Surface dispersion in the Lower St. Lawrence estuary

Project description: Accurately forecasting the drift and dispersion of oceanic contaminants such as oil and microplastics is important for societal activities and for the health of coastal communities. A central question is what range of spatial and temporal scales needs to be resolved by numerical ocean circulation models to obtain accurate forecasts of pollutant pathways and concentrations in the ocean. For certain dynamic regimes, dispersion is dominated by the largest-scale energetic eddies (called non-local). In these regimes, dispersion can be accurately forecast by a numerical model resolving the largest eddies. For other dynamic regimes, dispersion is dominated by eddies of a size similar to the distance separating the water parcels (called local). In these regimes, the accurate prediction of dispersion requires resolving all scales of interest. While dye release experiments in the surface layer of the ocean seem to support the local dispersion regime for scales ranging from 100 m to 100 km, experiments based on surface Lagrangian drifters are less conclusive, due in part to methodological issues. To reconcile results from dye release and surface drifter experiments, both dye and a large number of surface drifters (180) will be released simultaneously in the Lower St. Lawrence estuary at the end of summer 2020, in an area monitored by high-frequency radars measuring surface currents and waves as well as a met-ocean buoy with current and stratification profilers. These observations will be analyzed to assess the dispersion regimes (local vs. non-local) and the main physical processes controlling the surface dispersion in this coastal environment.

Additional information and thesis supervision: Cédric Chavanne, Supervisor, and Dany Dumont, Co-supervisor.