Quantifying and Predicting Canada's Ocean Carbon Sink

Glider work in the Northwest Atlantic and the Labrador Sea

(MSc or PhD opportunity)

The ocean has taken up approximately 40% of the anthropogenic CO_2 released into the atmosphere over the industrial era. Thanks to the deep convection that occurs in the Labrador Sea, the northwest Atlantic Ocean sequestrates a large part of this carbon in the deepest layers of the ocean. The ocean's carbon absorption rate however changes from year to year and from location to location, affecting the accuracy of estimates. This transfer of carbon from the atmosphere to the ocean also causes ocean acidification, which involves a decrease in pH (increase in acidity) and a decrease in dissolved carbonate (one component of many marine species' shells). Increased atmospheric CO_2 over the next century elevates the risk for some keystone species, particularly via the corrosive effects on carbonate-shelled plankton and benthic organisms of commercial importance; these have the potential to impact coastal ecosystems.

Present estimates of the ocean carbon sink integrate over decadal or longer time horizons, but new ocean observations from a variety of platforms are now making it possible to estimate the ocean carbon sink on scales of one to several years. Such estimates require new techniques to transform observations into reliable ocean carbon uptake rates. *This project thus aims to use innovative techniques (e.g. ocean gliders) to monitor the carbon sink in the NW Atlantic and the Labrador Sea.*

Objectives:
More precisely, the project aims to:

1. Enhance the capability of gliders to directly measure pH or pCO_2 with a focus on deployments in the Labrador Sea;
2. Develop methods to inter-calibrate with mooring measurements when in the near vicinity and to integrate glider measurements with floats;
3. Quantify carbon uptake using the alkalinity relationship.

Location: Memorial University (MUN).

Supervisory committee:

- Brad deYoung (MUN) – expertise in glider deployments and data interpretation including the addition of novel sensors
- Heather Reader (MUN) – expertise in biogeochemical dynamics of marine dissolved organic matter
- Frédéric Cyr (DFO-NL) – expertise in physical-biogeochemical interactions, diapycnal mixing and gliders

Please send cover letter and CV to bdeyoung@mun.ca, hreader@mun.ca or Frederic.Cyr@dfo-mpo.gc.ca with the subject line Ocean Carbon Sink.