

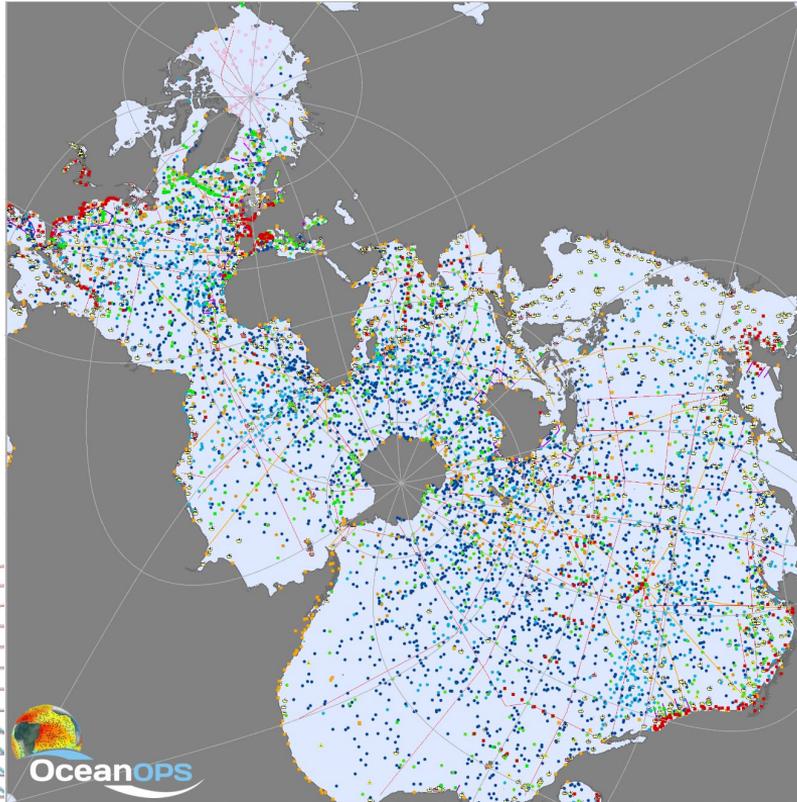
amrit

Advance **Marine Research Infrastructures** Together

EOOS Technical Support Centre: supporting operations at sea for EOOS

- AMRIT lays the cornerstone for the European Ocean Observation System with the Technical Support Centre
- AMRIT prepares for the future of Marine Research Infrastructures in Europe

From national, European to global Ocean Observing Systems: a complex techno-socio-economic system



- OOSs collect (in-situ) data based on the requirements of the society, including research (**GOOS Framework for Ocean Observing**)
- Many OOSs are organised using networks such as ARGO, OceanSITES, FerryBox, etc.
 - **EOVs: From platforms & sensors to information and services**
 - From local to global, from events to the long term
 - In synergy with the satellite component
- Many operators/Principal Investigators involved from
 - Operational agencies (Met. Offices, ...)
 - **Marine Research Infrastructures**
 - Research performing organisations, incl. Universities
 - And also from NGOs, companies, ...
- A complex organisation and governance
 - Composite: National, Regional/European, Global networks
 - Heterogeneous between countries
 - Blends the organisation and working streams of operational agencies and international scientific networks
 - At global level, it is managed by two specialised UN agencies, WMO and UNESCO
 - **Funded by very diverse sources, often unsustainable**

European Ocean Observing System



EOOS Roadmap for Implementation 2023-2027

Co-designing EOOS

<https://www.eoos-ocean.eu/>

- EOOS' Mission is to coordinate and integrate European communities and organisations operating, supporting and maintaining ocean observing infrastructures and activities, fostering collaboration and innovation
- Most key European stakeholders for ocean observing are engaged in the EOOS framework (EuroGOOS, EMB, JPIO, Emodnet, CMEMS, MRIs, GOOS NFPs, ...)
- In the context of the recent Ocean Pact, upcoming Ocean Act and Ocean Observing Initiative, the EOOS SG has gained considerable legitimacy with the EC Directorates-General (DG MARE, etc.)
- But we still do not know how EOOS will take shape !

The current MRI Landscape

FP7, H2020, HE DS
(bottom up)

GROOM

JERICO DS

GROOM II

EuroGO-SHIP 

JERICO ESFRI26

MINKE

FP7, H2020 I3
(targeted or open)

SeaDataNet II

SeaDataNet AISBL

JERICO

JERICO Next

JERICO S3

AMRIT

FP7, H2020 I3
(bottom up)

Eurofleets

Eurofleets 2

Eurofleets+

EF+ AISBL

LIFEWATCH PP

LIFEWATCH ERIC

ANERIS

EMBRC PP

EMBRC ERIC

GEORGE

EMSO PP

EMSO ERIC

TRICUSO

ICOS PP

ICOS ERIC

Euro-Argo PP

Euro-Argo ERIC

2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026

Examples of dashboards: IOOS (US) & EMSO (EU)

EMSO ERIC Facilities

From surface to the deep sea, high-tech platforms carry advanced sensors arrays that measure physical and bio-geo-chemical parameters continuously and in the long-term.



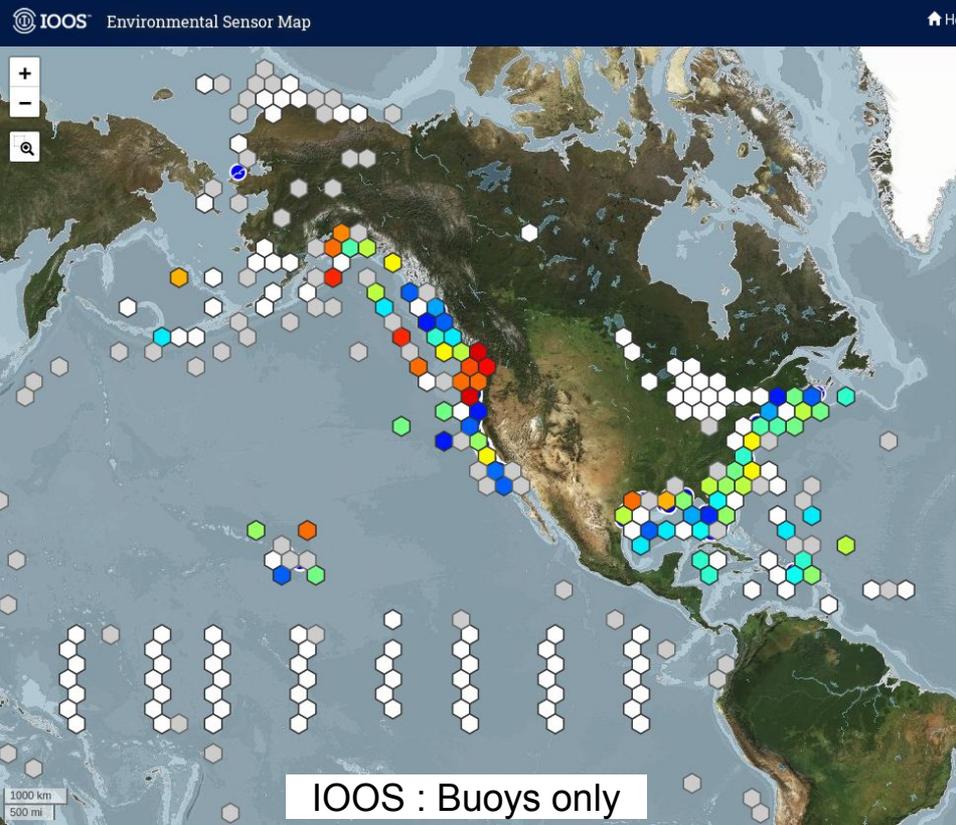
- Black Sea
- Cretan Sea
- EMSO Azores**
- EMSO Canarias
- Hellenic Arc
- Iberian Margin
- Ligurian Sea
- Nordic Seas
- OBSEA
- Smartbay
- South Adriatic Sea
- Western Ionian Sea
- Western Mediterranean Sea

EMSO Azores

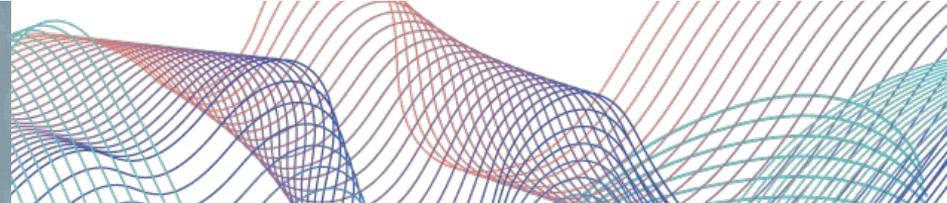
General Information
[EMSO Azores description](#)

Data sources
[EMSO France](#)

Sites
 BOREL2: [Data](#) [Information](#)
 SeaMoN West: [Data](#) [Information](#)
 SeaMoN East: [Data](#) [Information](#)



IOOS : Buoys only



The GOOS Dashboard

maintained by OceanOPS <https://www.ocean-ops.org/>



Funded by
the European Union



Search



Submit



Charts



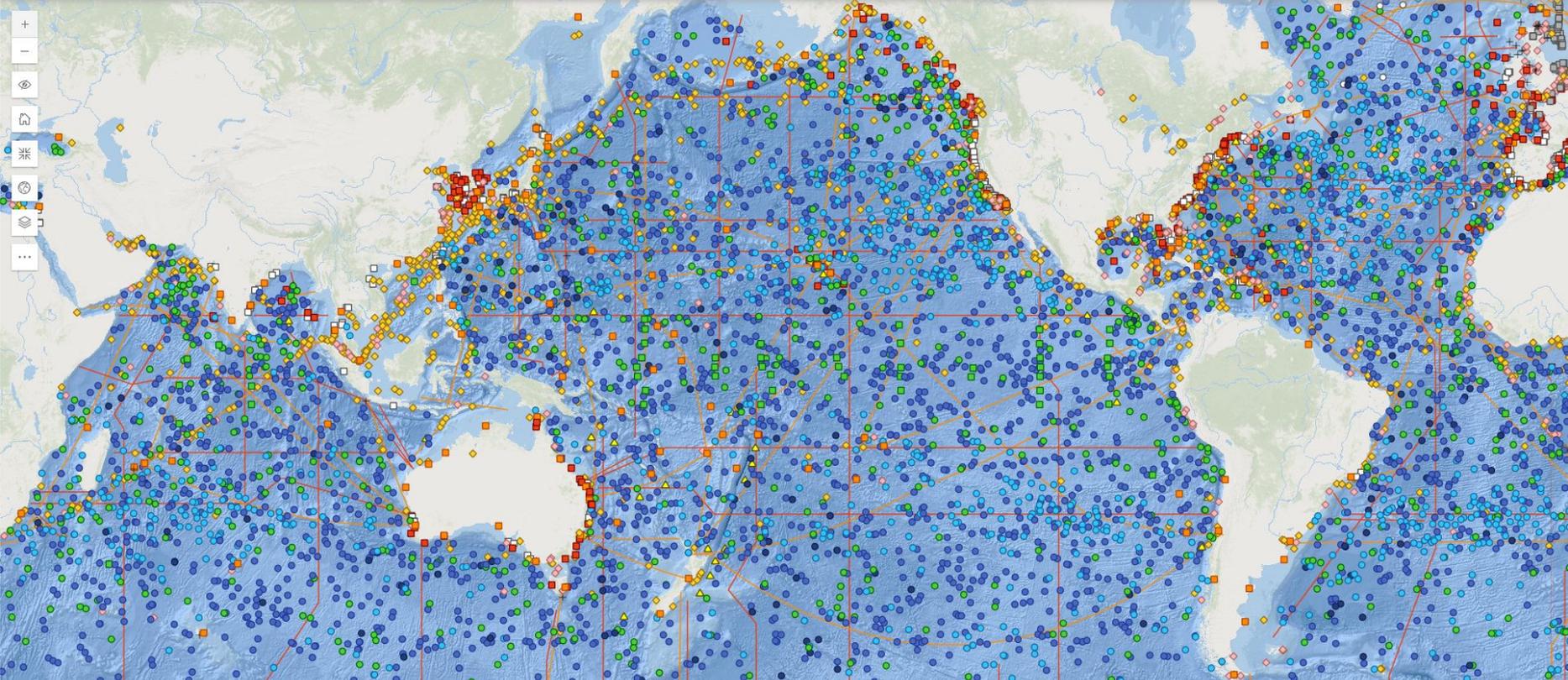
Maps



Metrics

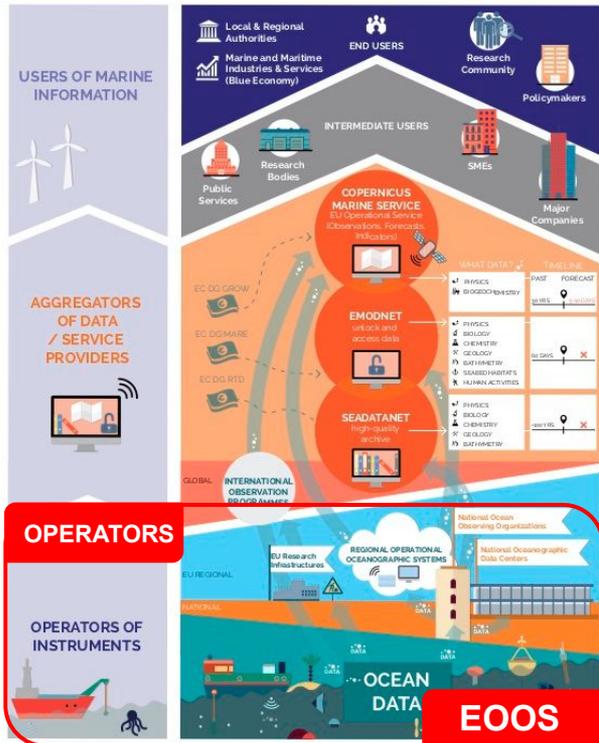


Log In

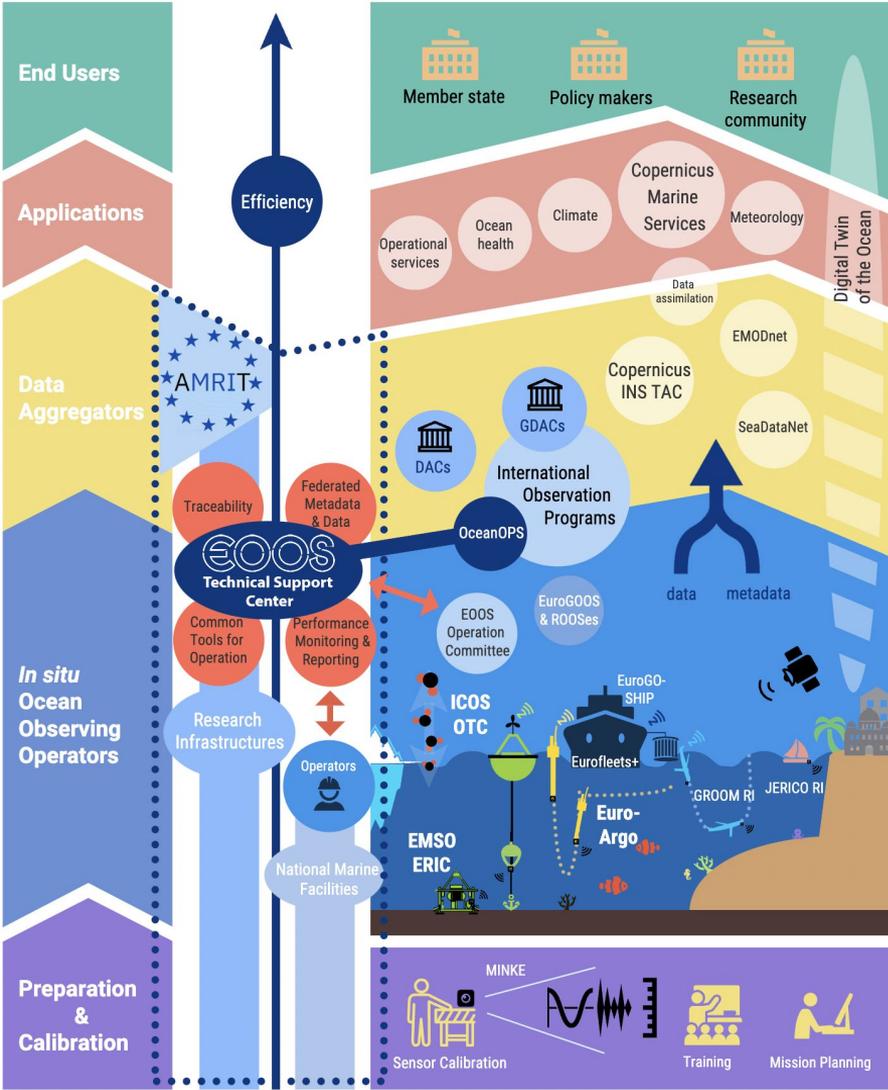


Why AMRIT is needed? For Copernicus and EOOS

COPERNICUS MARINE SERVICE and marine sea-borne observation infrastructure



- Copernicus Marine Service relies on a loose organisation for data collection
 - ⇒ need for EOOS. EOOS provides data for CMS, but also addresses research, policies like MSFD, CFP, etc.
- Weaknesses in the observation area
 - Little coordination for operations at sea between national operators
 - No established mechanism for joint programming and no service to support multi platform offshore operations
 - Many duplication between national operators
 - **Poor metadata descriptors to support operations and to ensure quality and uptake throughout the data value chain**
- ⇒ **An integrated metadata service is essential to solving these problems and advancing the foundation of EOOS ⇒ AMRIT main deliverable**



AMRIT Main deliverable: a sustained EOO S Technical Support Center

- **A federation of existing and new services (API!)**

- Performance monitoring & reporting
- Common tools for operations
- Traceability of the data down to the users and feedback (persistent & unique IDs!)
- Materialize best practices with adequate metadata

⇒ Establish a 'AMRIT scrum team of IT developers' supported by all partners

⇒ Common vocabularies and metadata standards across all MRIs

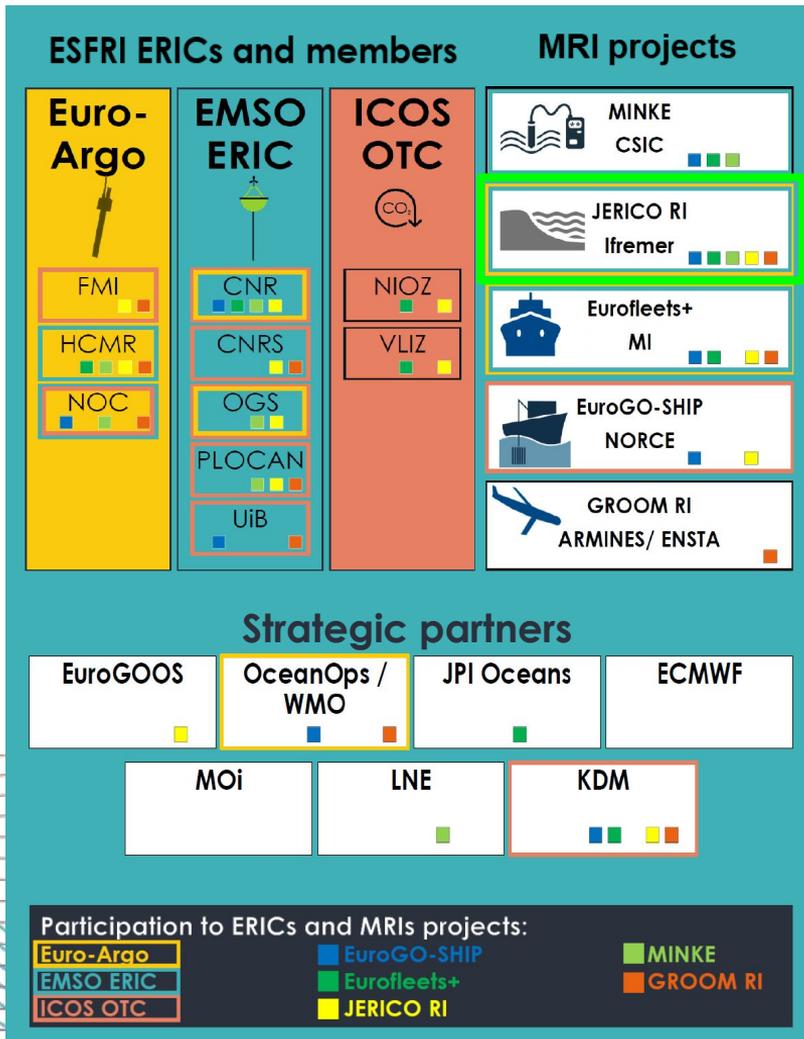
⇒ Issuance of a (unique) Platform Mission Passport

The EOO S TSC will be the single entry point for all operators (operational, MRIs, PIs) supported by OceanOPS / WMO

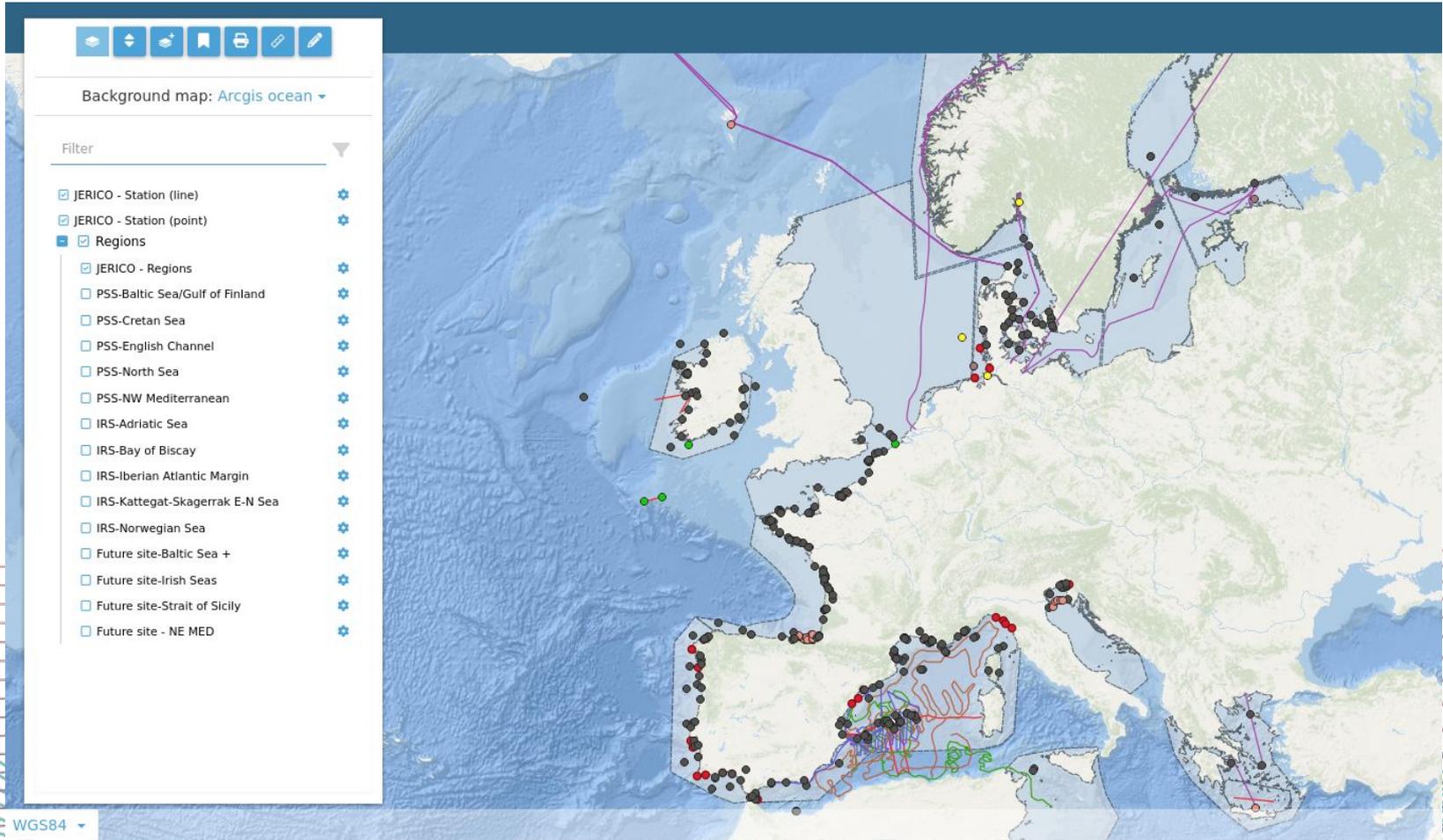
Only all MRIs TOGETHER can advances EOOS

- Based on the 3 marine ERICs focused on marine observations
 - Based on the 5 key MRI projects, seen by the EC as the 'national networks' representing the main observational capacities in the Members States
 - Relies on Copernicus, EOOS and GOOS
- Key players:

- MOi and ECMWF (Copernicus Marine and Climate)
- Coordination and 'Policy' oriented (EuroGOOS, WMO, JPIO)



JERICO RI coastal nodes inventory



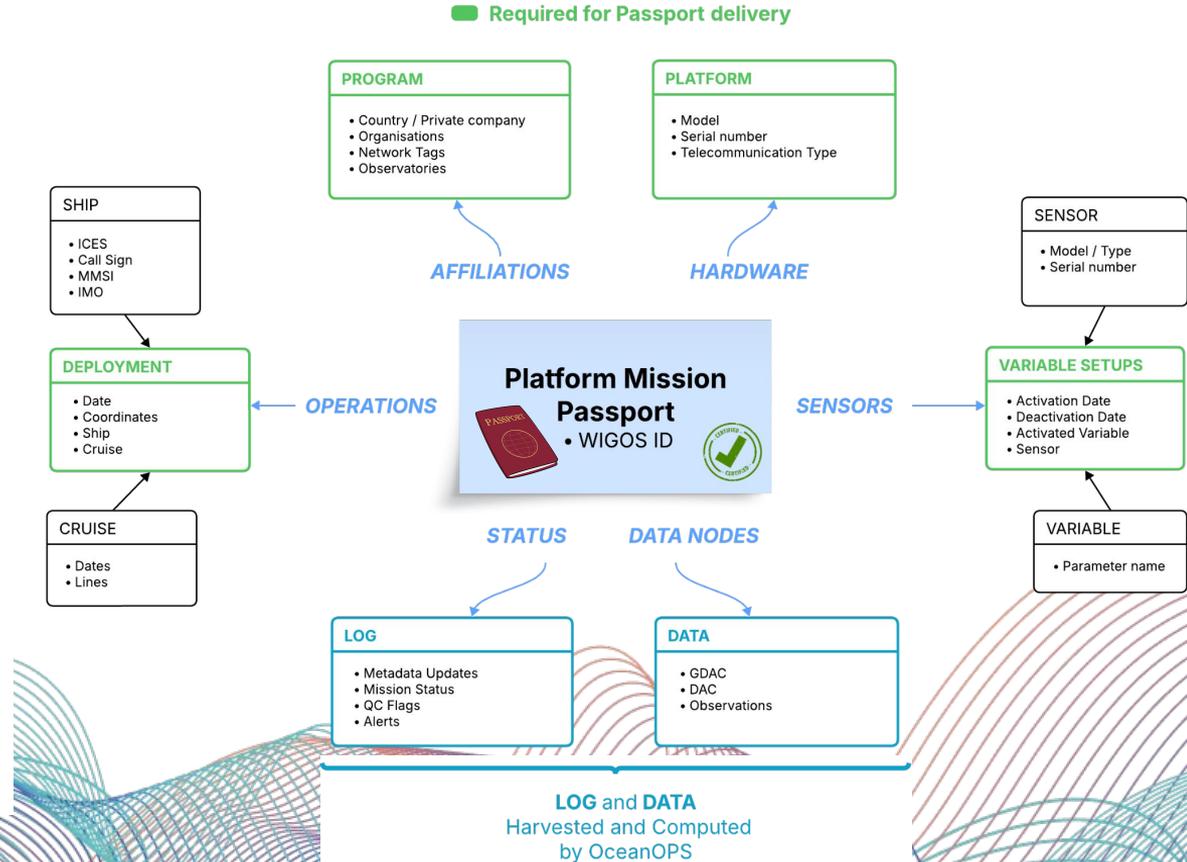
New Concept: Platform Mission Passport for EOOS / GOOS

For each mission, OceanOPS issues a **Platform Mission Passport with a unique identifier (WIGOS-ID)**.

A **platform mission** represents a defined period for an observing platform during which it collects and transmits data in alignment with EOOS/GOOS objectives.

The **required mandatory metadata** criteria ensure the capacity for traceability, interoperability, monitoring, coordination and discoverability.

The issuance of a Platform's Mission Passport therefore serves as validation that the mission meets **EOOS/GOOS objectives**.



API development - Options for data sharing

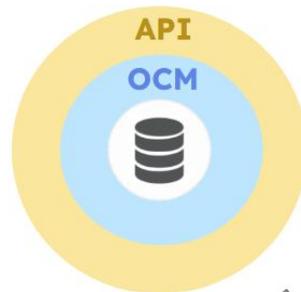


OPTION A
Program's machine
pushes Missions, Ships
and Sensor Setups via
JSON requests

OPTION B
Program provides files to
be harvested directly by
OceanOPS or via an
ERDDAP (CSV, JSON,
NetCDF existing formats)



OPTION C
Program Managers manually
push using OceanOPS and
AMRIT GUI Converters,
Uploaders and Forms



Passport

WMDR



WCMP2

INSPIRE



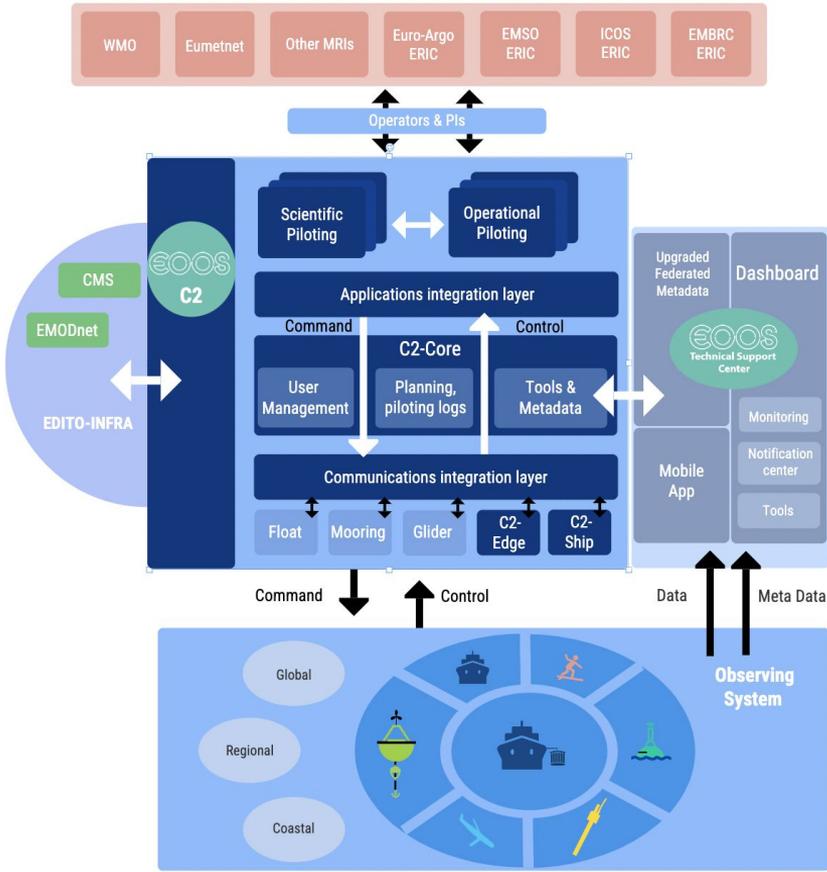
EU Portals

OceanOPS
Applications

AMRIT long term strategy for a general EOOS TSC

- The 'Observation Capability Area' of EOOS is in charge of offshore operations
- In the EOOS Obs. Capability Area, **National Agencies, Research Organisations and MRIs** jointly operate:
 - The **national Ocean Observing Systems, as part of EOOS, contribute to the GOOS / WIGOS**, organised along MRIs and GOOS networks
 - The **EOOS Technical Support Center**:
 - **The current EOOS TSC** developed by AMRIT for metadata
 - **EOOS Sensors / Metrology**, designed by the MINKE project
 - **EOOS Autonomy Command and Control**, a critical need for the future of observation with the massification of autonomous systems
 - EOOS Citizen Science Programme
 - EOOS R&D Programme

EOOS Autonomy Control & Command



- A federation of existing and new ‘Command and Control’ services to remotely operate
 - long range marine autonomous systems (profilers, gliders, USVs, etc.)
 - fixed points observatories
 - underway systems on RVs and SOPs, such as meteo station and pCO2 sensors
 - and digital twins of
 - single systems
 - ocean observing systems and research field campaigns
- ⇒ **Work with the EOOS TSC ‘scrum team’ (AMRIT)**
 ⇒ **Includes NMHS developers (from EumetNet, NOAA)**
 ⇒ **rely on ocean digital twin architecture E-DITO**
- A single entry point for all operators (operational, MRIs, PIs, etc.)
 - A cloud architecture based on core and edge computing

Integration of Coastal Ocean Observations along Europe

- Integration of metadata descriptors for coastal observations has begun during AMRIT using the EOOS/GOOS passport
 - With JERICO RI coastal nodes
 - Being tested by VLIZ, CNR, OGS, PLOCAN, FMI, HCMR, MI, CSIC, Ifremer
 - Can be extended to any coastal ocean observer - contact support@ocean-ops.org
 - Tutorial material, github, ... will be available soon and widely disseminated
- By design, this integration is coherent with all other ocean observations delivered by
 - European MRIs
 - GOOS networks (ARGO, OceanGliders, OceanSites, etc.)
 - This ensures a standardized flow of data from operators to end users and makes feedback possible
- The EOOS Technical Support Centre will
 - Maintain the services
 - Which will ensures a standardized flow of data from operators to end users and makes feedback possible



amritproject.eu

laurent.mortier@ensta.fr