Ocean Observations on the Scotian Shelf using Autonomous Vehicles

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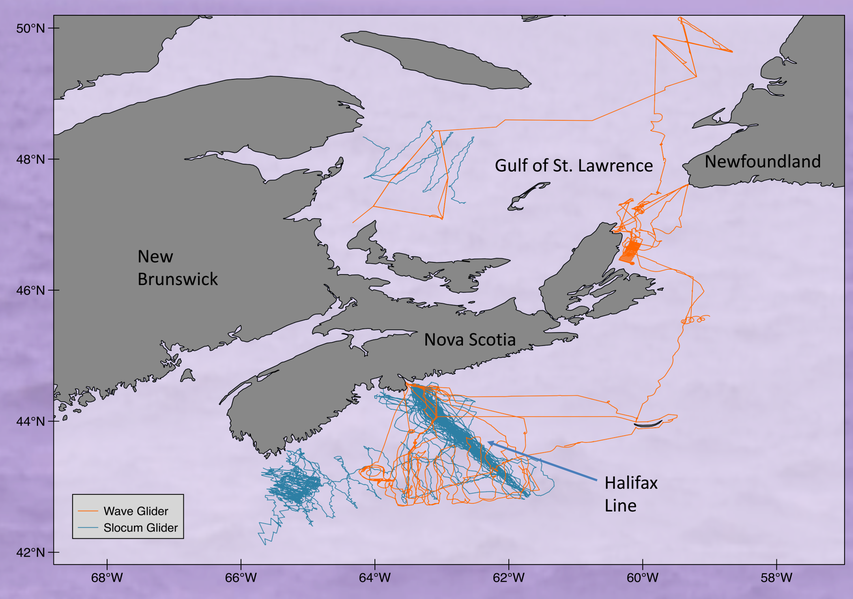
Abstract

The Ocean Tracking Network (OTN) and the Marine Environmental Observation Prediction and Response Network (MEOPAR), both hosted at Dalhousie University, have jointly operated five Teledyne Webb Slocum gliders and one Liquid Robotics wave glider in Canadian waters since 2011. We support a variety of projects, including measuring water conditions to extend federal monitoring programs on the Scotian Shelf, characterizing whale habitat, detecting acoustically-tagged animals, and offloading data from bottom-mounted acoustic receivers.

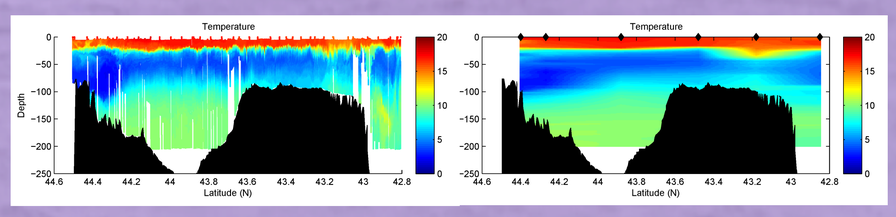
Glider Operations



Fisheries and Oceans Canada has occupied the Halifax Line biannually using research vessels since 1998 (see poster by D. Hebert). OTN/MEOPAR has occupied the Halifax Line semi-continuously using gliders since 2011.

Typical glider transect

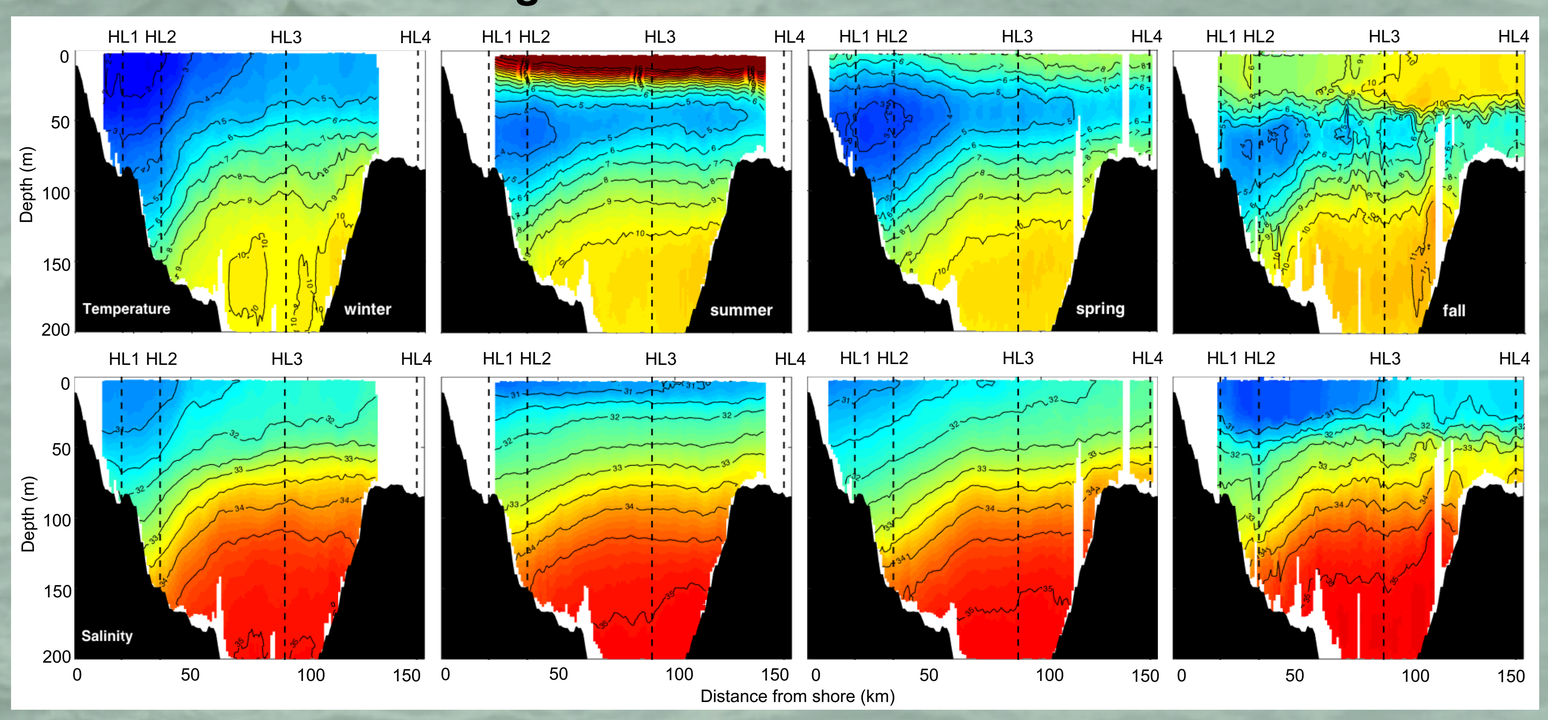
Glider data subsampled to Halifax Line stations

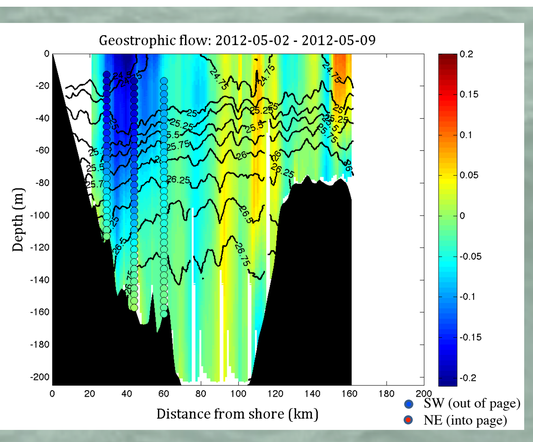


OTN/MEOPAR gliders have logged:

- 63 missions
- >37000 km traveled
- >1300 days at sea
- >2 billion data points

Environmental Monitoring on the Scotian Shelf

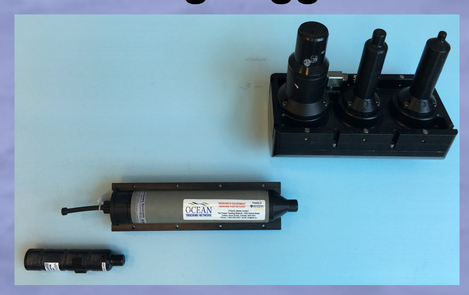


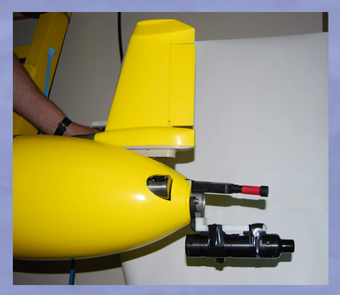


Seasonal averages of temperature and salinity for the Halifax Line show cold and fresh water inshore associated with the Gulf of St. Lawrence as well as the persistent cold intermediate layer on the Scotian Shelf.

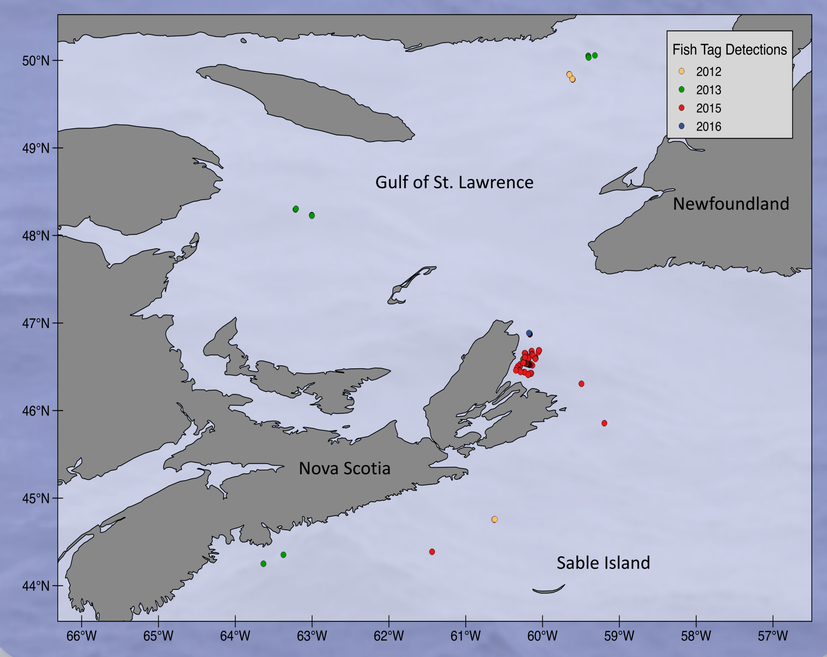
Glider-derived density combined with glider drift allows for calculation of cross-track geostrophic currents, shown here compared to *in situ* ADCP measurements (colored circles).

Detecting Tagged Animals



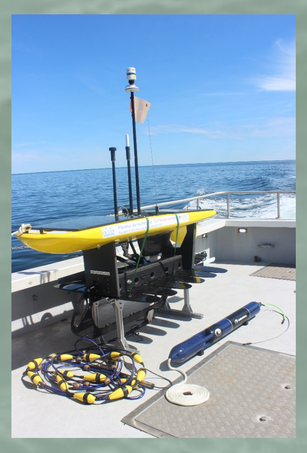


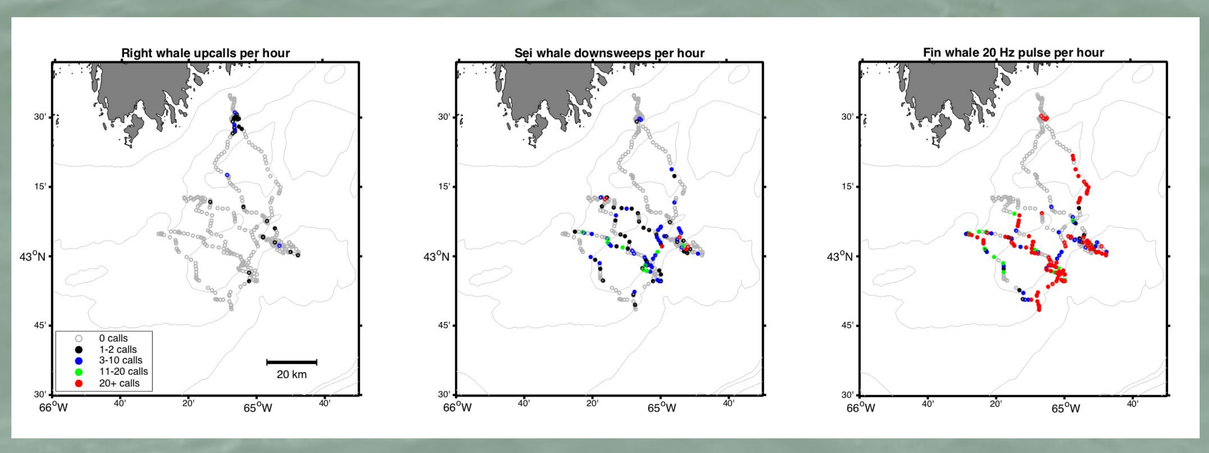
Almost 700 tagged marine animals have been detected using gliders as mobile receivers, expanding the reach of OTN. Much of this work is done in partnership with private industry.



Tracking Whales

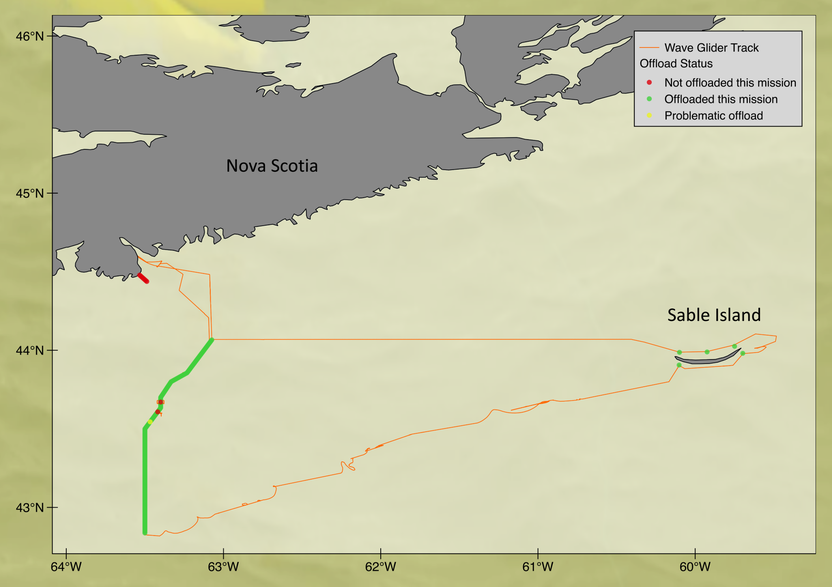
Passive acoustic hydrophone from WHOI records and classifies whale calls for real-time transmission to shipping industry to mitigate ship strikes. Directional hydrophones for wave gliders are being developed with local companies.





Offloading Data

Using the wave glider to offload 466 acoustic receivers reduced the operational costs of OTN by 35%.



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