Arctic coastal and drifting ice processes and dynamics

Annual Report 2021
Licence # 02 025 21R-M Issued to D. Mueller, Carleton University

Most of our field plans were cancelled in the spring and summer of 2021 this year due to COVID-19. We were fortunate to get some information on ice conditions with the help of our community partners in Ikpiarjuk (Arctic Bay) and some tracking beacons were dropped on ice islands north of Meighen Island.

Admiralty Inlet, Baffin Island:
Although our Carleton team was not able to travel to Ikpiarjuk for field work, we worked with our community partners, SmartICE and Arctic Bay Adventures, to put 4 cameras in Admiralty Inlet from June to July 2021. We have been putting out these cameras in various locations near the floe edge each spring since 2019 to observe landfast ice breakup in Admiralty Inlet (see Figure 1 for locations). Images from these cameras were put together to make videos of changes in the landfast ice at breakup, and videos from all the cameras deployed from 2019-2021 can be found here: https://www.youtube.com/playlist?list=PLLbOAqFevQJJo0wZAq4WhMADG-B9Epuhh.

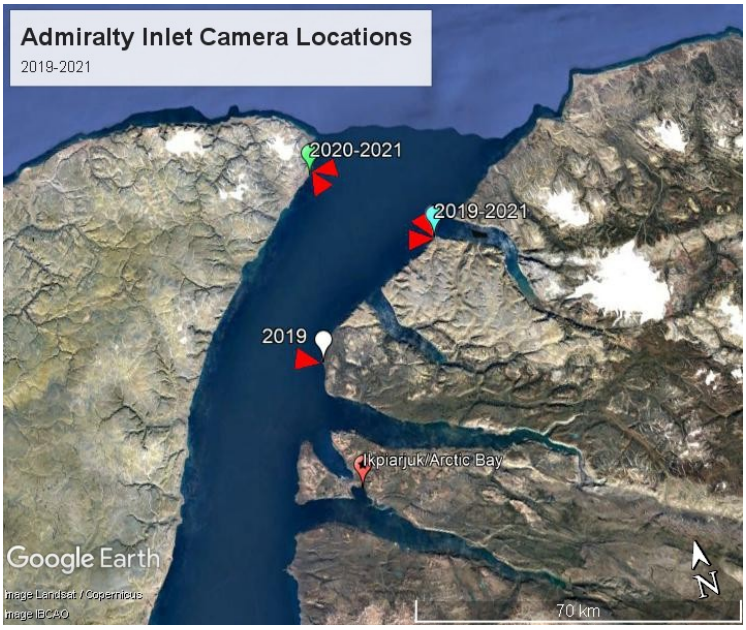

Figure 1. Location of camera deployments in Admiralty Inlet from 2019-2021. Red triangles indicate approximate directions cameras were looking.

A video summarizing the research completed on this project from 2019-2021 was created and shared with community members in Ikpiarjuk and can be found here in English: https://www.youtube.com/watch?v=VOh9P8RUezw (8 minutes), and here in Inuktitut: https://www.youtube.com/watch?v=z8kzFw5Zch8 (14.5 minutes). So far, we've learned that the timing of breakup in Admiralty Inlet has been gradually occurring earlier over the last 20 years. The number of times pieces of ice break off from the floe edge changes from year to year, but there seem to be more break off events in recent years. We've also learned that the winds in Admiralty Inlet are very different than the winds measured at the airport near Ikpiarjuk.

Informal discussions were held with community members in Ikpiarjuk and Mittimatalik (Pond Inlet) in September 2021 to present research findings and discuss community interest in our future research plans to study sea ice breakup in both Ikpiarjuk and Mittimatalik. We are planning a trip to Ikpiarjuk this spring to continue our instrument deployments in Admiralty Inlet. There we will deploy the cameras, weather stations, tide gauges, current meters and track small ice motion using GPS. We will also engage with community members in both Ikpiarjuk and Mittimatalik to discuss our research and make plans for the future. When we are in Mittimatalik we will train Andrew Arreak, Regional Operations Lead, Qikiqtaaluk Region, SmartICE to deploy community weather stations around Mittimatalik.

Milne Fiord, Ellesmere Island:

We were not able to go to our Milne Fiord research site but we were able to drop tracking beacons on large ice islands that broke away from the Milne Ice Shelf in 2020. The paths that they drifted can be seen in Figure 2 below and we will follow them as they drift to the west next summer. We are planning to return to the Milne Fiord area this July to check on our monitoring equipment, determine the stability of the remaining portion of the ice shelf and to observe what has changed at this site. We will be using our ice radar to look at changes in ice thickness, we will measure how much the ice has thinned since our last visit and we will put weather stations out on the glacier and ice shelf. We will check on our oceanographic instruments in the fiord and bring a robotic submarine to look under the ice. We plan on having a team member from Grise Fiord join us in the field this year.

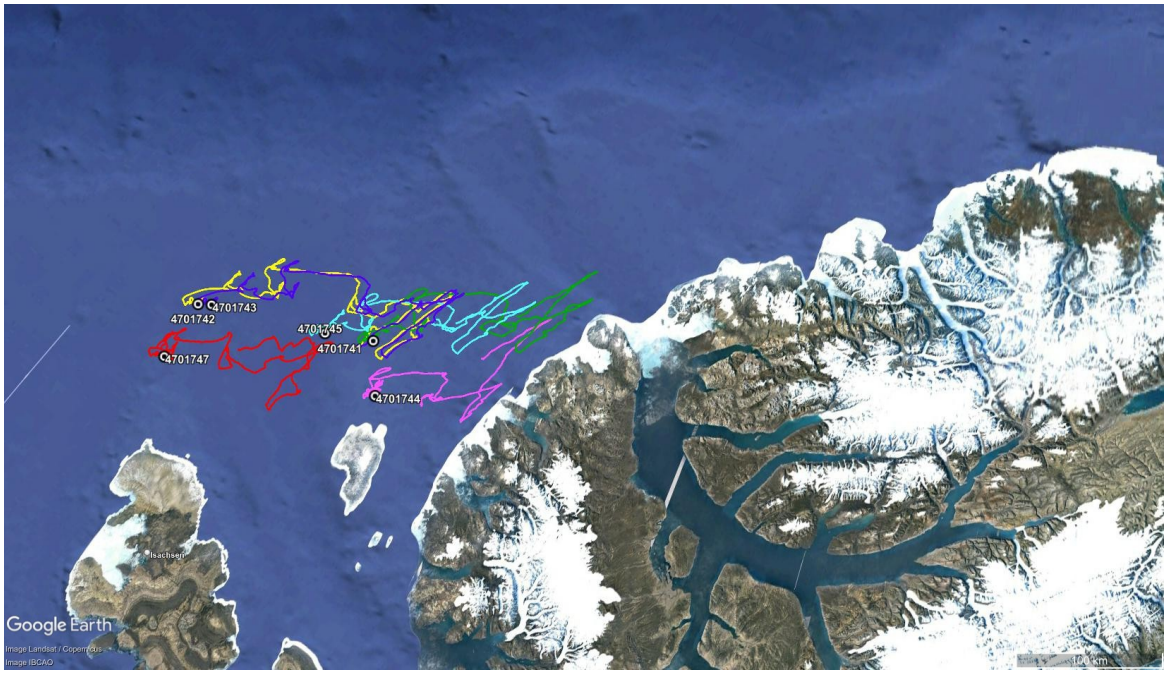

Figure 2. Drift tracks of 6 ice islands from late summer 2021 to March 1, 2022. The tracking number is labelled at the ice island's last position.