

Arctic coastal and drifting ice processes and dynamics

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Project description

Changes in Arctic climate have profound implications for the break-up of coastal ice. In the recent past, there have been large calving events of ice shelves and glaciers that have produced many vast ice islands and icebergs that drift through Nunavut waters.

Our research is focused on understanding how various types of coastal ice interact with the atmosphere above, the ocean below as well as meltwater and glacier ice from the adjacent land. In particular, we are interested in how both thick ice (ice tongues, ice shelves) and thin ice (landfast sea ice and lake ice) are melting and breaking-up in a changing climate. In addition, we study how large ice masses (icebergs and ice islands) that break away from the coast, drift and deteriorate. To conduct our research, we place instruments in the water to measure temperature, salinity and water currents; we measure the temperature and melting rate of ice using dataloggers, ice-penetrating radar and ablation stakes; we also measure air temperature, wind and solar radiation to examine energy input to ice. We employ technologies such as satellite tracking beacons and remote sensing to examine ice drift, passive seismometers to record ice movements, as well as uninhabited aerial vehicles (UAVs), autonomous underwater vehicles (AUVs) and remotely operated vehicles (ROVs) to make precise maps of the ice and take water measurements under-ice.

Some of our research takes place at the northern coast of Ellesmere Island where there are extensive ice shelves and ice tongues. Our study of drifting icebergs and ice islands occurs where they go, which is typically within the Queen Elizabeth Islands, Lancaster Sound and along the east coast of Ellesmere, Devon and Baffin islands. We hope to work out of and with eastern Baffin Island communities where icebergs drift by. We are also planning to study flat and ridged landfast sea ice near these communities. We access our far northern site from small camps that are established using Twin Otter and helicopter, we visit ice islands and icebergs by ship, boat and helicopter but also work from communities to access ice by snow machine or small boats. The data we collect will eventually be available in public repositories following dissemination of results to communities and in the peer-reviewed literature.

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