2022 United Nations Ocean Conference Side Event

Interoperable, transparent, and accessible marine data for the UN 2030 Agenda, the UN Ocean Decade, and for the benefit of all

29 June 2022, 18:00-20:00 (GMT+1), Portugal Pavilion, Lisbon

Organized by: Fugro, European Marine Observation and Data Network (EMODnet), IOC-UNESCO and International Oceanographic Data and Information Exchange (IODE) programme, Intertidal Agency, Mercator Ocean International, Flanders Marine Institute (VLIZ)

Event webpage, with presentations and full recording: https://emodnet.ec.europa.eu/en/UN-Ocean-Conference-SideEvent-MarineDataInteroperability

Scope of the workshop

This side event provided a high-level overview of current ocean data interoperability initiatives with key examples from around the world, shared insights from these efforts and discussed how these can support the goals of the UN Decade of Ocean Science for Sustainable Development and contribute to achieving UN 2030 Agenda, and in particular SDG14. The two sessions built upon and considered messages from previous events and activities related to marine data interoperability. It connected and brought together representatives of these initiatives as well as experts and interested stakeholders from the marine, maritime and wider environmental community to:

- Share and exchange latest information on existing and emerging ocean data and information interoperability initiatives worldwide to take stock the current status;
- Highlight contributions of marine data, information and knowledge services for SDG14 and wider UN 2030 Agenda;
- Assess existing best practices in data policies, terms of use and interoperability; gather lessons learned from past, ongoing and planned projects, programmes and initiatives; identify solutions for known problems and bottlenecks;
- Discover and explore the role and responsibility of major existing marine data acquisition, management, processing and sharing initiative at the regional and global level to achieving a fully interoperable global ocean data ecosystem, as a direct contribution to the UN Decade of Ocean Science for Sustainable Development;

Community feedback will be used to shape the UN Ocean Decade Data Coordination Group Strategy.

Summary and key messages from the workshop

Prepared by EMODnet Secretariat, Flanders Marine Institute (VLIZ), Fugro and IOC-UNESCO.

Introduction and opening remarks

- It needs to be more widely recognized that it is not possible to generate marine knowledge - let alone apply it in our decision making – if we do not first observe our seas and ocean, collect marine data and manage it in a way it can be shared and easily found and re-used by our engineers, scientists, policy advisors and businesses.
- The basis of the marine knowledge ecosystem or pyramid, is largely invisible and as a result undervalued and underfunded. This jeopardizes our ability to generate and serve the information and knowledge we need to tackle the Ocean Decade challenges and SDG14.
- The UN Ocean Decade recognizes that the digitisation, sharing, and management of data, information and digital knowledge are cornerstones for the success of the Ocean Decade and by extension a successful implementation of Sustainable Development Goal 14.
- The Decade implementation plan calls for the co-design and development of a distributed digital data and information ecosystem which is capable of (i) holistically representing the complex socio-ecological ocean system at global, regional or local scales; and (ii) representing the ocean's role in sustainable development across scales. An important condition is that all stakeholders must be able to access, use, and contribute to this digital ecosystem through multiple interfaces which are tailored to their needs and capacities.
- No one global system or central infrastructure will be able to implement the Ocean Decade vision for data and information management; instead, all stakeholders will need to collectively contribute to the development of this distributed "digital ecosystem" of interoperating parts.
- A possible approach to help achieving this aspiration is to create 'Communities of Practice' around the four key elements of the marine knowledge value chain/net: Observations, Data Management, Analytics & Modelling (value extraction), and Applications (the knowledge and information delivery systems).
- The structural components of the underpinning marine knowledge framework under the Decade are taking shape along key Decade Coordination Centres (DCCs), Coordination Offices (DCOs) and Programmes and these will be essential to catalyse the transition towards a functional global digital ecosystem as envisioned. These components which should act as catalysers for the communities of practices are already in place or being formed, but they need to be interconnected, strengthened and empowered.
- To be successful, it will be necessary to ensure interoperability at various levels (and not only data & information systems): first/foremost interoperability between people, organizations, networks, between models and even various digital twin applications we will see emerge on top of it in the coming years.

Recommendations *spanning the workshop focus areas*

(i) Current marine data management and sharing capability, examples of regional and sectoral interoperability; and

(ii) *Scaling up marine data and information interoperability for the Ocean Decade and implementation of UN 2030 Agenda SDG 14: future look and recommendations.*

- **Current status:** There are a number of key assets across the world offering national and regional marine data services. As was illustrated by several panellists, many regions, from South Africa to Australia and from Europe to Canada and the U.S. already have mature, centralised marine data repositories and databases, achieved using a common architecture, standards, and other elements that strengthen interoperability;
- **Regional examples:** In Europe, EMODnet has overcome the challenges of marine data management across 27 different Member States to provide an integrated *in situ* marine data service for Europe, using EU INSPIRE (for geo-spatial data) standards, international ISO standards (e.g., for metadata) and interoperability tools for open discovery and access e.g., ERDDAP;
- **Prioritising data for society:** This will vary from region to region and we need to assess data in terms of the urgency, timeliness and impact of protecting lives and property and providing data and information for evidence-based decision-making, operations at sea, etc;

- **Small Island States (SIDS) and/or Large Ocean States (LOSs)** require vast amounts of ocean data and information to inform their decision-making in the face of the climate emergency, biodiversity loss and pollution, amongst other threats. There was a call for all regions to work with SIDS/LOSs to achieve this;
- **Private sector:** The blue economy and wider private sector are a key producer and user of marine environmental data. The private sector is increasingly sharing data for public good e.g., Fugro's partnerships with Seabed 2030 and EMODnet to share bathymetry data. More can be done to exchange on best practice and ensure that the private sector is aware of the publicly funded marine data repositories and services that can support the sharing and interoperability of marine data, for all. This is as much a change in culture regarding data ownership as it is an interoperability challenge;
- **Global marine data interoperability:** Whilst many nations and regions already work together on international interoperability e.g., through IODE, Ocean ODIS and the OceanInfohub (OIH), more could be done to exchange data conventions, standards. Data and web services and wider interoperability measures across existing regions, so that all regions can work together towards a fully interoperable ocean data commons and marine data space;
- **Cross-regional partnerships, organization and governance:** partnerships e.g. the EU-China EMOD-PACE/CEMDNET partnership projects on marine data, OIH-LAC (Latin America and the Caribbean) etc are key to fostering marine data diplomacy, the start of marine data exchange and interoperability. Showcased by video message, the ODIN-WESTPAC (Ocean Data and Information Network for the Western Pacific) provides a capacity building framework to promote regional collaboration in marine data and information and products sharing and to provide data and information services mainly for the WESTPAC member states and other users. Other ODIN's around the world offer the same, but at various levels of maturity. It would be interesting to explore an EMOD-AFRICAN partnership to build further on the ODINAFRICA legacy and the African Marine Atlas;
- **Remove barriers to data:** Where possible open access should be just that – with no barriers to accessing the data;
- **Human capacity, training and capacity development**
    - Whilst interoperability is mainly thought of as a technical issue, a lot of non-technical aspects came up in the discussion, including human component and behaviour ('data systems can only move at the pace of trust'). Attention needs to be placed on building trust across people and jointly working to increase human capacity in marine data, marine data management and interoperability issues;
    - Vladimir Ryabinin, IOC-UNESCO has stated that 'data is the new oil'. To make oil/data flow, we need a diversity of skilled people and specialists: (data) architects, (datasystem) planners, constructors, data scientists (petrochemiststs), new materials, smart sensors, maintenance, monitoring, diplomats and negotiators (pipelines are cross-border) and capacity building and development, training etc.
    - There needs to be stronger political will to set these requirements and include earmarked funding in project design for meaningful, concrete capacity building. Not just tick the box and not just transferring knowledge to other regions, but working together to find solutions that work at a local, national and regional scale.
- **Semantics and discoverability:** standards for marine data are still largely based on English semantics (BODC semantics), need to bring this in multilingual (FR-ESP-Chinese…) in order to increase the F and A in FAIR, and ensure that we connect more people and data in this knowledge graph we are building. This is important also to **increase detectability of data**. It was recommended by one of the participants to perform a comprehensive inventory in the framework of the Ocean Decade of what marine data already exists and where it can be found.
- **Legal instruments/ administrative arrangements:**
    - It is vital that public funding instruments communicate more strongly on the need for data producers and providers to share data, not just with any open access repository but with trusted marine data centres, infrastructures and services. In Europe, the European funding for research already makes Data Management Plans DMP and Open Data mandatory mentioning key marine

data services in funding calls (e.g. EMODnet and Copernicus Marine). However: (i) there is no external review of the DMP to advise on optimizing this for marine data interoperability; and (ii) there is no mandate for funding recipients to submit their data to these services, resulting in many data being submitted to other repositories (e.g. Zenodo). Whilst these are open access, they are often not interoperable with other marine data services.
    - Few national science funding instruments have a mandatory DMP, or clause on open data. We need to step up the ambition! Make binding agreements in mutual respect and recognition (e.g. moratorium for data publishing etc.; data user agreements etc.). Why not make it mandatory to share data with acknowledged data centres (e.g. IOC-IODE's National Oceanographic Data Centres NODCs) which can then articulate with the large aggregators such as EMODnet central portal. This needs dedicated earmarked funding, which is 'marginal' in total project budget, if planned in initial phase with the project managers. Compliance mechanisms must also in place, especially in public funding instruments;
    - Even if falling under a regulatory framework, the large bulk of the data sharing is based on voluntary agreements (e.g. Fugro) or by individuals (e.g. in context of Data Publication DOI). Every single dataset is valuable. One single historical dataset can be crucial in the understanding of Climate Change. Historical data rescue is often slow and a manual process and this requires funding and time.
    - In Europe, the EC Ocean Observation initiative is working to increase the coordination across all ocean observing, marine monitoring and data collection initiatives and could be a framework in which to link closer with the marine data services to promote data sharing with trusted marine data services.
- **Co-design:** there is a need to set up a process to ensure the current and future systems can adapt and absorb new types of:
    - data**:** from genetics to in situ, species tracking and remote sensing
    - geographic areas: expand partnerships in less represented or under-sampled/covered regions such as black sea, African continent.
    - stakeholders: citizen sciences, ships of opportunity. This needs special attention for Quality Assessment and Quality Control (QA-QX): 'better no data than bad data' - < 'flagging' the data in different quality levels may not be such a good idea, especially in policy context or in products and services. Users will rely on the fact that you/we back up the quality. (e.g. Marine regions maps of areas in dispute. Even if they have a disclaimer, people do not use or cope the disclaimer in their final products)
    - new platforms: autonomous platforms that cover large areas, sample in less covered areas (coastal, deep sea ...)
    - visualisation: move towards 4 dimensions (or even 5 including human/societal) mapping the dimension time together with the 3 spatial dimensions and complex (seafloor) features. Especially important for human activities, MSP, multiple use planning (aquaculture and wind farms); temporal dimensions, we do that for chemical and physical data, human activities space-uses / and marine spatial planning.
    - new users: planners – DTO is raising huge expectations! As (near) real-time data flow is growing, so is the expectation to reach (near) real time dynamic ocean management.
- **Connecting across the marine data value chain and bi-directional communication and feedback:** Often the data users are data providers and vice versa; understand human behaviour to identify what/when/how to trigger users and providers to take a proactive approach in Open Data also at personal level. Understand where the win-win is... e.g. the Global Ocean Science Report (GOSR) from IO-UNESCO clearly shows that Data publishing increases opportunity for international cooperation and excellence in science'.

- **UN 2030 Agenda for Sustainable Development:** whilst the UN Ocean Conference focused on SDG14, it is striking to see how much the success of SDG14 and others may come down to achieving SDG17: creating governance, building stable and sustainable partnerships, and recognising how much more needs to be done.
- **Funding (related to governance).**
    - We need to communicate better to politicians, funding bodies and society that unlocking data and information provides a much greater return on investment in R&I spanning research, policy, civil society, industry and wider society.
    - There is a gap between huge scale of interventions (and e.g. harmful subsidies) and the funding mechanisms for many of our data management initiatives where the funding is fragmented, short-term (e.g. 2-3 year funding commitments for operational services). This is not sustainable. Such unsustainable funding hampers technological developments and limits the ability to build and sustain services for users. Policy and decisionmakers lose overview, and so do users.
    - Some regions are taking a longer-term vision/approach: Flanders government was cited as an example showing long-term vision and approach supporting and financing EMODnet, IODE and related activities such as Ocean Infohub, and Ocean Teacher Global Academy. Lessons learned and recommendations include: ensure sustainability in these processes and key support functions, insisting on the co-design aspect and the need to be demand-driven. It is essential to really listen to and involve communities of practice, user communities. However, despite this, the funding for each initiative remains short-term and at this point in time is not at the level required to both maintain operational services and expand to bring in diverse data sources, evolve towards truly interoperable services contributing to a global ocean digital common.
- The **UN Ocean Decade Data Coordination Group** is part of the solution, bringing experts from across the world together with provide a real vision and implementation plan for data in the UN Ocean Decade. The UN DCG could be a vehicle to generate an atmosphere of trust and cultural change for data sharing. It could serve as a real 'thinktank' that works on demand driven issues. It could invite experts beyond the classic marine data, to include data philosophers, futurologists, human behaviour studies. It could include upcoming evolutions in society (understand the amazons and social media and how to prepare and embrace).
- A new **UN Ocean Decade Corporate Data Group** will also be key to leveraging the vast expertise of the private sector and finding win-win solutions for data sharing from the blue economy;

In conclusion, the global marine data and information community has a high capability. It now needs to be more strategic about getting common key messages across to communities of practice, federating its assets, seeking strategic partnerships and speak as one voice. Investment at the national and regional level will be key to leveraging the expertise and community willingness to achieve global marine data interoperability towards transparent and accessible ocean data, for all.

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