

Simulation of Interannual Circulation and Stratification around Placentia Bay (MSc Thesis Seminar)

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ABSTRACT: In this thesis, an application of a three-dimensional, full-prognostic and baroclinic model based on FVCOM is developed to simulate the interannual variability of circulation, sea surface temperature and stratification over Placentia Bay. The model is forced by NARR winds and heat fluxes on the surface and by tides, non-tidal sea level, temperature and salinity on the open boundary. Overall, the model solution compares well with the observed monthly mean water levels, surface currents, and SST except for the surface currents at a location near the head of the bay. The circulation patterns in the outer bay area for December 2011 and 2012 showed that the general monthly-mean circulation in the upper ocean were positively correlated with the intensities of the remote westward water inflow from the inshore branch of Labrador Current under geostrophic assumption, which resulted in larger current amplitudes of the cyclonic gyre for December 2012. Over the inner bay, currents in the upper ocean were much weaker due to the reduced effect of the inshore branch of Labrador Current. When the amplitude of the monthly-mean local wind forcing was relatively strong for several months such as October 2010, the wind effect could be as important as the effect of the remote water inflow on the surface circulation. The monthly-mean surface temperature distributions for August 2010 and 2014 showed distinct spatial and interannual variations positively correlated with the observed air temperature, the net heat flux on the sea surface and the water inflow advected from the inshore branch of the Labrador Current. The depth-averaged (0-50m) buoyancy frequency, Richardson Number (Ri) and the mixed layer depth at Buoy-Mouth and Buoy-Red Island also showed interannual variability that may be positively correlated with the interannual variations of some variables, such as wind intensity, air temperature, and net heat flux.

ALL ARE WELCOME!