Organic matter characteristics: From Pleistocene permafrost to Lena River water

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Thesis Objectives

1. Defining **sources of riverine C & N** at land to sea interface
2. Creating **datasets** of i) permafrost using lipid biomarker analysis
   ii) NO^{3-} & DON & respective isotopes of river water using the denitrifier method
3. Determine **source processes of nitrogen** compounds
4. Investigating **implications of OM transport** for primary productivity in the Arctic coastal near-shore

Study area

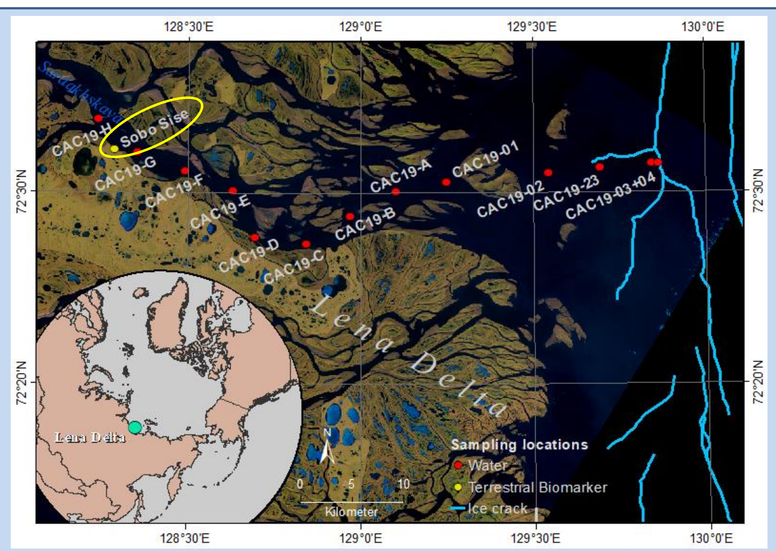


Fig. 1: Sampling scematic of Lena River Delta, credits: M. Fuchs.

Lipid Biomarkers of Sobo Sise Cliff

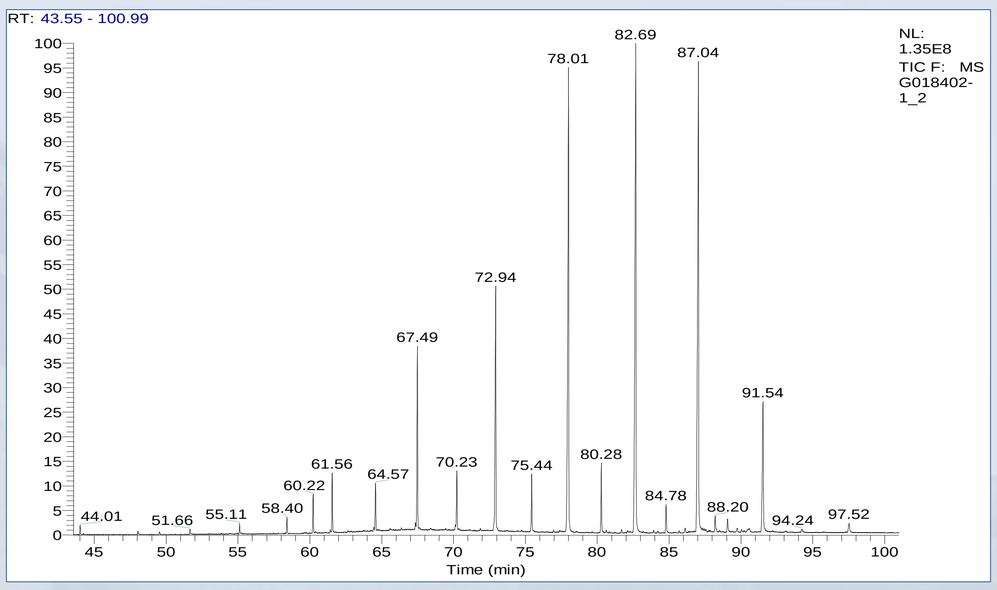


Fig.2: Chromatogram example of 1 sample showing n-Alkanes (Xcalibur).

Progress

28 permafrost samples analysed for aliphatic/aromatic compounds
13 selected samples for brGDGTs (alkohole compounds)

Preliminary Results

N-Alkanes – odd over even predominance

Indices to be determined:

(1) n-alkane concentrations
(2) CPI (Carbon Preference index; degree of C degradation)
(3) ACL (Average Chain Length; organic matter source)
(4) brGDGTs (rel. input of SOM into marine environment)

Denitrifier technique for nitrogen compounds

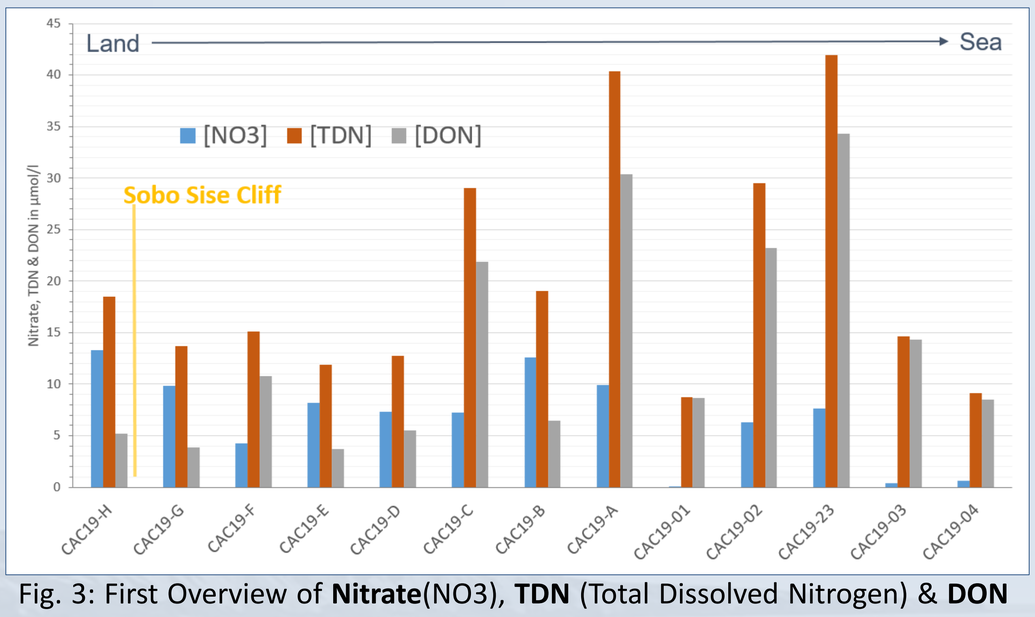


Fig. 3: First Overview of **Nitrate**(NO3), **TDN** (Total Dissolved Nitrogen) & **DON** (Dissolved organic Nitrogen) displayed as a land-to-sea transect.

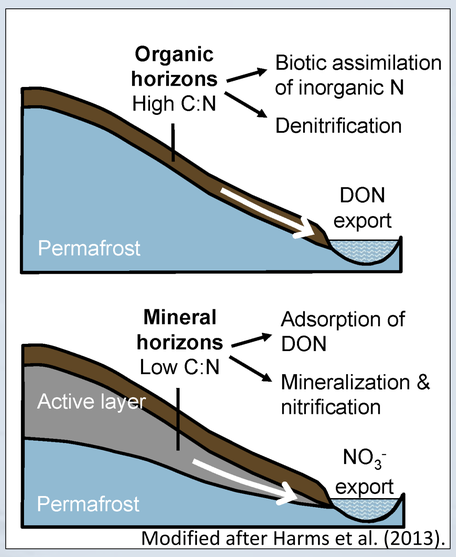
Preliminary Results

- DON excess compares to NO3-

Nitrogen Export Hypothesis

Changing nitrogen export to rivers with active layer deepening as a result of permafrost thaw

- Intact permafrost condition (A)
  N export largely in the form of DON
- Permafrost thaw conditions (B)
  N export dominated by NO^{3-}
  (DON retained)



Modified after Harms et al. (2013).

What is next

- Finish analysis and relate 2 datasets
- Correlation of isotope signature to fractionation processes of the nitrogen cycle to identify **sources of NO^{3-} and DON**
- Potential implications for **primary productivity** & role in nitrogen cycle
- **Nutrient dynamics** following permafrost thaw in the Arctic nearshore area

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