



USNA Material Flux Study on the North Slope

1/c Grace McInturff



Purpose

- Rapid changes are occurring in the Arctic
- Sparse data causes difficulties in creating a baseline to which changes can be compared
- Gather data to compare changes in water chemistry and flow rate from early spring to late fall



Background

- Hydrological pathways are deepening, exposing previously frozen soils and minerals due to permafrost degradation
- Permafrost collapse is leading to shifts in nutrient, trace metal, trace element, and carbon fluxes
- Increases in total dissolved carbon concentrations and shifts in carbon flux lead to concerns about positive feedback to global warming
- Altering nutrient, trace metal, and trace element fluvial concentrations can significantly impact local marine ecosystems

Toolik Research

- Sampled water chemistry from early spring to late fall
- Collected grab samples for TSS, POC, and total mercury content
- Collected syringe grab samples for DOC, DIC, CDOM, trace metals, and trace major elements
- To prevent changes in concentrations phosphoric acid was added to DOC samples and nitric acid was added to trace metal samples prior to freezing and shipment
- TSS and POC were conducted and filters were saved
- Measured flow rate and turbulence using FlowTracker and the river ray



CRREL Research

- Conducted experiment measuring mass flux from permafrost due to direct rainfall
- Simulated rainfall over three separate permafrost blocks using showerheads
- Runoff was collected and TSS was conducted to determine mass
- Samples were baked and then massed again prior to storage



Cadet Life

- Valuable, hands-on field research experience
- Application of class knowledge in specific, interesting fields of chemistry and physical oceanography
- Work and build relationships with many researchers
- Visit Alaska and the Arctic Circle



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References

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