

**Application for NRI Research License: Dynamics and Change of the Devon Ice Cap,
Nunavut (Extends Work Proposed Under NRI License 02 022 17R-M)**

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Project Location: Devon Ice Cap, Devon Island, Nunavut

Project Plans 2019

Field Team (2019): Ashley Dubnick (Post-Doctoral Fellow); Patrick Williams (MSc Student)

Timeframe: April 2019 - June 2019 (~1 month in field)

Purpose: Understand how Arctic ice caps are responding to climate warming and quantify the contribution of glacier melt in Arctic Canada to sea level change.

Goals & objectives (2019).

(1) To service and recover data from 5 GPS sensors installed on bedrock around Devon Ice cap that record vertical motion of the Earth's crust in response to changes in the ice cap's mass. We expect the crust around the ice cap to rise if the ice cap is losing mass and to sink if it is gaining mass, and the rates of elevation change to scale with the amount of mass lost or gained. We also expect to see a seasonal cycle of uplift in summer when the ice cap is losing mass by melting and subsidence in winter when it is gaining mass by snowfall.

(2) To collect glacier ice samples and return them to the laboratory for chemistry and microbial analyses and experiments.

Access: by Twin Otter from PCSP, Resolute Bay; Travel on ice cap (Party of 2) by skidoo and sled or helicopter.

Any structures that will be erected (permanent / temporary): A temporary base camp (party of 2) will be established at the ice cap summit and small traveling camps of 1-2 tents will be used at remote sites. Camps are dismantled at the end of the field program and minimal materials (fuel/equipment/skidoos) will be cached at the northern margin of the ice cap to reduce transport costs next year.

Restoration / abandonment plans: Equipment not needed for subsequent field seasons will be removed after the 2019 season. Some equipment and fuel needed for 2020 may be cached on the northern margin of the ice cap. All equipment and cached materials will be removed at the end of the project. There should be no need for restoration as camp sites are on ice and GPS can be unbolted from bedrock.

Methodology

Collection Protocol and Mechanisms:

(i) **GPS measurements:** Each GPS system consists of an antenna mast (approximately 1m high) bolted into bedrock, a Trimble Net R9 GPS sensor, batteries, and solar panels. These systems will operate year-round until they are dismantled and removed at the end of the study. We service them and download data from them each spring.

(ii) **Ice sampling:** Small ice samples (~1 kg each) will be collected using a chisel and hammer.

Indicate why specific communities or individuals were selected for your research - Not applicable.

Data

- **Short term & Long term use of data.** Student theses, research publications, and public talks. Climate Change Assessment Reports (e.g. IPCC, AMAP). Data available on request to interested parties. Ultimately, data will be deposited in a public data repository.
- **Other uses of data.** None

Reporting

- Results will be communicated through annual reports to the Nunavut Research Institute and Nunavut Climate Change Center, and summaries of research results to Grise Fjord and Resolute Bay communities in Inuktitut and English. NRI and NCCC will receive copies of published articles.

Will the research result in a publication? Yes – journal articles.