Standards, best practices, challenges and incentives for maximising the use of ocean data in the Atlantic region

The need for a change in culture (and curricula), stimulating standards adoption via engaging with best practice and exemplary use cases, further connecting ocean-observing data collection efforts and unlocking archives with historical data: the outcomes of the workshop organised by Blue-Cloud on June 3rd engaged experts across the Atlantic in a dialogue to identify needs and challenges of data sharing 'pole to pole' and gave some recommendations towards setting up an Atlantic Data space for the ocean.

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On the 3rd of June 2021 experts from research institutes, data providers, marine data services and industry actors across the Atlantic region join the event "Towards an All Atlantic Data Space", jointly organised by Blue-Cloud and the All-Atlantic Ocean Research Alliance (AANChOR), the G7 Future of the Seas and Oceans Initiative, and H2020 projects iAtlantic and AtlantECO, in collaboration with EMODnet and Copernicus Marine Service. The workshop was a side-event at the [All-Atlantic 2021 R&I for a Sustainable Ocean Ministerial & High-level Stakeholder Conference](#) co-organised by the [Portuguese Presidency of the European Union Council](#) and the European Commission. The workshop provided an arena to share the current capability of marine data collection, sharing and services across the Atlantic Ocean, and to debate about EU and international initiatives working to harmonise and facilitate data sharing across the Atlantic, and offered insight into available facilities, tools, training, and the latest open science 'blue cloud' technologies to make data findable, accessible, interoperable, and reusable.

The main outcomes of the debates are summarised below.

One Ocean, different cultures, many practices. When dealing with the marine data value chain, the situation varies a lot from pole to pole, East to West. Not only emerging countries often struggle with data care and long-term data preservation for reuse of data (as reported by José Henrique Muelbert, Professor at the Institute of Oceanography, Federal University of Rio Grande). There is a "Community memory" benefitting from software tools and related best practices created across the Atlantic region, but tools themselves are not enough, and a new generation of data managers is needed to lead a change in pace towards a different approach to data sharing. **Data stewards and data managers are more and more needed** - *and are we sure all stakeholders get the difference between the two terms?* - an element of awareness and recognition must be introduced, for instance via professional curricula on data management with clear indications on the benefits for such skills. Let's focus on an aligned human capacity, then.

Standards and interoperability are key. There are some good regional examples e.g. EMODnet, where community best practices and standards for marine data and metadata are already applied, in the context of international standards and efforts e.g. IODE. These - together with other examples from across the Atlantic Ocean basin, can be used as best practices and inspiration for other regions to join the momentum towards a fully interoperable All Atlantic Ocean Data space. To achieve this, a change in culture is also the only way to propagate the use of standards and best practices, which already exist, as key components of the FAIR approach towards data management. This goes far beyond data archiving into repositories. A systemic approach towards interoperability and shared (cross-disciplinary) metadata policy is needed: it should not matter where you submit your data to be able to harvest and multiply its impact globally while keeping provenance tracked. Legal interoperability is part of this.

Measure Once, Use Many Times. Usability is a key and acknowledgement and incentives are needed to work with other regions. Best practices can be propagated via bodies such as the Ocean Best Practices System (OBPS) of UNESCO IOC/IODE and other infrastructures that are already paving the way to good practices (such as EMODnet or Copernicus Marine Service, representatives of which joined the event, as well as having the pleasure to have **Jay Pearlman**, co-chair of the **OBPS Steering Group,** chairing the first session of the event). Users must be put at the centre, whether they are scientists or end-users, and this was also pointed out clearly by **Fabienne Jacq**, Policy Officer of DG Defence, Industry and Space (DEFIS) at the European Commission, who opened the event: *"Let's avoid duplication, let's focus on the extra missing mile in terms of data gathering, targeting new data sources from industry, citizen scientists, students, starting with use cases, first".*

Marine knowledge for policy makers. Ocean observing should become the norm. Policy drivers are needed to further efforts towards the objectives of the UN Ocean Decade in a way to identify (or set up) **programmes in those countries across the Atlantic that are strategic in terms of data gathering** but not yet engaged in the monitoring, to involve their national scientific communities progressing towards data sharing. The community collaboration must engender trust in the data through documented provenance and employed best practices and standards. Moreover, ocean observing needs to evolve from a niche activity of scientists to a societal norm such as weather or health observations. Data rescue, data archaeology and data ingestion portals must be supported. The issue of opening to sensitive data must also be led by international policy bodies and fit into their agendas.

What about industry? There are two aspects to consider when dealing with industry. **The first is the budget**. To ensure commitment of all industry sectors that might play a role in the chain (from commercial vessel fleets to oil & gas), industry should be incentivised to uptake standards for data collection as well as to provide data ingestion into existing public services, possibly via mechanisms such as Public-Private Partnerships (**PPP**). Second, work should be undertaken to **unlock industry archives** from less open countries towards a Global data space. The social contract with Science needs to be updated to one that demands environmental data sharing after some time of exclusive use

About the workshop. The workshop was hosted by Sara Pittonet Gaiarin, coordinator of the Blue-Cloud Flagship project, and opened by **Fabienne Jacq**, Policy Officer, DG Defence, Industry and Space (DEFIS), European Commission. It was organised in two panels. The first panel was moderated by **Jay Pearlman,** IEEE / SG-OBPS, and discussed the existing capability and how to collaborate and move towards truly FAIR, interoperable data services with **Alain Arnaud**, DIAS Program manager at Mercator Ocean, **Conor Delaney**, Technical Coordinator EMODnet Secretariat, **José Henrique Muelbert**, Professor at the Institute of Oceanography, Federal University of Rio Grande, Rio Grande, Brazil, **Tshikana Rasehlomi**, Department of Forestry, Fisheries and the Environment (DFFE), South Africa, Dick Schaap, MARIS and Technical Coordinator of Blue-Cloud and **Lucy Scott**, Ocean InfoHub Project Manager, IOC Project Office for IODE. The second panel was chaired by **Martin Visbeck**, GEOMAR, who guided the discussion around the priority actions required to achieve the goals of an All-Atlantic Data Space with **Pier-Luigi Buttigieg**, Knowledge Steward / Senior Data Scientist at GEOMAR, **Tina Dohna**, PANGAEA Project Manager at MARUM, **Kate Larkin,** Deputy Head of EMODnet Secretariat, Seascape Belgium, **Anja Kreiner**, National Marine Information and Research Centre (NatMIRC), Ministry of Fisheries and Marine Resources of Namibia, **Marc Taconet**, Team Leader, Fisheries Knowledge and Information Management Team, NFISI and **Ben Williams**, Metocean Director for the Americas region at Fugro. **Meet the speakers**.

Presentations and recordings of the day are available on the Blue-Cloud website at https://www.blue-cloud.org/events/towards-all-atlantic-data-space-ocean.

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