Integrated Ocean Observing Across the Northwest Atlantic

Jake Kritzer[1], Shayla Fitzsimmons[2], Fred Whoriskey[3], John Trowbridge[4], Richard Vallée[5]

[1]NERACOOS, [2]CIOOS Atlantic, [3]Ocean Tracking Network, [4]Woods Hold Oceanographic Institution/Ocean Observatories Initiative, [5]Innovasea

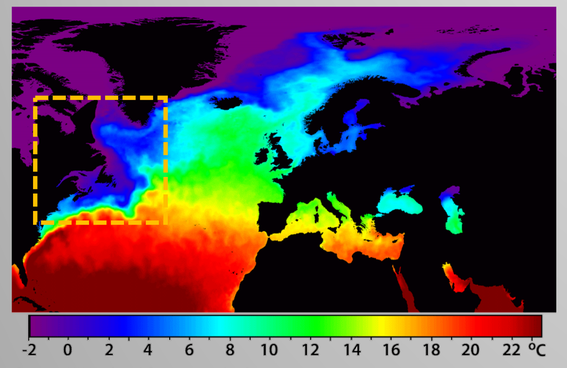
The National Academies of SCIENCES ENGINEERING MEDICINE

Vision

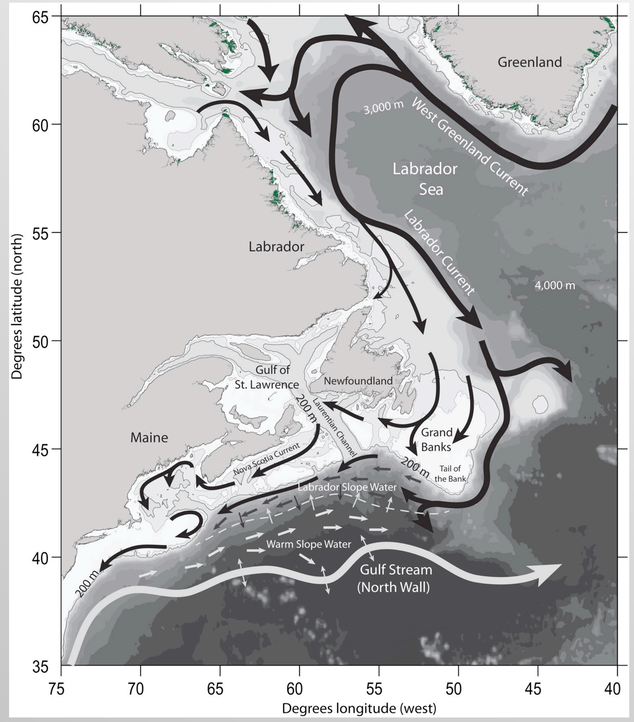
We envision an interconnected system to track oceanographic and ecological changes from the Arctic to the Gulf of Maine integrating state of the art technologies, Indigenous knowledge, and citizen science to better understand the rapidly changing Northwest Atlantic. By convening agencies, institutions, Indigenous communities, and private sector stakeholders across the region, we can track and communicate changes with greater speed and at scale, including marine carbon stores. Local portfolios of observing assets will vary across this domain due to differences in geography, population density, ocean uses, and other factors, but tools such as satellite remote sensing, oceanographic models, and data products paired with international communities of practice, knowledge sharing networks, and capacity building initiatives can unify observing at scale. This can be a model for multinational partnerships across major current systems grappling with environmental change.

Rationale

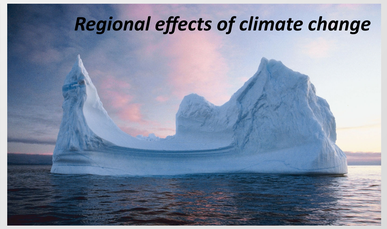
The oceanographic influence of climate-driven changes in the Arctic extends well into mid-latitudes along the Northwest Atlantic coast (below). The Greenland Current feeds the Labrador Current, which carries waters of Arctic origin over the Scotian Shelf into the Gulf of Maine (right). Distributions of many species are shifting northward against this flow, bringing new species into contact with ocean-dependent communities as others are lost. Amidst these changes, ocean observing systems are inconsistent and uncoordinated.



Source: UK National Oceanography Centre



Source: Townsend et al. 2015. *Journal of Marine Research*.



Regional Needs

Although communities across the Northwest Atlantic vary culturally, ecologically, and economically, the linkages created by oceanography and climatology mean that several key challenges are shared across the region:

- Attention is growing to the important knowledge and traditions held by **Indigenous communities**, and the need to address historical injustices.
- Indigenous peoples and others are grappling with **climate change**, including its uncertainties and impacts on safety, livelihoods, and culture.
- **Biodiversity** is being affected by climate change and other anthropogenic impacts, which threatens a number of ecosystem services, especially fisheries.
- All of these changes are re-shaping the entire **blue economy**, including the seafood industry, tourism, energy, and shipping.

Partners

Our aim is to continually expand this initiative by bringing new partners to the table over the course of the Decade. At the outset, this initiative is being shaped by:

- ***NERACOOS*** implements the U.S. Integrated Ocean Observing System in ocean waters from the Scotian Shelf to the Mid-Atlantic Bight.
- ***CIOOS Atlantic*** implements the Canadian Integrated Ocean Observing System from Labrador to the U.S.A.
- ***Ocean Tracking Network*** informs sustainable management of aquatic animals through knowledge on movements, habitats & survival.
- ***Ocean Observatories Initiative*** is an integrated infrastructure program measuring physical, chemical, geological and biological properties.
- ***Innovasea*** designs the world's most technologically advanced solutions for fish tracking and fish farming.

Together, these partners bring experience in developing all aspects of ocean observing systems at the national level (NERACOOS & CIOOS Atlantic), building international collaborations on biological (OTN) and physical (OOI) observing, and public service engagement by the private sector (Innovasea). We will recruit new partners to represent other nations, Indigenous communities, other industries, and more.

NERACOOS NORTHEASTERN REGIONAL ASSOCIATION OF COASTAL OCEAN OBSERVING SYSTEMS

CIOOS ATLANTIC REGIONAL ASSOCIATION OF THE CANADIAN INTEGRATED OCEAN OBSERVING SYSTEM

OCEAN TRACKING NETWORK

OCEAN OBSERVATORIES INITIATIVE

INNOVASEA