Update on 2020 and 2021 planning:

Canadian Wildlife Service multiyear licence NF-NR-2019-NU-013
Nunavut Research Institute licence 02 009 19R-M
Mayor's Office, Sulukvait ACMC & HTO, Resolute NU

Project Title: Lake Ice in the Canadian High Arctic

Lake ice is an important part of the cryosphere and recent projections suggest a pan-arctic reduction by the end of the century in ice duration (ranging from 20 to >100 days) and thickness (ranging from 30 cm to > 1 m). Since the majority of ground-based ice observations in Canada ceased by the 1990s, recent changes in ice regimes have been primarily noted through modelling and remote sensing. Observation data, essential for validating both remote sensing and modelling research, is currently inadequate though some volunteer monitoring efforts have emerged since the decline of Canada's monitoring network and have been utilized for ice research. As changes are noted in ice regimes, we need to fully understand the implications and response in terms of water and energy balance and their effects on other areas of research (e.g. limnology, transportation). To achieve this, in situ data of lake ice in Canada is being collected across a latitudinal gradient (temperate, sub-Arctic, High Arctic). The field data will be used to improve the effects of snow cover on modelled ice thickness, as well as to isolate how the duration of the modelled ice break-up season is affected by the shape/size of the lake. Resolute and Polar Bear Pass provide ideal locations for the High Arctic portion of this study and data collection is underway.

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2020 Research Team:
We were not able to conduct any field research in 2020 due to COVID-19 restrictions. We were able to retrieve some of the camera images thanks to Debbie Iqaluk.

Proposed 2021 Research Team:
If we are able to travel north in 2021 our research team will consist of three people in May and four people in August, depending on quarantine restrictions in place at that time our team members may need to change:

- Laura Brown (May, August)
- Claude Labine (May, August)
- Daniel Serrano Cadena (May, August)
- Alexis Robinson (August)
- Brianna Lane (possibly August)
- Xiaomeng Zuo (possibly May or August if needed)
- We also hope to hire a field assistance from Resolute through the HTA for our trips to Nanuit Itillinga and will look into this once we know if/when our logistical support is possible.

Date and Duration of planned research:

May 11 – 25 & Aug 1 – 17: We are hoping to travel to Resolute and Nanuit Itillinga in May (proposed time frame, May 11 – 25, or shorter depending on logistical support) to retrieve more of the 2020 field data and make manual measurements of the ice thickness. We hope to visit again in August (proposed time from Aug 1 – 17, or

shorter). Similar to previous years, we plan only short visits to Nanuit Itillinga for maintenance on the weather tower and to download the camera imagery.

Summaries of Activities / Plans for next year:

While we weren't able to do any fieldwork, we did make progress on the computer side of the project. Last year we showed the full ice season for Small Lake and how different the ice thickness was from the 1980s. This year some modelling has shown that the ice has become thinner on Resolute Lake as well since the 1960's, more so since the 1990's. We only have a few historical maximum ice thickness values to compare the model results to, comparison to the melt timing suggests the thickness is probably realistic, but we'd love to talk to people who might remember what the ice conditions were like in previous years compared to now. The ice thickness measurement from the fishing derby a few years ago was great, and I'm hoping to overlap my planned visit in May so that I can be there for that in 2021.

We do have a new paper out focusing on snow and sea ice change in the Arctic Islands from satellite imagery. While not directly relevant to the current project, if anyone is interested in the recent snow and ice trends observed from satellite imagery the paper is online here:

Dauginis A and Brown LC. 2020. **Sea ice and snow phenology in the Canadian Arctic Archipelago from 1997 - 2018**. *Arctic Science*, https://doi.org/10.1139/AS-2020-0024

We are still hoping to add a satellite link to the weather tower and will keep the community in Resolute up to date on progress with that and how to access the data once it is available. Other plans for next year are the same as previous years: maintenance, downloading and resetting the cameras, ice sensor and weather tower, and some manual ice thickness measurements in the spring if travel is permitted by May.