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|---|---|
| **Topic** | H2020 – INFRAIA-2018-2020 |
| **Short Title** | Eurofleets+ |
| **Title** | An alliance of European marine research infrastructures to meet the evolving requirements of the research and industrial communities |
| **Project Number** | 824077 |
| **Delivery Date** | 22.07.2021 |
| **Deliverable No** | D5.2 |
| **Lead Beneficiary** | EMSO ERIC |
| **Dissemination Level** | Public |

# D5.2 Report and recommendations from International Workshop 1

| Document information | |
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|---|---|---|---|
| | **Name** | **Organisation** | **Date** |
| **Coordinator** | Aodhán Fitzgerald | Marine Institute | 22.07.2021 |
| **Activity Coordinator** | Paolo Favali | EMSO ERIC | 21.07.2021 |
| **WP Leader** | Valentina Tegas | EMSO ERIC | 21.07.2021 |

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| **V0** | First Release | Full Review | Valentina Tegas |
| **V1** | Second Release | Full Review | Paolo Favali |
| **V2** | Third Release | Full Review | Valentina Tegas |
| **V3** | Fourth Release | Full Review | Paolo Favali |
| **V4** | Fifth Release | Full Review | Giuseppe Magnifico, George Petihakis, Sandra Sà, Lorenza Evangelista |
| **V5** | Sixth Release | Full Review | Paolo Favali, Valentina Tegas |
| **V6** | Final Release | Full Review | Aodhán Fitzgerald |



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## Executive Summary

Deliverable D5.2 “Report and recommendations from International Workshop 1” compiles the key outcomes and suggestions raised during the 1st International workshop, entitled "Combining fixed and mobile ocean observing systems and their link with satellite observations". This workshop was organized online by the Eurofleets+ project on the afternoon of April 13th, 2021.
The workshop aimed at connecting fixed and mobile ocean observing infrastructures' operators and stakeholders for the benefit of greater coordination and integration, that would undoubtedly translate into efficiency and more and better data for improved services to societal challenges concerning climate change for example.

The event had five invited speakers after a short introduction on the Eurofleets+ project, its objectives and future plans to evolve towards a distributed Infrastructure for the long-term and sustainable coordination of the Research Vessels (RVs) in Europe (EUROFLEETS RI). The first two invited speakers represented the European Commission (EC) and the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT). The EC representative briefly outlined the strategy, trends and priorities of the 9th European Framework Programme for Research and Innovation (Horizon Europe, 2021-2027) in the environmental-marine domain. The EUMETSAT representative briefly outlined the strategy, trends and priorities of Horizon Europe in the space domain in relations to the marine one.
The other three invited speakers came from fixed-point and mobile research infrastructures (RIs: EMSO ERIC and EuroARGO-ERIC) and from a project dealing with gliders (GROOM-II). To stimulate discussion during the workshop, four key concepts towards an interdisciplinary framework of excellent science with fit-for-purpose technology were proposed in line with the Horizon Europe objectives and the UN Decade of Ocean Science for Sustainable Development (2021-2030).

The workshop was announced through the Eurofleets+, EurOcean and EMSO ERIC websites and distributed to all related networks, requesting the registration via Evenbrite. This process was very successful with 218 registered including participants form non-European countries (e.g., Africa and Asia), during the meeting the attendance reached peaks of over 140 participants.

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# 2 Workshop Description

The 1st Eurofleets+ International workshop "Combining fixed and mobile ocean observing systems and their link with satellite observations" was organized online on April 13th, 2021 due to the COVID-19 restrictions, lasting there and half hours in total.

The interdisciplinary nature of the Earth System demands a much more coordinated and interconnected organization of research infrastructures and significant efforts for interoperability and harmonization of research infrastructure operations to meet the environmental and societal challenges of today. The remote sensing community will benefit from fast, cheap and efficient satellite sensor calibrations for accurately measuring Essential Ocean Variables (EOVs). The fixed cabled and stand-alone submarine observation systems of EMSO ERIC, EuroARGO-ERIC, and other mobile observation systems including RVs, are oceanic observing assets that together with the Earth Observation System's satellite sensors provide data on a larger temporal and spatial scale, with better resolution and accuracy.

The organizers of the workshop were EMSO ERIC, MI, CNR, HCMR and EuroOcean. The event was hosted on Zoom Platform and an expert moderator/facilitator was contracted to manage the on-line event.

The workshop aimed at connecting the principal operators for the benefit of greater coordination and integration that will undoubtedly translate into efficiency and delivery of more and better data while connecting to public/societal concerns related to important issues, such as climate change for example. The RV operators represented by Eurofleets+ are central and fundamental players in this scenario, and it is essential that they act in a coordinated and integrated mode with all the other actors.

One of the crucial points presented and discussed was "to define the challenges for which an interdisciplinary and integrated approach can deliver benefits not reachable when working independently".

TARGET AUDIENCE was identified in the following communities:

- vessels operators;
- fixed-point observatories (coastal and deep-ocean);
- mobile systems (unmanned vehicles, ARGO floats);
- remote sensing (airborne, satellite).
-

The detailed workshop agenda is included in Annex 6.1.

**WORKSHOP STRUCTURE:** The event had five invited speakers preceeded by a short introduction on the Eurofleets+ project, its objectives and future plans to evolve towards a long-term sustainable distributed Infrastructure for the coordination of RVs in Europe (EUROFLEETS RI). The first two invited speakers represented the European Commission (EC) and the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT). The EC representative briefly outlined the

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strategy, trends and priorities of Horizon Europe in the environmental-marine domain. The EUMETSAT representative briefly outlined the strategy, trends and priorities of Horizon Europe in the space domain in relation to the marine one.

The remaining speakers came from fixed-point and mobile RIs (EMSO ERIC and EuroARGO ERIC) and from an H2020 infrastructure project on gliders (GROOM-II). To stimulate discussion during the workshop, four key concepts towards an interdisciplinary framework of excellent science with fit-for-purpose technology were proposed in line with the UN Decade and Horizon Europe objectives (see below for details).

The speakers are listed below:

- Eurofleets+, Aodhán Fitzgerald;
- EC DG RES & INN, Agnès Robin;
- EUMETSAT, Estelle Obligis;
- EMSO ERIC, Juan José Dañobeitia;
- EuroARGO-ERIC, Sylvie Pouliquen;
- GROOM-II, Laurent Mortier.

A *copy* of all the presentations is enclosed in Annex 6.2.

As outlined above, the organizers of the workshop defined the following four key concepts (see Table 1 for the detailed explanation):

1. cooperation;
2. coordination;
3. integration;
4. simplification.

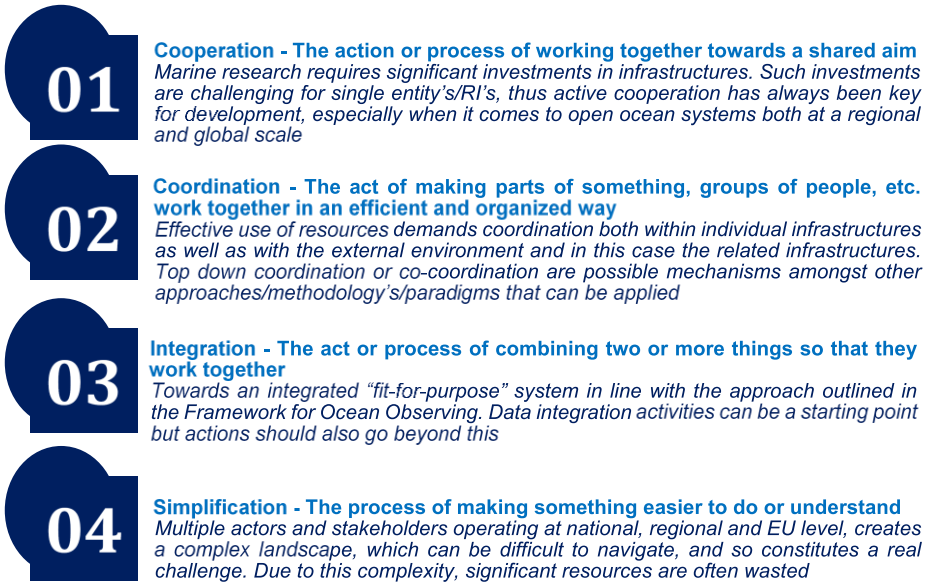


*Figure 1 Definition of the four "key-concepts" and their tuning to the scientific domains*

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Each of the last three invited speakers were asked in their presentations to briefly address three questions related to the above four "key concepts", before breaking into small discussion groups to further explore the matter. The questions to be addressed were:

a) **What are the main actions [*Name of RI]* is doing to achieve/implement/advance/deliver on these key concepts?**
b) **What are the principal gaps/barriers [*Name of RI*] has identified to their implementation?**
c) **What plans are in place to bridge the identified gaps/barriers in a short-term (1-3ys), medium-term (4-6ys) and long-term (10ys)?**

Additionally, a list of representatives from key entities related to the scope of the workshop, such as International organizations (e.g., EEA, EMB, ESA), ERICs, data infrastructures, projects and industry were identified and specifically invited to attend.

Following the presentations, an open floor discussion took place, focusing on the key points highlighted in the presentations, facilitated and chaired by the appointed moderator. In parallel, live polls were launched to foster the opinions of the audience (see Annex 6.3 for the poll results).

The workshop was very successful with 218 registered including participants from non-European countries (e.g., Africa and Asia), during the meeting the attendance reached peaks of over 140 participants.

A statement depicting the main outcomes and the crucial points was outlined at the end of the workshop.

The entire workshop was recorded with the consent of the participants, the moderator/facilitator extracted an 8-min video to highlight the main important points arisen during the workshop. The link to the video is: https://www.youtube.com/watch?v=73efbjzLXS4&feature=emb_imp_woyt.

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# 3. Main outcomes from the workshop

The event generated several different outcomes, which were mainly related to:

- gaining information about status of data acquisition, monitoring, sampling activities from the different marine organizations;
- finding areas and potential opportunities for improving collaboration between the different ocean observing networks;
- better understanding the objectives and role of the Eurofleets+ initiative;
- understanding the needs of the systems/observatories, as well as underling the needs of the RVs.

The **main outcomes** identified were related to the importance of the workshop as a vehicle of information, on the crucial role of Eurofleets+ initiative as a place for improving collaboration and coordination among the different observing networks and RVs operators.

In particular, the participants expressed the need for:

- having a formal schedule of ship time access;
- promoting the integration and sensor interoperability with RVs;
- enhancing the collaboration for RV access for deployment and recovery of equipment, common multipurpose cruises, common experiments with different RIs or research groups;
- fostering data sharing and access;
- stimulating a joint programme for training researchers, technologists and technicians;
- encouraging personnel exchange (e.g., marine technicians);
- open access to detailed cruise track;
- long-term funding streams - joint funding streams for RIs.

**The crucial measures** suggested during the event and grouped in the categories of the four above-mentioned key concepts were:

- **Cooperation -** Better collaboration with RVs, sharing of best practices, development of tools for long-term actions continuity.
- **Coordination -** Improved coordination between RIs, joint training and testing.
- **Integration -** Better interoperability, real-time data, multi-mission operations.
- **Simplification -** Automation of key online access processes, global efforts in GOOS, align Programmes, work with industries.

For some of these measures a timeline for implementation was also proposed:

- **Short term: 1-3 yrs.-** Planning system with RVs, shareable IT platform, improved data management including real time, shared vision for marine RI landscape, services for industrial sectors.
- **Medium term: 4-6 yrs. -** Collaborative system between marine RIs, development of a strategy for platform recovery with RVs.
- **Long term**: **10 yrs. -** Joint research actions to develop sensors, long-term planning for marine operations. Coordinate a long-term plan of operations at sea and maintain frontier science services and innovation.


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# 4. Overall evaluation

On conclusion of the workshop, an online evaluation questionnaire of the event, was launched by the organisers.

The survey indicated a high-overall satisfaction, and included some valuable suggestions and proposals.

The great majority of respondents found that the objectives of the workshop were met to a great/full extent.

In terms of practical organization, what participants enjoyed the most was the opportunity to discuss the topics in a multidisciplinary way with all relevant actors around the table. Some respondents identified the presentations as very valuable and allowing them to stay informed on key developments, while a few respondents found the same presentations less relevant to them. Likewise, the use of breakout groups to discuss the topic in smaller assemblies was mostly found useful and valuable by some participants, but too short or less valuable by others. A few issues coming from the technical side (e.g., Google slides not syncing) were raised by a few participants.

Generally, this workshop's feedback tells us that there is a need for these conversations to happen - the workshop was described by one respondent as the first of its kind - but it could be that smaller groups or more targeted audiences would make such workshops more effective and valuable, both on the tech side, as in having more effective and quality exchanges.

The response to the breakout rooms demonstrated an appetite from the community to continue small group discussions on the topics, while the community and stakeholders at large would like to stay continuously informed on the next developments. The complete list of the main outcomes of the workshop is shown in Annex 6.4.

# 5. Next Steps

As a step forward, Eurofleets+ consortium is promoting a discussion among the stakeholders through the Eurofleets+ web-based discussion forum (https://www.eurofleets.eu/forums/forum/stakeholder-forum/) on the project website in order to enable interested parties to interact with project participants. This aims at gathering all relevant stakeholders and RV operators in one virtual place, taking advantage of other stakeholder engagement activities, as the on-going interview process and the upcoming international workshops. The forum has been launched during the 9th EuroGOOS International Conference (3-5 May in webinar).

To further promote the results of the workshop through the forum, it was prepared an explanatory text on the workshop results accompanied by an 8-min video was prepared.

Moreover, the stakeholder engagement activities will follow through a 2nd International workshop, which should be organized before May 2022.

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# 6. Conclusion

The main outcomes can be summarized as:

- improving the cooperation/coordination between RV operators with other RIs and stakeholders;
- favouring integration through better interoperability;
- simplifying the access system towards multi-mission approach with the purpose of optimizing the space-time use of the RVs.

The interactions will be maintained with discussion fora and organizing other workshops in the near future. The final consideration is related to the importance to advancing the establishment of a legal entity for Eurofleets (EUROFLEETS RI) aimed at uniting the world-class RVs and associated equipment among European partners to facilitate access to unique marine infrastructure for a wide community of users.

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# 7. Annexes

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# Annex 1 Workshop Agenda

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# Eurofleets+ 1st International workshop programme

13 April 2021 - 14:00 to 17:30

You can join using this Zoom link (Zoom ID: 849 7580 0129 and passcode: 158613).

| CET | Agenda |
|---|---|
| 14:00 | **Opening & introductions** |
| 14:05 | **Strengthening our collaboration, presentations from partners and key stakeholders**<br><br>- Aodhán Fitzgerald, Eurofleets+ Project Lead Coordinator<br>- Agnès Robin - European Commission DG Research and Innovation<br>- Estelle Obligis - EUMETSAT<br>- Juanjo Dañobeitia - EMSO ERIC<br>- Sylvie Pouliquen - EuroARGO<br>- Laurent Mortier - GROOM project<br>**Q&A** |
| 15:30 | **Break** |
| 15:45 | **Strengthening our collaboration, group discussions**<br><br>Participants will be invited to contribute to an interactive workshop on building a sustainable future for the collaboration between operators of research vessels operators, fixed-point observatories, mobile systems, remote sensing, and policy makers in the environmental-marine domain. |
| 17:00 | **Summarizing key takeaways, next steps** |
| 17:30 | **Closing** |

# Annex 2 Workshop Presentations

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# EUROFLEETS+
# 1st International Workshop

Aodhán Fitzgerald

Project Coordinator

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# The Evolution of EUROFLEETS

**Eurofleets 2009-2013**

- FP7
- 5 Ocean Research Vessels
- 14 Regional Vessels
- 24 Partners
- Funding of €7.2 m

**Eurofleets2 2013-2017**

- FP7
- 22 Research Vessels (8 Global Ocean RV, 14 Regional)
- 31 Partners
- Funding of €9m

**Eurofleets+ 2019-2023**

- H2020
- **27 research vessels** (13 Global/Ocean and 14 Regional), **7 ROVs, 5 AUVs,** and a **telepresence unit**
- 42 Partners
- Funding of €9.9 m

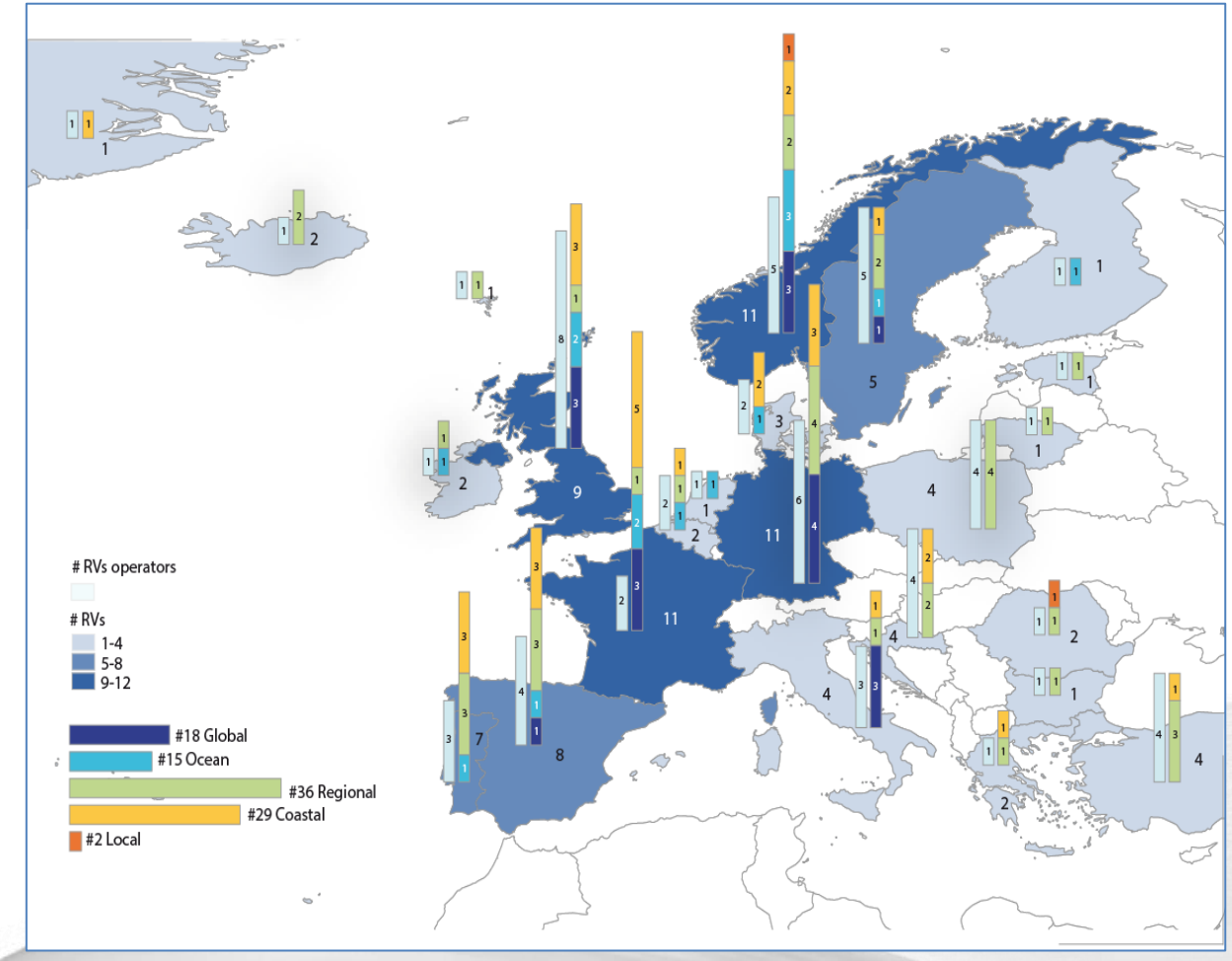
**Eurofleets RI Beyond 2023…**

- Develop Eurofleets as a Legal Entity
- Established full time central coordination office
- Horizon Europe

**E**uropean **R**esearch **V**essels **O**perators (ERVO) 1999-Present

# European Research Vessel Landscape

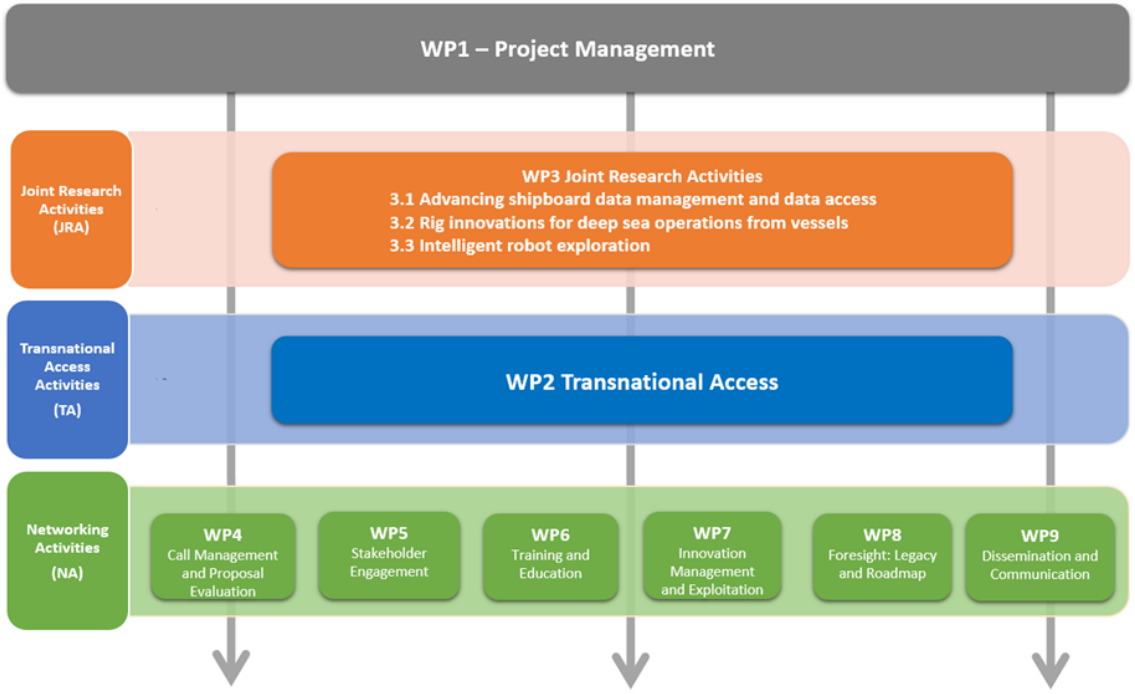
- Since 2010 the network of Research Vessel Operators have produced two reports, the latest of which is EMB's Position Paper 25, 2019)
- Currently 99+ Research Vessels in operation across Europe
- Includes Global (18%), Ocean (15%), Regional (36%), Coastal and Local vessels (31%).
- Working towards a more efficient use of available resources




*Geographical overview of the numbers and classes of European research vessels per country (Source: EMB's Position Paper 25, 2019)*

# Eurofleets+ Project Overview

**Call:** Integrating and opening existing national and regional research infrastructures of European interest (INFRAIA Call H2020 2018)
**Topic**: Integrating Activities for Advanced Communities




- 42 Partners
- 9.9M€ Budget
- Duration 57 months (48 originally)
- 27 Research Vessels
- 7 ROVS
- 5 AUVS

*COVID-19 Pandemic has impacted TA implementation, tasks and deliverables. Project extension sought and approved to ensure implementation of all 21 funded transnational access cruises.*

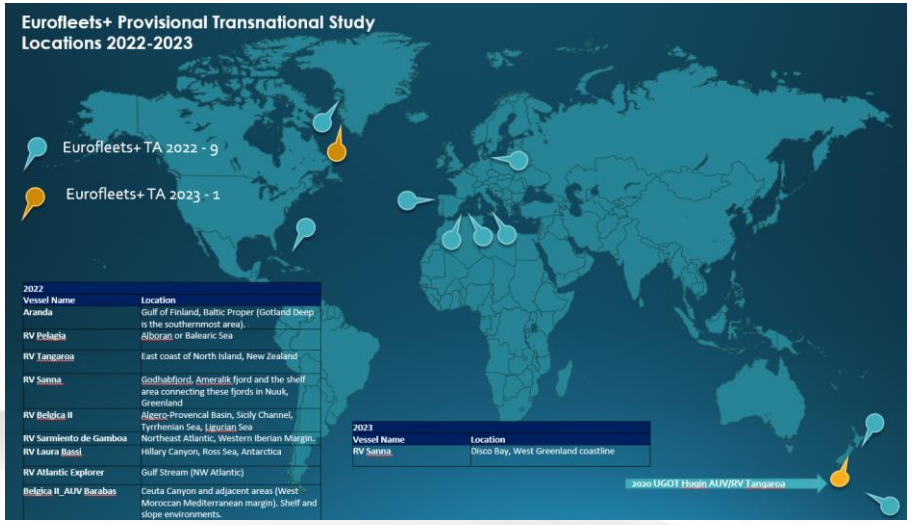
*COVID-19 Pandemic*

**Period 1 Feb19 to Jul 20 18 M** → **Period 1 Aug 20 to Jan 22 18 M** → **Period 1 Feb 22 to Oct 23 21 M**

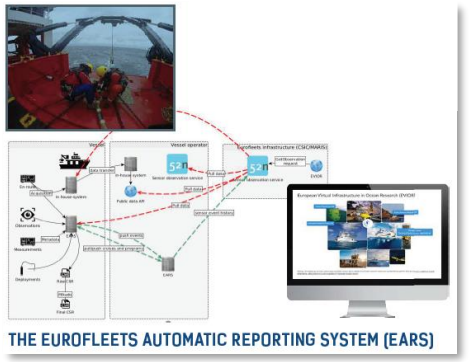
# Eurofleets+ Project Update

# WP4 Call Management & Proposal Evaluation and WP2 Transnational Access

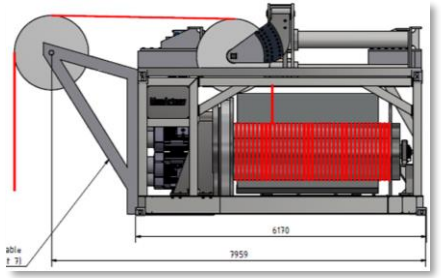
- 21 Cruises Scheduled (10 x 2021 & 9 x 2022)
- 219 Days Access Approved
- 55 AUV Days Access
- 21 ROV Days Access
- 1 Multi Vessel Cruise
- CoPI & RTA Programmes Remain Open and accepting applications

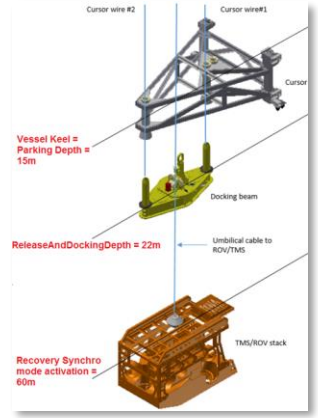



# WP3 Joint Research Activities Update

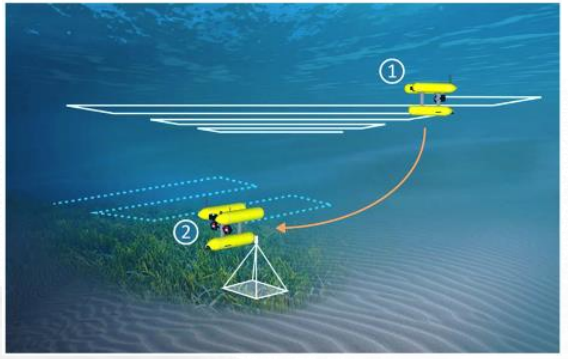



- **3.1 Advanced Shipboard Data** Management and Data Access (MARIS) EARS 2 complete and deployed on upcoming cruises with EARS 3 near completion






- **3.2 Equipment innovations for deep sea operations from vessels** (CSIC) New portable electric winch design and dual handling system developed with industry.



- **3.3 Intelligent AUV Mapping** (UdG) developing innovative methods and strategies for intelligent exploration, mapping and control using cooperative navigation.

# WP 6 EDUCATION AND TRAINING

## INTERNATIONAL, IN-THE-FIELD FORMATION OF EUROPEAN YOUNG RESEARCHERS AND NEXT GENERATION OF MARINE SCIENTISTS

**5 x FLOATING UNIVERSITY - CLASSROOM LECTURE AND ON BOARD TRAINING COURSES DEVOTED TO POST-GRADUATE AND EARLY CAREER MARINE SCIENTISTS**

5 x Floating Universites scheduled. 1 Complete, 3 schedued to take place in 2021.
Partnerships with INFORMAR and EuroArgo to expand impact of the courses

**4 x WORKSHOPS - TO ENABLE THE NEXT GENERATION OF MARINE RESEARCHERS /TECHNICIANS TO FULLY UTILIZE THE POSSIBILITIES OFFERED BY THE NEW GENERATION OF SCIENTIFIC INSTRUMENTATION ONBOARD EUROPEAN RESEARCH VESSELS.**

1 AUV and 1 Robotics workshops have taken place
1 x Seismic workshop scheduled for June 2021
Remainder of workshops will take place in 2022 including industry partnerships with Kongsberg

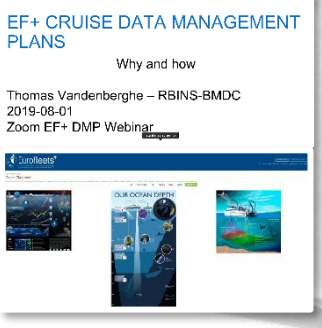
**3 WEBINARS – AVAILABLE AT https://www.eurofleets.eu/education/webinars-presentations/**

1 x Data Management
1 x Sea Programme Application Preparation
1 x CoPI/RTA Application Preparation

**OCEAN CLASSROOM PORTAL**

The portal currently provides access to 37 resources such as activity sheets, educational documents, websites, videos, posters and infographics detailing how AUV and ROVS work and are implemented. The ALUMNI FORUM provides an exclusive space for Eurofleets+ alumni to engage, network and collaborate





# Networking Activities

## WP 5 Stakeholder Engagement

- Stakeholder Database developed
- Online Questionnaires complete
- Direct Interviews complete
- Map of User Needs developed
- 1 X International Workshops

## WP 7 Innovation management

- Exploitation and innovation management process published
- Guidelines and support for TA to user groups and researchers Published
- Innovation management and exploitation Published
- Innovation committee and Industry Platform established

# Networking Activities

## WP 8 Legacy and Roadmap

- On-line survey to define EFs+ aspirations (MISSION, VISION and VALUES), positioning and environment through a PESTLE and SWOT analysis
- Brain-storming session attended by an "ad-hoc" working group of WP8 beneficiaries
- Strategic Leadership Programme for EUROFLEETS+ Workshop, attended by 12 Eurofleets+ beneficiaries – **EMMRI Programme**
- ERVO webinar "Long-term vision for the European Research Fleet"
- Desktop study of existing legal entities adopted by European Distributed Research Infrastructures.

## WP 9 Dissemination & Communications

- Eurofleets+ Website
- Project Newsletters Dissemination Toolbox for Young Researches -
- The Communication Package towards other Infrastructures
- Training, R&D and Networking dissemination activity
- Evior PORTAL - Sharing information on planned, current and completed cruises and on details of European research vessels and specialized equipment

# Eurofleets RI Next Steps

# Unique Challenges for Eurofleets RI

- **Costly Asset** – to build, manage and maintain
- **National Assets** – owned by a single national entity or in some cases jointly owned by multiple national entities
- No common **ownership** across the fleet (62 different RV operators manage 99 RV's from 23 countries, source *(EMB's Position Paper 25, 2019)*
- Research Vessels **National Flag**
- **Funding** (Primarily from National Governments but differs across Europe)


(Source: EMB's Position Paper 25, 2019)

# Eurofleets RI – The future

## MISSION

- To be the **central coordination** point for **Trans-national access** funded by the EU,
- To be a **"market place"** for those offering access to RVs and/or LEXIs and those looking for charter, barter or in-kind contribution **to research projects**, **monitoring activities**, **logistical functions** etc.
- To coordinate **sharing or pooling** of sophisticated/expensive facilities to **optimize** their use. To these ends, maintaining and validating the European vessel and equipment database.
- To host permanent or temporary technical groups dedicated to **exchange of best practices** and shared IT development: **operational standards** for vessels and equipment, **acquisition standards** and associated **software…**
- **To build up and** pilot the preconfiguration processes of future **common** infrastructures, the realisation of which can no longer in every case be the responsibility of a single country (inhabited diving, large shared seismic systems…).
- To **support** research and development projects for **eco-designed** and **eco-responsible** European fleets of the 21st century.

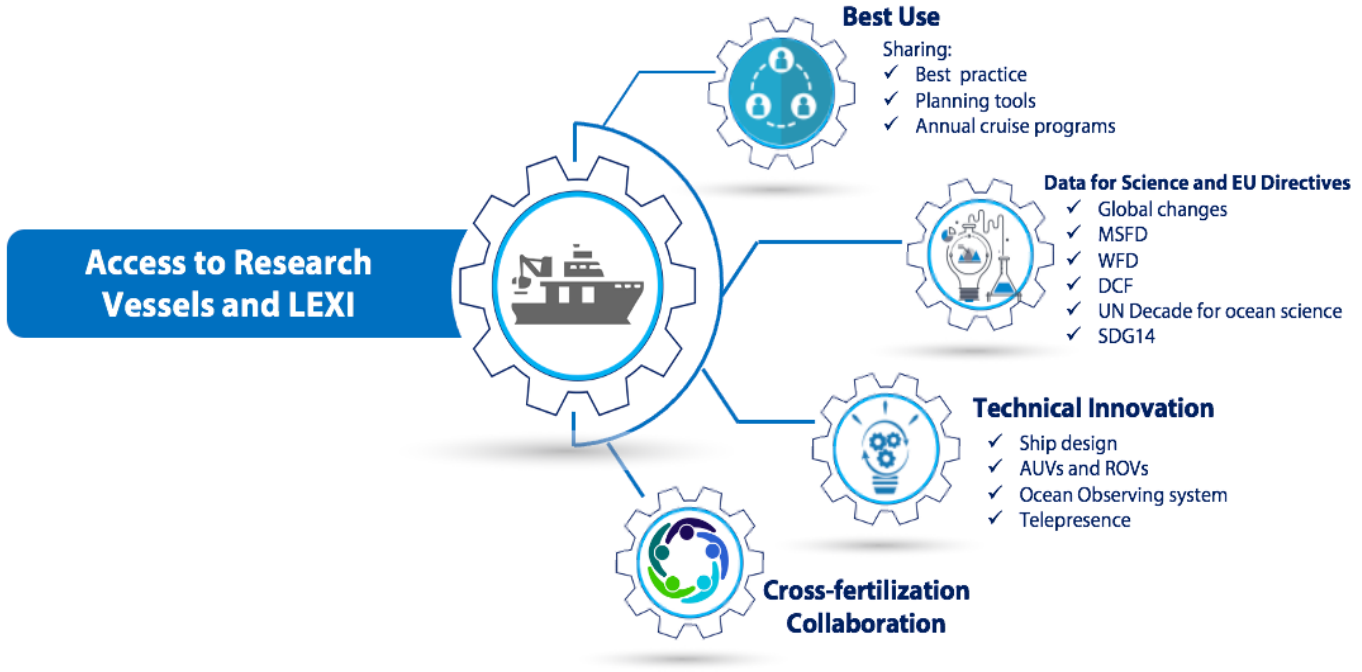
## VISION

*We believe that cooperation and strengthening of links between the operators of European marine research fleets is a necessity for continued excellent marine research and monitoring in Europe.*

# Eurofleets RI – The future

## VALUES

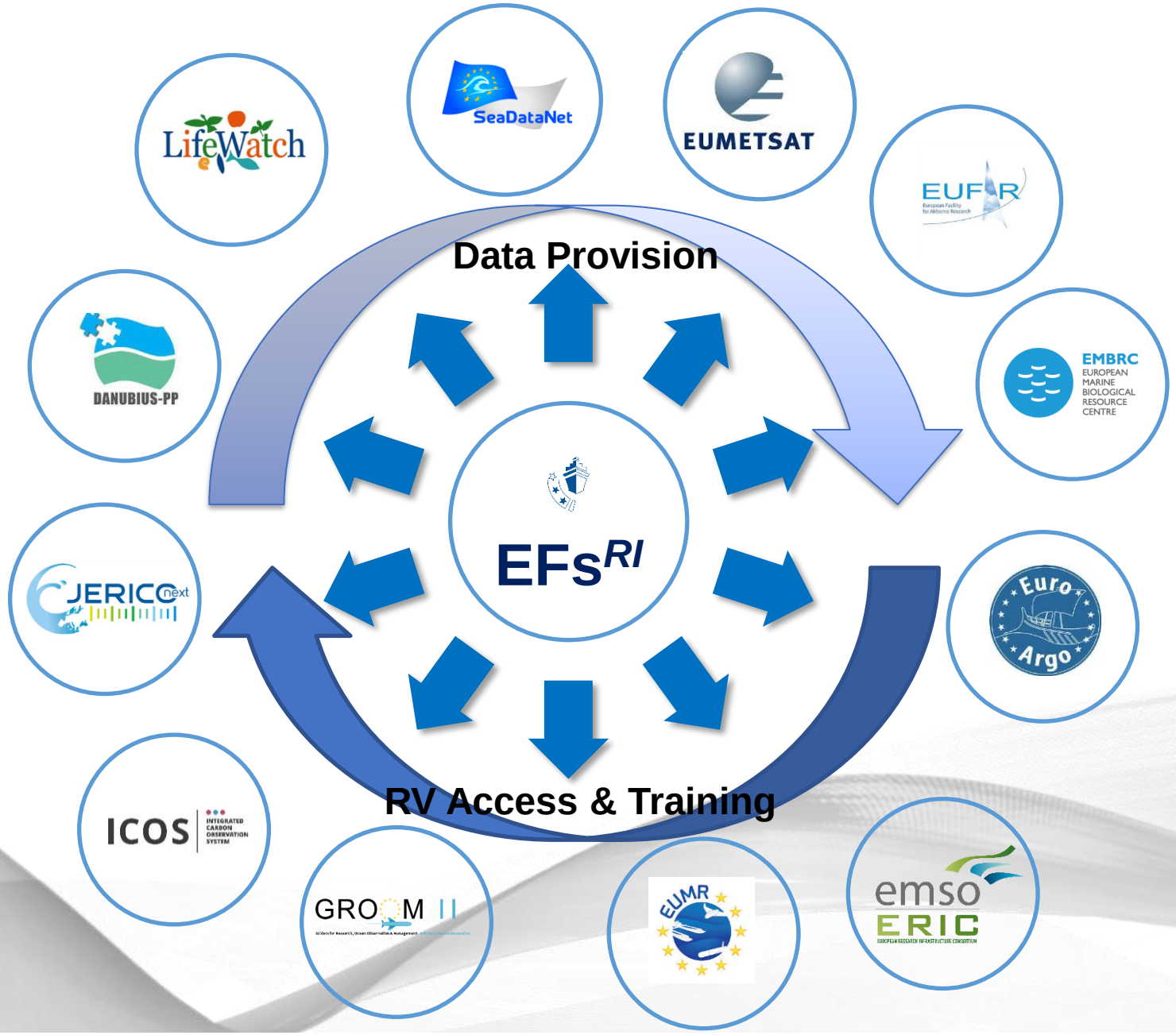
- in the need for our countries and for Europe to develop **marine research** and **monitoring of excellence**, open **to large-scale international cooperation.**
- in the importance of **providing** the **scientific community with up-to-date scientific instruments and equipment** adapted to the needs of **marine research and monitoring**
- in providing **quality open data** useful to the **entire** European scientific community.
- that the links developed in the various European infrastructure networks and projects (e.g. EF1 and 2) should be structured to be more **sustainable and strengthened** in order to improve **efficient** use of the fleets and associated instruments and equipment, and to **enable** an **improved return on investment,**



# Eurofleets RI and Horizon Europe

# Eurofleets RI – Horizon Europe

# Eurofleets RI – HUB for Oceanographic Research



# Eurofleets RI – Horizon Europe Missions

| Cancer | Adaptation to climate change including societal transformation | Healthy oceans, seas, coastal and inland waters | Climate-neutral and smart cities | Soil health and food |
|---|---|---|---|---|
| Support Bio Medical Research from our oceans | Monitoring and informing on Climate Change | Monitoring of marine pollution | Climate Change | Climate Change |
| | Managing climate risks such as floods and storms | Climate change in the ocean | European Green Deal | Sea Level Rising |
| | Informing and actively contributing to and supporting scientists to enable goal 14. and associated targets | Sustainability use of ocean resources | Greening of RV Fleet | European Green Deal |
| | | maritime spatial planning | Climate Neutral harbors | Sustainable Food |
| | | ocean governance | | Monitor effect of Caring for soil mission on oceans |

# Eurofleets RI – Impact Pathways

Horizon Europe

1. Providing access to our oceans and as yet unexplored ecosystems to create new knowledge.
2. Coming together as an RI to consolidate human capital and resources
3. Working with other RI's in sharing knowledge and providing open data

SCIENTIFIC IMPACT

4. Through participation in Horizon Europe projects addressing key EU policy priorities and global challenges through R&I
5. Working towards the Horizon Europe Missions via R&I
6. Collaborating with industry and all social actors to strengthen ties with R&I

SOCIETAL IMPACT

7. Collaborative and co-creation with industry to accelerate innovation growth
8. Increase employment opportunities through training and new role development.
9. Ensure that EU and National investment in infrastructure delivers increased ROI

ECONOMIC IMPACT

# **Research Vessel** significance to the scientific priorities of the UN Decade of Ocean Science for Sustainable Development (2021-2030)


*https://oceandecade.org/*

| SCIENTIFIC PRIORITY | RESEARCH VESSEL RELEVANCE |
|---|---|
| 1. Comprehensive digital atlas of the ocean | Provision of the means to aquire the data which will underpin the atlas |
| 2. Comprehensive ocean observing system for all major basins | Enabling installation, maintenance and calibration of ocean observation infrastructures, and delivering the monitoring needed for a fully comprehensive ocean observing system |
| 3. Quantitative understanding of ocean ecosystems and their functioning as the basis for their management and adaptation | Key provision of data to enable understanding and analysis |
| 4. Data and information portal | Provision of data, including in real- and near-real time |
| 5. Integrated multi-hazard warning system | Data collection and observation infrastructure support, especially in critical deep-sea and Polar regions |
| 6. Ocean in earth-system observation, research and prediction, supported by social and human sciences and economic valuation | Providing observations but also providing a research vessel operators perspective on social, human and economic valuation of fleet, equipment and infrastructures |
| 7. Capacity-building and accelerated technology transfer, training and education, ocean literacy | Technological innovation to enable new science and research vessels as a great tool for outreach and ocean literacy promotion |
| 8. Provide ocean science, data and information to inform policies for a well-functioning ocean in support of all sustainable development goals of 2030 Agenda | Provision of data conducted in a sustainable manner to the science community, in order to support policy- and decision-making |

Eurofleets+
An alliance of European marine research infrastructure
to meet the evolving needs of the research and industrial communities

# THANK YOU

www.eurofleets.eu

**Email:** eurofleetsplus@marine.ie

Marine Institute
Foras na Mara

This project has received funding from the EU H2020 research and innovation programme under Grant Agreement No 824077

Eurofleets+ 1st International Workshop

***Fixed and mobile ocean observing systems and satellite observation***

*April 13th, 2021*


# THE EU RESEARCH & INNOVATION PROGRAMME 2021 – 27

**Agnès Robin**
**R&I Actors and Research Careers (RTD.A.3)**
**DG Research and Innovation**
**European Commission**

This presentation is based on the political agreement of 11 December 2020 on the Horizon Europe. Information on some parts is pending revision.

19 March 2021

*Research and Innovation*

# HORIZON EUROPE

# EURATOM

## SPECIFIC PROGRAMME: EUROPEAN DEFENCE FUND

*Exclusive focus on defence research & development*

- Research actions
- Development actions

## SPECIFIC PROGRAMME IMPLEMENTING HORIZON EUROPE & EIT*

*Exclusive focus on civil applications*

### Pillar I
### EXCELLENT SCIENCE

- European Research Council
- Marie Skłodowska-Curie
- Research Infrastructures

### Pillar II
### GLOBAL CHALLENGES & EUROPEAN INDUSTRIAL COMPETITIVENESS

Clusters

- Health
- Culture, Creativity & Inclusive Society
- Civil Security for Society
- Digital, Industry & Space
- Climate, Energy & Mobility
- Food, Bioeconomy, Natural Resources, Agriculture & Environment

Joint Research Centre

### Pillar III
### INNOVATIVE EUROPE

- European Innovation Council
- European Innovation Ecosystems
- European Institute of Innovation & Technology*

## WIDENING PARTICIPATION AND STRENGTHENING THE EUROPEAN RESEARCH AREA

- Widening participation & spreading excellence
- Reforming & Enhancing the European R&I system

## EURATOM

- Fusion
- Fission
- Joint Research Center

* The European Institute of Innovation & Technology (EIT) is not part of the Specific Programme

European Commission

# Five Missions Areas

**Adaptation to climate change, including societal transformation**

**Cancer**

**Healthy oceans, seas, coastal & inland waters**

**Climate-neutral & smart cities**

**Soil health & food**

European Commission

# Overview of 49 candidate European Partnerships

## HORIZON EUROPE PILLAR II - Global challenges & European industrial competitiveness

### CLUSTER 1: Health

- Innovative Health Initiative
- Global Health Partnership
- Transformation of health systems
- Chemicals risk assessment
- ERA for Health
- Rare diseases*
- One-Health Anti Microbial Resistance*
- Personalised Medicine*
- Pandemic Preparedness*

*Co-funded or co-programmed*

### CLUSTER 4: Digital, Industry & Space

- Key Digital Technologies
- Smart Networks & Services
- High Performance Computing
- European Metrology (Art. 185)
- AI-Data-Robotics
- Photonics
- Made in Europe
- Clean steel – low-carbon steelmaking
- Processes4Planet
- Global competitive space systems**

### CLUSTER 5: Climate, Energy & Mobility

- Clean Hydrogen
- Clean Aviation
- Single European Sky ATM Research 3
- Europe's Rail
- Connected and Automated Mobility (CCAM)
- Batteries
- Zero-emission waterborne transport
- Zero-emission road transport
- Built4People
- Clean Energy Transition
- Driving Urban Transitions

### CLUSTER 6: Food, Bioeconomy, Agriculture, …

- Circular Bio-based Europe
- Rescuing Biodiversity to Safeguard Life on Earth
- Climate Neutral, Sustainable & Productive Blue Economy
- Water4All
- Animal Health & Welfare*
- Accelerating Farming Systems Transitions*
- Agriculture of Data*
- Safe & Sustainable Food System*

## PILLAR III - Innovative Europe

### EIT (KNOWLEDGE & INNOVATION COMMUNITIES)

- InnoEnergy
- Climate
- Digital
- Food
- Health
- Raw Materials
- Manufacturing
- Urban Mobility
- Cultural and Creative Industries

### SUPPORT TO INNOVATION ECOSYSTEMS

- Innovative SMEs

## CROSS-PILLARS II & III

- European Open Science Cloud

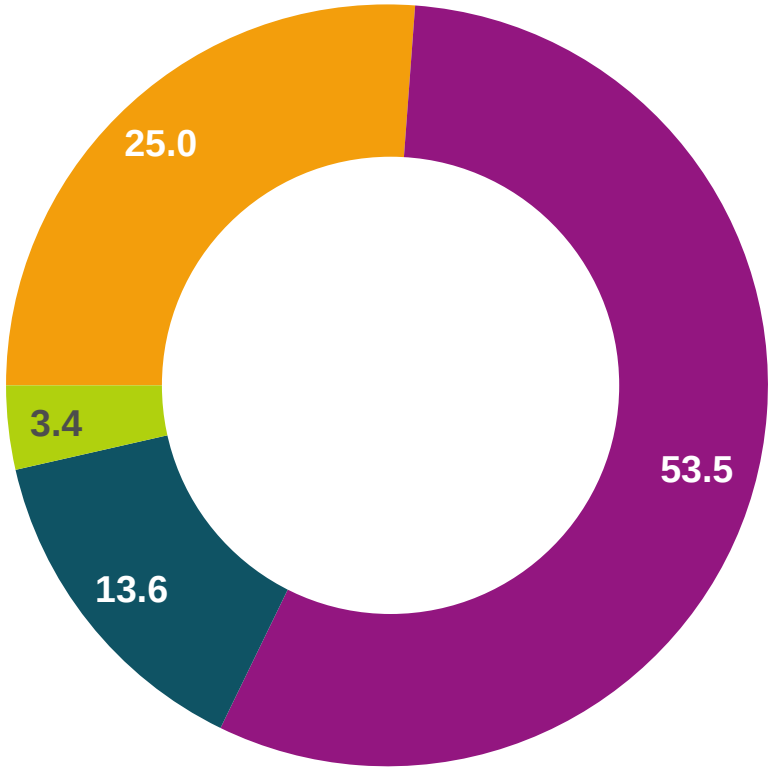
Institutionalised Partnerships (Art 185/7)
Institutionalised Partnerships / EIT KICs
Co-Programmed
Co-Funded

* *Calls with opening dates in 2023-24*
** *Calls with opening dates not before 2022*

European Commission

# Horizon Europe Budget: €95.5 billion (2021-2027)

(including €5.4 billion from NGEU – Next Generation Europe – programme of EU for Recovery from COVID-19 crisis)




## Political agreement December 2020

***€ billion in current prices***

- Excellent Science
- Global challenges and European ind. comp.
- Innovative Europe
- Widening Part and ERA

European Commission

Pillar I

# EXCELLENT SCIENCE:

reinforcing and extending the **excellence of the Union's science base**

### European Research Council

Frontier research by the best researchers and their teams

**€16 billion**

### Marie Skłodowska-Curie Actions

Equipping researchers with new knowledge and skills through mobility and training

**€6.6 billion**

### Research Infrastructures

Integrated and inter-connected world-class research infrastructures

**€2.4 billion**

European Commission

Pillar II

# Budget for clusters & for JRC

*in current prices*

| | | |
|---|---|---|
| **Cluster 1** | **Health** | **€8.246 billion**<br>(including €1.35 billion from NGEU) |
| **Cluster 2** | **Culture, Creativity & Inclusive Societies** | **€2.280 billion** |
| **Cluster 3** | **Civil Security for Society** | **€1.596 billion** |
| **Cluster 4** | **Digital, Industry & Space** | **€15.349 billion**<br>(including €1.35 billion from NGEU) |
| **Cluster 5** | **Climate, Energy & Mobility** | **€15.123 billion**<br>(including €1.35 billion from NGEU) |
| **Cluster 6** | **Food, Bioeconomy, Natural Resources, Agriculture & Environment** | **€8.952 billion** |
| | **JRC (non-nuclear direct actions)** | **€1.970 billion** |

Clusters are including a budget for Partnerships and Missions
NGEU is Next Generation EU programme – Recovery Fund

European Commission

# HE Cluster 6 WP structure

| Strategic Plan - expected impacts | Work Programme 2021-2022 |
|---|---|
| **27. Climate neutrality and adaptation to climate change** | • Destination 5 – Land, **oceans** and water for climate action |
| **28. Preservation and restoration of biodiversity and ecosystems** | • Destination 1 – **Biodiversity and Ecosystem Services** |
| **29. Sustainable and circular management of natural resources; tackling pollution; bioeconomy** | • Destination 3 – Circular economy and bioeconomy sectors<br>• Destination 4 – Clean environment and zero pollution |
| **30. Food and nutrition security for all from sustainable food systems from farm to fork** | • Destination 2 – Fair, healthy and environmentally-friendly food systems from primary production to consumption |
| **31. Balanced development of rural, coastal and urban areas** | • Destination 6 – Resilient, inclusive, healthy and green rural, **coastal** and urban communities |
| **32. Innovative governance models enabling sustainability, environmental observation** | • Destination 7 – Innovative governance, **environmental observations** and digital solutions in support of the Green Deal |

# Research Infrastructures in HE

- **Destination 1:** Developing, consolidating and optimising European RIs landscape, maintaining global leadership
- **Destination 2:** Enabling an operational, open and FAIR EOSC ecosystem
- **Destination 3:** RI services to support health research, accelerate the **green and digital transformation**, and advance frontier knowledge
- **Destination 4:** Next generation of scientific instruments, tools and methods and advanced digital solutions
- **Destination 5:** Network connectivity - enabler for collaboration without boundaries

# RI WP 2021-2022 – Destination #3

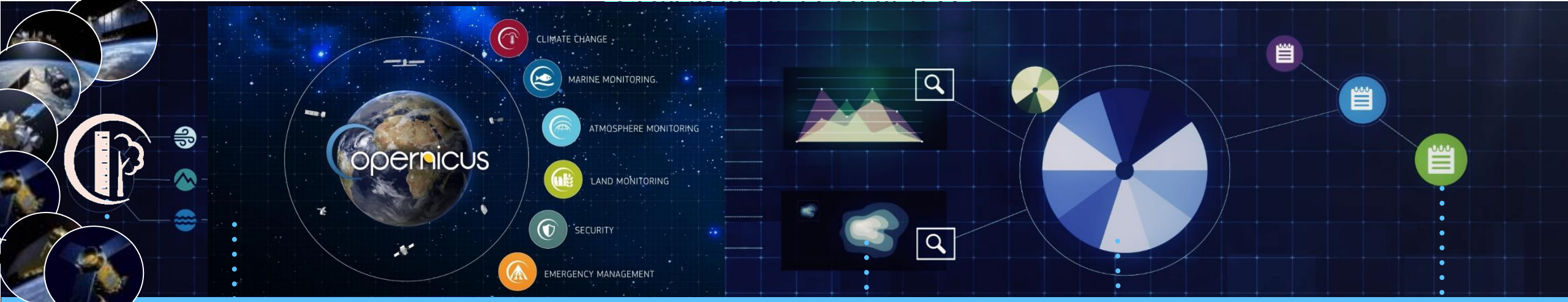
**Challenge-driven topics** in:

- Health: 3 topics on **infectious diseases; cancer** and **EBRAINS**
- Food and agriculture: 1 topic on **sustainable agriculture**
- Environment: 1 topic on **climate-change risks**
- Analytical physics for matter analysis: 1 topic on **sustainable materials**
- Socio-economic sciences: 1 topic on **recovery from socio-economic crisis – focus on global value chain**
- Data, Computing and Digital: 1 topic on acquisition and use of **imaging data**

**Curiosity-driven topic domains:**

- **Environment/Geosphere**, including geo-hazards and geo-resources
- **Environment/Biosphere,** including terrestrial biodiversity and ecosystems, including Arctic and forest
- **Particle and nuclear physics**

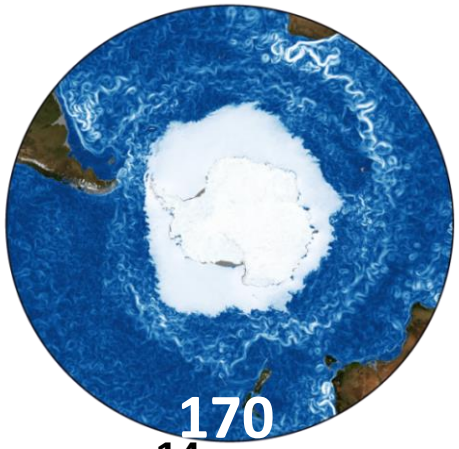
***(Astronomy, Energy, Humanities*** → *2023-2024)*




DATA | SERVICES | INFORMATION | TAILORED PROCESSES | PRODUCTS

opernicus
Europe's eyes on Earth

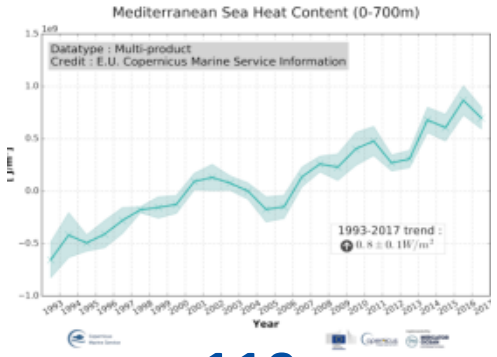
# EU SPACE PROGRAMME: OCEAN INFORMATION IS A PUBLIC GOOD



**170**

**14**

**OBSERVATION FORECASTS, CLIMATE RECORDS**




**110**

**OCEAN MONITORING INDICATORS**


**5**

**OCEAN STATE REPORTS**

**7**

**SEA BASINS**


**12**

**SECTORS**

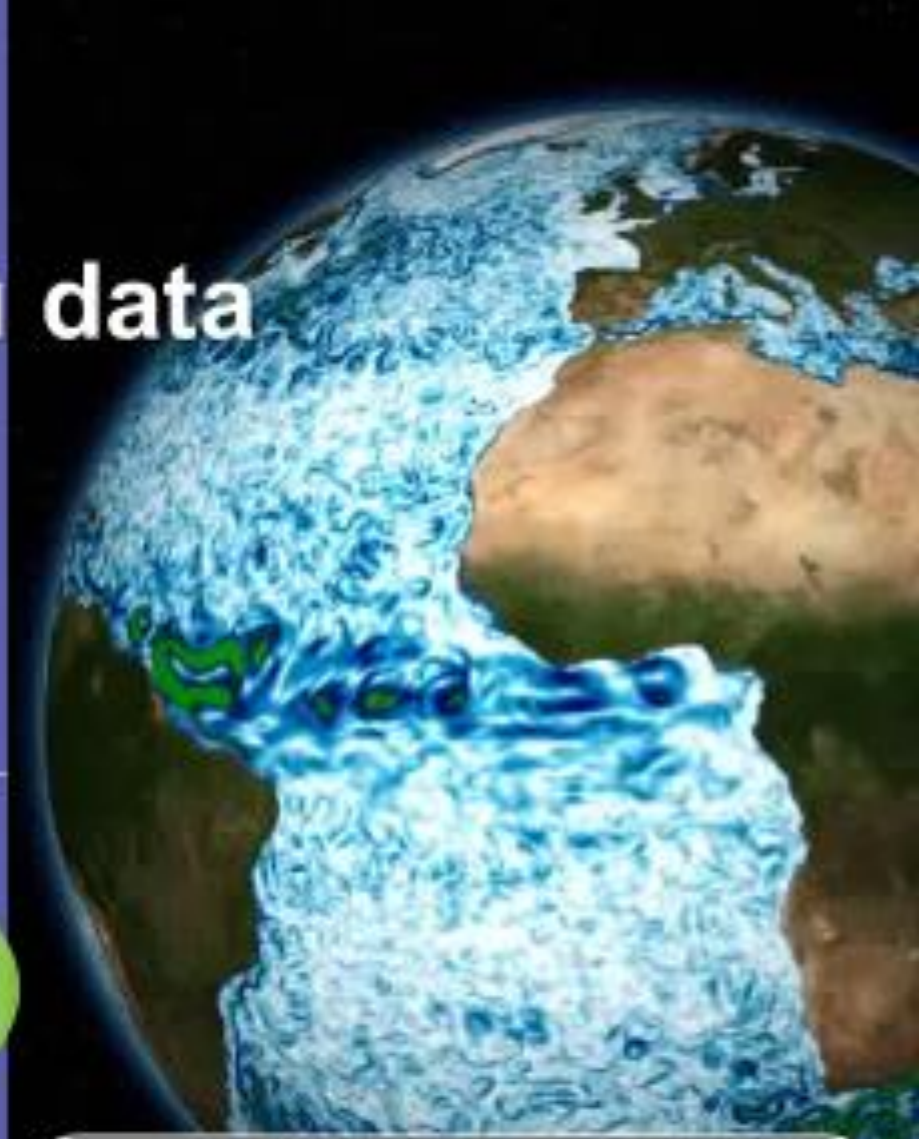
# We cannot do without operational sustained in-situ data



Blue
(Physics)

White
(Sea Ice)

Gree
n
(Biogeoch
emistry)



Observation and forecasts
Projections

AVAILABLE TO ALL – FREE - OPEN

# Follow us and keep up to date via:

**HorizonEU**

*Commissioner* **Mariya Gabriel:** @GabrielMariya

*Director-General* **Jean-Eric Paquet:** @JEPaquetEU

**DG Research and Innovation:** @EUScienceInnov @EU_H2020
https://www.facebook.com/EUScienceInnov/

**Horizon Magazine:** @HorizonMagEU

**Horizon Europe website:** http://ec.europa.eu/horizon-europe

**European Innovation Council:** http://ec.europa.eu/research/eic

**European Research Council:** https://erc.europa.eu/


European Commission

# Operational Oceanography @EUMETSAT

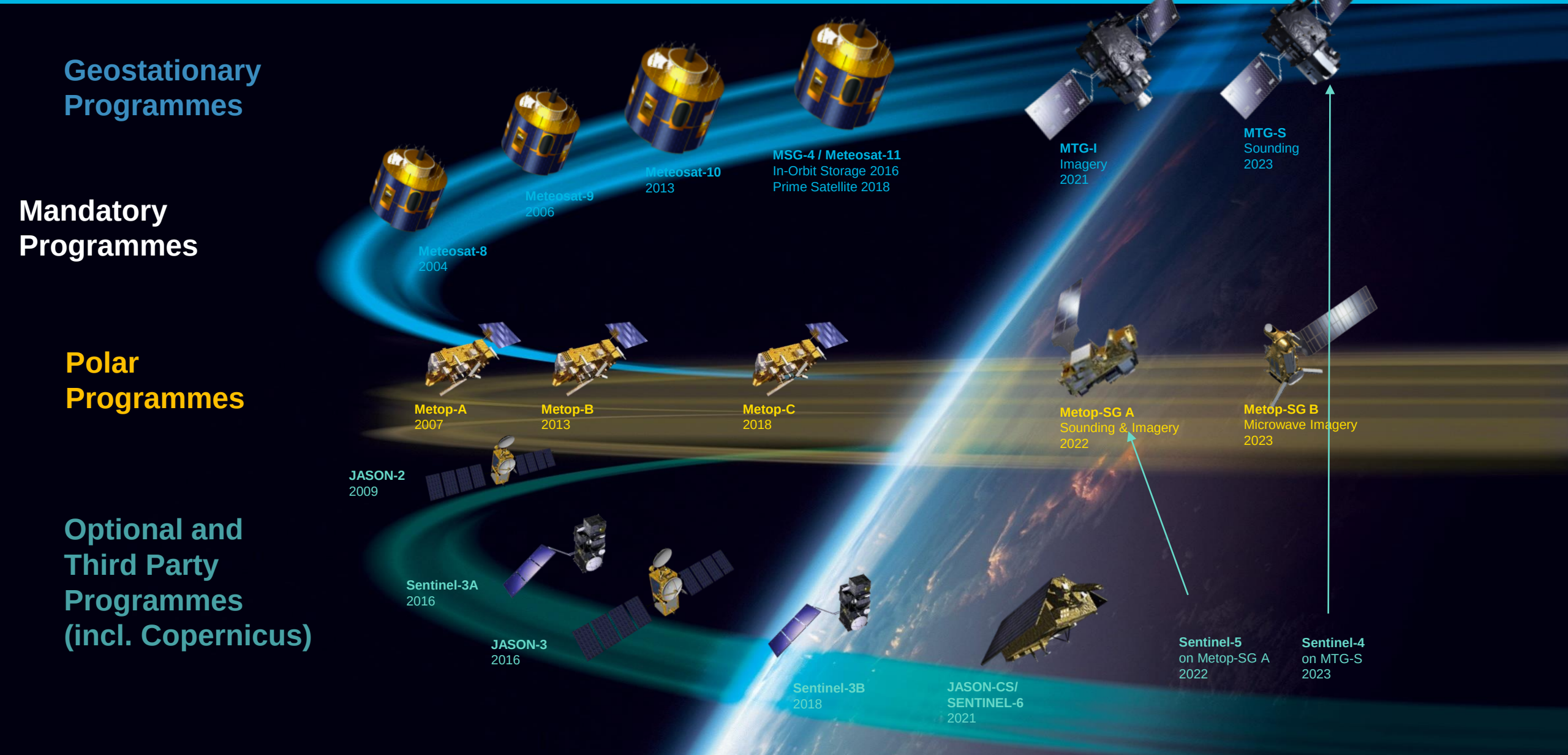
EuroFleets+ 1st International Workshop
13 April 2021

Estelle OBLIGIS

# EUMETSAT – AN INTERGOVERNMENTAL ORGANISATION WITH 30 MEMBER STATES

AUSTRIA
BELGIUM
BULGARIA
CROATIA
CZECHIA
DENMARK
ESTONIA
FINLAND
FRANCE
GERMANY
GREECE
HUNGARY
ICELAND
IRELAND
ITALY
LATVIA
LITHUANIA
LUXEMBOURG
THE NETHERLANDS
NORWAY
POLAND
PORTUGAL
ROMANIA
SLOVAK REPUBLIC
SLOVENIA
SPAIN
SWEDEN
SWITZERLAND
TURKEY
UNITED KINGDOM

# EUMETSAT MISSIONS – *CURRENT AND FUTURE*



# A GROWING INTEGRATED STREAM OF EUMETSAT MARINE PRODUCTS

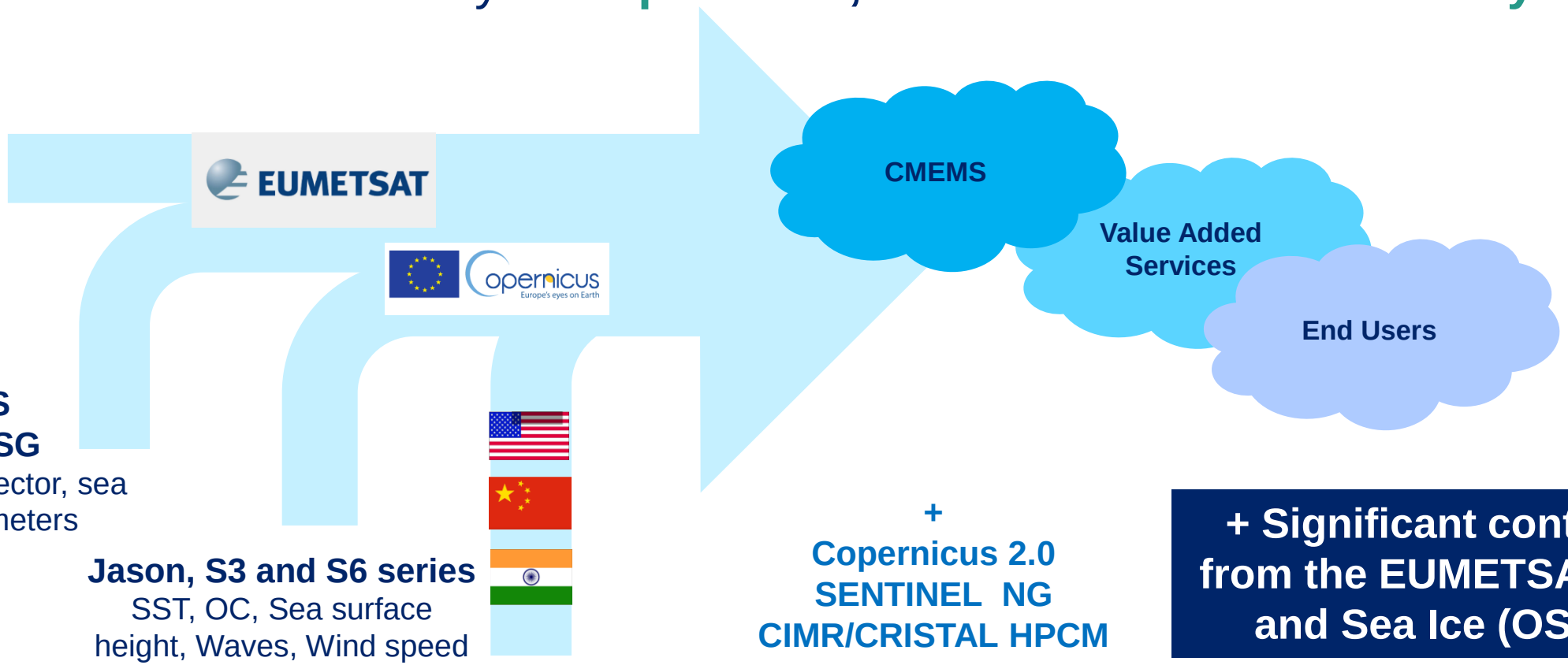
## Operational NRT delivery of **Copernicus**, **EUMETSAT** and **Third-Party data**

**MSG**
**MTG**
SST, Fluxes,
Ocean Colour

**EPS**
**EPS-SG**
SST, Wind vector, sea ice parameters

**Jason, S3 and S6 series**
SST, OC, Sea surface height, Waves, Wind speed

**Third-Party Data**
**NOAA SNPP, NOAA-20**
SST and OC
**On going discussions on China (HY-1/2, CFOSAT) and India (Oceansat, Altika)**

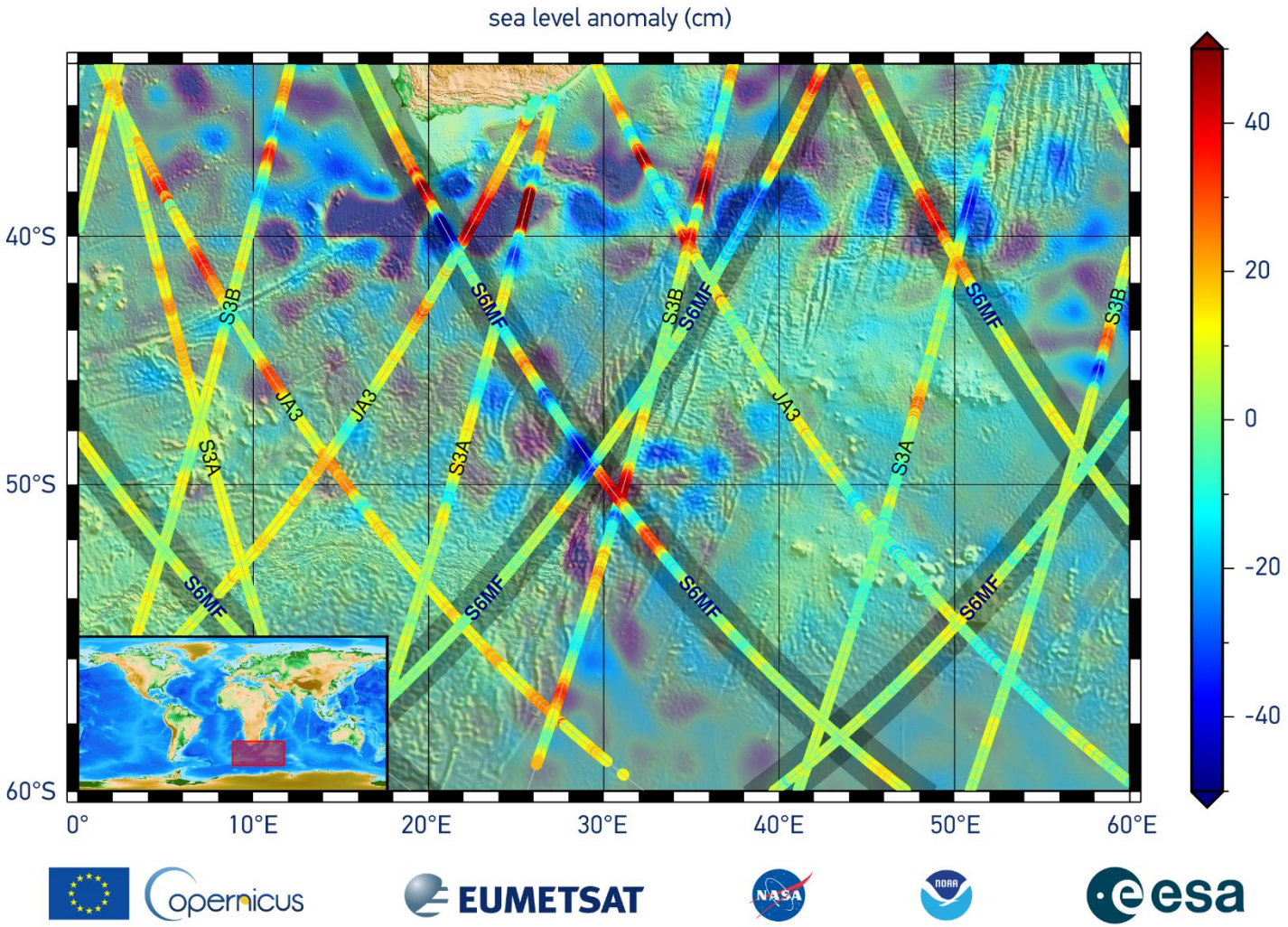



**+**
**Copernicus 2.0**
**SENTINEL NG**
**CIMR/CRISTAL HPCM**

**+ Significant contribution from the EUMETSAT Ocean and Sea Ice (OSI) SAF**

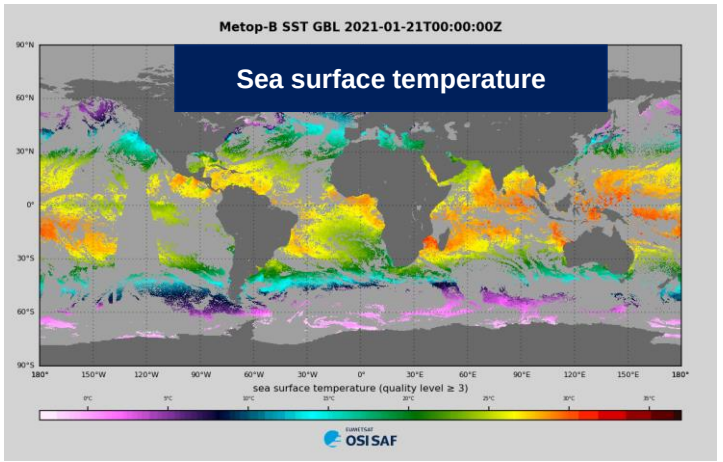
EUMETSAT OSI SAF OCEAN AND SEA ICE

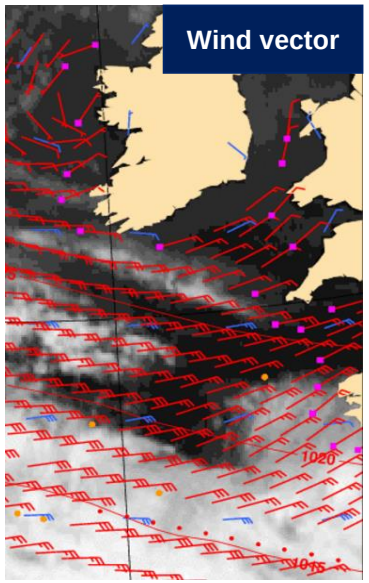
# FIRST SENTINEL-6 SEA LEVEL ANOMALY PRODUCTS, OVERLAID ON A MAP SHOWING THE SIMILAR PRODUCTS FROM ALL OTHER COPERNICUS ALTIMETRY MISSIONS – JASON-3, SENTINEL-3A AND -3B

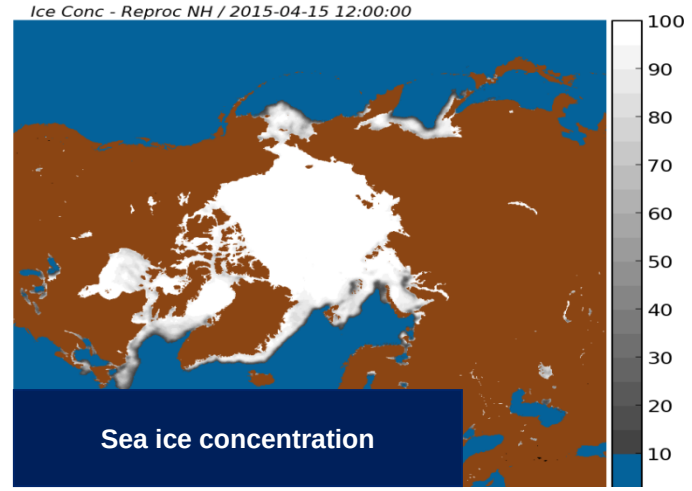


# OCEAN AND SEA ICE SAF (OSI SAF) A MAJOR CONTRIBUTION

- **Ocean and Sea Ice Satellite Application Facility (OSI SAF)** routinely produces and disseminates NRT products characterising the ocean surface:
  - ✓ Sea Surface Temperature and the energy fluxes
  - ✓ Information on the sea ice characteristics (extend, concentration, …)
  - ✓ Surface Wind speed from scatterometry
- Leading Entity is Météo-France in Lannion
- OSI SAF distributes near real-time and data record products based on data NOAA, MSG, Metop, DMSP, GOES and other satellites



# BE THE PROVIDER OF REFERENCE PRODUCTS FOR OCEANOGRAPHY

**EUMETSAT operates Jason-3, Sentinel-3 series and Sentinel-6 in a multi-mission environment creating value to users and cost efficiency, and enabling easier generation of combined products based on synergies.**

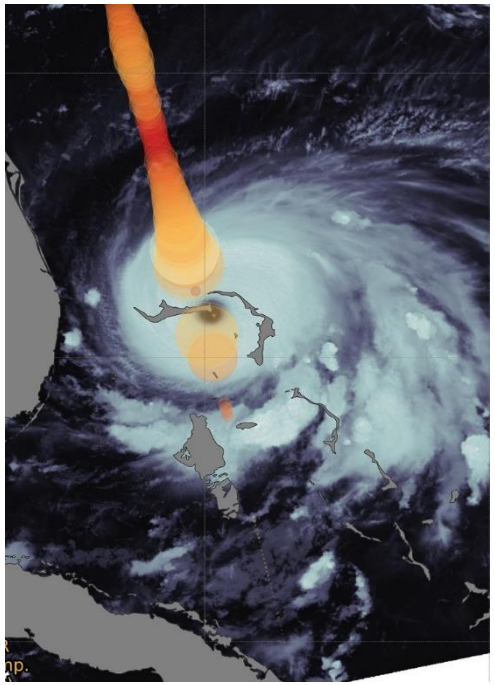
EUMETSAT aim at releasing reference products for ocean observations needed by CMEMS:

**Altimetry** products from the combination of Sentinel-6 and Sentinel-3 observations

**SST** products from Sentinel-3 SLSTR are becoming the reference product in the international community – represented by GHRSST

**Wind products** from ASCAT / SCA with absolute calibration for oceanography and climate monitoring

**Ocean Colour** products from Sentinel-3 OLCI with development of the Copernicus Ocean Colour Vicarious Calibration System



These products rely on the three sources of observations : EUMETSAT, Copernicus and Third-Parties.

# DATA ACCESS TO WIDER USER COMMUNITY : WEKEO

WEkEO is the Copernicus DIAS (Data and Information Access Service) reference service for environmental data, virtual processing environments and skilled user support.

WEkEO was developed an implemented by EUMETSAT, ECMWF and Mercator Ocean, in a stepwise approach, minimizing the risks, capitalizing on user feedback, and strongly involving the industry through procurement.

# FUTURE EUMETSAT PROGRAMMES IN HORIZON EUROPE

- EUMETSAT and Copernicus Programmes are operational programmes each guaranteeing more than 20 years of observations to the European providers of marine, weather and environment information services but also to the European Science and Climate research Community

- The satellites will fly innovative instruments developed by European industry, several being even “world première”: there will therefore be a need for investing in R&D activities to get the most out of these new data, and to create innovation through their use, alone or in combination with other data

- Synergy between the Programmes and missions will offer unique opportunities for developing innovative multi-sensor products for the monitoring of the oceans, the atmosphere, and climate change

# CAL/VAL OF SPACE-BORNE DATA

- Calibration and Validation is essential to quantify the data quality for both scientific and operational missions through the lifetime of an EO mission
- This involves specialised and direct investments in Cal/Val manpower and infrastructure, aircraft/balloon/ships/ground-based, and coordination both of in-situ activities (calibration, protocols, collection) and in-situ data access
- Relies heavily on existing network in-situ data (for example WMO/GTS, AERONET, etc.), and voluntary scientific efforts and contributions
- Fiducial Reference Measurements are needed to deliver a satellite mission with a KNOWN product quality that is “fit for purpose”, with easy and timely access

# EUMETSAT MARINE CHALLENGES

- To maintain and reinforce the link with our users as key source of requirements for ocean observations.
- To maintain the continuity of key space-based observations that are necessary for operational oceanography
- To maintain EUMETSAT as a key provider of Ocean observations from international partners : US, China, India, Russia, Japan, Korea,...
- To encourage R&D activities to get the most out of our operational data, and to create innovation through their use, alone or in combination with other data for a better monitoring of the oceans, the atmosphere, and climate change
- *To develop the Copernicus Ocean Coulour System Vicarious Calibration*

To meet the quality goals of EUMETSAT and Copernicus missions over the next years, a close cooperation between Space Agencies and expert communities (groundbased, through NMIs, through WMO) are needed to coordinate infrastructure, calibration facilities and procedures/"best practices", measurement Standard Operational Procedures, groundbased/space data accessibility

# Thank you - any questions?

Eurofleets+
An alliance of European marine research infrastructure to meet the evolving needs of the research and industrial communities

1st International Workshop

# *Fixed and mobile ocean observing systems and satellite observation*

*April 13th, 2021*

Dañobeitia Juanjo

emso ERIC
EUROPEAN RESEARCH INFRASTRUCTURE CONSORTIUM

# *EMSO ERIC Distributed RI at European Seas*

## EMSO ERIC
### Distributed Infrastructure

**DISTRIBUITED RESEARCH INFRASTRUCTURE**

EMSO ERIC Central Hub

**12 FIXED POINT MUTI-SENSORS PLATFORMS:**

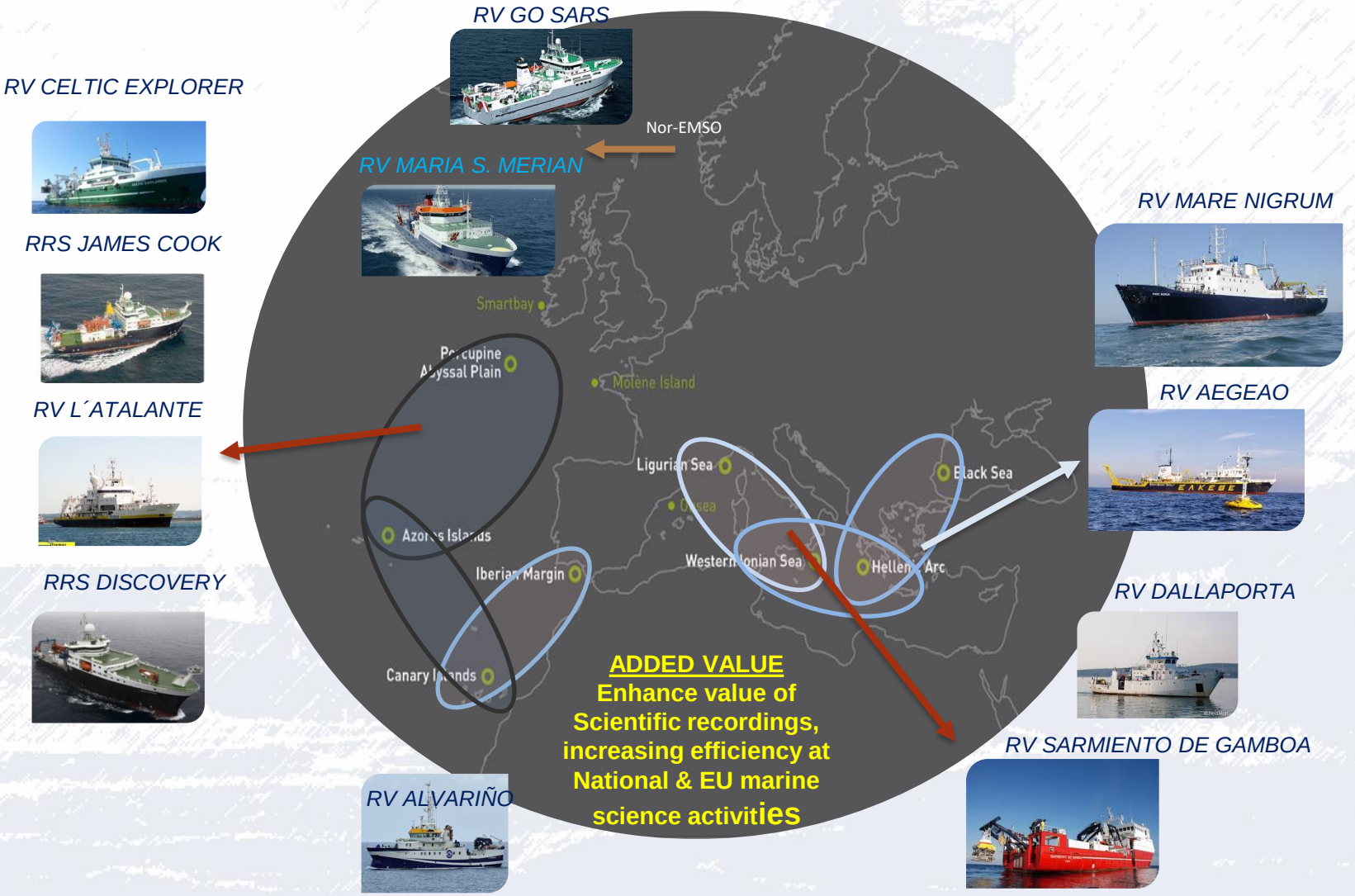
- ✓ **9 Deep Sea Observatories (Cable & Stand-alone)**
- ✓ **3 Test Sites, Shallow water**


**New accepted Facilities**
2 in Italian waters
1 in Greek waters

# RESEARCH CONSORTIUM

| COUNTRY | REPRESENTING ENTITY | |
|---|---|---|
| FRANCE | **Ifremer**<br>**CNRS** | L'Institut Français de Recherche pour l'Exploitation de la Mer<br>Centre National de la Recherche Scientifique |
| GREECE | **HCMR** | Hellenic Centre for Marine Research |
| IRELAND | **MI** | Marine Institute |
| ITALY<br>Host Country | **INGV** | Istituto Nazionale di Geofisica e Vulcanologia |
| NORWAY | **RCN** | Research Council of Norway RCN |
| PORTUGAL | **FCT** | Fundação para a Ciência e a Tecnologia |
| ROMANIA | **GeoEcoMar** | National Research and Development Institute for Marine Geology and Geoecology |
| SPAIN | **PLOCAN** | Plataforma Oceánica de Canarias |
| UK | **NOC** | National Oceanography Centre |

# "POTENTIAL SUPPLY" OF THE EUROPEAN RESEARCH FLEETS TO LOGISTICS AND MAINTENANCE OF EMSO ERIC REGIONAL FACILITIES



# WHAT ARE THE MAIN ACTIONS *EMSO ERIC* IS DOING TO ACHIEVE/IMPLEMENT/ADVANCE/DELIVER ON THESE KEY CONCEPTS

- **EMSO ERIC** requires well equipped **RVs** for a significant portion of its facilities (especially underwater) for offshore operations in the deployment, engineering tasks, recovery and maintenance of equipment and sensors.
- **EMSO ERIC** is working on a long-term collaboration planning to assure an efficient support to the Deepsea observatories
  - We will have to move from informally sharing "***Research Vessel time schedule***" to a formal system well programmed in advance by both parties.
  - Exchange of detailed observatories mapping of equipment, systems and Meeting preparation for interventions, including emergency ones, and maintenance
- Today there are a variety of ***Ocean Observation Systems***, between mobile and fixed platforms, an integration between the different systems would reduce costs and increase the efficiency and synchronization of the **RVs fleet**.
  - Improve synchronization towards full system and sensor interoperability to facilitate security and operations in **RVs** and enhance the value of data.
  - sharing plans and programs will undoubtedly optimize their use and cost between RIs EuroArgo, ICOS-marine, mobile platforms such as ocean gliders, auv´s, hybrid systems, etc.
  - Operational systems system well integrated with **RV fleet**.

# WHAT PLANS ARE IN PLACE TO BRIDGE THE IDENTIFIED GAPS/BARRIERS IN A SHORT-TERM (1-3YS), MEDIUM-TERM (4-6YS) AND LONG-TERM (10YS)?

- To set up a reliable planning with Deep sea floor observatories with large European RVs for maintenance and deployment (1.3)
- Establishment of collaborative operations between RIs for deployment and maintenance at the regional level for a period of 5 years.
- Long term planning, is it setup joint teams to advance in the new developments sensors and in communications systems which should be part of a **JOINT ACTION** between different platforms partners mostly RIs

# WHAT ARE THE PRINCIPAL GAPS/BARRIERS *EMSO ERIC* HAS IDENTIFIED TO THEIR IMPLEMENTATION?

- The most important challenges in ocean observation is to understand that collaboration benefits everyone and reduces expenses. it is not so easy to program it, due to the different national or regional interests and due to an absence of medium-term vision. Quality ocean observation requires in situ observation at all depths, a ground truth for satellite observations and excellent coordination, planning and programming among all actors.
- In the case of the fixed point observatories requires an long-term agreement to operate at regional seas and deep seas.
- Key point is a permanent interchange of information and developing of systems

01

**Cooperation -**

- Enhance collaboration among RV´s a Environmental Ris y implementing Operational systems system well integrated with RV fleet.
- Joint Long term commitment in the development of intelligent communication systems between RV's and Deepsea Observatories
- Setup a Deepsea inter-comparison/intercalibration programme
- Rapid interventions actions emergency programme

02

**Coordination**

- Coordination team made up of RVs and Marine RIs
- Towards a full interoperability of systems and sensors to facility the RV operations and enhance the data value
- Facilitate common management systems for heavy sensor equipment
- Common joint training/testing services ?

03

**Integration**

- Protocols to optimize a joint integrated procedures optimizing mobilisation time. Fluent exchange of information
- Tracking availability of underwater vehicles systems and procurement policies

04

**Simplification**

- Automation of some key access process, online and with a help desk

# emso ERIC

EUROPEAN RESEARCH INFRASTRUCTURE CONSORTIUM

Observing the ocean to save the earth

Eurofleets+

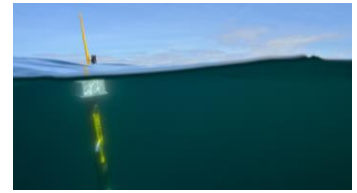
An alliance of European marine research infrastructure to meet the evolving needs of the research and industrial communities

1st International Workshop

# *Fixed and mobile ocean observing systems and satellite observation*

*April 13th, 2021*

## Euro-Argo ERIC



# Euro-Argo the European contribution to Argo

- Argo represents a fleet of about 4000 autonomous floats, deployed all over the world ocean, up to depths of 2000m to the abyss.
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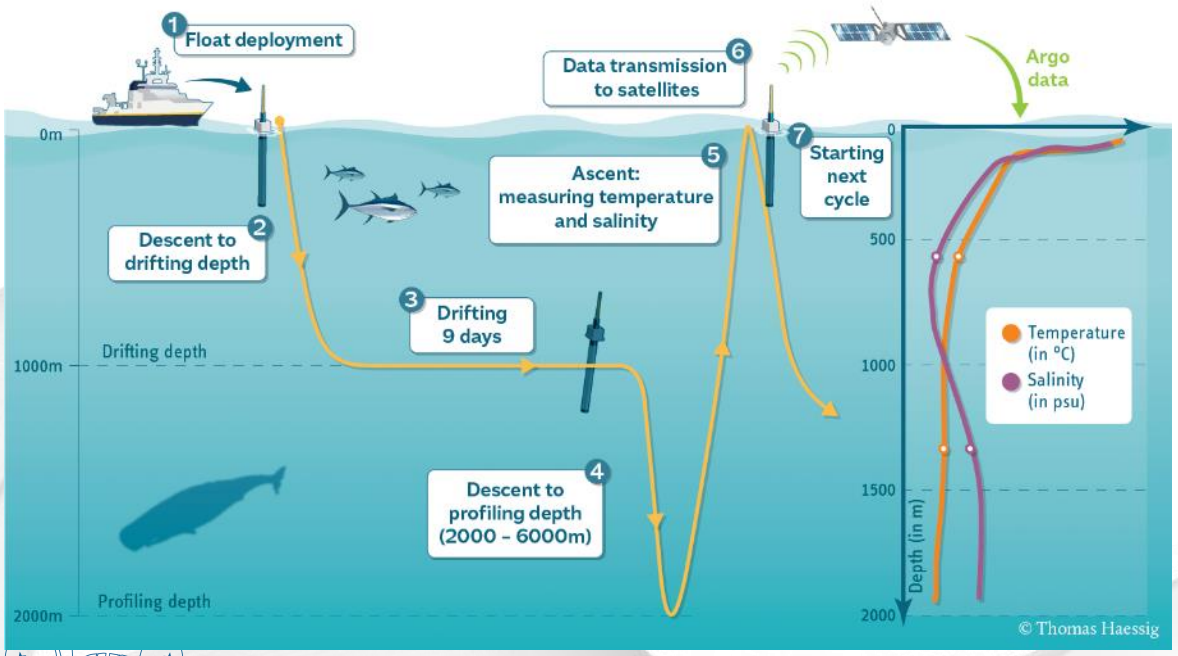


From 2000M
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To the abyss

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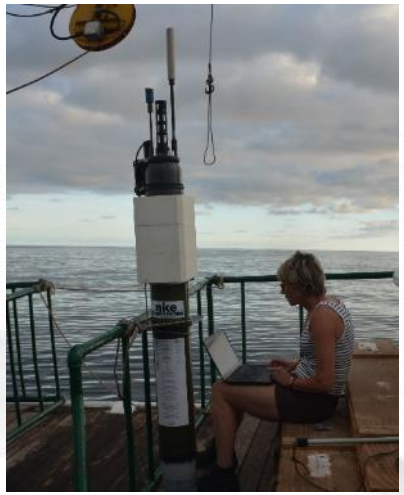
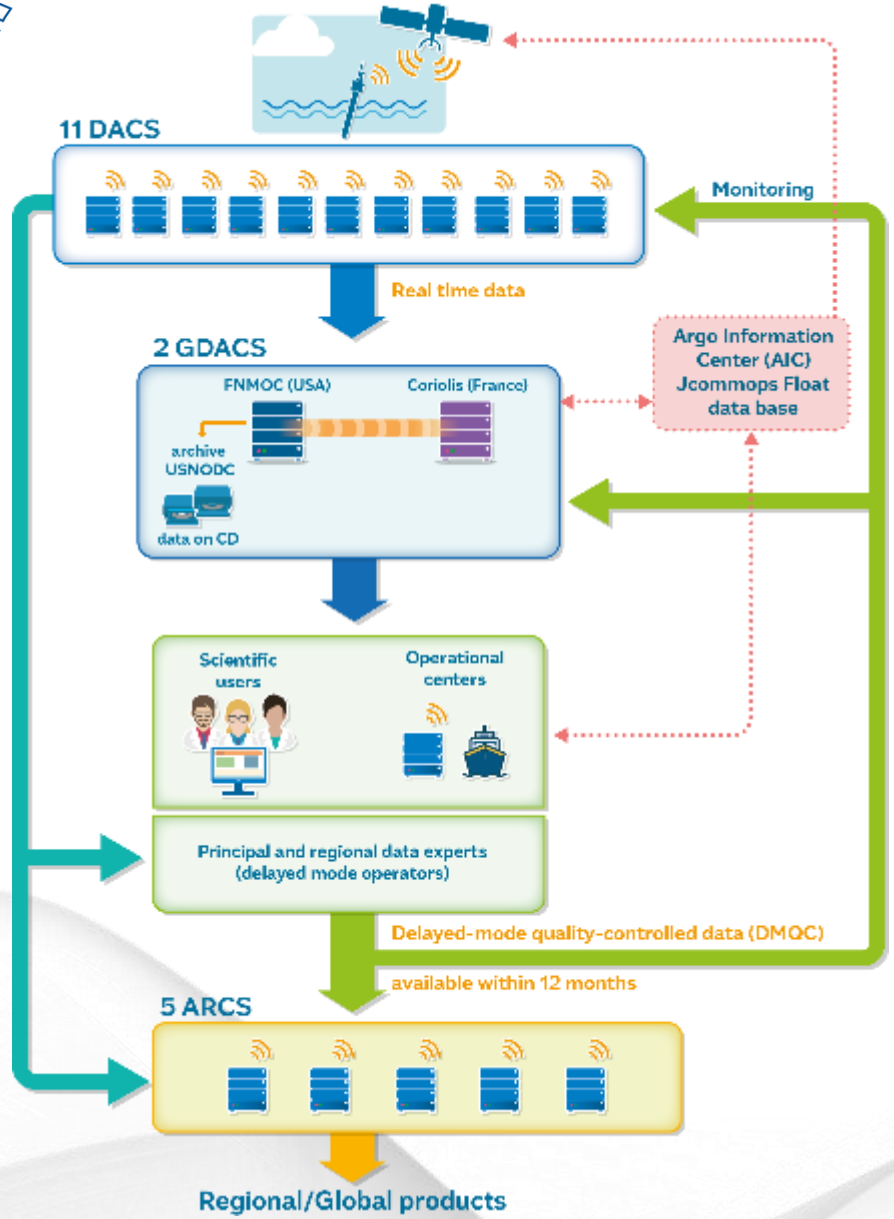
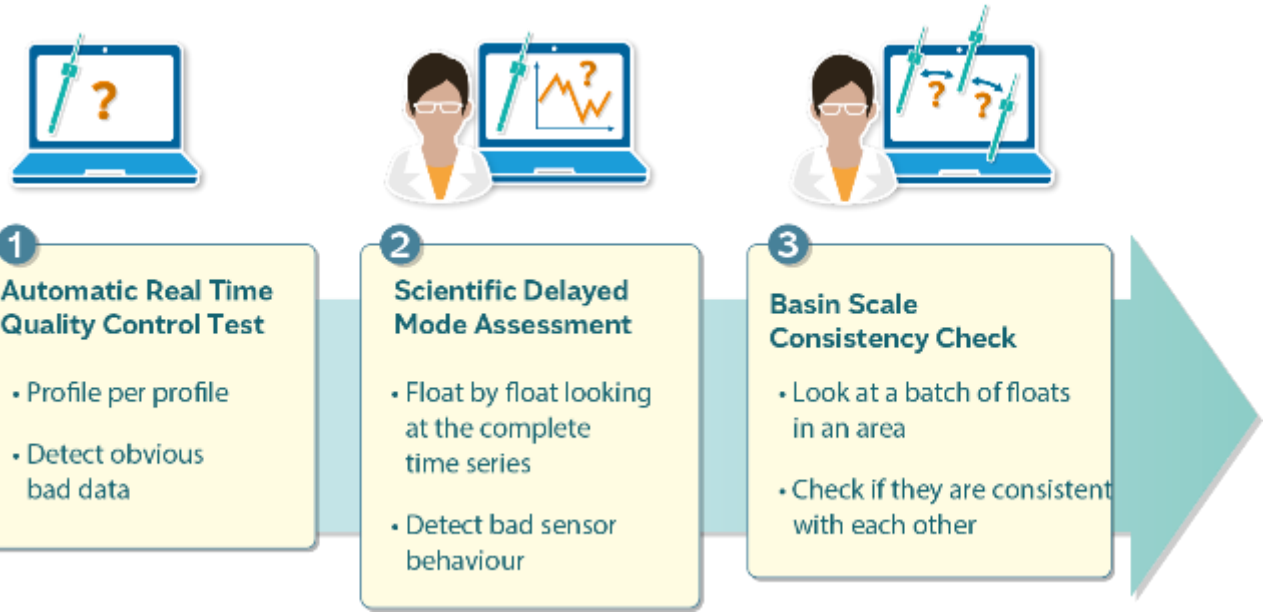
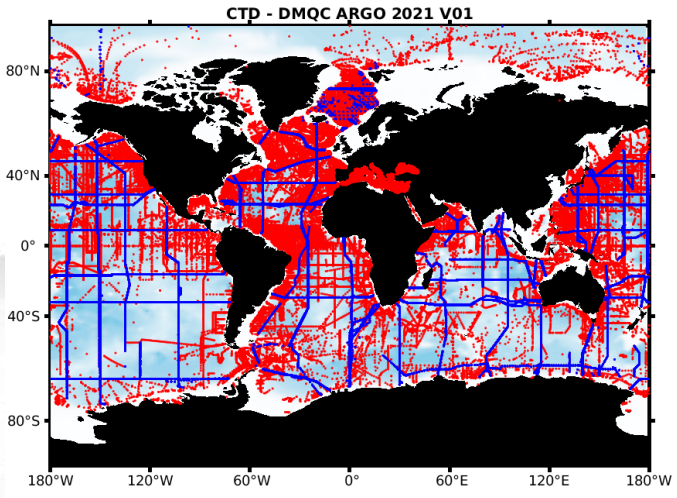


# Argo Data System



# Argo Users are in fact multi-observing system users

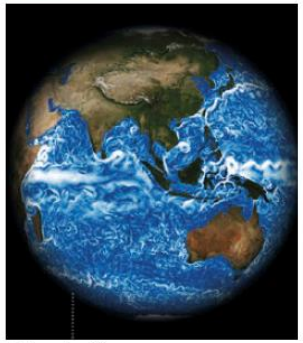

Argo floats free and open data

**For weather, climate and ocean forecasts prediction**

**The data is used by the operational oceanography:**

Argo demonstrated real impact on the accuracy of the ocean forecast and is critical for developing reliable seasonal to decadal climate predictions. Argo is a game changer in term of ocean observations.

© NASA



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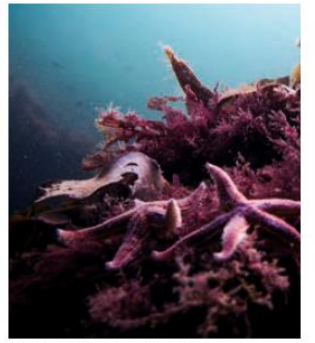

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**Positive impacts on the environment and society**

Contribution to 2 of the 17 Sustainable Development Goals (SDGs) adopted by all United Nations Member States in 2015

# WHAT ARE THE MAIN ACTIONS *EURO-ARGO ERIC* IS DOING TO ACHIEVE/IMPLEMENT/ADVANCE/DELIVER ON THESE KEY CONCEPTS

- Euro-Argo **relies mostly on Research Vessels** to deploy (and sometimes recover) its floats and therefore **collaboration with EuroFleet is essential.**
- As Argo floats can't be recovered most of the time , Euro-Argo need ancillary data to perform delayed mode Quality control
  - Sharing high quality data with other Research Infrastructures and in particular GOSHIP/ICOS/EMSO/SeaDataNet/EMODnet is crucial . **Most of those RIs use Research vessels to acquire their observations**

- Argo is extending **to new EOVs** and **testing prototypes** and **sensors** at sea **requires the use of Research Vessels**

- **Scientists and operational users such as Copernicus Marine** use Argo in combination with other Research Infrastructures data assembled by Integrators into fit for purpose products
  - Enhance FAIR metadata and data access using common standards facilitate the use of Argo combined with other in situ and enhance reusability by users at large. **Collect enough metadata closer to the acquisition/deployment on RV is essential**
  - In Situ data can be complex and **training/outreach actions to facilitate user uptake** presently through CMEMS and EMODnet . **Could be done through collaborative action between RI& including Eurofleet coordination**

# WHAT ARE THE PRINCIPAL GAPS/BARRIERS *EURO-ARGO ERIC* HAS IDENTIFIED TO THEIR IMPLEMENTATION?

- Integrated open access to detailed cruise track would need to be facilitated for a lot of Research Vessels and a service like Marine Facilities Planning Portal with information shared with OceanOPS would be useful
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- No overall monitoring of the European Observing system ( similar to the OceanOPS system at GOOS/OCG level)

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L Work with EuroFleet and other European RIs , to **better coordinate the long term planning of at sea operations** necessary to maintain a multiplatform ocean observing network Europe needs in a coordinated manner extending OceanOPS facilities

01

## Cooperation -

- RV are essential for deployment of autonomous platforms such as Argo and need cooperation at all levels from national, to EU ( EU RIs and EuroGOOS) to International (GOOS)
- EU projects helps to develop concepts/Tools but sustained organisation is needed for long term actions continuity

02

## Coordination

- Still relies on best effort between different RIs => development of EOOS if successful should help
- ERICs set up is a mean to foster EU coordination
- A lot of coordination is still mainly funded through projects with multiple funding streams

03

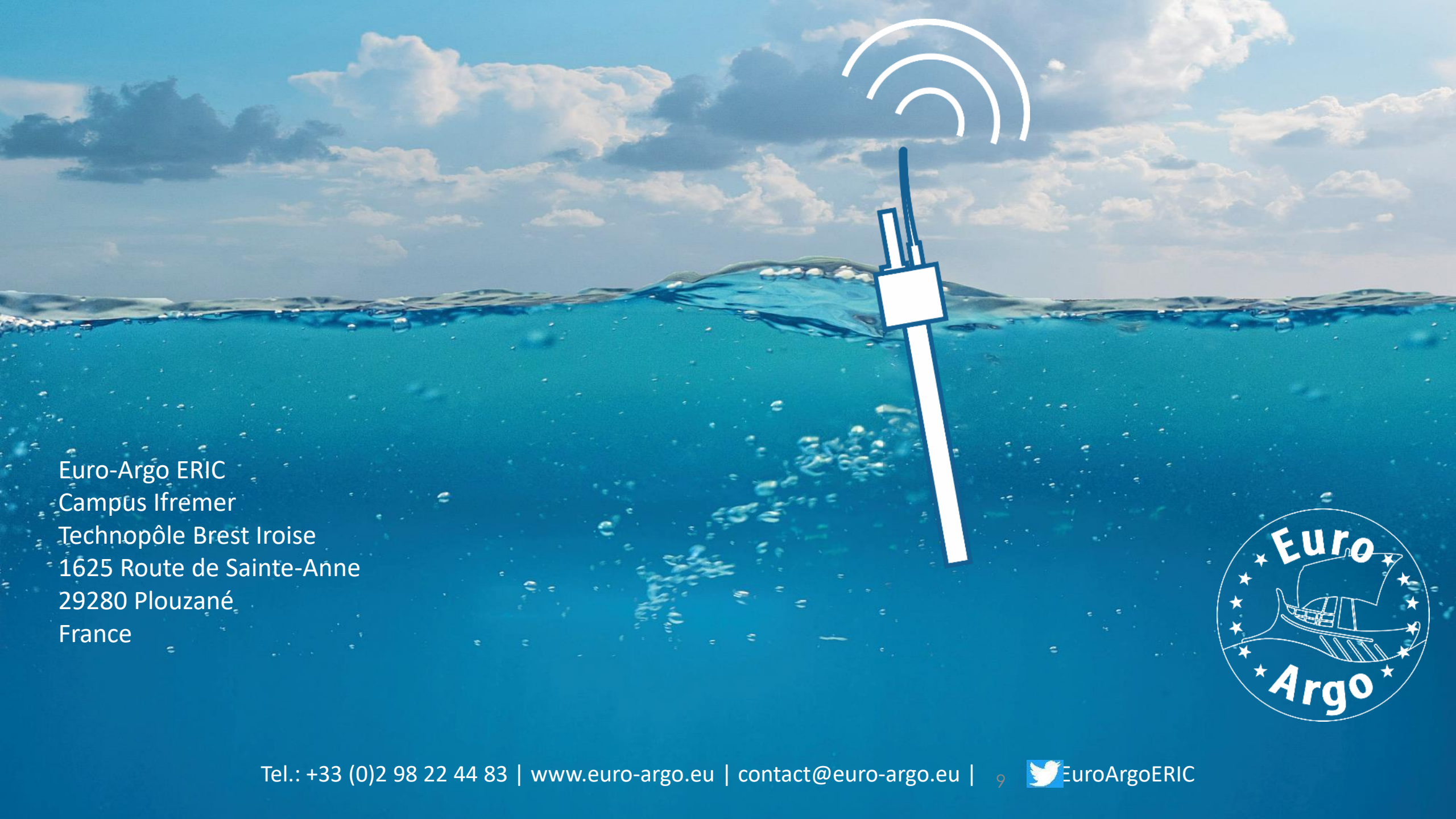
## Integration

- ENVRI cluster and EOOS should facilitate such integration but presently we are still a the level of cooperation/coordination
- Integrated monitoring system of the existing and planned Ocean Observing System is needed including Research Vessels cruise plan

04

## Simplification

- Necessitate EU RIs set up on the long term with sustained funding from nations and EU
- Allocate Research Vessels time for EU RIs observing system maintenance



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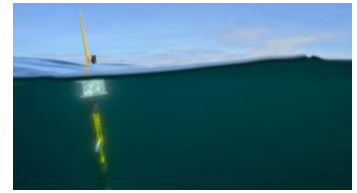
1st International Workshop

# *Fixed and mobile ocean observing systems and satellite observation*

*April 13th, 2021*

## Euro-Argo ERIC



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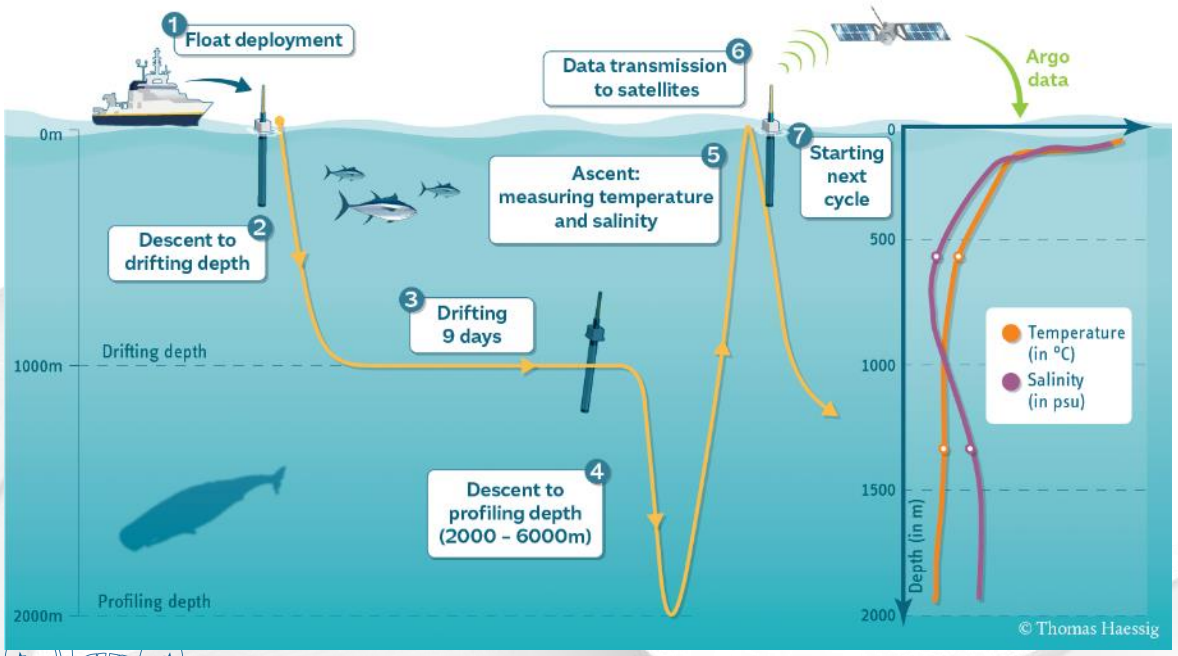


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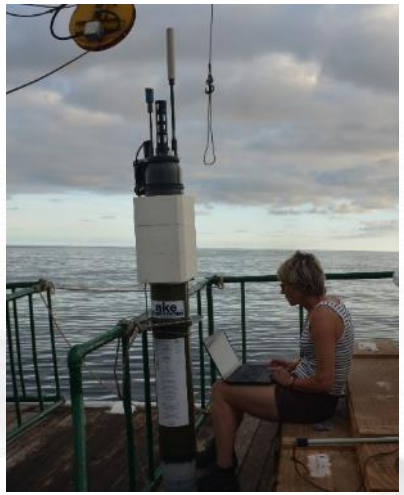

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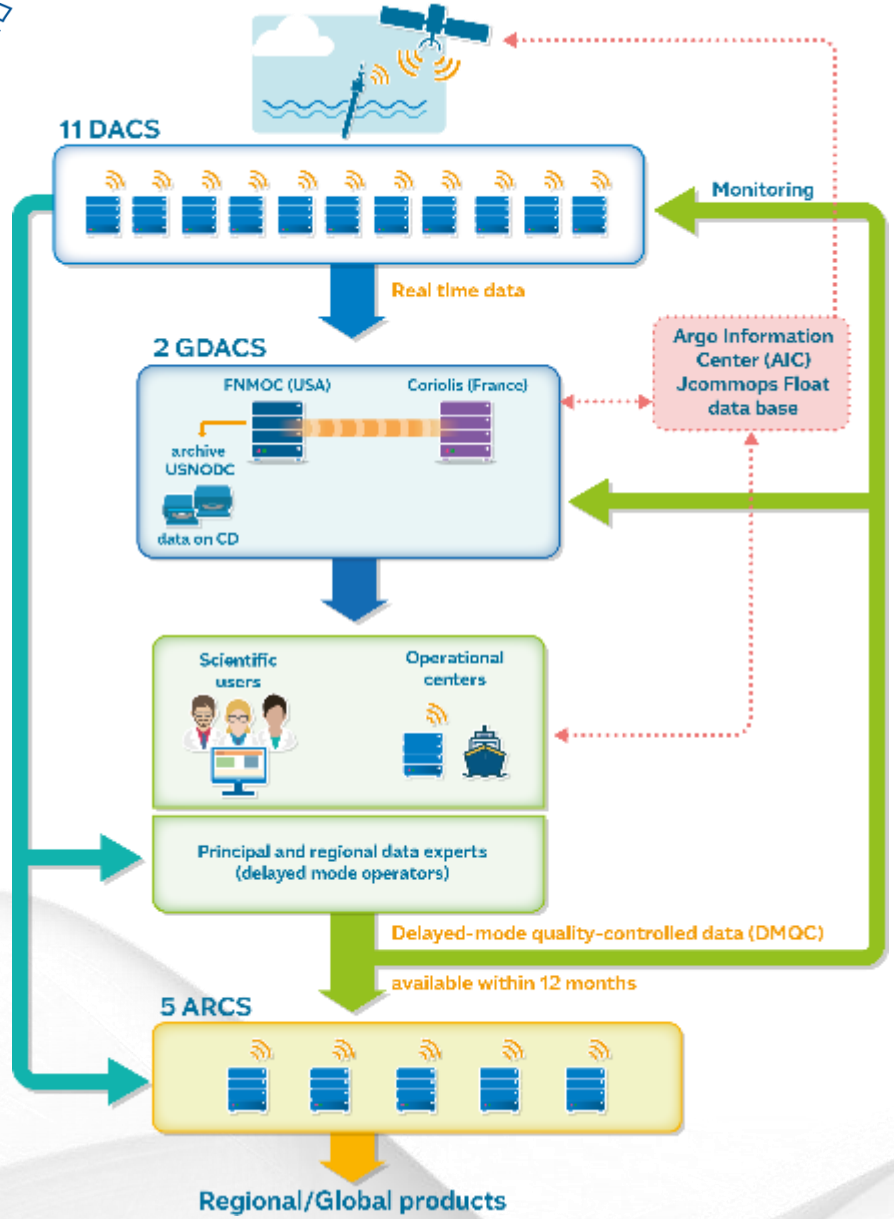


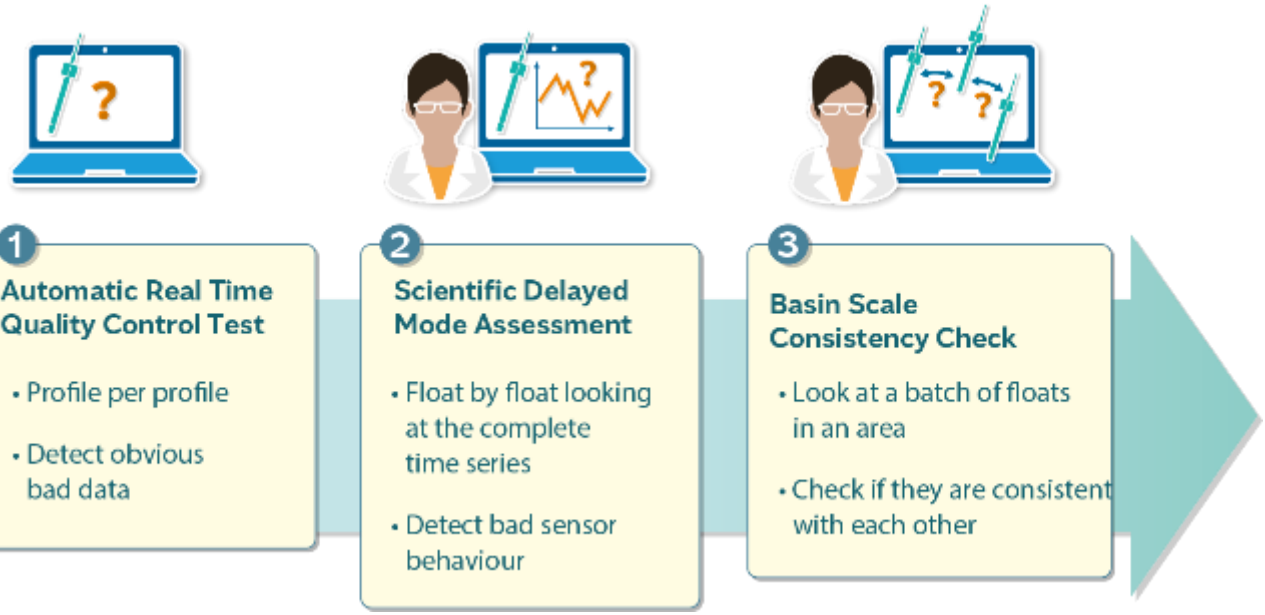


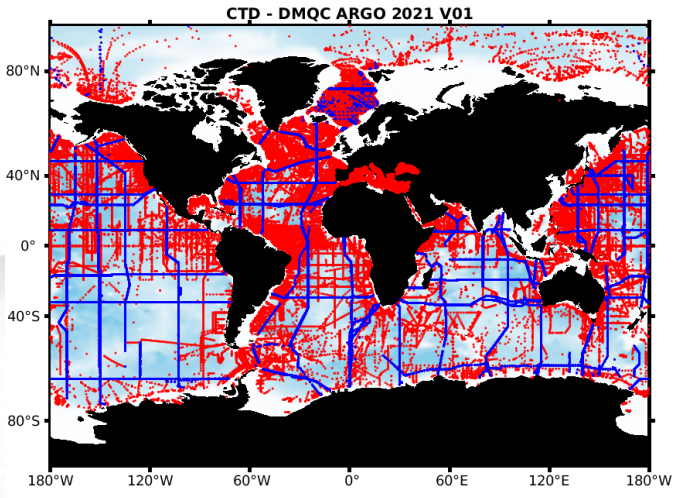

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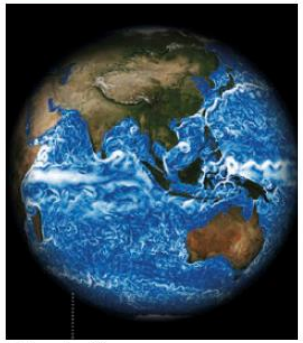

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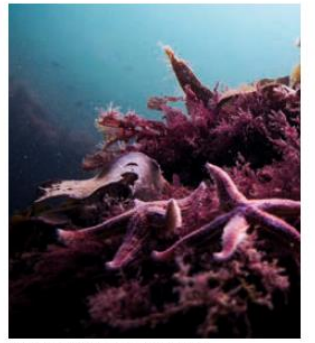

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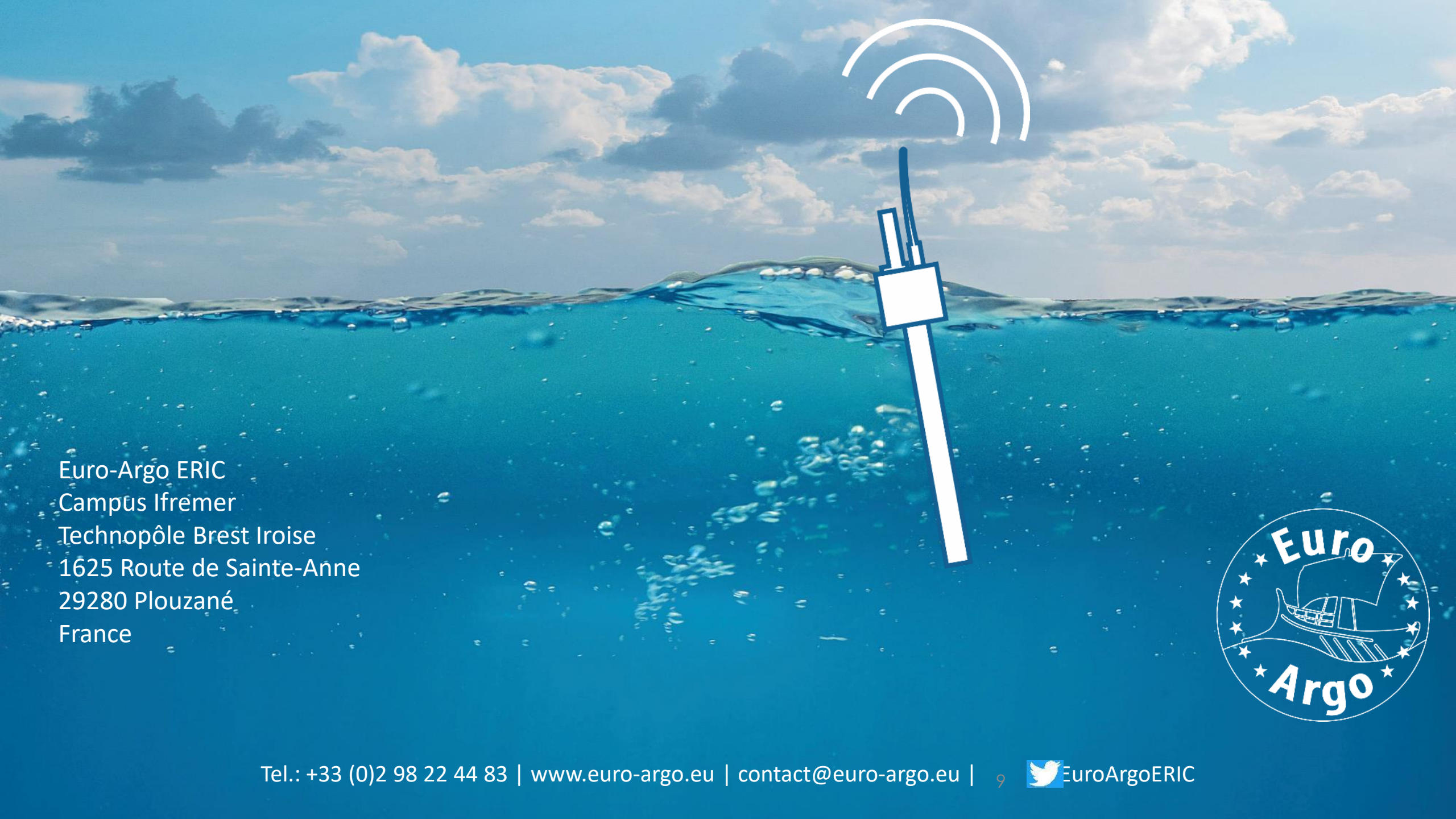

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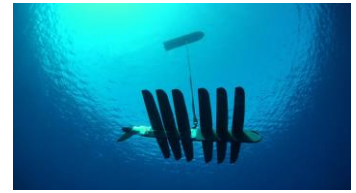
# GROOM II project / GROOM-RI

Gliders for Research, Ocean Observations and Management: Infrastructure and Innovation

*Laurent Mortier*

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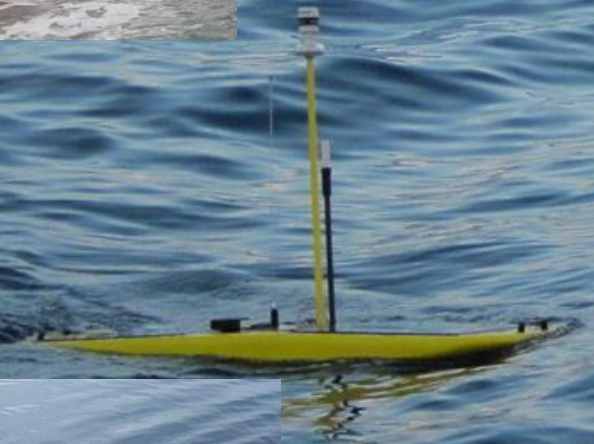
GLIDERS FOR RESEARCH, OCEAN OBSERVATION & MANAGEMENT : INFRASTRUCTURE AND INNOVATION



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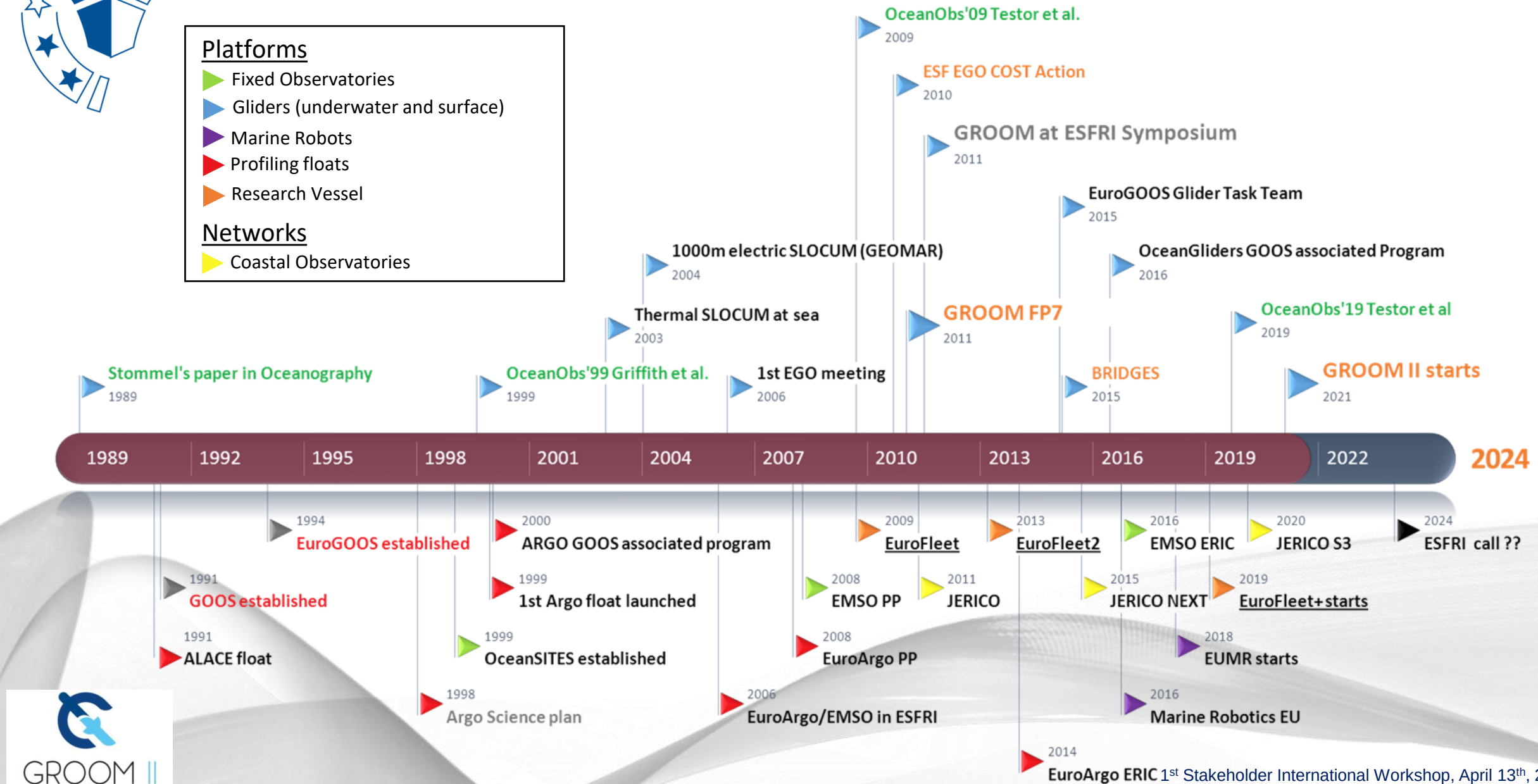
# GROOM HISTORY AND COMMUNITY



# EUROPEAN AND GLOBAL LEADERSHIP

EGO Everyone's Gliding Observatories

**A worldwide community of glider users**

bringing together :

- glider operator,
- scientists,
- manufacturer,
- data manager,

to share results, experience, knowledge and develop international cooperation.

GROOM — Gliders for Research, Ocean Observation & Management

GROOM II — GLIDERS FOR RESEARCH, OCEAN OBSERVATION & MANAGEMENT : INFRASTRUCTURE AND INNOVATION

**Building the glider European RI**

Sustained observation monitoring

Sustained observation requirement

Ocean Gliders

**GOOS associated program**

**Frontier Sciences** — frontiers in Marine Science

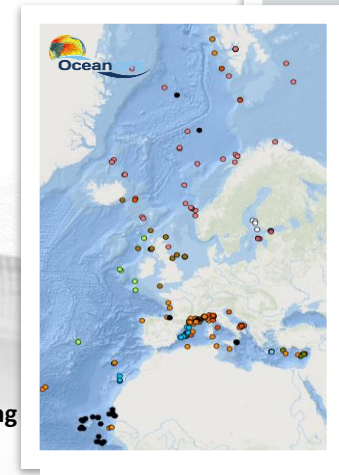
**innovation** — Copernicus Marine for MSFD

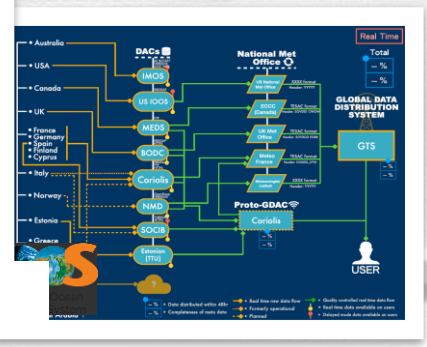
**infrastructure** — ENVRI community

**Ocean Services**

**Data services**


**International scientific cooperation**

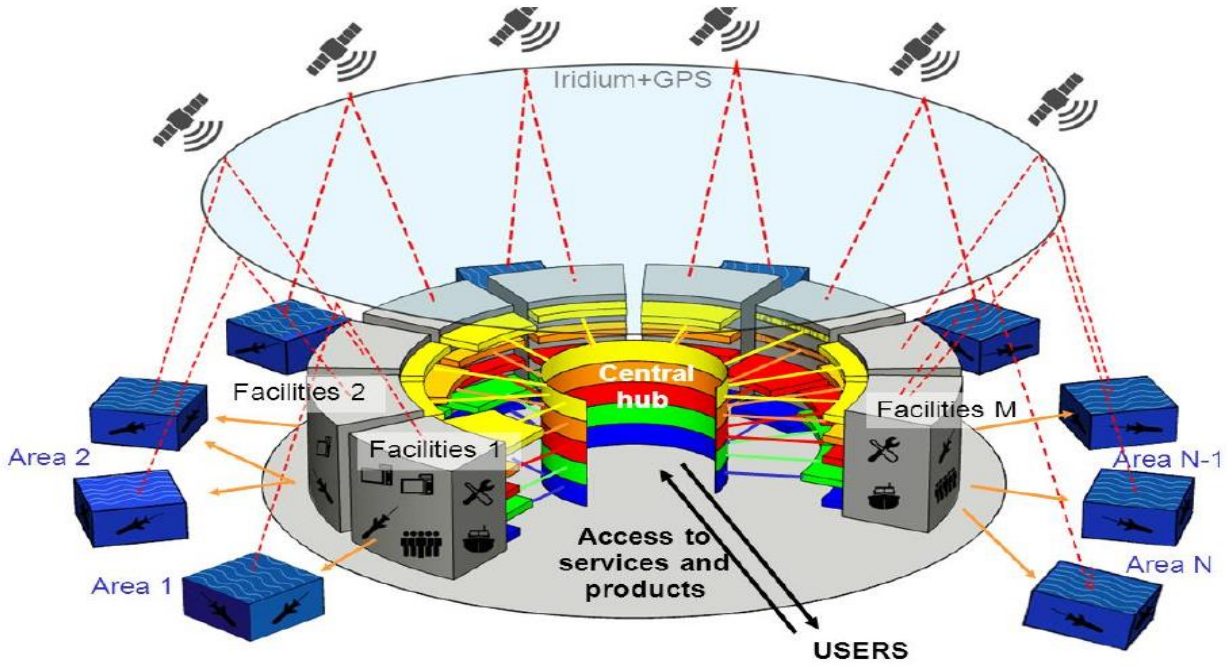




**Global monitoring**

**Internationa**
**metadata flo**

# GROOM-RI : Glider European Research Infrastructure (GERI) Concept




- Mission planning, piloting, artificial intelligence, …
- Vehicle maintenance and operations
- Data management
- Sensor calibration and integration
- Acces, outreach, training, …

**01** **GROOM : Central hub and distributed nodes**

*High potential of economy of scales with this approach* ***Strong case for an ESFRI like infrastructure***

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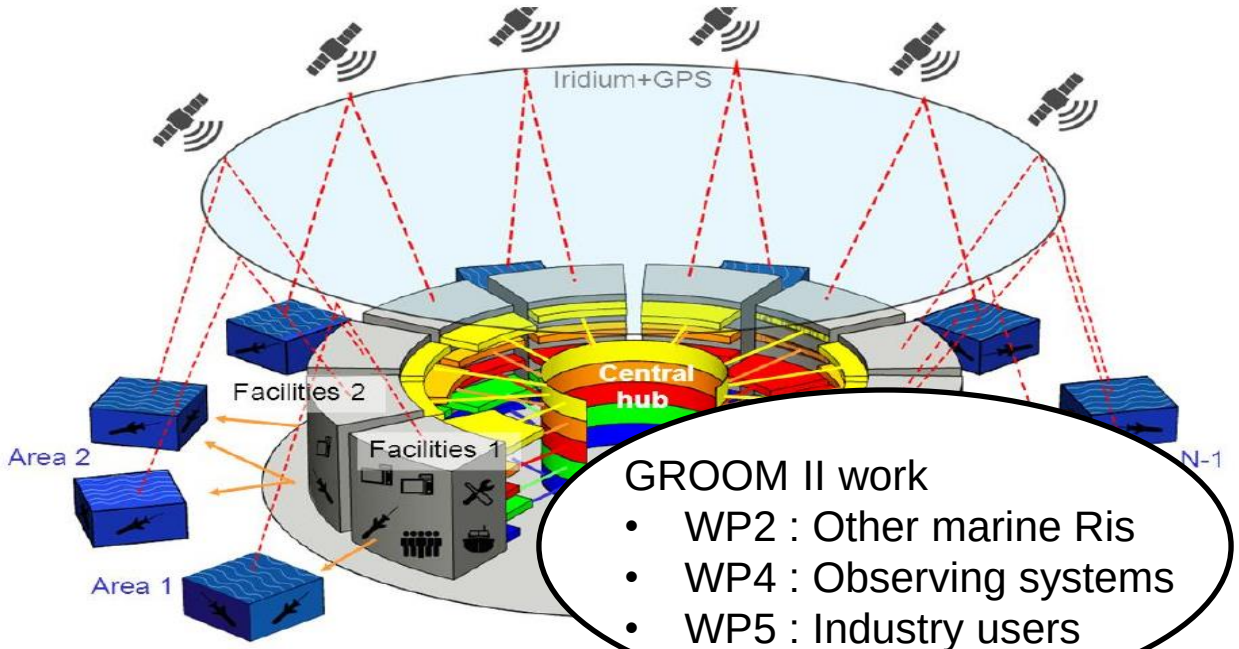


GROOM II work
- WP2 : Other marine Ris
- WP4 : Observing systems
- WP5 : Industry users

- Mission planning, piloting, artificial intelligence, …
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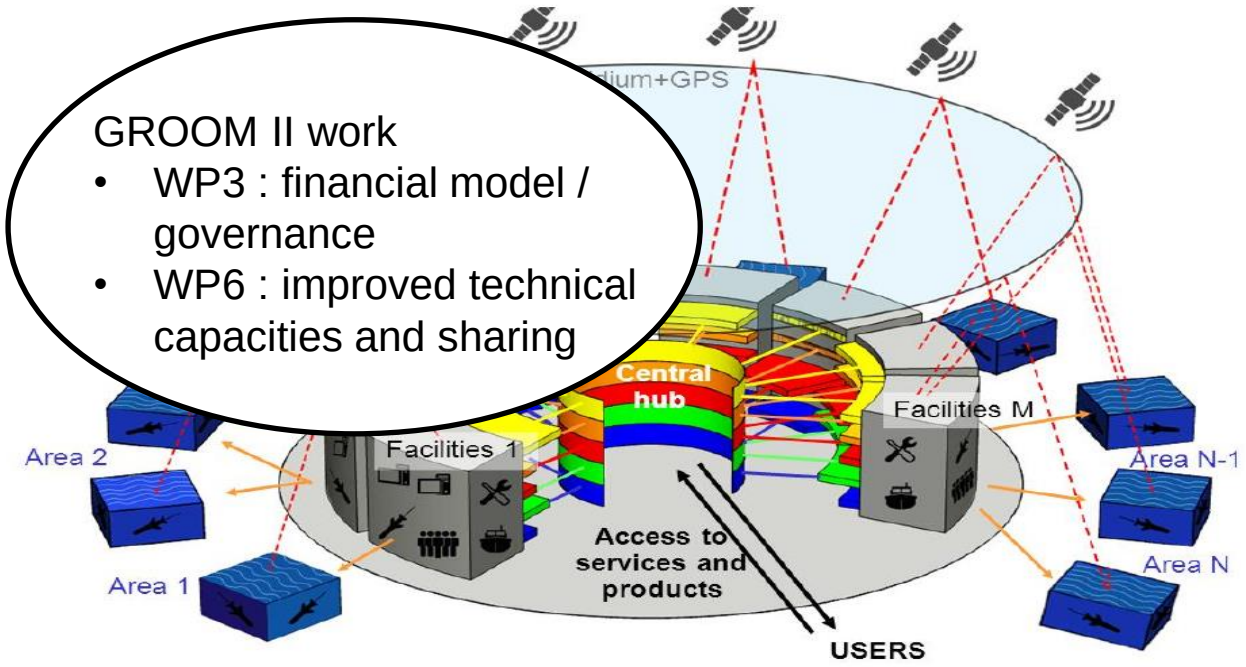
**02** **GROOM II**
Integration of the GERI in the landscape of European MRIs
Services for the GOOS, EOOS (including MSFD, …) and to the Industrial sector

GROOM II
GLIDERS FOR RESEARCH, OCEAN OBSERVATION & MANAGEMENT : INFRASTRUCTURE AND INNOVATION

# GROOM II project

GROOM II work
- WP3 : financial model / governance
- WP6 : improved technical capacities and sharing




- Mission planning, piloting, artificial intelligence, …
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**01** **GROOM : Central hub and distributed nodes technical organisation**
*High potential of economy of scales this approach*  ***Strong case for an ESFRI like infrastructure***

**02** **GROOM II**
- Integration of the GERI in the landscape of European MRIs
- Services for the GOOS, EOOS (including MSFD, …) and to the Industrial sector

**03** **GROOM II**
- Update technical organization and detailed assessment of economies of scales
- Governance and funding schemes formally designed
- Series of KPI to assess the efficiency of the GERI (versus a network of reg./nat. facilities)

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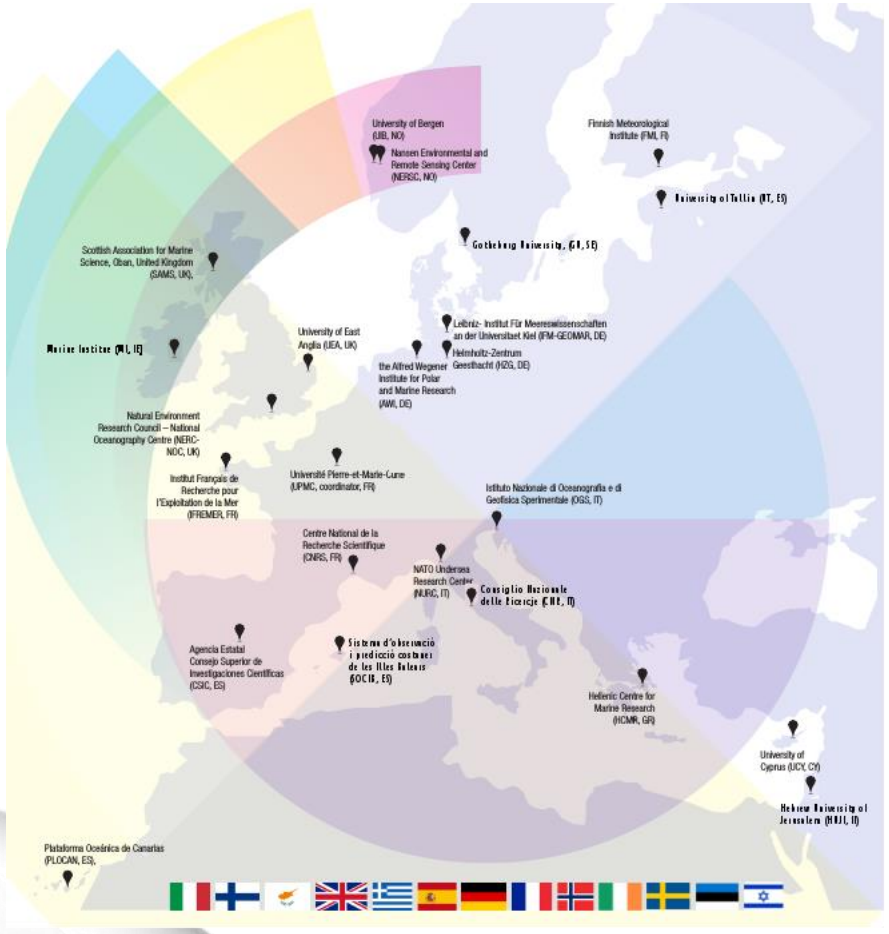
# GROOM-RI NODES TODAY




Map from the European glider GDAC (Coriolis) (and US GDAC) showing GROOM-RI capacity to maintain (sustained) observatories

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# WHAT ARE THE MAIN ACTIONS *GROOM-RI* IS DOING/WILL DO TO ACHIEVE/IMPLEMENT/ADVANCE/DELIVER ON THESE KEY CONCEPTS

**01**

**Cooperation**

- Sharing of best practices  Strong cooperation potential with other **RIs**
- Deployment/recovery of gliders in remote areas  Cooperation with **RVs**
- Data management organization  Cooperation with EuroArgo, potentially EMSO (OceanSites for biogeochem.)

**02**

**Coordination**

- Strong coordination through **OceanGliders** with the other **GOOS** programs
- Gliders can “fill gaps”: Fit for purpose multi-platform approach for **EOOS and JERICO**  need for strong coordination between **RIs**, with the **RVs** playing a central role
- Strong potential for interface with other env. **RIs** (rivers, GHG emission, …)  Coordination with **ENVRI** (**Danubius**, **ICOS**, **EMBRC**, …)

**03**

**Integration**

- Real Time and Delay Mode Data management  strong commonalities with **EuroArgo**
- Mission planning, piloting of gliders needs costly IT systems  Potential for integration with future large multi-missions surface and underwater vehicles (often part fo **RVs**)

**04**

**Simplification**

- **GROOM-RI** is in line with OceanGliders  we can follow the global efforts in the GOOS to align Programs (Argo, OceanSites, …) avoiding adding extra layers in the system.
- BGC and biological scientific payloads on gliders  Potential for common developments with **EuroArgo**
- Blue Economy : **GROOM-RI** works with industries  Sharing effort with **EMSO** (testbeds, sensors, …)

GROOM II
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# WHAT ARE THE PRINCIPAL GAPS/BARRIERS *GROOM-RI* HAS IDENTIFIED TO THEIR IMPLEMENTATION?

**01**

**Cooperation**

- Best practices: bottom-up approach makes difficult convergence, endorsement
- Access to **RVs** in **EuroFleet** with TNA like mechanism is not really adequate. National access and OFEG like mechanism more suitable ?
- Data management with EuroArgo : no real barrier but risk of divergent evolutions

**02**

**Coordination**

- GOOS programs do not encompass all activities of European **MRIs**
- Gliders can “fill gaps” : few coordination at the moment or mainly on a national basis in some regions
- Interface with Environ. RIs  To be done

**03**

**Integration**

- Real Time/DM Data management  no strong barrier but lack of resources
- Mission planning, piloting of gliders needs costly IT systems: complexity of existing approaches

**04**

**Simplification**

- Alignment with GOOS programs is difficult (except for **EuroArgo**) because **GROOM-RI** (OceanGliders)**, EMSO** (OceanSites component), **EuroFleet** (GO-SHIP) have other activities
- BGC and biological scientific payloads on gliders  no strong barrier but silo approaches because of organizational constraints
- Blue Economy and work with industries  No real barrier but silo approaches and lack of resources. To be done

GROOM II
GLIDERS FOR RESEARCH, OCEAN OBSERVATION & MANAGEMENT : INFRASTRUCTURE AND INNOVATION

# WHAT PLANS ARE IN PLACE TO BRIDGE THE IDENTIFIED GAPS/BARRIERS IN A SHORT-TERM (1-3YS), MEDIUM-TERM (4-6YS) AND LONG-TERM (10YS)?

**1-3**

**Work with EuroFleet, EMSO, EUMR, EuroArgo : Workshops organized by GROOM II or the others RIs**

- **only <u>design</u> and <u>potentially proposals for action</u>**
  - Shareable IT platform (EUMR)
  - Services for the industrial sector (EMSO)
  - Improved Data management / BGC and biological scientific payloads (EuroArgo)
  - Toward an improved shared vision for the Marine RI landscape, including with **JERICO, Danubius, …**

**4-6**

**Work with EuroFleet, EMSO, EUMR, EuroArgo. Plans are not in place but**

- Shareable IT platform feasible with EUMR if common vision achieved
- Services for the industrial sector with EMSO: current willingness is favorable for action
- Improved Data management / BGC and biological scientific payloads with EuroArgo: Work on projects basis
- Toward an improved shared vision for the Marine RI landscape: Being platform oriented RI makes easier to define the interfaces (operation, services, …) between RIs, but to be done

**10**

Work with **EuroFleet** and **other European RIs**:

- to **better coordinate the long term planning of at sea operations** necessary to maintain a multiplatform ocean observing network and for that, EOOS needs coordination extending (GOOS) Ocean-Ops facility
- to maintain frontier science services and service innovation

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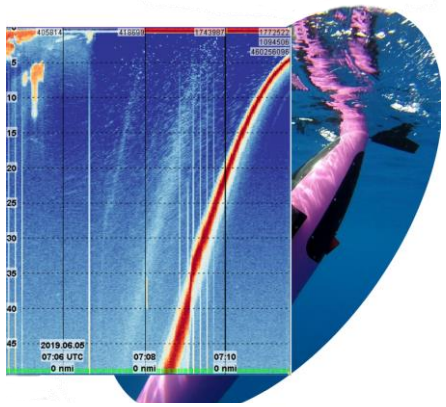
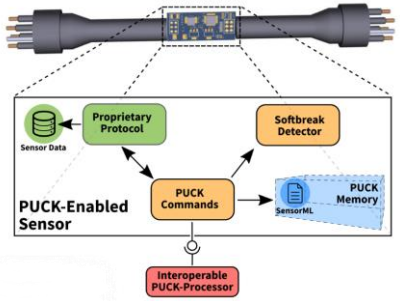
European Commission

# GROOM : Helps developing an European glider industrial sector






**01** **A growing sector routed in the research community at national, Eu and global level**
*Alseamar (Fr), CSCS (Cy), APN (No), MTS (Sw), …*

**02** **High potential for research and innovation**
*BRIDGES (deep gliders), BIOGLIDER (advanced imagery), …*

**03** **Services**
*To the research community, the O&G sector (including CCS),*

☒ **Strong need for a common approach with other RIs and the marine/maritime industrial clusters**

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# Annex 3 Workshop Poll results

This project has received funding from the EU
H2020 research and innovation programme
under Grant Agreement No 824077

# Eurofleets

07 - 13 Apr 2021

Poll results

Multiple-choice poll

Eurofleets+ / Pre-workshop survey (1/3)

0 1 4

## Which domain best describes your organisation?

(1/2)

Research vessels operator

14 %

Fixed-point observatory

14 %

Mobile systems

21 %

Remote sensing

0 %

Environmental-marine policy maker

0 %

Multiple-choice poll

Eurofleets+ / Pre-workshop survey (1/3)

0 1 4

## Which domain best describes your organisation?

(2/2)

University / Academia

21 %

Merchant marine

0 %

Other

29 %

Eurofleets+ / Pre-workshop survey (2/3)

006

# If you answered 'other', please briefly describe the domain in which you work

(1/2)

- DANUBIUS-RI (Implementation Phase) Romanian National Institute for R&D in Marine Geology and Geo-Ecology
- Maritime technology provider
- Marine data broker EMODnet is a marine data broker, making in situ marine observations Findable, Accessible, Interoperable and Reusable (FAIR) by providing open and free access to standardized, harmonized and integrated marine data and data products, together with associated metadata providing information about the data and products. EMODnet’s portfolio spans hundreds of parameters across seven thematic areas: bathymetry, biology, chemistry, geology, human activities, physics and seabed habitats, with a focus on

Eurofleets+ / Pre-workshop survey (2/3)

006

# If you answered 'other', please briefly describe the domain in which you work

(2/2)

European seas but with increasing coverage at global level. EMODnet works in collaboration with many national, regional and European ocean observing and data initiatives and infrastructures, with a dedicated Data Ingestion Service, and in partnership with the Copernicus Marine Environment Monitoring Service (CMEMS).

- Observational Platform (Balearic Islands Coastal Observing and Forecasting System): SOCIB
- EUFAR: Research aircraft, instrumentation and data for environmental science.
- Monitoring of the Baltic Sea using SeaExplorer gliders and Sailbuoys within Voice of the Ocean non-profit foundation

Open text poll

Eurofleets+ / Pre-workshop survey (3/3)

0 1 1

# What are your expectations for this workshop?

(1/4)

- Find areas & potential opportunities for improving collaboration between the different ocean observing networks
- Basically to see how other organisations in Europe are working with combining data aquisition from these different platforms and sharing what we are doing at my organisation. Also to find possible future collaborations
- networking for deployment opportunities for our mobile systems (Argo floats)
- get a notion on how Eurofleet aims at advancing (European) ocean observing
- To have an updated picture of the european monitoring services and stakeholders
- Knowledge on the impacts of both human impacts and related climate change on ecosystem functioning

Eurofleets+ / Pre-workshop survey (3/3)

0 1 1

# What are your expectations for this workshop?

(2/4)

and behavior is now essential together with the continued mapping and understanding of the distribution and abundance of marine life (and trends herein) and the physical and chemical state of the ocean (historical and real-time). In addition, the continued collation, standardization and harmonization of existing marine data e.g.
by EMODnet and CMEMS is crucial to reduce uncertainty in knowledge and identify real gaps in observation temporal and spatial coverage and parameters. Long-term global (marine) data initiatives need to be interconnected to ensure the long-term discovery of and easy access to data needed to support the marine knowledge pipeline.

- To know little bit more the function and work procedures of Eurofleets initiative and interchange of expeirences.

Open text poll

Eurofleets+ / Pre-workshop survey (3/3)

0 1 1

# What are your expectations for this workshop?

(3/4)

- to learn about opportunities of collaboration and sampling in marine environment
- That the goals of the workshop are met as indicated in the workshop description. As a research vessel operator it is important to understand the needs of the other systems/observatories, but is also important
- that the managers/users of these systems understand the importance of research vessels not only during operations but also with regard to the financing incl. the build of research vessels and the associated requirements.
- To gain a better understanding of Eurofleets objectives for the future. Also to discuss how EUFAR may support

Eurofleets+ / Pre-workshop survey (3/3)

0 1 1

# What are your expectations for this workshop?

(4/4)

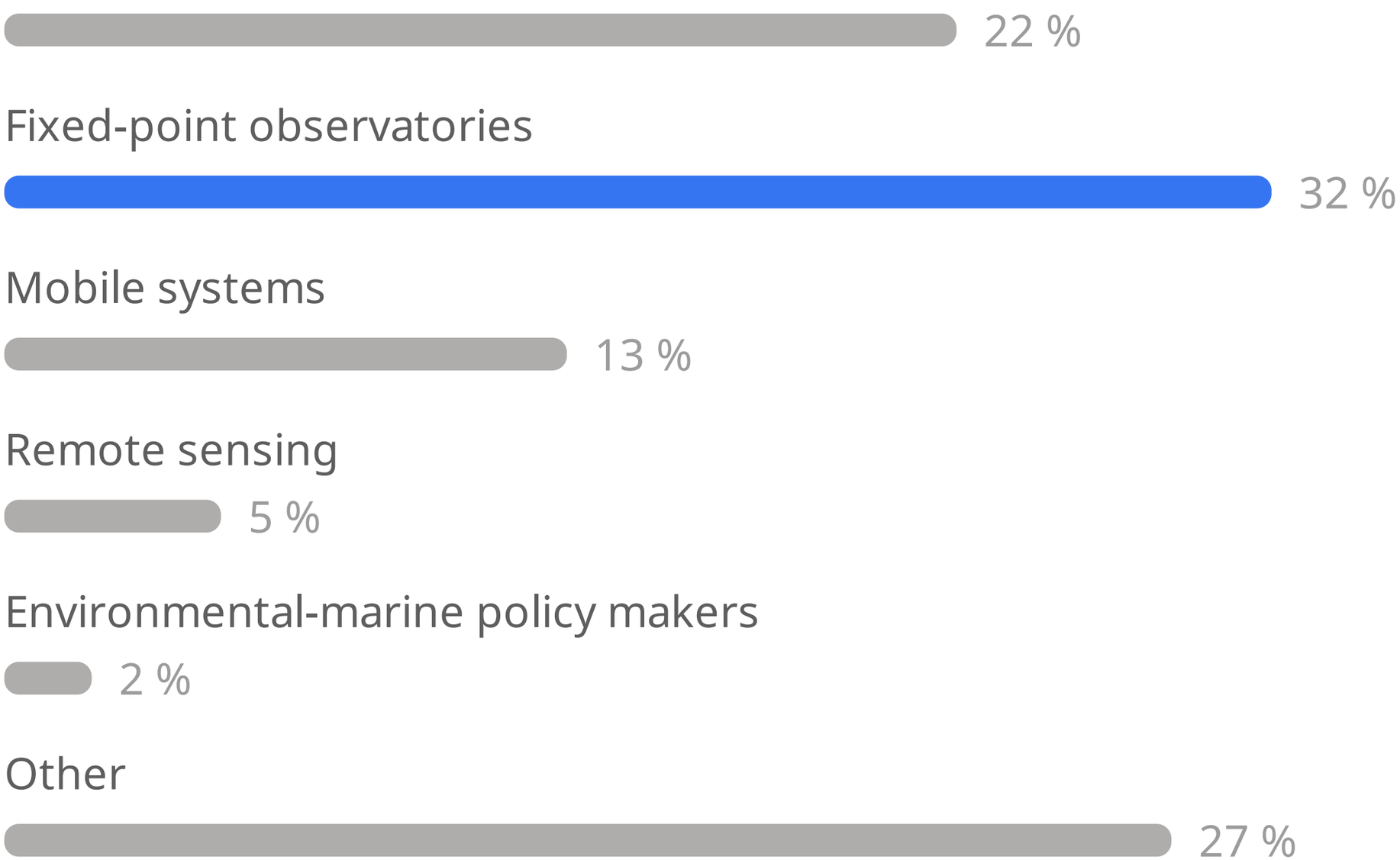
or contribute to these activities,
for example through the
promotion of joint shipborne and
airborne observing activities.

- To find out what is currentlly happening in the field

Multiple-choice poll

## Which domain are you working with?

0 6 0



Open text poll

## What is your key takeaway from this workshop? 0 3 2

(1/3)

- RI key action is to provide services and excellent data for scientist and other stakeholders, as industry and/or policy makets
- Need to keep the community connected, from this workshop to continuous information interchange. Information access and sharing information on resources, plans and opportunities
- A Council of RIs?
- Sharing information between RIs is a first essential step toward integration and simplification ( first step is cruise sharing as we all use RV) Data is at the end of the value chain and we should work on upstream data
- More coordination and effort on biological observation
- RV schedule sharing with other RI's Tailor Transnational access to RI needs
- Need to try and determine and agree at what level RI co - ordination can best succeed and work to achieve this.
- New long-term funding schemes for RIs are needed
- The need to exchange and find

# What is your key takeaway from this workshop? 032
(2/3)

a way to integrate observation systems
- Umbrela Operacional plan to put RI at sea in a consistent way
- Workshops like this should happen more often.
- Intensive cooperation at all levels
- We need to solve data integration and data sharing.
- Today we had an excellent workshop to start the collaboration
- There is a need to share the infrastructure. Not very clear how we can do!
- Optimize what we have, while thinking about the needs of others. And the key is information.
- There is a need for greater coordination to optimise opportunities and make the most of resources
- Integration is the most important step.
- This is the beginning of a journey. Continuity in exchange and communication is key moving forward.
- There are opportunities for inter-RI collaboration

## What is your key takeaway from this workshop?

0 3 2

(3/3)

that aren't yet beig actiooned.
- Efficiency opportunities
- Networking and info sharing is key to cooperation
- We should continue our discussions
- We need to have more of this kind of workshops.
- Information exchange needs to be improved, starting with more frequent updates.
- We need concrete activities on the key issues - coordination, integration etc
- Better coordination between RI
- potential for integration and collaboration
- Need for enhanced collaboration
- We need to communicate better between ourselves as there is quite a lot of confusion in the structure of the ocean observing.
- Better collaboration between the RIs
- If you want to go fast, go alone. If you want to go far, go together.

# Annex 4 Main outcomes of Eurofleets+ 1st International Workshop Group conversations

This project has received funding from the EU H2020 research and innovation programme under Grant Agreement No 824077

# Eurofleets+
# 1st International Workshop

## Key takeaways from the group conversations

# Key takeaways -

- Formal schedule of Ship time **Access** EMSO (provided, then known in advance)
- Integration and sensor interoperability with RV
- Collaboration for RV **Access** for deployment and recovery of equipment, common multipurpose cruises, common experiments with different RI's or research groups
- Data Sharing and Access
- Joint programme for training researchers and technicians
- Personnel exchange (marine technicians)
- Open access to detailed cruise track
- Long-term funding streams - Joint Funding streams for RI's

# Key takeaways

**Cooperation**- Better collaboration with RV's, Sharing of best practice, Develop tools for long term actions continuity

**Coordination** - Improved coordination between RI's, Joint training and testing, Data

**Integration** - Better interoperability, Real Time Data, Multi Mission Operations, Resourcing, Funding

**Simplification** -Automation of key online access processes, global efforts in GOOS, Align Programmes, work with industries

**Short term: 1-3 yrs** - Planning system with RV's/Shareble IT Platform/Improved Data Mgt/Real Time/ Shared Vision for Marine RI landscape/ Service for industrial sectors

**Medium term: 4-6 yrs** - Collaborative system between Marine RI's / Develop a strategy for platform recovery with RVs

**Long term: 10 yrs** - Joint research actions to develop sensors, Long term planning for Marine operations / Coordinate a long-term plan of operations at sea/ Maintain frontier science services and innovation

# Suggestions From Break Out Room Slides

## Short term

- Funding Gap for Data Management
- Share RV Schedules Visualisation of Planning tools / visibility
- Link Infrastructures to better identify coop, coord, integration, simplification opportunities
- Focused Workshops to address Shared pains
- Better connections between RI's to identify areas for collaboration
- Identification of topics for joint projects
- Identify key personal contacts in each RI to promote further collaboration
- Basic meta data for every vessel

## Mid term

- Online Centralised hub for RI schedules and activity
- Group of trained crew members specialized in deployments
- Use same tools
- Use common languages/
- Training coordination
- Delay mode data mgt needs to be rethought - Global issue
- Robotic Needs regarding the european research programs (ROVs AUVs)
- Feedback of the applications submitted for the infrastructures owner
- Common coordination of funding for all ocean observation infrastructures

## Long term

- Consider a less fragmented structure for RIs in Europe? - e.g. how meteorological services operate
- Management system allowing fluid requests of ships along their routes
- Research Programmes across all RI's
- Find fund schemes for the post-acquisition phase activities
- Harmonization of data towards EOSC
- Less fragmentation across RI's

# Suggestions From Discussion

## Short term

- Create a collaborative hub, single access point, in order to share information and to represent members unitely outside
- Facilitate communication through dedicated workshops
- Workshops to discuss Real time data management
- Training from euro argo, emso eric on very specific aspects
- Optimize resources available for improving collaboration and sharing information

## Mid term

- Projects enabling to move toward stable programmes
- Real time data management
- Common coordination funding
- A better coordination of RIs will allow to have more funds for funding single observatories

## Long term

- Common calendar for ships
- Trust and share vision and information
- Discussion to clarify the role of each single RI dealing with sea it would be useful
- Less fragmentation of RIs
- Single observatories and their developments should be funded by national authorities