Il programma Copernicus dell'Unione Europea

Focus on methane emission monitoring

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European Commission

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www.copernicus.eu

Space

Copernicus
Europe's eyes on Earth

Why Copernicus ?

The Union Earth Observation and monitoring programme

Protect people and assets

Increase general knowledge on the state of the Planet

Improve environmental policy effectiveness

Facilitate adaptation to climate change

Monitor the environment

Foster downstream applications in a number of fields

Help managing emergency and security related situations

COPERNICUS ARCHITECTURE

FULL, FREE AND OPEN DATA

Sentinels

6 services use Earth Observation data to deliver…

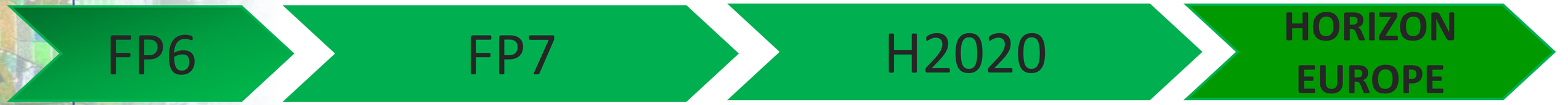
…added-value products

Contributing missions

In Situ

Copernicus timeline … an other perspective

From research to operations



ESA contributes with additional 25-30 %

The current evolution of space in Europe

IN SUPPORT OF { GREEN, DIGITAL, RESILIENT } TRANSITION

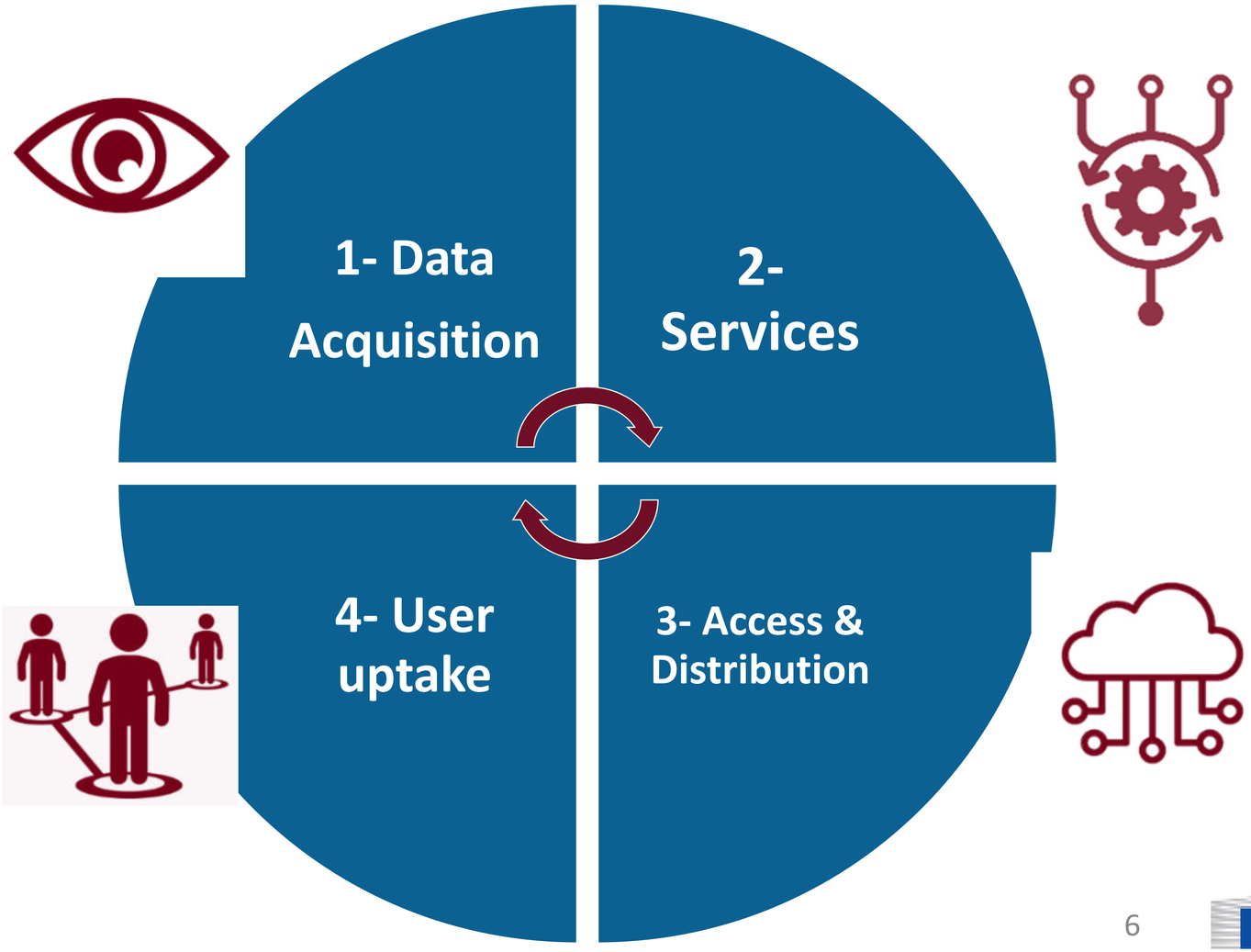
#vdLcommission

Political Priorities for the European Commission 2019-2024

1. A European Green Deal
2. An economy that works for people
3. A Europe fit for the digital age
4. Protecting our European way of life
5. A stronger Europe in the world
6. A new push for European democracy

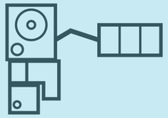
Copernicus evolution…

…CONTINUATION: as the FIRST KEY PRIORITY!



MAIN USES OF COPERNICUS SENTINELS







SENTINEL-1

All-weather, day and night observations to support services for sea-ice monitoring, marine environment surveillance, ship detection, land-surface motion risks, mapping of forest, water and soils, humanitarian aid and crisis management

SENTINEL-2

Agriculture/vegetation monitoring, soil and water cover, forest management, border and maritime surveillance, emergency management: floods, fires

SENTINEL-3

Ocean forecast, climate change and operational oceanography: sea surface height, ocean color, oceanic carbon fluxes, monitoring river or lakes level

SENTINEL-4

Continuous monitoring of atmospheric composition focused on air quality over Europe, with main products Ozone (O3), Nitrogen Dioxide (NO2), Sulphur Dioxide (SO2), Formaldehyde (HCHO) and aerosol properties

SENTINEL-5

(Precursor of Sentinel-5) daily global monitoring of the main atmospheric pollutants (CH4 and O2 NO2 CO2 HCHO, SO2) and two major greenhouse gases (CH4 and tropospheric O3)

SENTINEL-5P

Daily global monitoring for climate, air quality and ozone/surface UV applications, with key parameters O3, NO2, SO2, HCHO, CHOCHO, Aerosols, CH4 and stratospheric Ozone

SENTINEL-6

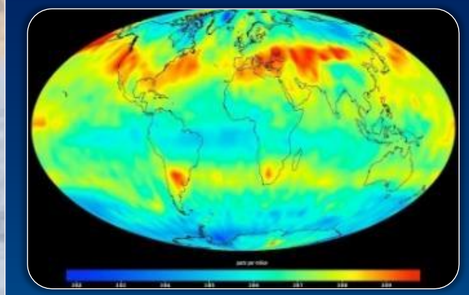
Ocean forecast, climate change and real time ocean topography: wave height, ocean surface, wind speed

Block 1: data acquisition … new missions

Space Compon

6 candidate missions – contracts awarded

Decision point Summer 2021 for production



CO2M

optical

Copernicus Anthropogenic CO2 Monitoring

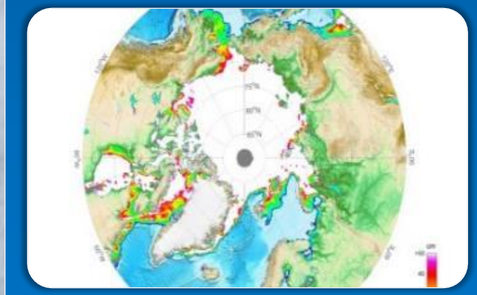
CO_2, NO_2, Aerosols Imaging Spectrometer (VNIR/SWIR), Polarimeter

CRISTAL

Copernicus Polar Ice & Snow Topography

Radar altimeter

HR microwave radiometer

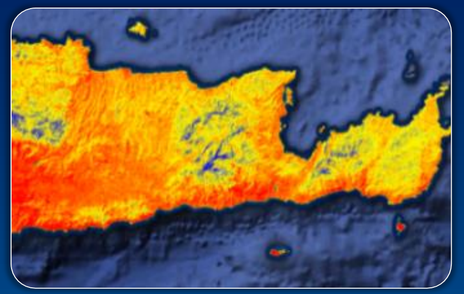


CIMR

Sea-ice, sea surface temperature, salinity

Copernicus Imaging Microwave Radiometer

Multi-frequency L-band Radiometer

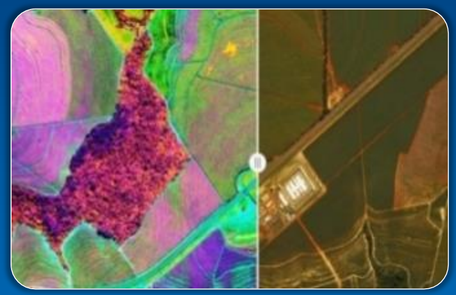


LSTM

optical

Land Surface Temperature Monitoring

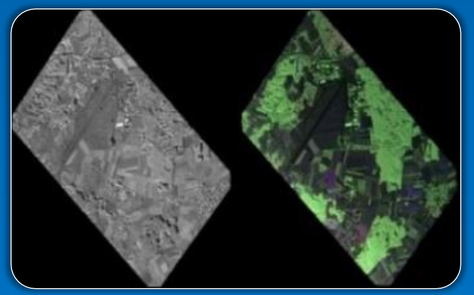
VNIR/TIR scanning radiometer



CHIME

optical

Copernicus Hyperspectral Imaging Mission for the Environment (VNIR/SWIR)



ROSE-L

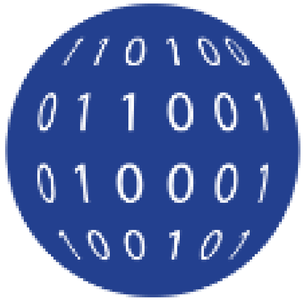
Observation under vegetation, cryosphere, soil

L-band SAR

Block 2: Data and services processing

Block 3 – Data & Information Access
Copernicus vs big data for business, science and skills

- **Massive amounts of data**
- **Full, open and free-of-charge**
- **Ease of access and use**



Over 16 TB data / day

- Different types of **dissemination** infrastructures (DIAS)
- **New technology** developments
- ICT and EO **cross-fertilisation**
- **Interoperability** with non-EO datasets
- **Copernicus mirrors** at national level
- Growth and jobs in **downstream** sector

User Uptake

Block 4 – Fostering uptake

Re-energise the downstream segment of Copernicus

- Turn Green Deal and Digital Agenda into business development opportunities
- Foster the competitiveness and innovation potential
- Establish global leadership in space-based monitoring and decision support products
- EUSPA supporting and scaling EU public and private sector solutions
  - Global market for EU-developed space-based information products
  - Skilling and capacity building (Copernicus academies, eLearning, structural funds)
- Cassini /EIB to invest in startups/SMEs and scaling up

HOW

COPERNICUS ARCHITECTURE

FULL, FREE AND OPEN DATA

Sentinels

6 services use Earth Observation data to deliver…

…added-value products

Contributing missions

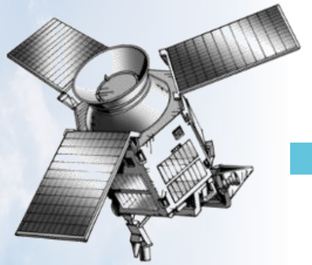
In Situ

Copernicus Europe's eyes on Earth

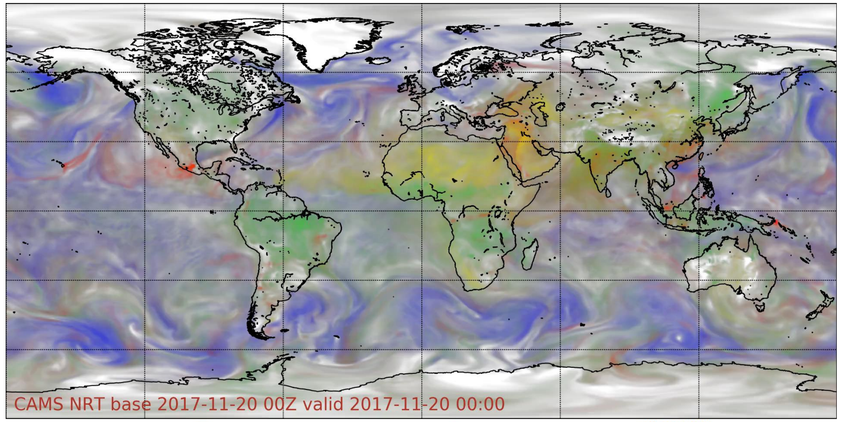
European Commission

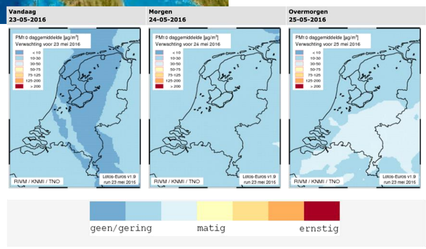
Copernicus Atmosphere Monitoring Service

Atmosphere Monitoring



Transforming satellite observations into user-driven services.





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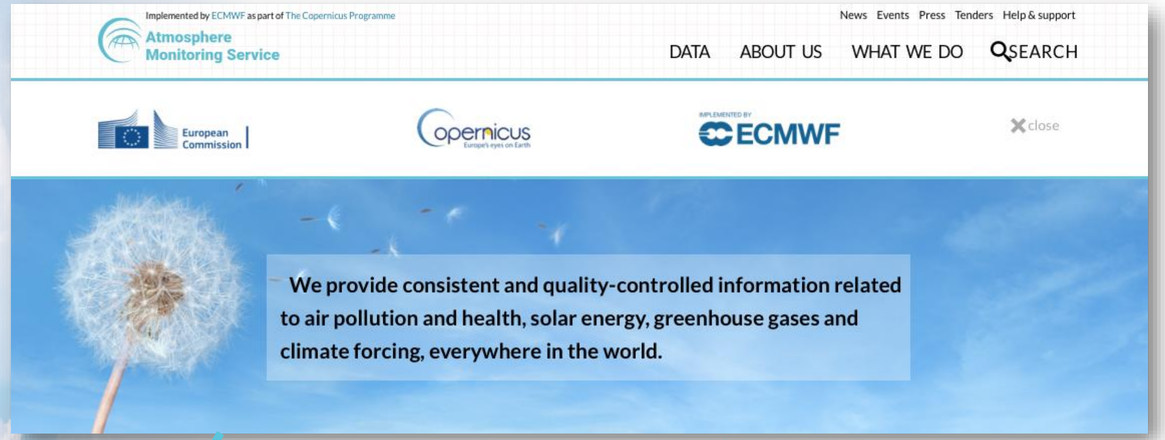
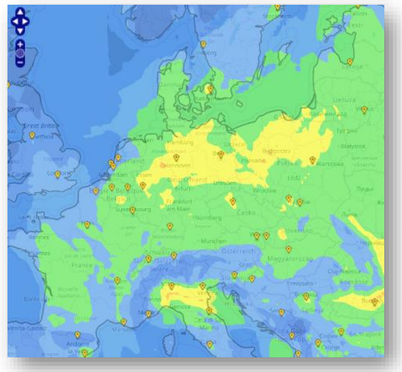
CAMS data is fully open and free of charge

Atmosphere Monitoring

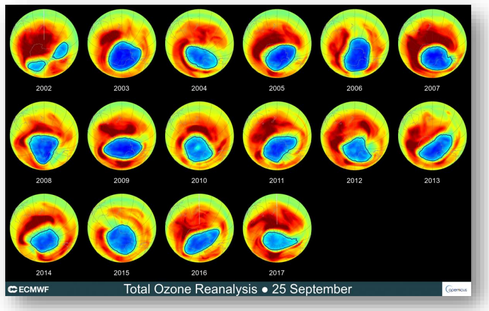
http://atmosphere.copernicus.eu



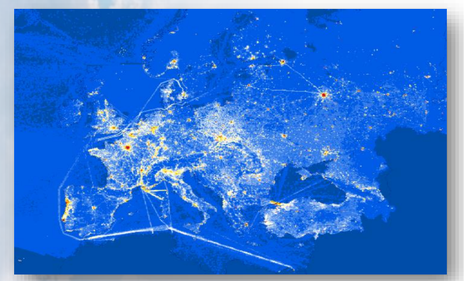


European Air Quality and products in support of policy users

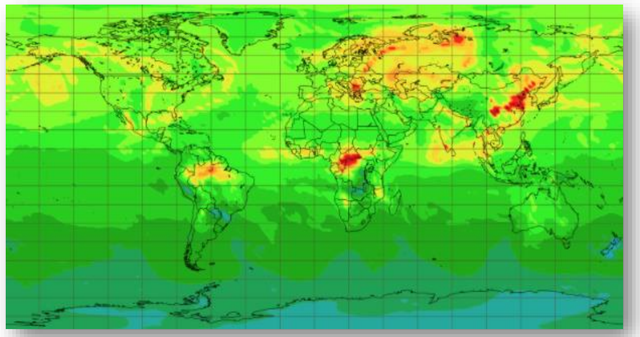
Ozone layer



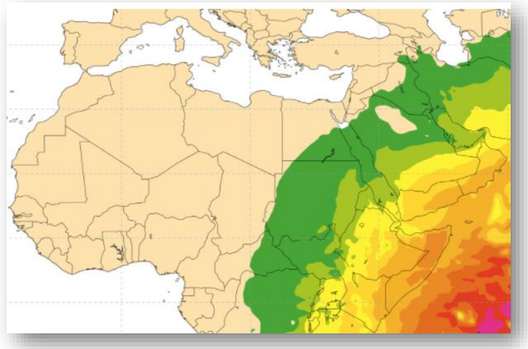
Climate forcings



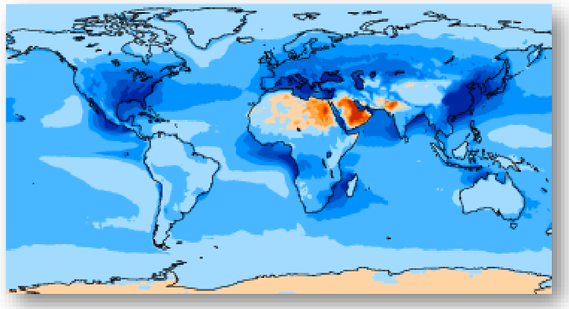
Bottom-up emissions and surface fluxes of greenhouse gases



Global analyses, forecasts and reanalyses (2003-...)



Solar radiation and UV index



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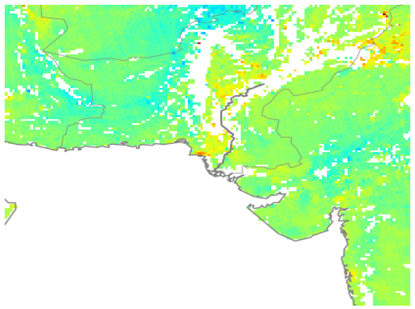
CH4 emission: CAMS available products(1/2)

Atmosphere Monitoring

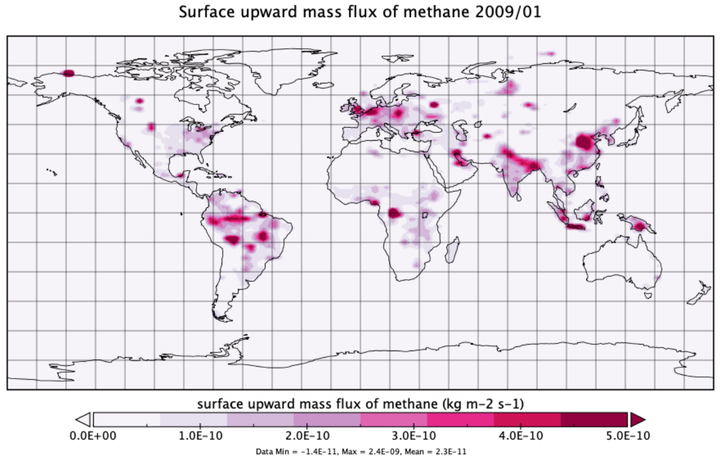
High-resolution satellite observations of CH_4

- Sentinel-5P TropOMI CH4 product (worldwide)
- Unprecedented pixel size (5 km x 3.5 km)
- Biases(due to clouds, surface temperature, surface reflectance…) depend upon location, season



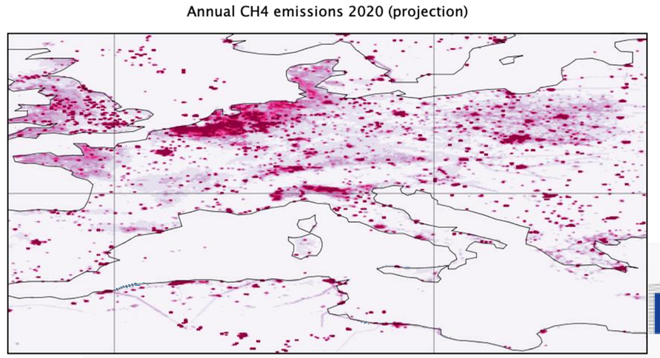
CAMS "top-down" emissions of CH_4

- Monthly averages from January 2009 to December 2019
- Based on surface and satellite (GOSAT, Japan) remote-sensing
- Coarse horizontal resolution 3º x 2º
- Optimisation of separate components: wildfires, wetlands, rice and the rest (other)



CAMS "bottom-up" CH4 emissions:

- Annual averages (2003-2020) with monthly factors
- Worldwide, 10 km horizontal resolution
- 12 different human activity sectors: agriculture, shipping, industry…



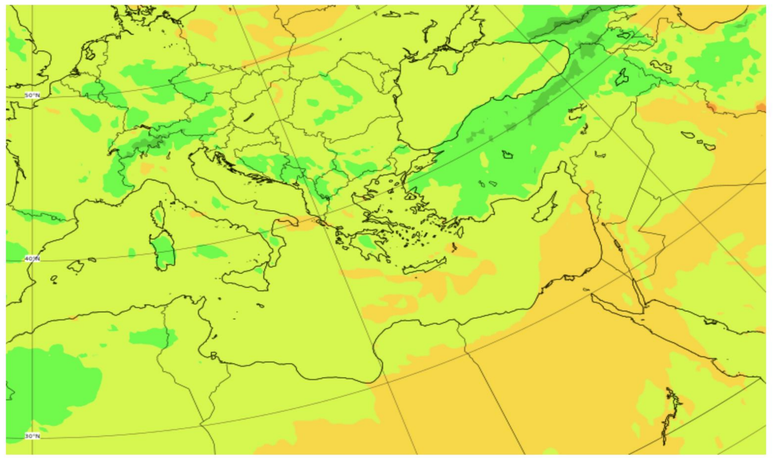
European Commission

CH4 emission: CAMS available products(2/2)

Atmosphere Monitoring

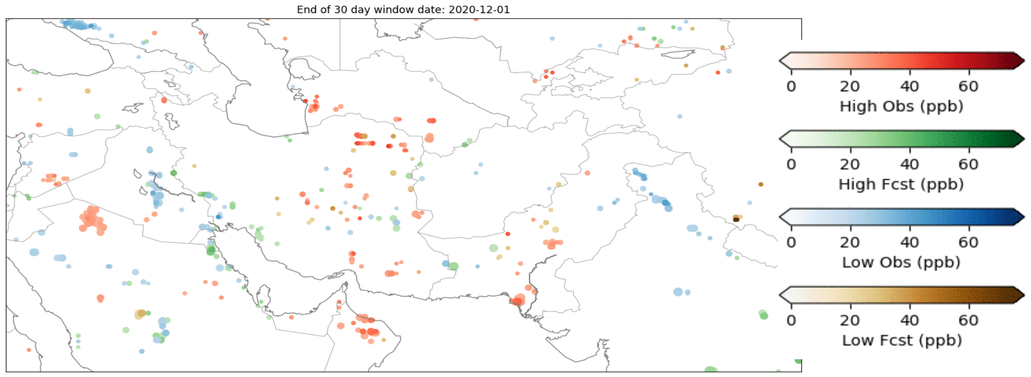
CAMS worldwide CH_4 forecasts:

- What are the expected concentrations of methane in the world over the next five days? Depends on emissions and weather.



CAMS CH_4 "anomalies" monitoring

- Do model "expected" CH_4 concentrations and incoming Sentinel-5P observations differ?
- Are there potential anomalies?



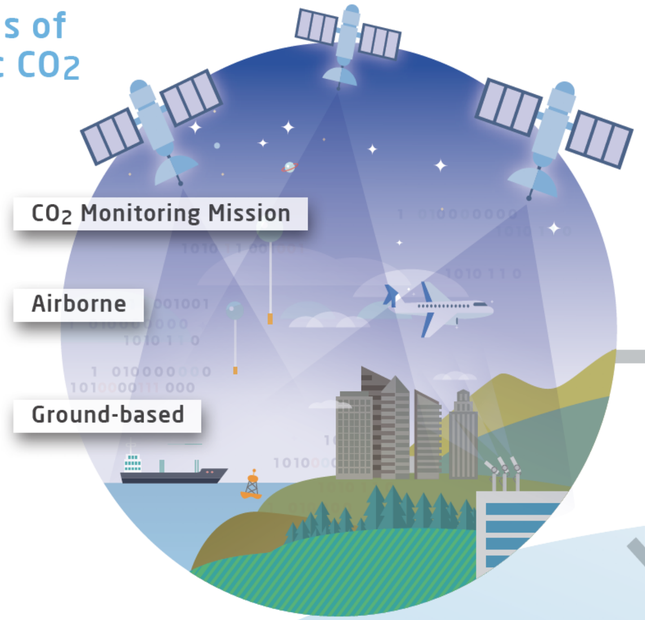
ECMWF Copernicus Europe's eyes on Earth European Commission

Copernicus has ambitious plans for the next years

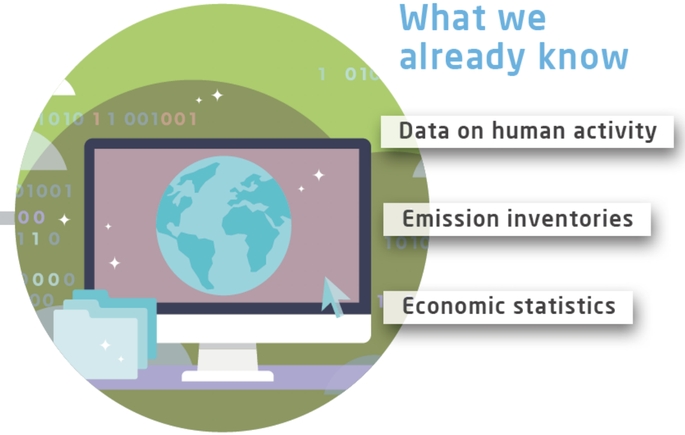
Atmosphere Monitoring

A new service element for monitoring **human CO2 emissions** will be part of the evolution of Copernicus, with a dedicated space infrastructure CO2 mission and with increased capacities in monitoring also CH4.

Observations of atmospheric CO_2

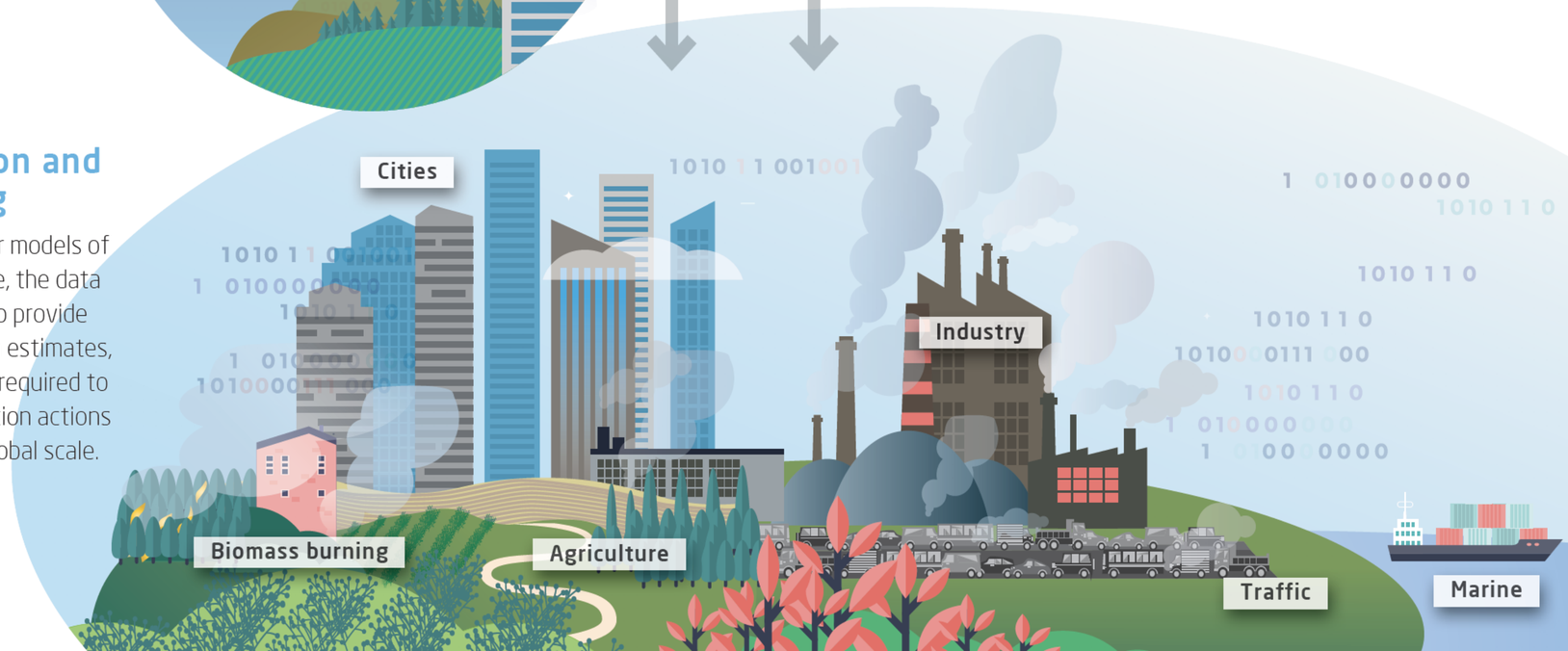


What we already know



Integration and modelling

Using computer models of the atmosphere, the data are combined to provide timely emission estimates, with the detail required to support mitigation actions from local to global scale.



CLEAN ENERGY FOR ALL EUROPEANS

EU Methane Strategy: Cross-sectoral actions

*Improve measurement, reporting and verification (**MRV**) as well as leak detection and repair (**LDAR**)*

Review** EU climate and environmental **legislation

*Establish an **International Methane Emissions Observatory (IMEO)** utilising EU **satellite** data*

*Targeted support for **biogas** from organic **waste** and residues*


EUROPEAN COMMISSION

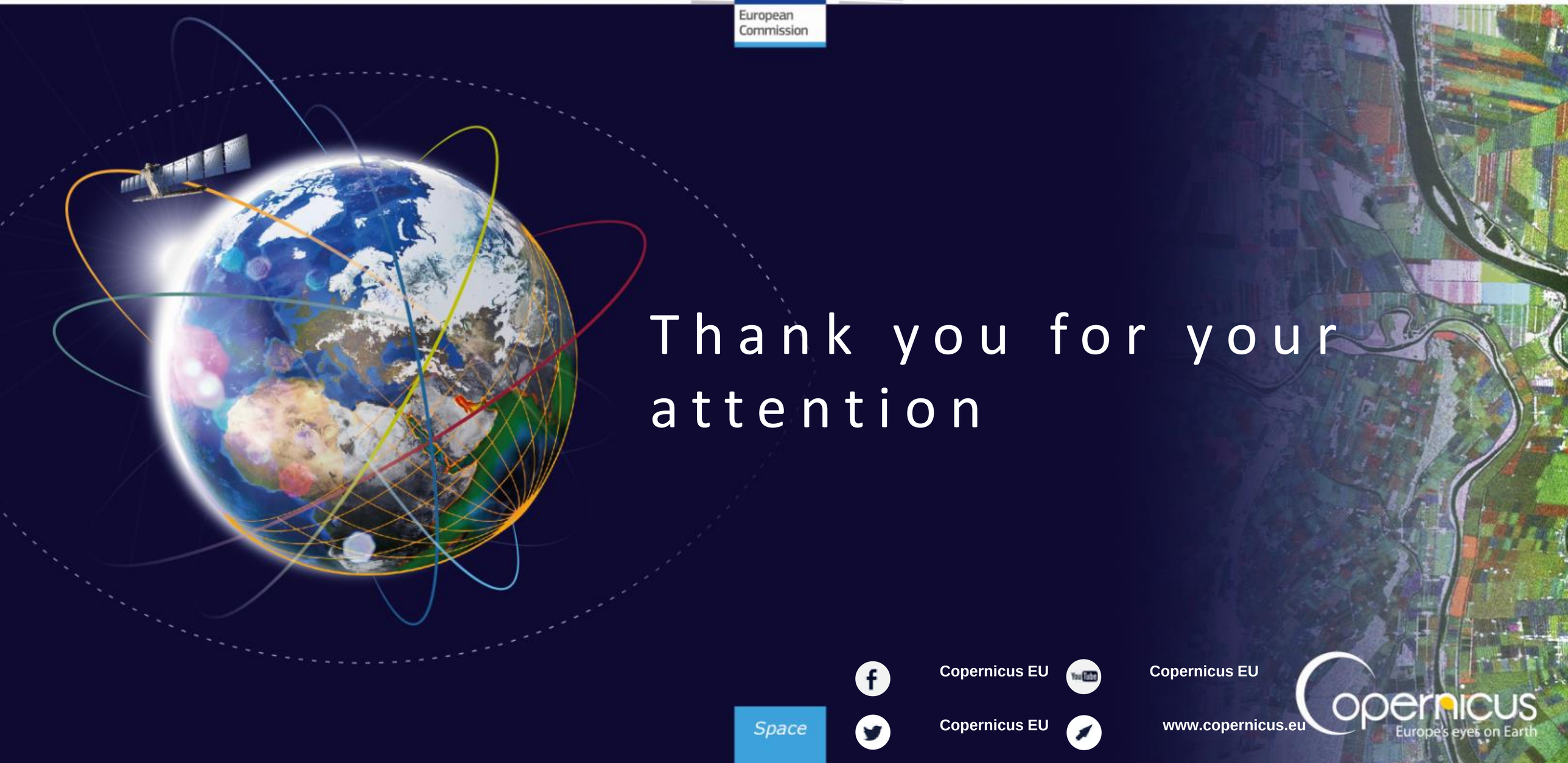
Brussels, 14.10.2020
COM(2020) 663 final

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

on an EU strategy to reduce methane emissions

EN EN

European Commission



Thank you for your attention

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