



Coastal Submesoscale Baroclinic Eddies in Cyclostrophic Balance in the Saguenay Fjord.

Alexandre Livernoche (1), Daniel Bourgault (1), Cédric Chavanne (1), and Peter Galbraith (2)

(1) University of Quebec at Rimouski, Rimouski, Canada, (2) Department of Fisheries and Oceans, Mont-Joli, Canada

Submesoscale baroclinic eddies in cyclostrophic balance were studied in the Saguenay fjord (Quebec, Canada) using mooring data, boat-based sampling and oblique images taken from the shore, obtained in 2013 and 2015. Cyclostrophic balance implies equilibrium between the centrifugal force and the pressure gradient, with negligible Coriolis effect. The shear between the strong ebb flow and the bathymetric obstacle of a cape in the fjord creates a front downstream from the cape, which in turn generates vortices that are hundreds of meters in diameter. Shipborne ADCP, echosounder and CTD transects across the front were measured in order to understand the eddy generation. The first observed vortex had a radius of ~ 175 m, a maximum horizontal velocity of 0.3 m/s, and was trapped above the pycnocline. The horizontal surface currents were determined using Particle Imagery Velocimetry (PIV) applied to successive georectified images. It was found that under some conditions, sea surface patterns can provide sufficiently clear information to quantitatively capture the eddy current field and its evolution over time. From these observations, the vertical vorticity field as well as the horizontal strain rate can be computed. These results, although preliminary, are promising for investigating horizontal eddy diffusion in coastal waters, as well as their parameterization in ocean.