

# Final Project EOSC 442

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## Deadline #1: Title, Research Question(s) and Data

1. **Summary of process we are investigating:** Permafrost and the soil layer above the permafrost that freezes and thaws annually - called the active layer - is directly affected by climate change. It is anticipated that rising temperatures in the Arctic will lead to permafrost warming/melt and thus thickening this the active layer.
2. **Preliminary Title:** Rate of change of permafrost active layer thickness at Owl River in Auyuittuq National Park compared to the change of the active layer thickness at Tanquary Fiord in Quttinirpaaq National Park.
3. **Research Question:** Is the rate of change of the active layer faster, slower, or the same at two different locations (Quttinirpaaq V.S. Auyuittuq)
4. **Dataset we will be using:**
  - a. **Description of the dataset:** The thickness of the active layer measured every summer from 1999-2017 for Quttinirpaaq and 2009-2017 for Auyuittuq. Active layer depth measurements, thaw depth at the time of monitoring and maximum thaw depth, are also monitored using a thaw tube.
  - b. **Where is it collected:**

Quttinirpaaq National Park (Tanquary Fiord).  
Latitude 81.4 Longitude -76.883333  
Nunavut, Canada

Auyuittuq National Park (near Owl River)  
Nunavut, Canada
  - c. **Who collected the dataset:** Conducted by Parks Canada under the CALM program (Circumpolar Active Layer Monitoring) that observes the long-term response of the active layer and near-surface permafrost to changes and variations in climate at more than 125 sites across the Earth.

- d. **How was it collected:** Active layer thickness measurements were taken each summer, at 100 points within the 100 m x 100 m grid, using a metal probe. Thaw-tube measurements were carried out using a metal rod that was inserted at the sampling location until a point of resistance, and the depth was recorded. Duplicate measurements were carried out 1m apart from each point.
- e. **Resolution of data and time-frame it covers:** Every summer during 1999-2017 for Quttinirpaaq and every summer during 2009-2017 for Auyuittuq. The data is collected on random days in July or August.
- f. **Source of data:**
  - i. Murchison, Colleen. "Active Layer - Quttinirpaaq." Government of Canada - Open Government. October 2017, 01. Accessed October 1, 2018.
  - ii. Colleen. "Active Layer - Auyuittuq" Government of Canada - Open Government. October 2017, 01. Accessed October 1, 2018.

- 5. **Description of proposed analysis:** The data will have to be sorted to find the average for each day at the different test locations. We will plot the datasets and find the rate of change of the active layer depth for each location. Then, we will then do a one-way ANOVA test to determine if there is a difference in the rate of change of the depth of the active layers of the two locations.

## 6. Sources:

Murchison, Colleen. "Active Layer - Quttinirpaaq." Government of Canada - Open Government. October 2017, 01. Accessed October 1, 2018.

<https://open.canada.ca/data/en/dataset/5e8d13ca-2af8-4335-b770-20b898a5b530>.

Nelson, Fritz, Jerry Brown, Toni Lewkowicz, and Al Taylor. "CALM Active Layer Protocol." George Washington University. Accessed October 1, 2018.

[https://www2.gwu.edu/~calm/research/active\\_layer.html](https://www2.gwu.edu/~calm/research/active_layer.html).

"Quttinirpaaq National Park (Tanquary Fiord)." Canadian Network of Northern Research Operators. May 30, 2015. Accessed October 02, 2018.

<http://cnnro.ca/quttinirpaaq-national-park-tanquary-fiord/>.

Colleen. "Active Layer - Auyuittuq" Government of Canada - Open Government. October 2017, 01. Accessed October 1, 2018.

<https://open.canada.ca/data/en/dataset/b5662fca-2082-428e-a9c3-3234822bbeed>

