

# The combined influence of the Labrador Current and the West Greenland Current on the zooplankton community structure in the Northern Labrador Sea

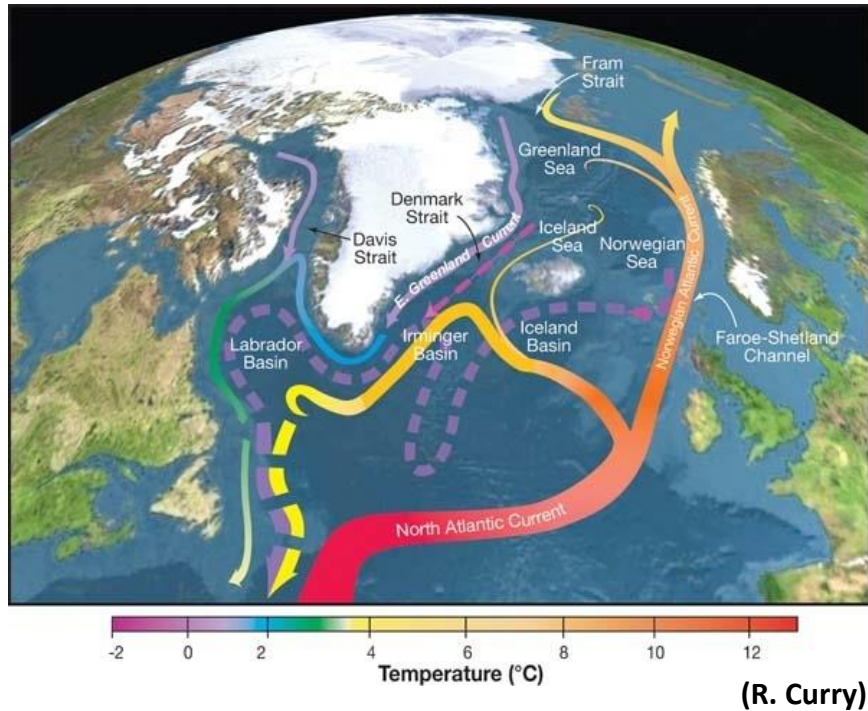


Gérald Darnis, Maxime Geoffroy, Tanya Brown, David Cote

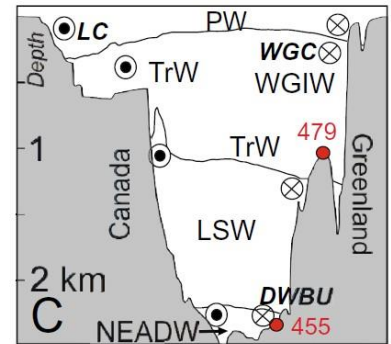
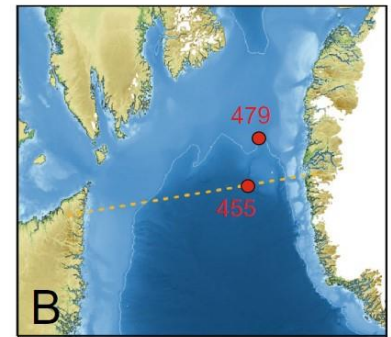
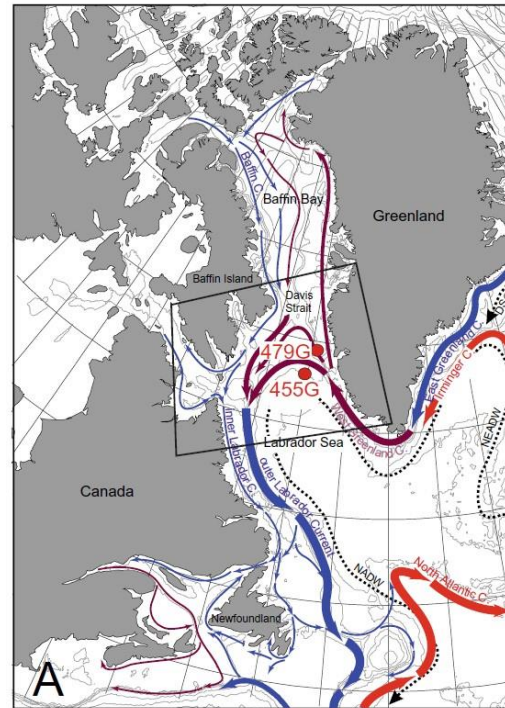
S10 Zooplankton in changing polar oceans, ZPS7, Hobart, 21 March 2024

# The Baffin-Labrador inflow/outflow system

## Atlantic Meridional Overturning Circulation (AMOC)



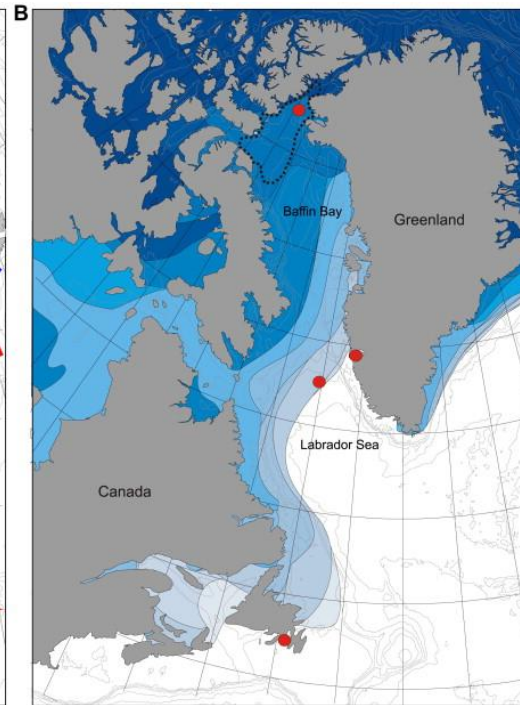
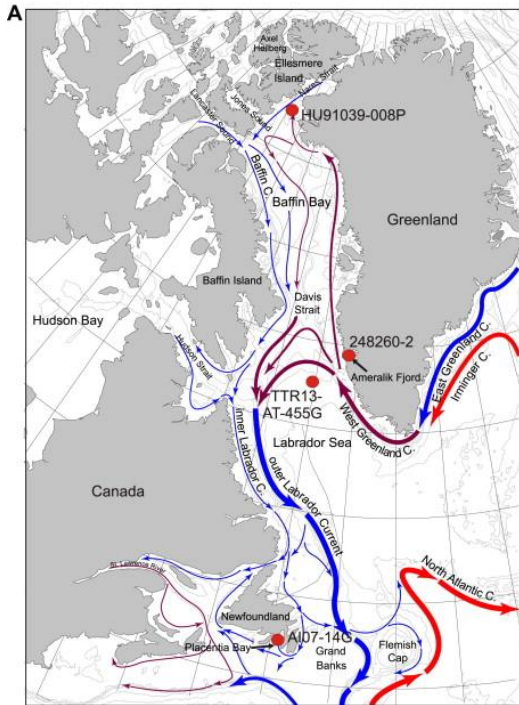
## Atlantic inflow and Arctic outflow



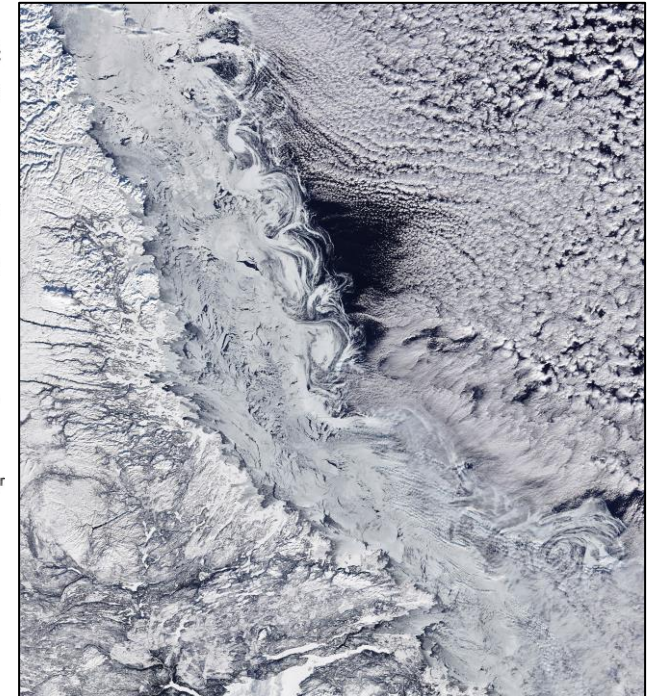
(Seidenkrantz et al. 2021)

# Sea ice in the Baffin-Labrador region

ice swirls along the  
Labrador coast

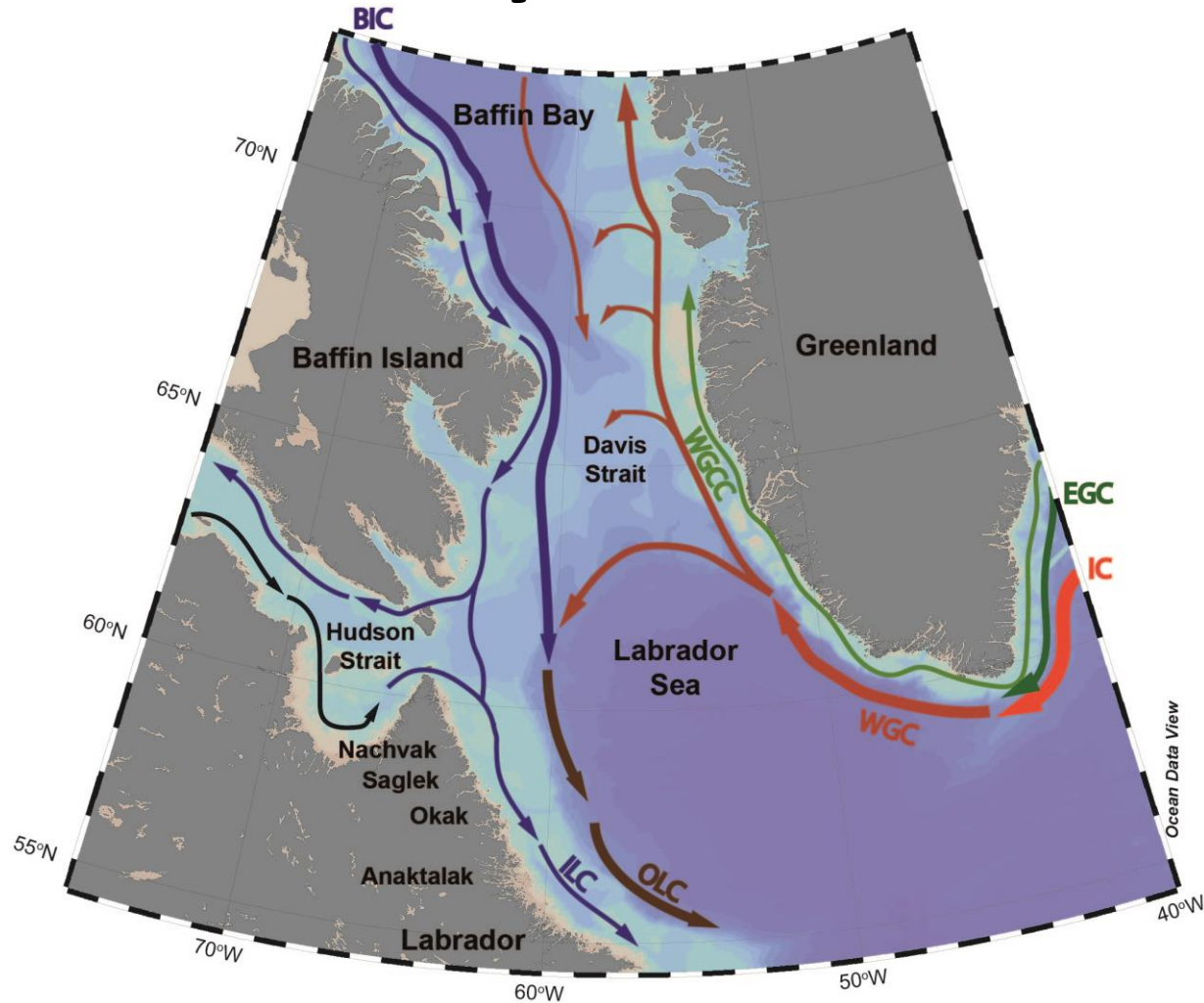


(Seidenkrantz, 2013)

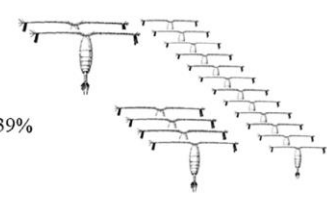
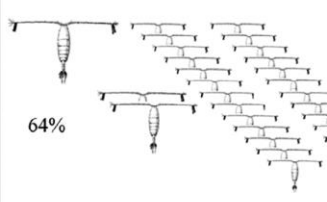



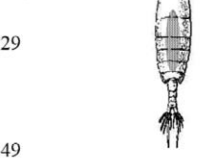
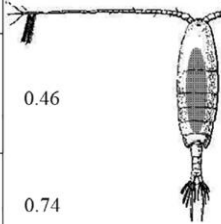
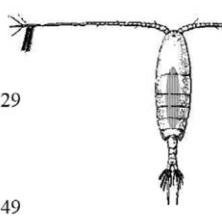


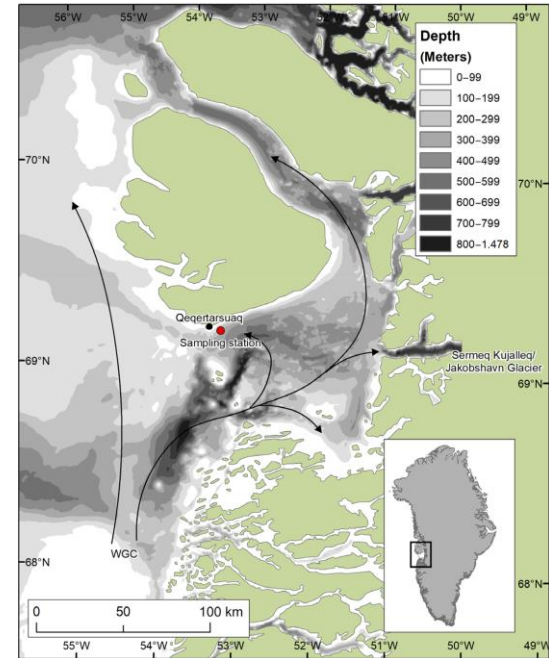
(NASA, 2024)

# Ocean circulation in the Baffin-Labrador system



# Atlantification and Calanus complex

	1992–2001	Change	2005–2018
% <i>C. finmarchicus</i> of <i>Calanus</i> female biomass	39% 	+64% ↗	64% 
Average <i>Calanus</i> female length (mm)	3.5 	-13% ↘	3.0 
Average <i>Calanus</i> female biomass (mg C)	0.46 	-38% ↘	0.29 
Average female lipid content (mg lipid (mg C biomass) <sup>-1</sup> )	0.74 	-34% ↘	0.49 



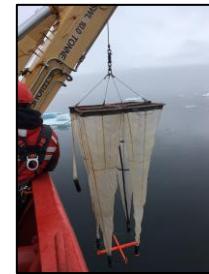
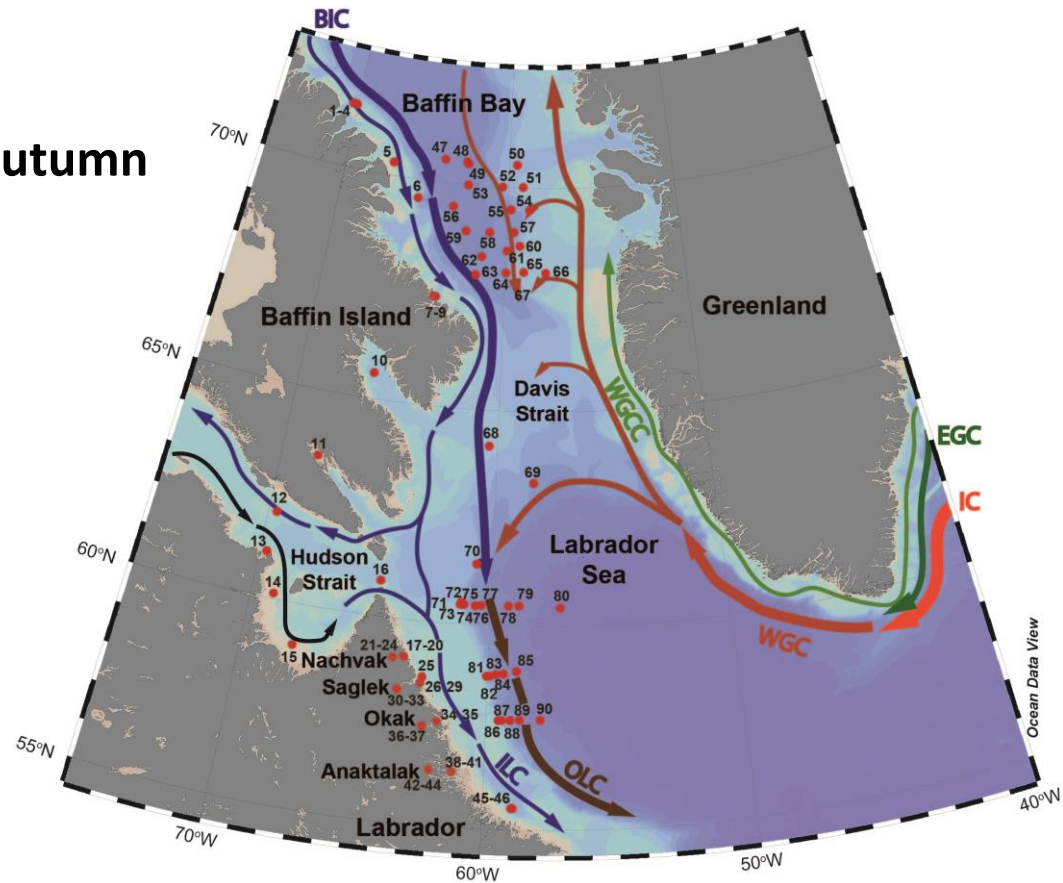
(Møller and Nielsen, 2019)

*Calanus glacialis*  
*Calanus hyperboreus* → *Calanus finmarchicus*

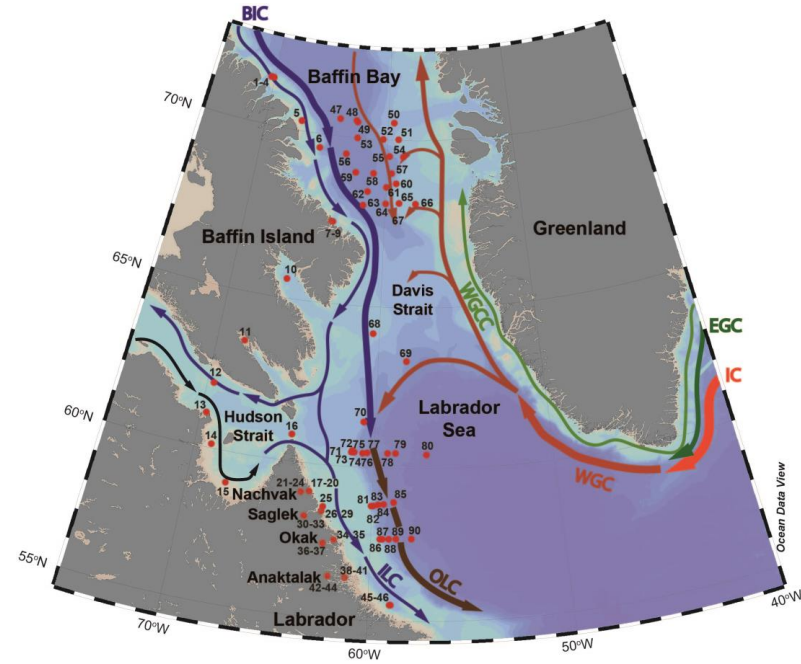
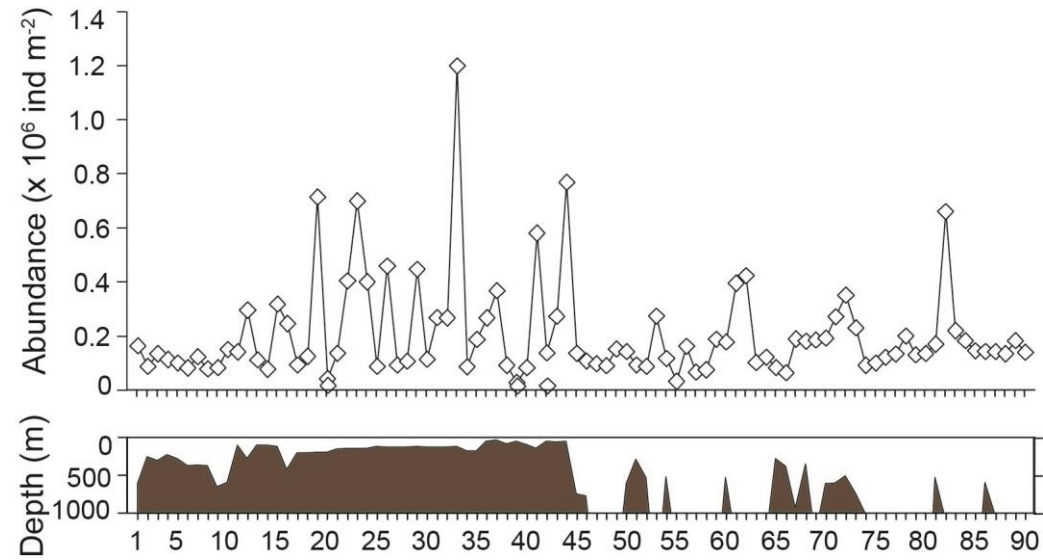
**Objective: study mesozooplankton distribution and drivers of community structure in southern Baffin Bay and northern Labrador**

# Method

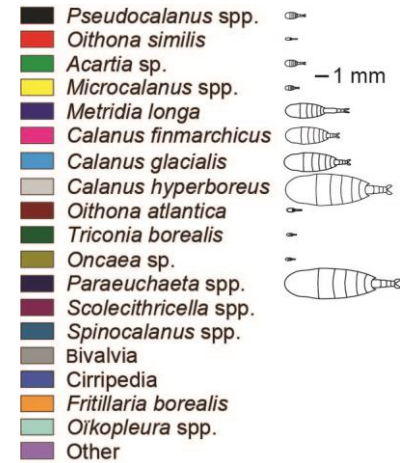
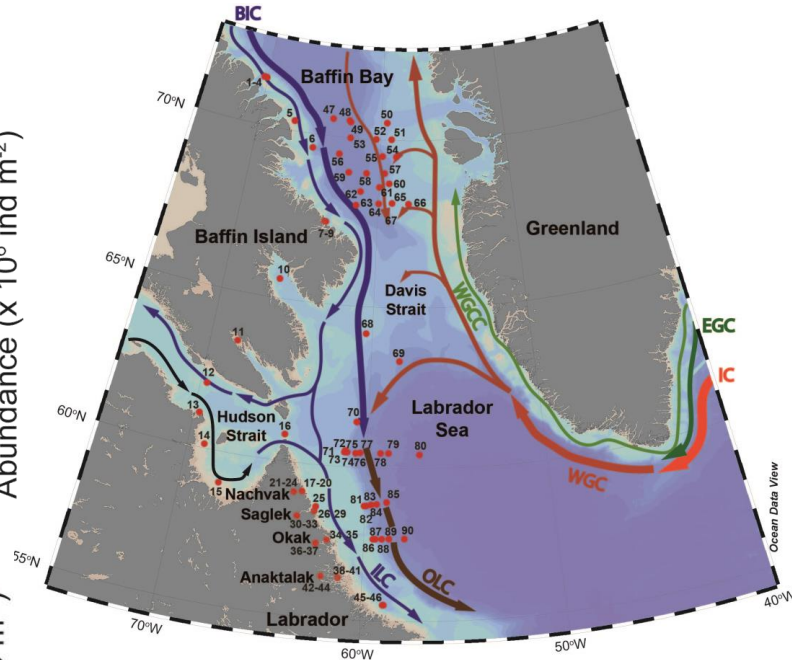
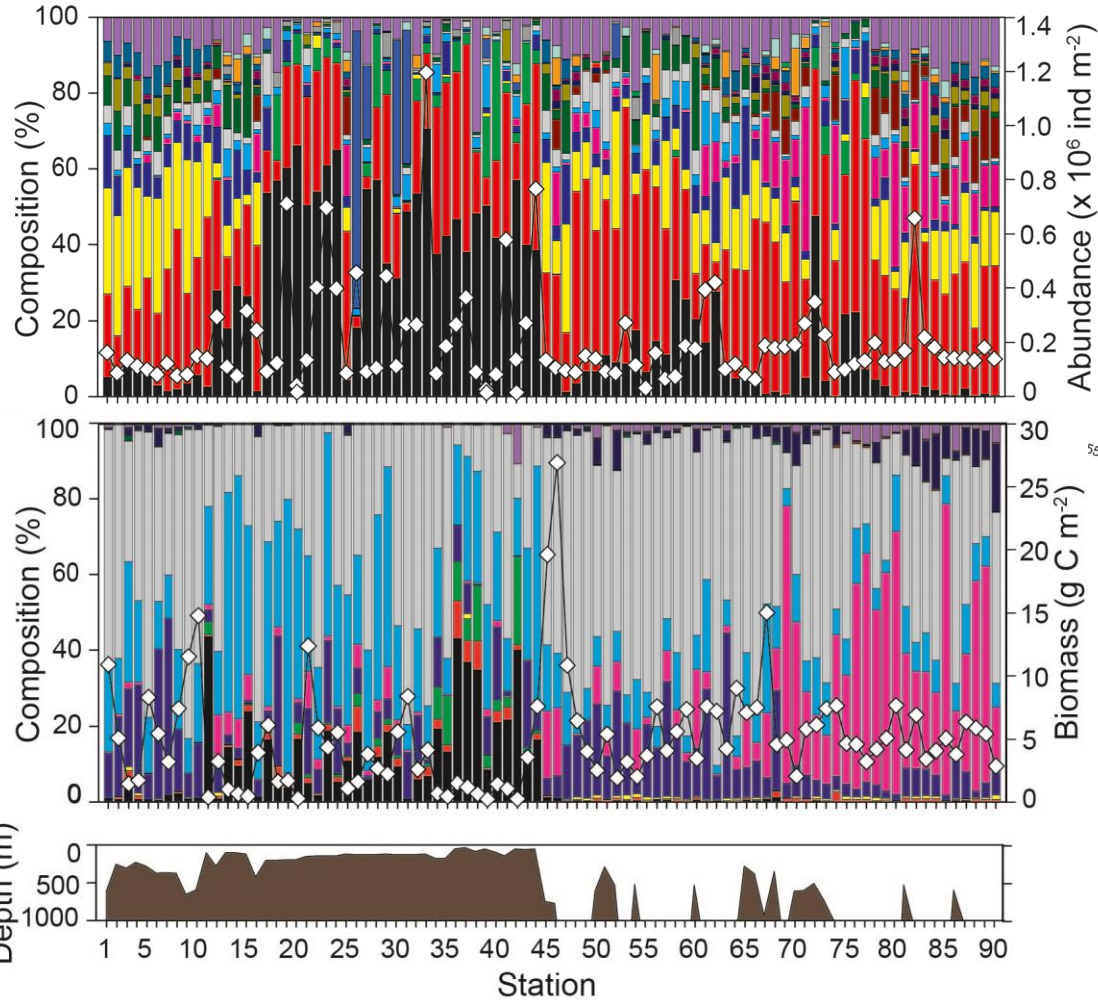
- 90 stations sampled in summer- autumn at 66 sites
- Years 2005-2021
- Bottom or 1000 m-surface vertical tows using 200- $\mu$ m mesh nets
- Taxonomic identification to lowest taxonomic level possible
- Biomass calculation using length-weight relationships



# Zooplankton composition



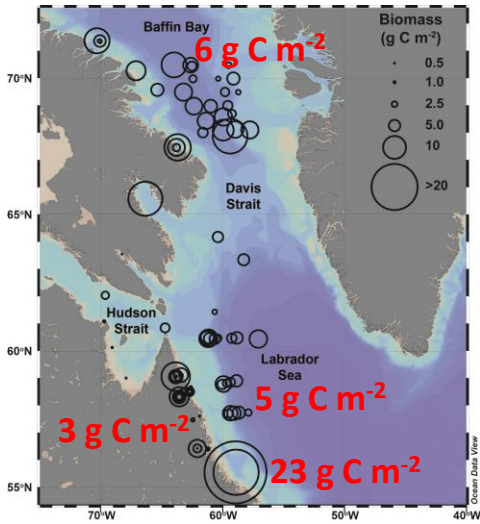
# Zooplankton composition



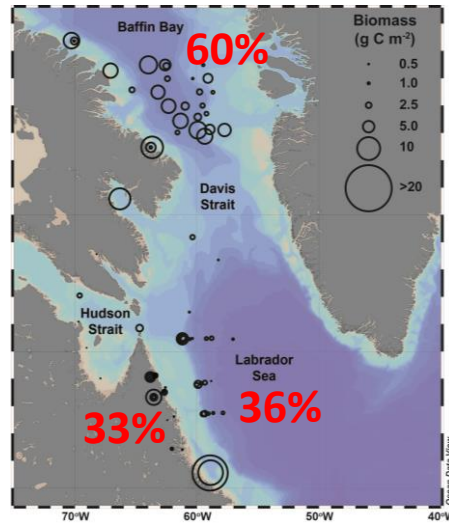


# Copepod biomass

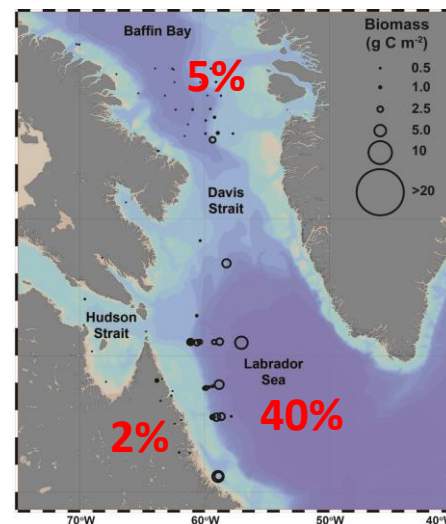
## Total copepod



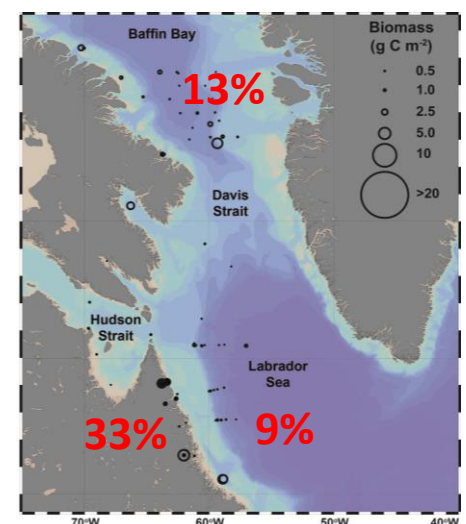
## *Calanus hyperboreus*



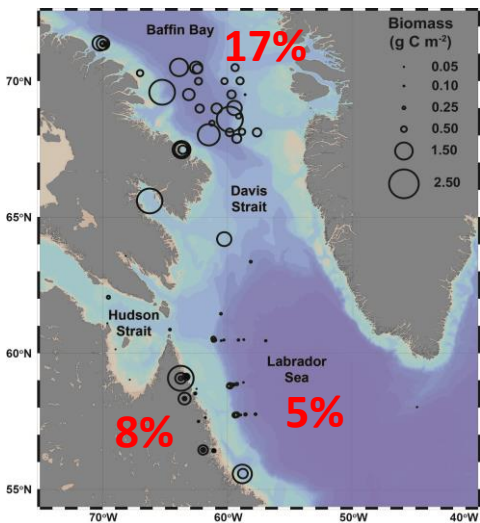
## *Calanus finmarchicus*



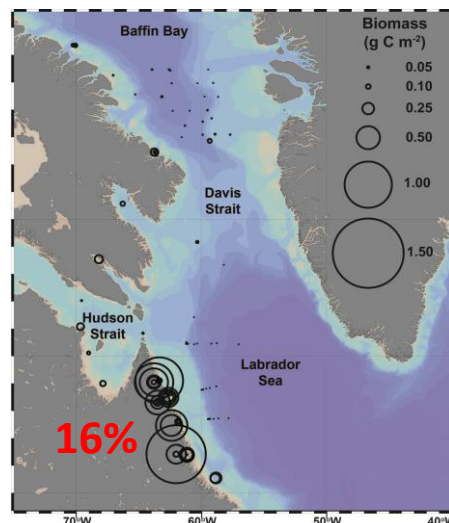
## *Calanus glacialis*



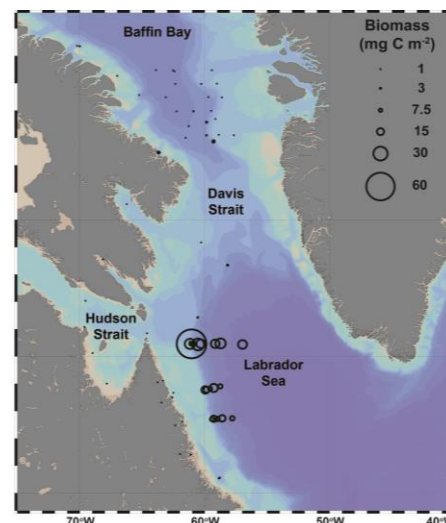
## *Metridia longa*



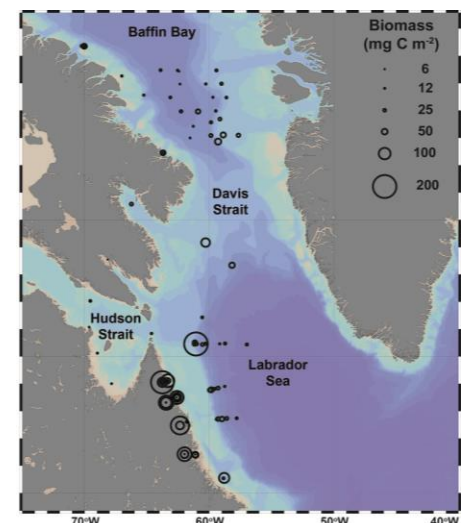
## *Pseudocalanus* spp.



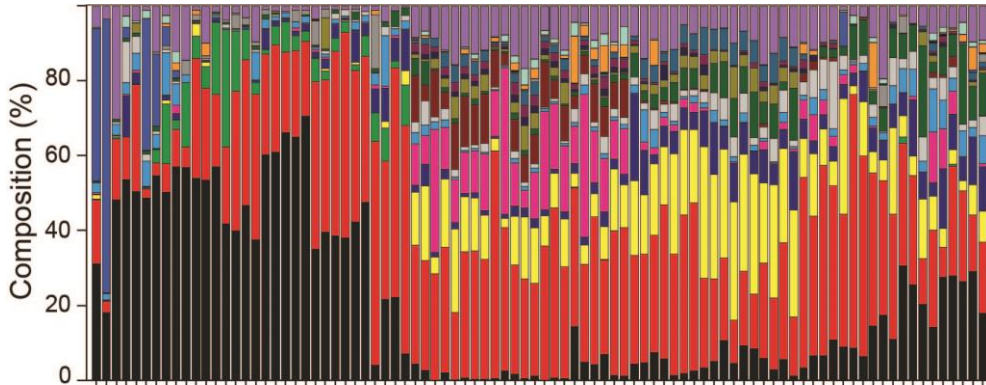
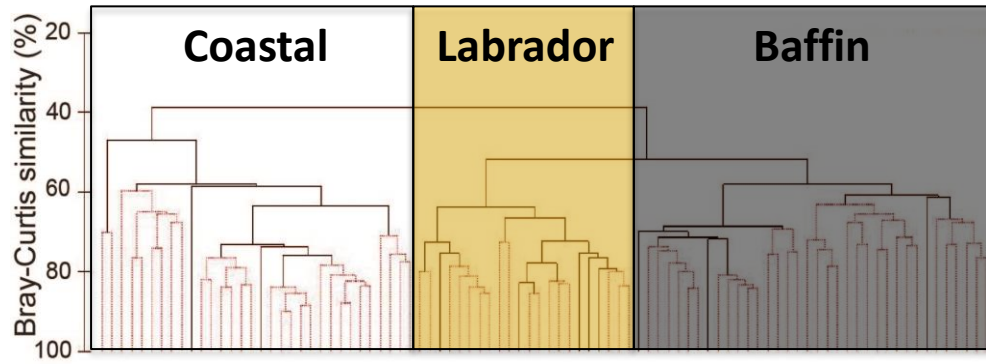
## *Oithona atlantica*



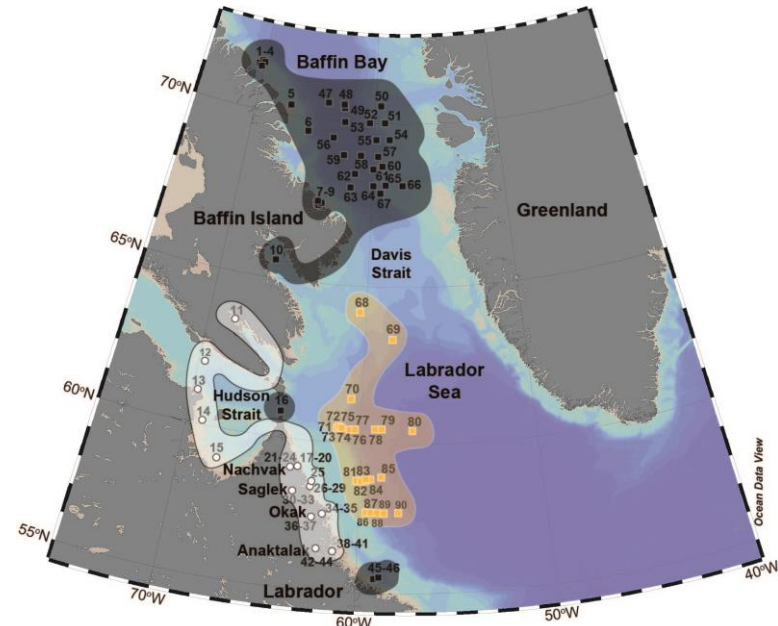
## *Oithona similis*



# Zooplankton communities in the Baffin-Labrador region

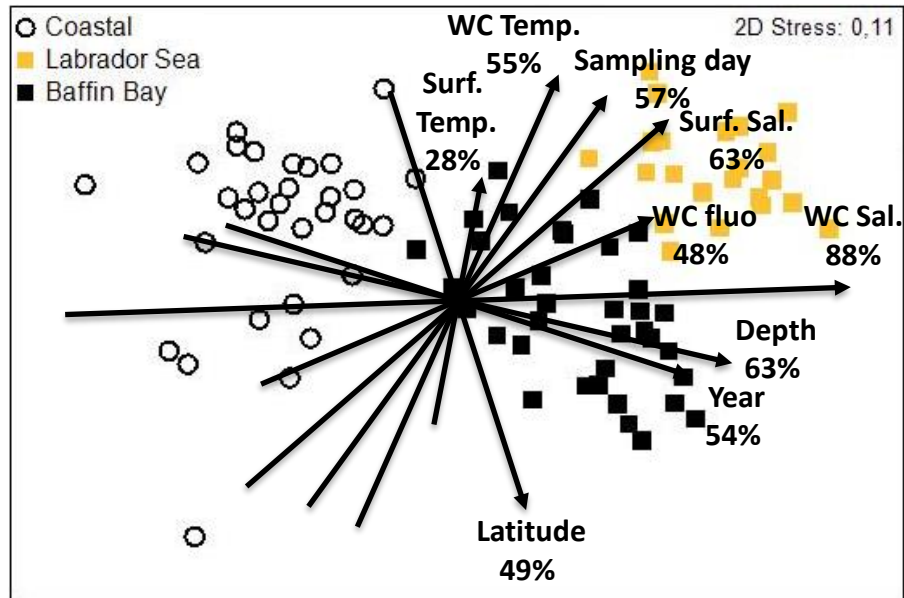


	Coastal	Labrador	Baffin
Depth (m)	127 ± 46	1459 ± 765	908 ± 643
WC Sal	32.0 ± 0.5	34.6 ± 0.2	33.8 ± 0.6
WC Temp	0.64 ± 1.13	3.58 ± 0.24	0.48 ± 0.80
S	19 ± 5	67 ± 14	35 ± 11



- *Pseudocalanus* spp.
- *Oithona similis*
- *Acartia* sp.
- *Microcalanus* spp.
- *Metridia longa*
- *Calanus finmarchicus*
- *Calanus glacialis*
- *Calanus hyperboreus*
- *Oithona atlantica*
- *Triconia borealis*
- *Oncaea* sp.
- *Paraeuchaeta* spp.
- *Scolecithricella* spp.
- *Spinocalanus* spp.
- Bivalvia
- Cirripedia
- *Fritillaria borealis*
- *Oikopleura* spp.
- Other

# Drivers of community structure



# Summary

- **2 mesozooplankton assemblages of Arctic taxa in cold Arctic waters:**
  - **Coastal assemblage in Labrador fjords and at all shallow coastal stations; made of neritic taxa (*Pseudocalanus* spp., *Acartia* spp.) and Arctic taxa**
  - **Arctic oceanic assemblage in deep Baffin Bay and along the course of the southward flowing Labrador Current; composed of Arctic taxa**
- **1 mesozooplankton assemblage over the northern Labrador slope influenced by Atlantic Water; composed of a mix of boreal Atlantic species (*C. finmarchicus*, *Oithona atlantica*) and Arctic species (*C. hyperboreus*)**
- **Coastal assemblage: carbon essentially packaged as small *Pseudocalanus* spp. and large *C. hyperboreus* and *C. glacialis***
- **Baffin assemblage: carbon packaged as large Arctic *Calanus* and *M. longa***
- **Labrador assemblage: carbon packaged as large oceanic Atlantic *C. finmarchicus* and Arctic *C. hyperboreus***

# Thanks!

Captains & crews of the icebreakers  
*Amundsen*

Fish and zooplankton teams,  
and zooplankton taxonomists

