



Co-ordinated by
ECMWF



CoC02

Prototype system for a
Copernicus CO₂ service

MONITORING HUMAN CARBON DIOXIDE EMISSIONS

From science innovation to
operational services

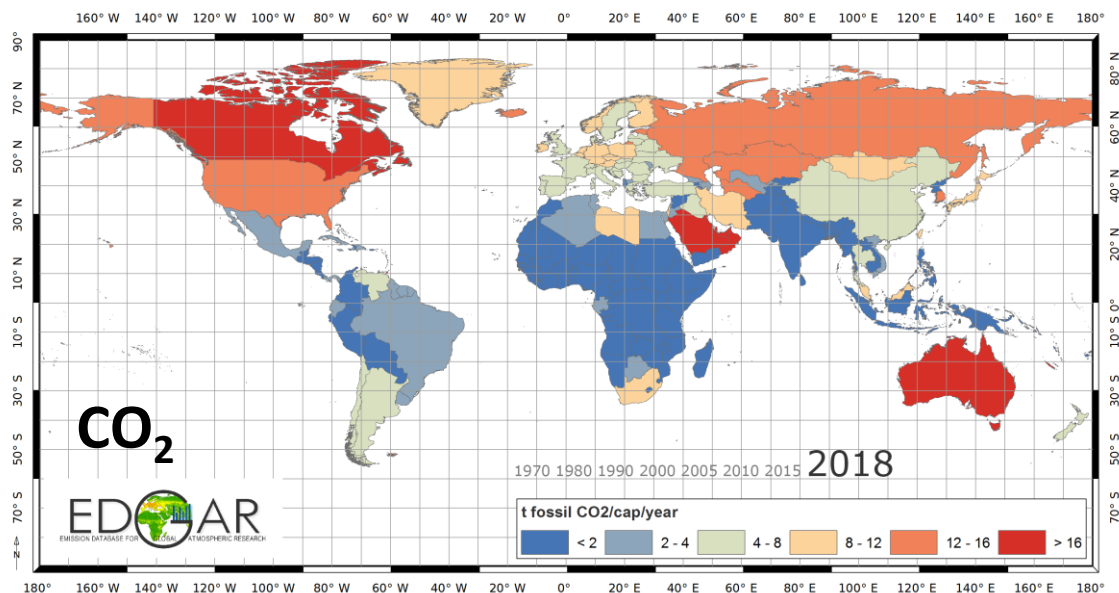
Richard Engelen
ECMWF

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 958927.





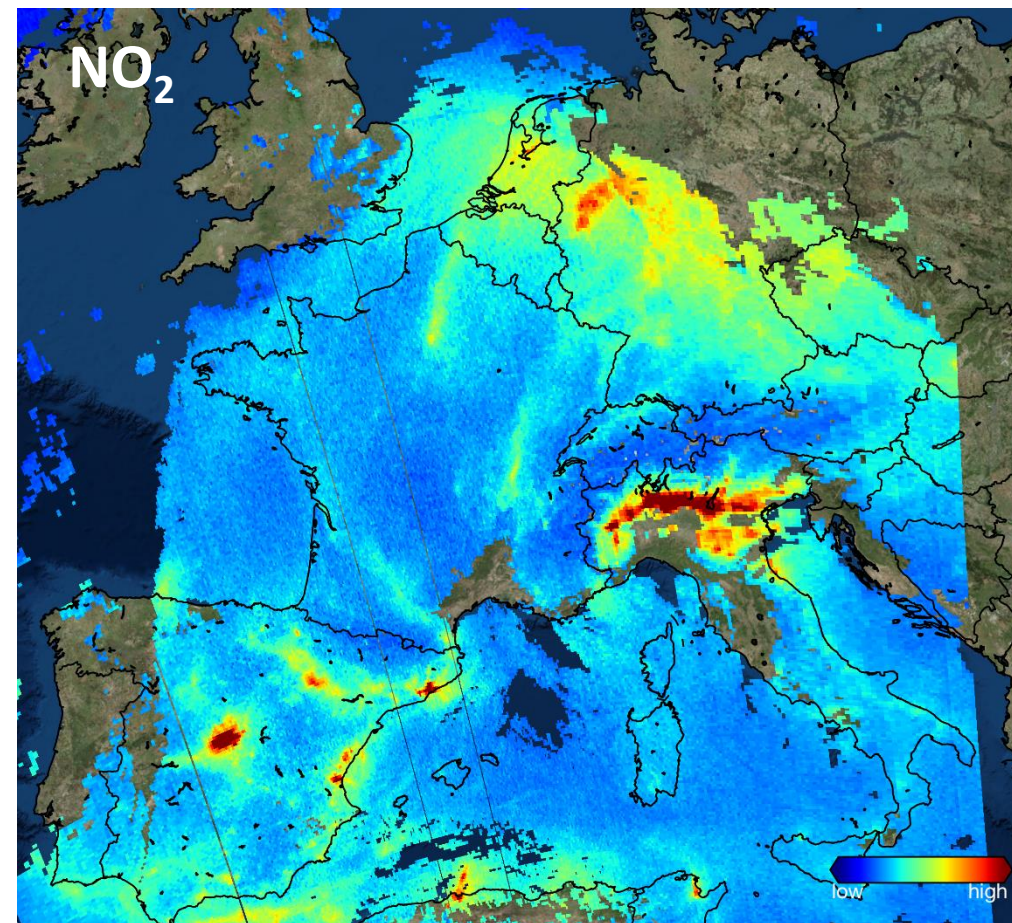
Understanding our emissions and how they change



CO₂ emission estimates based on nationally reported data

Observing atmospheric composition from space is a rapidly developing field. Many exciting new instruments, large and small, are being developed and launched.

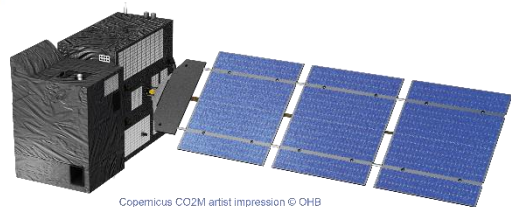
Can we use Earth observations to improve our knowledge of anthropogenic emissions?



contains modified Copernicus Sentinel data (2017), processed by KNMI/ESA
NO₂ tropospheric columns observed by Sentinel-5p



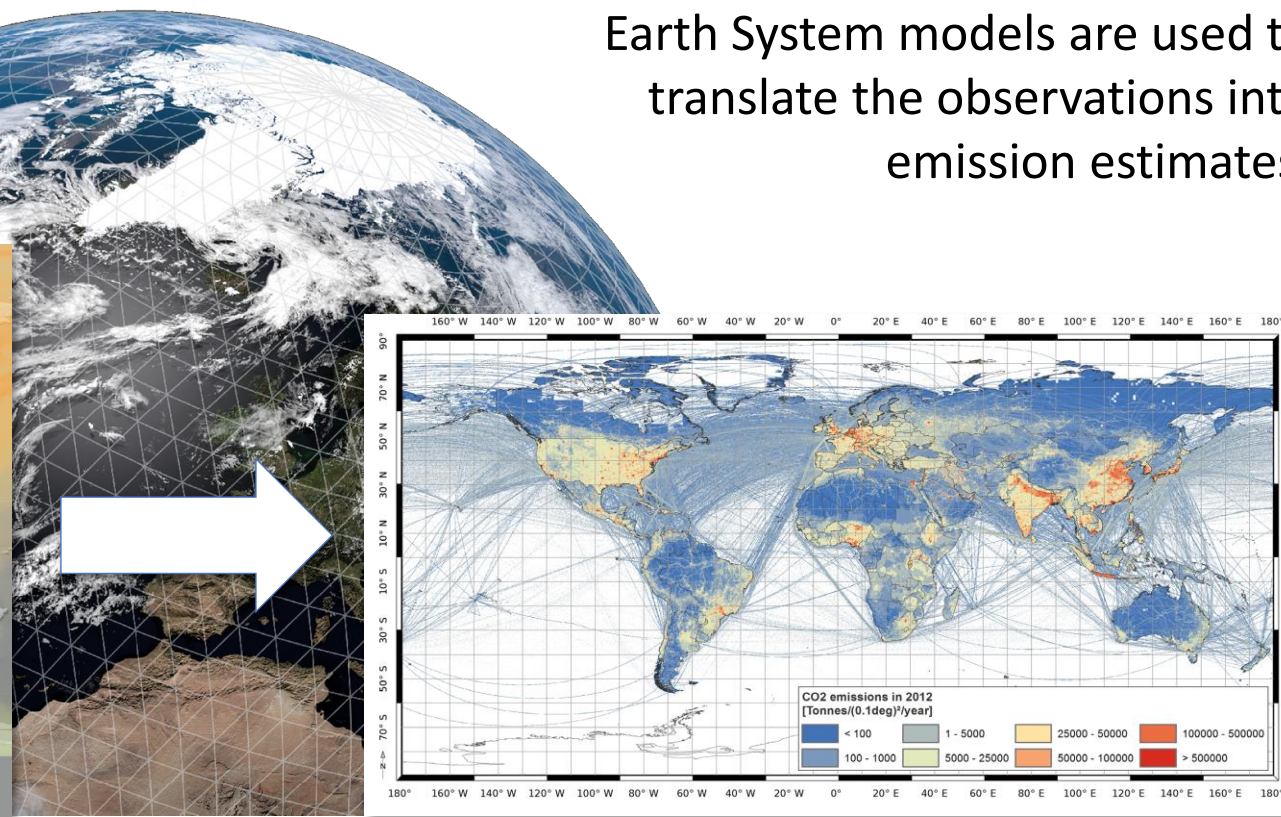
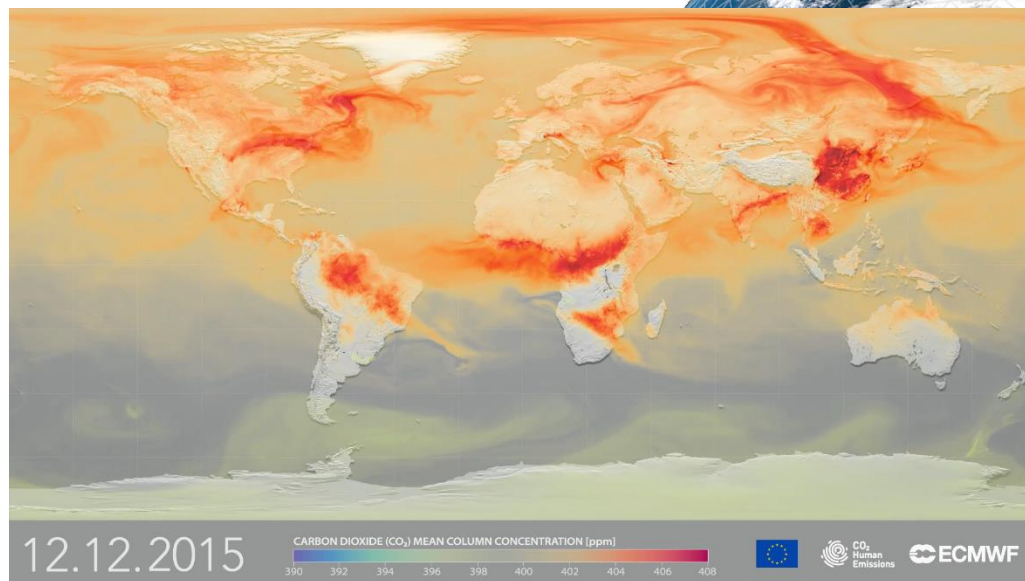
Challenges of observation-based emission monitoring



Copernicus CO2M artist impression © OHB

1. Satellites do not measure emissions directly; they measure the impact of emissions on the atmosphere.
2. Satellites see only the total impact of anthropogenic and natural effects.

Earth System models are used to translate the observations into emission estimates.

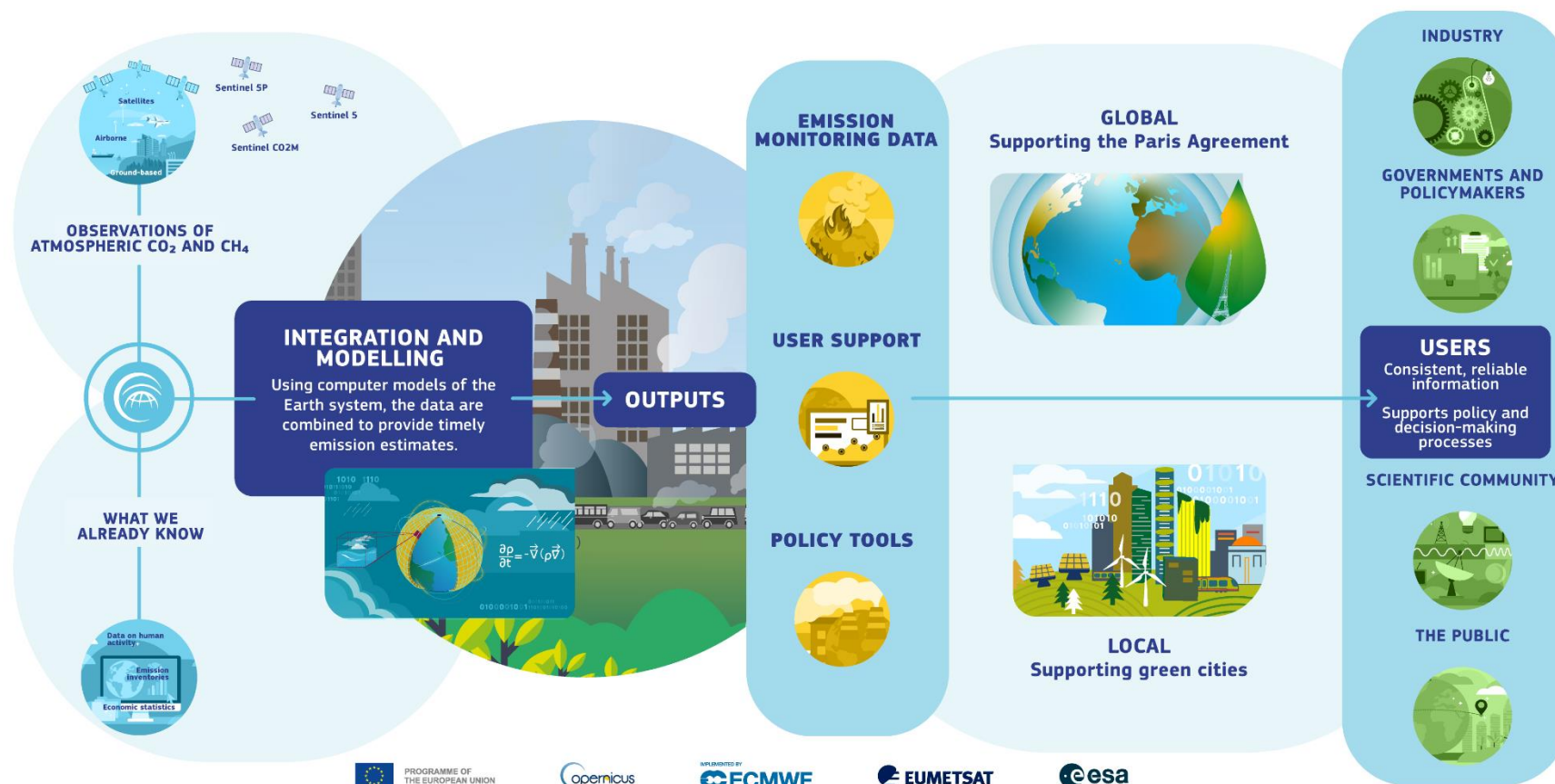




CoCO2: Developing a new Copernicus CO₂ monitoring service

Deliver the prototype systems for a new European anthropogenic CO₂ emissions monitoring & verification support (MVS) capacity.

Greenhouse gas emissions monitoring capacity



PROGRAMME OF
THE EUROPEAN UNION

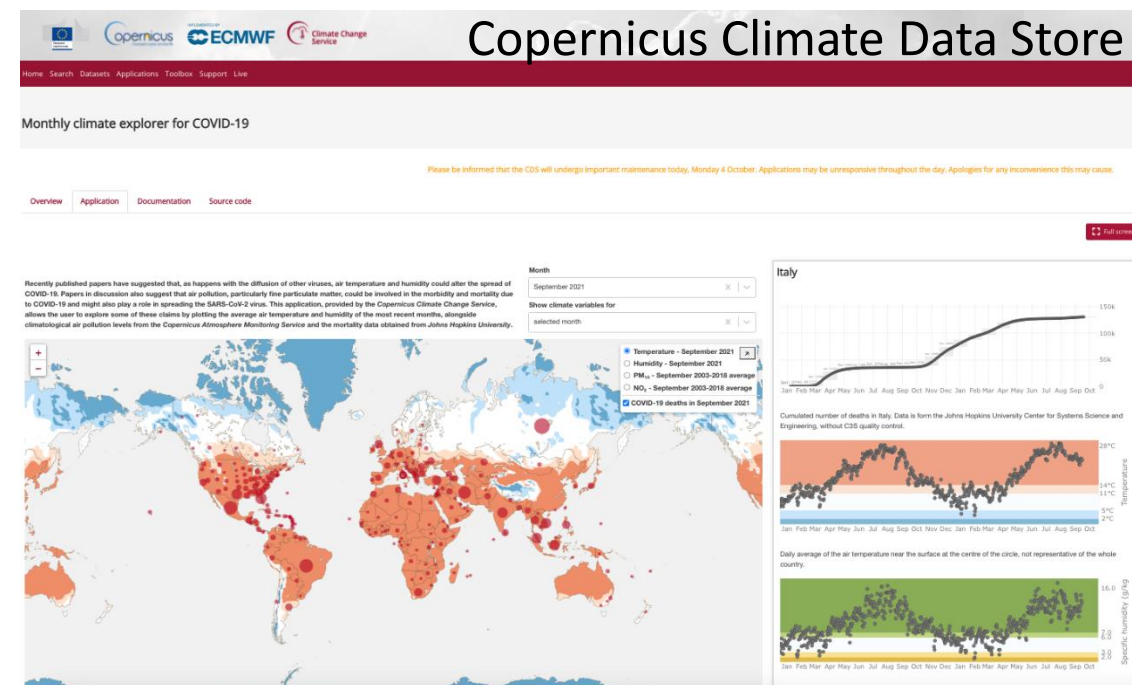
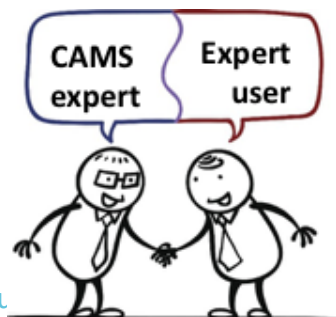
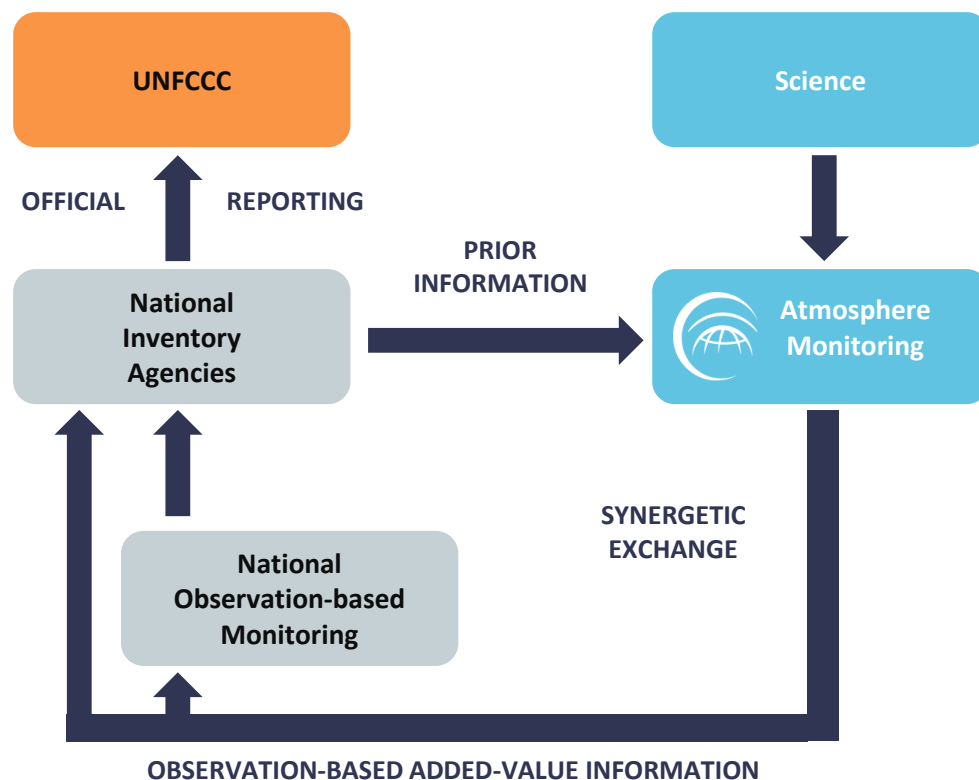


Atmosphere
Monitoring Service

atmosphere.copernicus.eu



User engagement for co-designed user services



WORLD
METEOROLOGICAL
ORGANIZATION

International standard for Urban
GHG Monitoring and assessment



User interaction to define direction of development



1st User consultation workshop

“How can atmospheric observations support city scale GHG inventories?”

Summary and outcomes

October 2021





Workshop conclusions

Reporting of city GHG inventories (GHG, sectors): responds to reporting frames and international climate initiatives.

Local and regional governments currently have looked into different approaches to overcome the lack of data or access to data:

- scaling down national/regional data
- data exchange arrangements to support the collection of data from different stakeholders

Current approaches used to overcome lack of data: might not always be appropriate at the local level.

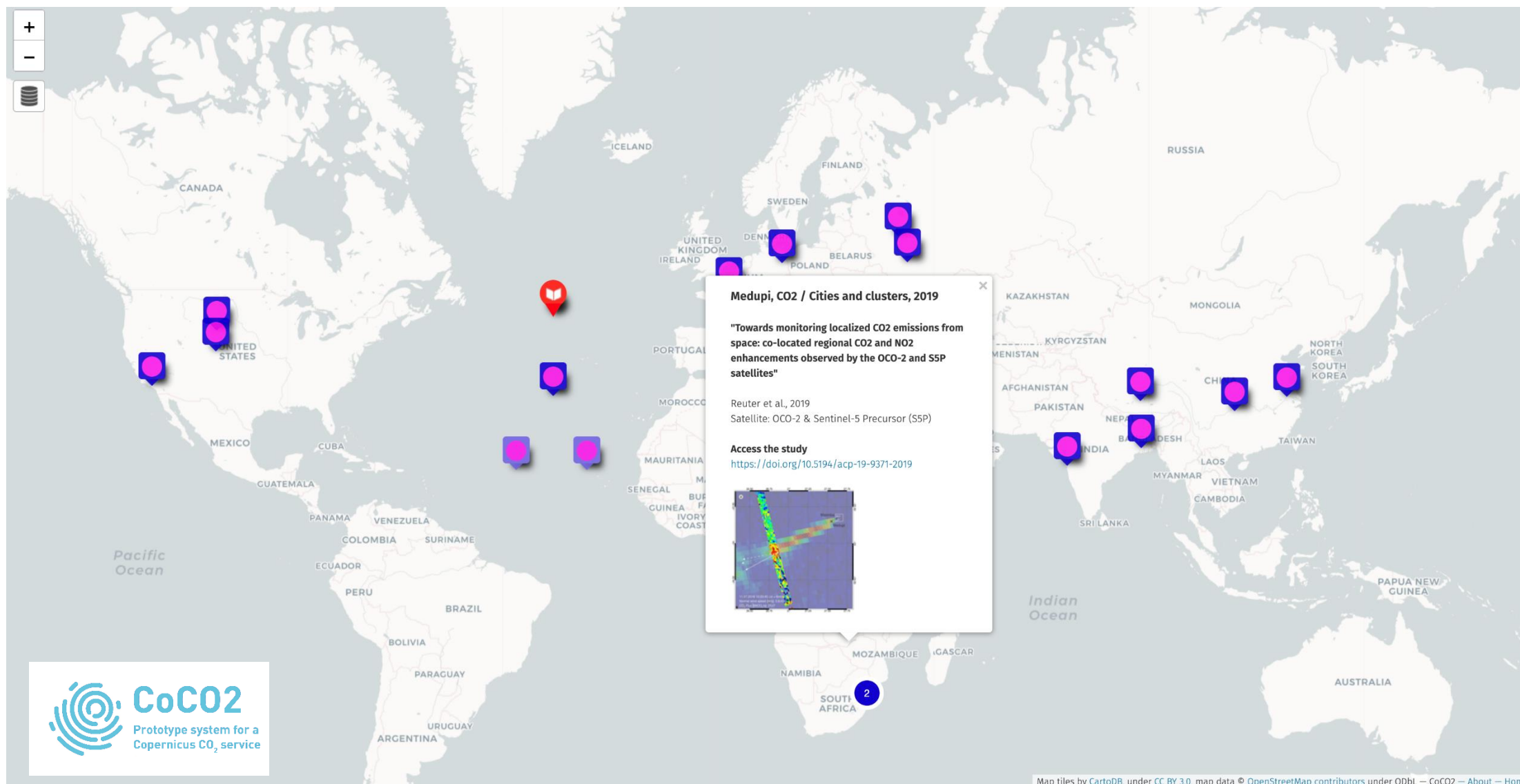


Further discussion needed

- Can emissions from observations be matched with GHG inventory emissions from a few years ago to support policy implementation?
- Help understand the relationships between activities and emissions, and to model effective climate action planning.
- Engage the urban population by informing them about local climate action impacts.
- What are the challenges associated to tracking policy progress using GHG inventories.
- Are there any anticipated risks emerging from using fast-track GHG inventories?



Overview of emission estimation studies at local scale



Published studies on hot spot detection (CO₂, CH₄) by LaurentChmiel — About | Browse data



Timeline of Copernicus Emission Services

From expert groups through
dedicated research funding,
to operational services

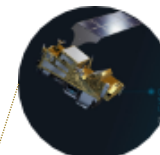


Sentinel 5p

SATELLITE MISSIONS



Sentinel 4

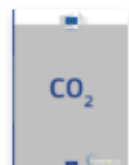


Sentinel 5



CO₂ Mission

CO₂ TASK FORCE
GUIDANCE DOCUMENTS



2015



2017



2019

2018



2017



RESEARCH AND
PREPARATORY
PROJECTS



2021



2022

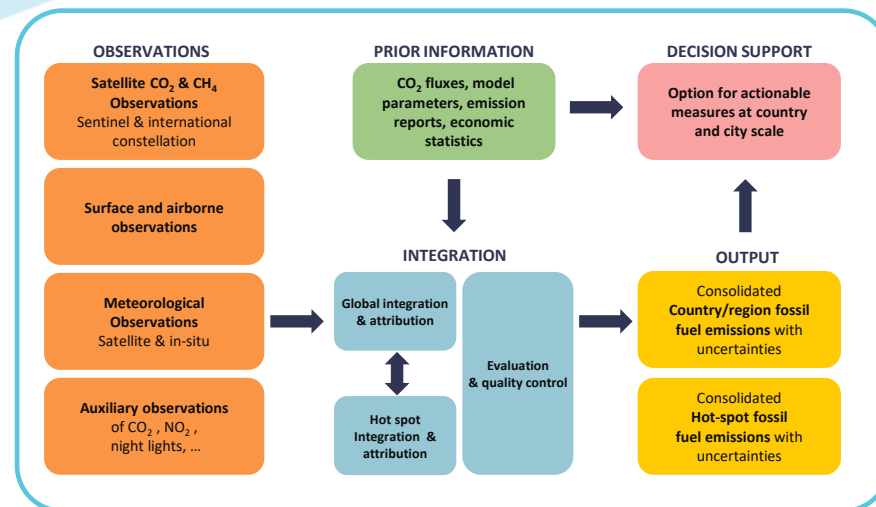
Operational
ramp-up in CAMS

Air Quality emissions
2025

CO₂ Monitoring & Verification Support (CO₂MVS)

2026

SERVICE
COMPONENTS





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