**Abstract**

The contents of permafrost in many areas of Northern Canada are becoming a highly studied area of research as well as extremely important when considering the possible environmental changes brought on by climate change (Jorgenson et al., 2010). This study focuses on understanding the soil water content and sediment characteristics via excess water and gravimetric water analysis, oxygen isotope analysis, loss on ignition (LOI), grain size, geochemistry, and soil colour analysis. Excess water analysis, loss on ignition, and oxygen isotope analysis were performed on two cores extracted from the Eskimo Lakes area, NWT. Samples were taken at every 0.5 m of a total length of 20 m for Core 7 and 10 m for Core 17. The results from this study show a high ground ice content in both cores. The oxygen isotope data reveals warming climate conditions. The LOI data indicates a lack of water movement through the soil column. Grain size of the samples ranges between 10-200 µm, sample composition ranges from high sand content to high clay content. Geochemistry data reveals high levels of CaCO3 in both cores and soil colour analysis reveals possible active layer depth at approximately 1 m in both cores.

**Research Objective**

The objective for this study is to analyze the ice and sediment content of each permafrost core via a variety of analyses to better understand the underlying processes that operate within permafrost environments.

**Methods**

Two sediment cores (7 & 17), extracted from continuous permafrost near the Eskimo Lakes (NWT), were assessed via water and sediment analyses. The water analyses included evaluating the excess water content, the gravimetric water content and the oxygen isotopes in each core. The sediment analyses conducted on the two cores included LOI, grain size, geochemistry and sediment colour. The following lists outlines how the cores were processed:

- **Excess water content**: compared to a higher water content to total volume. For this analysis, 74 samples were evaluated for Core 7 and 39 samples for Core 17.
- **Gravimetric water content**: compared to a wet dry weight; 74 samples were evaluated for Core 7 and 39 samples for Core 17.
- **Oxygen isotopes**: this analysis was conducted using the Los Gatos Research (LGR) Liquid Water Isotope Analyzer. 32.2 samples from Core 7 and 38.2 samples from Core 17 were processed.
- **LOI**: analysis was conducted using the LECO TGA701 Thermogravimetric Analyzer. 32 samples were analyzed from Core 7 and 19 samples from Core 17.
- **Grain size**: the analysis was conducted using a Particle Size Analyser Micromeritics 3300. 32 samples from Core 7, were analyzed and 12 samples from Core 17.
- **Geochemistry**: this analysis was conducted in the UCTTAWA ARC facility. 40 samples from Core 7 were analyzed and 20 samples from Core 17.
- **Sediment colour**: this analysis was conducted using a Munsell Colour Chart. 30 samples analyzed for Core 7 and 50 samples from Core 17.

**Results**

The contents of permafrost in many areas of Northern Canada are becoming a highly studied area of research as well as extremely important when considering the possible environmental changes brought on by climate change (Jorgenson et al., 2010). This study focuses on understanding the soil water content and sediment characteristics via excess water and gravimetric water analysis, oxygen isotope analysis, loss on ignition (LOI), grain size, geochemistry, and soil colour analysis. Excess water analysis, loss on ignition, and oxygen isotope analysis were performed on two cores extracted from the Eskimo Lakes area, NWT. Samples were taken at every 0.5 m of a total length of 20 m for Core 7 and 10 m for Core 17. The results from this study show a high ground ice content in both cores. The oxygen isotope data reveals warming climate conditions. The LOI data indicates a lack of water movement through the soil column. Grain size of the samples ranges between 10-200 µm, sample composition ranges from high sand content to high clay content. Geochemistry data reveals high levels of CaCO3 in both cores and soil colour analysis reveals possible active layer depth at approximately 1 m in both cores.

**References**


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