Executive Summary

Expert Recommendations to the AAORIA Work Plan on Ocean Observations and Modelling

The All-Atlantic Ocean Research and Innovation Alliance (AAORIA) High-Level Board endorsed a Work Plan for Ocean Observations and Modelling at the 2024 AAORIA Forum in Ottawa, Canada. Five expert groups were convened and consulted over the spring of 2025 for their recommendations on potential activities in Atlantic ocean observations and modelling to achieve the goals covered by the work plan. The five groups recommended specific activities which, if funded, would help to increase our understanding of 1) ocean productivity across trophic levels; 2) productivity in the deep sea including connections to the upper ocean; 3) the dynamics of the Atlantic Meridional Overturning Circulation (AMOC) and how they may change; 4) connections between coastal land, coastal ocean, and open ocean; and 5) methods to improve Atlantic ocean data management with FAIR and CARE principles.

1.1: Understanding Ocean Productivity Across Trophic Levels

Why? Understanding how energy and nutrients move across the food web is critical for predicting how marine ecosystems respond to environmental change, as well as informing effective ecosystem management.

- **Rec 1:** organize a workshop to *Define Backbone Requirements for Improving the Representation of Energy Rate Transfers in Marine Ecosystem Models*
- **Rec 2**: organize a workshop on *Improving the Ability to Observe Atlantic Productivity from Space* to prioritize needs for algorithm development and validation data
- **Rec 3:** organize a workshop to *Advance the Use of Biogeochemical-Argo data in the Atlantic* and fund the deployment of BGC-Argo floats

1.2: Understanding Deep Sea Productivity and its Links to the Upper Ocean

Why? There are huge gaps in our knowledge of how nutrients, energy, and carbon move between the deep and upper ocean, and these linkages influence the health of surface ecosystems and important fisheries.

- **Rec 1:** fund the development of a deep-sea biological oceanography online course designed to build regional expertise and offer in-person training, possibly at an Ocean Teacher Global Academy center.
- **Rec 2:** deploy 6-8 Deep Argo floats with oxygen sensors in the Southeast Atlantic
- **Rec 3:** fund a postdoctoral-led seamount study and kickoff workshop to assess biodiversity and ecosystem connections at key Atlantic seamounts

2: Observing and Modelling the Atlantic Meridional Overturning Circulation (AMOC)

Why? The AMOC is a system of ocean currents that circulates water within the Atlantic Ocean, carrying warm water northwards and colder water southwards. It plays a very significant role in the global transport of heat, salt, and carbon, and is a major feature of the global climate system that significantly influences regional and global weather patterns, sea level, and fisheries migration.

- **Rec 1:** fund two data management specialists over 2 years to coordinate and integrate AMOC data across the Atlantic and develop robust data indices describing the state of AMOC.
- **Rec 2:** fund a workshop to bring together the South Atlantic Meridional Overturning Circulation (SAMOC) and SAMOC Basin-wide Array (SAMBA) community of experts from across the basin to link SAMOC data to BGC data, identify most needed observations, align observation efforts, and identify underutilized datasets.

3.1: Optimizing Links Between the Land, Coastal Ocean, and Open Ocean

Why? Strengthening the representation of linkages between these zones in earth system models supports the creation of accurate decision support products for land and coastal ocean managers.

- **Rec 1:** fund a workshop to kick off a new Global Coasts pilot study in a priority coastal zone along the Atlantic Basin, in partnership with CoastPredict.
- **Rec 2:** fund a PhD or 2-year postdoctoral position in a Global South institution focused on setting up and running integrated coastal ocean models in the same region targeted by the Global Coasts pilot study. This will improve the coastal-shelf sea-ocean model landscape while investing in and leveraging local expertise.
- **Rec 3:** fund the purchase of low-cost sensor deployment and maintenance, as well as providing data management training to the local experts managing the data from the sensor packages. The project may follow the example of the Estación de Monitoreo Ambiental Costero (EMAC) buoys, for example. This model emphasizes use of equipment that is easy and affordable to repair and replace.

3.2: Improving Cross-Zone Data Management and Exchange, including Implementation of FAIR & CARE Principles

Why? Effective data support infrastructure is necessary to enable linkages between data collected in coastal land, shelf seas, and the open ocean, and to improve accessibility, interability, and reusability. FAIR and CARE data principles guide the recommendations.

- **Rec 1:** dedicate an expert to map the Atlantic digital landscape and identify data gaps, leveraging Ocean Data Information System (ODIS) digital infrastructure.
- **Rec 2:** support the development of new ODIS nodes across the Atlantic, conduct in-person training for experts who will manage Nodes in the Global South, and provide longer term support to the Nodes.
- **Rec 3:** kick off the formation of an Atlantic Node Network under the ODIS Federation by organizing a basin-wide workshop on best practices regarding land-sea interface observations. Community input will drive an implementation plan for an Atlantic-focused data portal.
- **Rec 4:** hire a contractor to evaluate the societal and economic benefit of Atlantic observations. Their analysis could inform private sector engagement and a plan for data product delivery.