# Copernicus Marine Environment Monitoring Service (CMEMS) and Polar regions monitoring

**Antonio Reppucci**
Mercator Océan

*INTAROS Workshop*
*Brussels, 05th of May 2017*

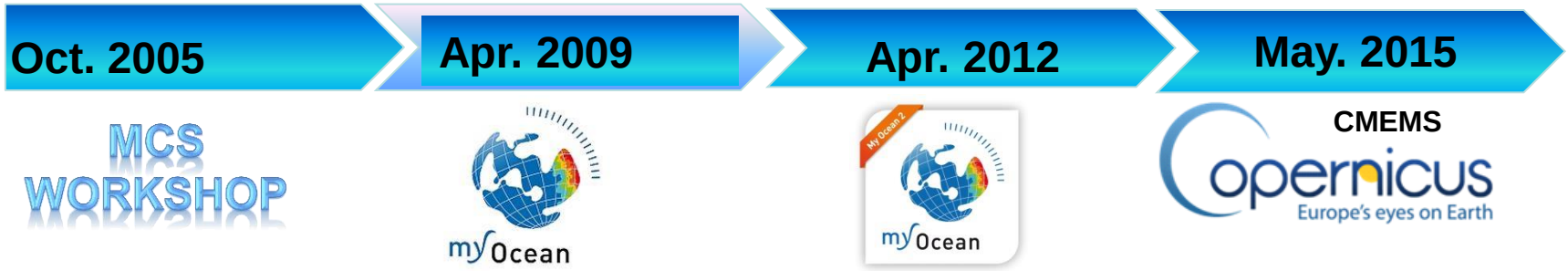
European Commission

Copernicus
Europe's eyes on Earth

Implemented by

MERCATOR OCEAN
OCEAN FORECASTERS

# The CMEMS




•The formative Workshop held in Brussels on **October 2005** led to the acceptance of the Marine Core Service as a GMES Fast Track.

• MYOCEAN Project, with its 61 partners from 29 countries, was launched on **April 2009** by a 'European ceremony' which brought together all 'Marine' actors in Toulouse.

•**May 2015**: CMEMS service starts for users.

# The CMEMS

**8000 + Subscriber**

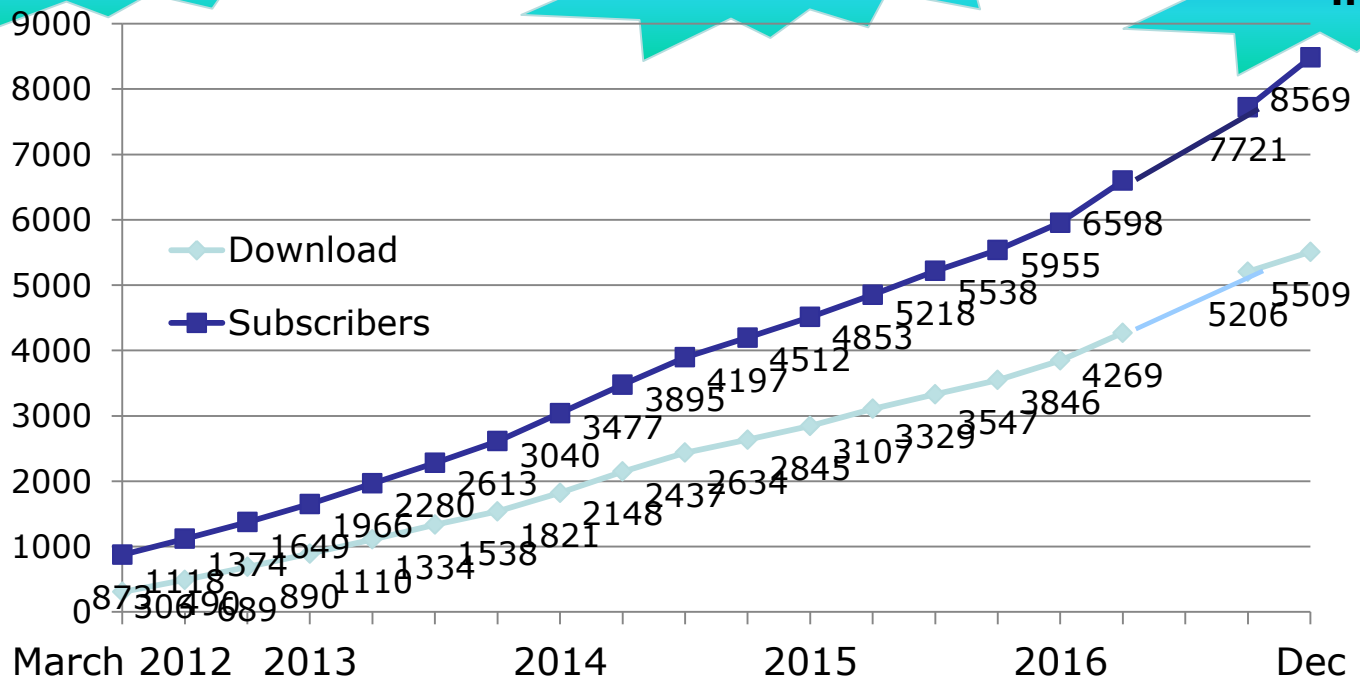
**120 + countries**

**350 Tb Disseminated**

**1650 organizations**

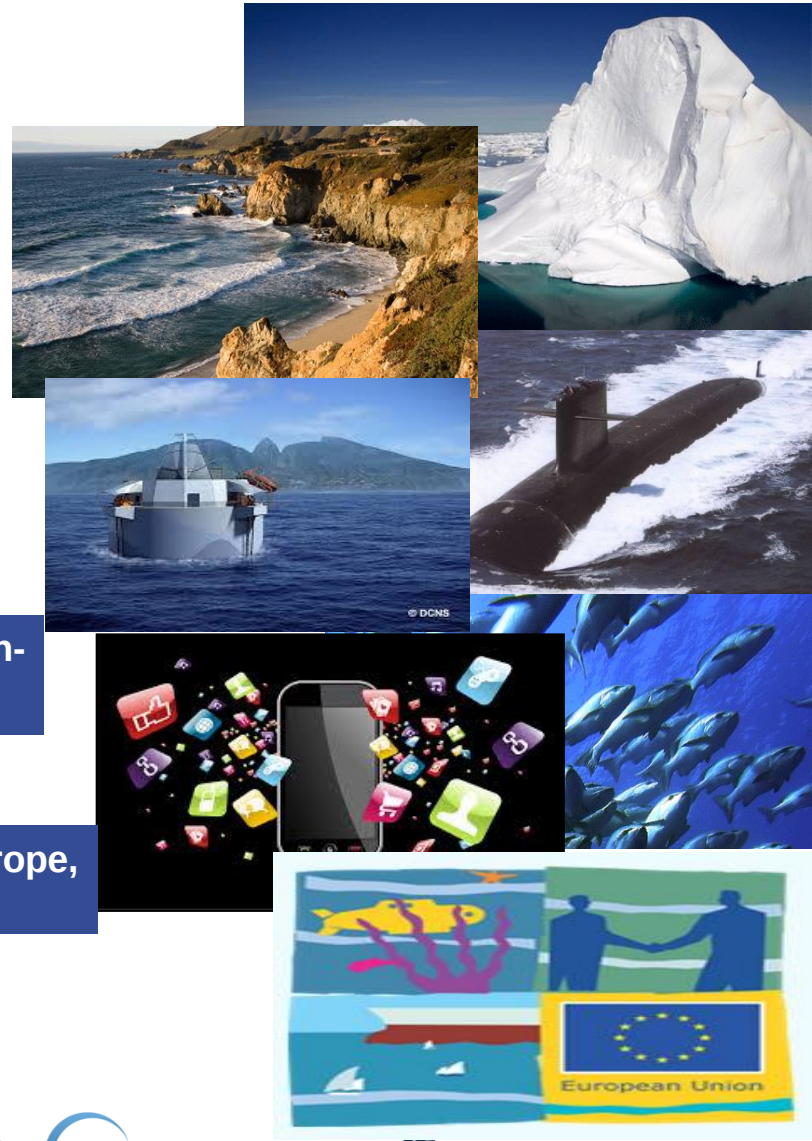
**31 M Transactions**

**4.8/5 user satisfaction metric**



# The CMEMS

## Drivers




- **Support a sustainable ocean and blue growth**

**Coastal Environment, Marine policies and public information, Marine operation and Safety, Marine Pollution, Research, Climate, New Services.**

- **Provide pioneering solutions**

**Operational and scientifically assessed, Worldwide and European-wide coverage, long-term sustainability, thousands of users.**

- **Provide Open and easy access to marine data**

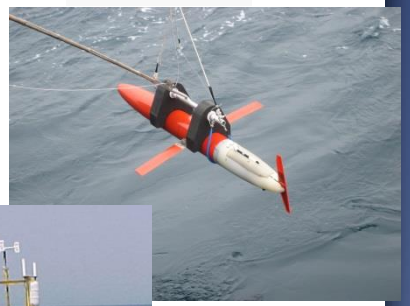
**Open and free data policy, network of producers throughout Europe, Modular organization, Common standards, Single point of access.**

# The CMEMS

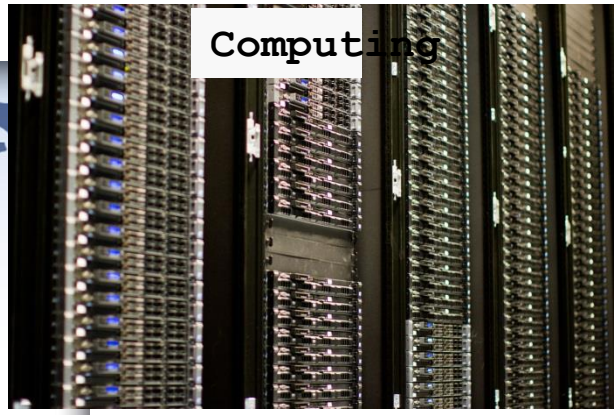
## Implementation

### A pan-European distributed platform for securing production & service

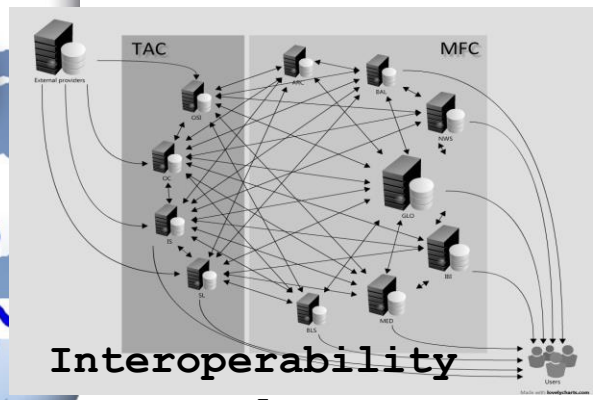
Space data



In-situ data

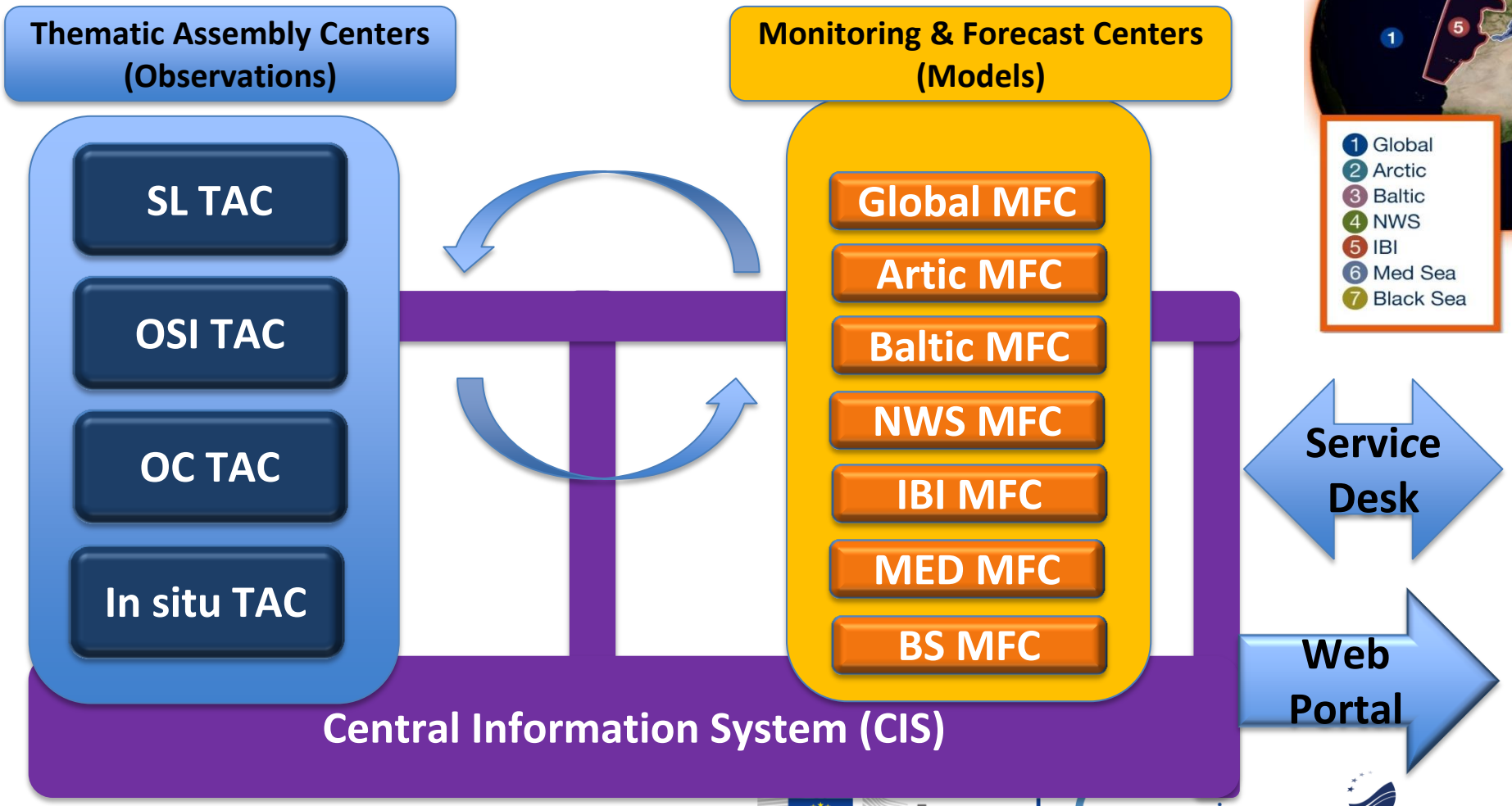
Computing




Interoperability Protocols

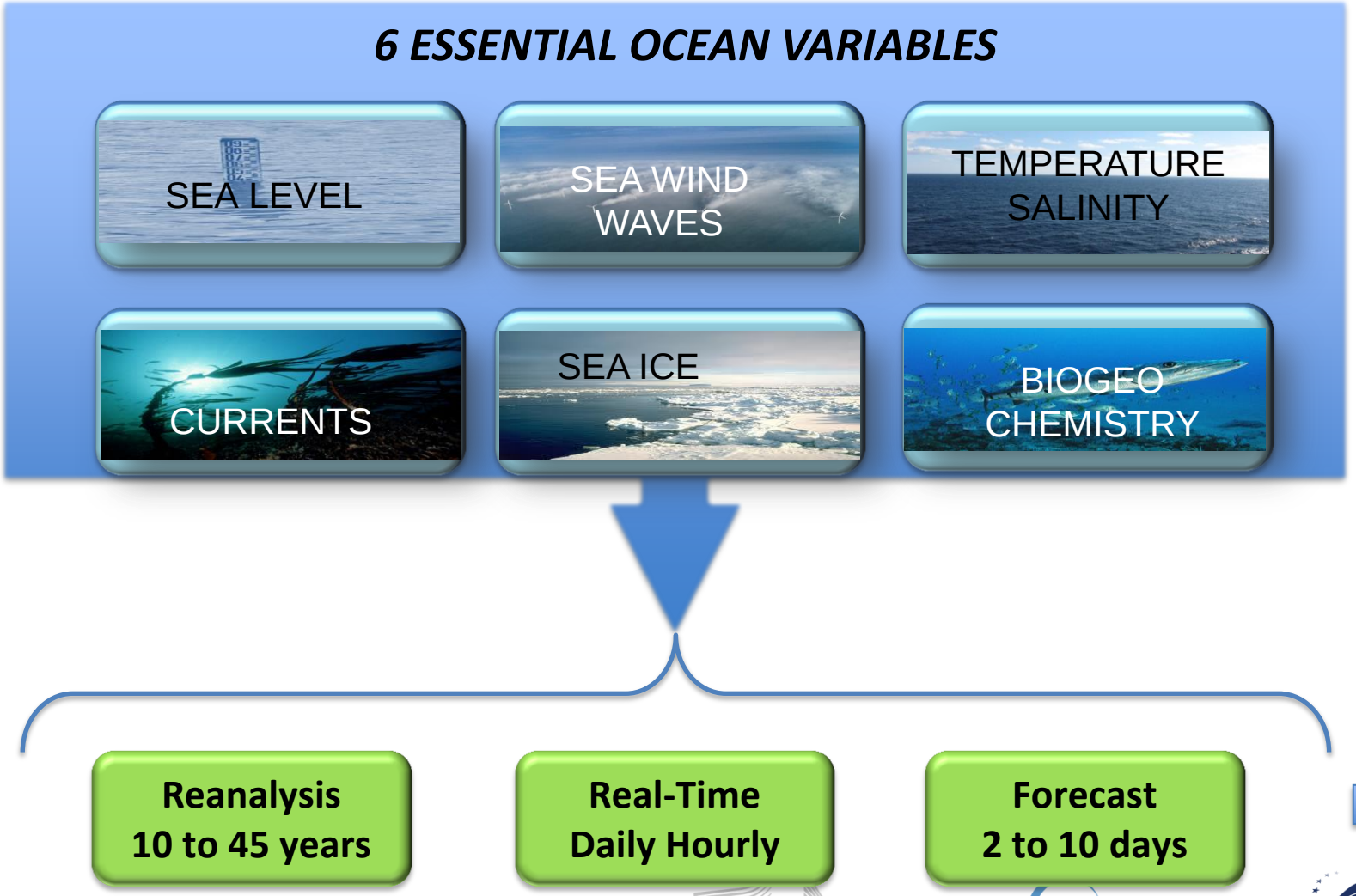
# The CMEMS

## Architecture

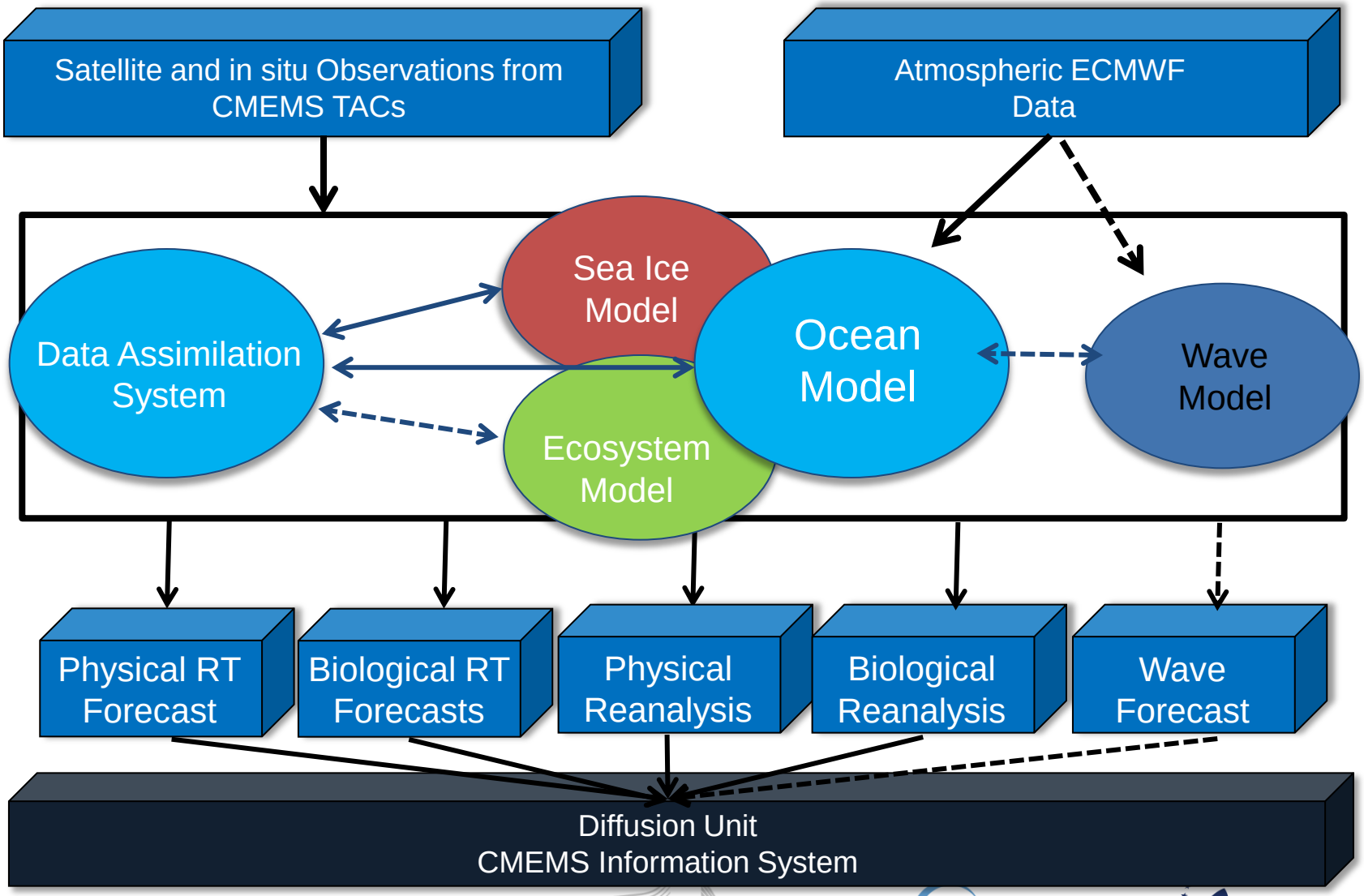


# The CMEMS

## Products:



# Products Generation



# Catalogue of Products for the Polar Regions

**Model products:**

Sea Surface: Temperature, Salinity, Height.

Sea Ice: Coverage, Thickness, Drift, surface Temperature.

BGC: Nutrients, Phytoplankton, Oxygen.

Waves: SWH, peak period, mean direction.

NRT, Forecast and analysis

Source: (Arctic MFC, Baltic MFC and Global MFC

**In Situ Observation products:**

Surface Temperature, Sea Surface Salinity, Height, Currents.

NRT and Reprocessing

Source: INS TAC

**Satellite Observation products:**

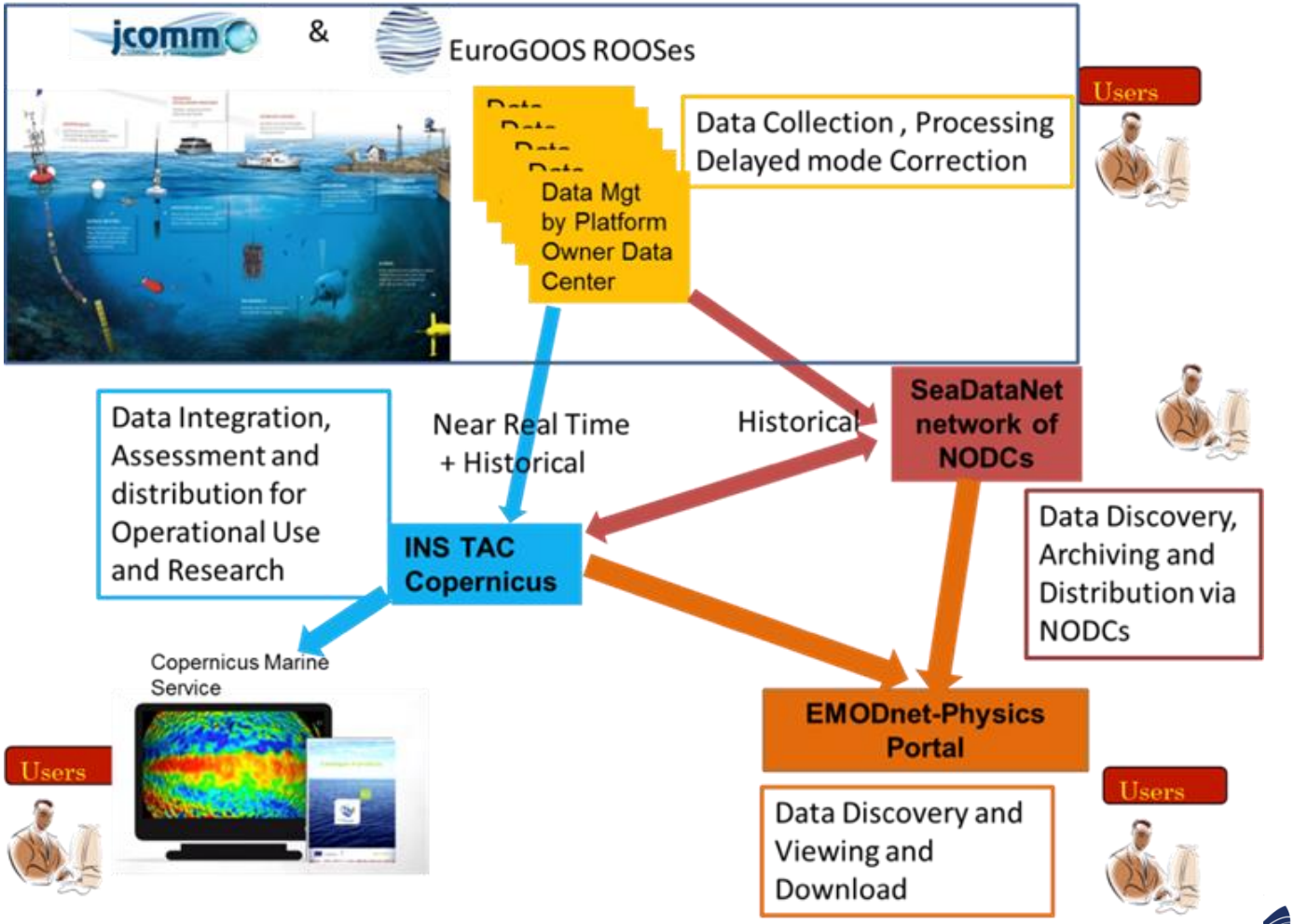
Sea Level, CHL, Optical Properties, Sea Surface Temperature, Sea Winds, Sea Ice, Temperature, Drift Edge, type, Iceberg Density.

NRT and Reprocessing

Source: OSI TAC, OC TAC, SL TAC

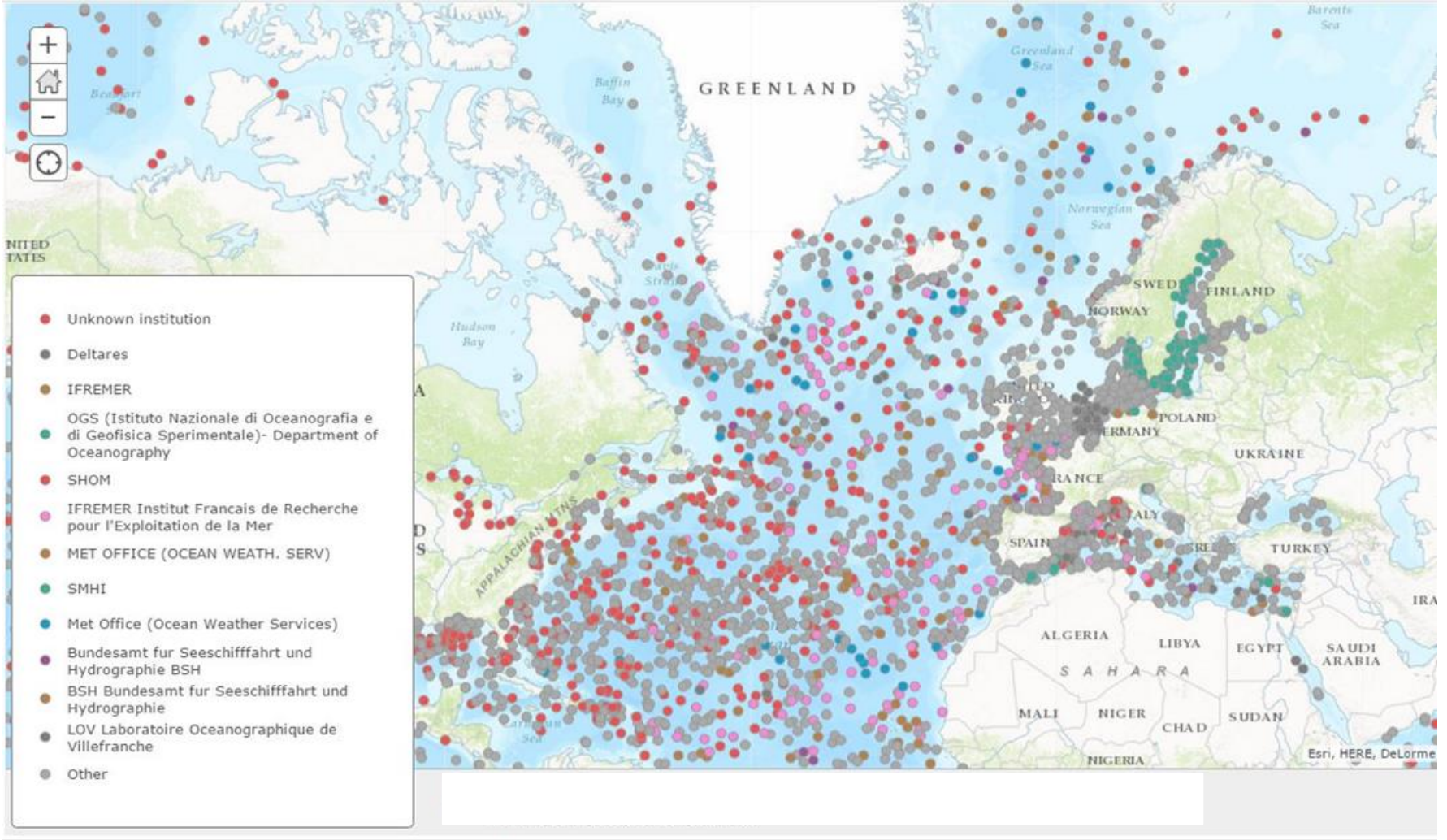
# Status of In-situ infrastructure

Major EU initiatives to standardize and improve data integration and dissemination



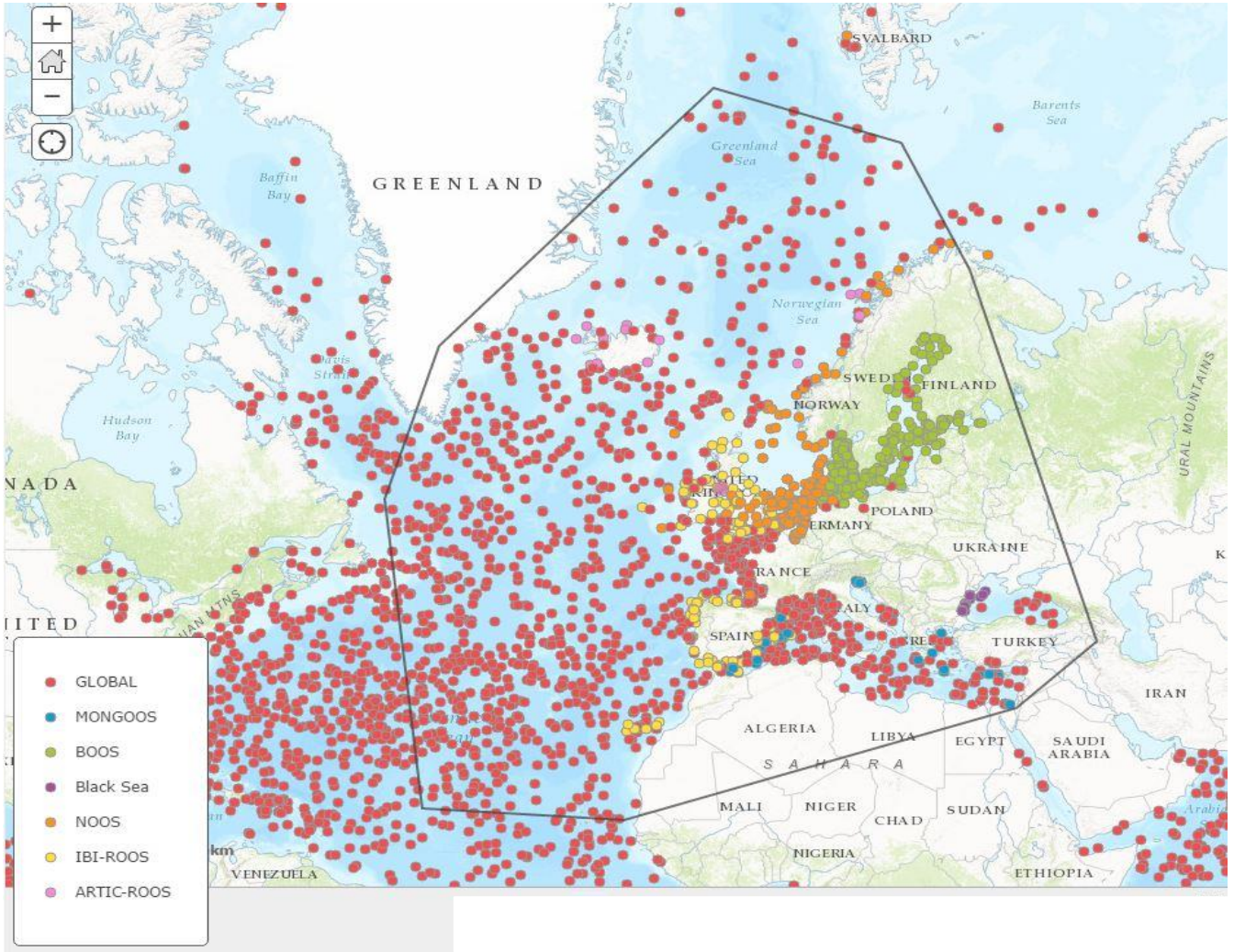
# Status of In-situ infrastructure

133 institutions providing data to CMEMS INSTAC in the European Seas



# Status of In-situ infrastructure

## 2095 In-situ platforms in CMEMS INSTAC




| Regional TAC | Number of Platforms |
|---|---|
| Global | 1300 |
| NOOS | 306 |
| BOOS | 260 |
| IBI-ROOS | 138 |
| MONGOOS | 55 |
| Black Sea | 19 |
| Artic ROOS | 17 |
| TOTAL | 2095 |

Number of in situ platforms providing data during the last year in the European Seas

# CMEMS In-Situ Gaps & requirements

Requirements were established in the framework of GISC Project. Requirements may be updated regularly by CMEMS.

**General Requirements:**

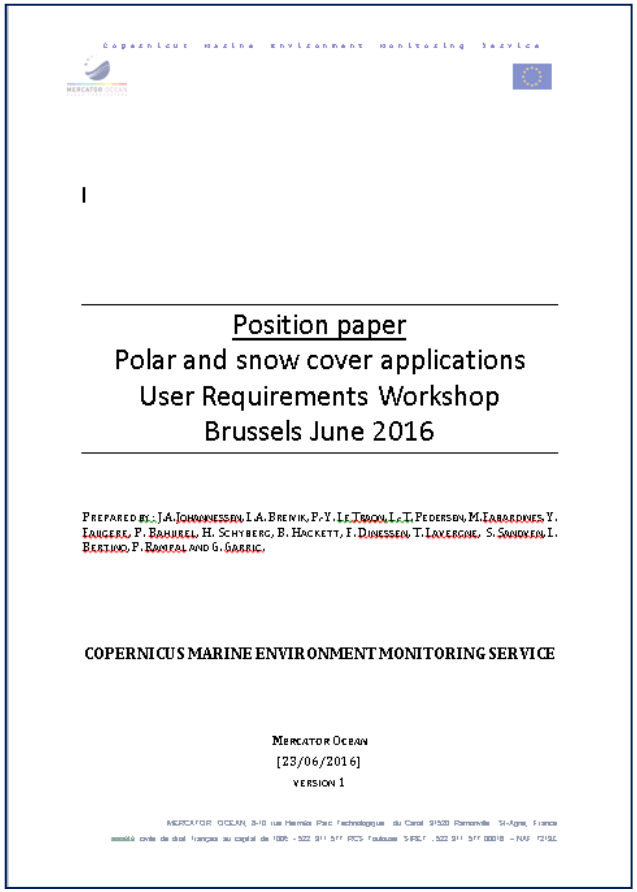
- Need of continuous observations systems, in near real time.
- Increase the number of deployed sensors (in particular in the thermocline/halocline).
- Enlarge the spatial coverage (Shelves).

**Specific Requirements:**

- In situ observations from ships and drifting surface buoys are scarce in most locations and must be strengthened.
- ARGO floats (physics and Bio) can operate in polar areas (implementation is on going).
- Ice drift platforms (e.g. ITP) are able to provide profiles from the upper part of the water column.
- Biogeochemical observations (oxygen, nutrients, Chl-a, Carbon/Ph). Need new or improved observing systems (BGC-Argo).
- Sea ice observations using in situ methods are important for ice/snow thickness and temperature measurements (IMB). These data are important for validation of the satellite retrievals, and for assimilation in operation models.

# CMEMS Satellite Requirements for Polar Monitoring

**Position Paper** prepared by (Alphabetical Order) : L.A. Breivik, F. Dinessen, Y. Faugere, G. Garric, B. Hackett, J.A. Johannessen, T. Lavergne, P.-Y. Le Traon, L.-T. Pedersen, S. Sandven and H. Schyberg.



Position paper
Polar and snow cover applications
User Requirements Workshop
Brussels June 2016

PREPARED BY : J.A. JOHANNESSEN, L.A. BREIVIK, P.-Y. LE TRAON, L.-T. PEDERSEN, M. FABRADNES, Y. FAUGERE, P. BAHUREL, H. SCHYBERG, B. HACKETT, F. DINESSEN, T. LAVERGNE, S. SANDVEN, I. BERTINO, P. RAMPAL AND G. GARRIC,

COPERNICUS MARINE ENVIRONMENT MONITORING SERVICE

MERCATOR OCEAN
[23/06/2016]
VERSION 1

# CMEMS Satellite Requirements for Polar Monitoring

- Continuation and improvement of the sea ice thickness time series from Cryosat-2. For climate and operational sea ice monitoring activities (including assimilation in sea ice models).
- Continue the altimetry sampling over the ocean in Polar Regions (data assimilation) (e.g. for improved ocean currents).
- Reliable restitution of sea level in the leads to reach the retrieval accuracy required to monitor Climate Change.
- Continuation of SMOS like observations of thin sea ice below 0.5 m.
- Sustainable operation of medium-resolution (5-10 km) multi-frequency and - polarization passive microwave observations of sea ice lead fraction and sea ice concentration, area and extent.
- Automated production of ice chart-like products from a combination of SAR data and other data (e.g. bi-static SAR, passive microwave, multi-frequency SAR).
- Reliable restitution of ocean colour in the marginal ice zone

# Thanks for Your Attention!

# marine.copernicus.eu