

## Rapid permafrost carbon degradation at the land-ocean-interface

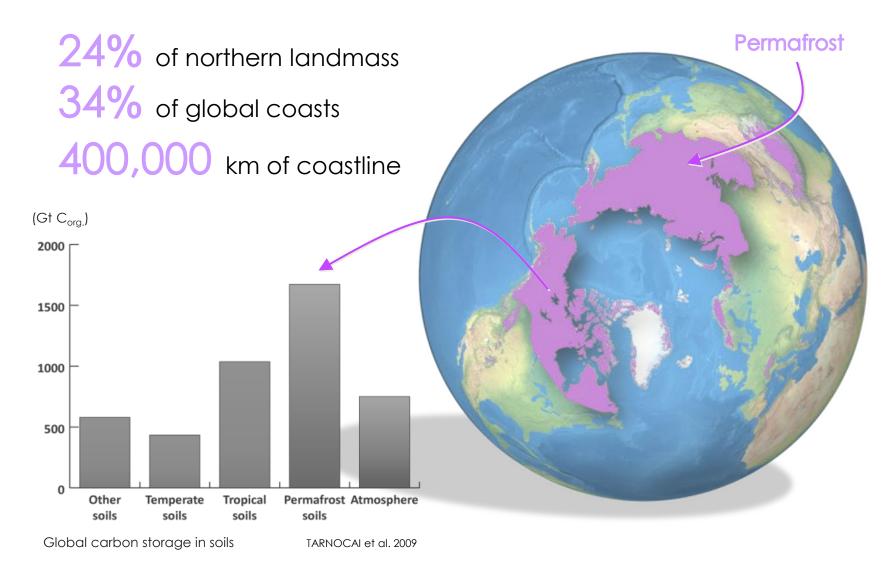
George Tanski, S. Ruttor, H. Lantuit , C. Knoblauch, J. Ramage, B. Radosavljevic, G. Mollenhauer, and M. Fritz

> <u>ArcticNet</u> ⊳₽⊳%ር%ጋℾ⋫ ጋ₽ィႫ⊲℅∩Ր<sup>с</sup>

Annual Scientific Meeting 2015 7 to 11 December - The Westin Bayshore - Vancouver, BC

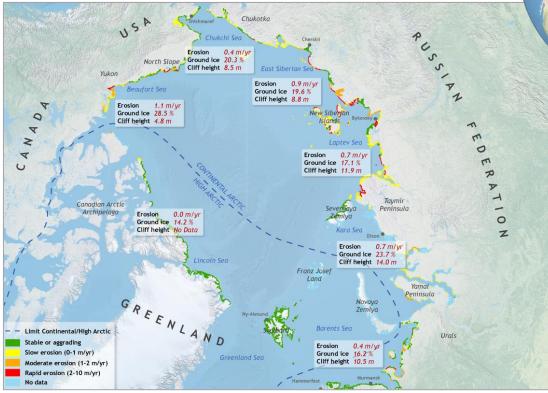
# Background





# Background

2/3 of the coast are unlithified Erosion rates up to  $10\ m\ yr$  <sup>-1</sup>

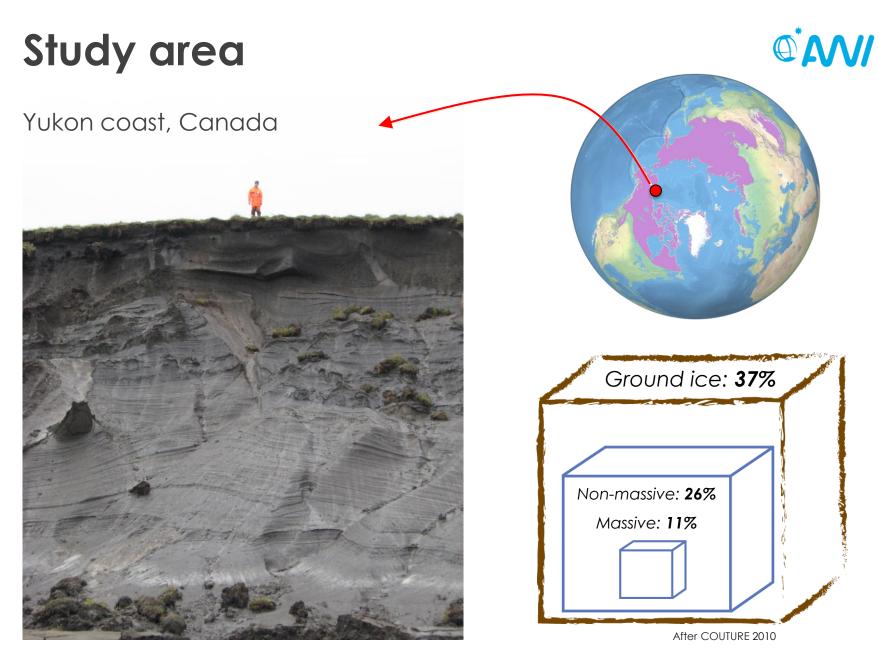


Coastal erosion and ice contents

LANTUIT et al. 2012



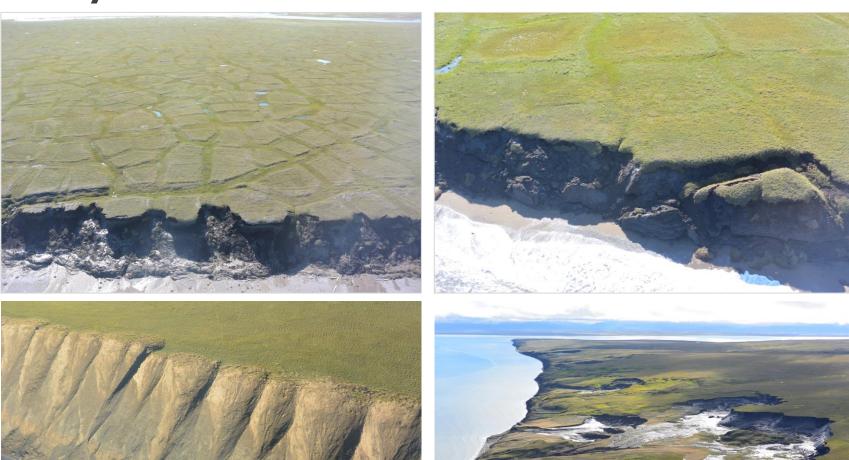




ArcticNet ϷየϷ℠ር℠ጋℾϷ ጋየፖσሻኈበሶና

# Study area

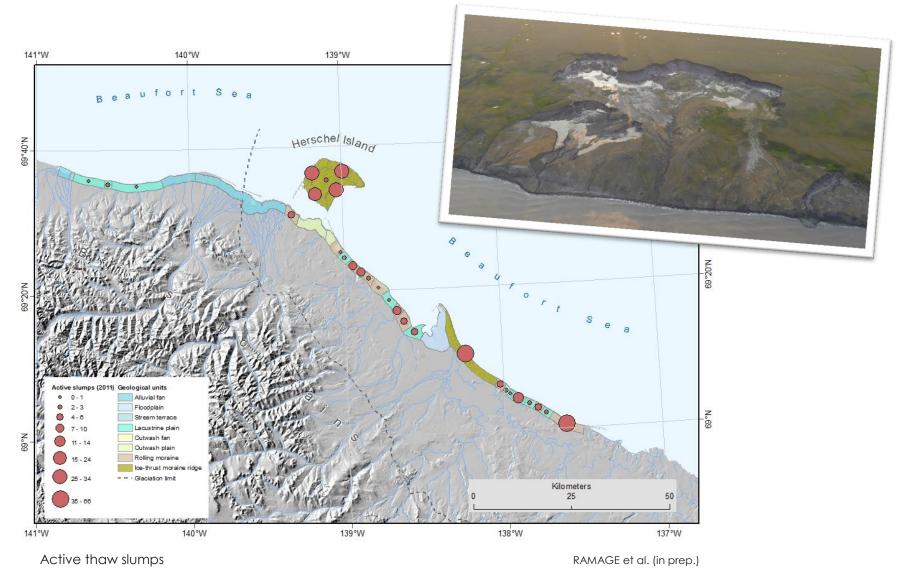




ArcticNet PPD55C5DT6 JPrdrd560105

# Study area

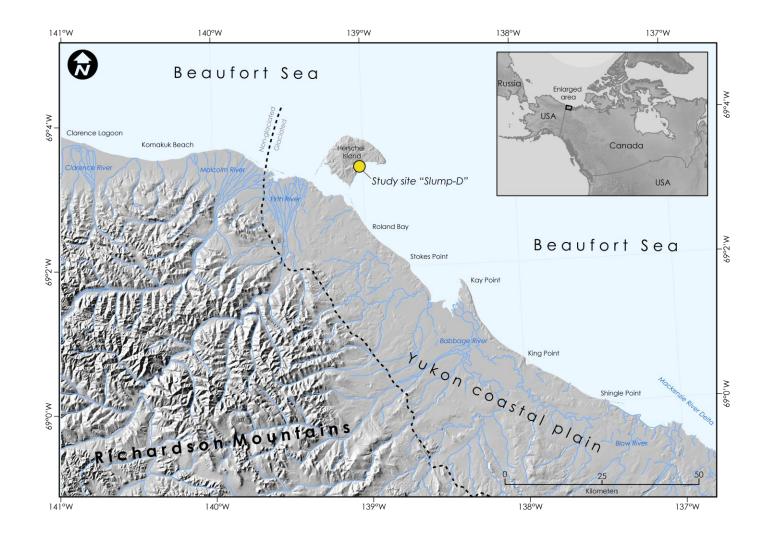




ArcticNet PPD<sup>sb</sup>C<sup>sb</sup>DT<sup>b</sup> DPJ of d<sup>sb</sup>Dr<sup>c</sup>

# Study area





# **Objectives**



- Differences in carbon and nitrogen through slumping
- Degradation of organic matter before entering the ocean
- Fate of slump material in the ocean



# **Topic II:** Degradation of organic matter





Retrogressive thaw slump: "Slump D"

ArcticNet PPD%C%DT% DProd%Drc

# **Topic II:** Degradation of organic matter



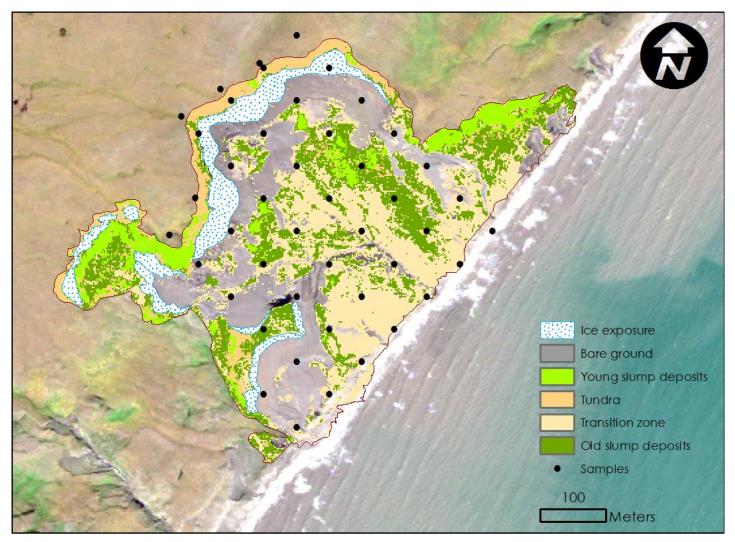


Retrogressive thaw slump: "Slump D"

ArcticNet PPD<sup>%</sup>C<sup>%</sup>DT<sup>b</sup> DPZ of 600°

## Background





Vegetation classification of "Slump D" based on NDVI

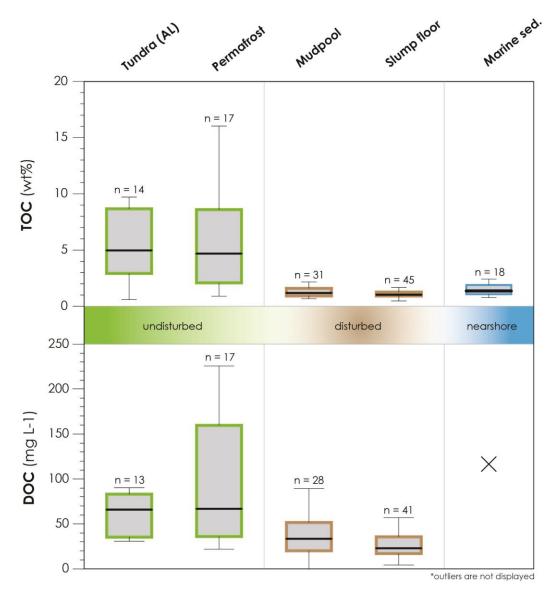
### Background





ArcticNet PPP%C%JF% JPr/σ4%Nrc

#### Organic matter inventory (TOC and DOC)

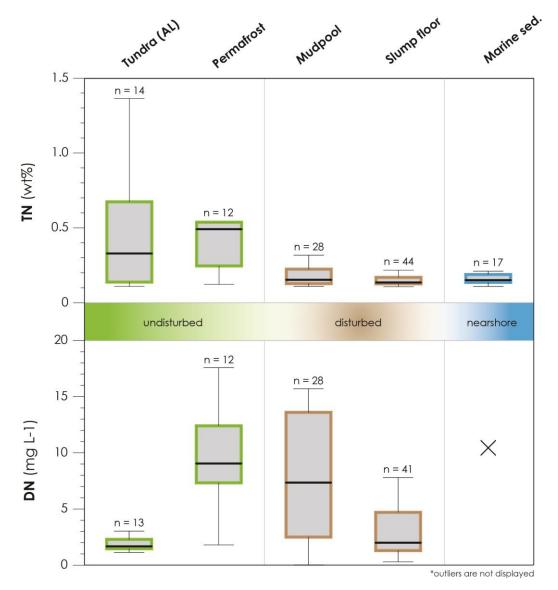




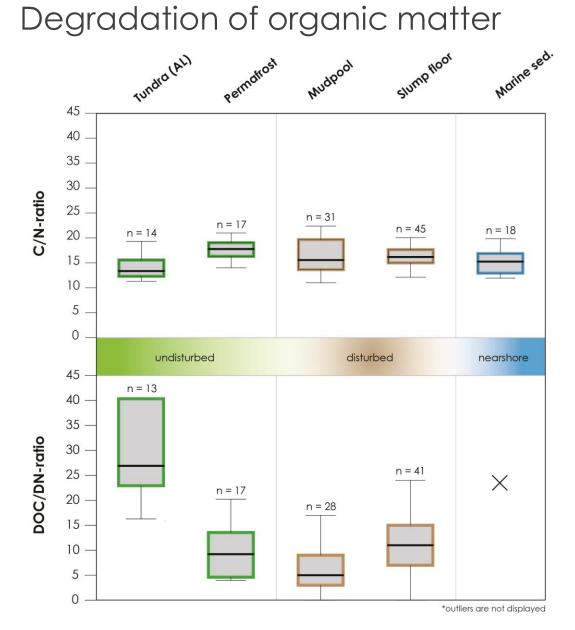
#### ArcticNet PPD%C%DTb DProd%D1'C

Organic matter inventory (TN and DN)

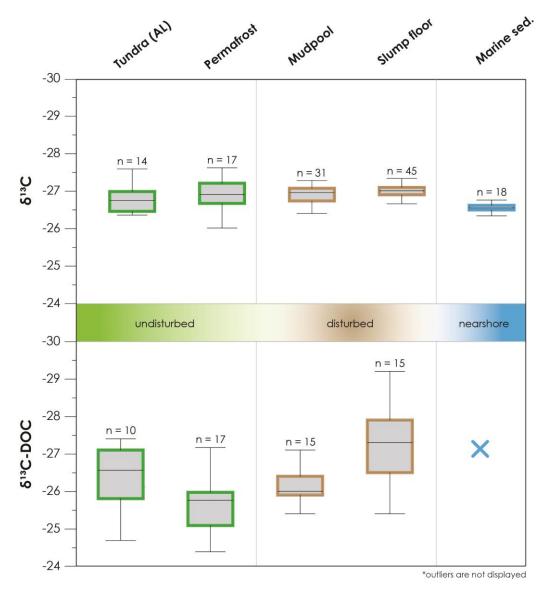




ArcticNet PPD%C%DT% DP7~d%DIC



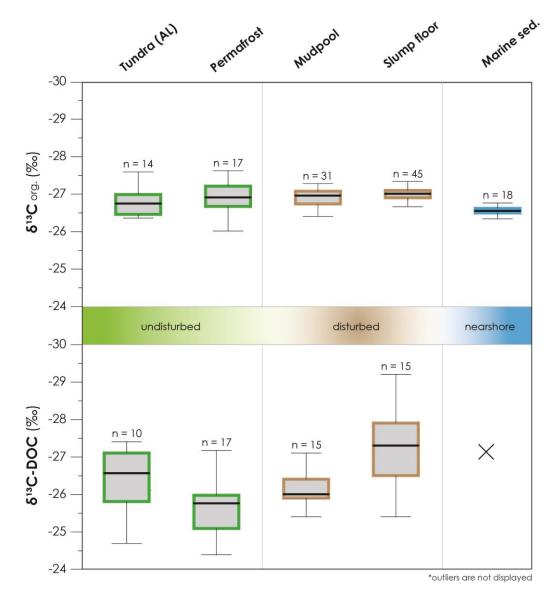
ArcticNet PPD%C%DT% DProd%DNrc Degradation of organic matter (d13C, d13C-DOO)



ArcticNet PPD%C%DT% DProd%DA

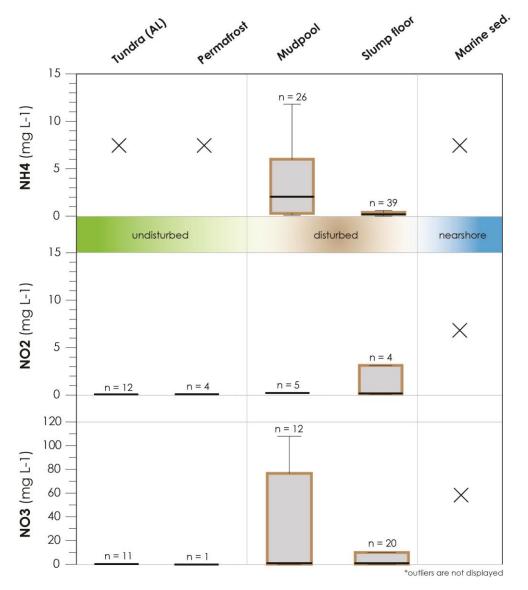
#### Degradation of organic matter (Nutrients)





### Degradation of organic matter (Nutrients)

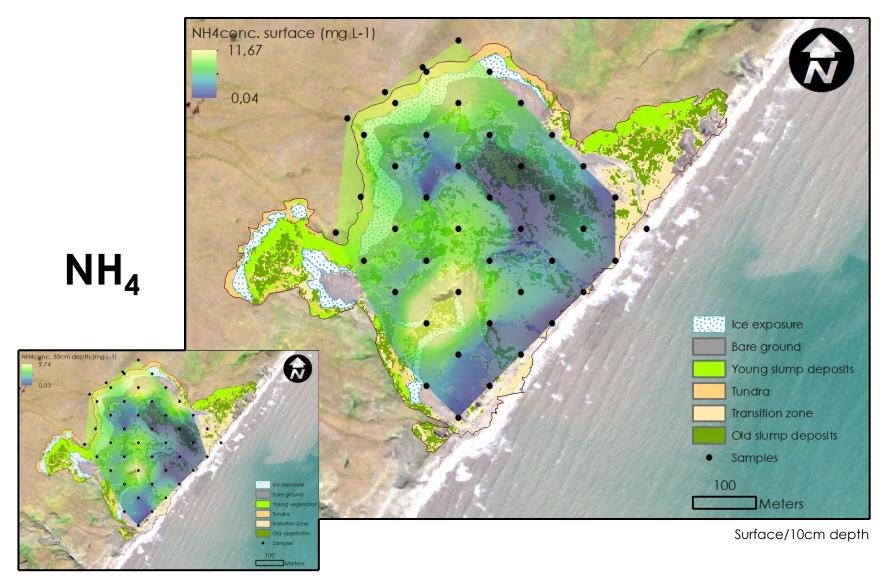




ArcticNet PPD°5C°52F° 2P2-d°60f°

# Topic II: Degradation of organic matter

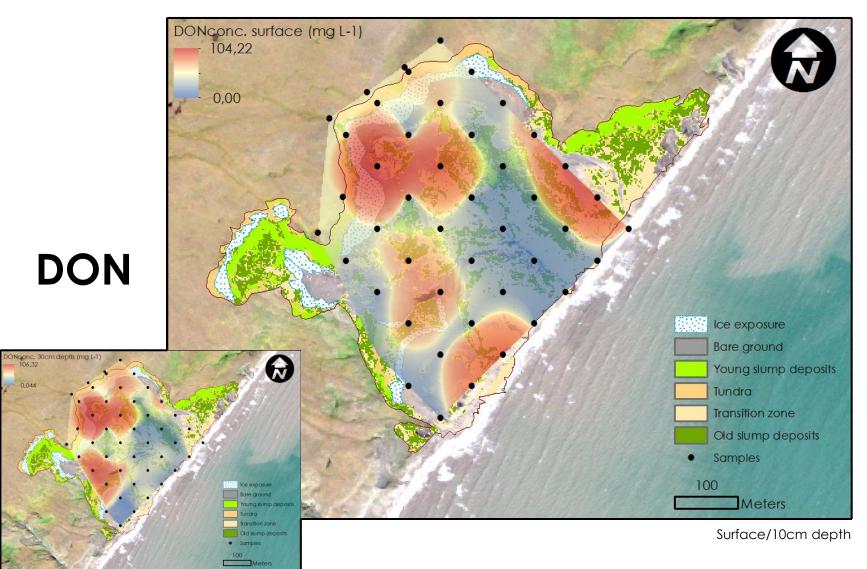




ArcticNet PPD%C%DTP JP7-J%Dr'c 30cm depth

# **Topic II:** Degradation of organic matter

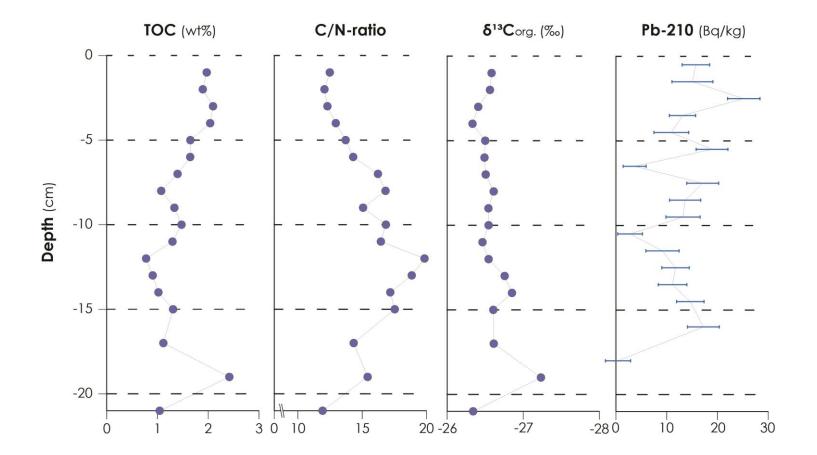




ArcticNet PPD%5075 JP7-d%Dr 30cm depth



#### Marine short core, CTD: Pb-210, TOC, d13Corg., C/N



ArcticNet PPD%C%DTb DP/d%D1<sup>c</sup>

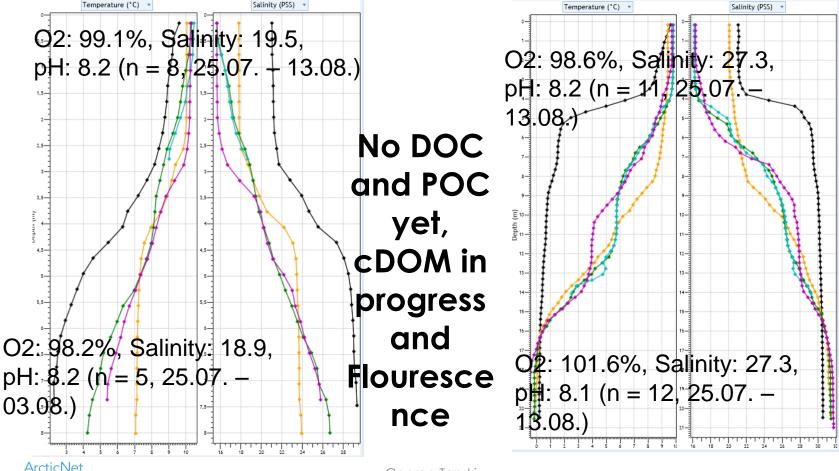
# Topic II: Fate of organic matter



CTD

#### Close to shore

#### Further from shore



Arcticinet ϷΡϷʹͽϹʹͽϽΓͼʹϽΫϭϤϤ

# Topic II: Conclusion



- DOC conc. gradient from permafrost headwall to slump deposits
  - $\rightarrow$  Degradation of DOC right after thawing
- High ammonium conc. directly after thawing

 $\rightarrow$  Indicator for quick depletion of organic material

• Strong degradtion of organic material at the land-ocean interface

# **Outlook and open questions**



What are the degradation mechanisms?

What are the degradation patterns of POC?

What happens with permafrost carbon after transport into the ocean?

What are possible impacts on nearshore marine nearshore ecosystem?

How is OC incorporated into local food webs?

# Thank you very much for the attention!

# **Questions?**



# Topic II: Origin of organic matter



