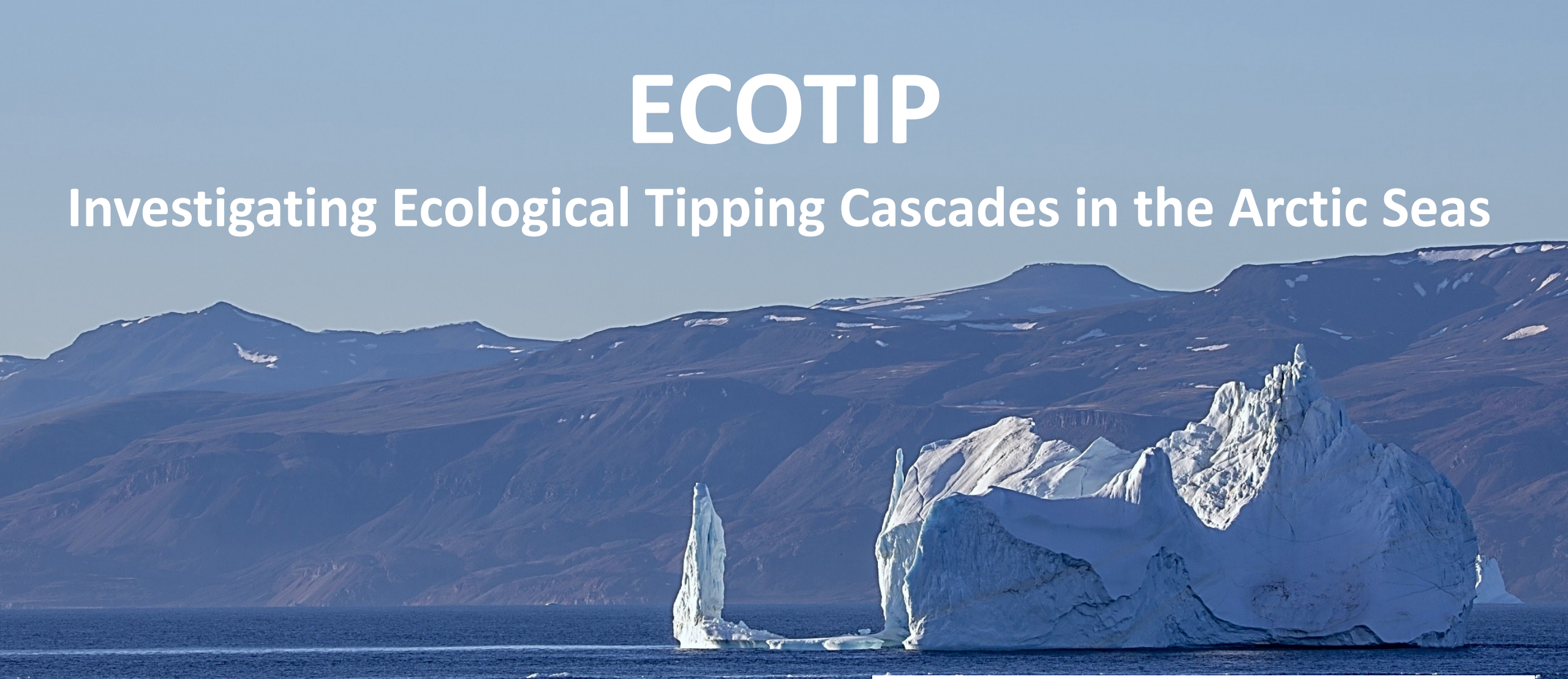
ECOTIP

Investigating Ecological Tipping Cascades in the Arctic Seas



Camilla Svensen & Ingrid Wiedmann
UiT The Arctic University of Norway

ECOTIP

This project is funded by the European Union
under grant agreement No 869383

ECOTIP concept

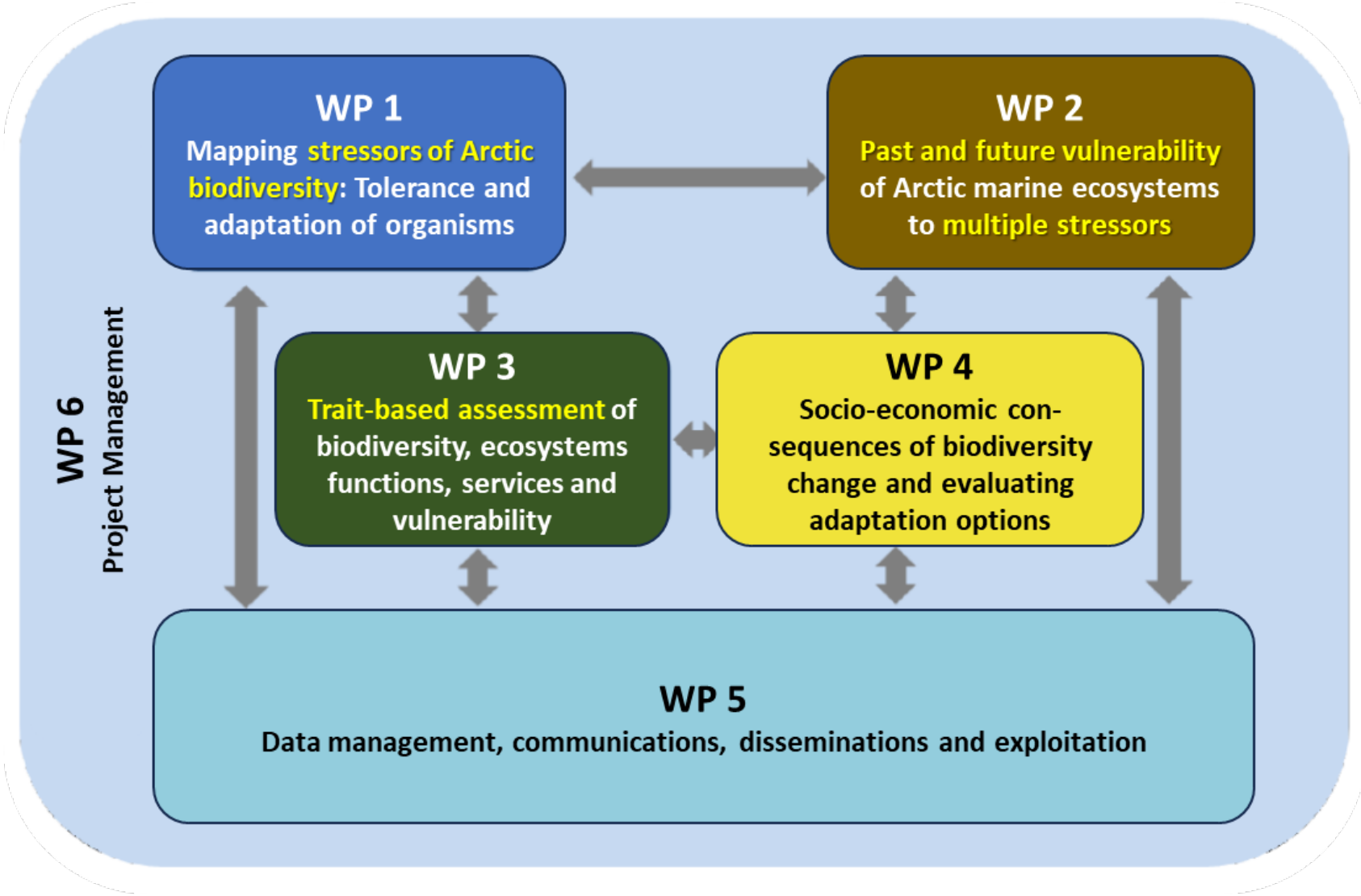
Causes for tipping points (climate and other anthropogenic stressors),

their **consequences** for marine ecosystem services such as fisheries and carbon sequestration,

and **adaptation** strategies of humans.

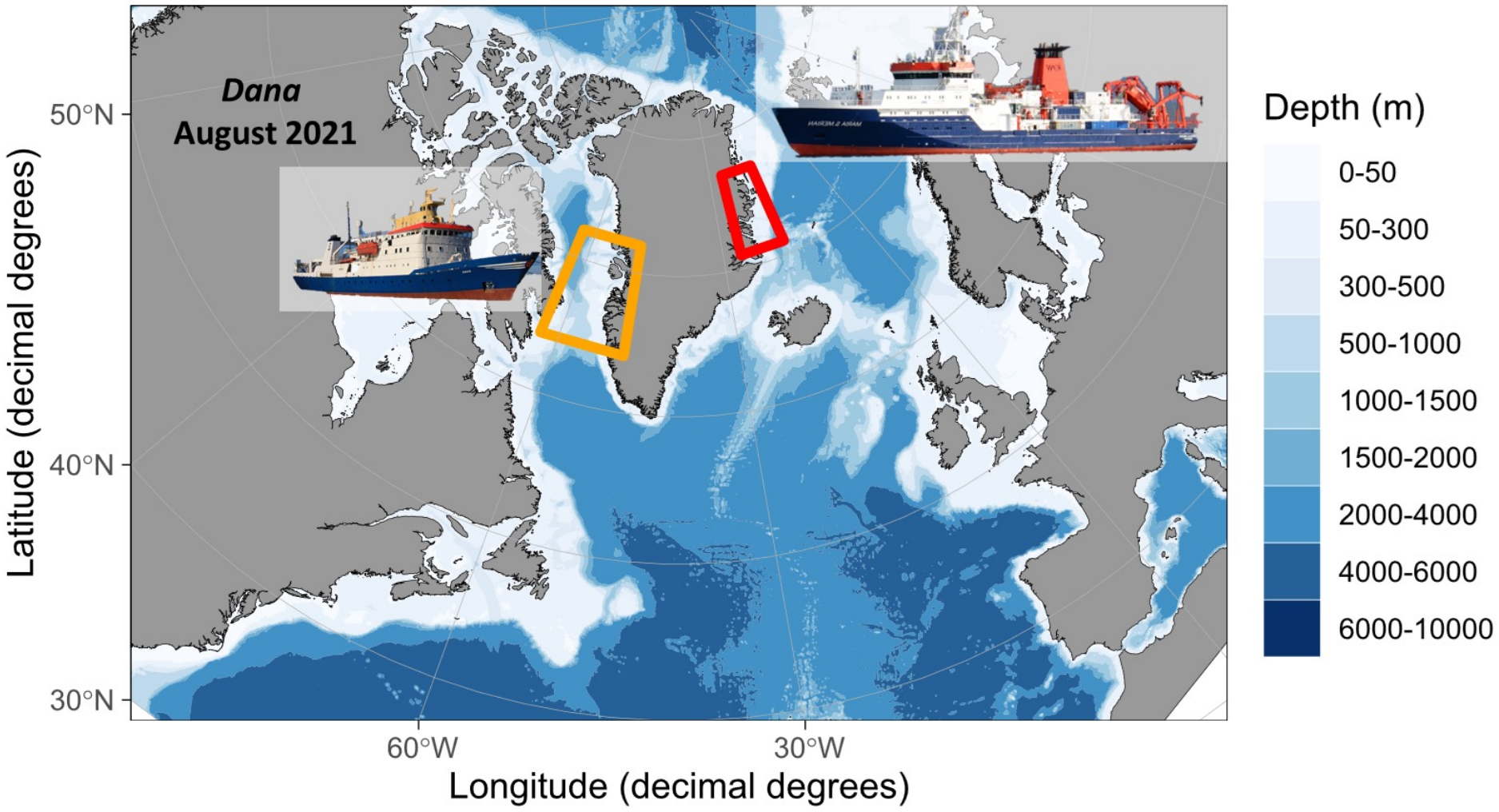
Focus area: Arctic marine ecosystem (mainly E/W-Greenland)

ECOTIP structure



WP1-3: Mapping stressors and the current biodiversity of Arctic marine ecosystems

***M.S. Merian* August 2022**



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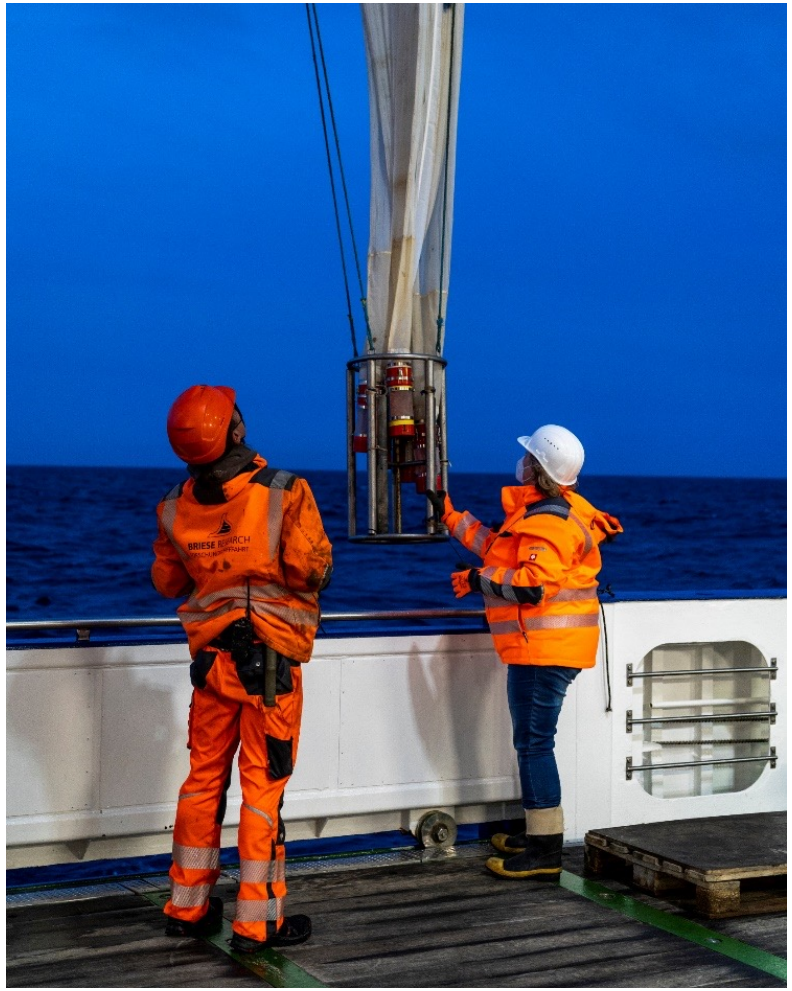

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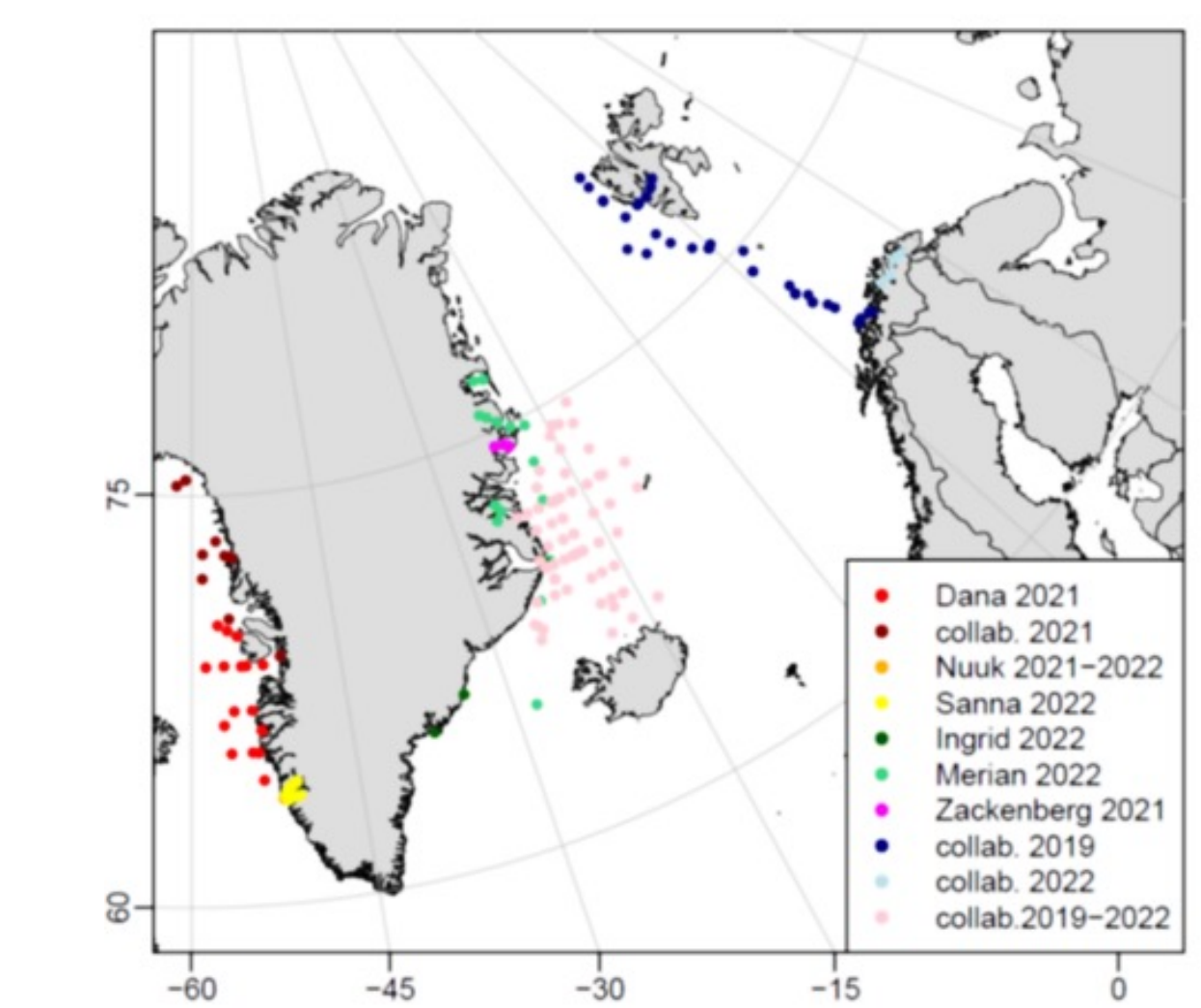
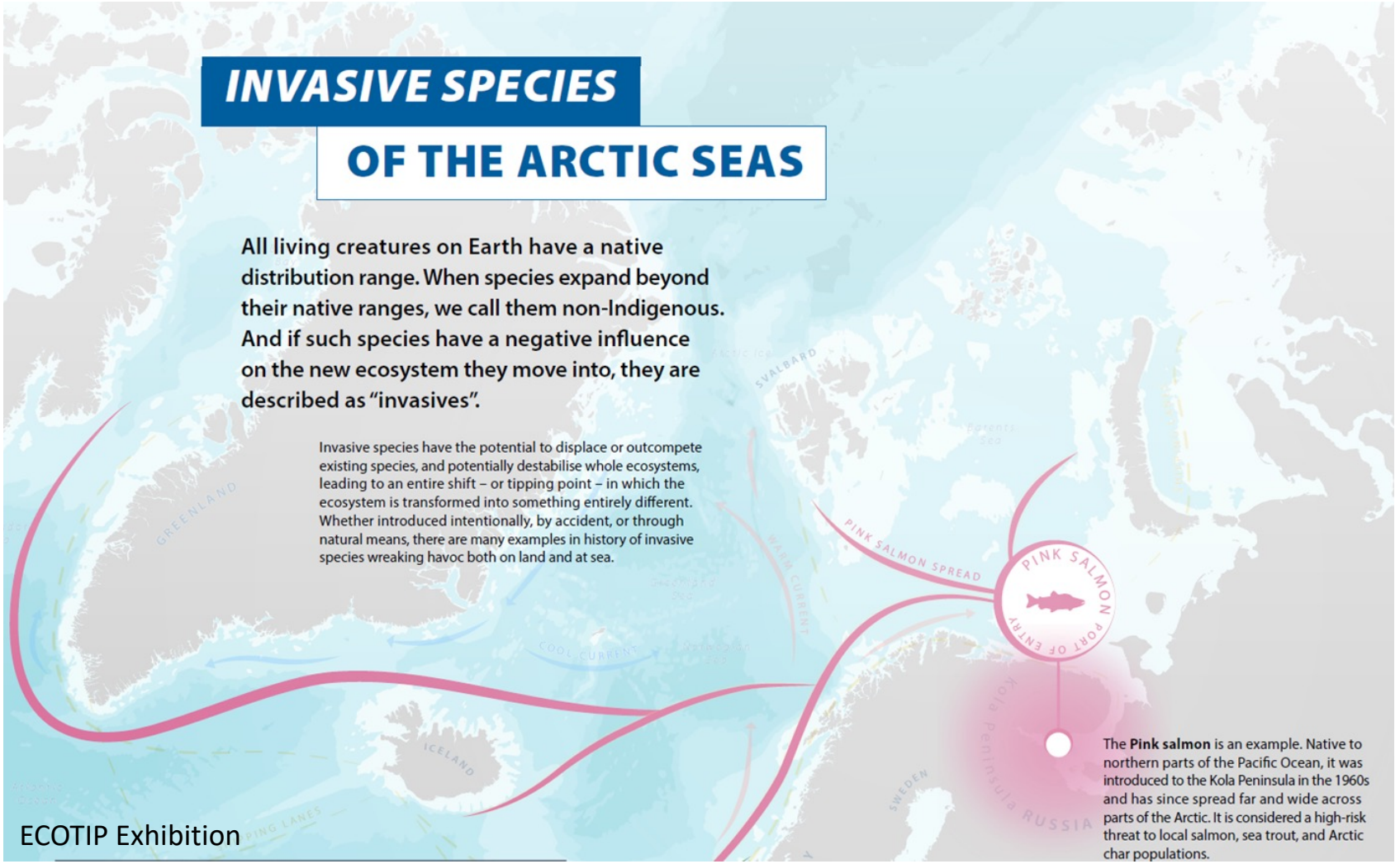


Monitoring of biodiversity and non-native species by eDNA

WP1-3: Mapping stressors and the current biodiversity of Arctic marine ecosystems



ECOTIP Exhibition

WP1-3: Mapping the biodiversity of Arctic marine ecosystems in the past and its interaction with external drivers

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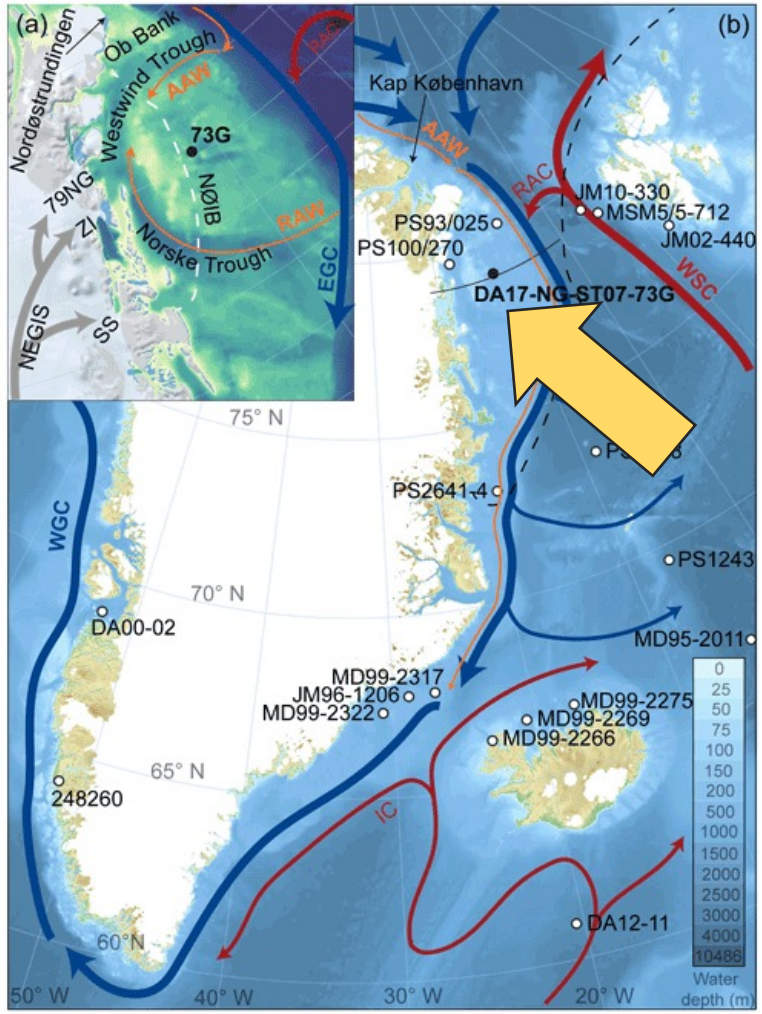
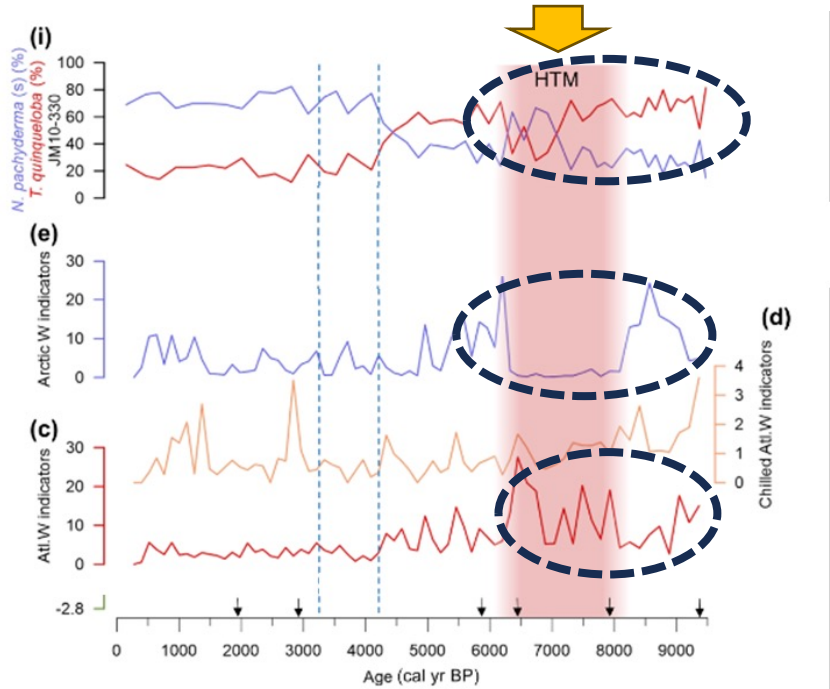


Sediment core from this sampling site has been analyzed

(sampling influenced by **cold Arctic derived water** and by **warmer Atlantic derived water**)

Holocene thermal maximum



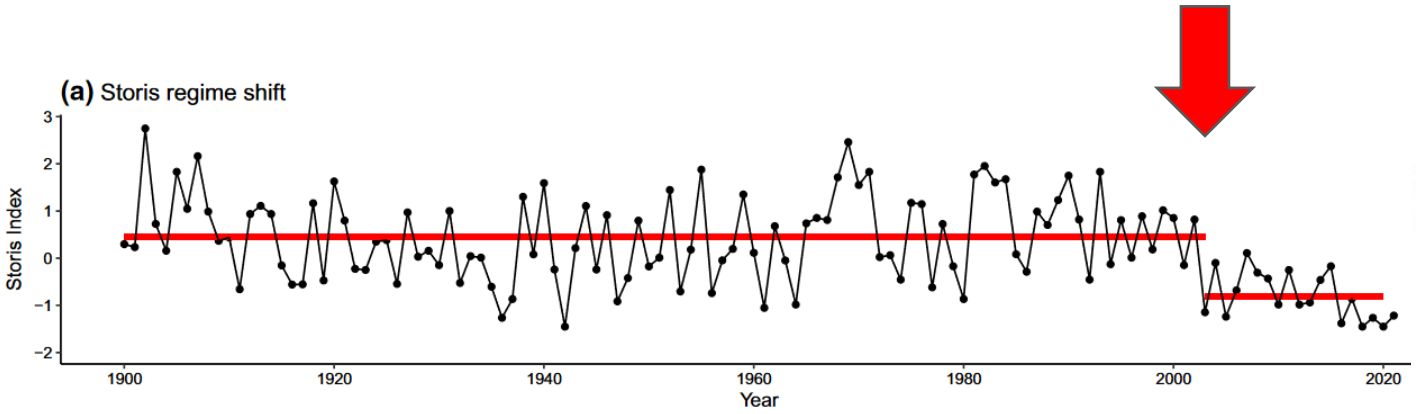
Pados-Dibattista et al. 2022

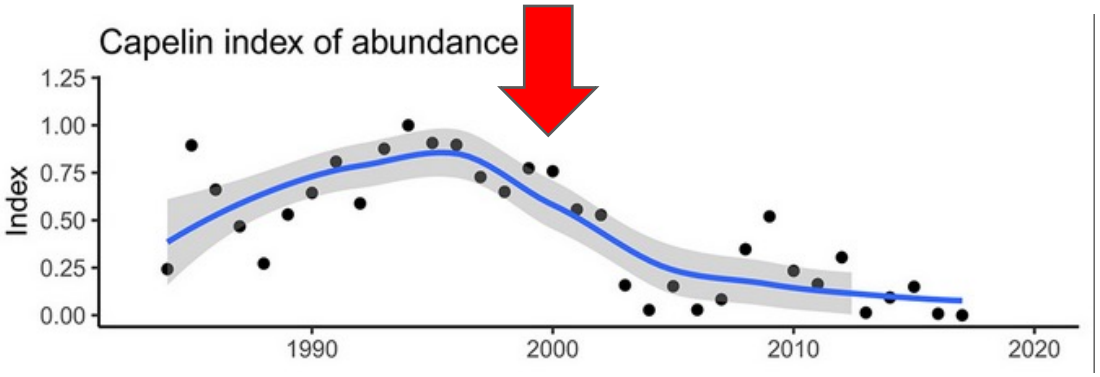
WP1-3: Determine the potential for ecosystem tipping points – Fisheries and marine mammals

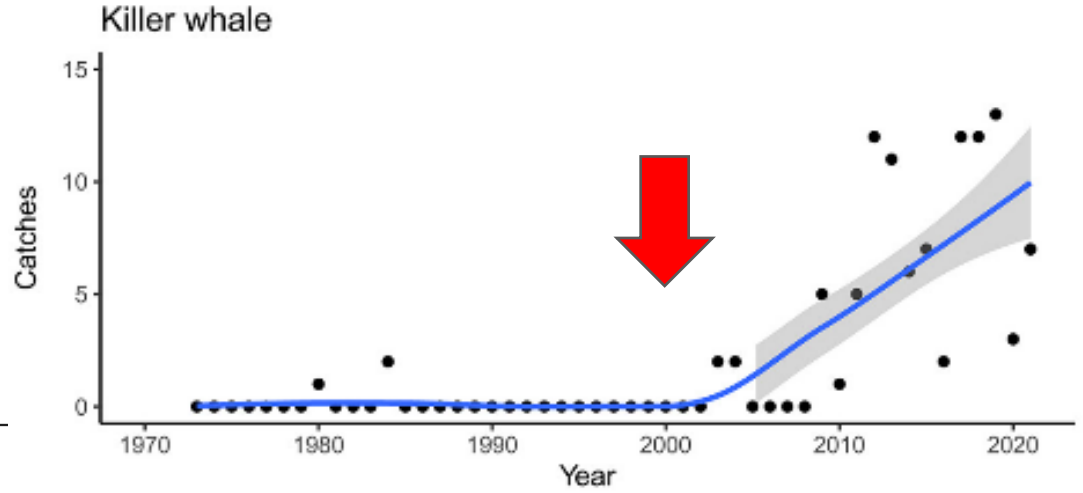
Global Change Biology

A regime shift in the Southeast Greenland marine ecosystem

Mads Peter Heide-Jørgensen[1] | Philippine Chambault[1,2] | Teunis Jansen[3,4] | Caroline V. B. Gjelstrup[3] | Aqqalu Rosing-Asvid[4] | Andreas Macrander[5] | Gísli Víkingsson[5] | Xiangdong Zhang[6] | Camilla S. Andresen[7] | Brian R. MacKenzie[3]



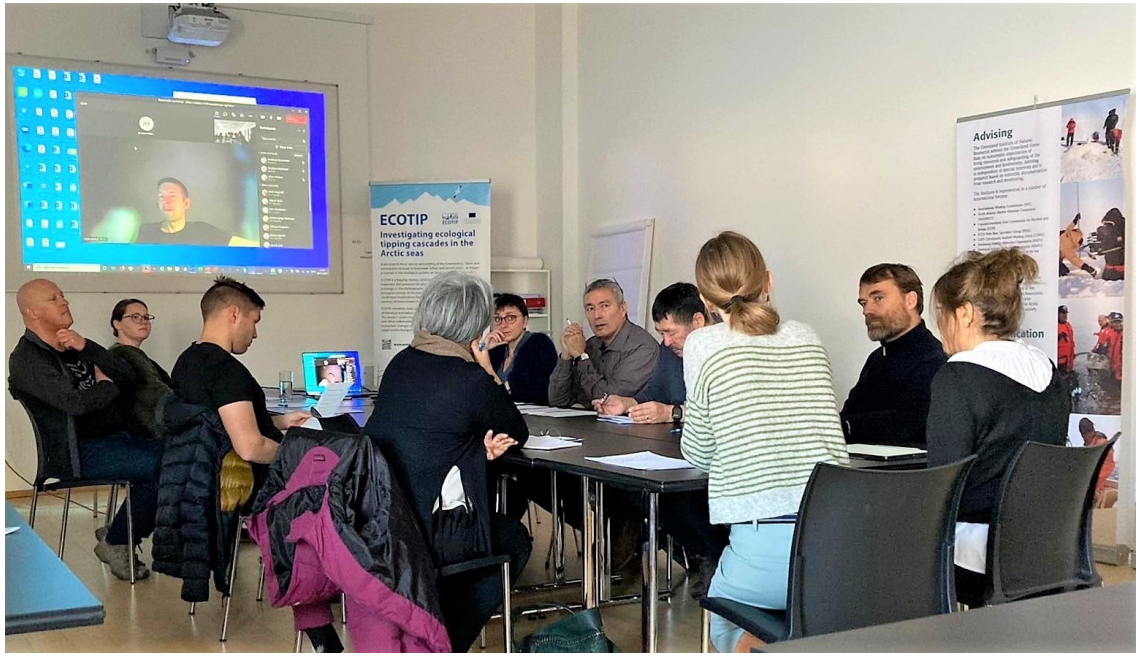




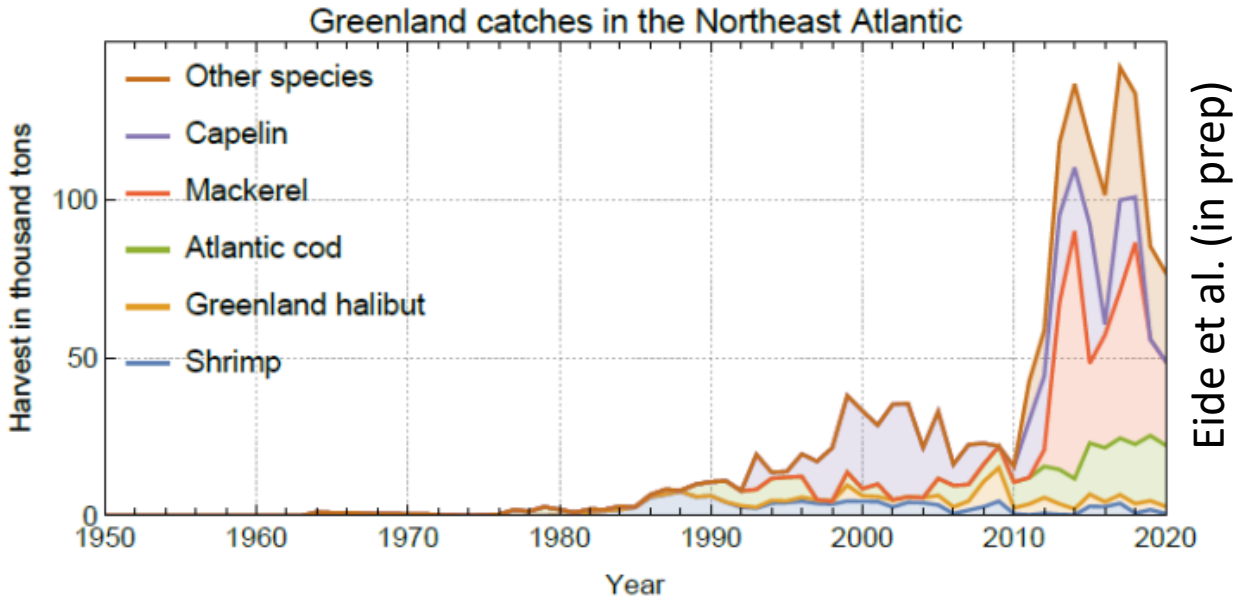
Heide-Jørgensen et al. 2022

WP4: Dialogue and co-creation of advice for improved governance and adaptation strategies with local and indigenous communities, industries and regulatory authorities

Communicating with Greenlandic communities



Analysis of fleet structure and markets



WP1-3: Determine the potential for ecosystem tipping points – Carbon sequestration

Melting ice

↓

Increased stratification

↓

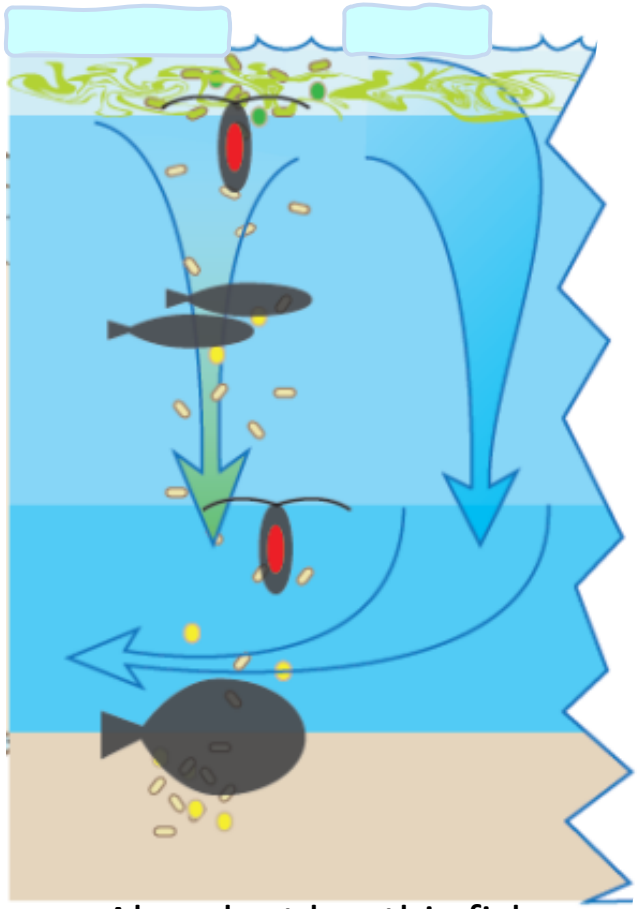
Decrease in the cell size of primary producers

↓

Shift towards small detritus-feeding copepods

↓

Effects on the biological carbon pump, food supply for the benthic communities, and food web efficiency



Abundant benthic fish
more C sequestration

WP1-3: Determine the potential for ecosystem tipping points – Carbon sequestration

Melting ice

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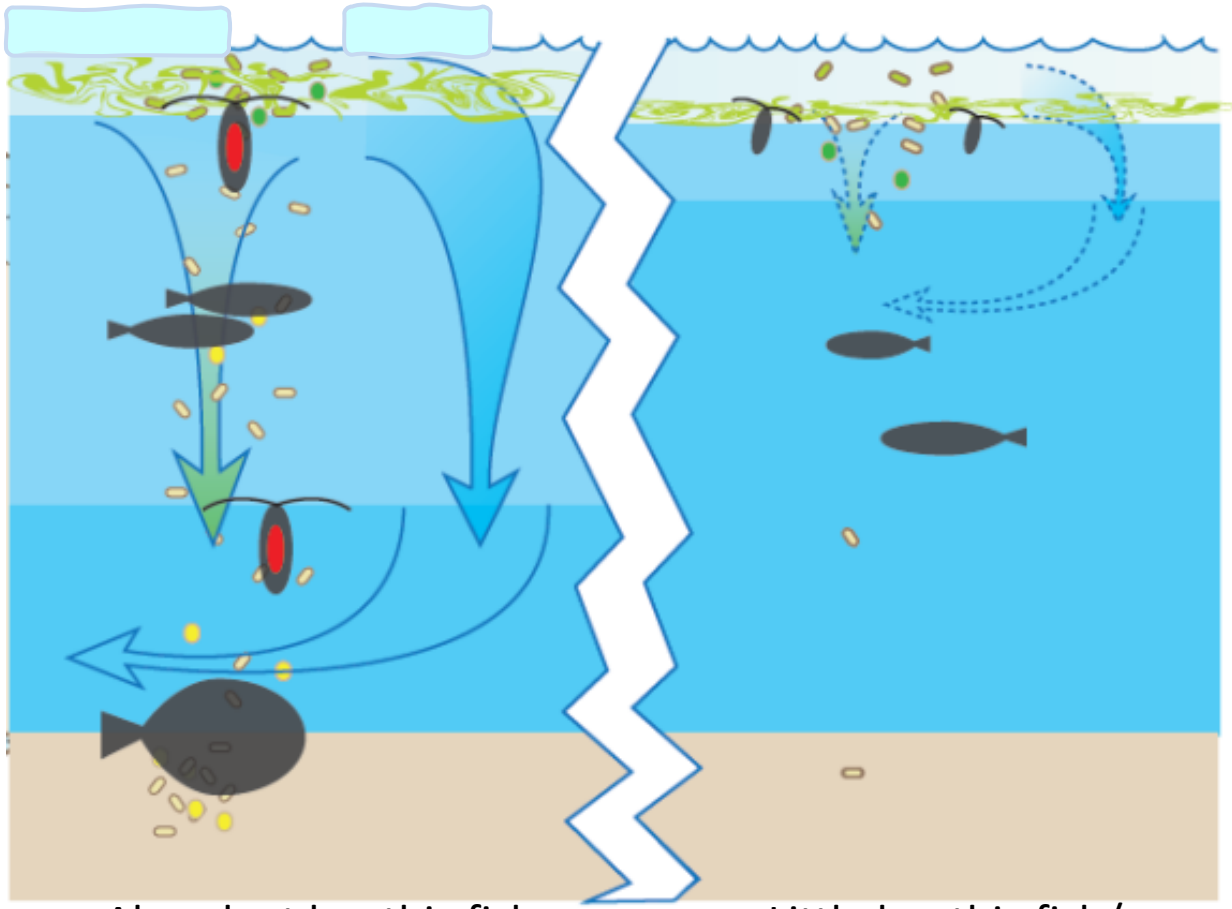
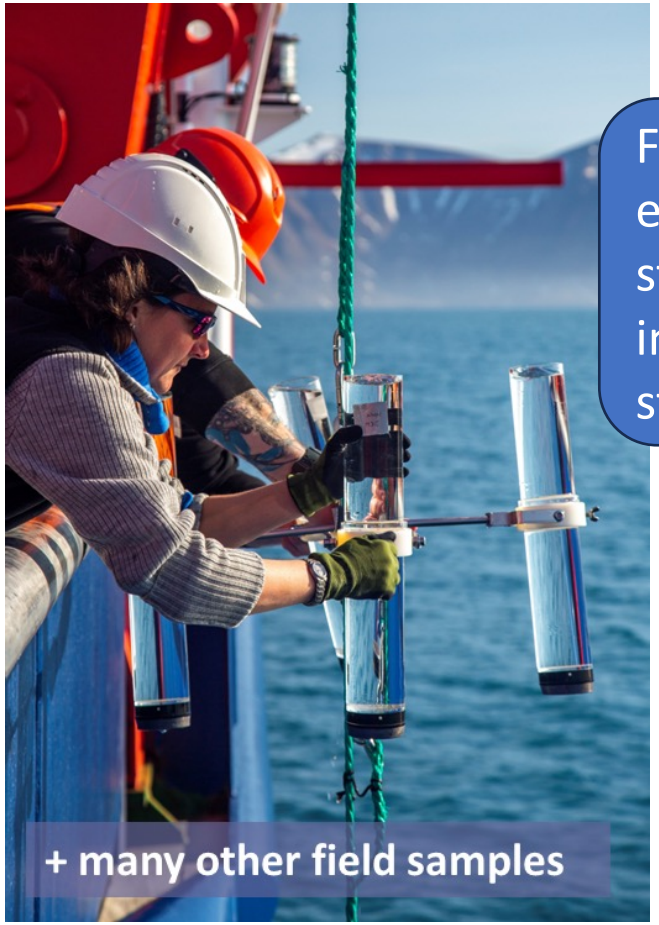


Abundant benthic fish
more C sequestration

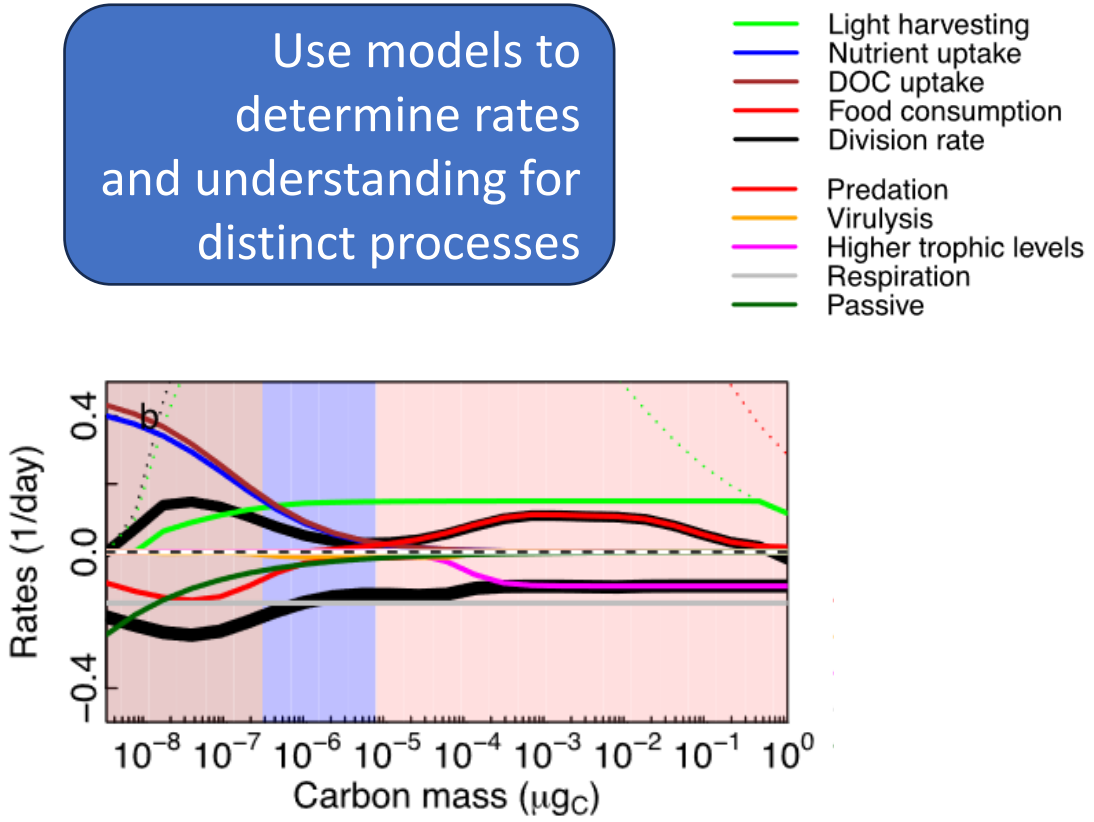
Little benthic fish/
little C sequestration

WP1-3: Determine the potential for ecosystem tipping points – Carbon sequestration



Field & experimental studies to get insight in current state

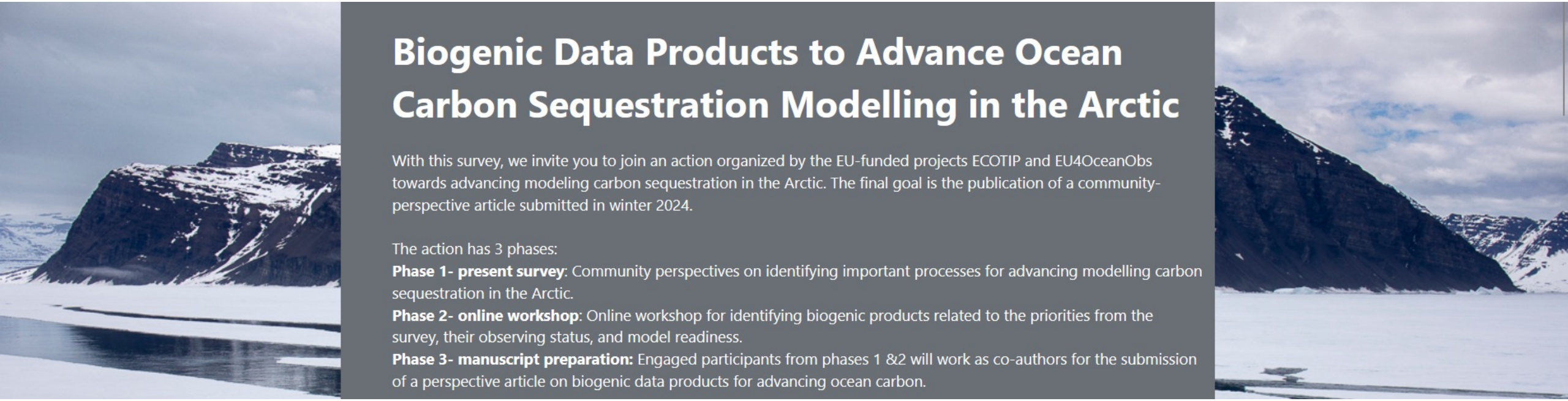
Use models to determine rates and understanding for distinct processes

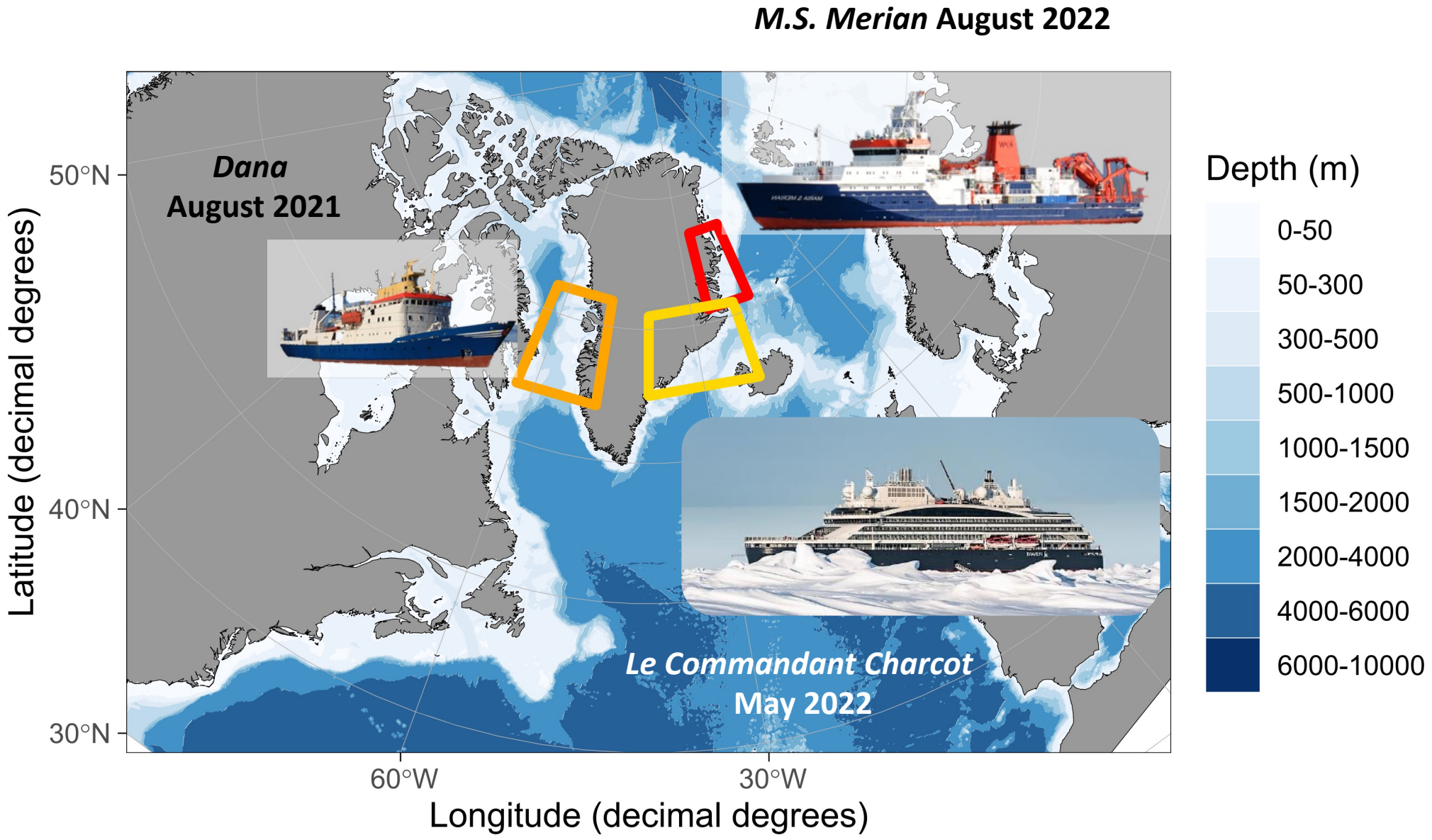


Andersen & Visser, 2023

WP1-3: WP1-3: Determine the potential for ecosystem tipping points – Carbon sequestration

Action organized by ECOTIP and EU4OceanObs to advance
the understanding between observational scientists and the modelling community

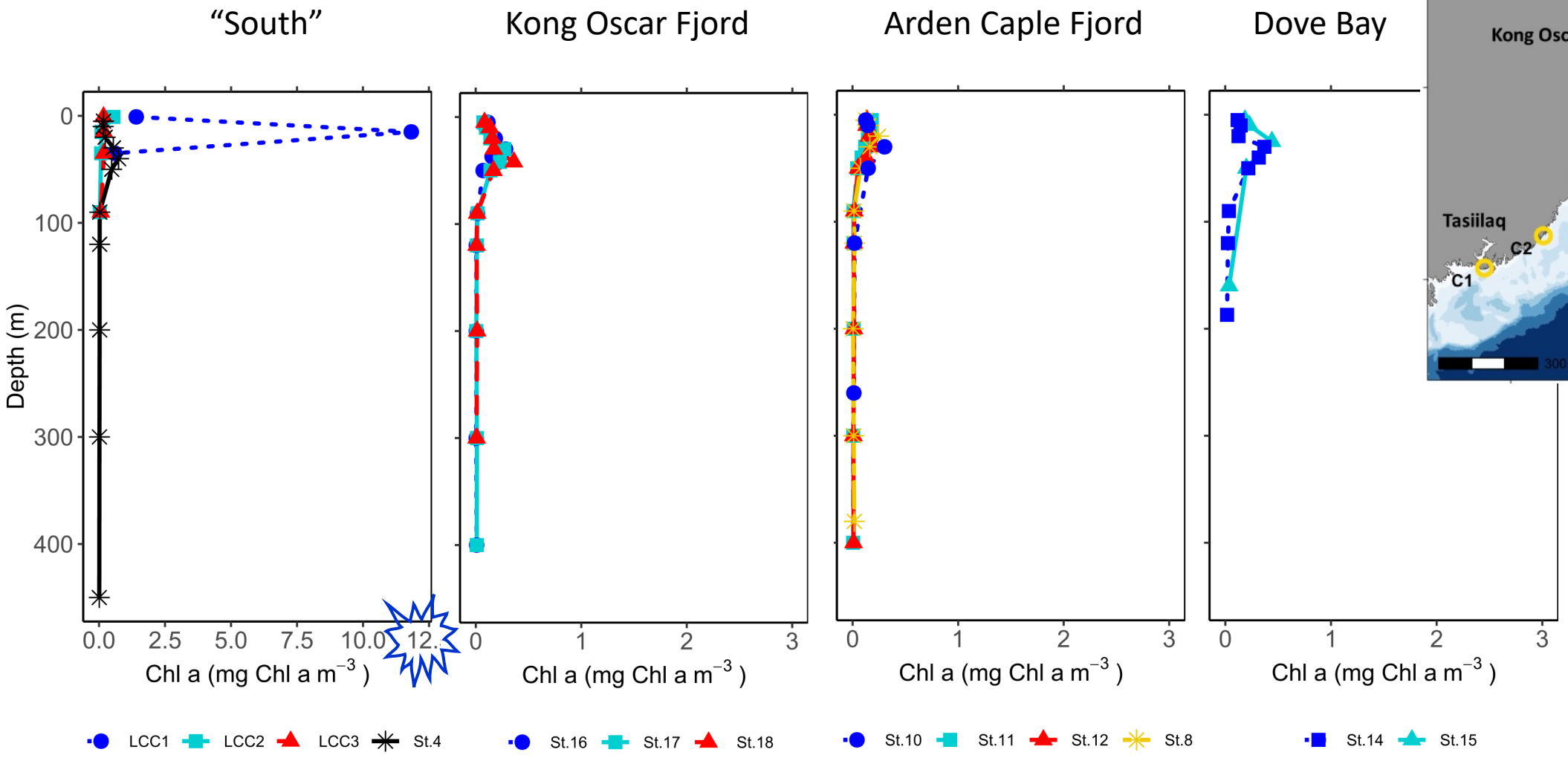


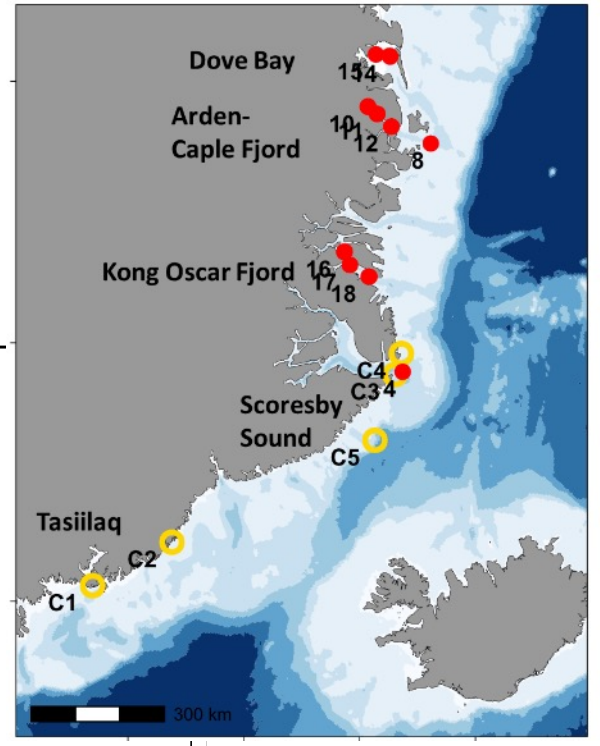

M.S. Merian August 2022
Dana
August 2021
Le Commandant Charcot
May 2022
Depth (m)
0-50
50-300
300-500
500-1000
1000-1500
1500-2000
2000-4000
4000-6000
6000-10000
50°N
40°N
30°N
60°W
30°W
Latitude (decimal degrees)
Longitude (decimal degrees)

Suspended biomass

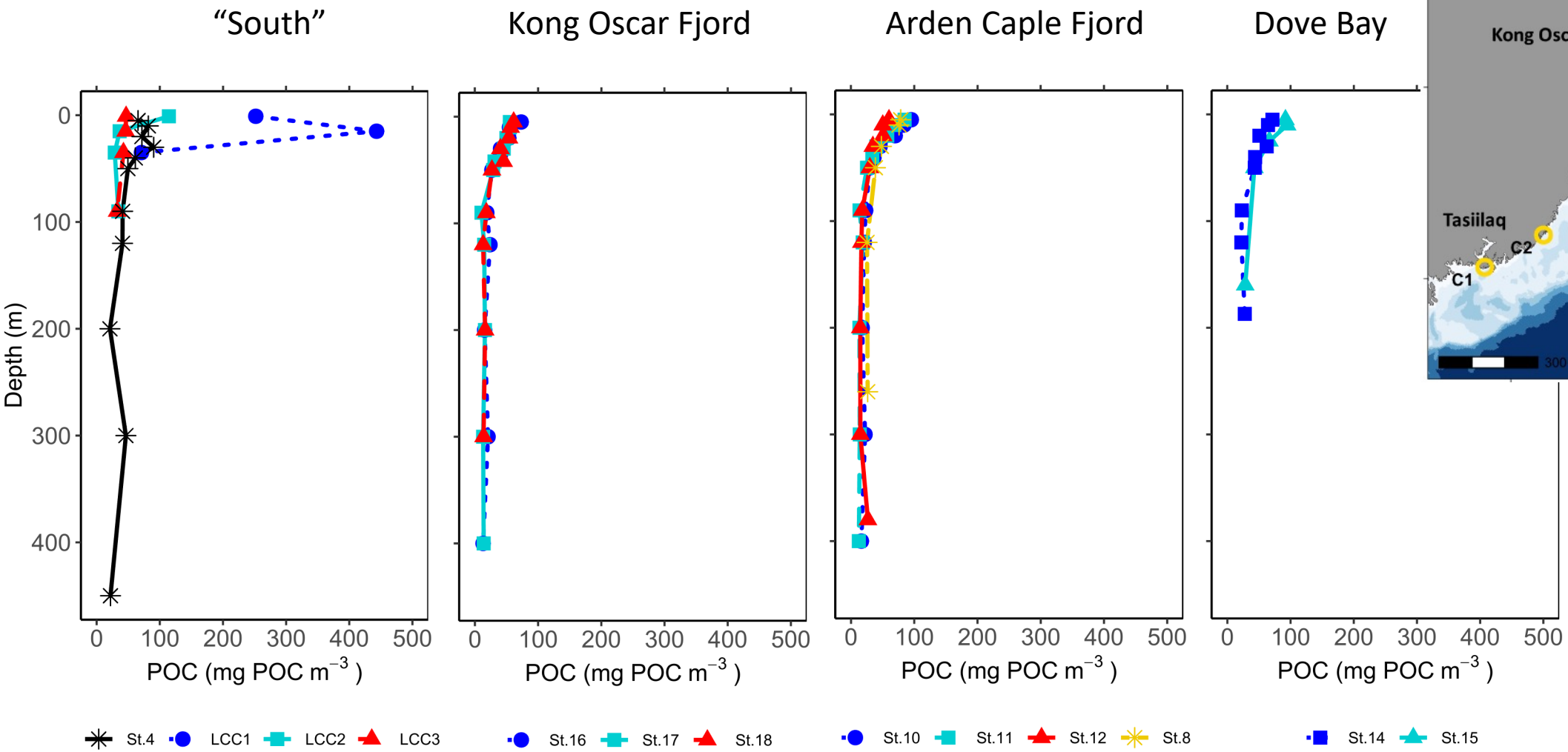
Chlorophyll a and particulate organic carbon (POC)

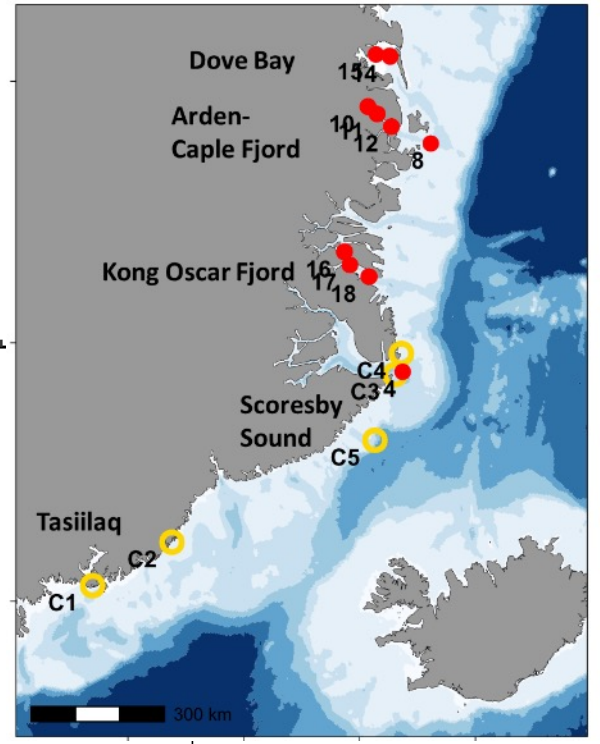
Chl a concentration in the water column



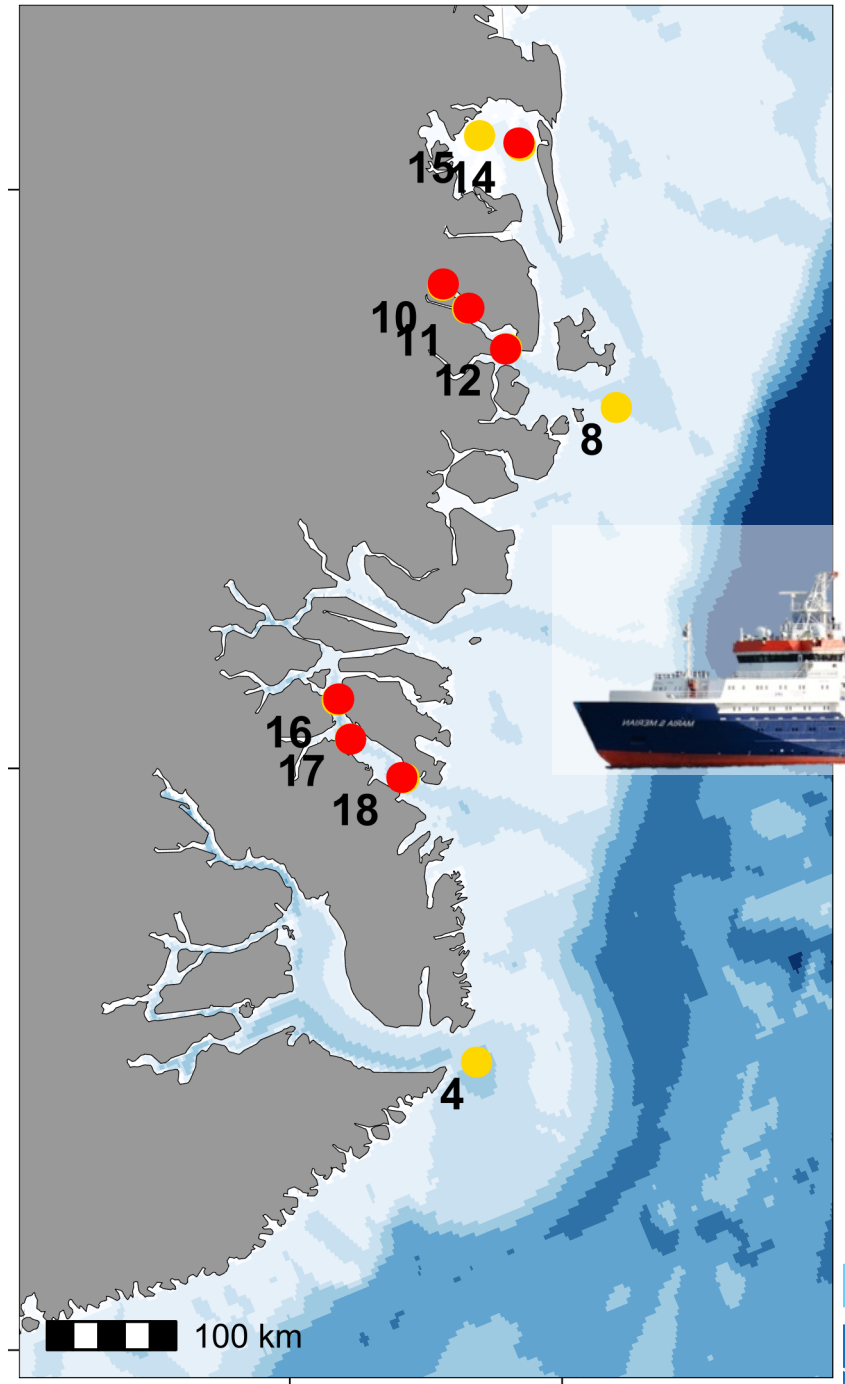


POC concentration in the water column





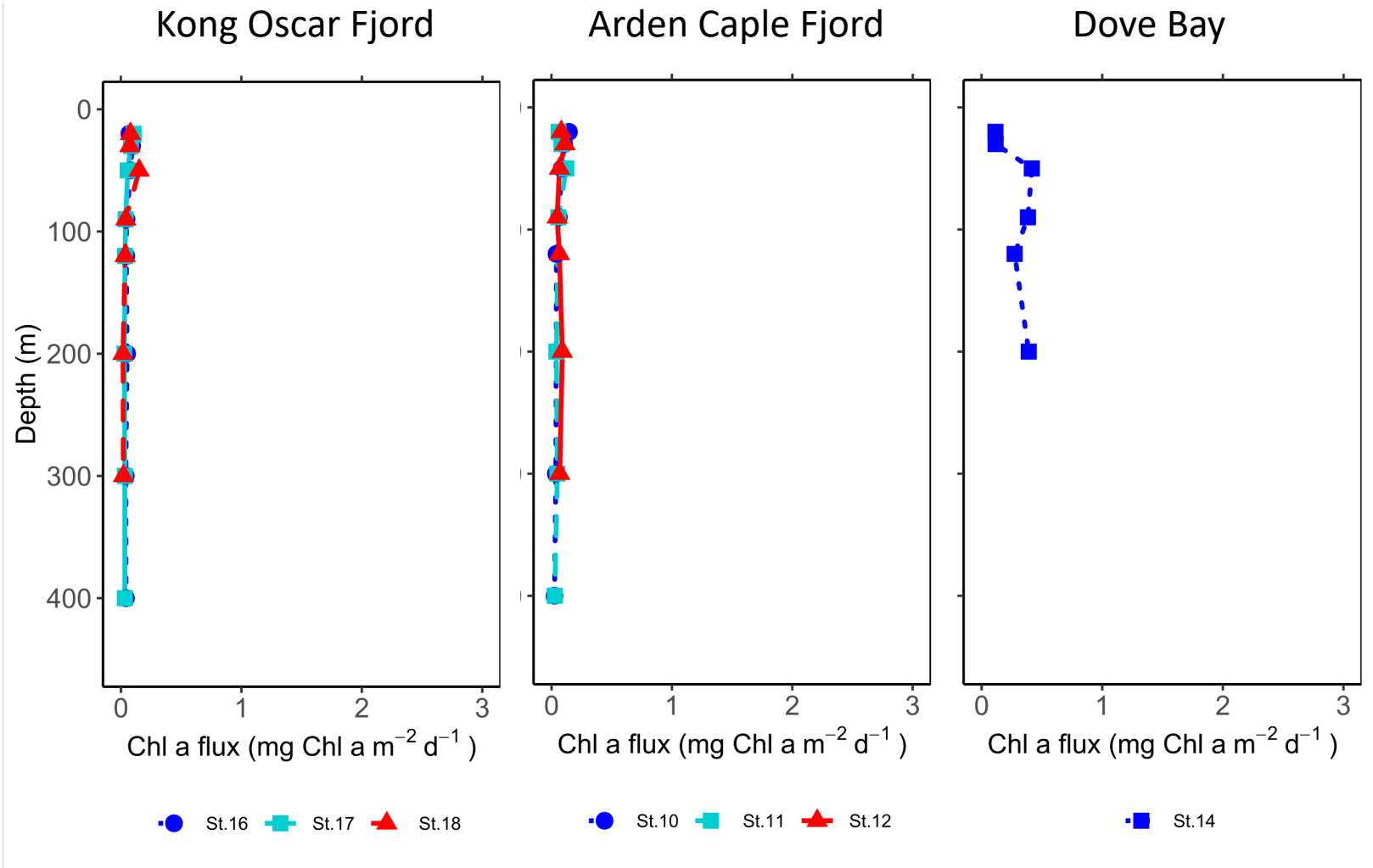
Downward flux of chlorophyll a and particulate organic carbon (sediment trap data)

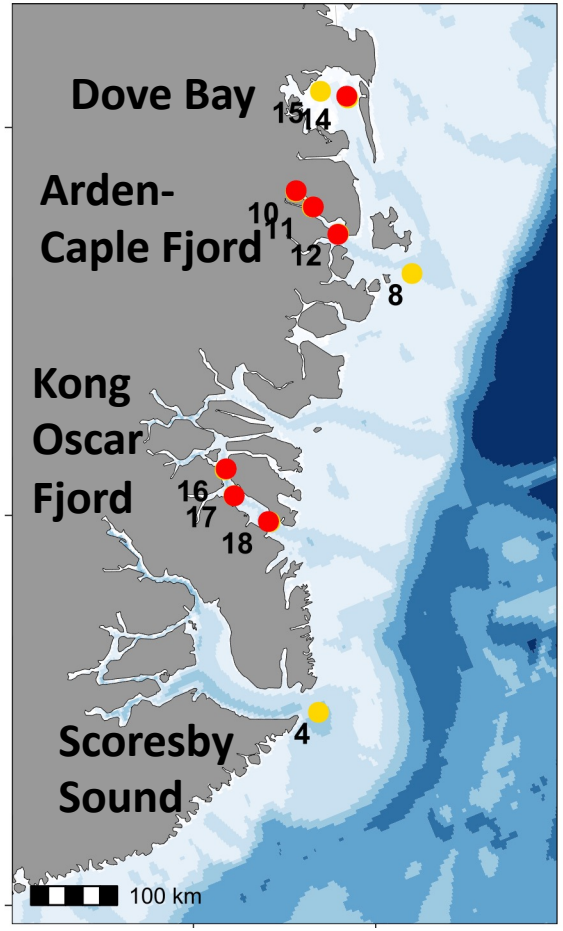


M.S. Merian
August 2022

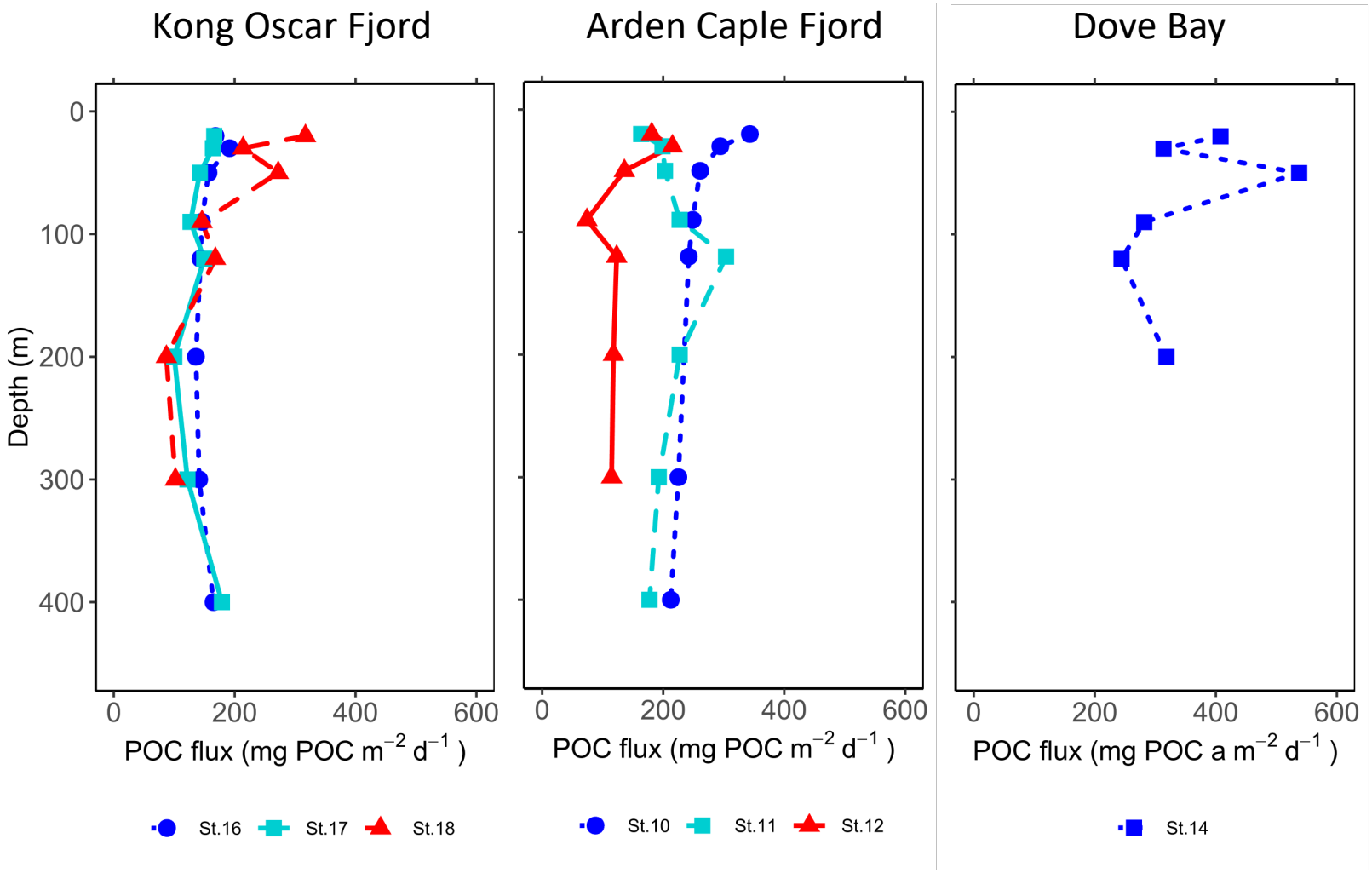
Sediment traps deployed at the “red” stations

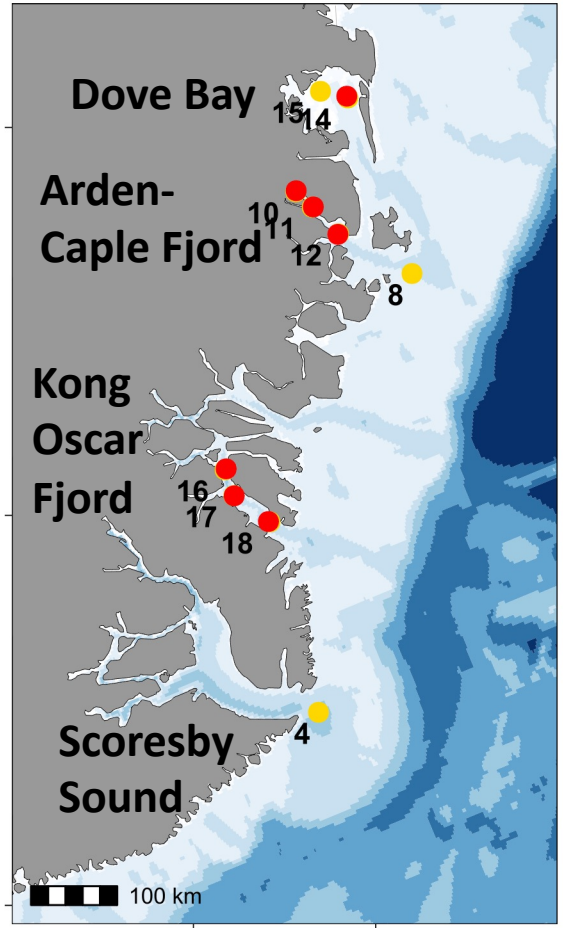
Downward Chl a flux (sediment traps)



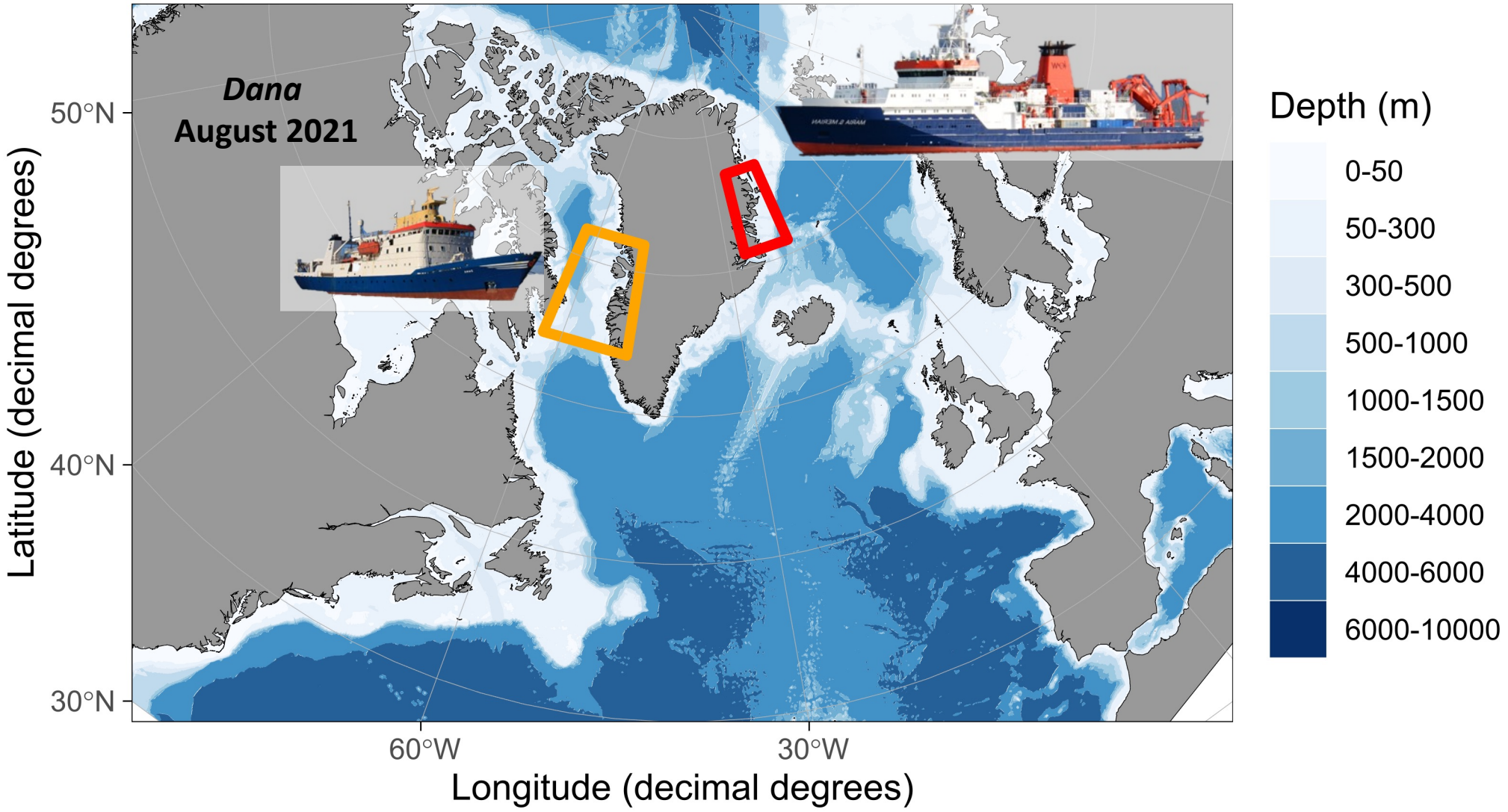


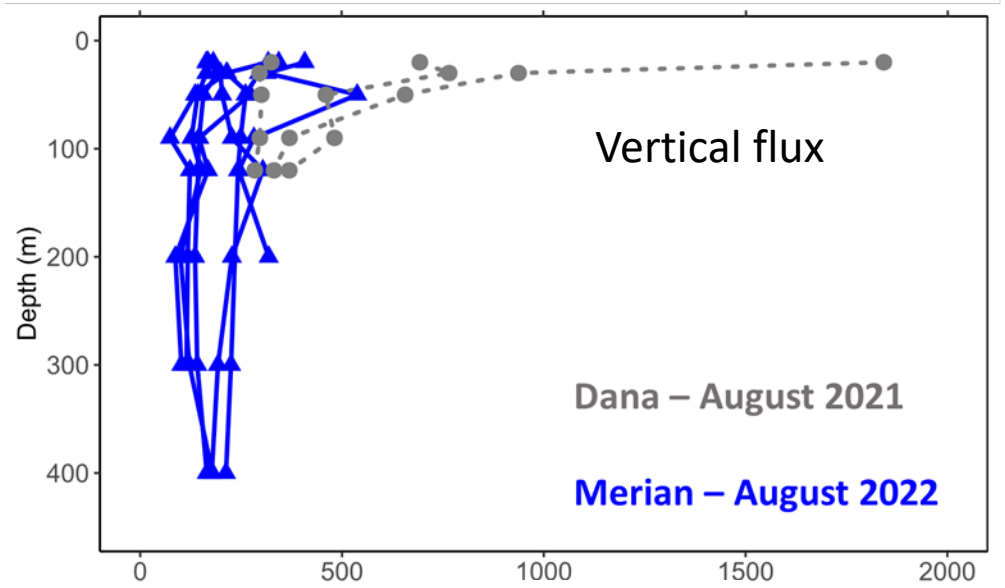
Downward POC flux (sediment traps)



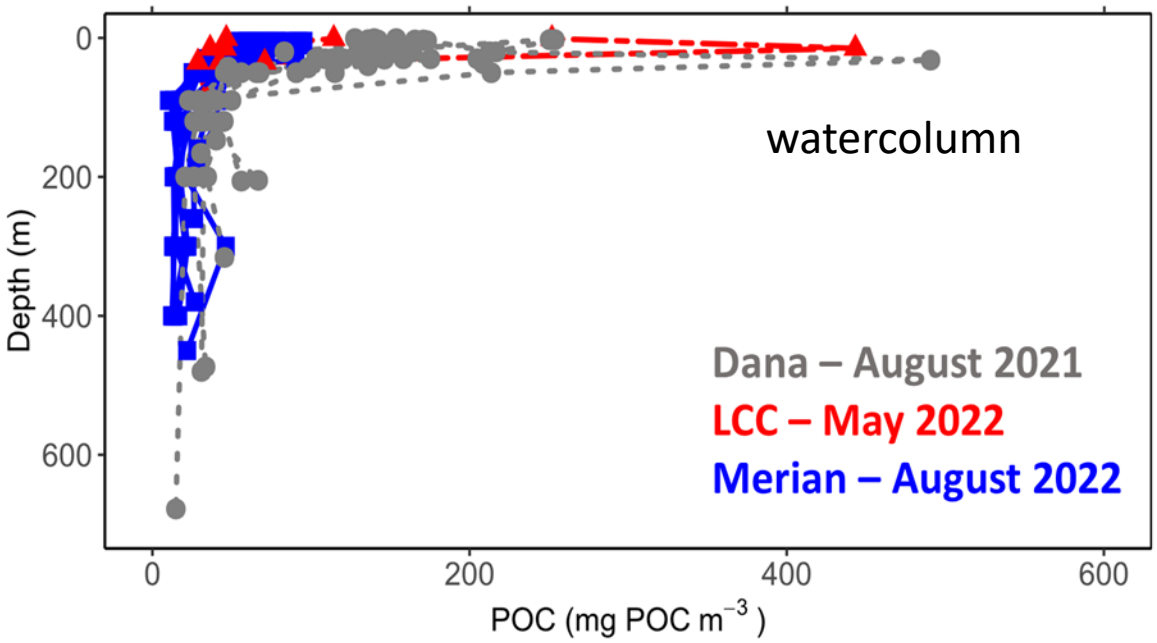


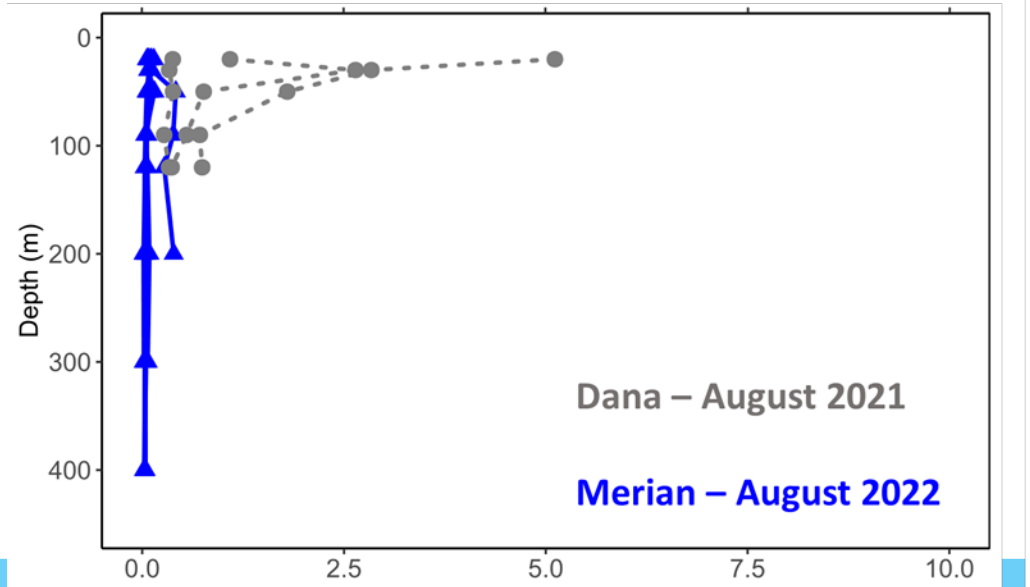
***M.S. Merian* August 2022**



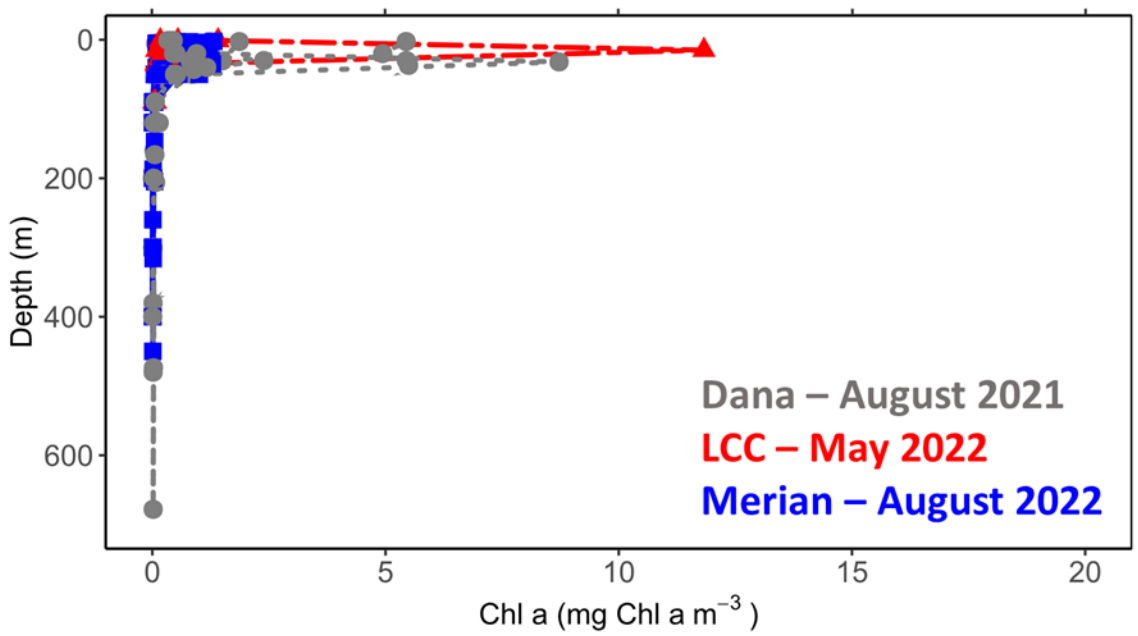


POC mg m^{-2} d^{-1}





Chl a mg m^{-2} d^{-1}



Next steps

- Phytoplankton taxonomy – pelagic and in traps
- Zooplankton functional traits
- Looking at processes and traits related to the biological pump
  - Phytoplankton
  - Benthos
  - zooplantkon