Arctic coastal and drifting ice processes and dynamics

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We had a very successful field season this year and worked in three main locations: Northern Ellesmere Island, Frobisher Bay and Baffin Bay to examine coastal and drifting ice processes.

Ellesmere Island:

From July 9th to July 31st 2017, a four-person team carried out oceanographic, hydrological and glaciological measurements on the Milne Ice Shelf and Milne Glacier in Milne Fiord, located on the northern coast of Ellesmere Island. Based out of a camp on the ice shelf, the team concentrated on a detailed investigation of a channel carved upward into the base of the ice by warm freshwater. A 40 cm hole was made through the ice shelf with a hot water drill in order to be able to deploy a remotely-operated vehicle (ROV) and sonar with the aim of measuring melt and exploring the channel. The team recovered instruments that record temperature and salinity in the Milne Fiord epishelf lake (a layer of freshwater floating on top of sea water) and re-deployed these to continue monitoring changes in the fiord for another year. On Milne Glacier, the team installed four seismic stations in order to investigate glacier movements and continued to monitor surface mass balance. For further details and images see:
https://wirl.carleton.ca/research/ice/ice-shelves/milne-ice-shelf/
https://wirl.carleton.ca/research/ice/epishelf-lakes/milne-epishelf-lake/
https://wirl.carleton.ca/photo-gallery/ellesmere-island-2017/

Frobisher Bay:

Field data collection for a project investigating the utility of uninhabited aerial vehicles (UAVs) for mapping sea-ice topography was conducted on Frobisher Bay from May 4th to 20th by Martin St-Amant, Adam Garbo and guide Ted Irniq. The team completed 14 aerial surveys of sea ice using a UAV equipped with a digital camera and high-precision GPS unit. Surveys aimed to capture a diversity of sea-ice features, such as level ice, pressure ridges, and tidally-deformed ice. Using the 'structure from motion' photogrammetry technique, aerial photos can be combined with GPS measurements to create 3D models of topography. UAV surveys can be conducted at low cost, with non-specialized tools and minimal expertise, so this project aims to evaluate the potential of this tool for sea-ice topography mapping. For further details and images see:
https://wirl.carleton.ca/ice-topography/
https://wirl.carleton.ca/photo-gallery/iqaluit-2017/

Baffin Bay:

Jill Rajewicz joined Leg 2b of the CCGS *Amundsen* science cruise from July 13 to August 1 with the aim of visiting data a large tabular iceberg ('ice island') grounded near Qikiqtarjuaq in Baffin Bay. The objective of this work is to use automated measurements of thickness change to better understand the deterioration of ice islands, which present potential hazards to shipping and natural resource exploration. Unfortunately conditions

and visibility were too poor to complete the work on the appointed day. Later in the cruise Jill deployed tracking beacons on large icebergs in Northern Baffin Bay in collaboration with the Canadian Ice Service and other research partners. For further details and images see:
https://wirl.carleton.ca/research/ice/ice-islands/ice-penetrating-radar/
https://wirl.carleton.ca/research/ice/ice-islands/tracking/