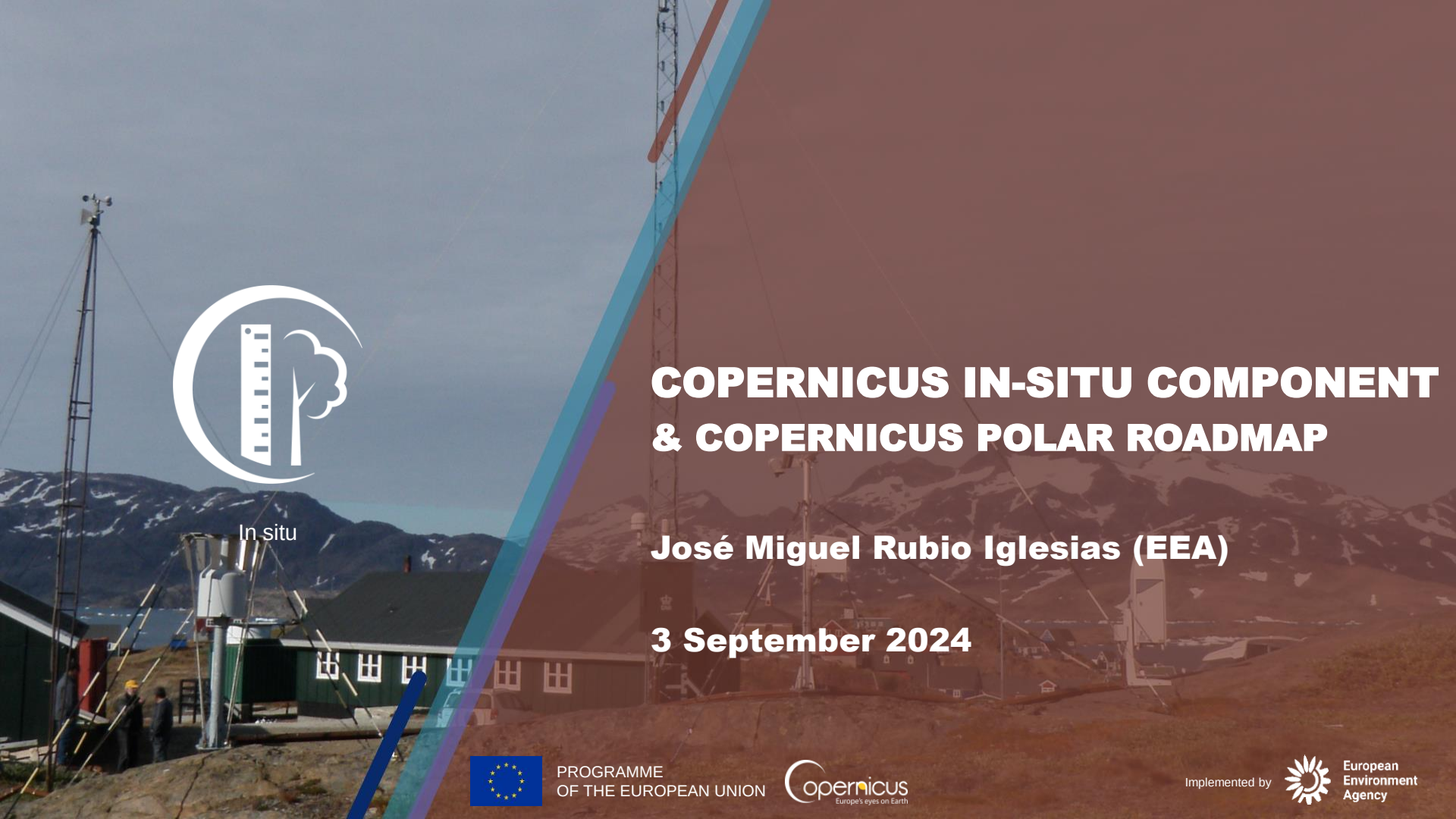


In situ

COPERNICUS IN-SITU COMPONENT & COPERNICUS POLAR ROADMAP

José Miguel Rubio Iglesias (EEA)

3 September 2024

PROGRAMME OF THE EUROPEAN UNION

Copernicus Europe's eyes on Earth

Implemented by European Environment Agency

In situ

Why in-situ data in Copernicus?

Copernicus in-situ data: **observations, reference and ancillary data** licensed or provided for use in Copernicus

What for?

- **Production and validation** in Copernicus services
- As stand-alone **observation** products
- **Cal/Val** of satellite sensors

In-situ data comes from a myriad of data providers and networks at national, regional and global level.

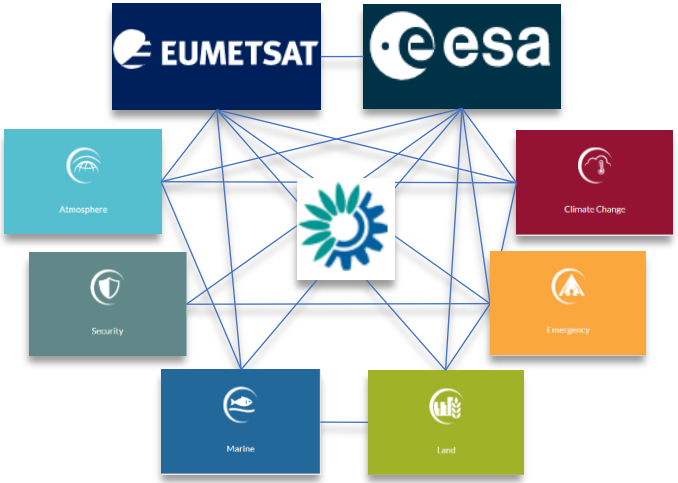
Without in-situ data, Copernicus simply cannot deliver its data, products and services – including on the polar regions

Copernicus In-Situ and the role of EEA

In situ

Entrusted Entities access and manage in-situ data directly according to their operational needs on a day-to-day basis.

The EEA intervenes when a coordinated approach to accessing in-situ data is required at a programmatic level.



Examples of cross-cutting in-situ activities (I)

In situ

Report on Arctic In-Situ data availability

Assessment of Copernicus requirements for Arctic in-situ data vs available data.

Severe gaps identified in:

- Central Arctic
- Timely availability and quality of observations
- Non-European regions
- Fit-for-purpose of observation technology
- Data management structures
- Sustainability of observing systems

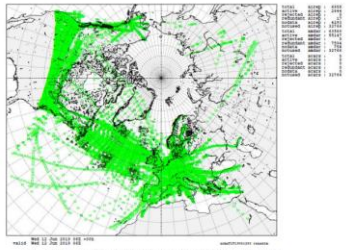


Figure 3.1.3 Upper air observations from aircrafts by June 12 2019

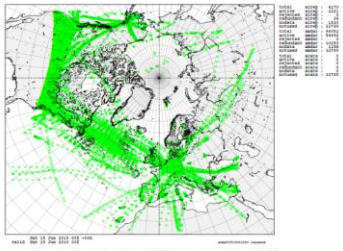


Figure 3.1.4 Upper air observations from aircrafts by June 15 2019

Catalogue of on-going and former Arctic time-limited (research) observation campaigns

A total of 169 projects with in-situ observations surveyed, with 34% with open and free data

Table 5. Distribution of identified time-limited projects in the various categories of data availability

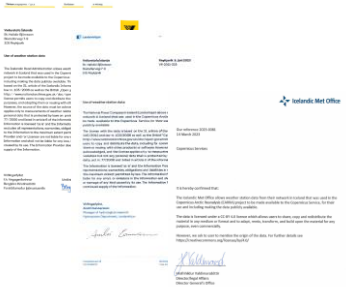
Category	Number of EU funded projects	Number of nationally funded projects	Number of regionally projects	Sum
Project has made in-situ observations and data freely available	14	37	6	**57**
Data is centrally managed with access based on request (uncertain if it is free or not)	7	62	1	**70**
Data is centrally managed without access information	6	9	6	**21**
Data is not centrally managed with access based on request	5	3	3	**11**
Data not centrally managed and without access information	4	4	0	**8**
Project has not made any in-situ observations	23	1	0	**24**
information has not yet been received from coordinator	15	11	0	**26**

Examples of cross-cutting in-situ activities (II)

In situ

Icelandic weather station data used in CARRA (C3S) available to Copernicus

Full time series from 403 weather stations going as far back as 1997 released as open data (CC-BY 4.0 license)



Assessing potential of emerging observations

Feasibility assessment of fishing vessels and marine mammal observations for CMEMS

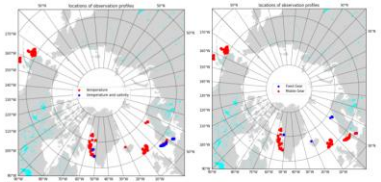


Figure 1. Locations of fishing vessel observations in the Arctic seas. Left figure: red – mobile gear; blue – fixed gear; right figure: red – water temperature profiles only; blue – both water temperature and salinity profiles are available.

Inventory of relevant sea ice and snow observations

Inventory and report to be ready in Q4 2024

General for the data set	For each parameter
Snow Data ID	Instrument
Data set name	Unit
Version number	Accuracy
Description	Temporal coverage
DOI	Temporal resolution *1min, 10min, 1h, daily, weekly, monthly, other*
Location *Latitude / Longitude / Elevation / Country / Free description*	Spatial resolution *horizontal, for snow courses etc.*
Snow parameters *snow depth, snow density, SWE, layers, hardness, wetness, grain size, grain type, LWC, SSA, reflectance, albedo, black carbon content, precipitation, precipitation particle type, backscattering, brightness temperature, partial snow cover, snow temperature, snow isotopes, snow surface temperature etc.*	Vertical resolution *height in snowpack*
Other parameters *link or access point; soil frost, air temperature, topography, landcover type, land use type, etc.*	Measurement protocol
License *e.g. CC-BY 4.0*	Category *automated / manual / semi-automated*
Access to data *e.g. downloadable from website, contact person*	Other remarks
Related materials *e.g. use cases, applications, publications (DOI)*	
Measurement protocol	
Other remarks	

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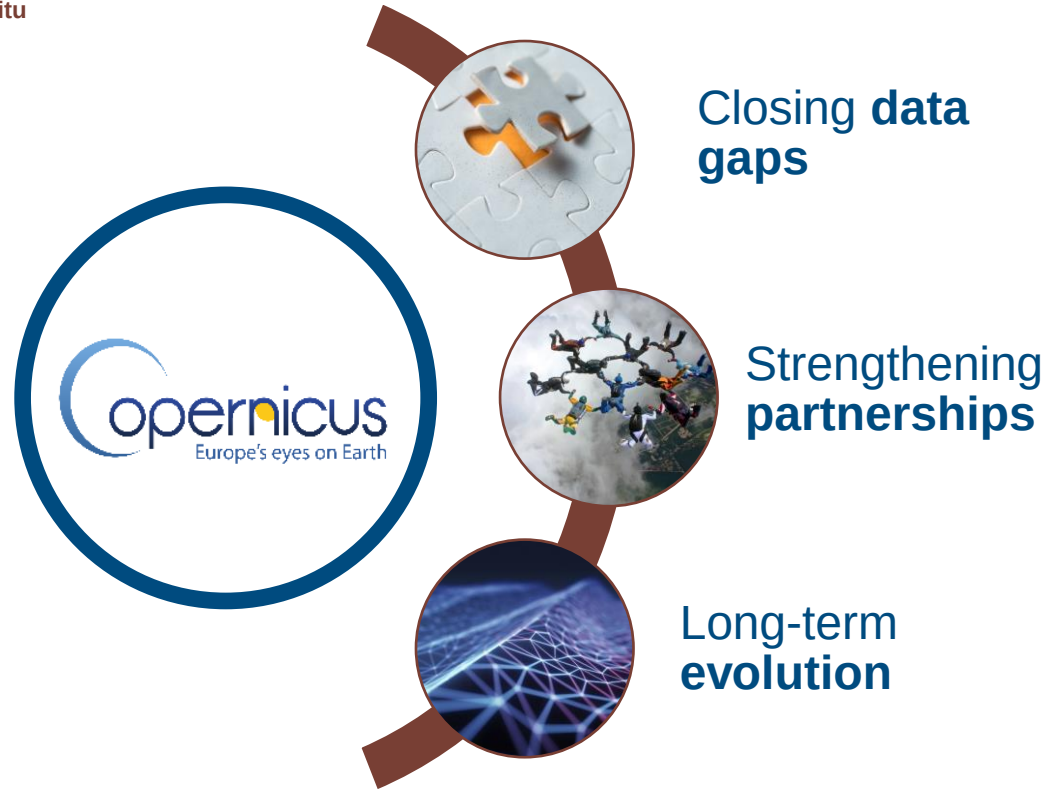
Evolution of the Copernicus In-Situ component

In situ



Closing **data gaps**

Strengthening **partnerships**

Long-term **evolution**

Evolution of the Copernicus In-Situ in the polar regions

In situ

Closing **data gaps**

Strengthening **partnerships**

Long-term **evolution**

- ✓ **Data sparse regions, including polar areas**
- ✓ **Sustainable research infrastructures and initiatives**

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Evolution of the Copernicus In-Situ in the polar regions

In situ

Closing **data gaps**

Strengthening **partnerships**

Long-term **evolution**

- ✓ Data sparse regions, including polar areas
- ✓ Sustainable research infrastructures and initiatives
- ✓ **International arrangements with relevant countries (e.g. Canada)**
- ✓ **UN initiatives such as WMO SOFF**

Evolution of the Copernicus In-Situ in the polar regions

In situ

Closing **data gaps**

Strengthening **partnerships**

Long-term **evolution**

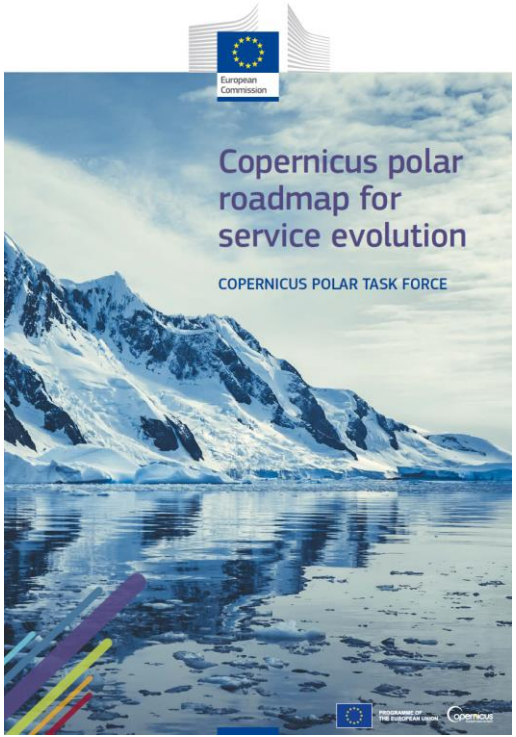
- ✓ Data sparse regions, including polar areas
- ✓ Sustainable research infrastructures and initiatives
- ✓ International arrangements with relevant countries (e.g. Canada)
- ✓ UN initiatives such as WMO SOFF
- ✓ **In-situ needs of relevant new missions (CRISTAL, ROSE-L, CIMR)**
- ✓ **Research to operations**

Copernicus In-Situ and the Polar Roadmap

In situ

How could Copernicus In-Situ contribute to the implementation of the roadmap?

- Overview of requirements and data availability
- Collaboration with polar scientific and research networks
- Open up more observational data, NRT
- Enrich in-situ knowledge of the Arctic Hub
- Data rescue activities
- Explore the value of novel observation technologies and alternative data sources
- Support cal/val missions

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