Ocean Observations on the Scotian Shelf using Autonomous Vehicles

R. Davis1, M. Baumgartner2, A. Comeau1, B. Covey1, K. Davies1, M. Dever1, K. Fupsova1, D. Hebert1, S. L’Orsa1, T. Ross4, F. Whoriskey1

1OTN/MEOPAR, Dalhousie University, Halifax, Nova Scotia B3H 4R2; 2Woods Hole Ocean Institute, Woods Hole, MA, 02543; 3BIO, Fisheries and Oceans Canada, Halifax, NS, B2Y 4A2; 4IOS, Fisheries and Oceans Canada, Sidney, BC, V8L 4B2

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.

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).

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

OTN/MEOPAR gliders have logged:
- 63 missions
- >37000 km traveled, or 93% of the earth’s circumference

Detected 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%.