

# ECOMAP

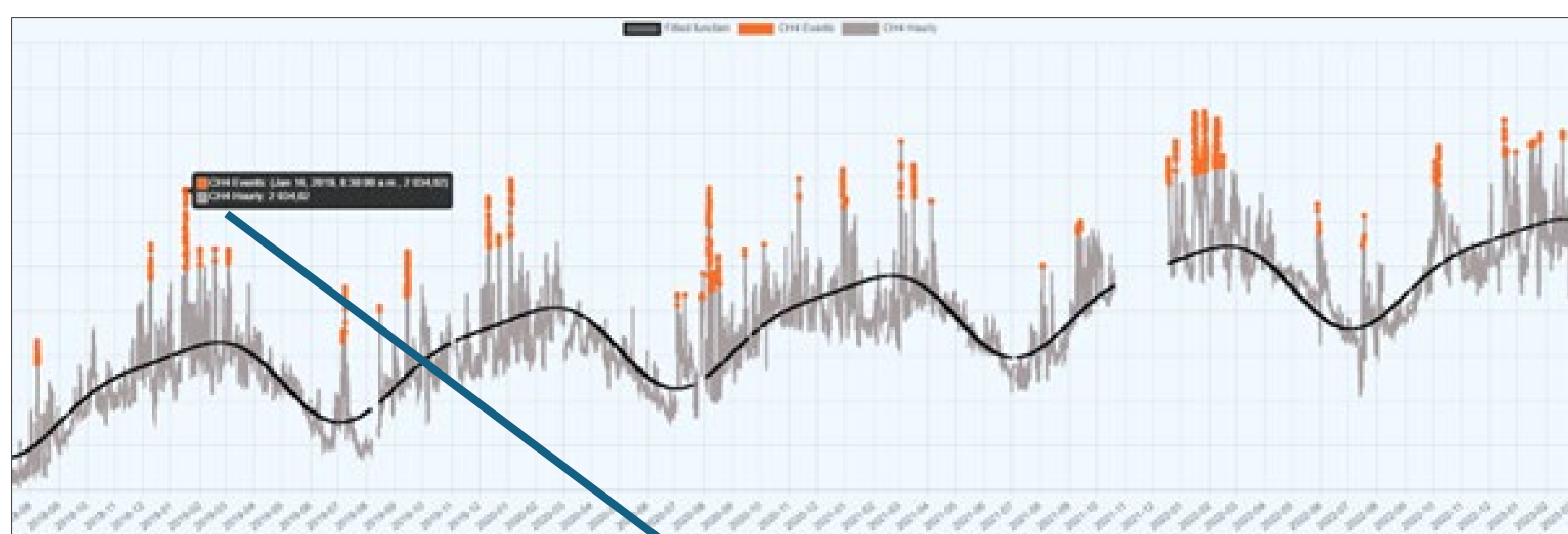
## Exploitation of ongoing and future COpernicus Missions for Atmospheric Applications

The purpose of ECOMAP is to demonstrate the value of remote sensing for greenhouse gas monitoring in Northern latitudes / the Arctic and air quality assessment in Norway with emphasis on the city-scale and to provide value-added products, as well as to access opportunities with upcoming geo-stationary missions.

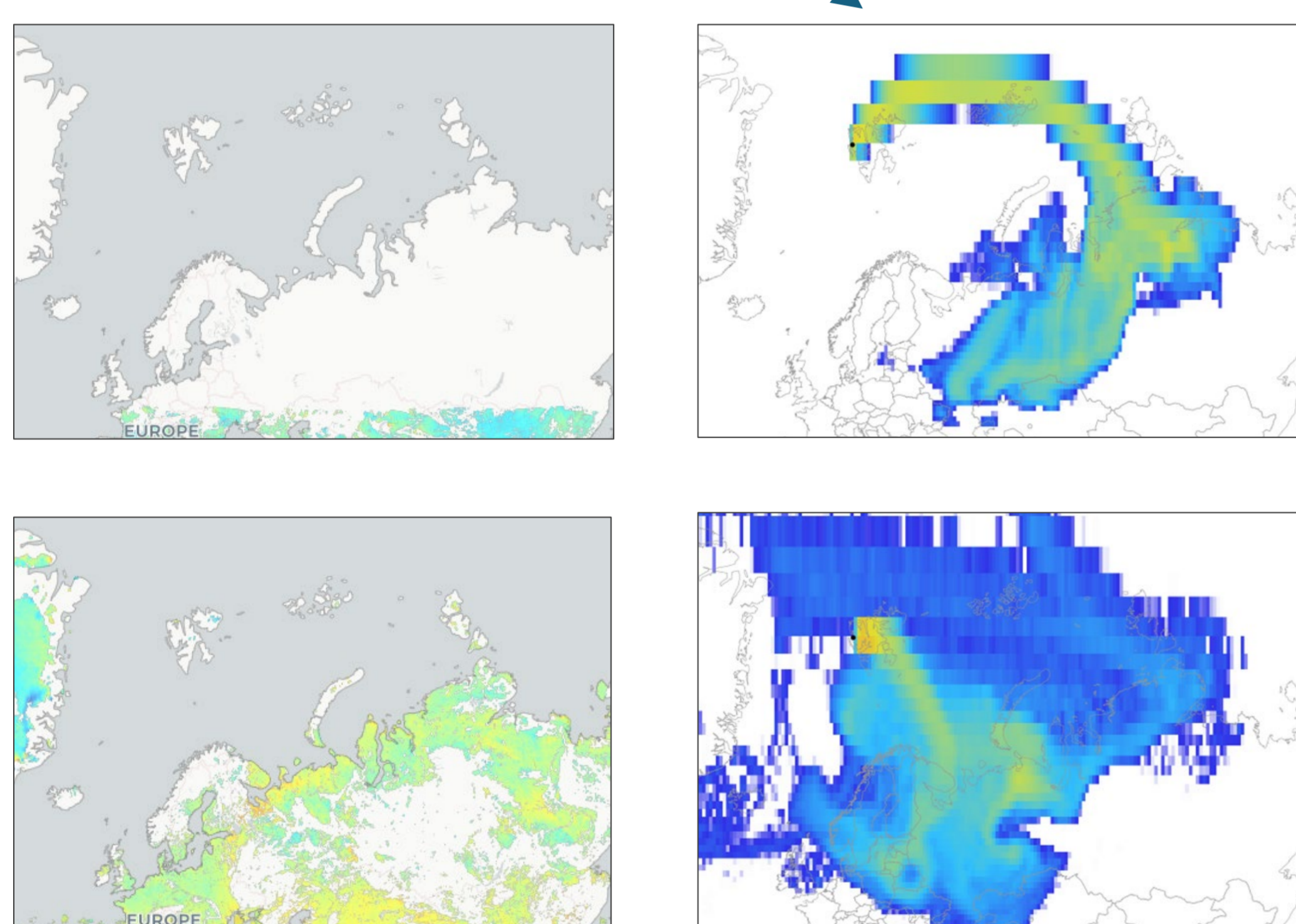
### The main goals are to:

- Exploit multi-sensor CH<sub>4</sub> (methane) in Northern latitudes / the Arctic; abundance and sources
- Exploit TROPOMI NO<sub>2</sub> (nitrogen dioxide) for air quality applications in Norway, with focus on cities and urban areas
- Preparation for Sentinel-4 Geostationary satellite
- Develop a new Norwegian prototype atmospheric service

### Linking methane episodes at the Zeppelin Observatory to its source regions

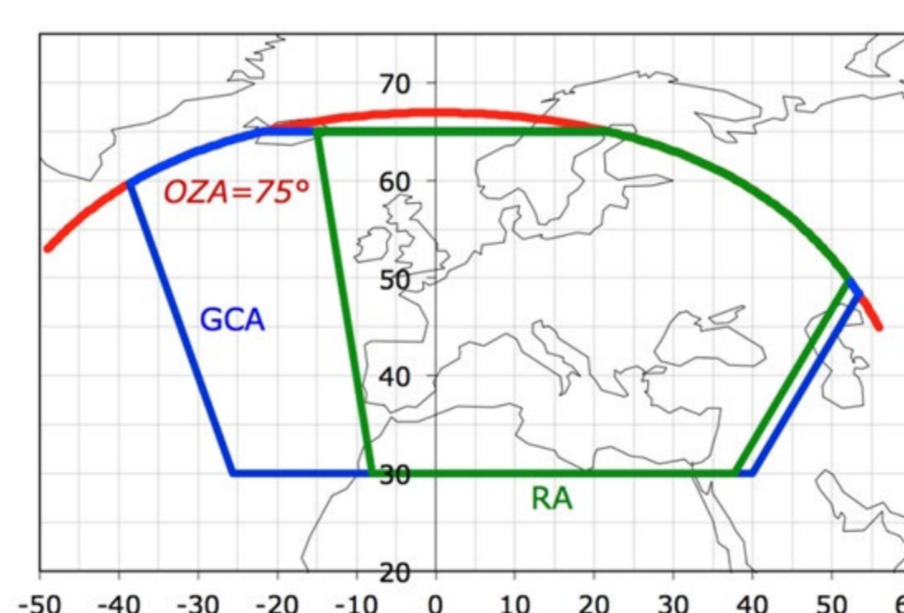


The Picarro instrument at the Norwegian Institute for Air Research (NILU) in Zeppelin Observatory precisely measures greenhouse gases like CO<sub>2</sub> and CH<sub>4</sub>. Situated at Ny-Ålesund in the Arctic, the Zeppelin Observatory monitors atmospheric composition in a remote, pristine environment. This research contributes vital data to global climate studies, tracking pollution and long-term climate change impacts.



The transport pattern on several episode days indicates a strong influence from Eastern Europe and central Russia. Fugitive emissions from Russian gas installations are normally the source of such high CH<sub>4</sub> values. The high CH<sub>4</sub> episodes at the Zeppelin observatory is analyzed using the Lagrangian transport model "FLEXible PARTICle dispersion model" (FLEXPART). It will be estimated whether the emissions can be identified by the TROPOMI observations.

Preliminary results show more and stronger episodes during NH winter.



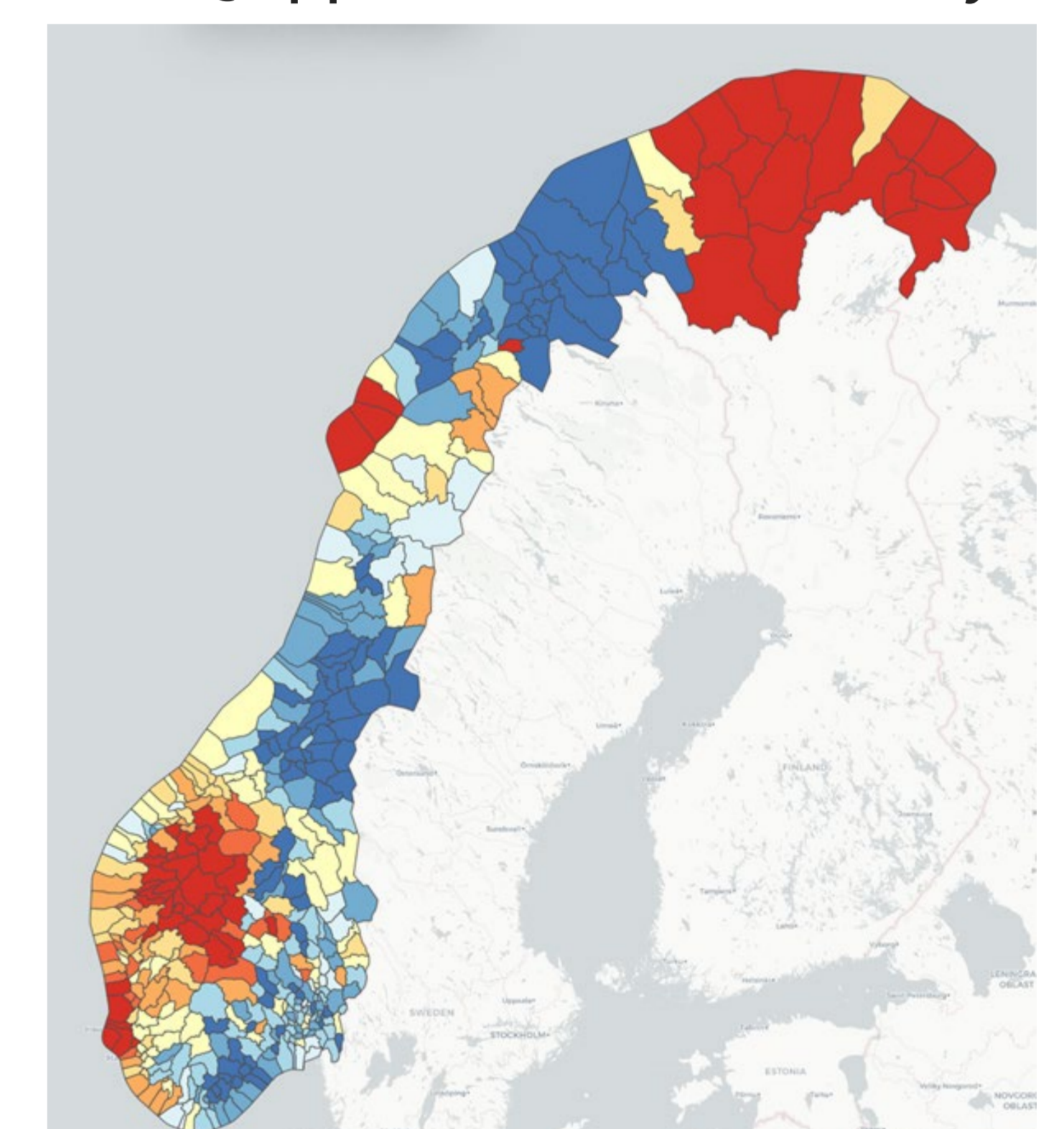
Above: Sentinel-4 geographical coverage, partly covering Norwegian interest area.

For 2024 and 2025 the work on continue with satellite-based methane source identifications and emission estimates, as well as further exploitation of spatial and temporal analysis and statistics for air quality in Norway. The work on preparation for expected performance of Sentinel-4 in Norwegian interest areas will be kicked off, and demonstrations of LEO/GEO synergies will be implemented in the service.

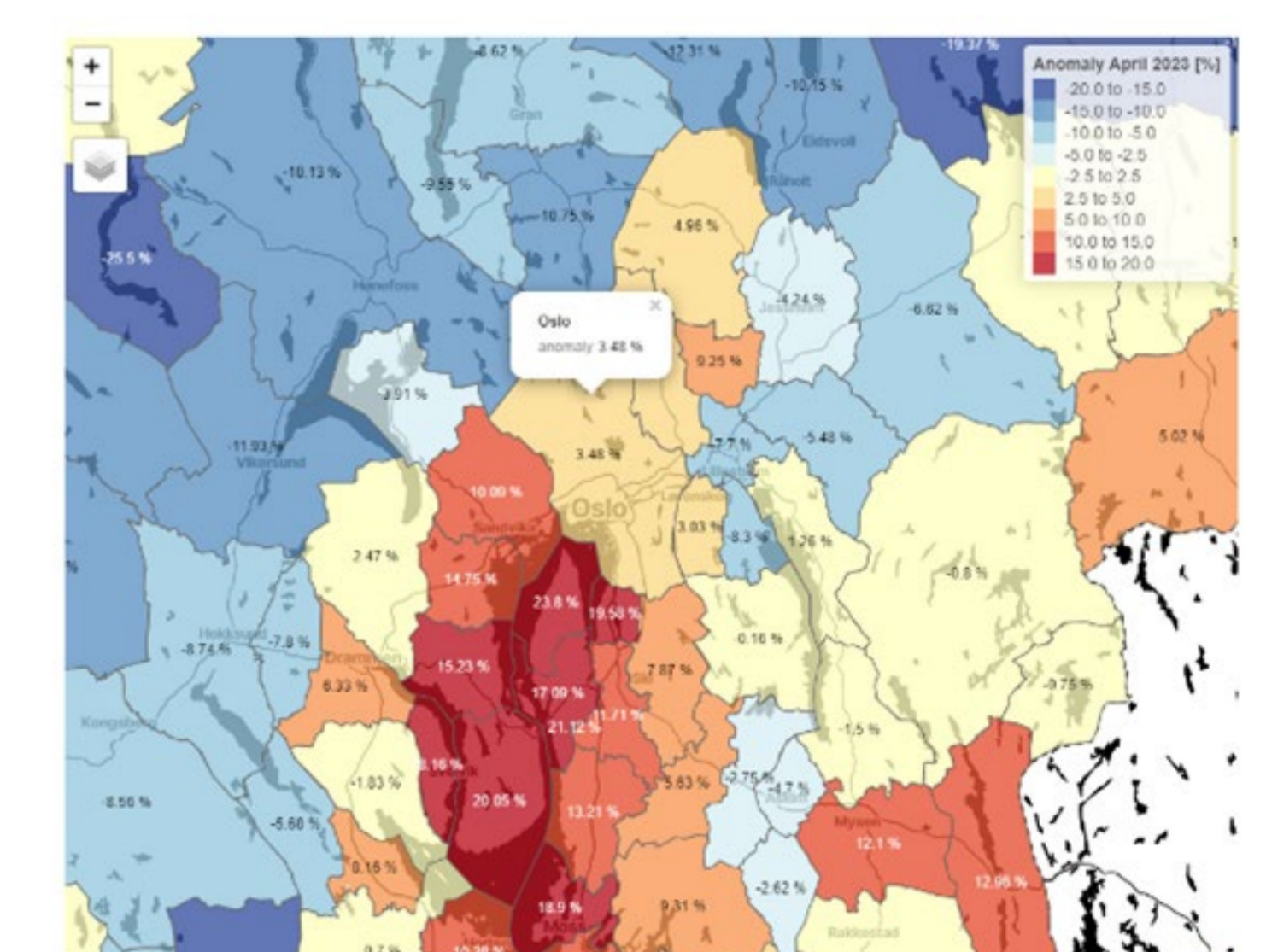


Left: Webpage visualization of monthly mean TROPOMI XCH<sub>4</sub> (ESA operational data) for April 2023.

### Exploration of Sentinel-5P for AQ applications over Norway



The relative anomaly information is an easy-to-understand metric, which is suitable for communication of satellite-based air quality information to the public.



Relative anomaly information for satellite based NO<sub>2</sub> aggregated at the level of individual municipalities, here shown for the southeast of Norway for the situation in April 2023. Each municipality is labeled with the actual relative anomaly calculated for the given month for the corresponding polygon.