I. BACKGROUND

The source and composition of organic matter can play an important role in metabolism in aquatic systems. Although thermokarst processes are thought to mobilize significant quantities of particulate organic matter (POM), and its organic carbon component (POC), to aquatic systems (1), we know little about its composition and fate, despite permafrost-origin dissolved organic carbon (DOC) having been shown to be easily degraded to CO$_2$ (2-4).

In the western Canadian Arctic, a warming and wetting climate has intensified thaw slumping (5). These features thaw large volumes of glacialic sediments and can increase total suspended sediment flux in streams by orders of magnitude (6). While these high sediment concentrations have been shown to have negative impacts on stream biota (7), the alteration of organic matter pools, especially POM pools, and its impact on aquatic ecosystems has not been addressed.

II. OBJECTIVES

- How do thaw slumps alter organic carbon delivery to streams and how does this effect differ in the dissolved vs. particulate phase?
- How do thaw slumps alter the composition of organic matter in streams and how does this effect differ in the dissolved vs. particulate phase?

III. METHODS

![Diagram of thaw slump sites, Peel Plateau, NWT.](image1)

(A) Slump Site
(B) Sampling schematic

Whole water samples were obtained upstream, from, and downstream of slump runoff. Samples were collected 1-2 times from each thaw slump from June to August 2015.

IV. RESULTS

Large thaw slumps, or those well connected to streams, increase organic carbon yields in streams by orders of magnitude, primarily driven by increases in POM. Impacted streams switch from being DOC dominated systems to POM dominated systems. This also reflects changes in the partitioning of organic matter pools.

![Diagram of POC to DOC ratio.](image2)

(A) Upstream
(B) Downstream

- POC to DOC ratio (mg C kg$^{-1}$)
- POC in DOC (mg C kg$^{-1}$)
- POC in DON (mg C kg$^{-1}$)

Impacted streams have an older PO$^{14}$C age similar to slump runoff suggesting significant mobilization of permafrost POM.

![Diagram of radiocarbon age.](image3)

- Radiocarbon age (in C age: Yrs BP 1950) of POC upstream, from, and downstream of slump runoff.
- Error bars represent confidence limits.

V. CONCLUSIONS & FUTURE DIRECTIONS

Thaw slumps increase total organic carbon and organic matter delivery to streams by orders of magnitude. However, this increase in delivery is primarily due to increases in the particulate phase. Thaw slump-mobilized POM is depleted in nutrients compared to POM present in un-impacted streams and may be a poorer quality food source to stream organisms. This, along with extreme loading of particulate material in streams, may have adverse impacts on stream biota both in adjacent aquatic systems and downstream environments.

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