2019 Annual Report: from the Université de Sherbrooke research group (GRIMP) – Research license 04 010 19R-M

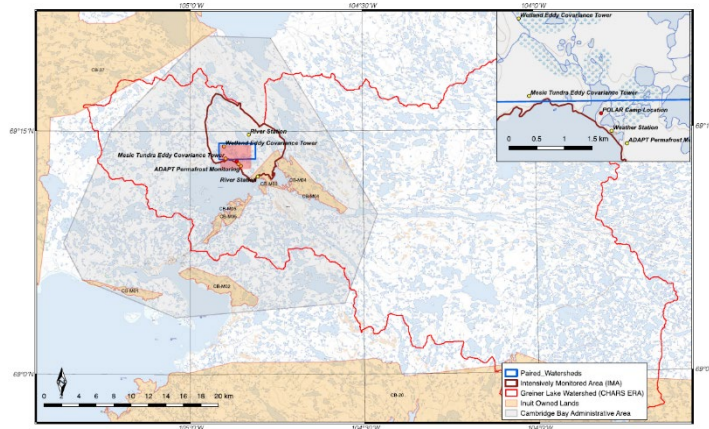## Prepared by: Prof. Dr. Alex Langlois, PI

The group from the Université de Sherbrooke was in Cambridge Bay 21 days in April and 8 days in July of 2019. We also had two staff members spending the full month of June looking and melting snow conditions. A total of seven researchers took part in snow measurements in the Intensive Monitoring Area (IMA) north of Greiner Lake, following the same transects established in the first 5 years of the project. The project is motivated by the increase in extreme weather events in the Arctic such as rain-on-snow (ROS) events, which change snow characteristics. Those events lead to the formation of ice layers that affect travel on the land and caribou grazing conditions. Several events killed many animals, not only in Canada. The year 2019 was also our second year flying our UAV that now has an autonomy of 30 minutes to map snow depth at 2-cm resolution. We are interested in knowing what controls snow depth, and in return how snow depth affects soil freeze-thaw. The ultimate goal is to be able to retrieve this information from satellites.

The main objective of this project is three-fold: 1) to develop rain-on-snow and ice detection methods using satellite image, 2) use a snow model to simulate caribou grazing conditions and 3) characterize snow from satellites. The short term use of the data allowed us to validate the snow model. In the long-term, the data collected on the field will be compared to satellites in order to see if they can detect changes in snow conditions (especially those during ROS events).

2019 sites surveyed (35 sites) with the following staff on the field: Daniel Kramer (PhD); Julien Meloche (MSc); Alex Langlois (prof); Guillaume Couture (M.Sc.); Simon Levasseur (MSc); Coralie Gautier (M.Sc.).

2020 plans (6 people, 3 weeks in April): Repeat the surveys from the map above and include snow microwave measurements using our radiometers; Fly our unmanned aerial vehicle (UAV) in the (IMA; blue square in flowing map) with a radar.

Figure: UAV flight zone near Greiner Lake