

Annual Summary for Licence #: 0401508N-M

Title: Reconstructing climate and river fluctuations at Pelly Bay, Nunavut

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During the first two weeks of August this project successfully sampled the mud of Pelly Bay near Kugaaruk. The purpose of this initial field work was collect a number of samples and to measure the temperature, salinity, oxygen content and other components of the water in the bay. These measurements and mud samples were then brought back to Queen's University where studies have been continuing. We hired a local guide and rented a boat for this work, and stayed in the hotel. We met many residents and discussed our work with them.

Overall, the bay was found to be mixed down to the bottom. The large rivers (the Arrowsmith and Kellet) are providing enough freshwater to the bay such that it is slightly less salty than typical ocean waters and they keep oxygen mixed into even the deepest waters. Of the cores of mud collected from the bay a few of the sites sampled look particularly interesting. When these mud cores were split alternate layering of coarse and fine grained sediments was observed. At one site from the southern end of the bay these layers average one centimeter in thickness. Dates taken from the mud indicate that the entire core (35 cm long) is approximately 40 years old and that these layers are likely annual in nature. The coarse layers of mud are likely related to the higher energy of the rivers in the spring and the finer layers during the lower energy of the late summer and winter. Work examining the chemical and magnetic composition of these layers of mud also indicates that there are significant differences in the type of sediment that make up these different layers. This may be caused by the larger rivers providing the majority of sediment to the site during the spring snow-melt and the smaller regional rivers providing the majority of the finer grained sediment to the site during quieter periods. This preliminary work indicates that this site is promising for further study and may help in determining whether or not different sized rivers are responding to climate variability in different manners.

It is our hope to continue this work in the upcoming year. We plan to return to Kugaaruk this spring (mid-May) with a coring system that is capable of recovering about 10 metres of mud. The cores that were recovered and evaluated in the last year are valuable, but limited because of their short length. With approximately a centimeter of mud accumulating in the bay every year, a longer mud core is necessary to be able to evaluate how the climate has changed in the region over a significant period of time. By obtaining a mud record that is longer than the weather observations of the region and potentially several hundreds of years old, it becomes possible to compare modern climate to the past.

This season's field work will be centered on recovering these longer mud cores from the ice surface by a coring system that uses vibrations to settle the core tubing into the layers of mud below the water column. Additionally, buoyed lines will be anchored at several locations in the southern bay. These lines will be equipped with temperature sensors and tubes that will collect the mud that is falling through the water for the summer. This will allow us to evaluate the type and amount of mud that the rivers bring to the bay. To accomplish this field work two researchers will base out of Kugaaruk in mid-May. They will stay in the local accommodations and will be renting equipment (snow-machines, generators, etc.) and hiring a local guide for assistance. Community support and interest in the project were quite strong during the previous field season and we hope they will remain so throughout the rest of this research project.