## Project summary

Canada's coastline is among the most extensive in the world and covers three oceans, two of which are at least seasonally ice-covered. Being able to respond to emergencies all along this coast requires appropriate equipment, reliable and efficient communication systems and trained personnel stationed at strategic locations. It also requires accurate hindcasts and forecasts of winds, waves and surface currents that are necessary to estimate with the highest degree of confidence where a person at sea or a spilled pollutant should be found. Time is key and this is particularly true in harsh ice-infested coastal environments : survival time is shorter, conditions can be extremely difficult, and equipment is highly pressured. In the case of an oil spill, the presence of sea ice can simply make the recovery impossible, which requires knowing where it will be when it melts and trapped oil is released. This is a paramount challenge, which adds up to the bigger challenge of tracking how the oil patch disperses and evolves in a cold multi-phase environment and quantifying the short- and long-term impacts on the ecosystem. In this interdisciplinary and multisectoral initiative, we propose **to improve surface drift forecasts**, **to build the capacity of using the improved tools** and **to document this process for subsequent uses elsewhere**. We will carry this project in the Lower St. Lawrence Estuary (LSLE), a particularly dynamic marine environment where a suite of research and operational modeling and monitoring systems are maintained. This suite includes a 5-km resolution operational coupled ice-atmosphere-ocean numerical model, a 400-m resolution tidal ocean model, four high-frequency radars (HFR) measuring surface currents in real-time, and one automatic buoy providing real-time surface measurements of currents, waves and winds during Summer. The HFR array that was recently deployed in the area allows for a truly innovative and ground-breaking study of marine dispersion. In this project, we supplement models and real-time observations with drifting buoy data against which they will be tested. We will also set-up a spectral wave model to estimate the wave-induced drift that has been so far ignored. A special focus will be placed on surface drift in the presence of sea ice so that the entire spectrum of environmental conditions affecting surface drift is covered. The research directly involves Canadian marine operational service providers (Environment and Fisheries and Oceans Canada), the Canadian Operational Network of Coupled Environmental Prediction Systems (CONCEPTS), the Canadian Coast Guard (Search and Rescue, Environmental Response and the Auxiliary), the St. Lawrence Global Observatory (SLGO), and the Fire Services and Civil Security of La Mitis regional county municipality.