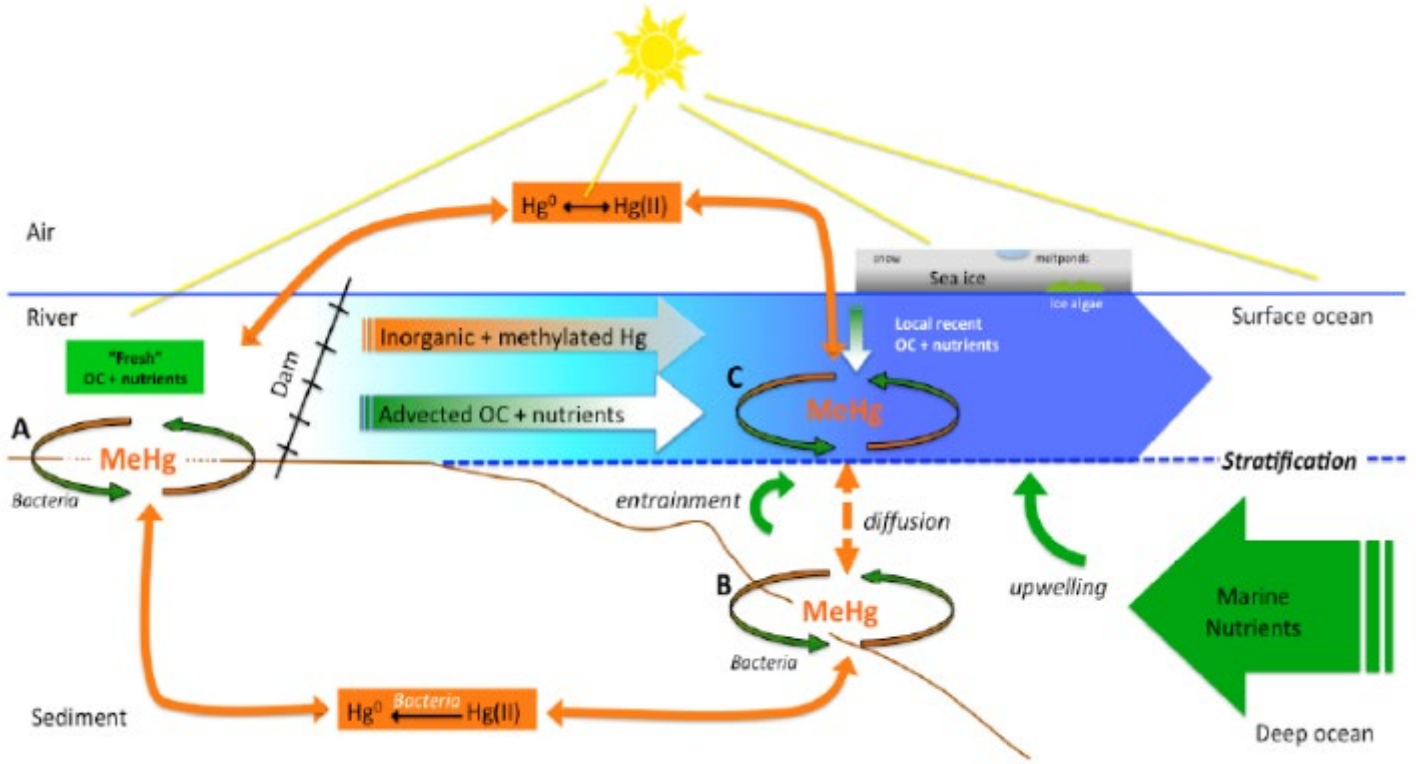
Team 5 – Contaminants
All-Hands Meeting
14 November 2019

Mercury transport and transformation in the Hudson Bay system in response to hydroelectric development and changing climate



Co-Leads:

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Sarah Wakelin

Coordinator:

Kathleen Munson

Tech Support:

Debbie Armstrong

PIs:

Gary Stern

Zou Zou Kuzyk

David Lobb

Philip Owens

Ellen Petticrew

Robie Macdonald

University of Manitoba

UNBC

Manitoba Hydro

HQP:

Manitoba Grain Commission

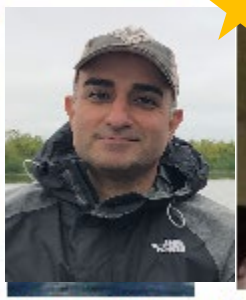
Stantec

Alaska

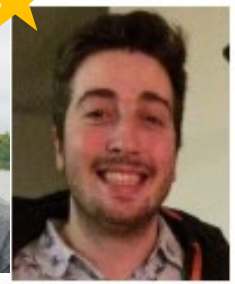
Southwest University

His PhD

Kathleen Munson



Masoud Goharrokhi



James Singer

Samantha Huyghe

Tassia Stainton

Zakhar Kazmiruk

Jiang Liu

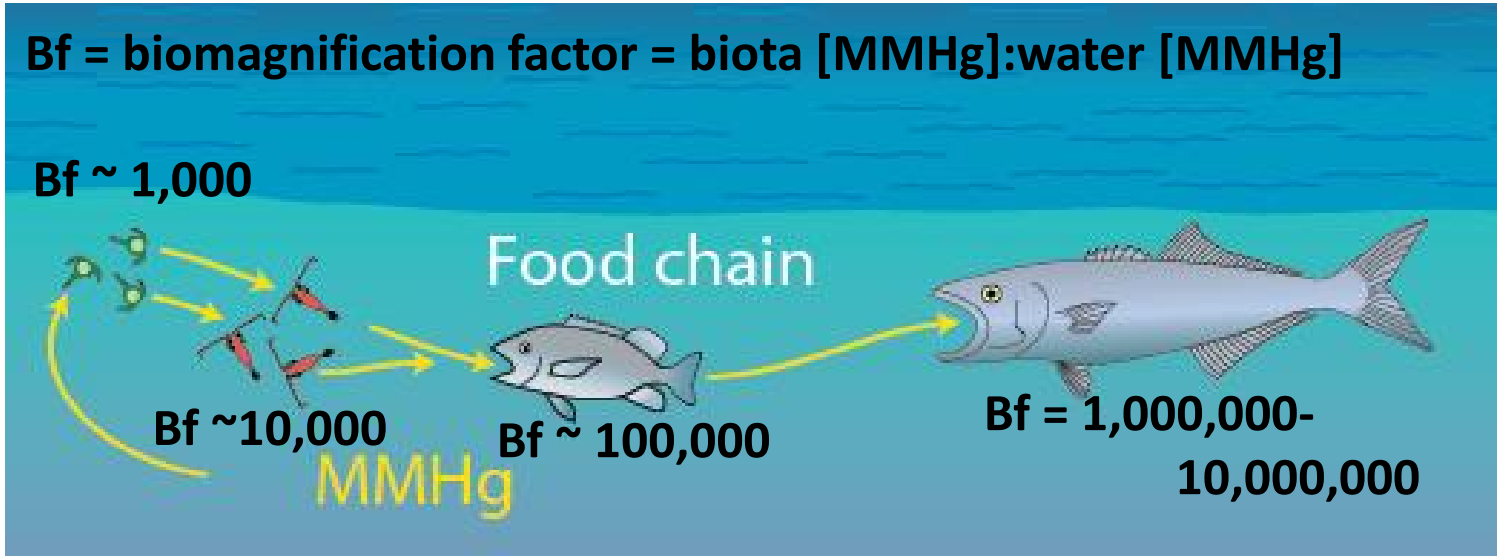
Jeff Gao

Team 5 – Contaminants

Guiding hypotheses:

- H1: Organic matter is the primary control over mercury methylation in the water column and in sediments

- H2: Flooding and changing climate are playing an increasing role in mercury accumulation at the base of the Hudson Bay marine and coastal food webs



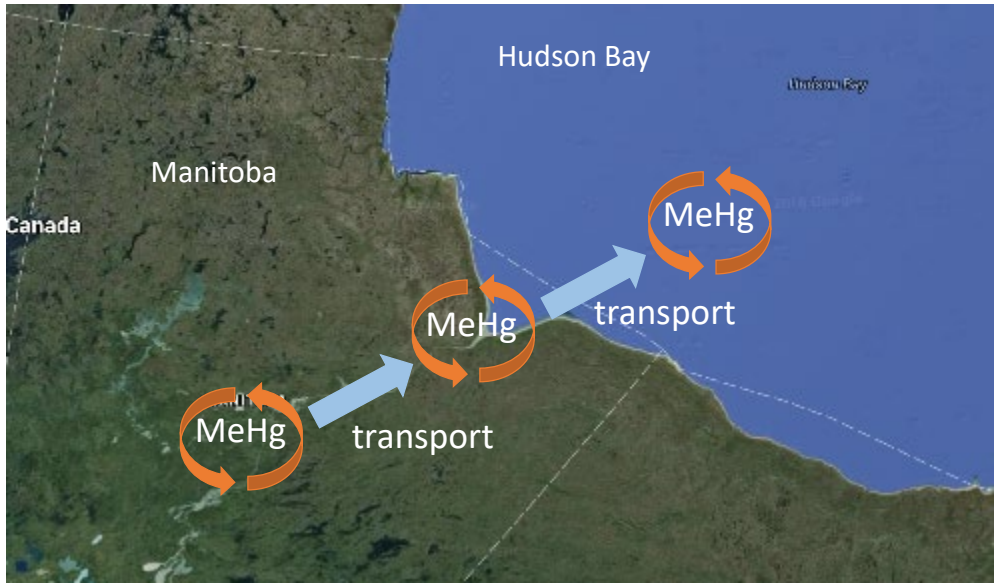
Jack Cook, WHOI

Team 5 – Contaminants: Tasks

5.2: Suspended sediment and organic/inorganic matter fingerprinting

5.1: Determine the relationship between mercury methylation and organic matter remineralization

5.3: Mass balance model of methyl mercury in Hudson Bay



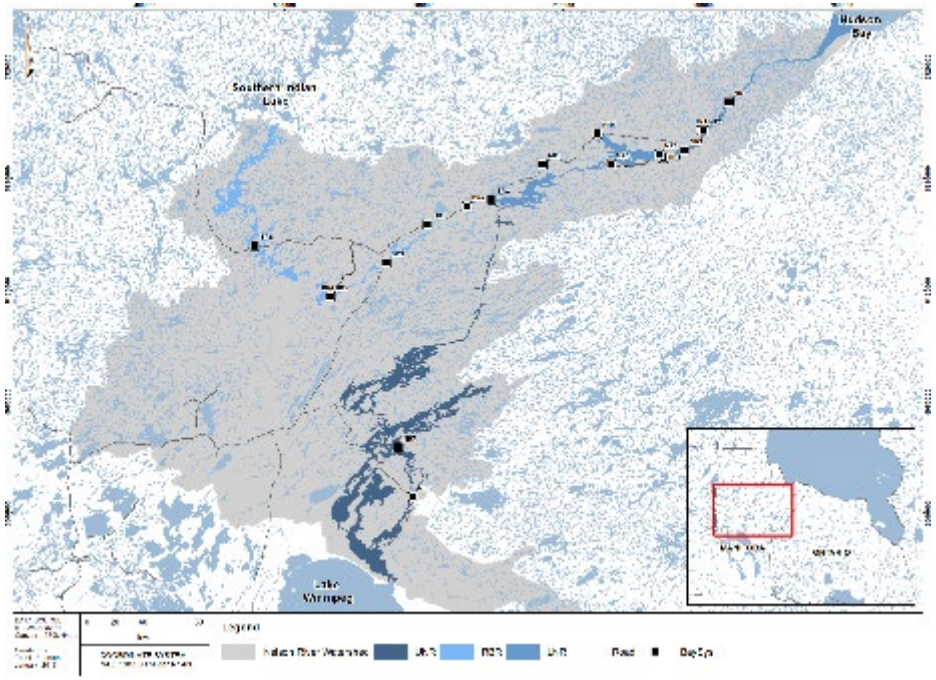
CAMP Reservoir *2016-2018*

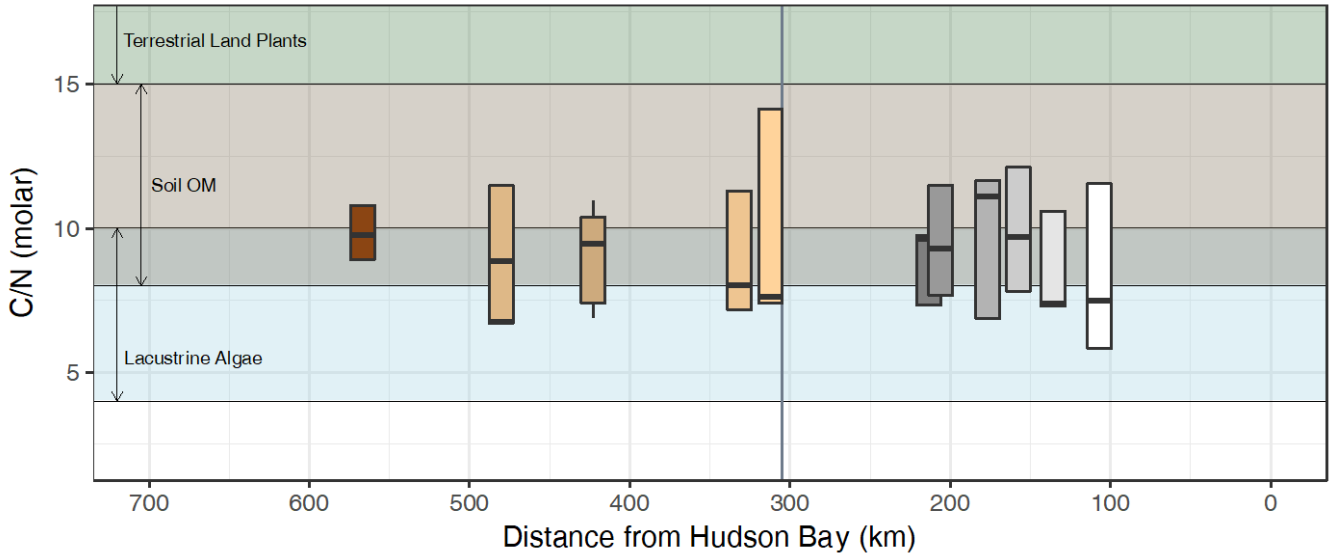
Moorings *Fall 2016 – Fall 2017* Estuary *Winter 2017*

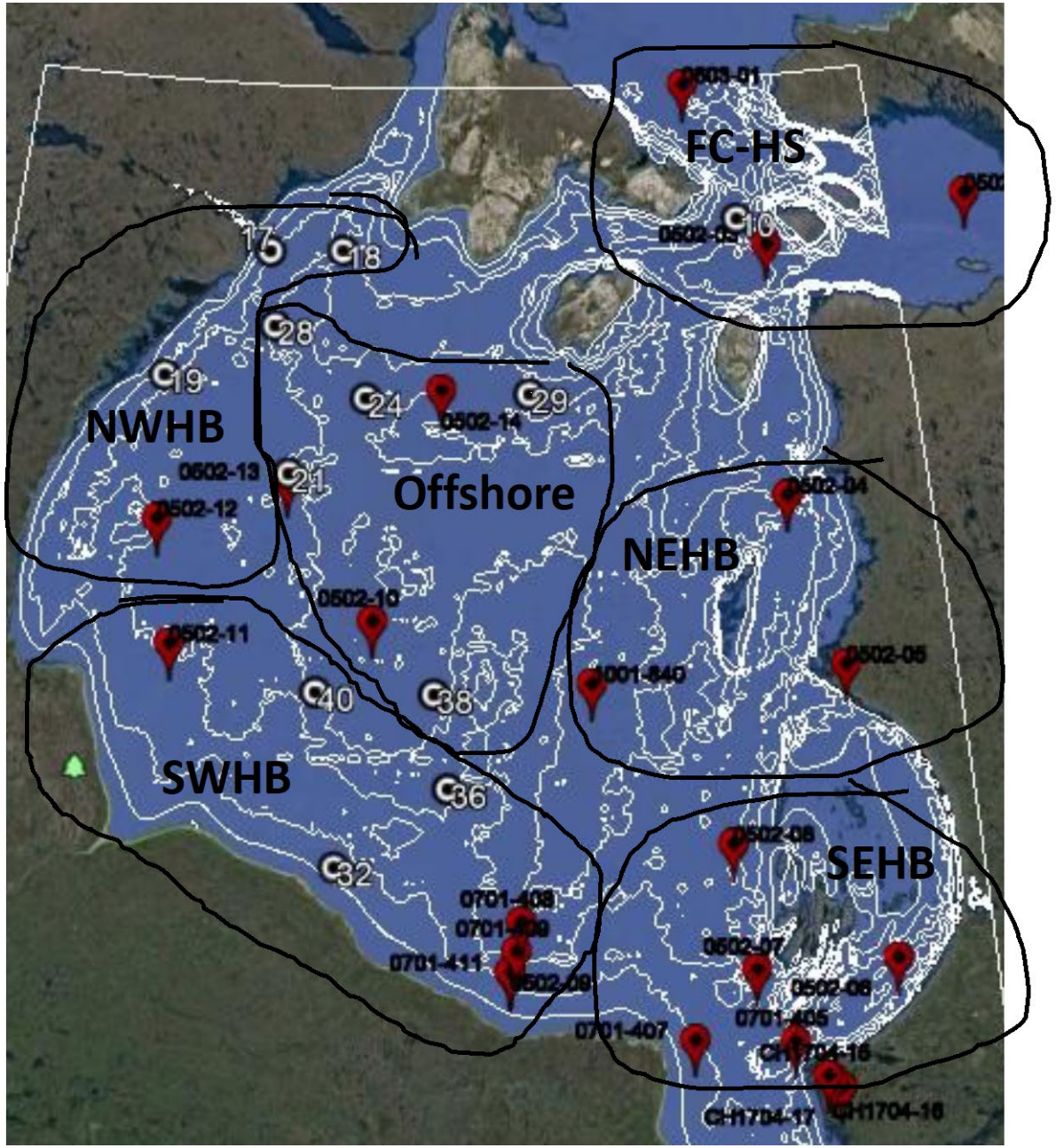
Bay-wide Cruise *Summer 2016 (sediment) Summer 2018*

5.2: Suspended sediment and organic/inorganic matter fingerprinting

- T Stainton (2019)







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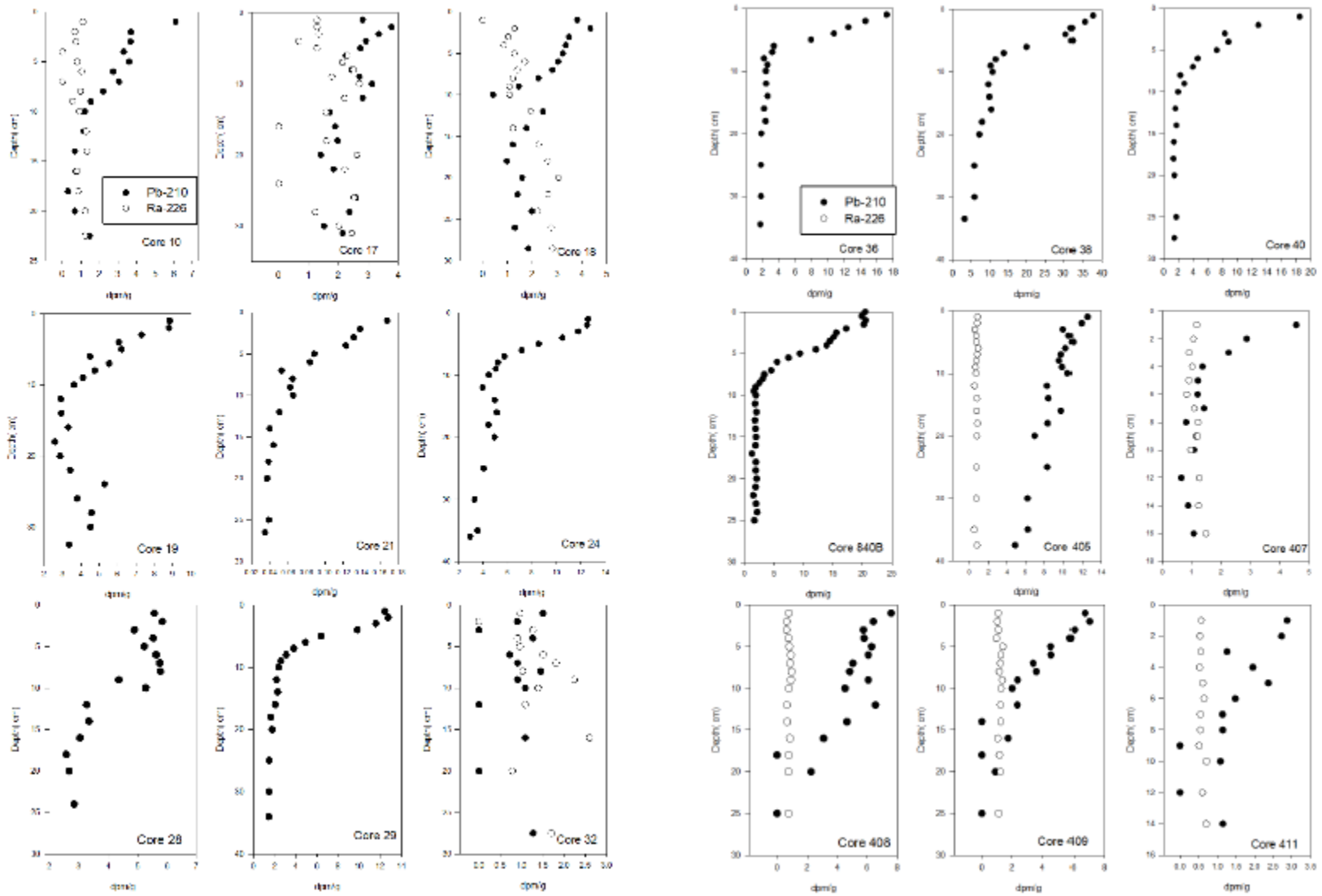
Downcore Profiles of Radioisotopes Ra-226 and Pb-210



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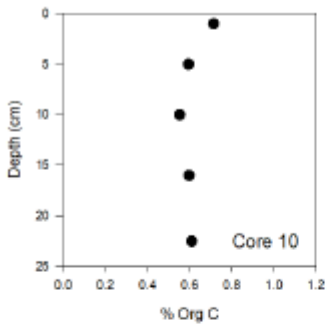
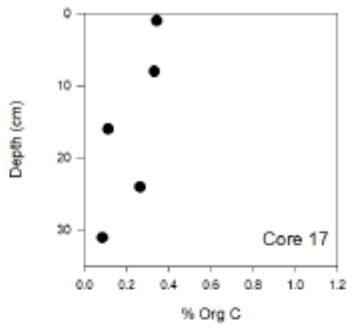
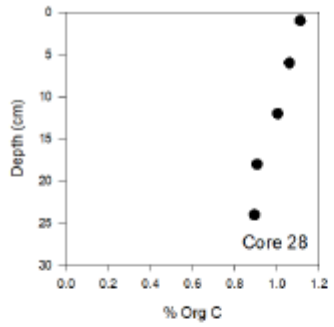
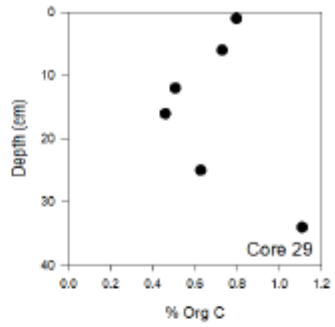
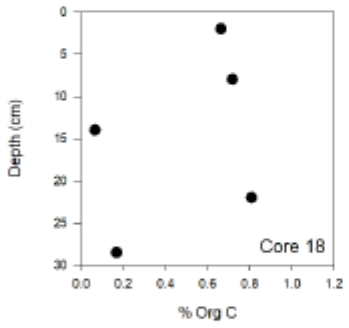
Downcore Profiles of OC

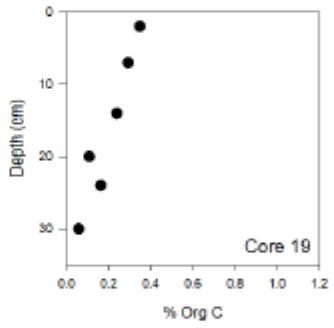


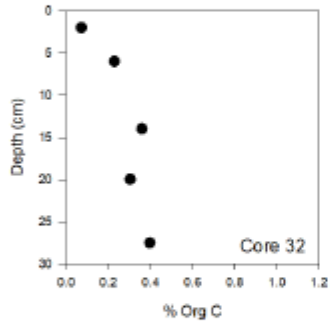


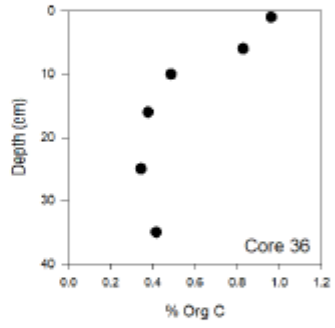


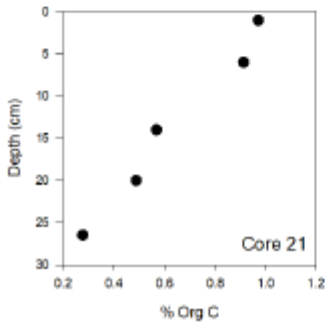


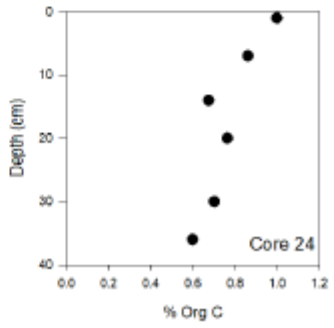


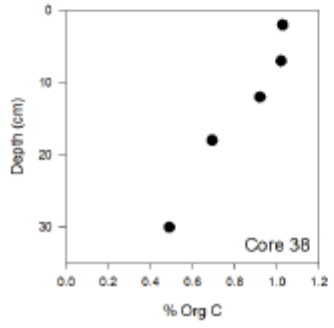


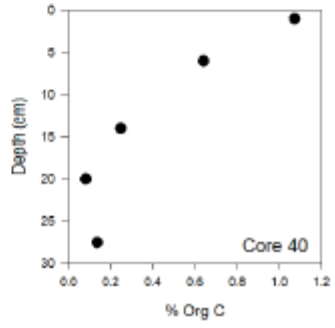












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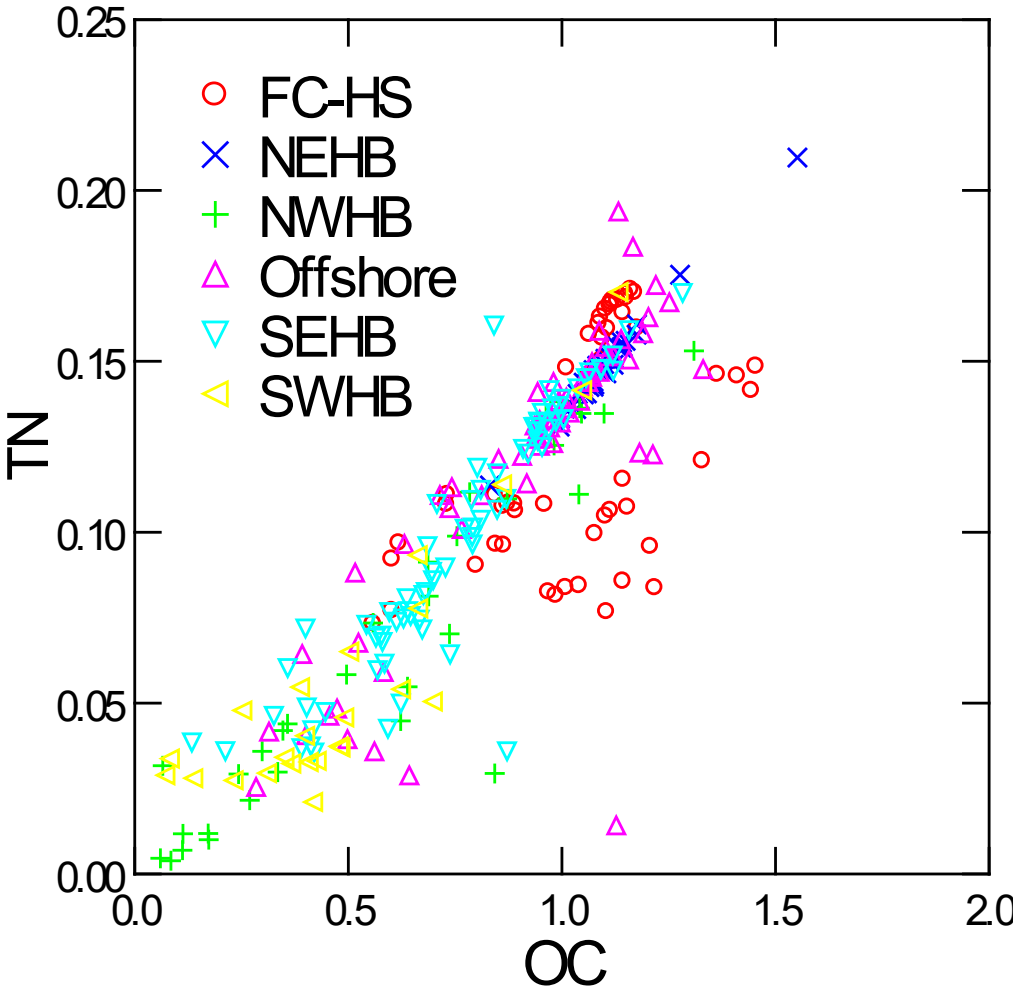
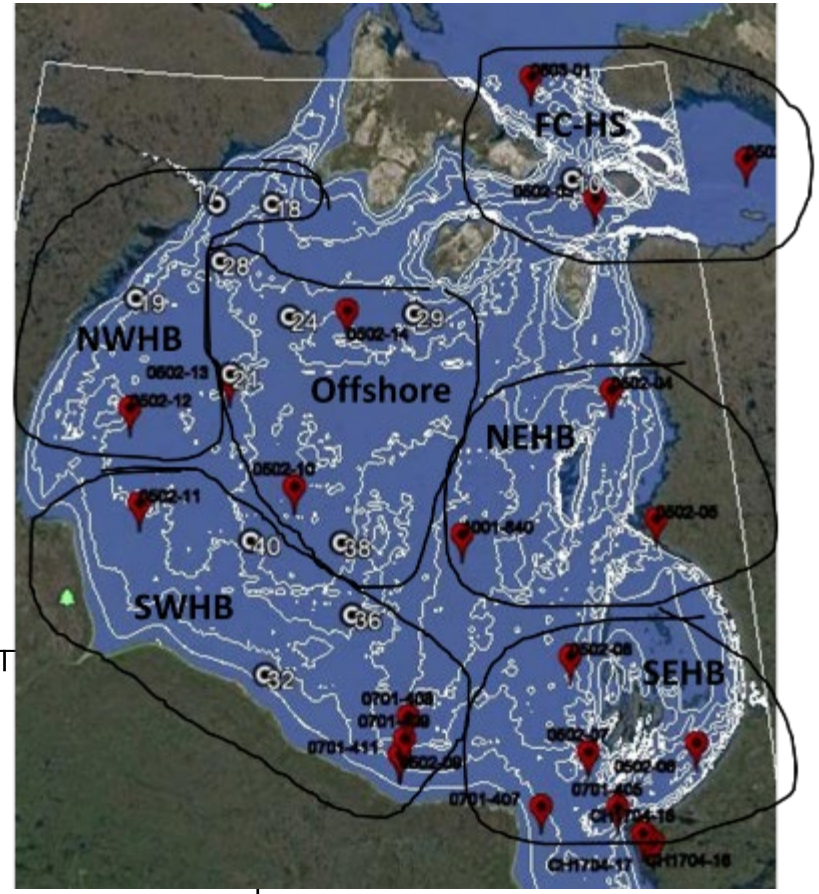
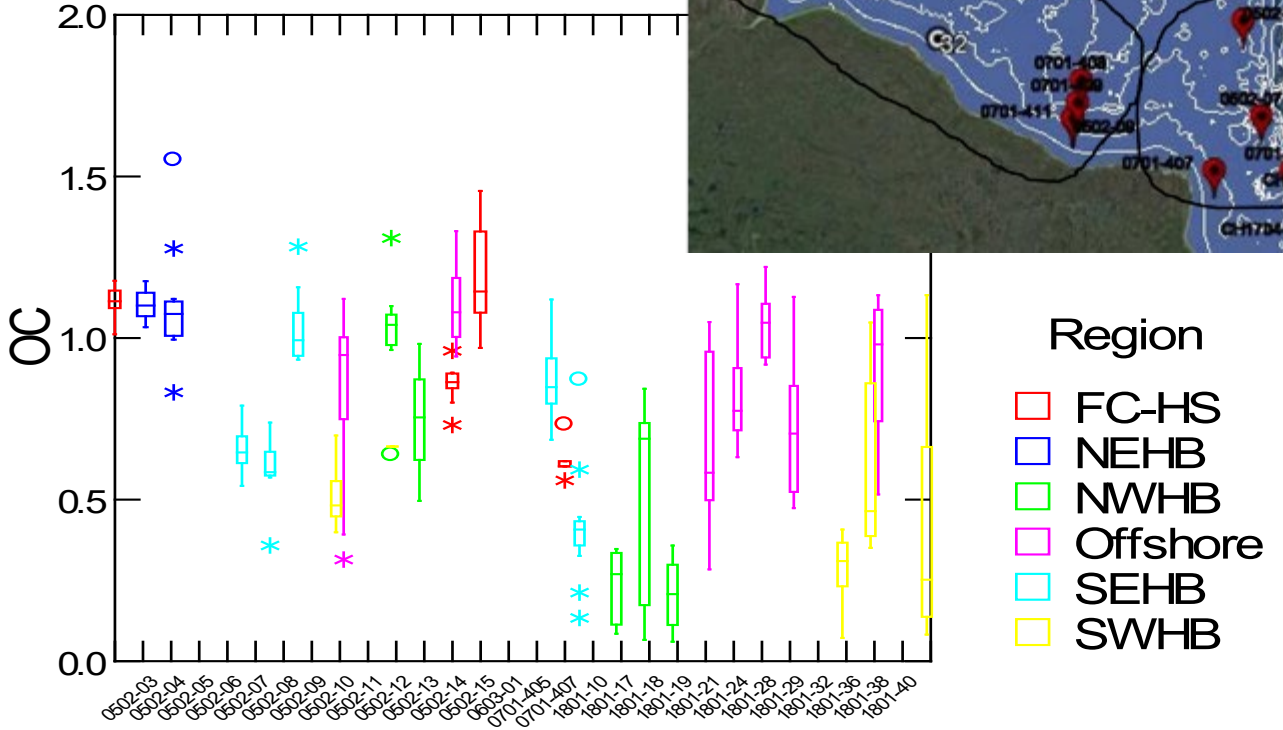


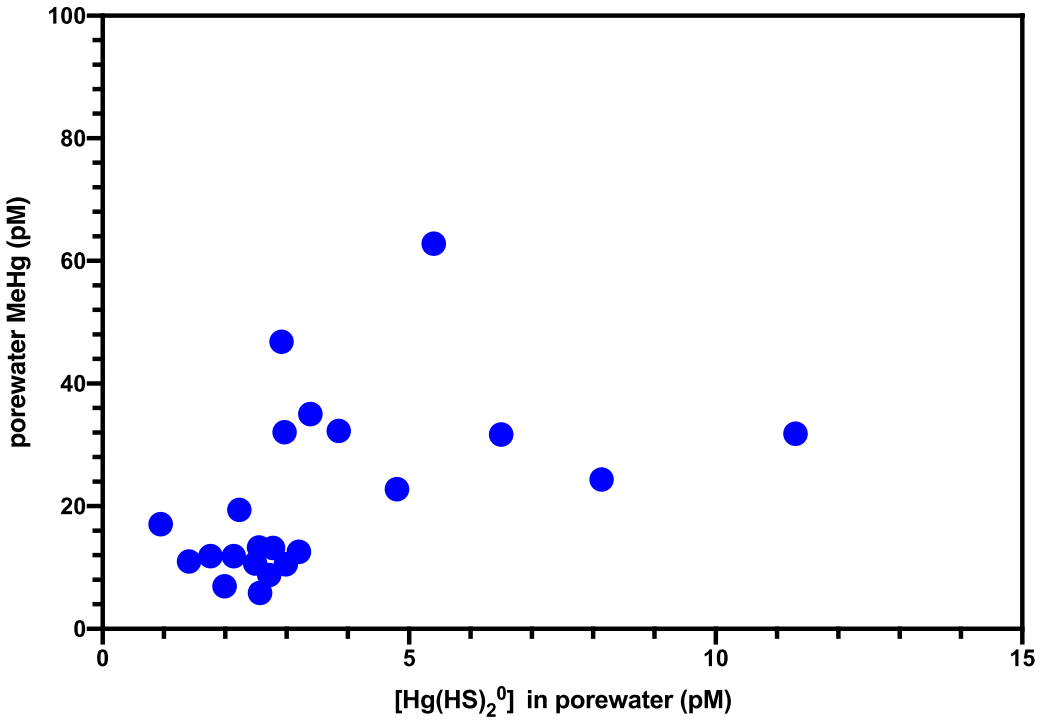


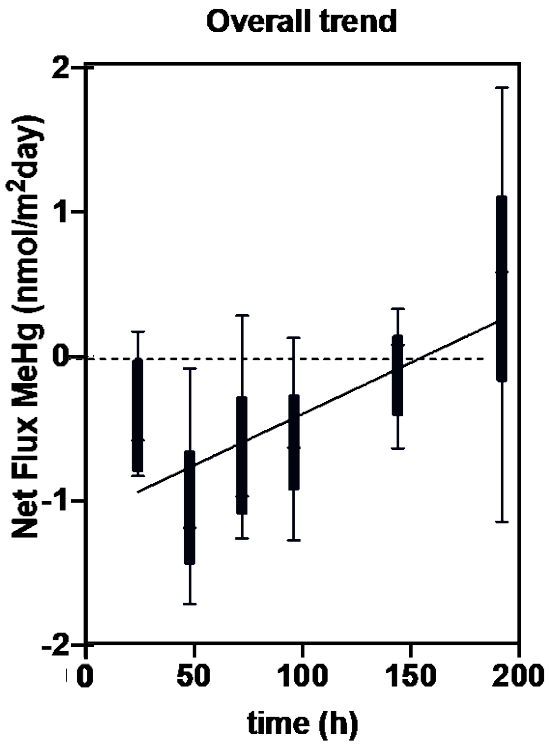


S Huyghe, ZZ Kuzyk

5.1: Determine the relationship between mercury methylation and organic matter remineralization

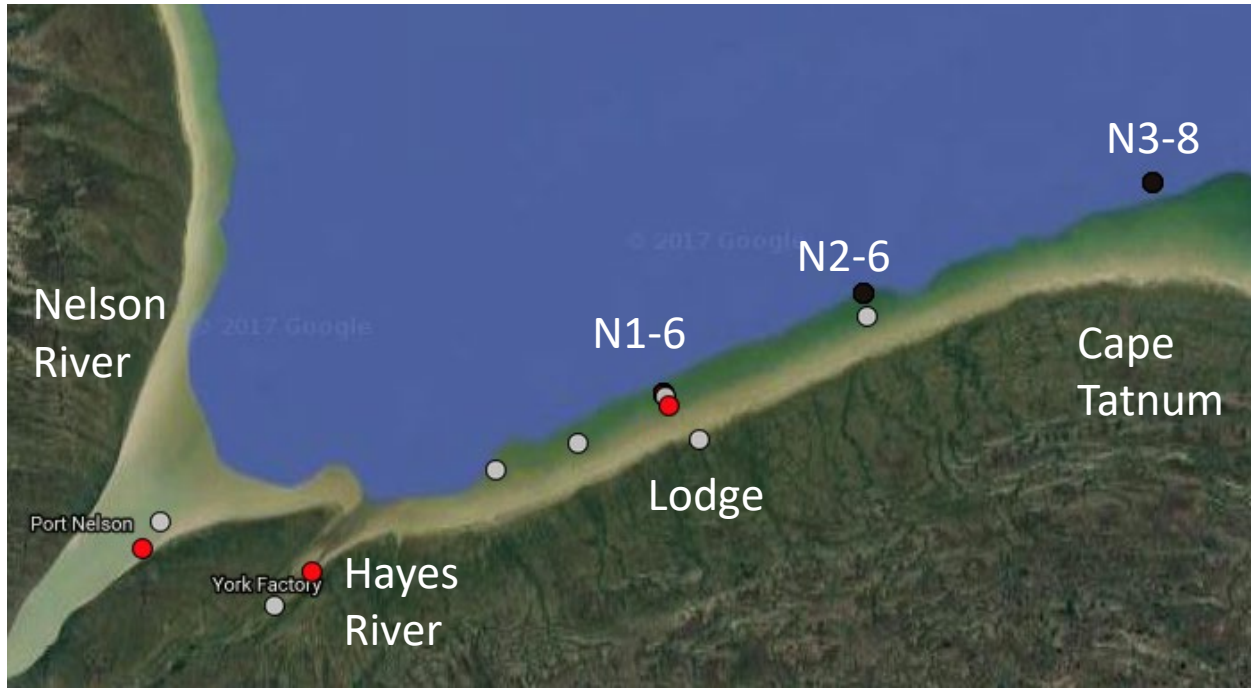
- J Singer (defense 28 November, 2019)





5.1: Determine the relationship between mercury methylation and organic matter remineralization

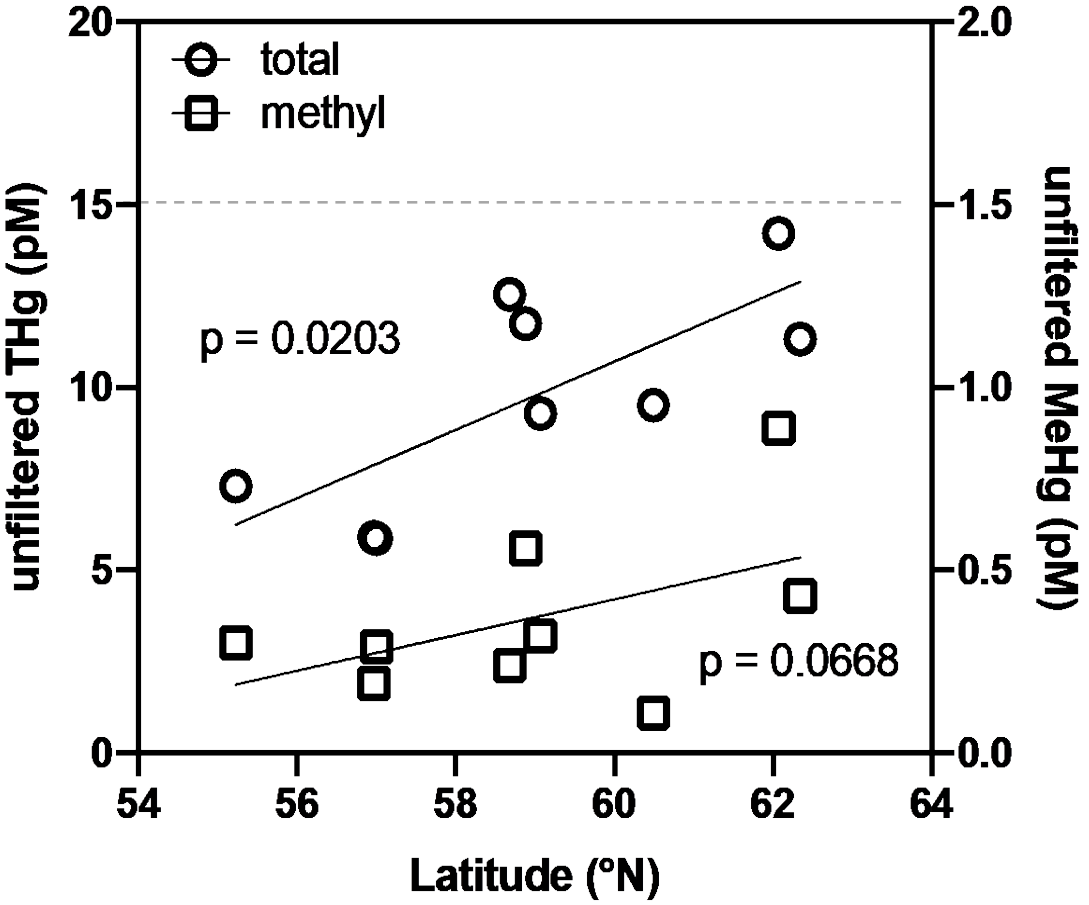
- Connect watershed processes to Hudson Bay input
  - Datasets
    - Sediment trap subsamples
    - Nanuk campaign
    - BaySys 2018 cruise
    - Historical: 2005-2012 (A. Hare, G. McCullough, ArcticNet)

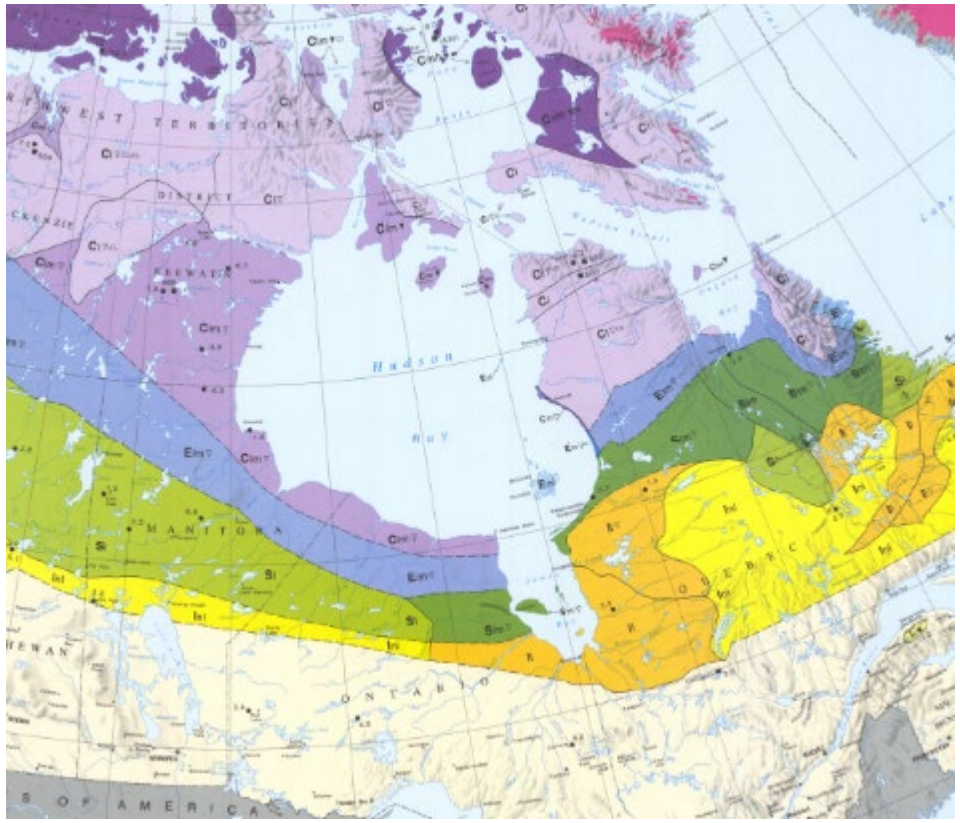


Nanuk I: 24 Feb – 1 Mar
Nanuk I and II/III 24 Feb – 11 Apr
Nanuk II/III: 21 Mar – 11 Apr

Rivers

Western HB Rivers

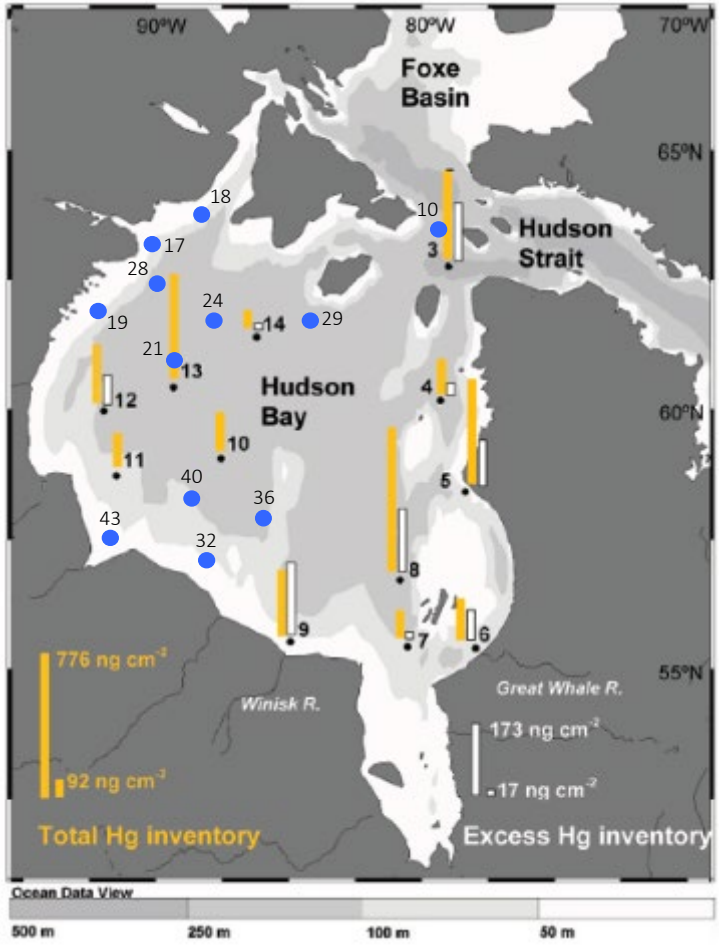


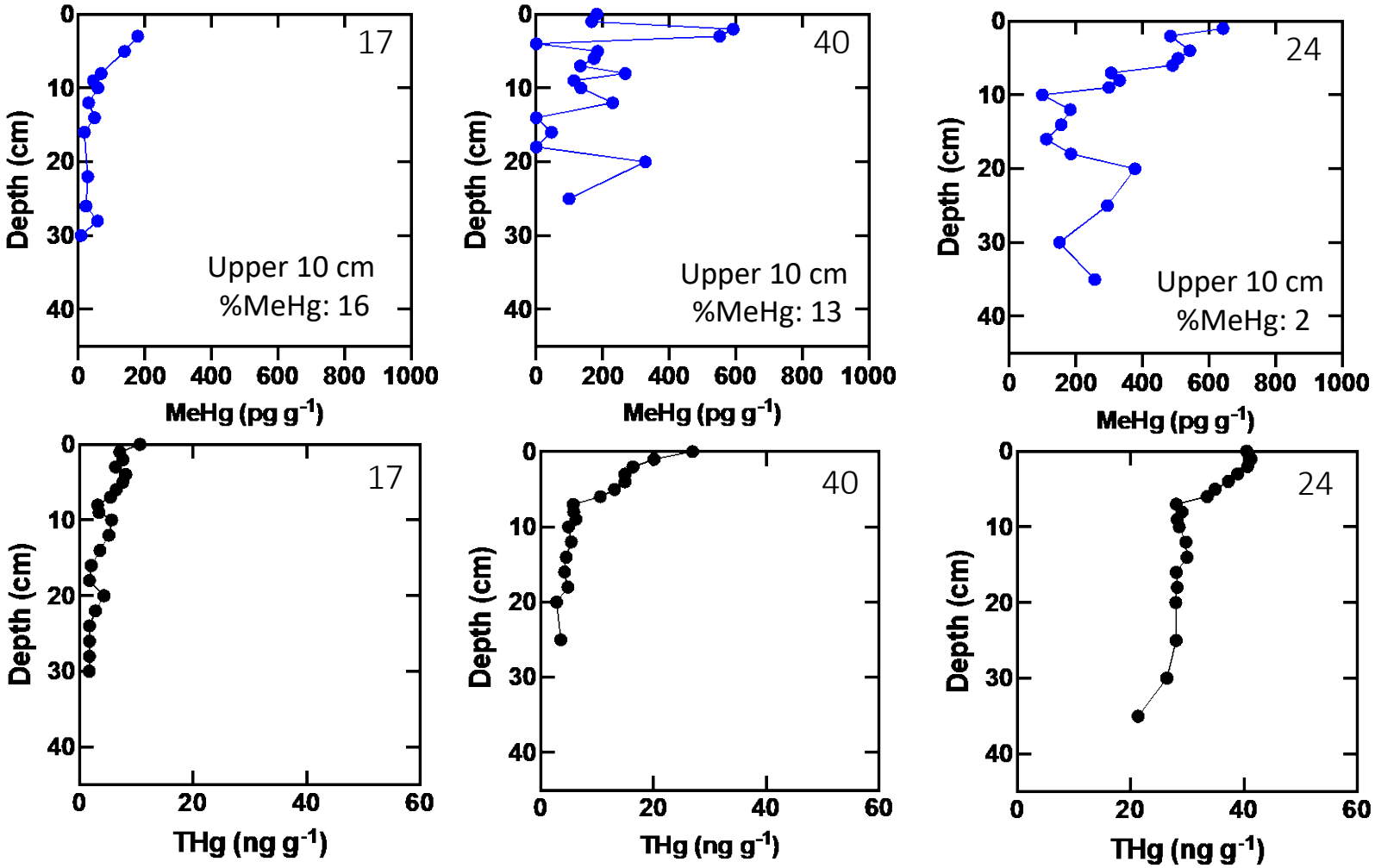


Natural Resources Canada, 2015

KM Munson

Sediment

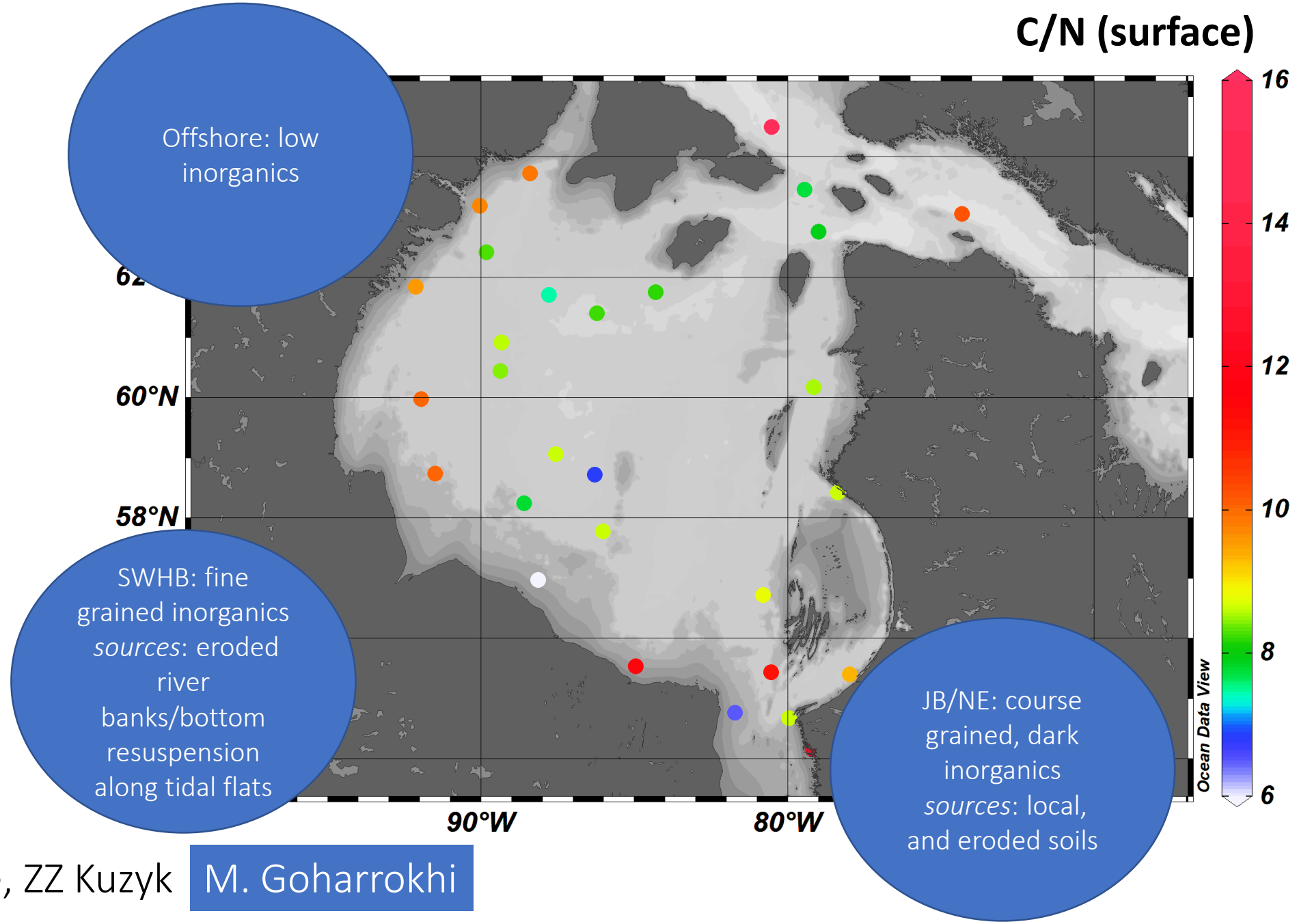




Decreasing %MeHg offshore suggest local methylation rather than methylation due to resuspension

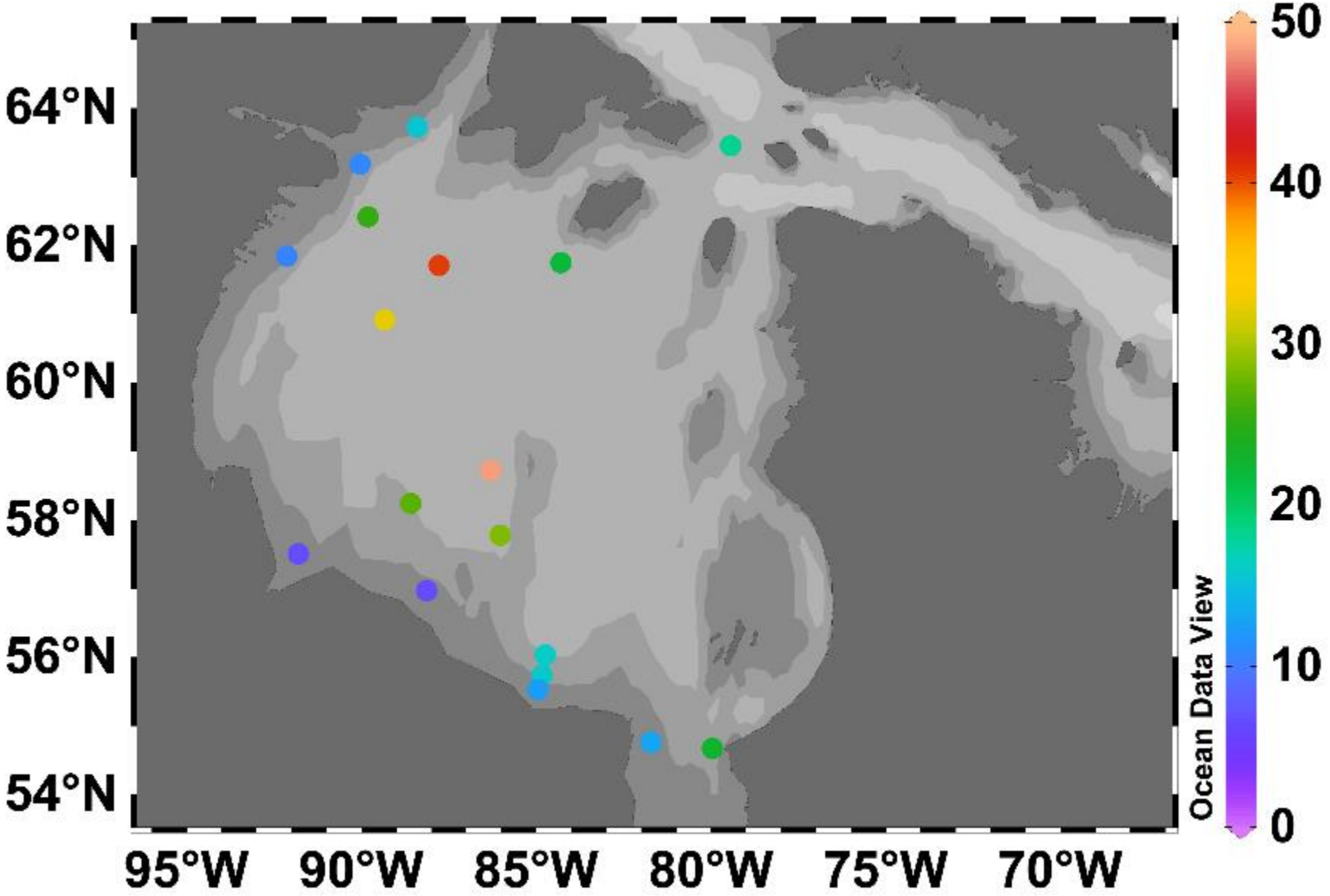
*but wait for sediment budget

KM Munson



S Huyghe, ZZ Kuzyk M. Goharrokhi

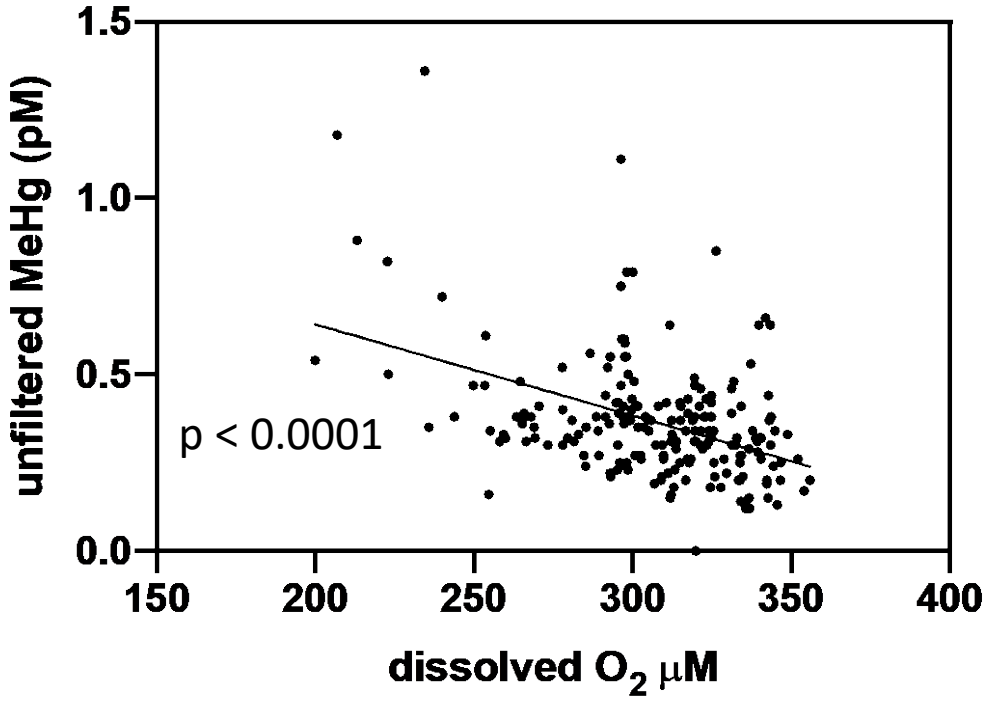
Surface sed THg (ng/g)

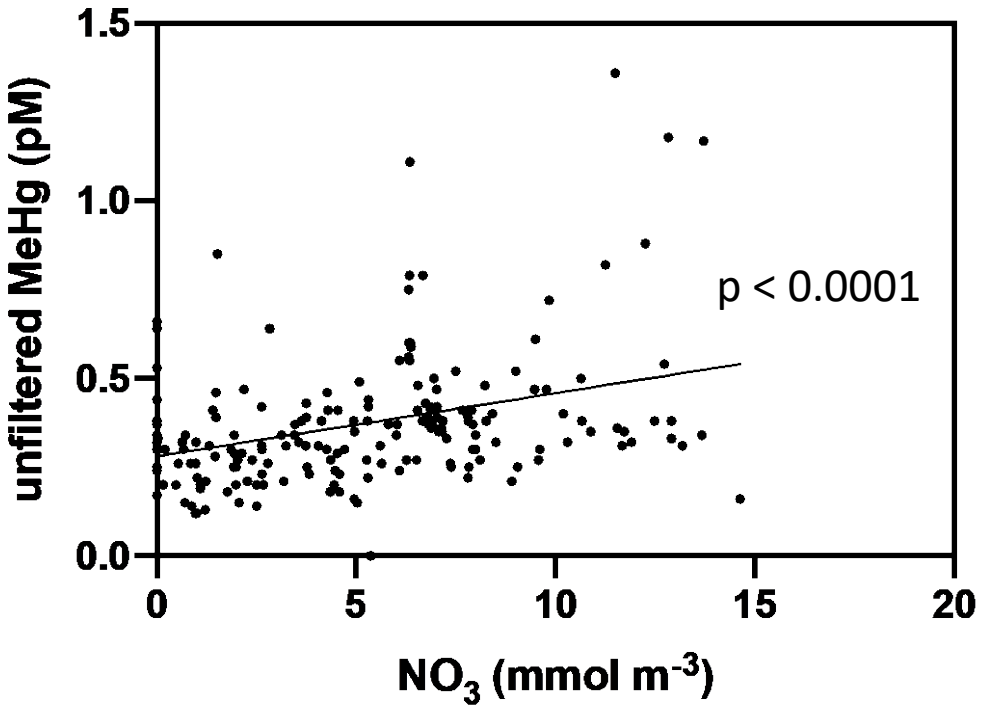


KM Munson

Water column

- [MeHg] not correlated with [THg], which has opposite trends with O_2 and NO_3
- Provides empirical relationships needed to link to BGC model output

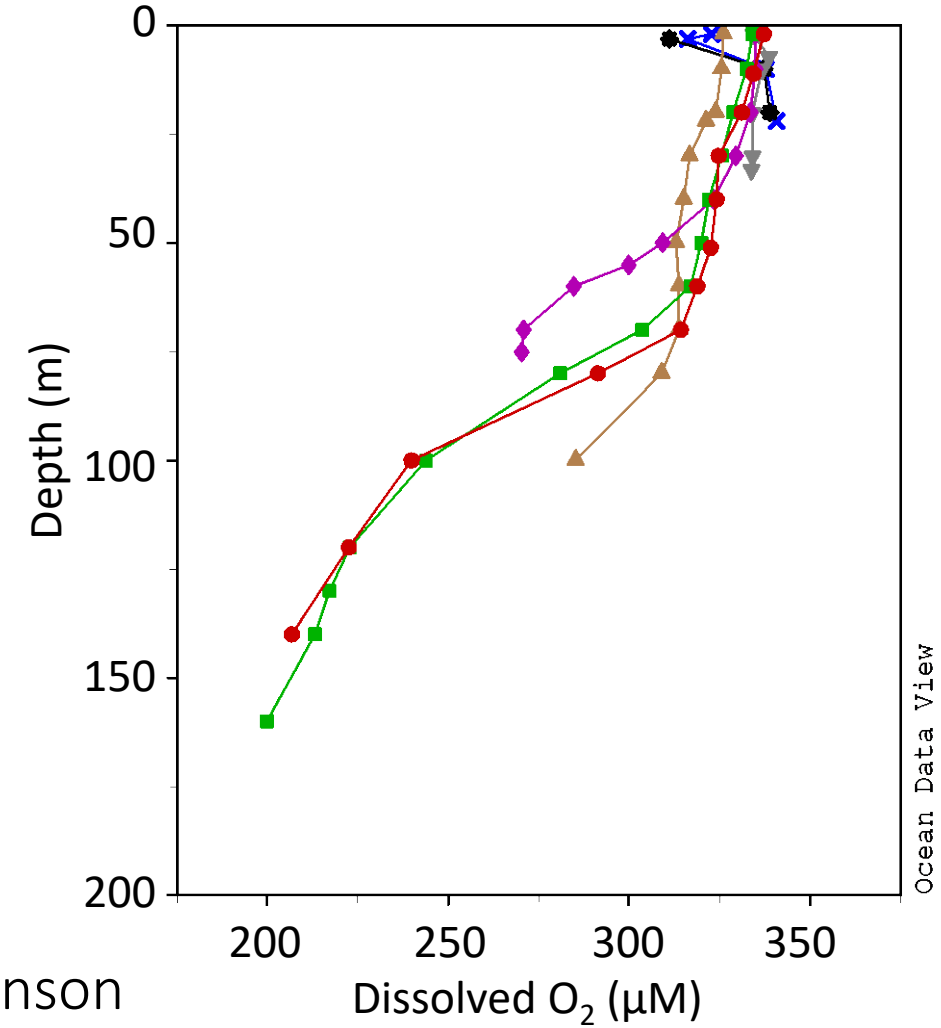


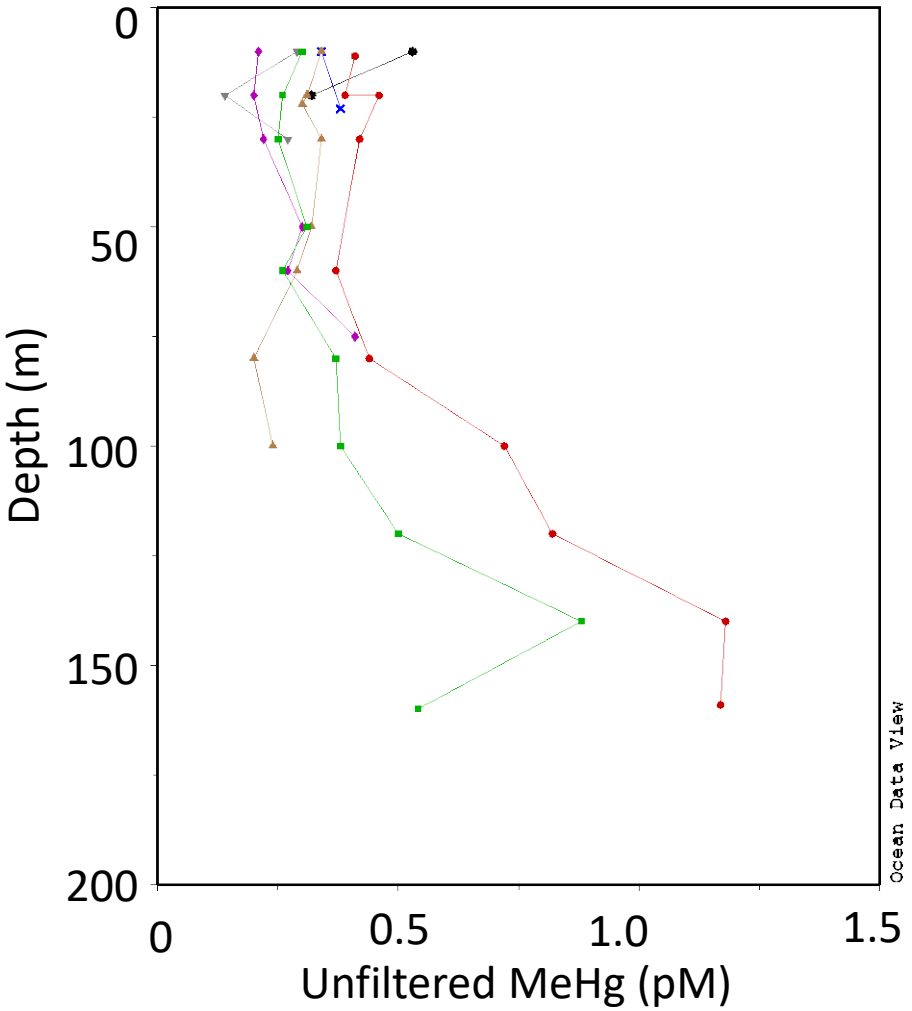


KM Munson

Water column

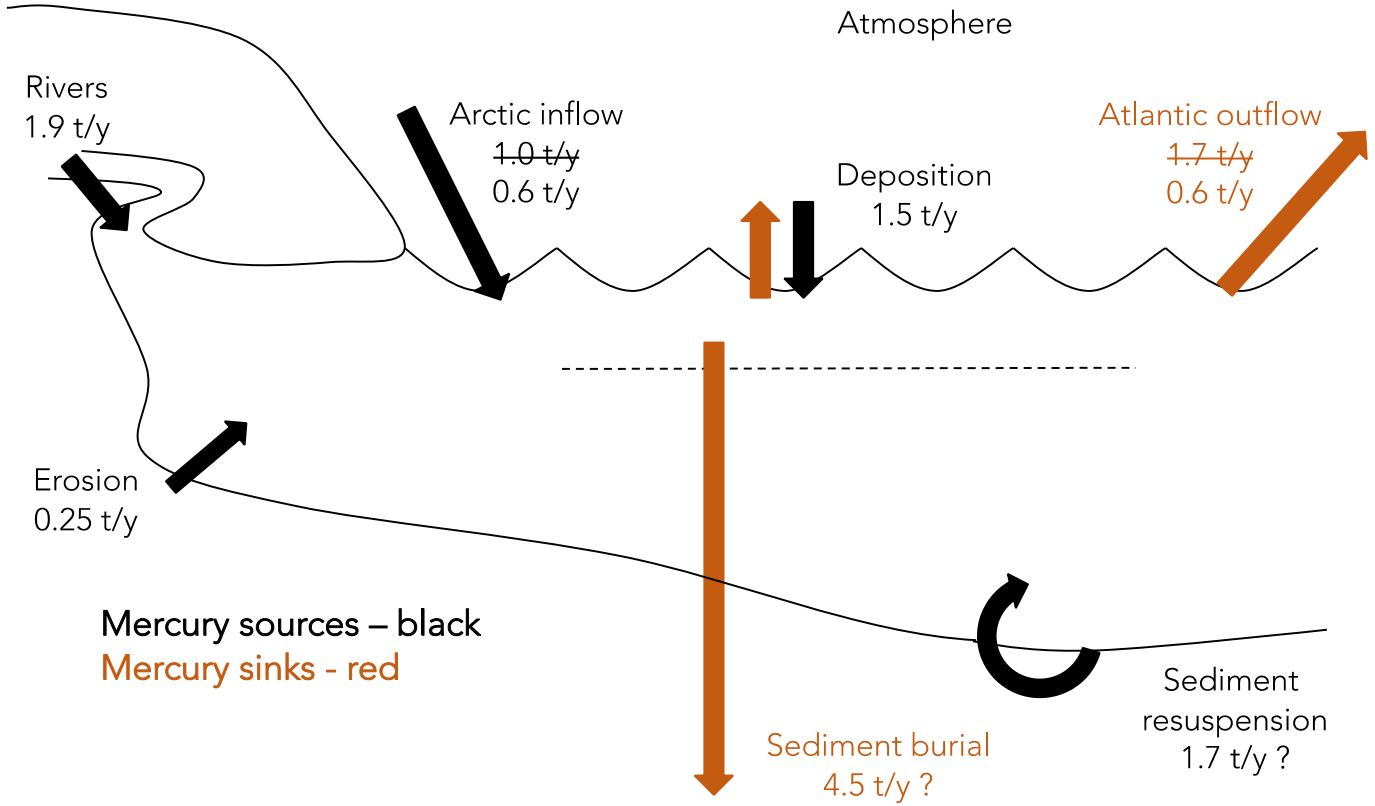
- [MeHg] increase with depth
- Water column or sediment source?





KM Munson

5.3: Mass balance model of methyl mercury in Hudson Bay



Hare et al, 2008 Total mercury mass balance for Hudson Bay
Updated for 2018 bay-wide cruise measurements

- Stuff on previous slides
- Also, benthic invertebrate and zooplankton THg analyzed
  - MeHg samples selected for external analysis