Project Overview for USCGC *Healy* Baffin Bay Survey

This is a multi-disciplinary research project that will take advantage of the US Coast Guard Cutter *Healy* operating in Baffin Bay in September/October 2021. There will be science teams aboard from various institutions, as detailed below. We will depart from Nuuk, Greenland on 17 September, and disembark in Boston, Massachusetts, USA on 17 October. The ship will take measurements in central/southern Baffin Bay, extending from just offshore the Greenland coast to just offshore the coast of Baffin Island. The following is a brief summary of the 8 projects, including the main scientific objectives and measurements being collected. A total of 14 scientists will participate on the cruise.

1. Scientists from the Woods Hole Oceanographic Institution, USA will conduct a survey of the water properties and water velocity in Baffin Bay. The water properties are measured using an instrument package lowered over the side of the ship. The velocity is measured using an acoustic current profiler situated in the hull of the ship. The main objectives are to determine the fate of the freshwater carried into Baffin Bay by the West Greenland Boundary Current, and to establish the pathways by which heat from the current gets diverted to the Uummannaq region glaciers of West Greenland.

2. Scientists from the Bedford Institute of Oceanography, Canada will carry out seafloor mapping and sub-bottom profiling in designated areas adjacent to Baffin Island. The main objectives are to map the distribution of underwater landslides on the continental slope of Baffin Bay, assess the relative age of underwater landslides, and identify possible trigger mechanisms for these landslides.

3. Scientists from the University of Alaska, USA will collect carbon isotope measurements in Baffin Bay, both in the water and in the air. The main objective is to quantify ocean-atmosphere-ice-land interactions using these quantities.

4. Scientists from the University of Bergen, Norway will deploy an underwater autonomous vehicle, known as a “sea glider”, in the vicinity of Jakobshavn glacier, West Greenland to measure water properties. The vehicle will be recovered later in the fall by the Canadian Coast Guard Ship *Amundsen*. The main objective is to map the detailed pathways by which heat is brought to the glacier, and estimate small-scale variations in this process.

5. Scientists from NORCE Research Center, Norway will collect water samples to measure oxygen isotopes and nutrients in Baffin Bay. The main objective is to distinguish the sources of freshwater between meltwater from the Greenland ice cap and outflow from the Arctic Ocean.

6. Scientists from the University of Windsor, Canada will attach an acoustic receiver to the package lowered over the side of the ship. The receiver records signals from fish (Greenland Halibut) that have been previously tagged. The main objective is to track the whereabouts of the fish.

7. Scientists from the National Oceanography Center, UK will deploy satellite-tracked surface drifters that measure surface water properties and barometric pressure (a subset of the drifters will also measure wind speed). These will be launched at various locations in Baffin Bay. The main objective is to track the movement and evolution of the water, and provide atmospheric information.

8. Scientists from the Woods Hole Oceanographic Institution, USA will collect water samples to measure biochemical properties of the water (oxygen, dissolved inorganic carbon, and total alkalinity) in Baffin Bay. The main objective is to identify the origin and transformation of the water.

The work has been, and will be, coordinated with scientists from the Geological Survey of Canada (GSC). Our colleagues from the GSC made initial community engagement visits in 2013. In May 2015 and in March 2016, 2018 and 2019, community engagement sessions were held in Clyde River, Qikiqtarjuaq, Pangnirtung and Iqaluit. COVID prevented such visits in 2020. Research results will be reported back during community visits following the cruise and will be made publicly available. Results will also be presented at workshops in the North, at science conferences, and will result in publications in various scientific journals, reports, and plain language documents over the months and years following the project.