

Glider-based ocean sampling in Atlantic Canada

T. Byrne¹ and A. Comeau¹

¹Ocean Tracking Network, Halifax, Canada
tbyrne@oceantrack.org, acomeau@oceantrack.org

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ABSTRACT

The Ocean Tracking Network (OTN) - based at Dalhousie University - has been operating long endurance underwater and surface semi-autonomous vehicles in Atlantic Canadian waters for over 13 years. OTN's glider group operates the largest academic fleet of marine autonomous vehicles in Canada—11 Teledyne Webb Research Slocum gliders and 3 Liquid Robotics Wave Gliders. The Slocum glider dives up and down through the water column in a sawtooth pattern by means of a buoyancy engine, moving slowly and quietly along a pre-programmed path that can be modified by shore-based pilots. The Waver Glider is a two-part system with a surface and subsurface unit, which has solar panels that charge a set of batteries and power the system electronics and science sensors. The subsurface unit is attached to the surface unit by an 8m tether and has wings that harness wave energy for propulsion. A variety of science sensors can be mounted to both platforms. Data from these sensors can be transmitted in near real-time over an iridium satellite connection.

To date, the combined glider fleet has flown >180,000km and spent >7,000 days at sea. Data collected have been used in various monitoring and research programs. Through a collaboration with Transport Canada and the University of New Brunswick, gliders have been equipped with hydrophones to monitor several species of baleen whales, including the critically endangered North Atlantic right whale. Detection data are reported in near real-time to Transport Canada and Fisheries and Oceans Canada, who use the information as part of their marine mammal mortality mitigation schema. The gliders have also been used in animal movement studies by tracking acoustically tagged species of commercial and cultural significance, including salmon, sharks, snow crab, lobster, and halibut. The gliders have a wide variety of environmental monitoring sensors and have been used in long term studies to survey ecological hotspots for oxygen concentration, turbidity, ocean currents, pH, zooplankton, phytoplankton and more, making them an effective tool for long term offshore ocean environmental monitoring.