Climate services at the crossroads: balancing user needs and operational foundations"

How can C3S can serve ECMWF MS and society at large

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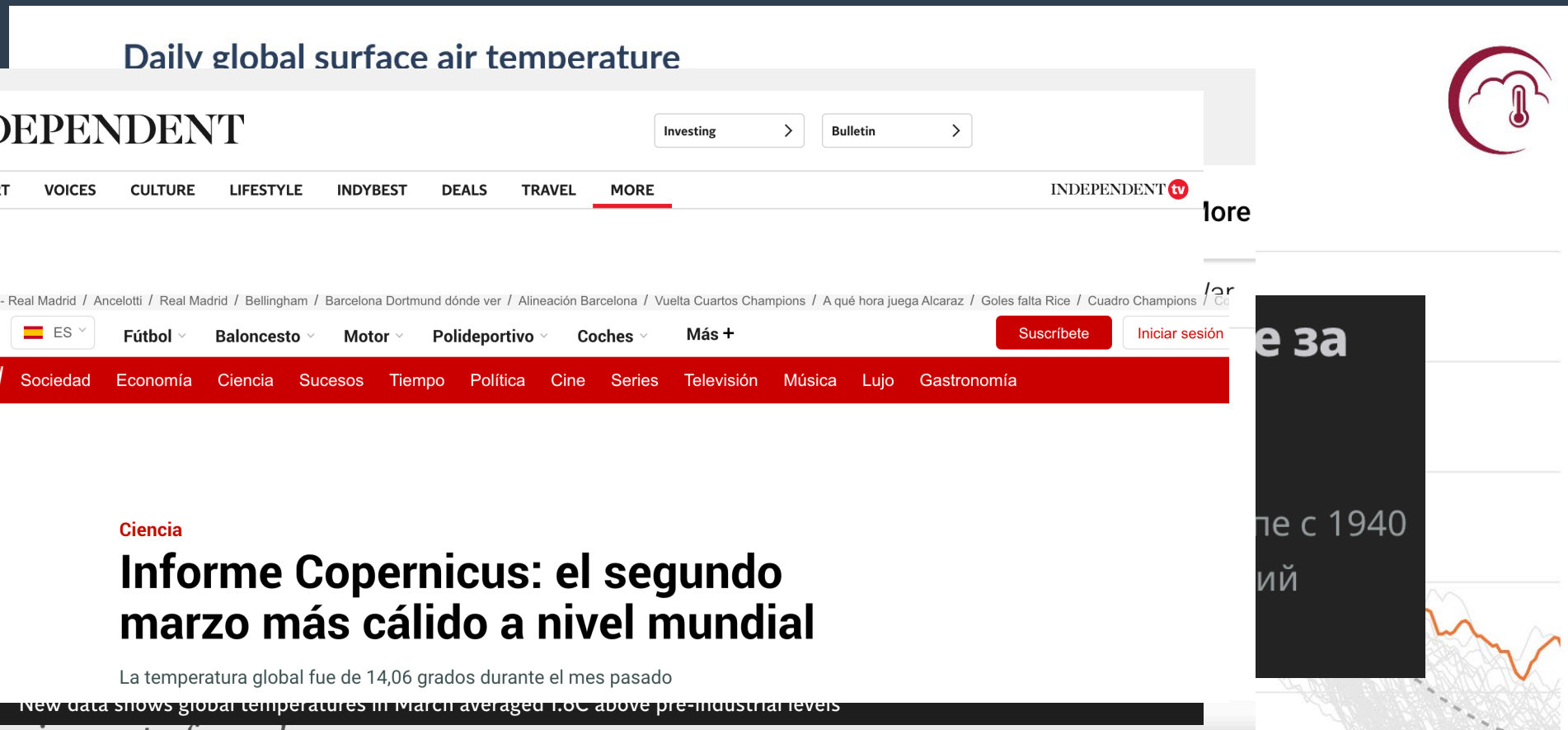
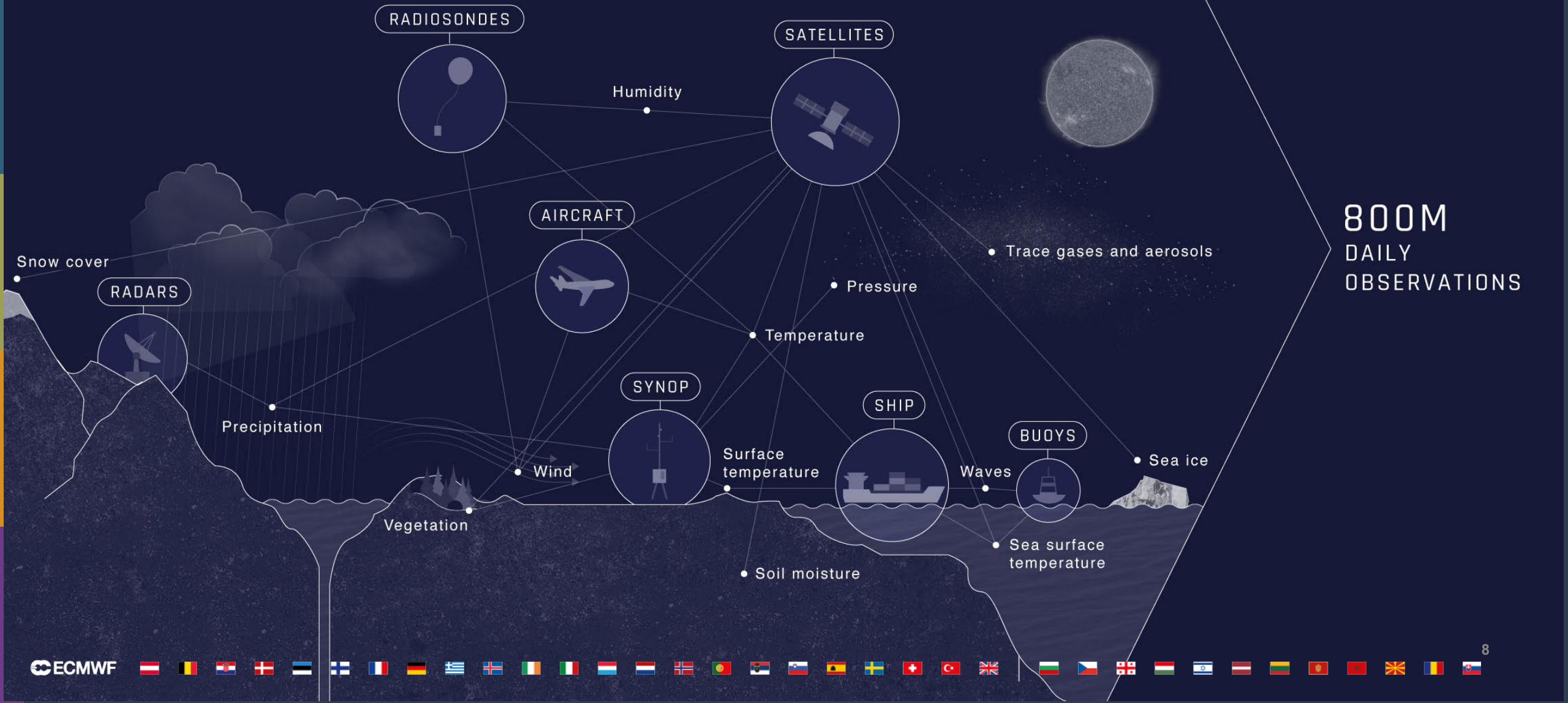
Navigating uncharted territories calls for effective climate services



CAPTURING THE WEATHER

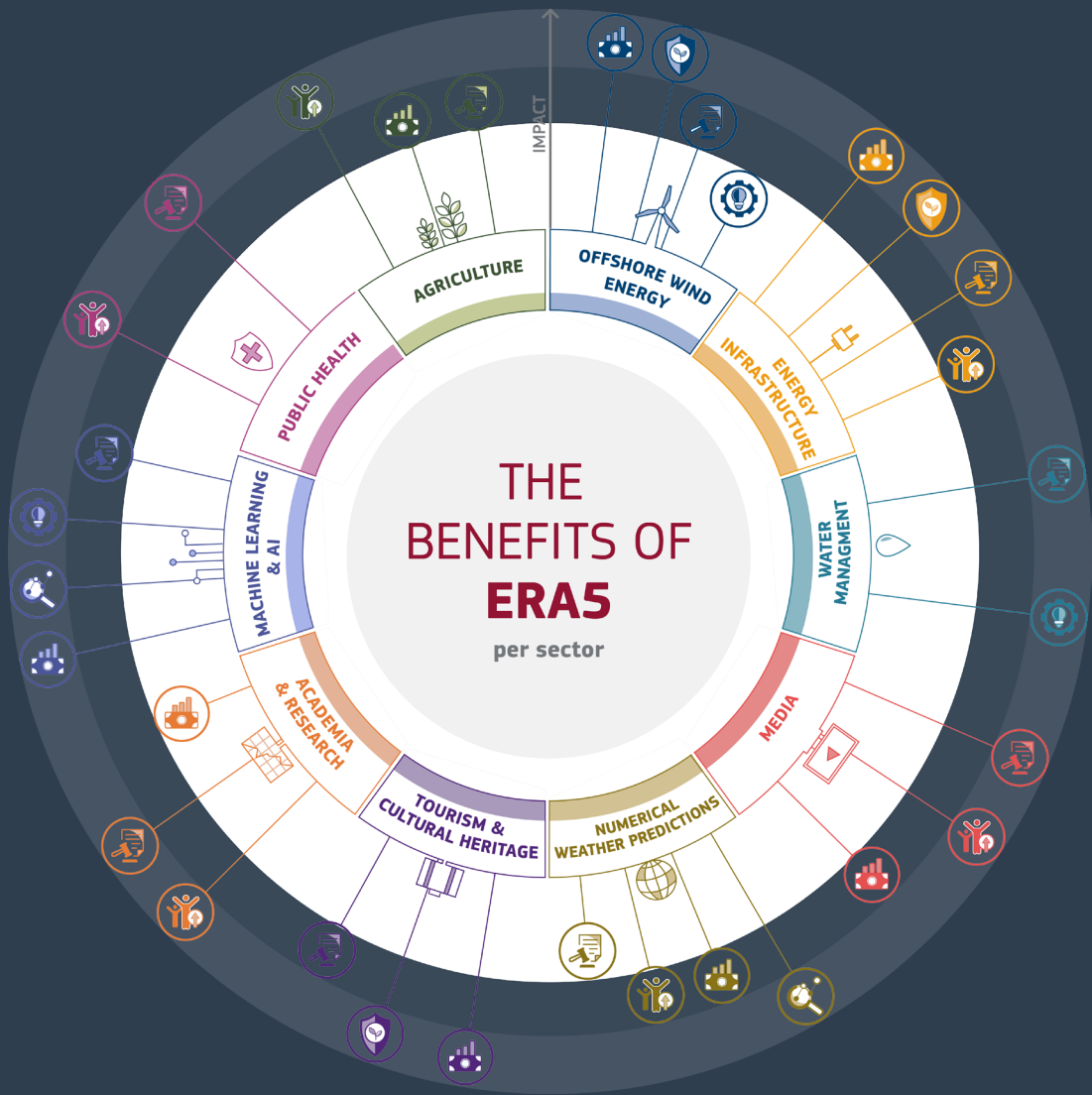
To predict the future, we observe the present. Every day, we absorb 800 million observations to create a detailed snapshot of Earth's weather.



How can we design climate services that are operational, scalable and tailored to the needs of all user communities?

The dual nature of climate services

Buontempo et al. 2018



https://climate.copernicus.eu/new-study-era5s-socio-economic-benefits

Decision-driven, user-centric design

- Decisions are rarely (if ever) influenced by climate alone.
- The saliency of the information provided depends by the ability to understand the universe in which the target users operate.
- Requirements and needs are different not only from one sector to another (e.g., finance vs agriculture) but between different actors operating in the same sector (e.g., large agribusiness vs farmer).

Systematic, operational production

To support effective climate services robust, reliable, and regularly updated reference datasets are required.

The *engine-room* of climate services requires suitable infrastructure, shared standards, interoperability.

But it also requires users support, quality assurance and training,

Dynamic tension, not a binary choice

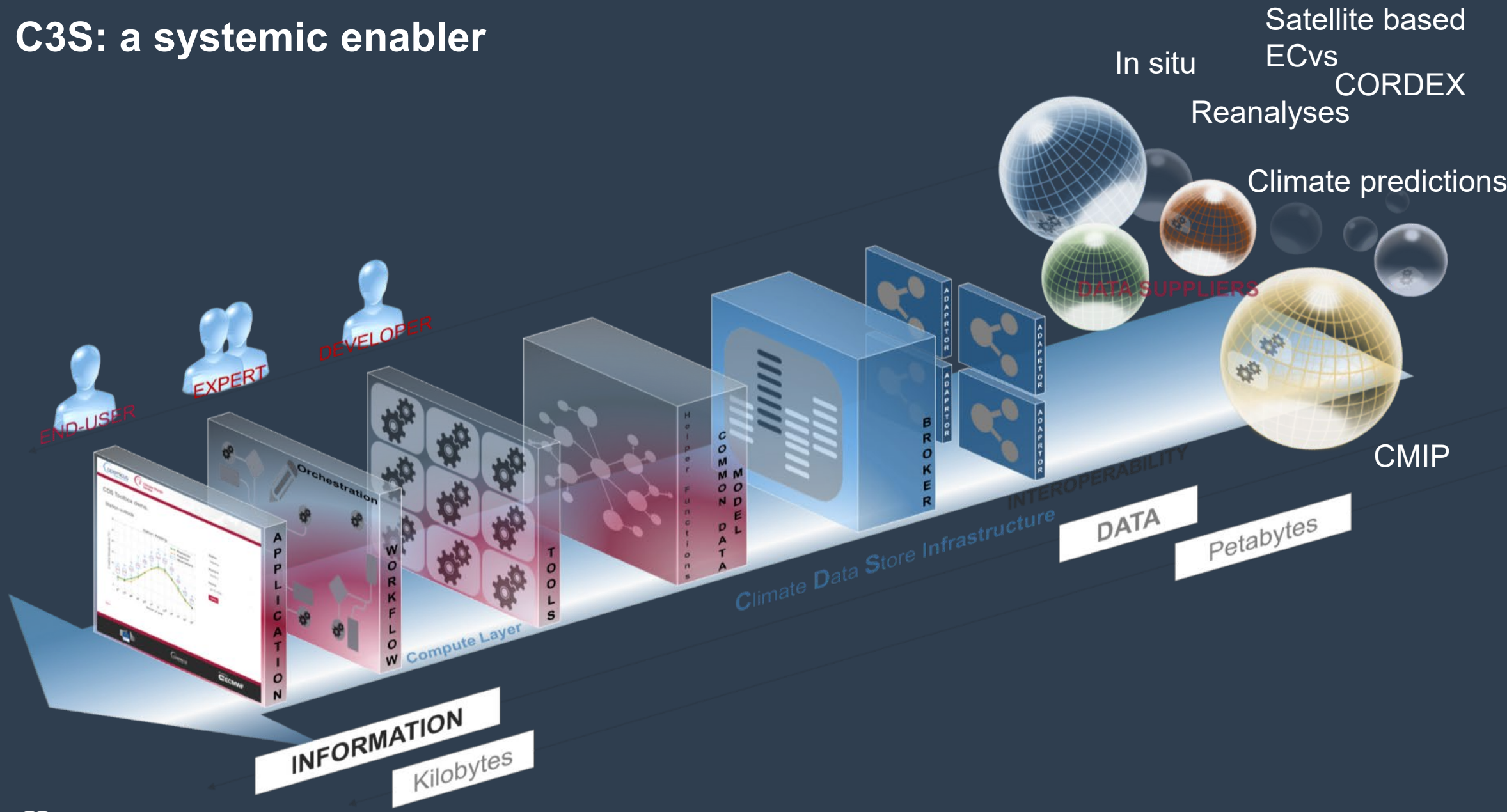
Decision driven

Systematic operational production

Very salient but potentially shallow services

Very accurate but possibly Irrelevant products

C3S: a systemic enabler



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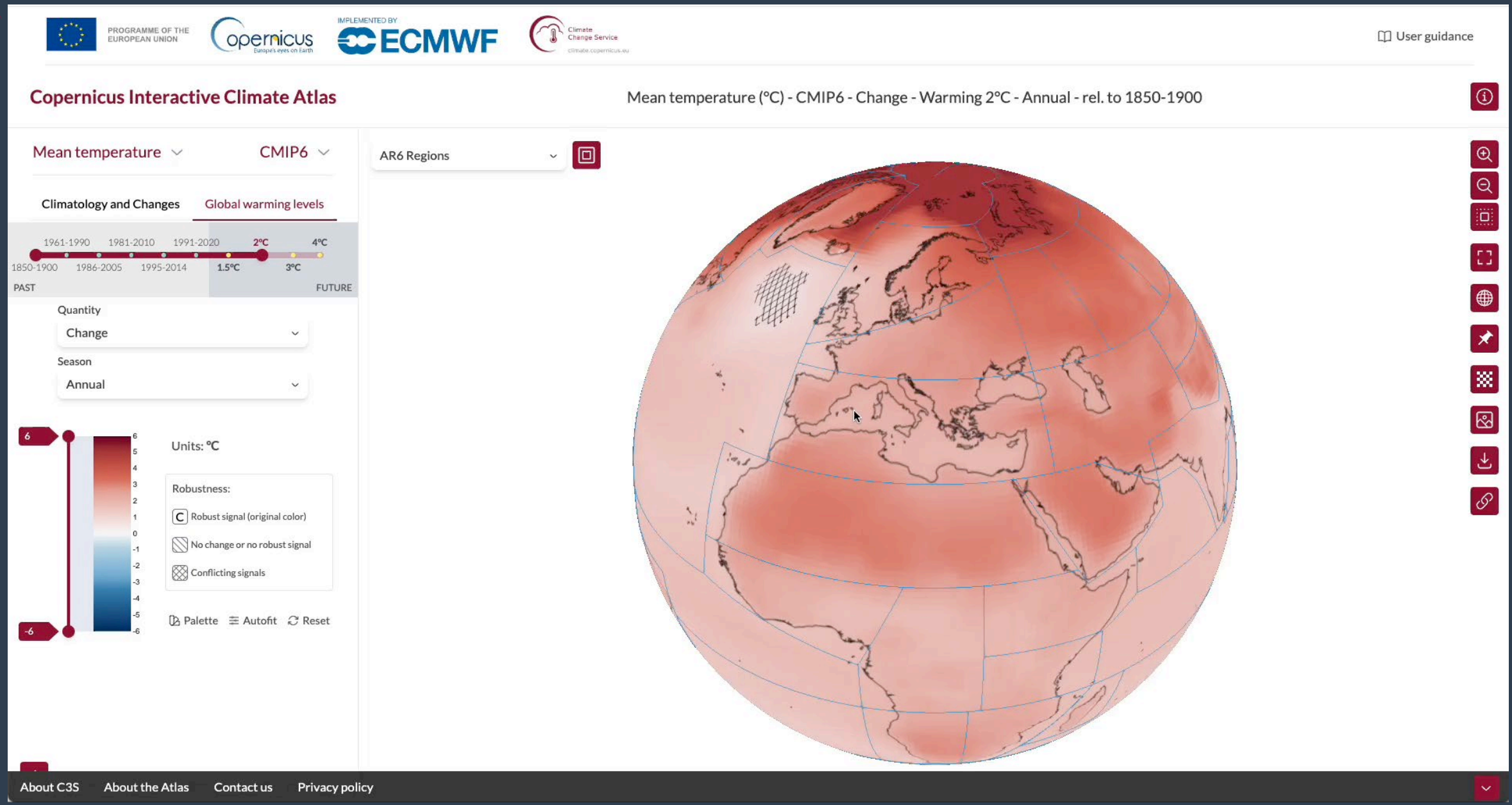
PROGRAMME OF THE EUROPEAN UNION
Copernicus
Europe's eyes on Earth
IMPLEMENTED BY
ECMWF
Climate Change Service
User guidance
Copernicus Interactive Climate Atlas
Mean temperature (°C) - CMIP6 - Change - Warming 2°C - Annual - rel. to 1850-1900
Mean temperature
CMIP6
AR6 Regions
Climatology and Changes
Global warming levels
1961-1990
1981-2010
1991-2020
2°C
4°C
1850-1900
1986-2005
1995-2014
1.5°C
3°C
PAST
FUTURE
Quantity
Change
Season
Annual
6
-6
Units: °C
Robustness:
Robust signal (original color)
No change or no robust signal
Conflicting signals
Palette
Autofit
Reset
About C3S
About the Atlas
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Supporting European institutions – the European Investment Bank

Courtesy of Chiara Cagnazzo

This activity is aimed at aiding the EIB in their own climate risk screening and assessments of investment project

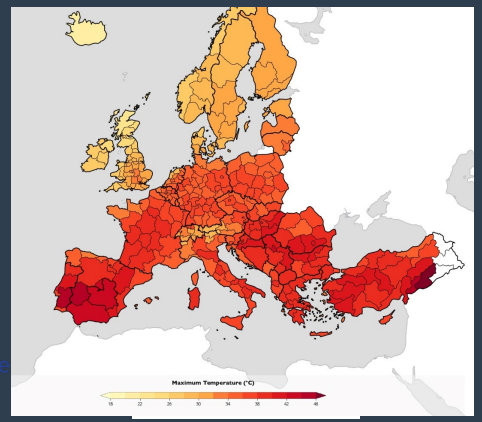
NACE code, sensitivity matrix, country hazard filter, economic lifetime etc.

C3S-based hazard matrix connecting hazards to climate impact indicators

EIB-C3S partnership to connect Sectors & Subsectors to ***Climate Impact Indicators*** and their evolution in time: current & under climate scenarios

EIB Climate Risk Assessment

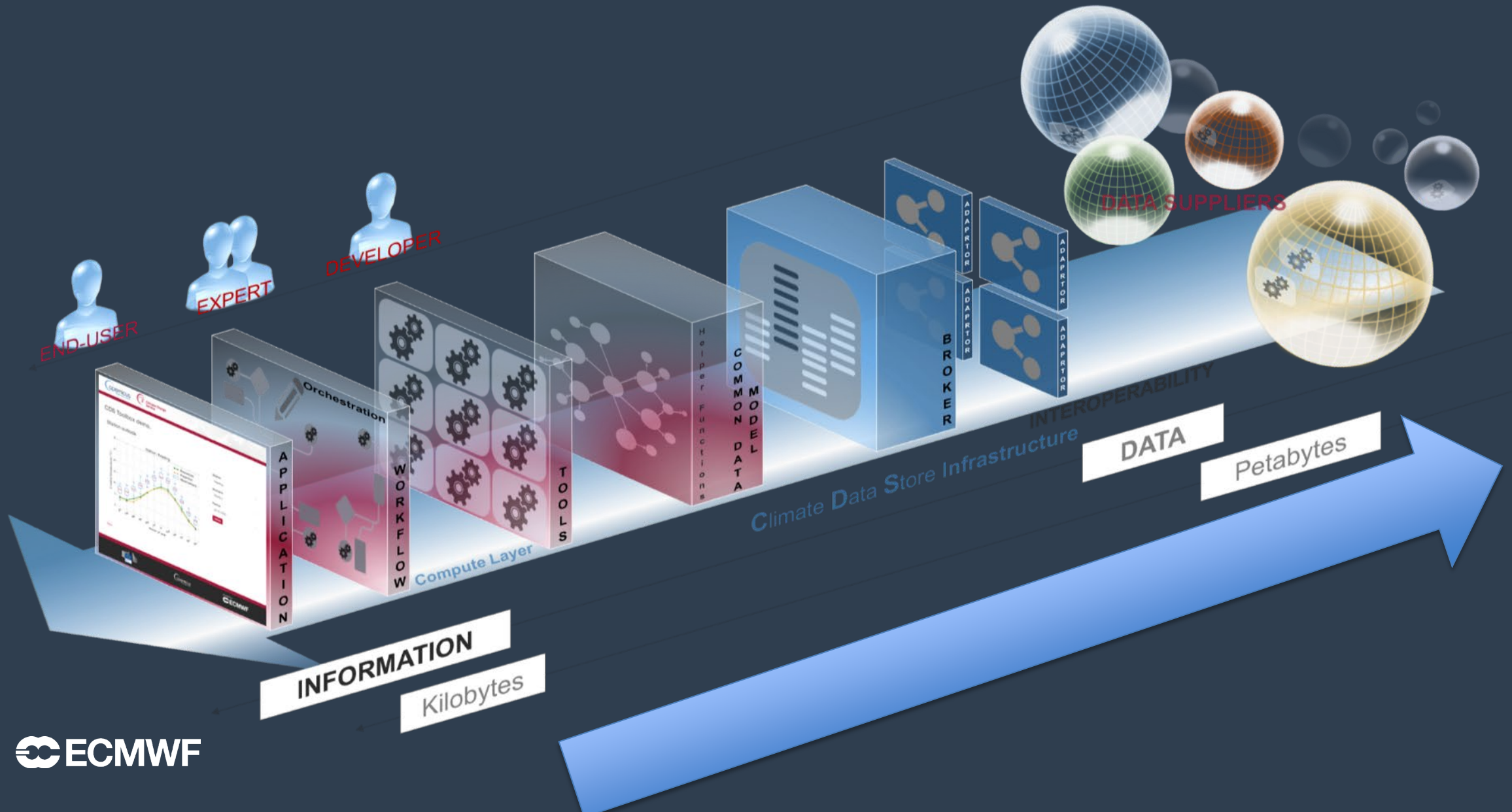
- Data interface to ECMWF
- EIB owned risk-based rules
- Geospatial analysis



Category	Chronic Hazards	Acute Hazards
Temperature - related	Changing temperatures (air, freshwater, marine)	Heat wave
	Heat stress	Cold wave frost
	Temperature variability	Wildfires
	Permafrost thawing	
Wind-related	Changing wind patterns	Cyclone, hurricane, typhoon
		Storms (including blizzards, dust and sandstorms)
		Tornadoes
Water - related	Changing precipitation patterns and types (rain, hail, snow/ice)	Drought
	Precipitation or hydrological variability	Heavy precipitation (rain, hail, snow, ice)
	Ocean acidification	Flood (coastal, fluvial, pluvial, ground water)
	Saline intrusion	Glacier Lake outburst
	Sea level rise	
	Water stress	
Solid-mass related	Coastal erosion	Avalanche
	Soil degradation	Landslide
	Soil erosion	Subsidence
	Solifluction	

Classification of climate related hazards as defined by the EU Taxonomy regulation

C3S: a systemic enabler



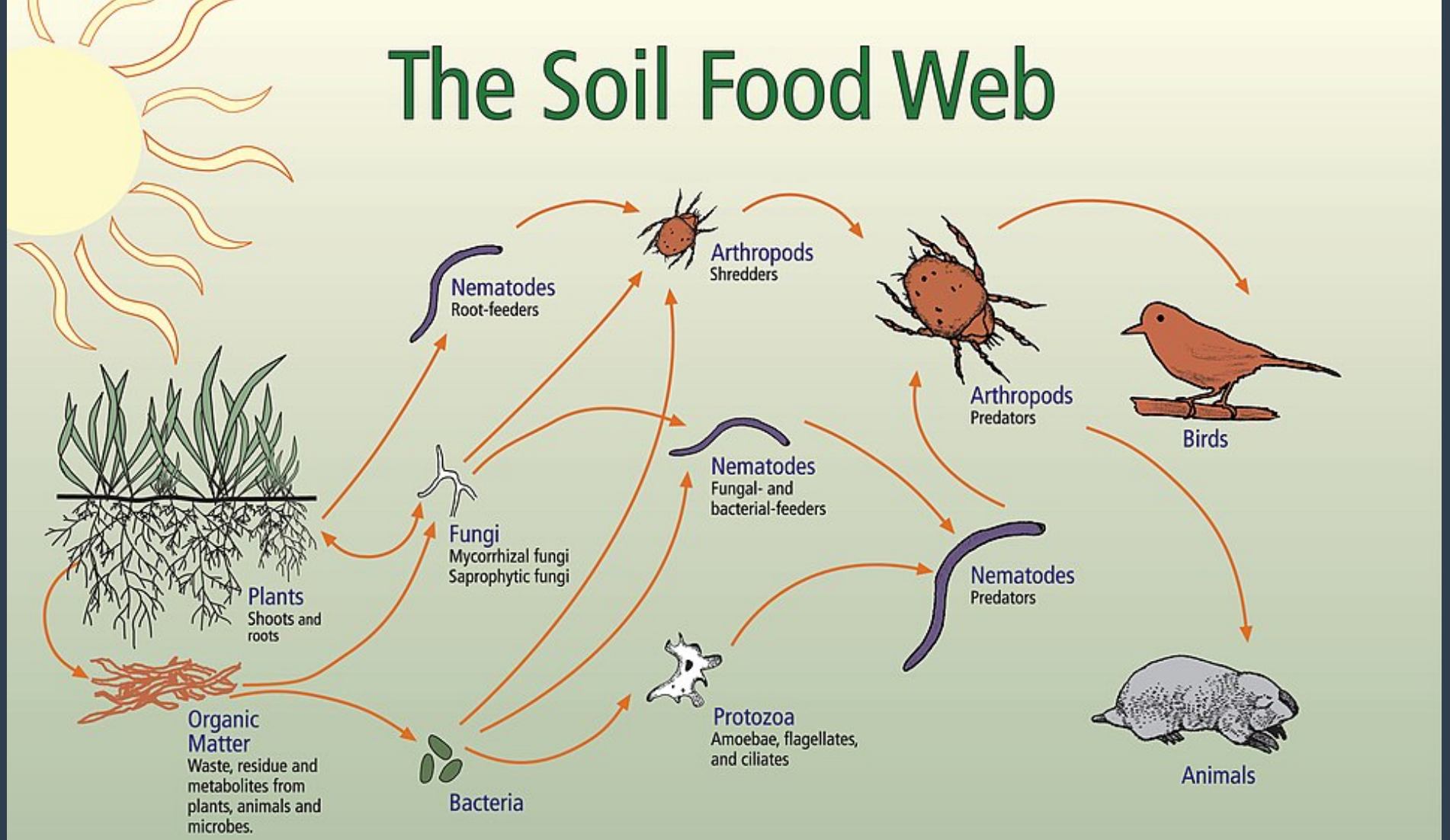
ECMWF

•Improve access and documentation of reanalysis datasets.

•Promote and foster validation and advertise successful applications of reanalysis datasets for Wind Energy applications, and thereby improve their value.

•Act as a point of contact / collaboration forum between reanalysis providers and the Wind Energy

The Soil Food Web



First trophic level:	Second trophic level:	Third trophic level:	Fourth trophic level:	Fifth and higher trophic levels:
Photosynthesizers	Decomposers Mutualists Pathogens, Parasites Root-feeders	Shredders Predators Grazers	Higher level predators	Higher level predators

Synergic cooperation

Promote the uptake of C3S products whilst facilitating MSs to develop climate services according to national needs and priorities, with the overarching goal to improve climate resilience and awareness

Enable access and promote uptake of national observations to promote standardisation of data domestic climate services and support C3S core activities & service offering

Lead	Country	C3S products used:	Priority areas:
CSIC	Spain	Seasonal forecast	fire and drought management
IEP-NRI	Poland	Seasonal forecast & reanalysis	Policy & adaptation planning
IPMA	Portugal	Reanalysis, seasonal and projections	Multi-sector risk assessment
ISPRA	Italy	GHG emissions, reanalysis, seasonal and projections	Multi domain climate risk assessment & adaptation
MetRo	Romania	Seasonal and decadal predictions	Agriculture
NoA	Greece	Seasonal and decadal predictions	Renewable energy
SMHI	Sweden	Climate monitoring and awareness	Climate monitoring and communication
VITO/BCC	Belgium	Reanalysis / observations	Health / data rescue & standardisation*

A possible way forward

Effective climate services depend on finding the right balance between operational backbone and user-tailored applications.

•An effective system should be plan based on three pillars:

- Support and expansion of robust operational services like C3S (top-down)
- Empowerment of local actors through co-production (bottom-up)
- Fostering intermediaries who can bridge the two

For this to work we need:

- **good governance (data and institutions)**,
- **Standards (data, communication, ..)**
- **Collaboration mechanisms (e.g. NCPs, training, etc.).**

Conclusions

- It takes two to … service but this doesn't mean service providers/users are bound to *dance* alone.
- C3S is already empowering the European climate service ecosystem.
- But it is not a done deal we should always ask ourselves what more could C3S do and what would be best left to national, regional and private actors.
- The kay is, as it is often the case, communication & cooperation .

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