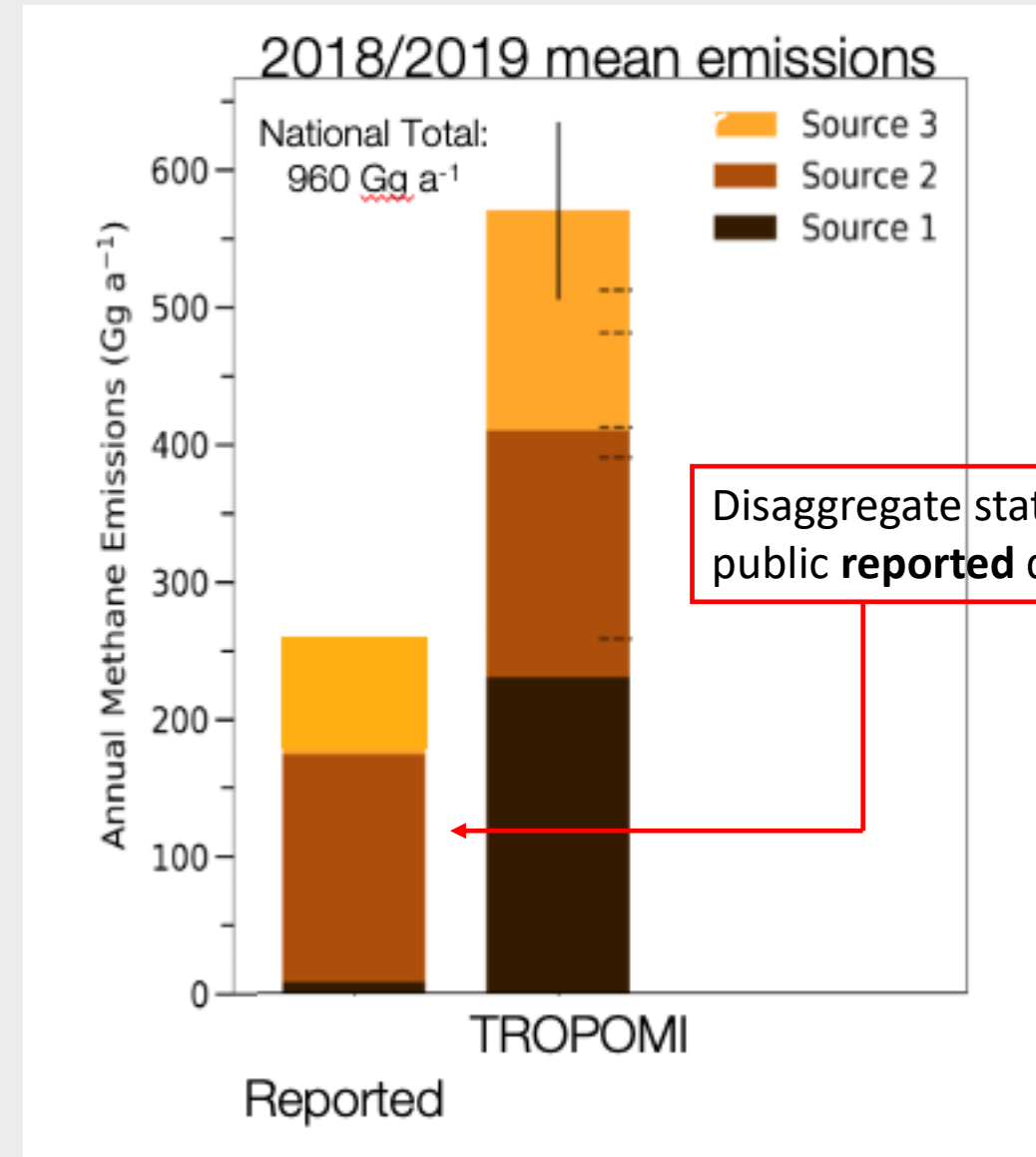2020 TROPOMI-detected Super-emitters

- 10 tons hr^{-1}
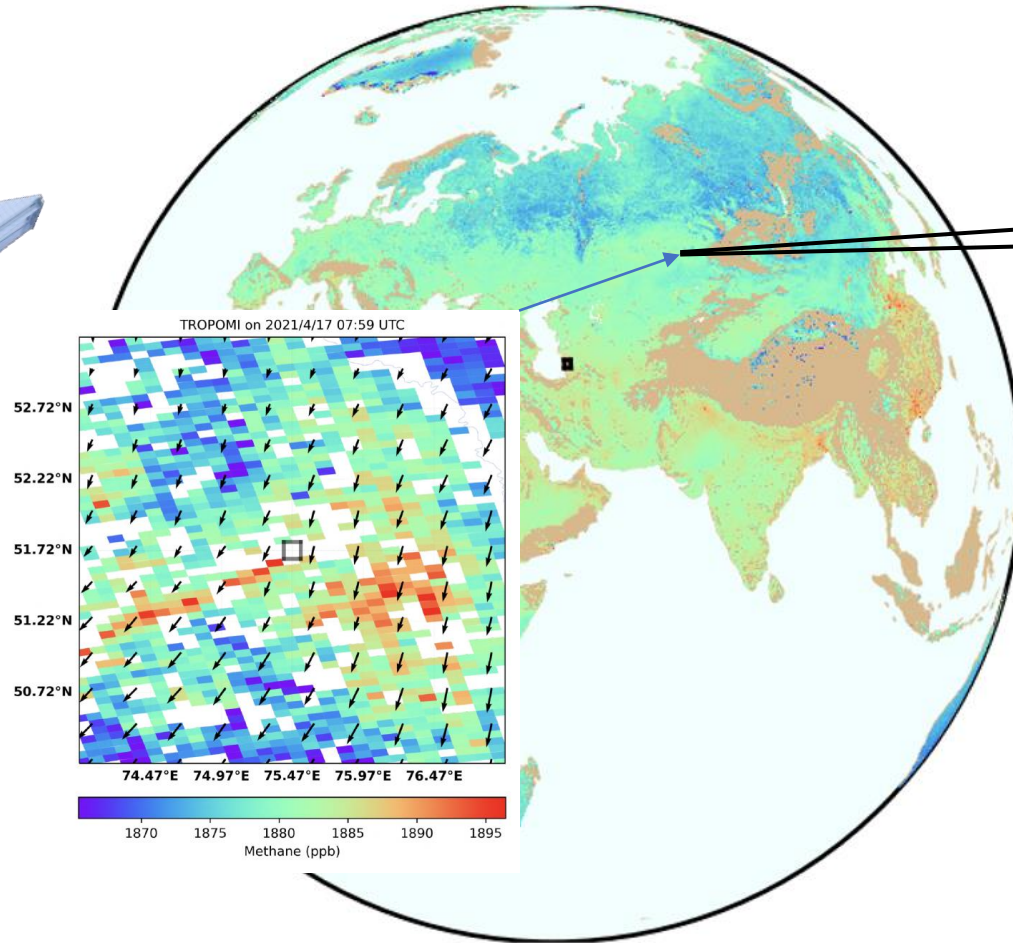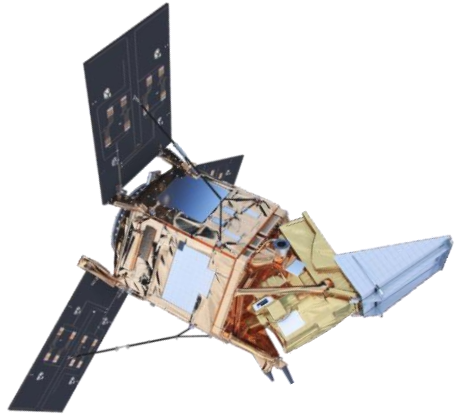- 100 tons hr^{-1}

Schuit et al. (in prep)

TROPOMI methane

Three super emitting coal mine (clusters).

6 mines : 7 % AUS. coal production, 55% reported AUS CH4 total coal emissions

One surface coal mine 1% coal production, 24% of reported emissions all coal mines AUS.

Sadavarte et al., ES&T, 2021

TROPOMI guiding high spatial resolution satellites to identify super emitters

TROPOMI on 2021/4/17 07:59 UTC

TROPOMI methane

Iris (GHGSat)

Hugo (GHGSat)

Claire (GHGSat)

PRISMA

SENTINEL-2

TROPOMI Sentinel-5P
Daily global coverage ~ 5.5 x 7 km^2

High spatial resolution instruments
Zooming in at facility level ~ 25 x 25 m^2

By analyzing global TROPOMI data we provide location to target high-resolution e.g. GHGSat observations to identify the facilities emitting methane.
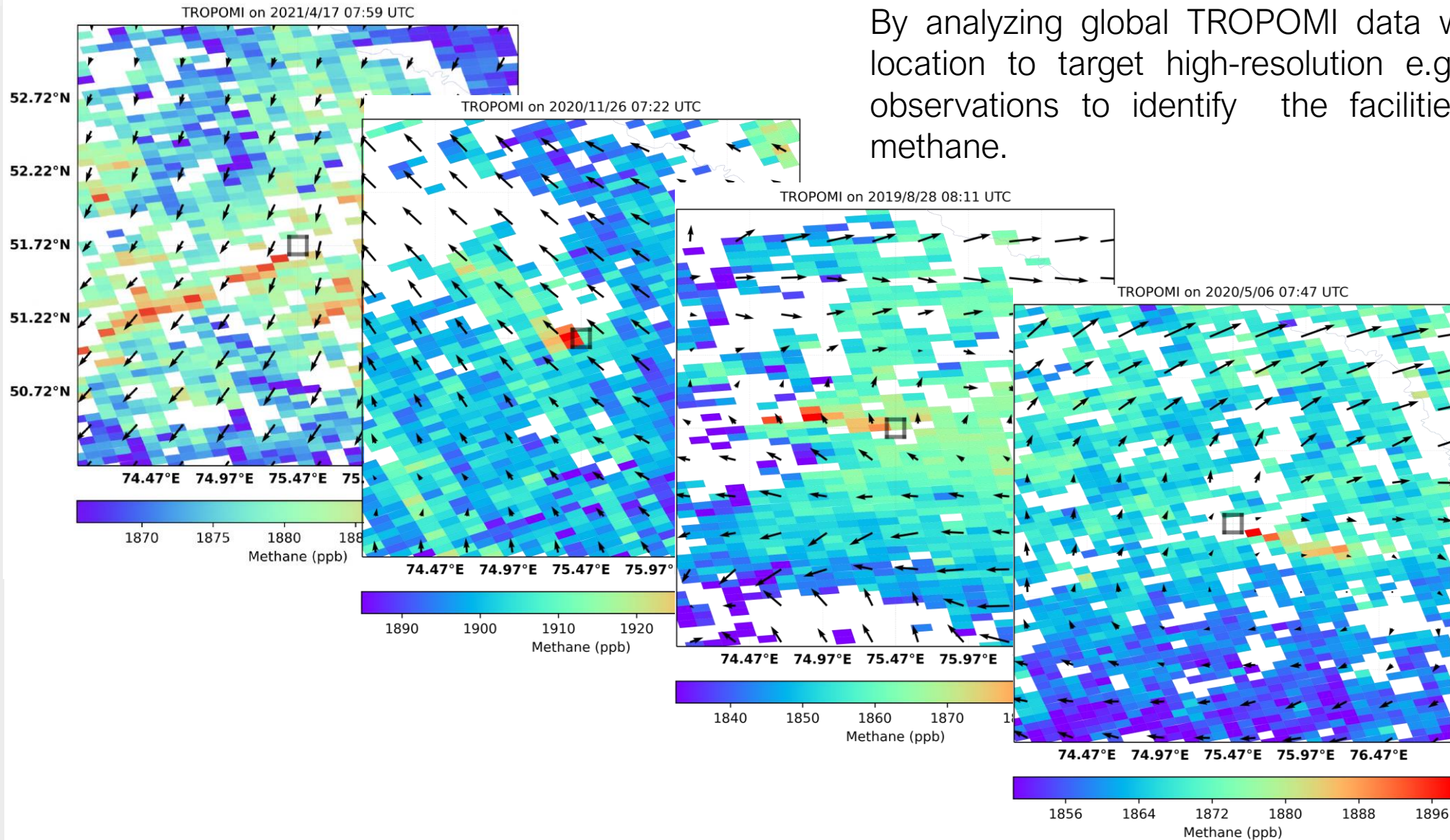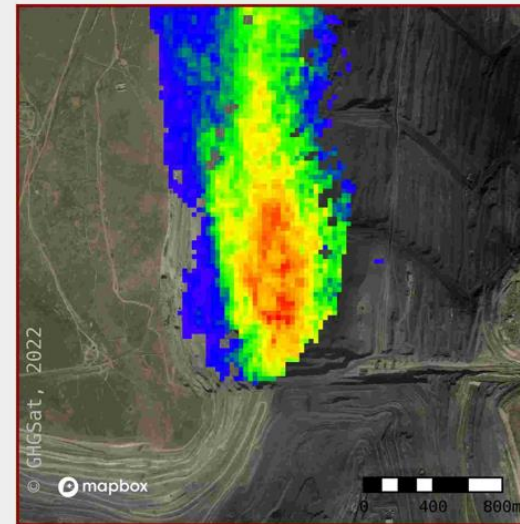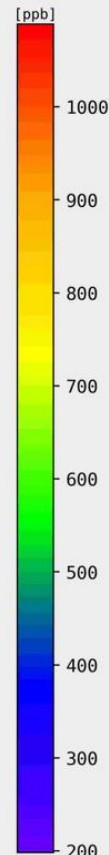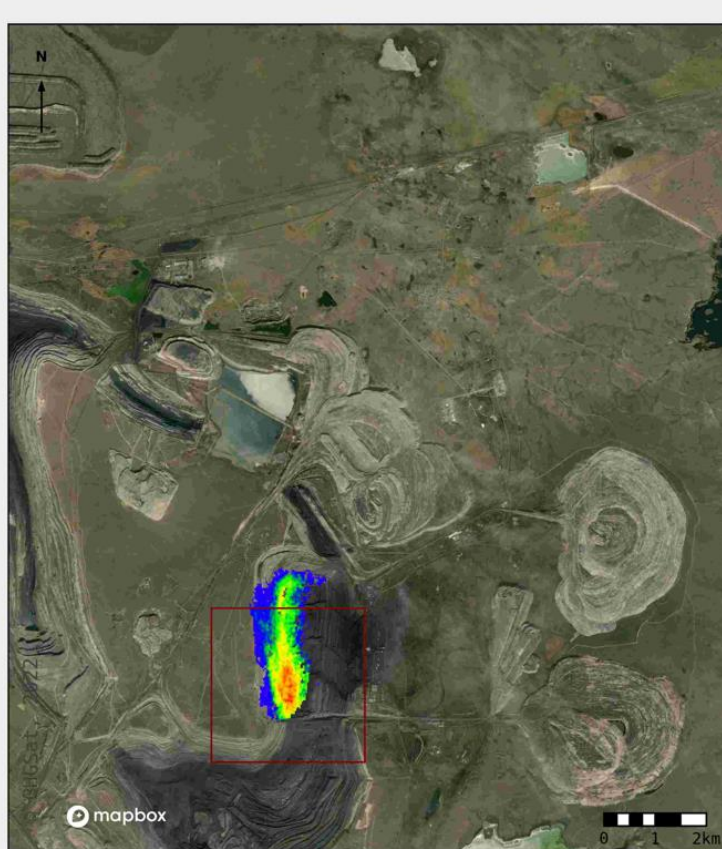
Point source 1: 37,455 kg/hr ±42%

Point source 2: 23,081 kg/hr ±42%

Guided by TROPOMI, GHGSat detected four individual plumes from coal mining in Pennsylvania (US) on Oct. 1, 2021
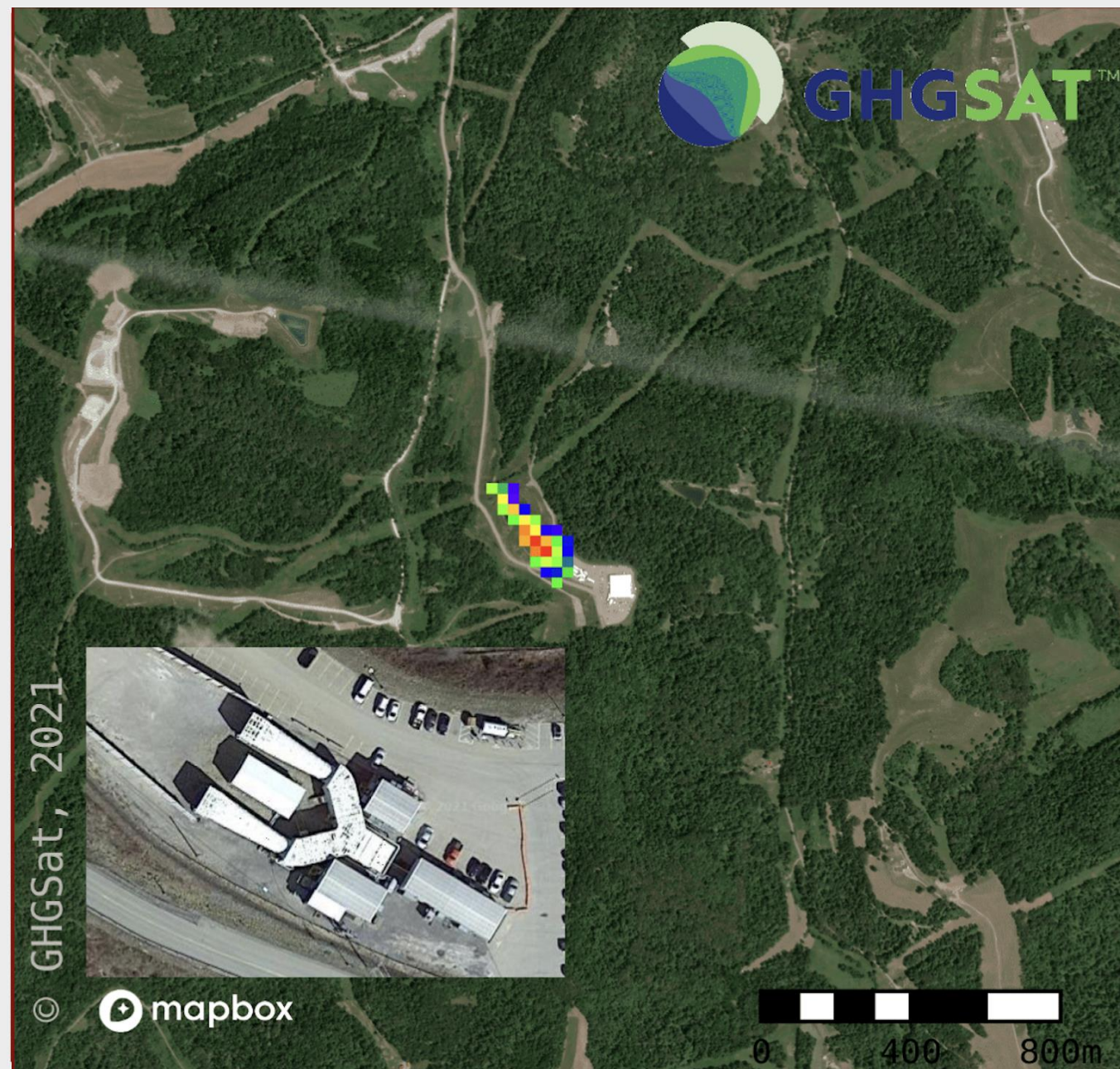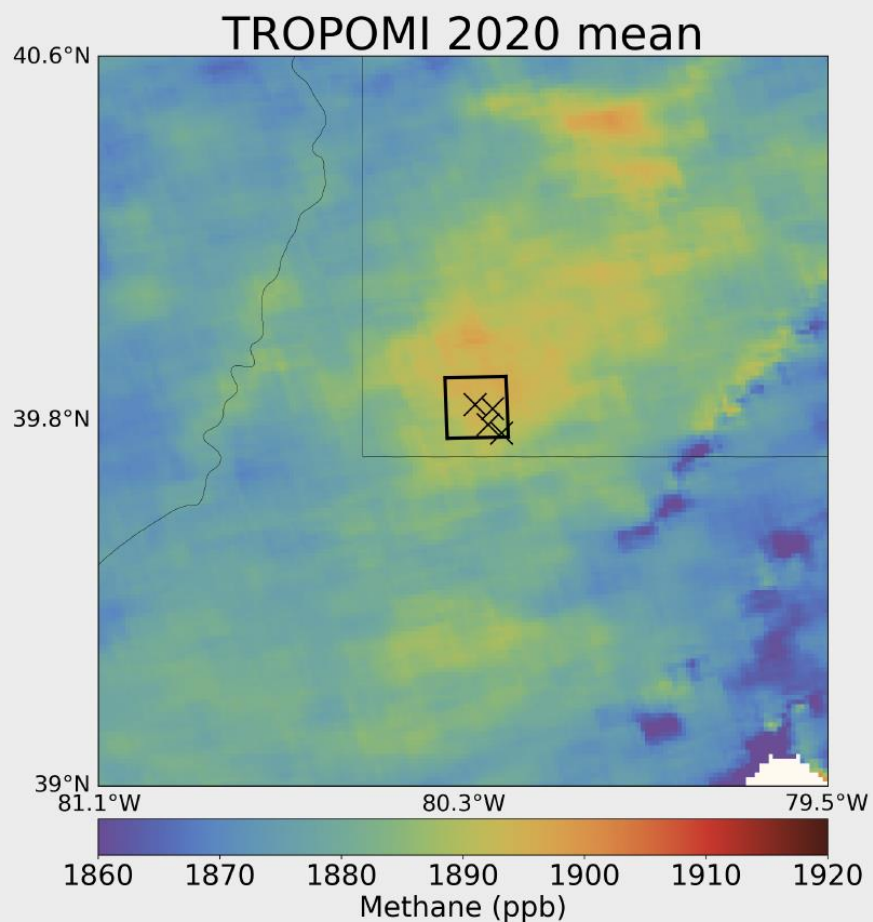
- TROPOMI is a real game changer wrt methane super emitters globally (but limited to large emissions ~ 5-10 t CH4/hr)

- Combination with high spatial resolution satellites (e.g. GHGSat) is VERY POWERFUL to identify the super emitting facilities

- Can support verification and prioritising climate mitigation action. Idea is to provide the information super emitters to International Methane Emission Observatory (IMEO under UN) to support industry etc. to reduce their emissions.

- Transparancy in reported emission values per facility (e.g. coal mine) helps the interpretation of satellite data