European Commission

Servicios Copernicus y el crecimiento verde

Juan Garcés de Marcilla
ECMWF, Director of Copernicus Services
Seville, 4 Octubre 2018

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Space

Copernicus EU Copernicus EU
Copernicus EU www.copernicus.eu

ECMWF: A mission-driven organisation

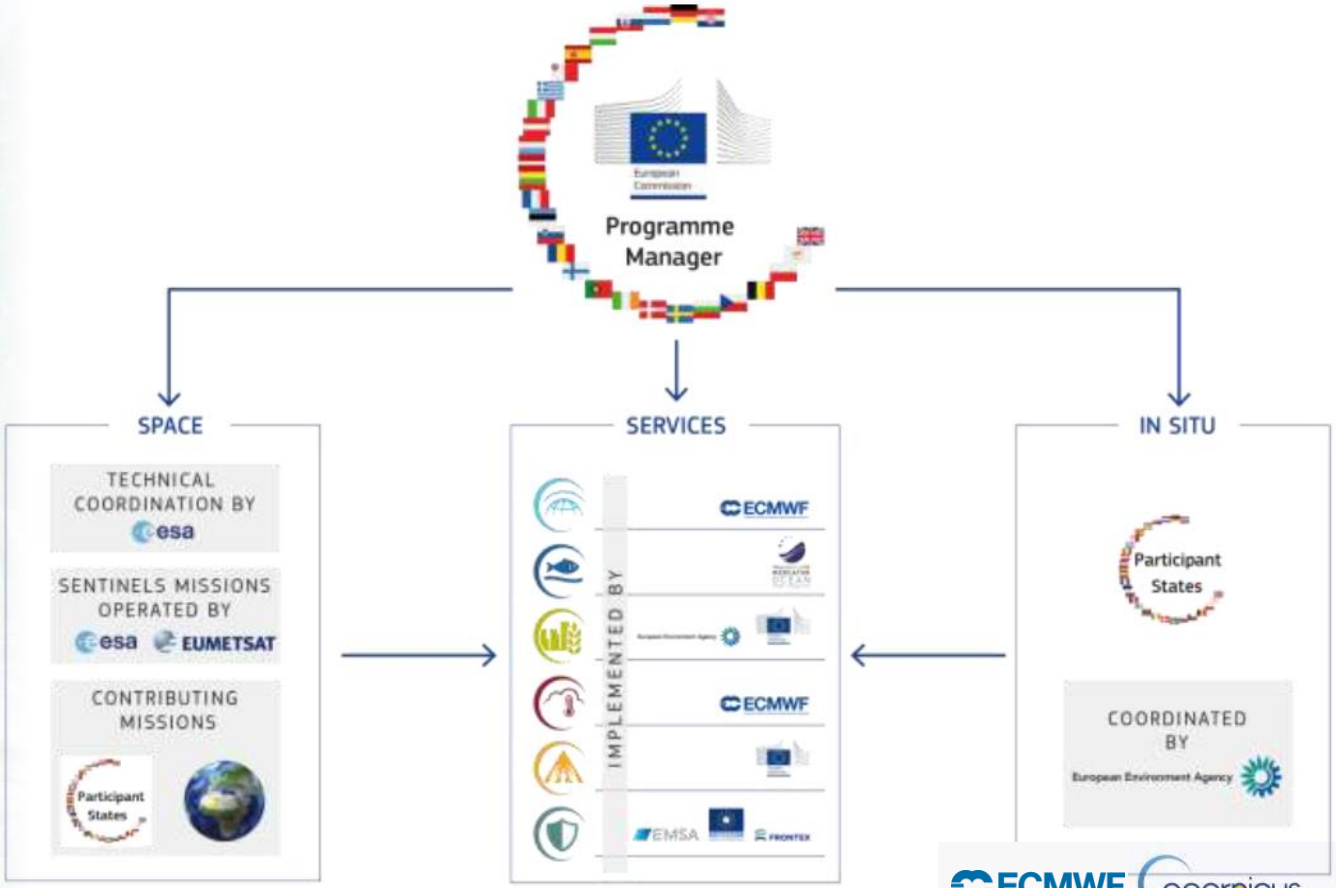
ECMWF's role is to address the critical and most difficult research problems in medium-range NWP that no one country could tackle on its own

European Commission

copernicus

ECMWF

COPERNICUS GOVERNANCE



THE SENTINELS

Space Component

FULL, FREE AND OPEN

Sentinel Mission and Status		Key Features
SENTINEL-1: 9-40m resolution, 6 days revisit at equator	*S1-A and B in orbit*	Polar-orbiting, all-weather, day-and-night radar imaging
SENTINEL-2: 10-60m resolution, 5 days revisit time	*S2-A in Orbit* *S2-B in Orbit*	Polar-orbiting, multispectral optical, high-res imaging
SENTINEL-3: 300-1200m resolution, <2 days revisit	*S3-A in Orbit* *S3-B Launch Q1-Q2 2018*	Optical and altimeter mission monitoring sea and land parameters
SENTINEL-4: 8km resolution, 60 min revisit time	*1st Launch 2023*	Payload for atmosphere chemistry monitoring on MTG-S
SENTINEL-5p: 7-68km resolution, 1 day revisit	*Launch* **13 October**	Mission to reduce data gaps between Envisat, and S-5
SENTINEL-5: 7.5-50km resolution, 1 day revisit	*1st Launch 2023*	Payload for atmosphere chemistry monitoring on MetOp 2ndGen
SENTINEL-6: 10 days revisit time	*July 2020*	Radar altimeter to measure sea-surface height globally

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Atmosphere Monitoring

The Copernicus Atmosphere Monitoring Service

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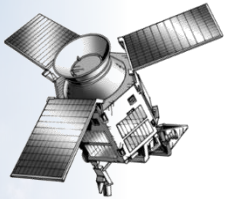
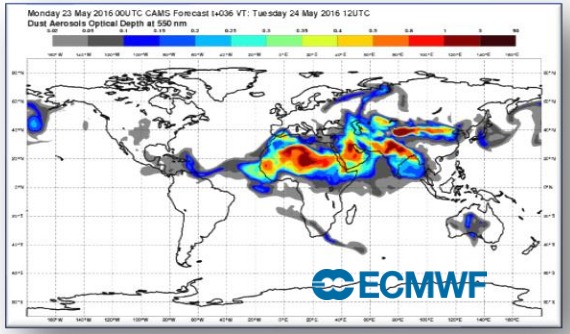
CAMS MAIN SERVICE CHAIN

Atmosphere Monitoring

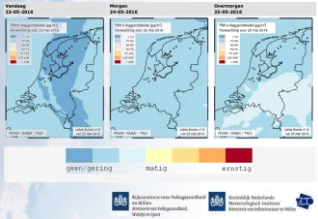
Space Agencies



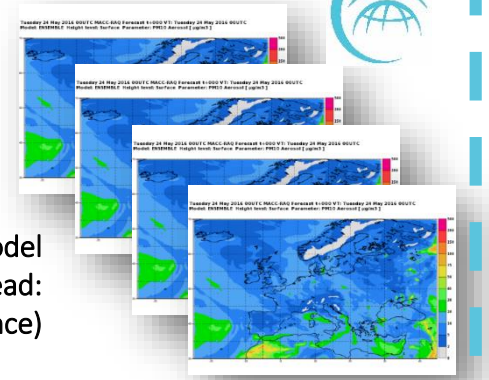


ECMWF Integrated Forecasting System (IFS)

In-situ observations



Users:
Env. Agencies
Academia
SMEs
Citizens
...



Regional multi-model ensemble (lead: Météo-France)

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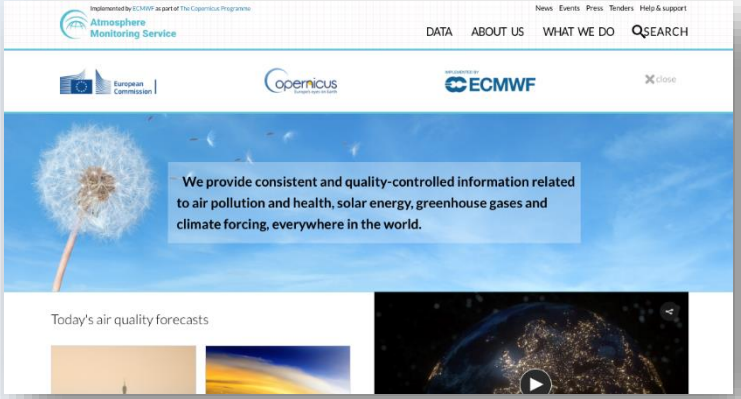
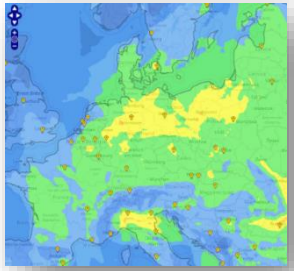
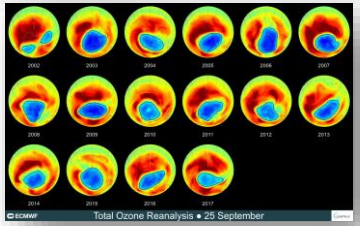


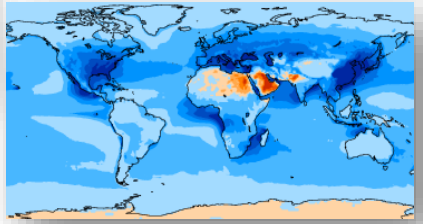


European Air Quality and products in support of policy users

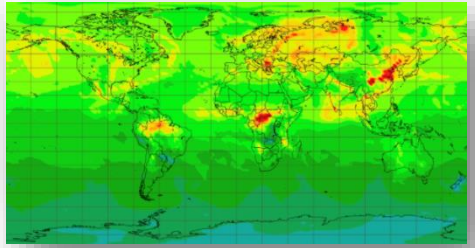
Ozone layer



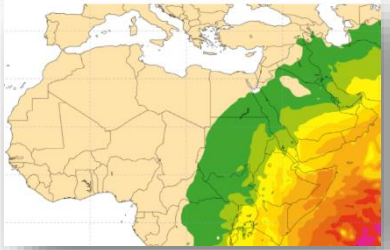
Radiative forcings



Bottom-up emissions and surface fluxes of greenhouse gases



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



Solar radiation and UV index

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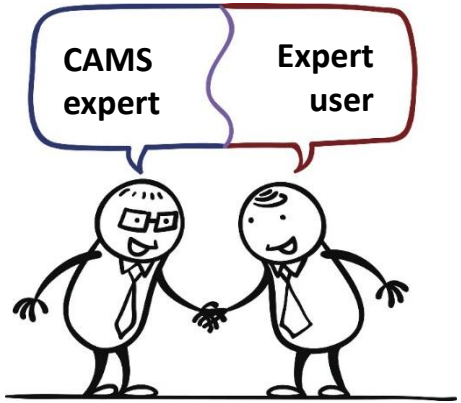
Atmosphere Monitoring

CAMS: big data for local applications

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

CAMS outputs are reaching now audiences of **over 10 million Europeans** (TV, web and apps).

The number of direct users is in excess of 7000 with about 2000 using information routinely.



Downstream applications

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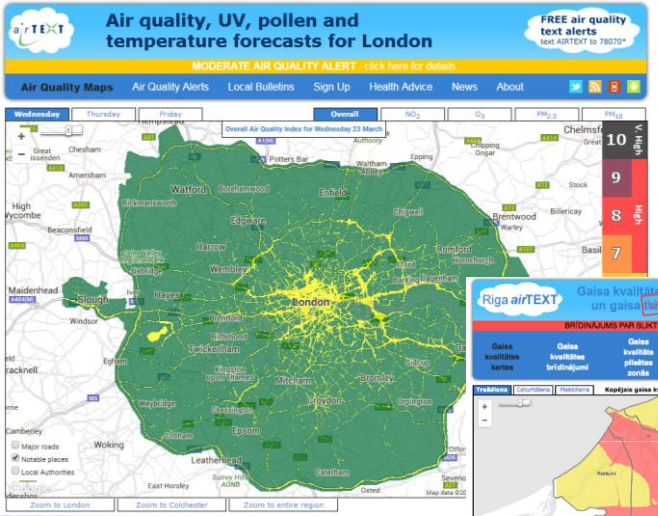
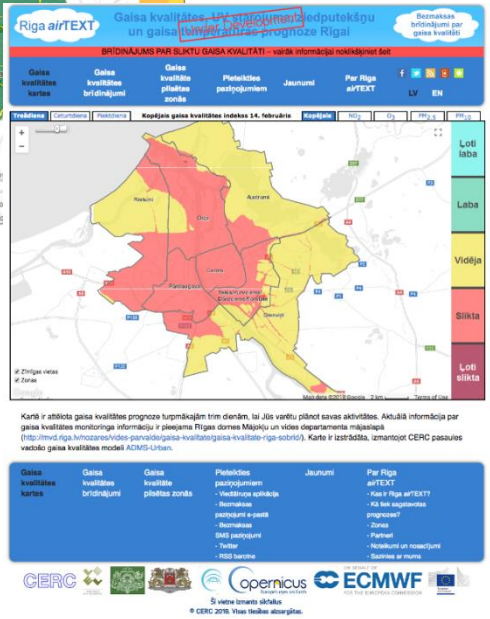
Atmosphere Monitoring

airTEXT

CERC





airTEXT is now available in London and Riga

airTEXT

Free air pollution, UV, pollen and temperature forecasts for Greater London and the South East.

Local forecast models need information on how much pollution flows into and out of the domain to provide an accurate service.
This is provided by CAMS European air quality forecasts.

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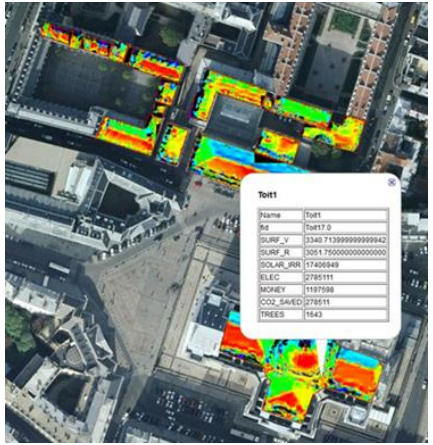
Mon Toit Solaire

Atmosphere Monitoring

Mon Toit Solaire provides a web-based decision support system for the development of rooftop photovoltaic solar panels.

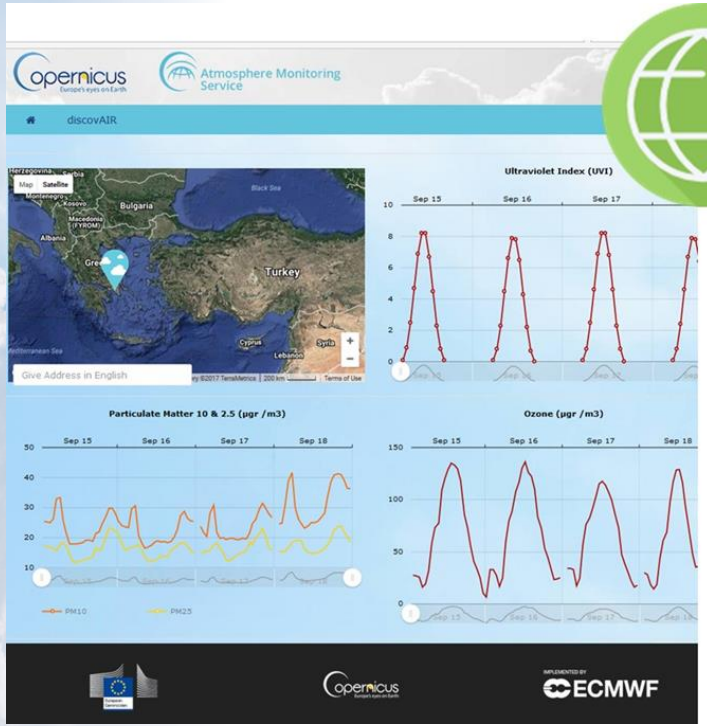
CAMS provides the satellite-based time series of available solar radiation for the specific location, taking into account the amount of clouds and aerosols.

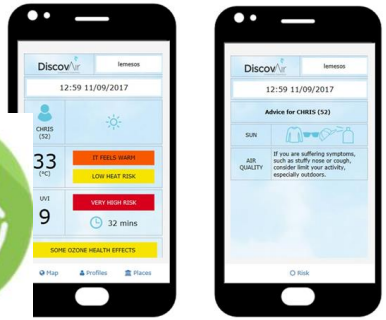


Atmosphere Monitoring

DiscovAIR

NATIONAL OBSERVATORY OF ATHENS
more than 170 years contribution to research and society





DiscovAir
powered by Copernicus

Based on the weather and other environmental conditions, DiscovAir provides location-specific, personalised advice and alerts for comfort and health.
DiscovAir enhances your trips, travels and days out.

CAMS European air quality forecasts are used to provide the up-to-date information on air pollution, pollen, UV and dust.

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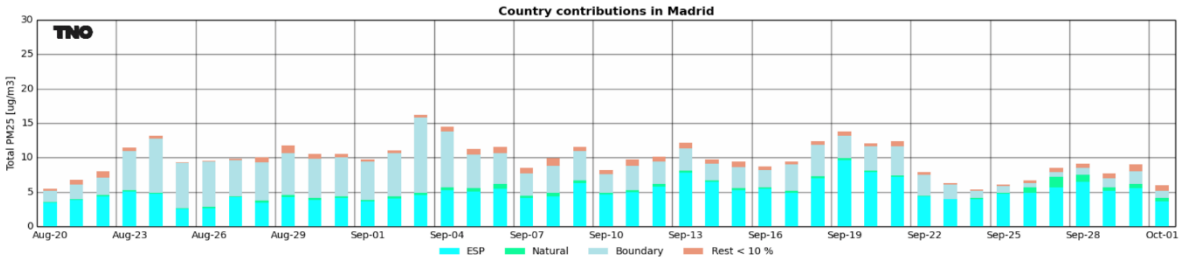
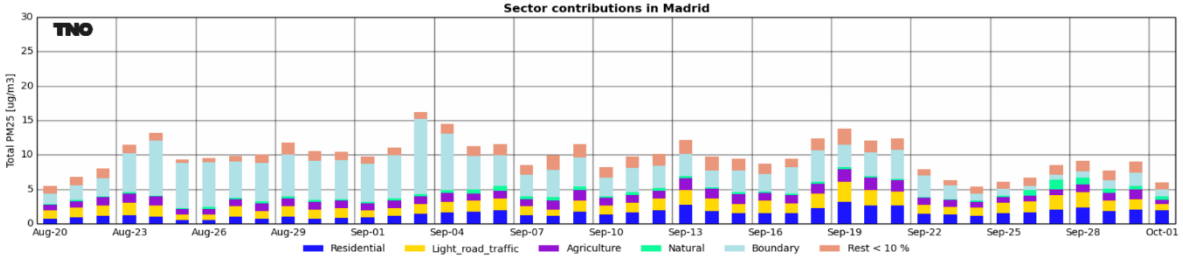
Atmosphere Monitoring

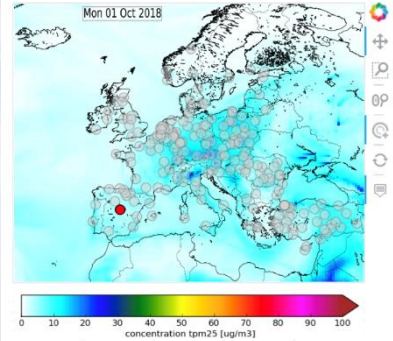
PM apportionment service



Contributions from countries.



Contributions from sectors.



The operational service uses the regional LOTOS-EUROS model forced by TNO emission information and CAMS data products to track the contributions to PM10 and PM2.5 levels of predefined source categories. The prototype service is a demonstrator and will be developed further to meet user requirements.

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Climate Change

The Copernicus Climate Change Service

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Europe's eyes on Earth

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Climate Change

The C3S mission

To support European adaptation and mitigation policies by:

- Providing consistent and authoritative information about climate, how is the climate changing, how will it change, how will it impact society
- Building on existing capabilities and infrastructures (nationally, in Europe and worldwide)
- Stimulating the market for climate services in Europe

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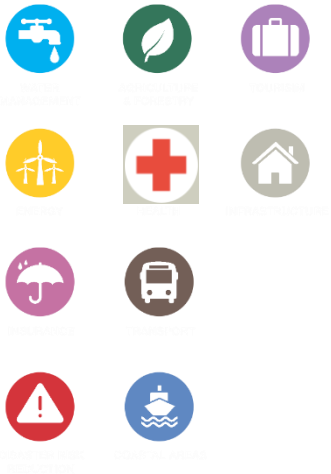
Climate Change

Climate Change Service (C3S) in a nutshell

Climate Data Store

- ECVs past, present and future
- Reanalysis and forecasts
- Derived climate indicators
- Tools to support adaptation and mitigation at global and European level
- Open and free access

Sectoral Information System



Evaluation and Quality Control

- Monitors quality of C3S products and services
- Ensures C3S delivers state-of-the-art climate information to users
- Identifies gaps in service provision
- Bridges Copernicus with the research agenda in Europe (e.g. H2020, national research projects)

Outreach and Dissemination

- Web content
- Public outreach
- Coordination with national outreach
- Liaison with public authorities
- Conferences, seminars
- Training and education

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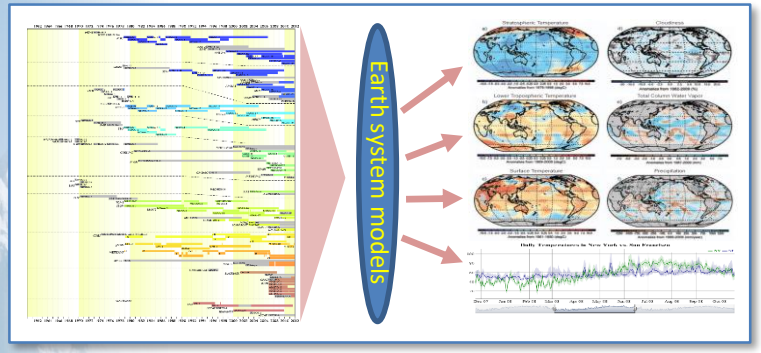
Climate Change

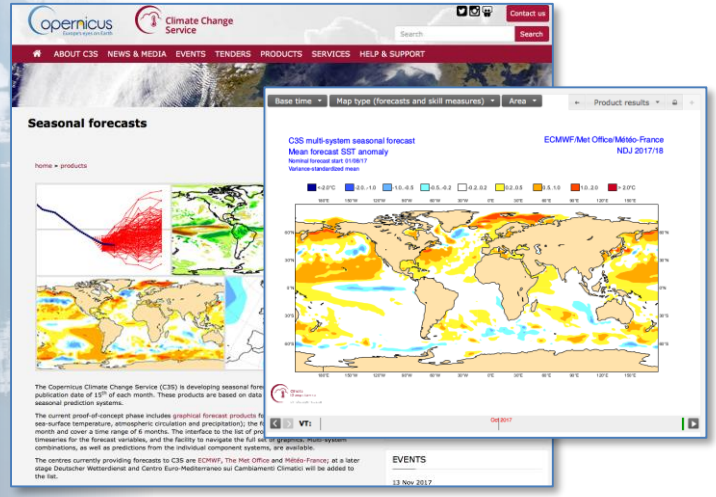
Access to past, present and future climate information

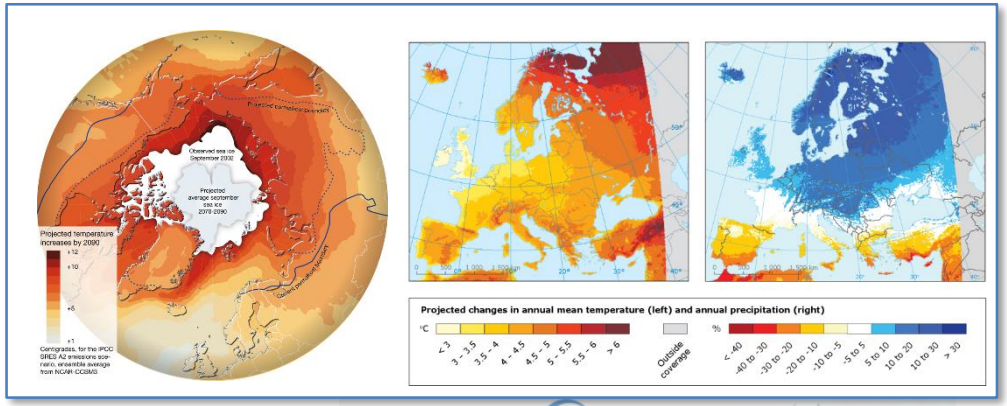


Observations and climate reanalyses

Seasonal forecast data and products

Climate model simulations





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C3S: EO based Essential Climate Variables

Climate Change

			C3S_312a				
				C3S_312b			
		GCOS	2017	2018	2019	2020	2021
Atmospheric physics							
	Precipitation	4.3.5		Lot 1			
	Surface Radiation Budget	4.3.6					
	Water Vapour	4.5.3					
	Cloud Properties	4.5.4					
	Earth Radiation Budget	4.5.5					
Atmospheric composition							
	Carbon Dioxide	4.7.1	Lot 6	Lot 2			
	Methane	4.7.2	Lot 6				
	Ozone	4.7.4	Lot 4				
	Aerosol	4.7.5	Lot 5				
Ocean							
	Sea Surface Temperature	5.3.1	Lot 3	Lot 3			
	Sea Level	5.3.3	Lot 2				
	Sea ice	5.3.5	Lot 1				
	Ocean Colour	5.3.7					
Land hydrology & cryosphere							
	Lakes	6.3.4		Lot 4			
	Glaciers	6.3.6	Lot 8				
	Ice sheets and ice shelves	6.3.7					
	Soil moisture	6.3.16	Lot 7				
Land biosphere							
	Albedo	6.3.9	Lot 9	Lot 5			
	Land Cover	6.3.10					
	Fraction of Absorbed Photosyntheti	6.3.11	Lot 9				
	Leaf Area Index	6.3.12	Lot 9				
	Fire	6.3.15					
			2017	2018	2019	2020	2021

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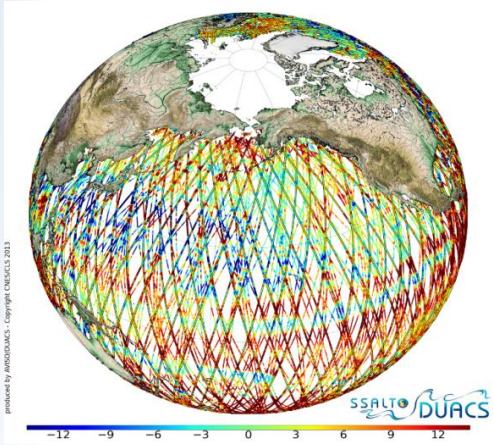
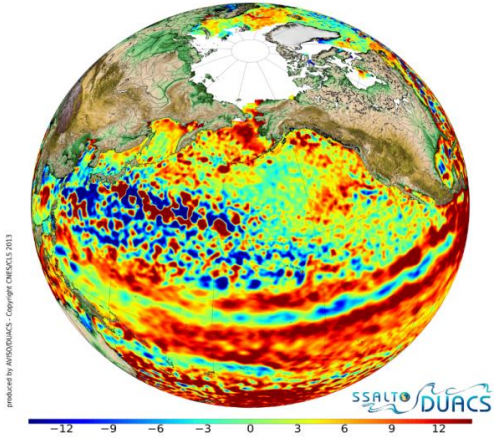
Climate Change

Sea Level production service

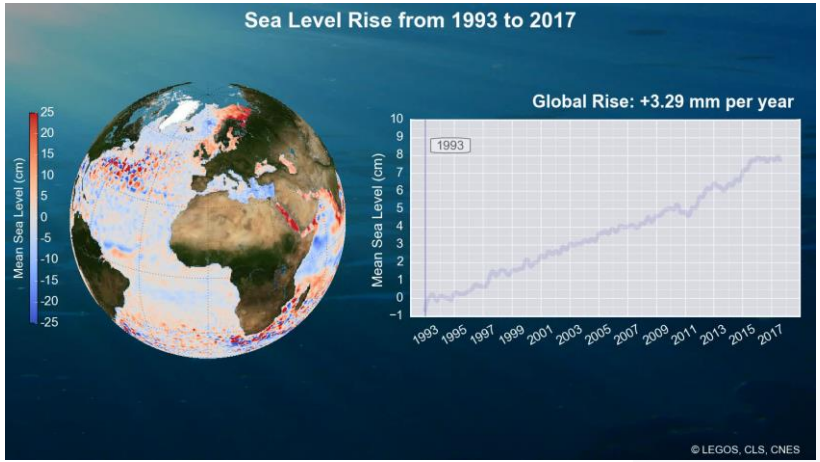


From satellite **along-track** measurements…

… to **sea level gridded maps**…



… to derive Ocean Monitoring Indicators



European Commission

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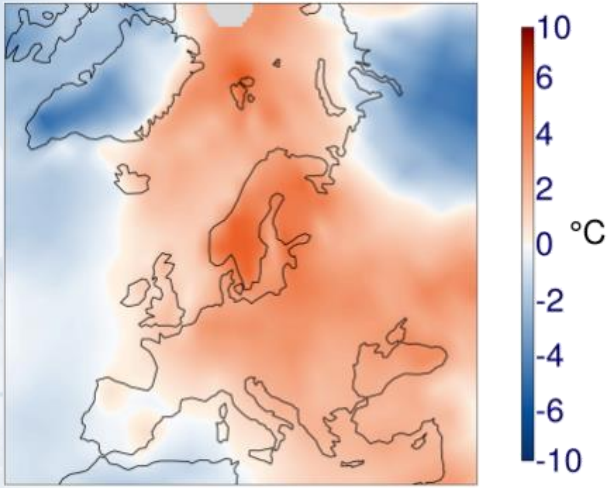
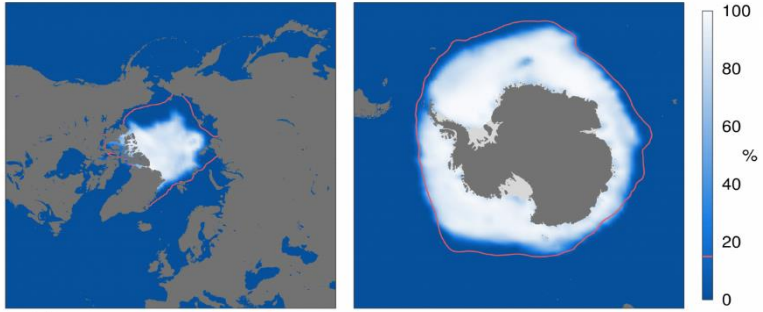
Climate Change

C3S climate bulletin- 4-5th every month

May 2018 – warmest May on record in Europe



September 2017 – Lowest Antarctic sea ice maximum on record



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Climate Change

A one-stop Climate Data Store

We have built a store.

The door opened to customers in June 2018

We continuously put products on the shelves.

Open and free data

Climate data records

cds.climate.copernicus.eu

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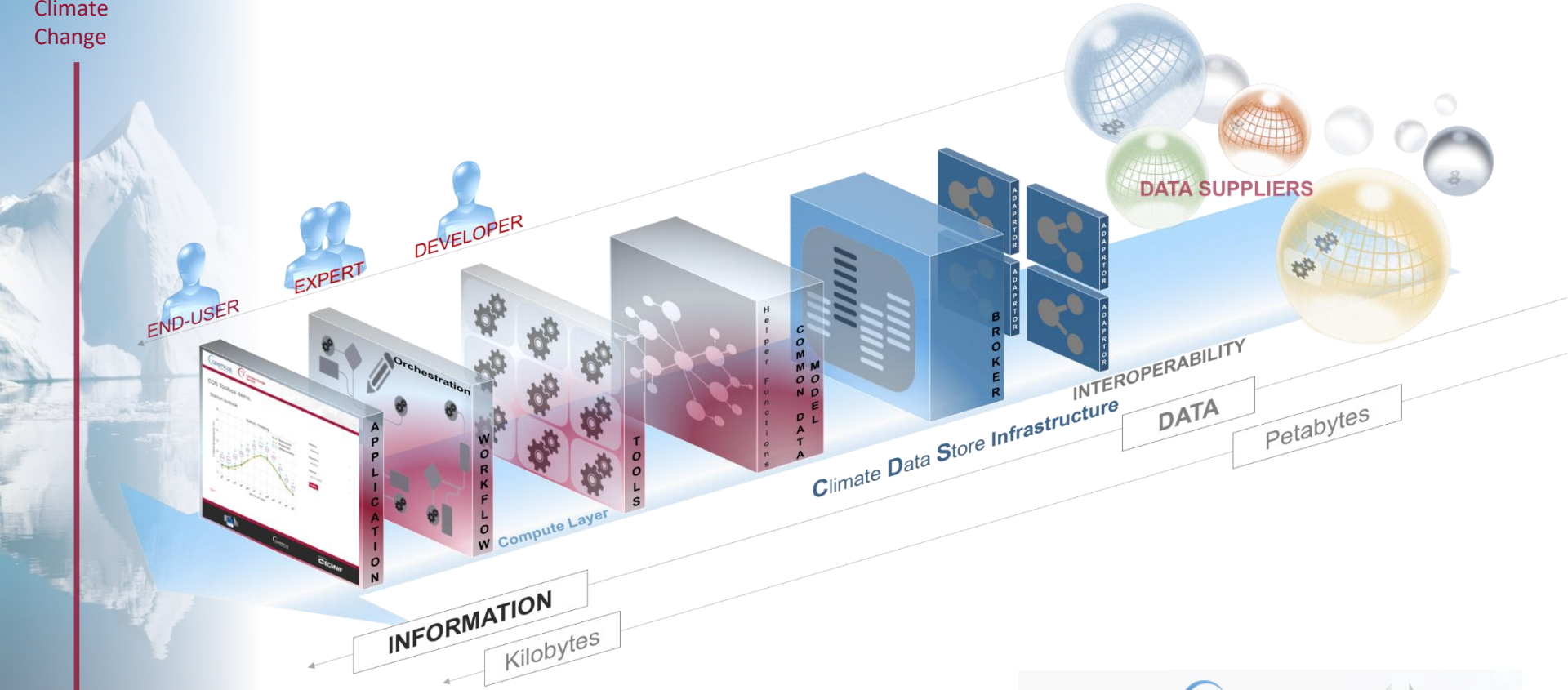
Climate Change

CDS infrastructure and toolbox



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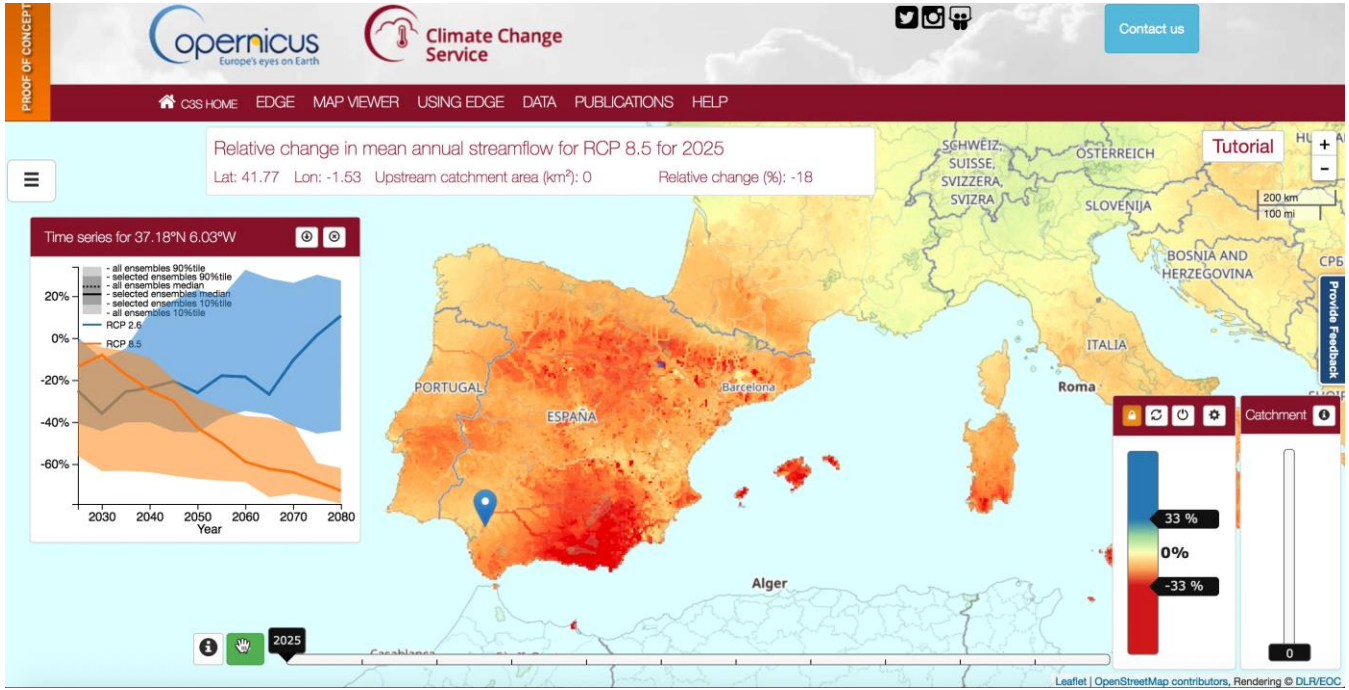

Using a combination of chain of models linking future climate scenarios with hydrological parameters it has been possible to produce an operational assessment of current and future conditions. The water-agriculture-energy nexus provide a good example of how climate mitigation and adaptation can be intertwined.
Madrid, in the small plot faces significantly different hydrological futures depending on the mitigation strategy adopted.

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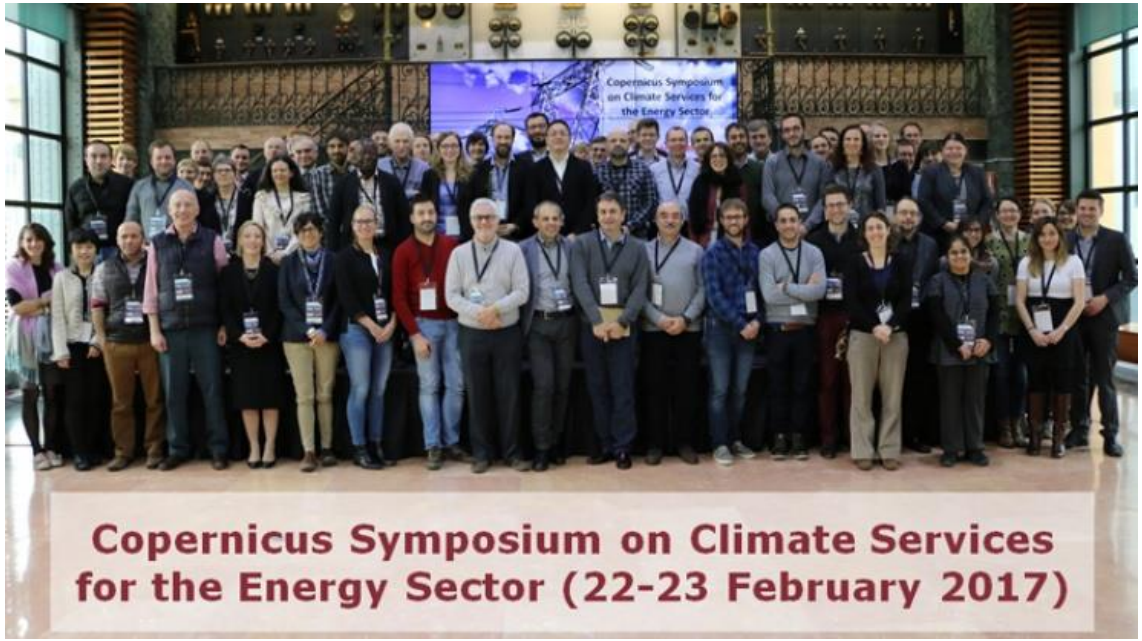
Climate Change

Climate for Energy



Historical reconstructions, seasonal predictions and climate projections for: energy demand, capacity factor for wind, solar and hydro power

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CO2, Sentinel 7