OKEANO

Supporting the
All-Atlantic Ocean Research
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Mapping the Atlantic Digital Landscape

Challenge 3 of the AAORIA intergenerational Hackathon 2026

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Context and problem statement

The Atlantic Ocean's digital data landscape remains fragmented and difficult to navigate. Ocean data and metadata are scattered across a variety of national and institutional platforms with limited interoperability and searchability, making it challenging for researchers, managers, and decision-makers to access and leverage the full breadth of available resources. This fragmentation is particularly acute in the South Atlantic, where data gaps are largest and observing infrastructure is most sparse.

The Ocean Data and Information System (ODIS) Federation, a core component of the emerging IOC Data Architecture, offers a pathway to address this challenge by connecting established and emerging data systems through a common set of technical norms and conventions, and has developed a catalogue to research available datasets, created by national ODIS nodes. However, meaningful basin-wide engagement with ODIS requires a clear, up-to-date baseline understanding of what data systems currently exist across the Atlantic, where the gaps lie, and which resources remain underutilized.

The AAORIA Ocean Observations and Modelling Expert Recommendations Report 2025 directly calls for the creation of a "Map of the Atlantic Digital Landscape" as a foundational step toward enhancing ocean data management and coordination using FAIR and CARE principles. Without such a map, efforts to grow the Atlantic sub-federation of ODIS Nodes lack a shared starting point. Our research and management goals for the Atlantic cannot be achieved without strong, interoperable data infrastructure. Building that infrastructure begins with knowing what we have, what we're missing, and where the opportunities lie.

Added value of the solution

The Map of the Atlantic Digital Landscape provides a practical, scalable framework for assessing and strengthening ocean data interoperability across the Atlantic basin. By identifying existing ODIS Nodes, highlighting geographic and thematic gaps, and visualizing participation opportunities, it establishes a shared baseline from which AAORIA, GOOS, IODE, and other stakeholders can coordinate future actions. In doing so, it directly supports AAORIA's objective of improving ocean data management and coordination through FAIR and CARE principles, encouraging greater interoperability, discoverability, and accessibility of ocean data resources across the basin.

Beyond technical mapping, the solution functions as a community-building tool, fostering a shared understanding among data providers, researchers, policymakers, and observing networks. By clearly demonstrating where participation is strong and where engagement opportunities remain, it provides a tangible mechanism to motivate national oceanographic institutions, research organizations, and private-sector actors to register their data systems in the ODIS catalogue and contribute to the growing the ODIS Federation. Uptake can be further driven through targeted engagement with regional observing systems and Atlantic partnerships, including communication campaigns, workshops, and presentations at ocean science conferences.

The solution's modular and documented approach also ensures it can be taken up and scaled by AAORIA, GOOS, and IODE beyond the hackathon, serving as a replicable methodology for other ocean basins facing similar data fragmentation challenges.

Ultimately, the solution contributes to the long-term vision of a truly interoperable and inclusive All-Atlantic Ocean observing and data system.

Prototype

The prototype consists of a pilot Map of the Atlantic Digital Landscape combining information from the ODIS Catalogue with supplementary research on Atlantic ocean data providers and observing initiatives. The initial implementation focuses on a defined pilot region, with particular emphasis on areas where data gaps are most evident, including the South Atlantic. The map visualizes the distribution of participating data systems, identifies areas with limited

representation, and highlights opportunities for expanding ODIS participation. To ensure scalability, it is accompanied by a documented methodology and SOP outlining data collection, gap analysis, classification criteria, and visualization techniques, enabling AAORIA, GOOS, IODE, and partner organizations to expand the mapping exercise basin-wide and ultimately replicate it in other ocean basins.

Figure 1. *Web-based (left) and mobile-adapted (right) interfaces of the pilot Map of the Atlantic Digital Landscape, prototyped for the South Atlantic offshore Brazil. The map displays Argo float positions and registered Argo trails, SIM Costa monitoring stations, ANP offshore oil infrastructure, and Projeto Azul stations, illustrating the coexistence of ODIS-connected resources and currently unregistered data systems within the study area.*

To honour the hosts of the 2026 AAORIA intergenerational hackathon in Salvador de Bahia, and highlight the interconnectivity of the Atlantic community, our team prototyped an interactive, web-based map of the digital landscape offshore Brazil, also adapted for mobile. Rather than simply searching the Atlantic data ecosystem, the prototype makes it *visible*. It shows what is registered in the ODIS catalogue alongside what exists but remains unconnected, making the gap tangible, not just searchable. It reveals how connection enables collaboration: French data

acquisition offshore Brazil, for instance, would be transformed by formal involvement of Brazilian scientists, an opportunity the map makes immediately obvious. It also exposes blind spots, data held by industry or national agencies that exists but remains outside the commons. The methodology is replicable and scales basin-wide, and comes with a set of recommendations the team has assembled for future integration.

Limitations

The prototype represents a first-step assessment rather than a comprehensive inventory of all Atlantic Ocean data systems, or even all available data in the chosen area. Due to time constraints and the scale of the challenge, not all relevant institutions, datasets, or platforms could be identified or evaluated. The mapping exercise relies primarily on publicly available information and existing ODIS catalogue records, which may not fully reflect the current state of data availability or interoperability.

In addition, the prototype focuses on identifying participation gaps and opportunities rather than assessing the quality, completeness, or operational maturity of individual data systems. As the Atlantic digital landscape continues to evolve, regular updates and stakeholder engagement will be required to maintain the relevance and accuracy of the map. Future work should also include broader consultation with regional partners, particularly in underrepresented areas of the South Atlantic, to ensure a more complete and inclusive representation of the basin's data ecosystem.

Plans for promoting the solution

Promotion of the solution will focus on increasing awareness, participation, and long-term adoption across the Atlantic ocean data community. Results and outputs will be disseminated through AAORIA, GOOS, IODE, AtlantOS, and Ocean Decade networks, reaching a broad audience of researchers, data managers, policymakers, and observing system operators. Dissemination channels will include webinars, stakeholder workshops, side events at major ocean science conferences, and targeted presentations to regional oceanographic bodies and national institutions.

ECOP networks will be actively leveraged to engage emerging ocean professionals as ambassadors for the initiative, helping to build grassroots momentum and ensure intergenerational continuity in the effort. Communication materials, including interactive dashboards, infographics, policy briefs, and success stories from organizations that have joined

the ODIS Federation, will be developed to demonstrate the concrete benefits of interoperability and lower the barrier to participation. These materials should be tailored to different audiences, from technical data managers to institutional decision-makers, to maximize uptake.

A targeted engagement strategy should also be developed for underrepresented regions, particularly in the Equatorial and South Atlantic and among Small Island Developing States, where the potential impact of joining the ODIS Federation is greatest but awareness and capacity may be limited.

Resources to support the approach

Successful implementation will require a combination of communication, networking, technical expertise, and financial support.

Communication resources

Ocean Decade communication channels, AAORIA and GOOS outreach platforms, webinars, stakeholder workshops, social media campaigns, and visual communication products such as dashboards and infographics.

Networking resources

Partnerships with AAORIA members, GOOS, IODE, AtlantOS, national oceanographic institutions, marine research organizations, regional observing systems, and ECOP networks to facilitate stakeholder engagement and data collection.

Technical resources

Access to ODIS catalogue, GIS and visualization tools, metadata management expertise, interoperability specialists, and technical support for maintaining and updating the digital landscape map.

Funding resources

Ocean Decade programmes, international research and innovation funding mechanisms, regional cooperation initiatives, philanthropic foundations supporting ocean science, and national funding agencies interested in strengthening ocean data infrastructure and digital transformation. Long-term sustainability will depend on continued collaboration among Atlantic partners and integration of the mapping effort into existing ocean observation and data coordination initiatives.

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