**Churchill Marine Observatory - Environmental Observing (CMO-EO)**

Led by the University of Manitoba, the Churchill Marine Observatory (CMO) is a major research infrastructure funded by the Canada Foundation for Innovation (CFI) in partnership with the provincial governments of Manitoba and Alberta and numerous other governmental, industrial, and nongovernmental organizations, including the Arctic Research Foundation. Once completed, CMO will be a globally unique, highly innovative, multidisciplinary research facility based out of Churchill, Manitoba, adjacent to North America's only Arctic deep-water port. The core CMO infrastructure is comprised of 1) the Oil-in-Sea-Ice Mesocosm (OSIM) with two saltwater sub-pools, to be located in Churchill, which is designed to simultaneously accommodate contaminated and control experiments on various scenarios of oil spills in sea ice, and 2) the Environmental Observatory (EO) system, which includes a 65 ft research vessel (*MV William Kennedy*), one cabled oceanographic mooring in the Churchill estuary, and four oceanographic moorings to be distributed along the main shipping channel across Hudson Bay and Strait.

Although the CMO science program is designed around studies on the detection, impact and mitigation of spills of oil and related contaminants in sea ice-covered waters, the CMO-EO system will be predominantly used to assist in data gathering in support of increasing our baseline knowledge of general oceanography (including physical, chemical and biological oceanographic investigations) and oceanographic monitoring capacity within the Hudson Bay complex, including Hudson Bay, Foxe Basin and Hudson Strait. Therefore, collaborations with existing and future projects will support recovery and deployment of additional moorings. Under this broad mandate, the CMO-EO system will plan to operate throughout the Hudson Bay complex every year over the next 7-years and beyond, with specific regional foci for different years based on secured research funding.

Currently, the CMO research vessel is in Summerside, PEI. In July 2018, we plan to bring the CMO research vessel to Hudson Bay where we will plan to deploy the four CMO-EO oceanographic moorings along shipping lanes, recover moorings deployed via the CCGS Amundsen as part of the University of Manitoba-led Hudson Bay System Study (BaySys) in southern Hudson Bay and then carry out coastal oceanographic sampling around Southampton Island (nearby Coral Harbour and Naujaat) in support of the Southampton Island Marine Ecosystem Project (SIMEP), and near Chesterfield Inlet as part of the GENICE (Microbial Genomics for Oil Spill Preparedness in Canada's Arctic Marine Environment) project. In support of SIMEP, an additional mooring will be deployed at the southern end of Roes Welcome Sound. Oceanographic moorings will consist of: electronic sensors (for temperature, salinity, dissolved oxygen, chlorophyll fluorescence, coloured dissolved organic matter, underwater light, and pH), low power acoustics similar in power to depth sounders used on small boats (for water velocity and backscatter from zooplankton and fish), hydrophones (to listen for marine mammals and ship noise), and sequential sediment traps (to measure export of planktonic organic matter from the surface ocean). Sampling via the CMO-EO research vessel will include: deployment of similar sensors to those mentioned above; water samples for ocean

geochemistry including carbonate system parameters and dissolved nutrients, bacterial abundance, primary production, and stable isotopes; nets to collect zooplankton and fish samples, box and gravity cores to collect sediment and benthic organism samples; a 24 ft zodiac launched from the research vessel to collect water and benthic samples closer to the coasts and to deploy scientific SCUBA divers who will assess species composition and biomass of macroalgae (e.g., kelp) within shallow waters; and a remotely operated vehicle to obtain video measurements of the benthic environment to map out organism distributions. Timing of the 2018 research activities will approximately follow: August 1-20 for the SIMEP project and August 21-24 for the GENICE project. The CMO-EO system involves the long-term deployment of our research vessel and oceanographic moorings in the Hudson Bay complex and therefore, will consist of annual research activity reports and updates as part of a seasonal (ice-free) multi-year program operating over at the next 7-years and beyond.