



CAMS

COPERNICUS ATMOSPHERE
MONITORING SERVICE

In a nutshell

Jean-Noël Thépaut & Vincent-Henri Peuch

European Centre for Medium-range Weather Forecasts

Copernicus4Regions 2020



Copernicus ECMWF
Copernicus EU



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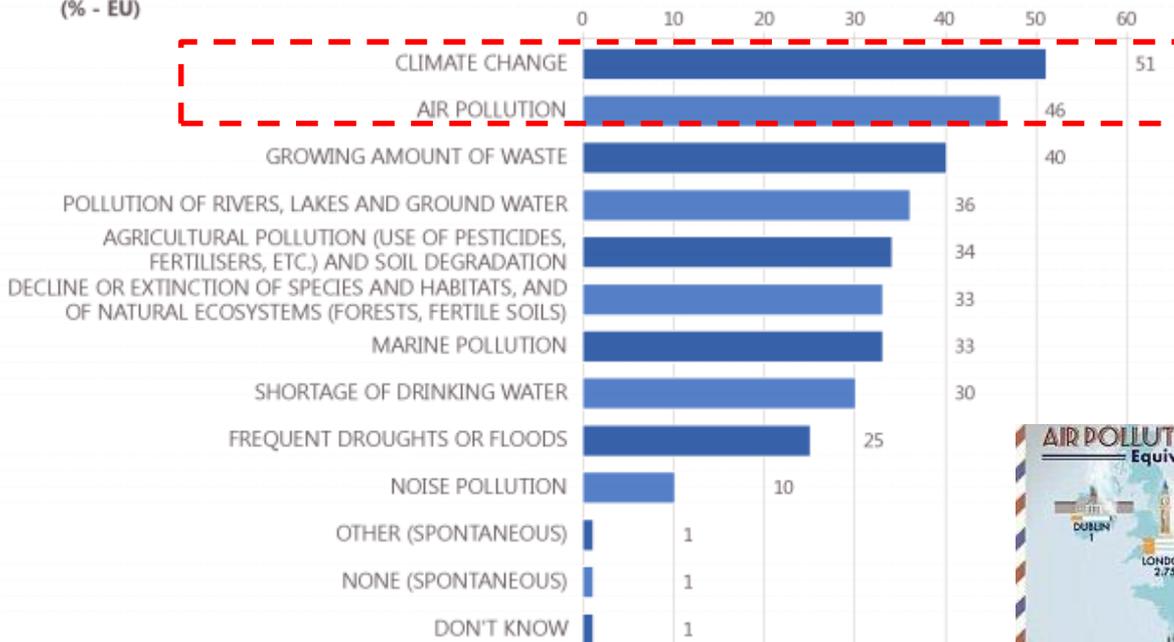


atmosphere.copernicus.eu
copernicus.eu



AIR POLLUTION: A KEY CONCERN FOR EUROPEANS

From the following list, please pick the four environmental issues which you consider the most important.
(MAX. 4 ANSWERS)
(% - EU)



Base: all respondents (n=27,881)

And it is rightly so...
There are about 450k premature deaths annually in Europe due to air pollution (EEA)



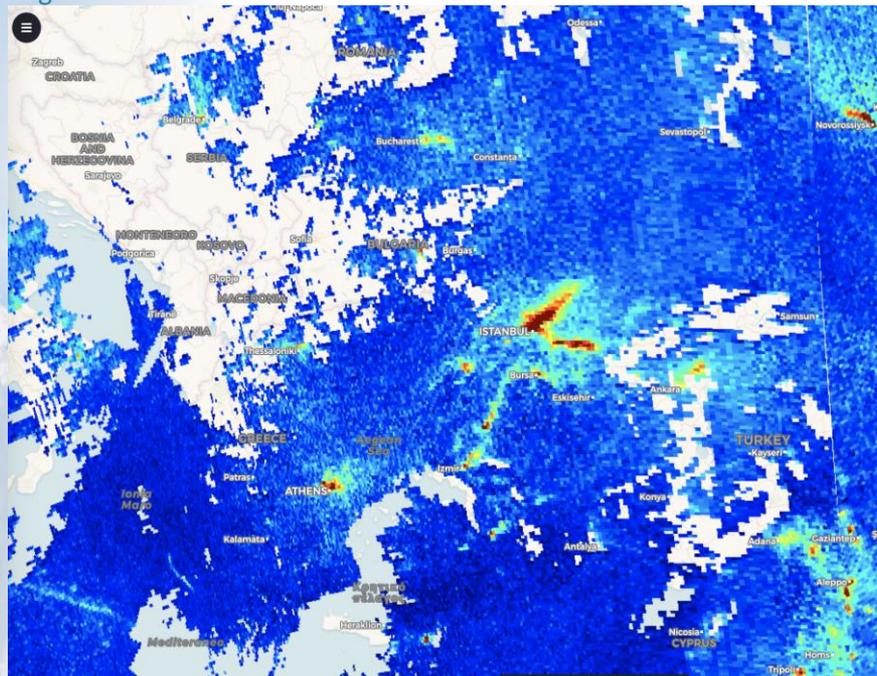
Source : Eurobarometer 2017

<http://ec.europa.eu/commfrontoffice/publicopinion/index.cfm/Survey/getSurveyDetail/instruments/SPECIAL/surveyKy/2156>



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WHY INFORMATION SERVICES ARE NEEDED?



Example: NO₂ tropospheric column from Copernicus Sentinel-5P (29/05/2019)

Observations are essential, but **direct use** is generally **limited**:

- gaps in space and time
- observed quantities may not be directly relevant (vertical column vs nose-level concentration)
- Complex and numerous

What services do:

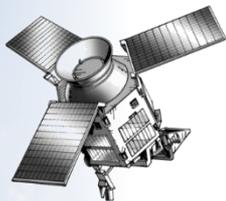
- blend observations (satellite and non satellite) with model to provide a consistent “picture”
- forecasts, some days ahead
- reanalyses over past years, decades



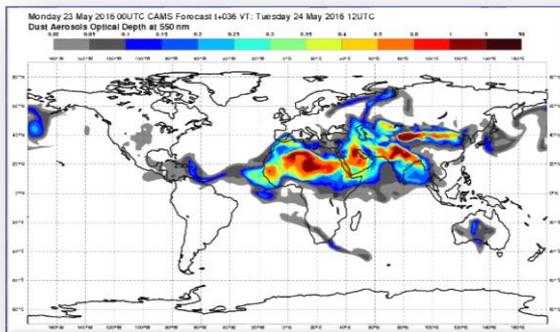
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CAMS VALUE-ADDING CHAIN

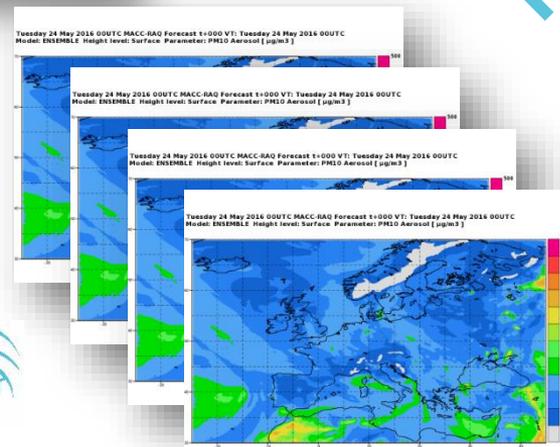
Space Agencies



In-situ observations



7+2 regional CTMs



ECMWF/IFS

Users

Vandaag 23-05-2016

Morgen 24-05-2016

Overmorgen 25-05-2016

PREV'AIR L'air en France aujourd'hui et demain

La qualité de l'air | Les dispositifs français | Analyses et bilans | Actualités | A propos de PREV'AIR

Zone géographique
Europe | Métropole | Outre-mer

Type de carte
Qualité de l'air | Indices

Pour la journée
- 17:52:017 +

Représentation
Moyenne journalière | Maximum journalier | Moyenne journalière

Type de données
Maximum journalier | Moyenne journalière

Polluant
PM10 - Particules en suspension

PM10, moyenne journalière, zone France, le 17/05/2017
Carte de prévision optimale (pour observations rétrospectives des AMSQA)

Pollution forecast provided by the Met Office

Today
Air pollution levels will be mainly **Low** today with only localised pockets of **Moderate**.

View full 5 day air pollution forecast
@DefraUKAir daily forecasts

Enter your location:
e.g. Newcastle Search

1 2 3 4 5 6 7 8 9 10
Low Moderate High Very High

Health advice for moderate, high or very high pollution >



ECMWF

Copernicus
Europe's eyes on Earth

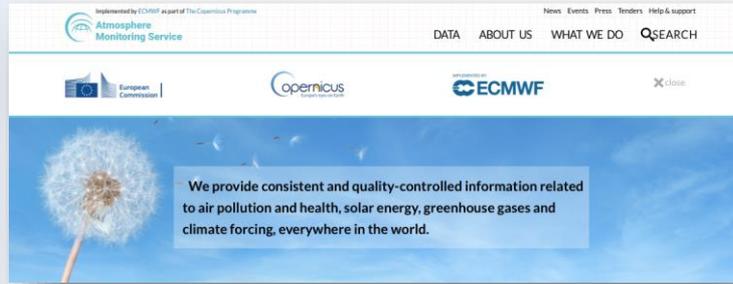




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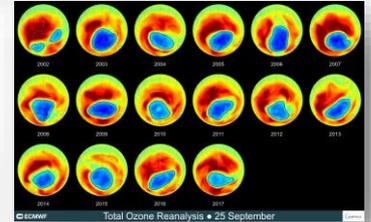
CAMS DATA IS FULLY OPEN AND FREE-OF-CHARGE

<http://atmosphere.copernicus.eu>

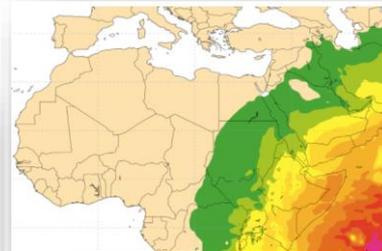
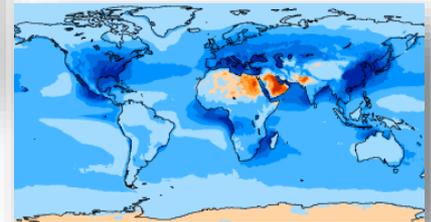


*European Air
Quality and
products in
support of
policy users*

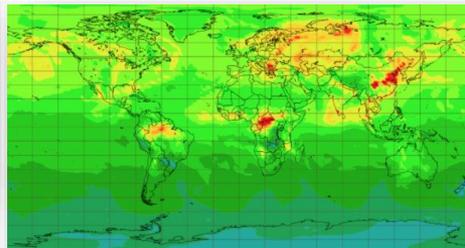
Ozone layer



Climate forcings



*Solar radiation
and UV index*



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



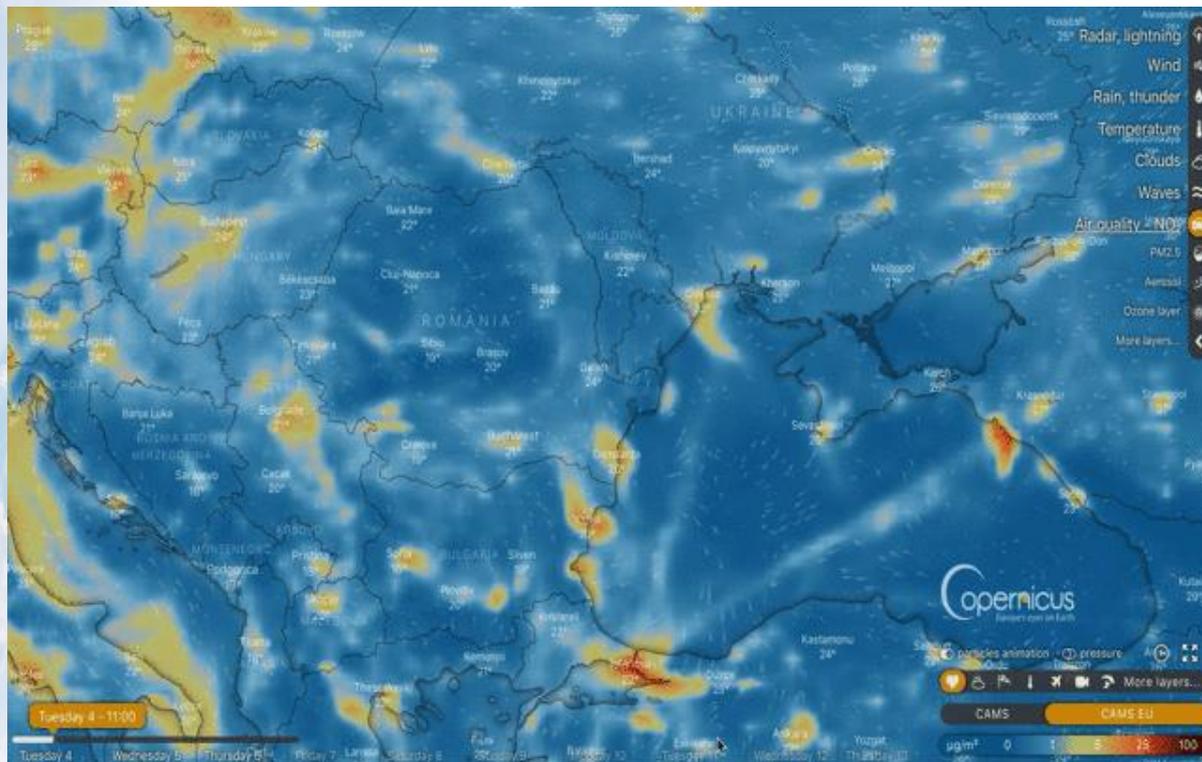
*Bottom-up
emissions and
surface fluxes of
greenhouse gases*





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EXAMPLE: CAMS GLOBAL AND REGIONAL FORECASTS



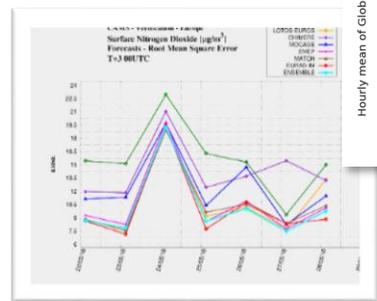
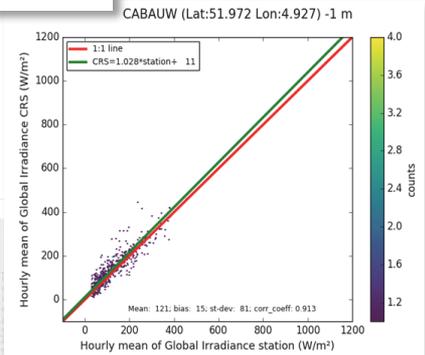
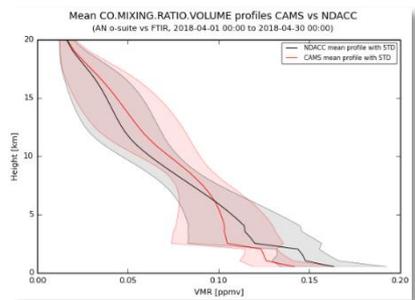
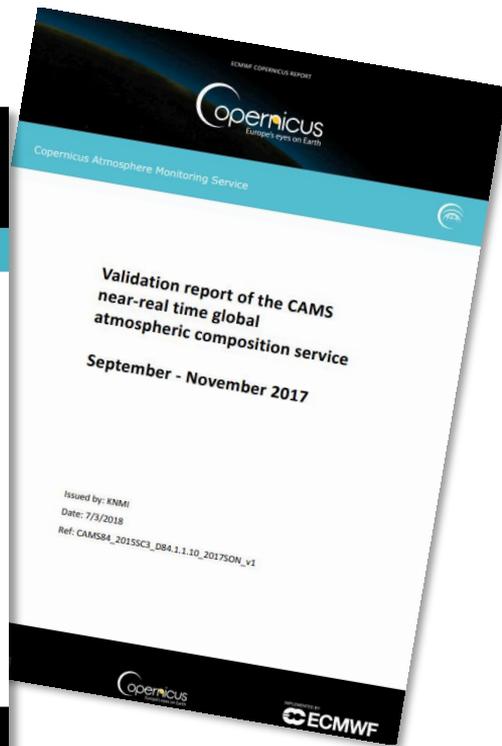
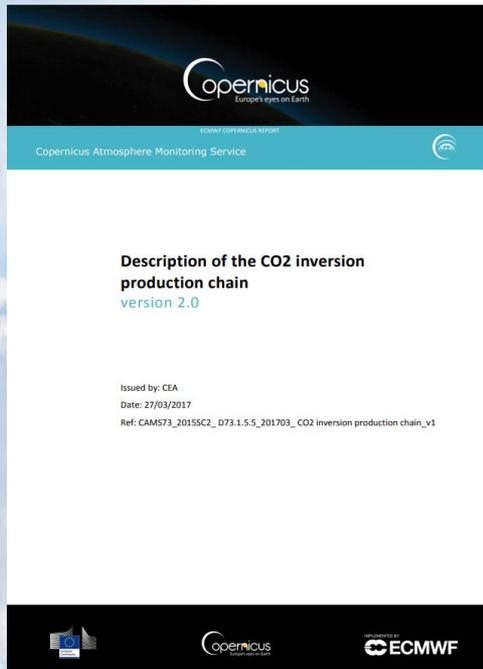
- Twice daily (based 00, 12) global analyses and forecasts up to +5 days, 40km resolution
- Daily (based 00) European analyses and forecasts up to +4 days, 10 km
- Delayed mode (4 day behind) global analyses and forecasts of CO₂ and CH₄, 9km

CAMS global and regional forecasts seen in the highly successful Windy app and website



DOCUMENTATION & QUALITY CONTROL

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CAMS provides detailed information about how its products are produced and what the quality is



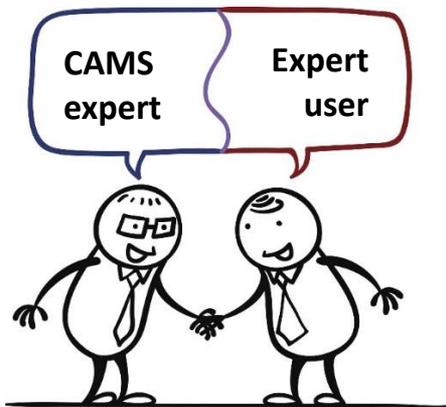
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CAMS: BIG DATA FOR LOCAL APPLICATIONS



CAMS provides big data with the corresponding technical and scientific expertise to support expert users.

In doing so, we allow the CAMS information to reach millions of users in and outside Europe.



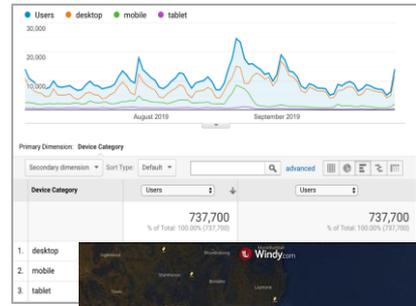
Downstream applications



CAMS: A MAINSTREAM INFO SOURCE ON AIR QUALITY

Atmosphere Monitoring

CAMS products are now reaching ~100s of million people worldwide



"Helps with my day before I even leave the house"





GLOBAL MEDIA IMPACT

Atmosphere
Monitoring

nature
accelerated science of earth

COMMENT

Five steps to improve air-quality forecasts

A worldwide network for monitoring and modelling air pollution would reduce its dramatic toll on health and food production, urge Rajesh Kumar and colleagues

Six million people die every year from air pollution. More than 100 million live with chronic respiratory disease. Air quality is a global public health and food production issue. We need a worldwide network for monitoring and modelling air pollution to reduce its dramatic toll on health and food production, urge Rajesh Kumar and colleagues.

BBC News Sport Weather iPlayer Sounds

NEWS

Home UK World Business Politics Tech Science Health Family & Education

Science & Environment

Watch how air pollution moves across Europe

By Jonathan Amos
BBC Science Correspondent

31 minutes ago

eu/oneWS Europe World Business Sport Culture Style Sci-Tech Travel Video Programmes

WORLD NEWS

Daily air quality forecasts could save millions of lives, say scientists

By Aileen Gully · last updated 16/09/2018

Six milliards d'investissements, soixante milliards de bénéfices

LaLibre.be

Copernicus veut nous aider à respirer

Environnement/Santé

Près de 6 milliards d'euros, c'est le budget que la Commission a annoncé vouloir consacrer à Copernicus ces prochaines années.

Les données obtenues par le réseau européen de surveillance de la Terre ont des applications très pratiques.

LIVESCIENCE

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So Much of the Arctic is on Fire, You Can See It From Space

By Laura Geggis July 24, 2018 Planet Earth

LE FIGARO PREMIUM

Politique Société International Économie Culture FigaroLive

Les feux records dans tout le cercle arctique

By Sophie Chapuis · 16/09/2018 à 10h00 · Publié le 16/09/2018 à 10h00

...saison des feux jamais

CAMS está em Lisboa para "decidir" os próximos 365 dias de previsão meteorológica

responsável por observar o ambiente a nível global e a nível de alta resolução, o sistema de previsão meteorológica Copernicus fornece dados para "tomar decisões" mais rápidas sobre as condições e está a fazer planos para o futuro a partir de capital português.

International Day for the Preservation of the Ozone Layer

International Day for the Preservation of the Ozone Layer

inside climate news

How Wildfires Can Affect Climate Change (and Vice Versa)

It's complicated: While CO2 causes long-term warming, aerosols can have both a warming and a temporary cooling effect.

By BOB BERENSON | INDEPENDENT NEWS

one World News Europe Asia Africa China Japan India Indonesia Entertainment

'Unprecedented' wildfires ravage the Arctic

By Isabelle Gosselin, CNA

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NEL 2018 RISPETTO AGLI ANNI '90

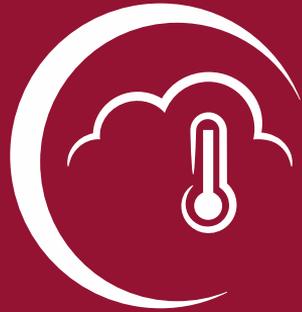
Antartide, si restringe il buco dell'ozono

Roma. Il buco dell'ozono sopra l'Antartide ha iniziato a restringersi: ha raggiunto infatti la sua massima estensione nella seconda metà di settembre, mentre la Comarca antarctica, nel 2018 è stata nella media e più piccola di quelli registrati da 30 anni nella media e più alta moderna (Cana). Il servizio di monitoraggio Copernicus, gestito dall'Istituto europeo per lo studio della Terra e dall'Agenzia europea per lo Spazio (Esa), il buco dell'ozono si sta restringendo e si sta ripulendo con ritmo ad agosto per raggiungere la sua massima estensione all'inizio di dicembre. Il servizio Copernicus ha annunciato che il buco dell'ozono si è ristretto del 10 per cento rispetto al 1980 e il 2018 e il 2019, implementando il

C3S

Copernicus Climate Change Service

In a nutshell



Climate Change

Jean-Noël Thépaut & Carlo Buontempo

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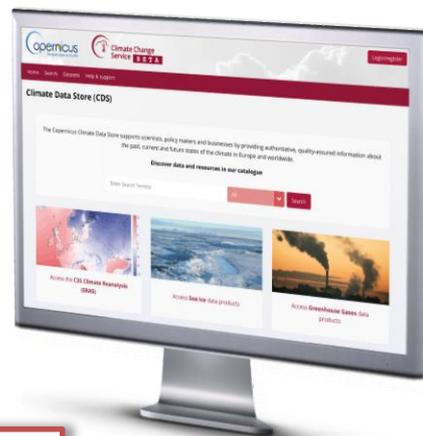




Climate
Change

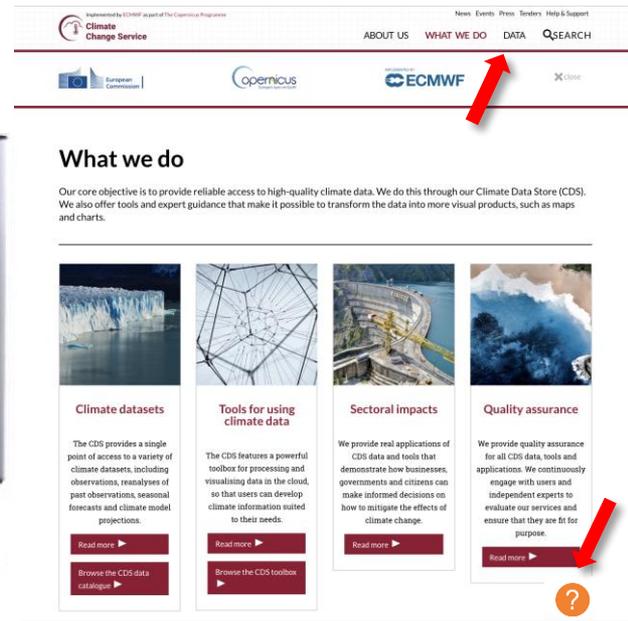
What the Climate Change Service has to offer

- **Open and free access to climate data**
- Tools needed to use the data
- Information on sectoral impacts
- Quality assurance
- User support and training
- Climate change assessments
- Outreach and communication



A one-stop Climate Data Store

<http://climate.copernicus.eu>





Climate Change

Evaluation and Quality Control (EQC)

A suitable EQC framework has been developed for quality assurance of CDS datasets

Key feature: Quality Assurance R

Sea ice monthly and daily gridded data from 1978

Overview Download data Documentatio **Quality**

This dataset provides daily values for sea ice **concentration**, sea ice **edge** and sea ice **type** and monthly values for sea ice **thickness**. These four variables are important markers for climate change studies since sea ice greatly influences the surface albedo and aa exchanges of energy, moisture and carbon. The sea-ice distribution, including polynyas and margins, also has an important infl on marine ecosystems. Changes in the distribution of sea ice affect these ecosystems and a number of activities such as shippingistic and tourist operations.

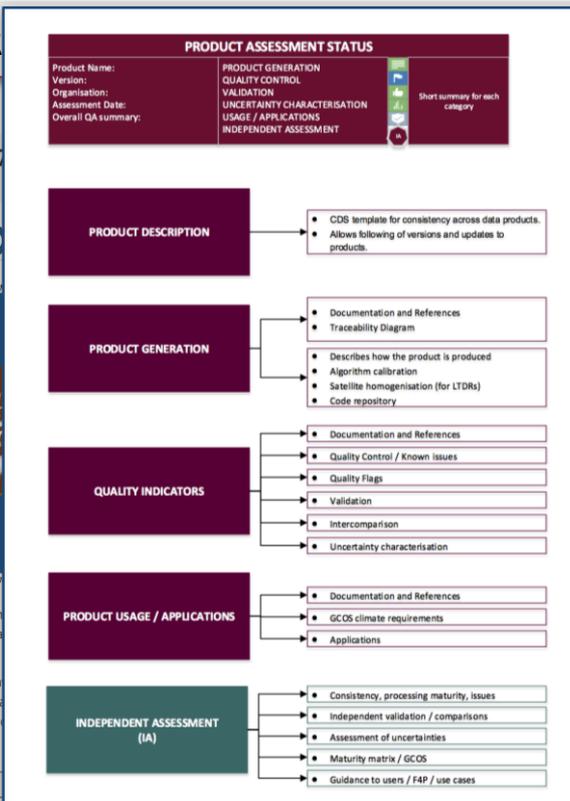
Sea ice edge, sea ice concentration and sea ice type were computed from satellite passive microwave brightness temperatures from the series of SMMR, SSM/I and SSMIS sensors. Sea ice thickness were computed from Ku-Band radar altimeter measurements collecting the Envisat and CryoSat-2 satellite missions. Ice thicknesses from Envisat satellite (October 2002 to October 2010) have less coverage and higher tainty than (November 2010 - March 2015), however the combined dataset provides a valuable variability.

From 1978 up to April 2015 the data records provided by this dataset have continuity to detect climate variability and change. From April 2015 onwards, same algorithms and processing environment but consistency and continuity have not been maintained.

More details about the product are given in the Documentation section.

DATA DESCRIPTION

Horizontal coverage	Sea ice concentration and edge: global ocean split in Northern and Southern hemisphere (Lambert EASE/EASE2 projection). Sea ice thickness and type: northern hemisphere (Lambert EASE2 projection).
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Quality of data:

- assessments
- user guidance
- gaps and limitations

Quality of tools:

- fitness for purpose
- best practices

Quality of service:

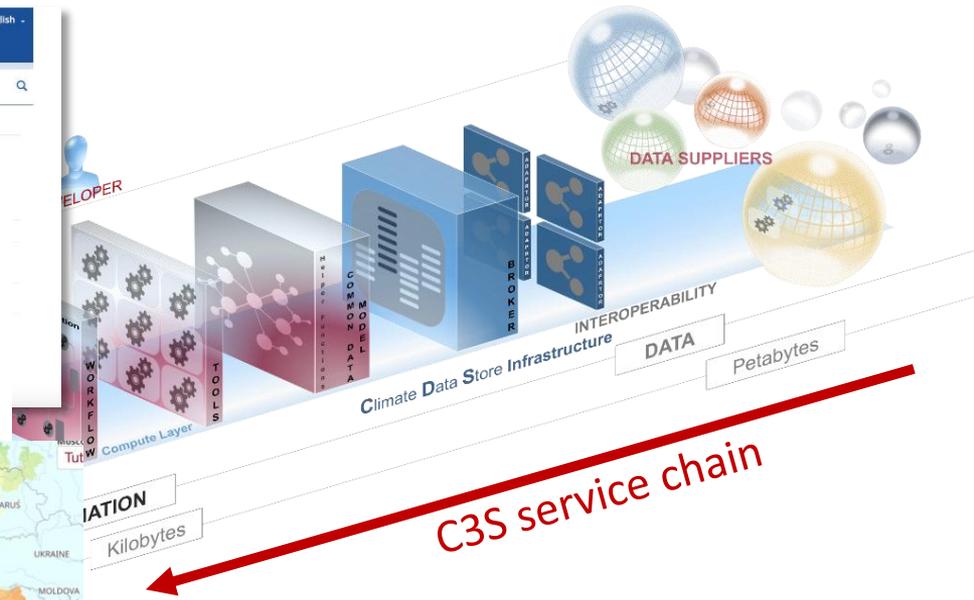
- speed, responsiveness
- system availability, ...





Transforming data into actionable information products

Surface air temperature anomaly for July 2018 relative to 1981-2010



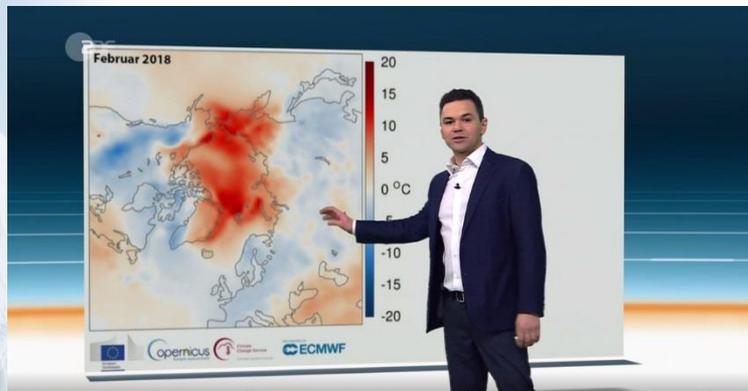
Quality assured information and tools for scientists, consultants, decision makers.





Climate Change

User uptake by the media



Credit: ZDF – German State TV, Özden Terli



Temperatures are meas...
Source: Copernicus Climate C...
Weather Forecasts

Countries across the wor...
temperatures this summ...

From the UK, across to Scan...
continue for the rest of the m...
high temperatures leading to...
Various temperature records...
Canada, Algeria and Norway

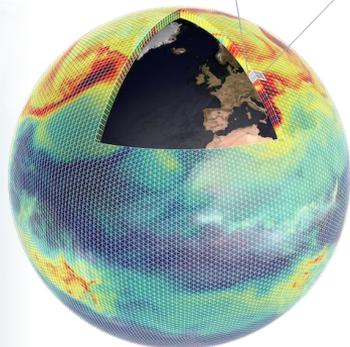
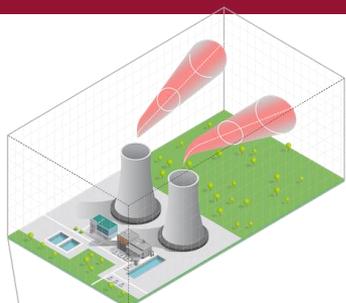
Media partnerships with



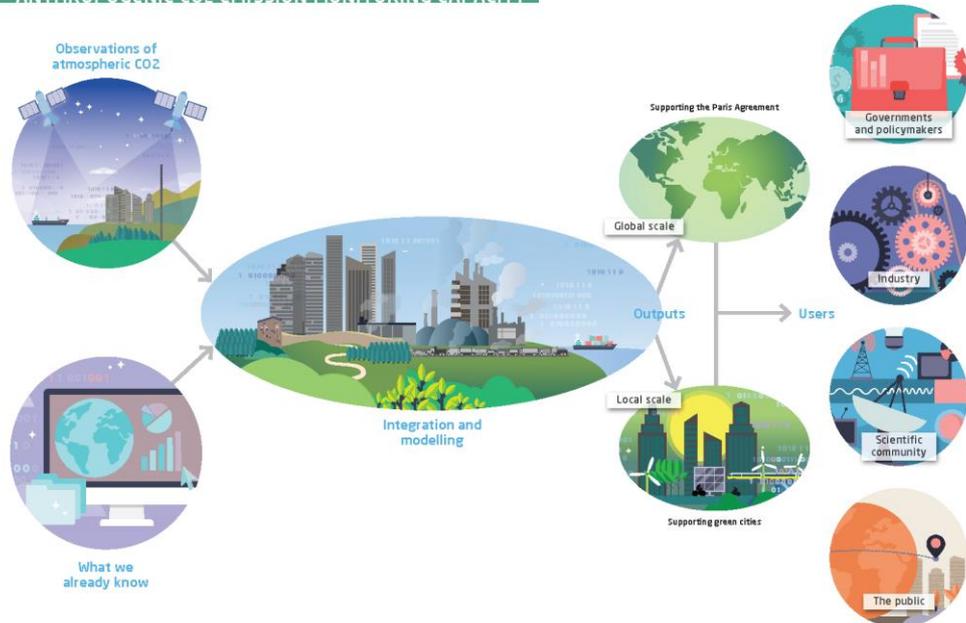


Climate
Change

Taking advantage of CAMS and C3S know how: Towards a CO₂ Anthropogenic Emission Monitoring & Verification Support Capacity



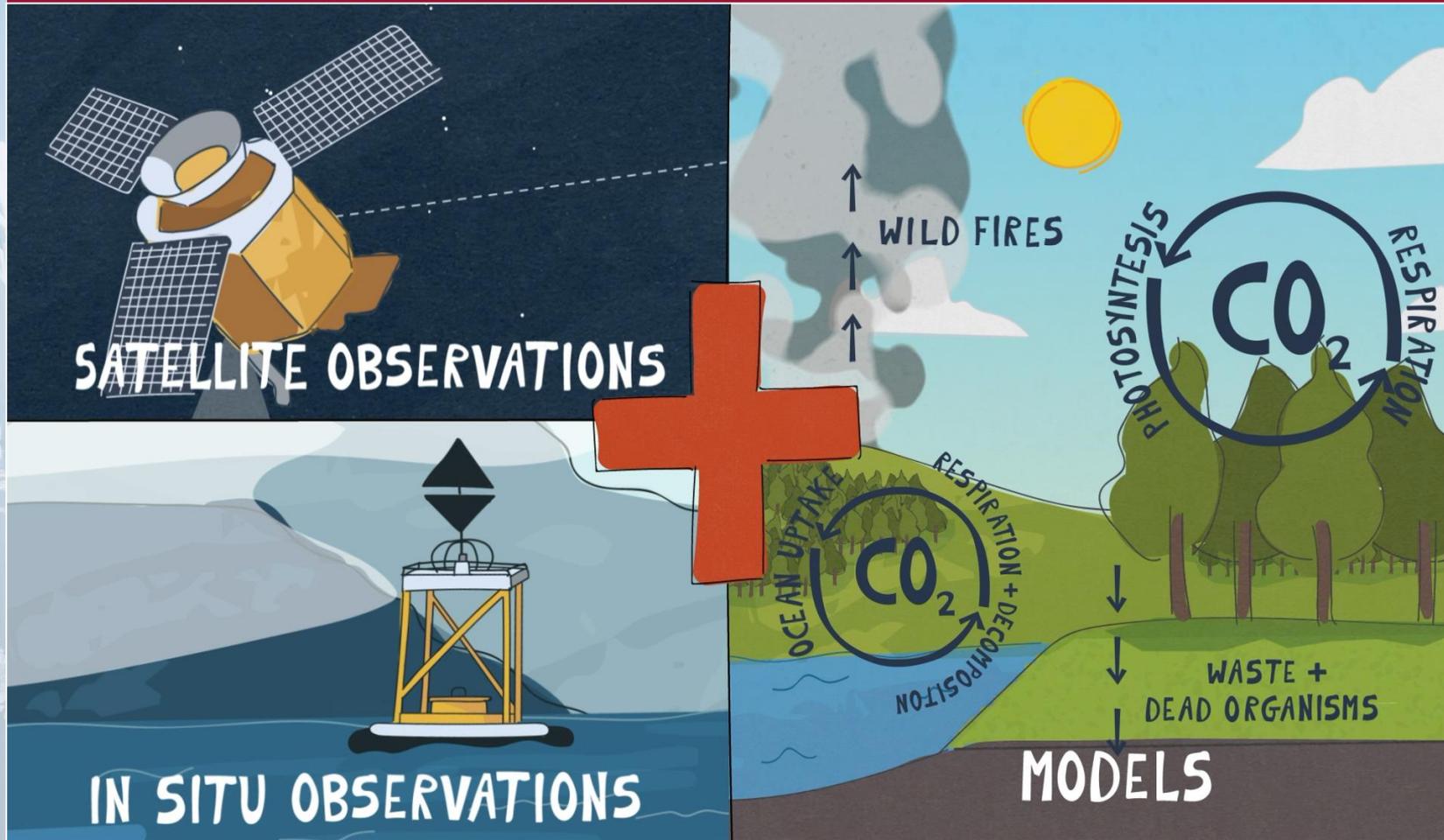
ANTHROPOGENIC CO₂ EMISSION MONITORING CAPACITY





Climate
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How do we do it?

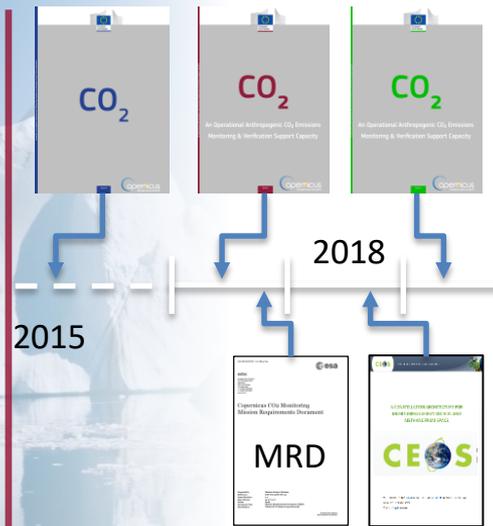




Roadmap to the MVS capacity

Climate Change

CO₂ Monitoring Task Force



1st global stocktake

Launch of the CO₂ Sentinel constellation

2nd global stocktake

Prototyping activities including relevant CO₂ satellite missions from international space agencies

Copernicus service in full operations using CO₂ Sentinels and international virtual constellation

R&D Support Actions



Climate
Change

Thank You!

jean-noel.thepaut@ecmwf.int

@JeanNoelThepaut

