

MEETING REPORT

2nd EOOS Resource Forum Meeting

(7 December 2022, 9:00 – 13:00 CET)



Welcome & Introduction

At its first meeting in 2021, the Resource Forum had begun to identify shared priorities and to discuss strategies for long-term sustainable ocean observation in Europe. This year, during the second meeting of the EOOS Resource Forum Thorsten Kiefer (JPI Oceans, chairing EOOS Resource Forum) reassembled national and European funders to update on the latest developments in key ocean observing initiatives and exchange information about national funding activities related to ocean observing.

Key responsibilities of the EOOS Resource Forum include to advise on strategies for long-term funding of ocean observations, to communicate relevant strategic funding opportunities for EOOS, to advise about changes in the funding landscape and to identify shared priorities and advise on the EOOS added value. After an introduction given by Thorsten Kiefer, EuroGOOS and European Marine Board complemented the EOOS context with overviews of the latest development of EOOSs.

The EOOS framework is structured in implementation cycles. The first one ends 2022. The EOOS Strategy was revised this year in close collaboration with the EOOS Steering Group (SG), the EOOS Advisory Committee (AC) and the EOOS Operations Committee (OC). The EOOS Strategy 2023-2027 will be launched in February 2023, together with an Implementation Roadmap.

The EOOS Strategy 2023-2027 defines the following objectives:

- **Unite** the European ocean observing community through the EOOS Framework, to collaboratively design and work towards a sustained multi-platform, multi-network and multi-thematic EOOS that meets the specific needs of users

- **Engage** with European providers of services and products derived from ocean observations to improve collaboration across the marine knowledge value chain
- **Advise** governance, funding and policymaking to implement recommendations towards a sustained EOOS

Furthermore, the outcome of the EOOS Technology Forum 2022 was presented. During a forward-looking workshop new technologies required to fulfill the goals of the UN Decade for Ocean Science and Sustainable Development were discussed. A main question was: What actions can Europe and EOOS Framework take to help the integration of technologies for multi-disciplinary observations and increase the technology readiness for operationalization? In response, it was stated that the EOOS Framework could help to set up the roadmaps that establish technology requirements in ocean observing by linking user requirements to technology development and by facilitating the transdisciplinary collaboration between sectors. In addition, the EOOS Framework could improve the effectiveness of country contributions to regional-level decisions and promote the sharing of data, observing assets, and infrastructures between organisations and countries by connecting the ocean observing community at the Technology Forum.

As an outlook Inga Lips (EuroGOOS) presented how to advance the transition from disconnected ocean observing activities to a joined-up, efficient and more cost-effective EOOS. She concluded that EOOS needs to

- Identify priorities and gaps
- Make ocean observing plans and activities visible
- Improve collaboration
- Reduce and overcome organisational and regulatory barriers to integration of ocean
- Observing-communicating the value of ocean observing

During the Q&A it was asked whether a gap analysis has ever been conducted to assess in which fields EOOS should be active and where its engagement is limited. It was also of interest whether there is room for improvements.

Due to the absence of such a study, it was suggested that EOOS should work on this to create consistency and adapt to the current user needs. Studies conducted at national level could provide valuable input to such a study. A planned study of the European Marine Board on how ocean observation is coordinated in Europe could complement the picture.

Dialogue with key ocean observing initiatives

Next steps that had been identified during the EOOS Resource Forum meeting 2021 were reviewed for their progress. The expansion of the OC survey on national

funding structures by contacting funders at national level as well as the translation of the European Marine Board report 'Sustaining in situ Ocean Observations' in other languages than English could not have been accomplished due to staff shortage during most of 2022. Communication channels with the EC, the EOOS OC and the OECD were maintained. EOOS is prominently mentioned in the candidate partnership 'A climate-neutral, sustainable and productive Blue Economy' (SBEP for Sustainable Blue Economy Partnership) descriptions, offering docking places where ocean observing can be prioritised and resourced and EOOS built into implementation activities.

Subsequently, interventions were given by the Organisation for Economic Cooperation and Development (OECD), the G7 Future of the Seas and Oceans Initiative (G7 FSOI), European Marine Observation and Data Network (EMODnet) and Copernicus. These are considered key ocean observation initiatives with relevance for EOOS. Of particular interest is also the European Commission's (EC) initiative '[Ocean observation – sharing responsibility](#)' which, however, is still pending internal approval.

Organisation for Economic Cooperation and Development (OECD)

Sustaining ocean observing systems can be costly but not all these costs are somehow identifiable, and the wide-ranging benefits are not always visible. Assessment of the value of ocean observations to society is therefore challenging and requires new and multidisciplinary approaches. Claire Jolly presented on the OECD's valuation of public marine data with a first case study in the UK. The study and its outcomes can be accessed [here](#). It provides robust evidence of who is using what marine data and why. It also identifies data flows within economic sectors (e. g. offshore wind, offshore oil and gas, marine archaeology, marine renewable energy, marine science) and most common uses of marine public data (e. g. risk assessment, inform marine planning decisions, inform operations, manage marine resources etc.). An assessment of that study's impact and glimpses into the processes of case studies in Flanders and Portugal were also presented. The survey has been slightly adapted to Portugal's specific requirements with regard to its Ocean Economy Satellite Account. Furthermore, negotiations with Ireland and Korea to include them in the study are ongoing. Besides OECD's intentions to expand the survey to other countries and respective marine data centers it also strives for reviewing best practices in the valuation of ocean observation.

After the presentation, it was stated that there is a need for continuation since the more case studies are available the easier is a comparison of results and identification of gaps. Feedback from data providers like wind parks or the aquaculture sector helps to shape the study further and to approve pre-defined assumptions.

G7 Future of the Seas and Oceans Initiative (G7 FSOI)

Maria Grigoratou reported on the outcome of the recent G7 FSOI working group meeting in Berlin and to what extent the agreed activities can be aligned with EOOS. The G7 FSOI working group meeting was held from 29-30 November 2022 under the German G7 Presidency. Created by the G7 in 2016, the FSOI Working Group unites marine scientists and representatives from government agencies and ministries across the G7 and the EC to enhance the global ocean observing system that provides ocean data on ocean health, for weather and climate forecasting, and for the development of a sustainable Blue Economy. G7 FSOI had addressed the ocean-climate-biodiversity nexus with sessions on the Digital Twins of the Ocean and on new frontiers of ocean observation. They also evaluated the current structure and G7 FSOI's main priorities. The resulting five main action areas are:

- Observing system
- Assessments and reporting
- Data sharing infrastructure
- Regional observing capacity
- Political cooperation

It was agreed that future activities will include the improvement of knowledge of the ocean's ability to uptake and store carbon, including the biological carbon pump, and sample more biological data as well as improve scientific information for decision-makers.

Finally, Kate Larkin and Pierre-Yves Le Traon shared how well their respective key ocean observing platforms, European Marine Observation and Data Network (EMODnet) and Copernicus respectively, manage to meet the various user demands. EMODnet together with Copernicus Marine Service provides the backbone for the European marine dataspace.

European Marine Observation and Data Network (EMODNet)

EMODnet is a network of more than 120 organisations and marine data experts. It aims to connect experts across the marine knowledge value chain to deliver open and free access to marine data and respective products for all. EMODnet together with Copernicus Marine Service provides the backbone for the European marine dataspace. Best practices presented include, inter alia:

- EUSeaMap2021: has filled in the gaps between the patchy array of habitat maps from surveys to allow for estimating the potential extent of physical damage to the seabed due to human activities in the Northeast Atlantic
- In 2019 EMODnet Human activities launched the vessel density composite map data product
- EU focal point for Maritime Spatial Planning offers harmonised in situ marine data spanning the marine environment and human activities

In January 2023 EMODnet will launch a fully centralised and unified service with one portal, a simplified single-entry point to all data and products, one central map viewer allowing multi-disciplinary marine environmental and human activity searches in one place and one Central catalogue and interoperability across the digital (marine data) commons through standardised machine-to-machine services. It was underlined that the collaboration with EOOS is important to map data and identify gaps.

Copernicus

The Copernicus Marine Service, funded by the European Commission (EC) and implemented by Mercator Ocean International, provides access to free and open data on the state of the Blue (physical), White (sea ice) and Green (biogeochemical) ocean, on a global and regional scale. Last year saw an increase in demand for ocean data (45 000 subscribers (+ 30% per year) and 450.000 single visitors/year on the web portal). The continuity of service until 2028 is guaranteed by finalising the work of Copernicus phase 1 and moving towards Copernicus phase 2. The kick-off of Copernicus 2 with more than 700 participants took place in February 2022. A summary can be found [here](#). The following main requirements were suggested:

- Reduce critical gaps in sampling for physical and mainly biogeochemical observations (e.g. carbon, oxygen, nutrients, chlorophyll-a) by sustaining the global Argo array, improving EuroGOOS Regional Operational Oceanographic Systems and putting specific efforts in the Arctic region
- Increase number of sensors deployed at global and regional scale
- Improve parameter timeliness, in particular for coastal observations
- Develop networks to collect [Fiducial Reference Measurements](#) for all ocean variables required by the Copernicus Satellite component

Dialogue among Forum members: Tour de Table and Discussion

Tour de table

Resource Forum members were invited to share statements about national funding activities and priorities. Several countries had provided them in writing before the Resource Forum meeting.

Belgium

- The marine area under Belgian federal jurisdiction is relatively small but densely used.
- Ocean observation is organised on a national or regional level.
- Increasing use of the sea for wind farms, aquaculture, robotics and sea cables will be drivers for observation requirements.

- Priority on national level is to foster innovations in technology. With a new digitalised data system Belgium currently develops a digital twin of the Port of Antwerp-Bruges to monitor real-time operations.
- Biological tracking systems of species become also more and more important and will be addressed in future.
- Structural funding for monitoring is secure but upscaling new technologies takes too long.

France

- France supports a large oceanographic fleet which allows for organising oceanographic campaigns in all seas. Given the increase in the fleet's operating costs (fuel), it is important that countries organise ship time sharing and secure funding to continue ocean observation.
- The French Ministry of Higher Education and Research has recently established its roadmap for Research Infrastructures. It includes EURO-ARGO, EMSO, ILICO (coastal – French node of JERICO), DATA TERRA (data center), the human resources and financial support of which are provided either by the Ministry or by research organizations and Universities.
- France is also about to set up (January 2023) a high-level national ocean observation coordination structure (French Ocean Observing System/Fr-OOS). Its overall objective is to strengthen long-term ocean observation at global, regional and coastal scales for research, sustainable ocean management and the development of ocean services and to better coordinate and improve the French contribution to European (EOOS) and international (GOOS) ocean observing activities.

Germany

- One of Germany's priorities is the Digital Twin of the Ocean (DTO)
- Specificities of ocean observations are
 - To clarify the input versus impact issue (what information we need)
 - carbon storage, acidification, recycling of carbon
 - the identification of success stories
 - to develop ocean climate solutions incl observing extreme events
 - To support co-design by working with end-users of ocean information
 - To enhance public-private-academic interactions
 - To develop modular ocean research infrastructures and integrate multiple observing systems
 - To reduce the research fleet's carbon footprint by using vessels with new technologies
- Germany put active partners and leaders in place in initiatives of the Ocean Decade

- Support of Citizen Science programmes, i.e.
 - Project "Macroplastics Pollution in the Southern North Sea - Sources, Pathways and Abatement strategies (Macroplastics)"
 - Shaping an Ocean of Opportunities: Unlocking the power of industry and civil society by co-designing a platform where commercial and private vessels collectively collect ocean (carbon) data for societal benefit

Malta

- The marine sector is considered a fundamental economic contributor in Malta, essentially depending on traditional sectors including tourism, fishing, and ship-register activities.
- National R&I funds have been increasingly committed to non-traditional areas including the valorisation of marine resources, marine biotechnology, aquaculture, renewable energy and other offshore activities and technologies.
- The national R&I funding programme, entitled FUSION, in the thematic area *marine and maritime technologies* supports innovative ideas throughout the research journey, starting from idea inception through to the commercialisation of prototypes.
- Further R&I cooperation and programmes:
 - SINO-Malta Fund
 - JPI Oceans Joint Action Ecological Aspects of Microplastics
 - ERA-NET Cofunds MarTERA and BlueBioeconomy
 - JPI Oceans Joint Action Science for Good Environmental Status
 - Participation in the HE Sustainable Blue Economy Partnership

Portugal

- The Portuguese ocean strategy for 2021-2030 places science in a central role. A national flagship action focuses on observation, high-resolution mapping, and knowledge of the deep sea in the EEZ and extended continental shelf. Much has been advanced by the Hydrographic Institute and IPMA (the Portuguese institute for the sea and atmosphere) and the Task Force for the Continental Shelf Extension Project. It
- The Fundação para a Ciência e a Tecnologia (FCT), the main funding institution in Portugal in all scientific domains, does not have targeted funding for ocean R&D. However, support to ocean observation can be found in the array of support instruments FCT holds. Some examples are:
 - Research infrastructures
 - TEC4SEA (developing, among other, marine sensors)
 - EMSO-PT (incorporating fixed point, deep sea multidisciplinary observatories)
 - COASTNET (monitoring coastal ecosystems through relevant chemical, physical and biological parameters)

- AIR Centre (including the Earth Observation Lab)
 - Collaborative Laboratories, entities aimed at closing the gap between Academia and industry. E.g. the +ATLANTIC CoLAB (from coastal observation, to low-cost ocean observation, or digital twins).
- some funding programmes in Portugal have targeted funding for ocean R&D, such as the EEA Grants and the Blue Fund (Fundo Azul).

United Kingdom

- Most of the UK's contribution to the Global Ocean Observing System (GOOS) is led through the National Oceanography Centre (NOC) and funded through National Capability Funding via the Natural Environment Research Council (NERC). National Capability programmes are commissioned every 5 years.
- The current programme, Climate Linked Atlantic Sector Science (CLASS) is due to be recommissioned next year. CLASS coordinates the UK's contribution to a range of international ocean observation programmes and data sets, inter alia NOC and with contributions to GO-SHIP, GLOSS, ICOADS, Ocean Sites, ICOS, GOA-ON and GACS programmes.
- Argo is partly supported by CLASS and the British Oceanographic Data Centre (BODC), however the purchase of standard Argo floats is generally funded through the UK Met Office. There is currently no agreed long-term support for Biogeochemistry Argo and Deep Argo, however, NOC managed to secure £3.7m last year to support these programmes opportunistically
- Prioritisation of the UK's contribution to ocean observing is driven by agreed commitment to international programmes under GOOS, priorities set by the G7 Future of the Seas and Oceans Initiative, and the ability to enhance understanding of the role the ocean plays in climate and potential impacts of climate change.
- Future prioritisation will include an assessment of how observing systems can be improved in terms of new technologies, carbon emissions associated with the activity and FAIR (findable, accessible, interoperable, and reusable) access to data.
- NERC have recently conducted a review to understand the importance of each observing system to help them prioritise funding going forward. Conclusions and recommendations will be available in early 2023. This review is not related to the Medin OECD work.
- Supported international programmes:
 - GO-SHIP (Global Ocean Ship-Based Hydrographic Investigations Programme)
 - GLOSS (Global Sea Level Observing System)
 - ICOADS (International Comprehensive Ocean-Atmosphere Data Set)
 - ICOS (Integrated Carbon Observation System)

- Ocean Sites
- GOA-ON (Global Ocean Acidification Observing Network)
- GACS (Global Alliance of Continuous Plankton Recorder surveys)

Discussion

Participants agreed that continuous efforts of all member countries are needed to further ocean observing but also that transfer of knowledge back from the European to the national level will ultimately help to enhance and sustain ocean observation in Europe. Among the shared areas that are in the focus of countries' respective national discussions around ocean observation and monitoring, several received multiple mentions, such as biodiversity, carbon cycle, deep sea, and topics in the climate-ocean nexus.

Discussions also touched on several major developments to include in the Resource Forum's forward planning. The widespread ambitions in Europe to develop digital twins of the ocean might offer a fresh narrative, the upcoming revision of the Marine Strategy Framework Directive's monitoring strategy a new target, the ARGO programme a suitable role model and the development of the Blue Economy a new motivation for ocean observing.

Summary and Next steps

The meeting precipitated several ideas for actions for the EOOS Resource Forum. One action idea is to promote further countries collaborating with the OECD on value chain studies. Another idea is to compile and share national overviews of the organisational, governance and financing structures underlying ocean observation to consolidate the ground for coordinated resourcing considerations. In addition, EOOS support for timely up-scaling of innovative techniques was considered as conducive to EOOS' objectives. A follow up and possible complementation of these actions will be addressed during a workshop in 2023, jointly held by the EOOS Operations Committee and Resource Forum. Further information will be posted at JPI Oceans website and EOOS website soon. The next EOOS Resource Forum will be held later in 2023.

ANNEX I – PARTICIPANT LIST

NAME	AFFILIATION	COUNTRY
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