Unique zooplankton diversity in the deep Nansen and Amundsen basins of the Arctic Ocean

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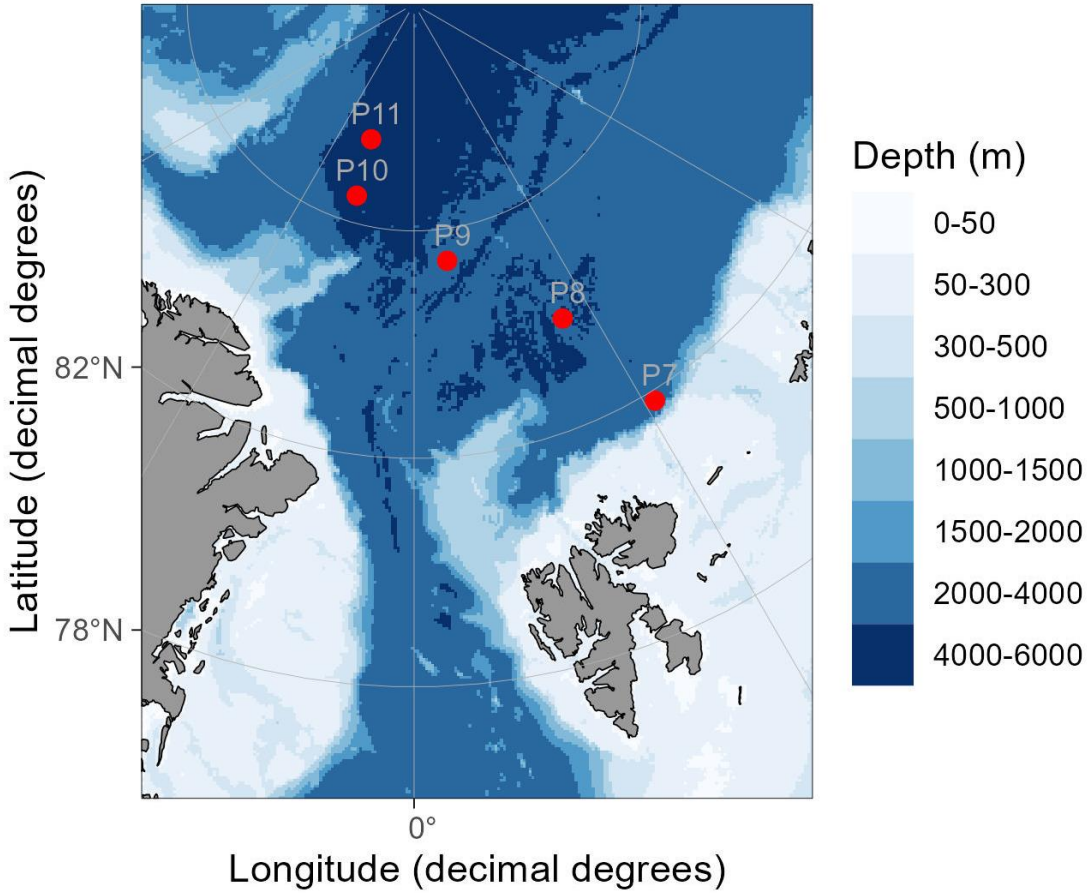
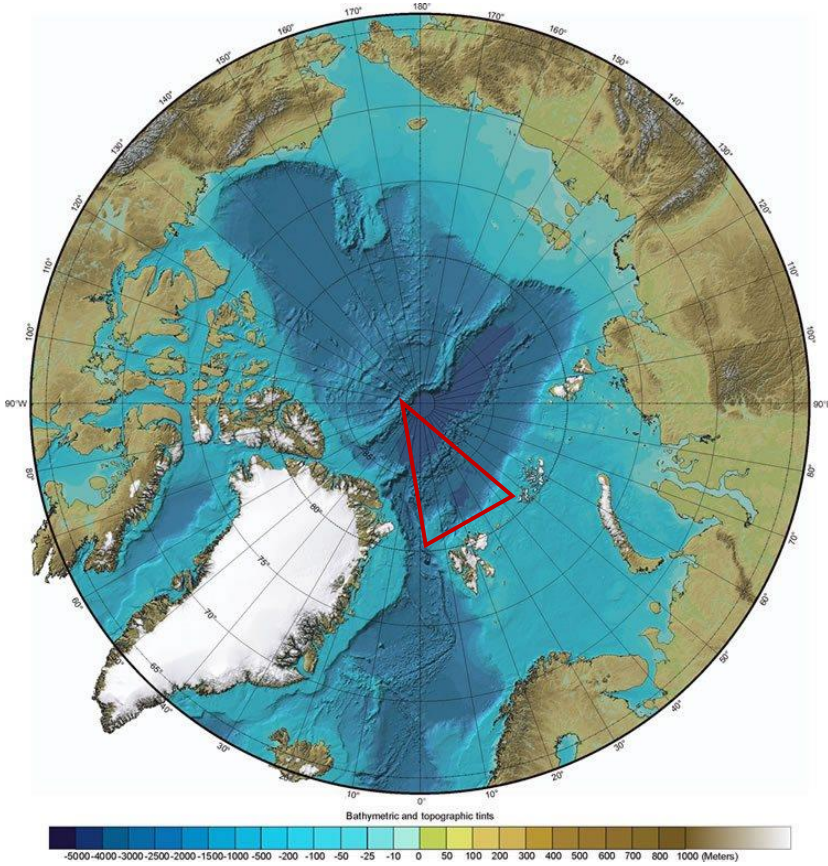
Arctic Ocean August and September 2021
Nansen Legacy JC2-2 Cruise



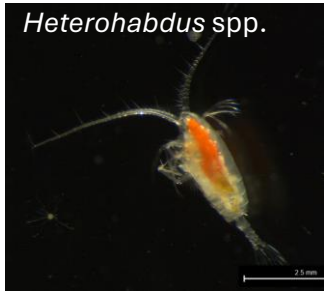


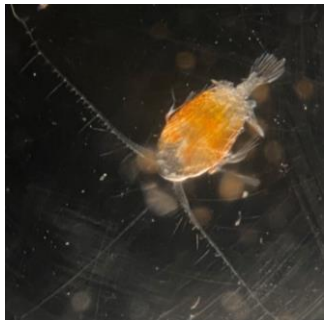
Why study the zooplankton community of Nansen and Amundsen Basins?

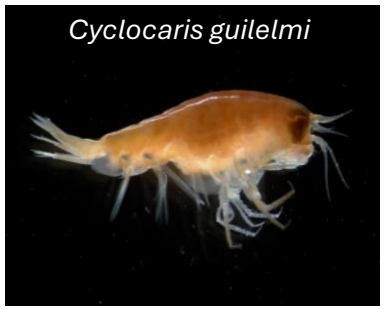
- Arctic Ocean (AO) impacted by climate change
  - Upper 2000 m of AO expected to warm twice the global mean rate
  - Increased inflow of Atlantic water into the Nansen Basin
  - Improve the species inventory

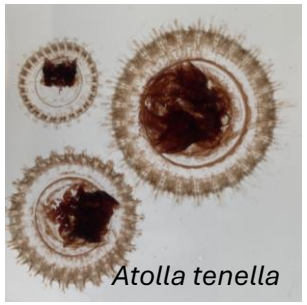
- How do these changes affect the plankton communities?
  - Will the advection of Atlantic species lead to a shift in the zooplankton communities?
  - Will changes in zooplankton have cascading effects on higher trophic levels?

- What does this study provide?
  - Inventory of the current status of the zooplankton composition in Nansen & Amundsen Basins based on the Nansen Legacy research
  - Comparison of the results with the classic works from 1993-1998 (Kosobokova & Hirche 2009, Kosobokova et al., 2011)









Methods

Mesozooplankton
MultiNet Midi 64 µm & 180 µm
bottom-surface: 5 depth layers

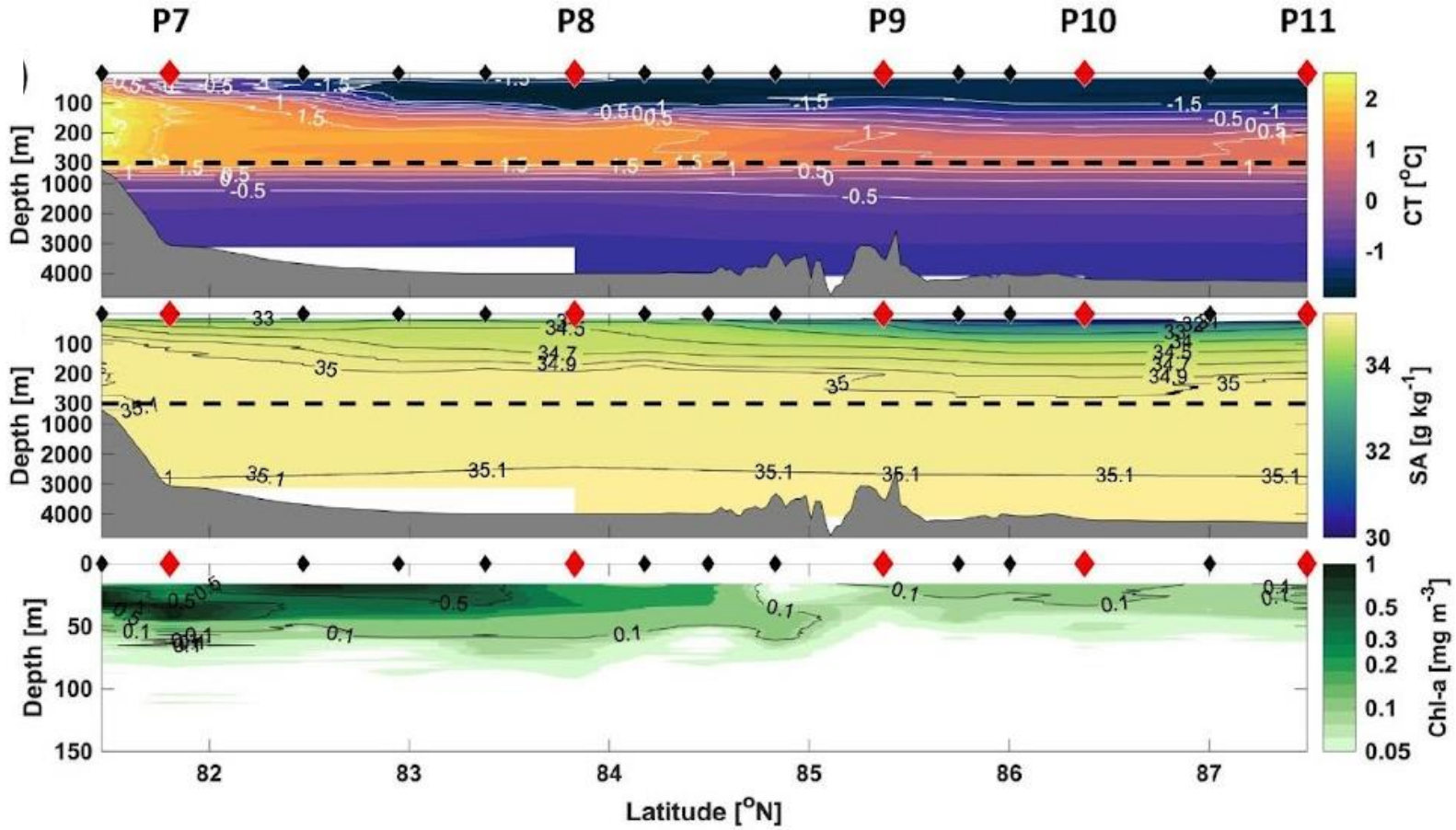
Mesozooplankton
MultiNet Mammoth 180 µm
bottom-surface: 9 depth layers

Macrozooplankton
MIK net 1500 µm
1000 m - surface

- The use of three complementary nets made it possible to examine a wide size spectrum of zooplankton.
- Examination of the samples to provide high taxonomic resolution.

Sample examination at IO PAN
by Mateusz Ormanczyk and
Slawomir Kwasniewski

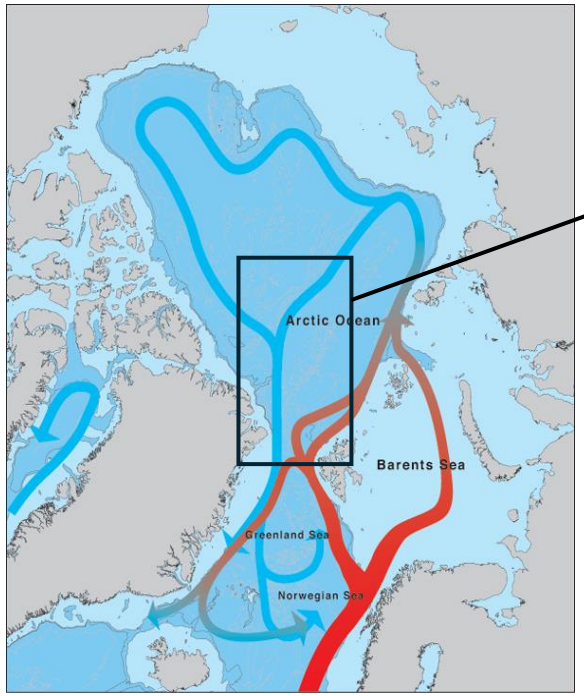
Physical properties along the transect



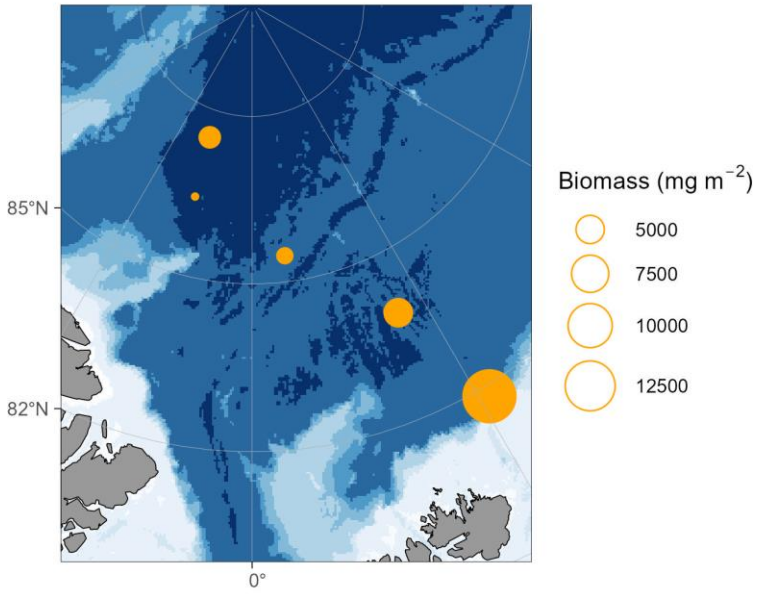
Nansen Basin
Strong influence of AW
High nutrient concentration
Blooms in late spring/early summer

Amundsen Basin
Influence by Trans Polar Drift-> riverine water from Sibir
Primary production restricted to leads
Blooms in late summer

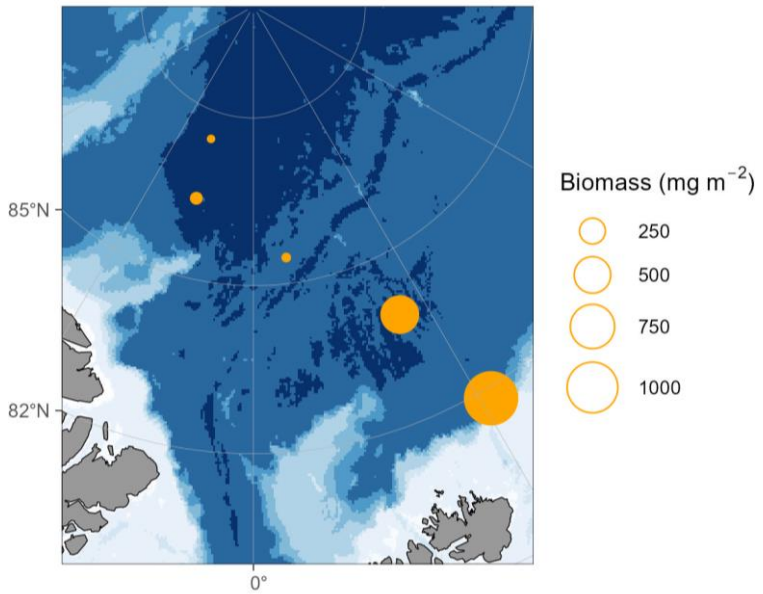
Biomass (mg DM m^{-2}) of **copepods** based on Multinet data



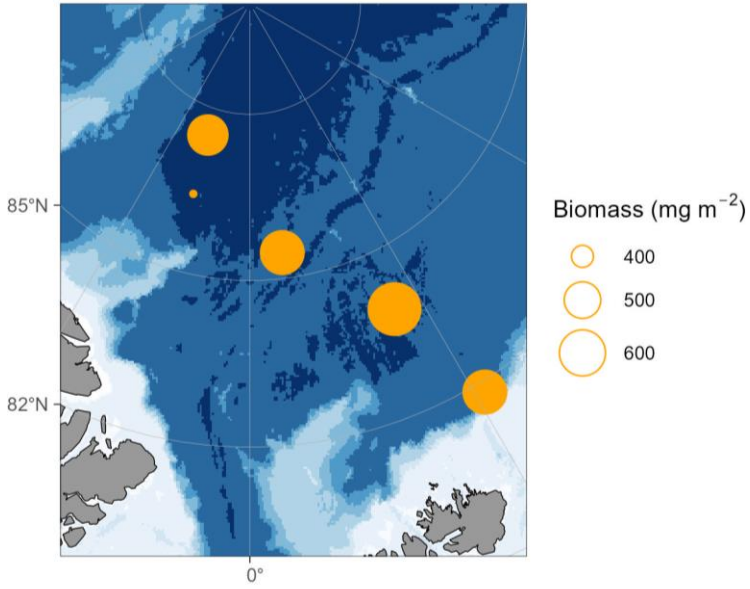
Calanus spp.



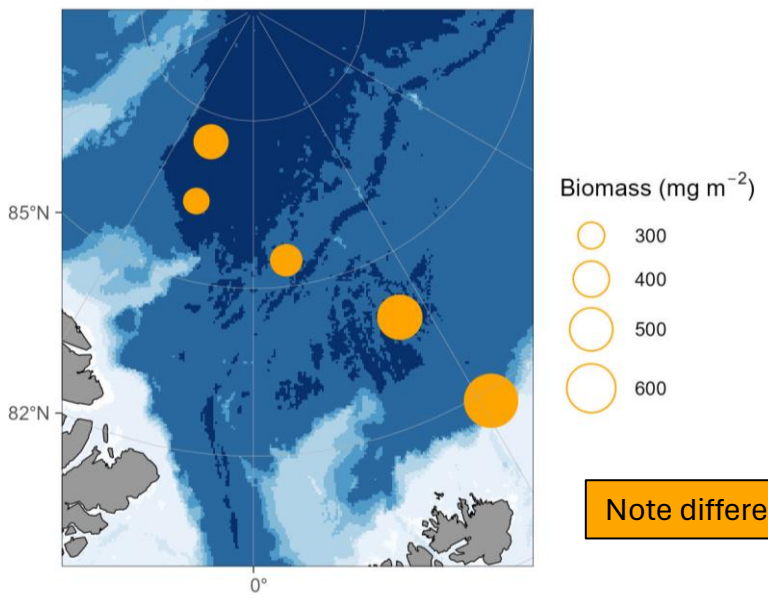
Metridia spp.



Large copepods



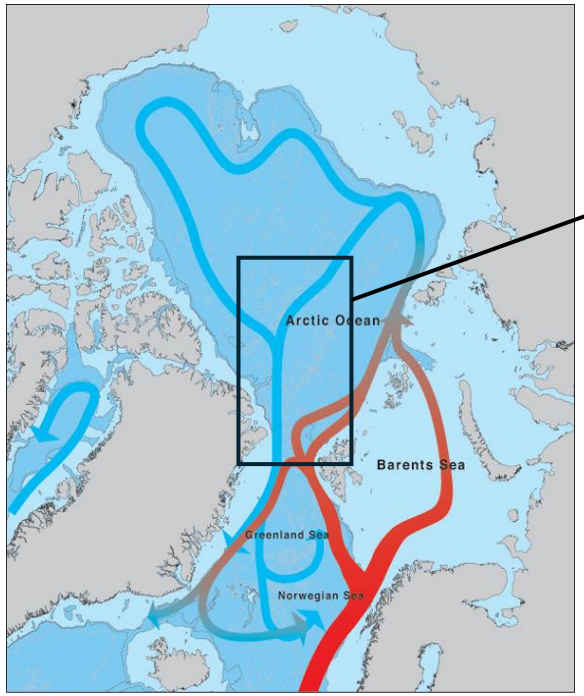
Small copepods

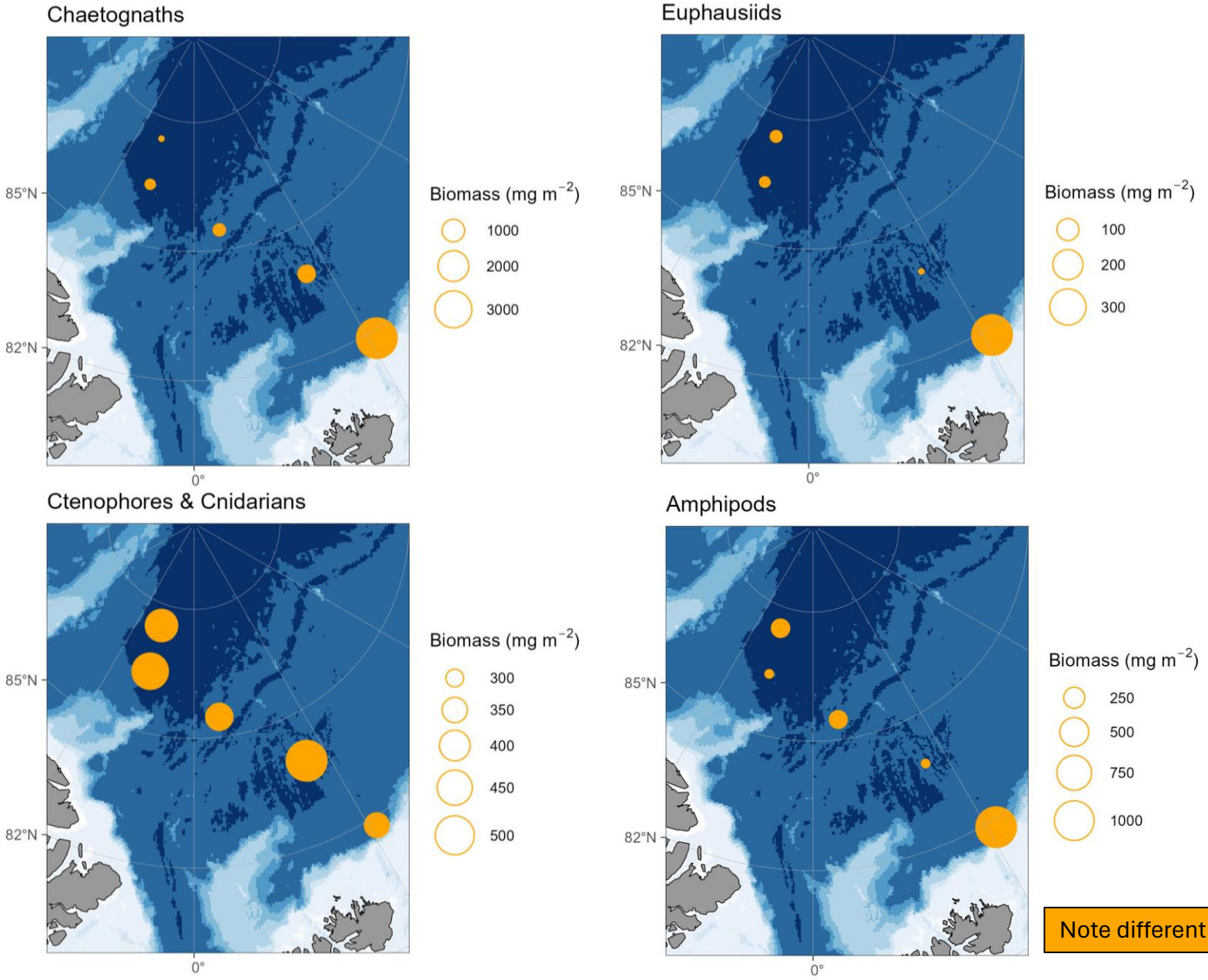


Note different scale

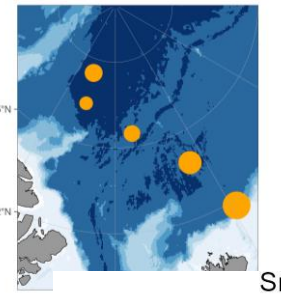
- The advection of Atlantic species *Calanus finmarchicus, C. glacialis* & *Metridia longa* contributes to the biomass of the southern Nansen Basin

Biomass (mg DM m^{-2}) of **Macrozooplankton** taxa based on Multinet & MIK

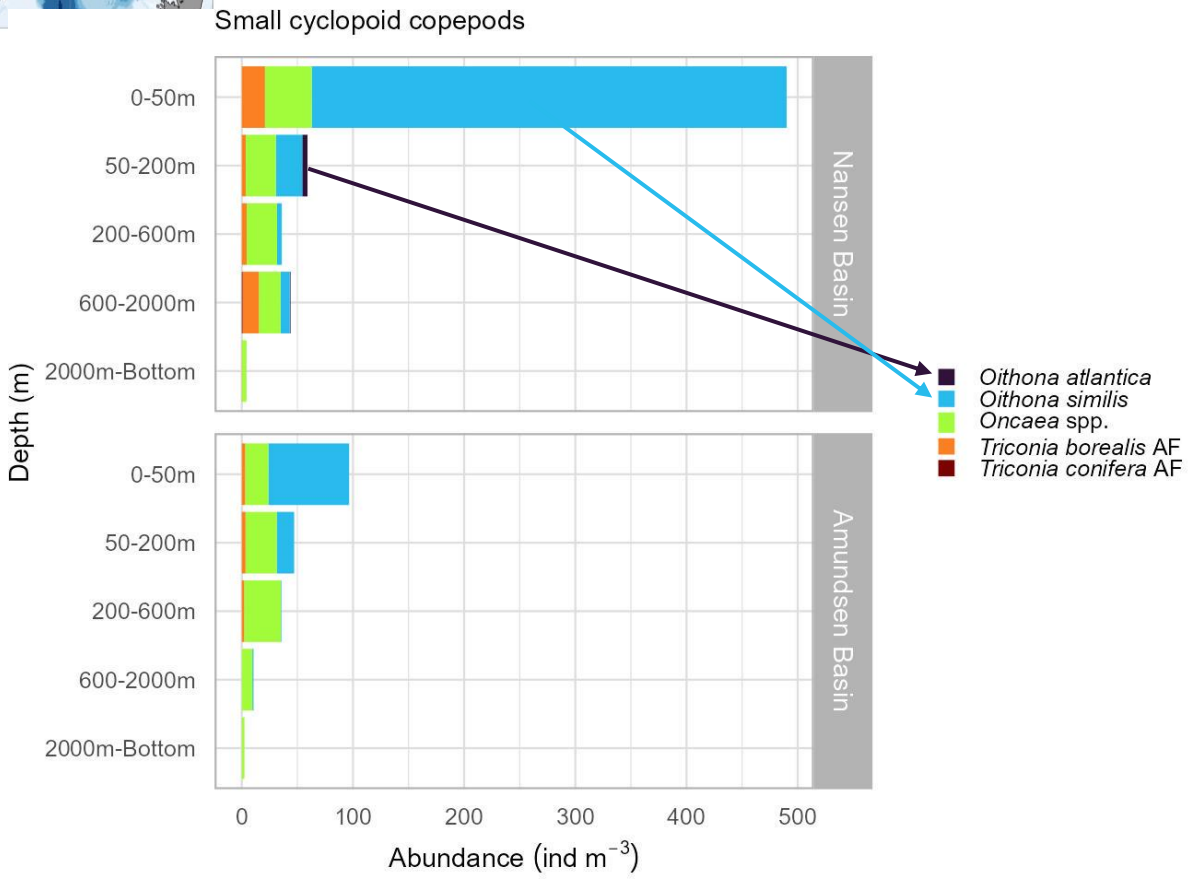


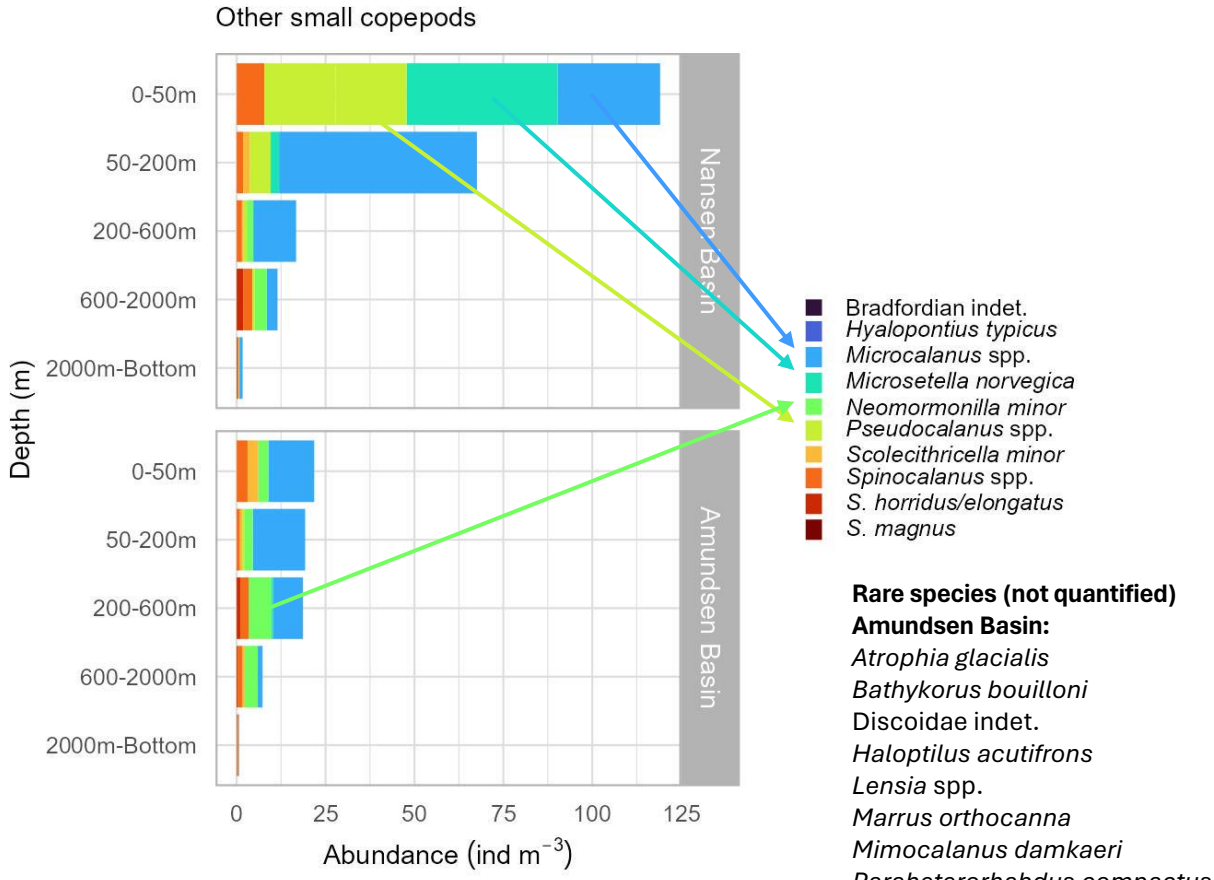


- Chaetognaths and euphausiids have contribute to the biomass in the southern Nansen Basin



Small copepods – species composition & depth distribution

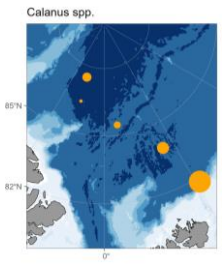




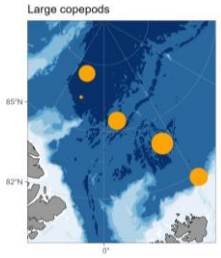
Rare species (not quantified)
Amundsen Basin:
Atrophia glacialis
Bathykorus bouilloni
Discoidae indet.
Haloptilus acutifrons
Lensia spp.
Marrus orthocanna
Mimocalanus damkaeri
Paraheterorhabdus compactus
Tharybis groenlandica
Xanthocalanus spp.

- *O. similis* high numbers in surface water in NB
- *O. atlantica & T. conifera* only in NB
- Relative high abundance (> 2000 ind m^{-3}) of cyclopoid nauplii in AB (not shown in figure)

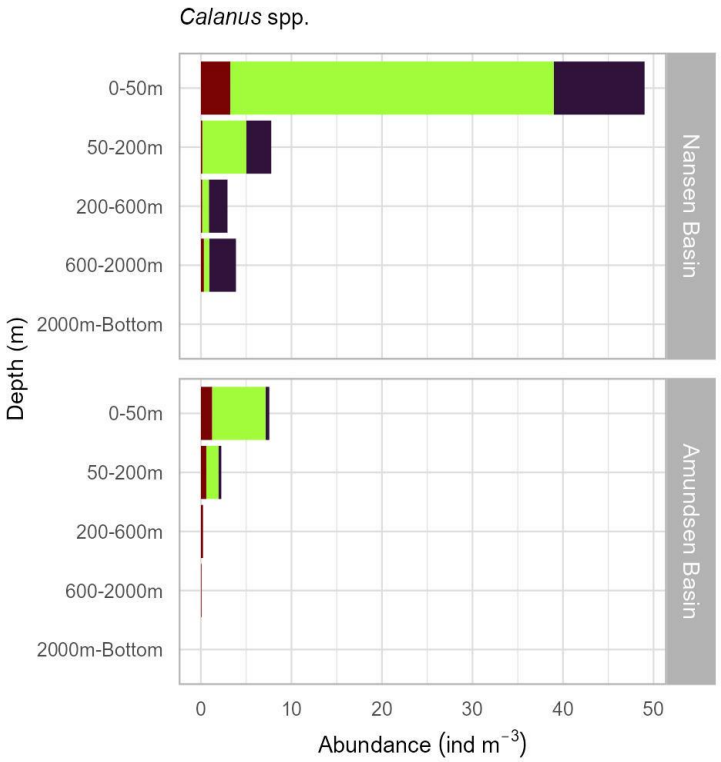
- *Microclanaus* spp., *Microcetella norvegica* & *Pseudocalanus* spp.: high numbers in surface waters in NB
- Many «rare species» not quantified in AB

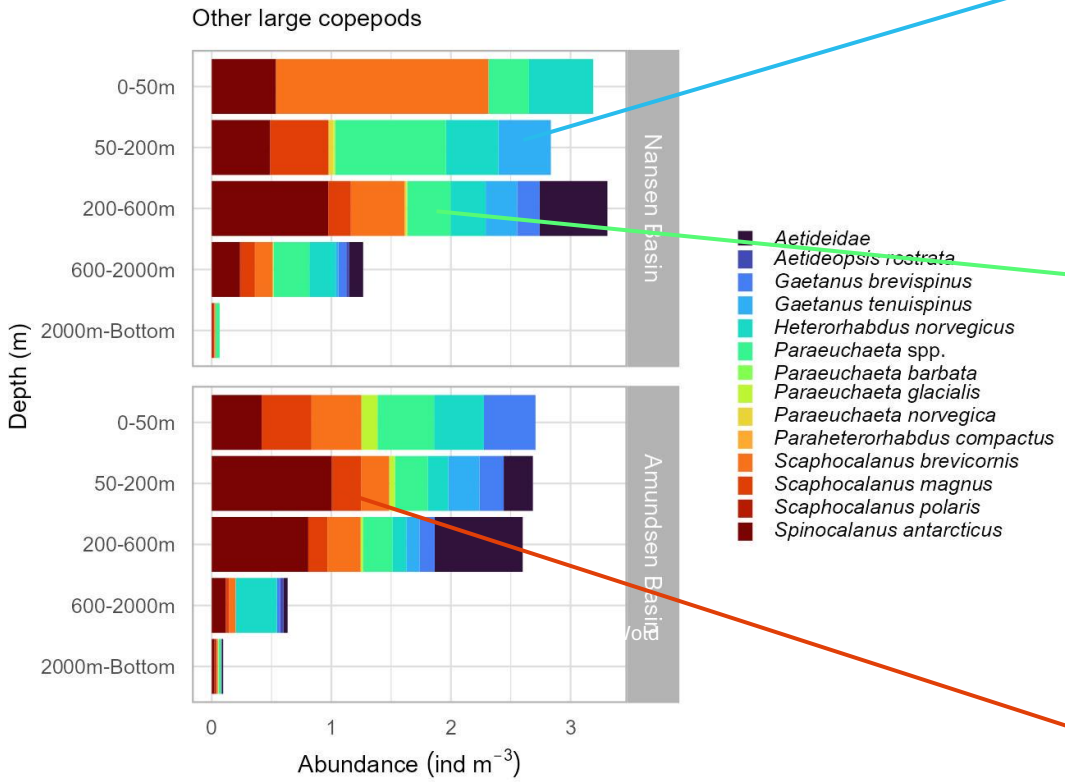


Calanus spp.



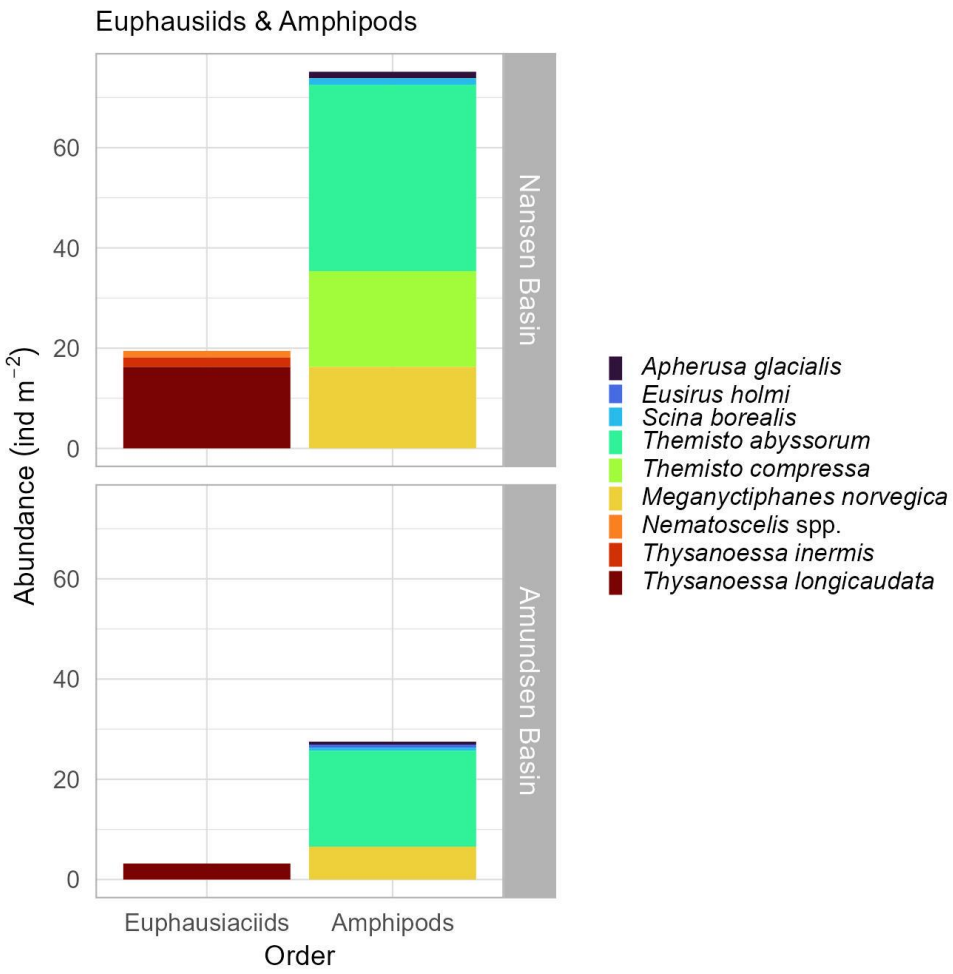
Other large copepods

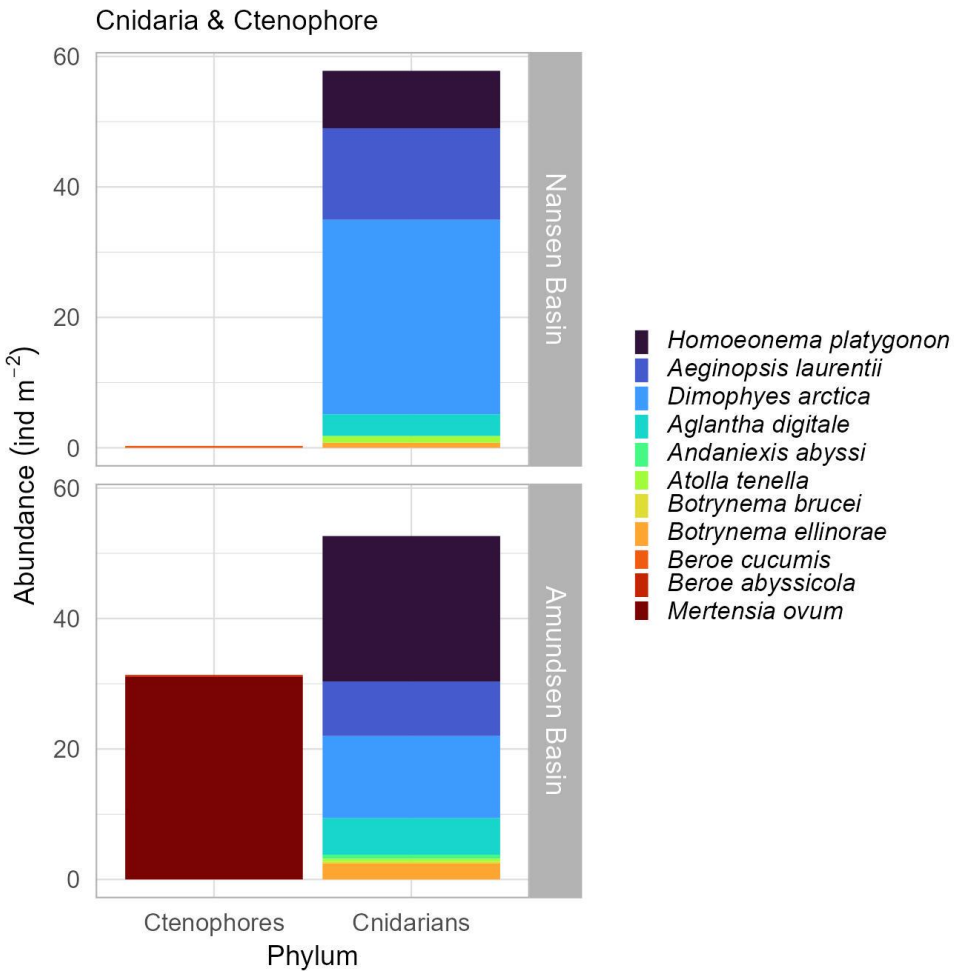




- High abundance of *C. finmarchicus* & *C. glacialis* in surface water of NB
- High diversity of large copepods at all depths, with lower abundance in the deepest (<600 m) layers.

Amphipods, Euphasiids & gelatinous zooplankton





- Euphasiids mainly present in the south
- Amphipods present in both basins

- In addition species present in low numbers not quantified such as :
  - **Narcomedusae**: *Aeginopsis laurentii, Bathykorus bouilloni, Solmundella bitentaculata*
  - **Trachymedusae:** *Sminthea arctica, Homoeonema platygonon, Plotocnide borealis*
  - **Siphonophora:** *Muggiaea bargmannae, Crystallophyes amygdalina, Marrus orthocanna*

Conclusions

- Highest biomass in the core of the Atlantic water inflow similar to what was observed in the period 1993-1998 (Kosobokova and Hirche, 2009).
- Sign of Atlantic influence in the northern part of NB, but not in AB
- Some less abundant species restricted to either NB or AB
- High biodiversity of copepods
- Part of a series of AO cruises
  - AO2022 Aug (Amundsen & Nansen Basin)
  - AO2023 Aug (Nansen Basin)
  - AO2024 Jul-Aug (Amundsen and Nansen Basin)

Species restricted to either NB or AB	
Nansen Basin	Amundsen Basin
Copepods	
Metridia lucens	*Disco triangularis*
Pseudocalanus acuspes	*Mimocalanus damkaeri*
Pseudocalanus minutus	*Brodskius arcticus*
Oithona atlantica	*Lubbockia glacialis*
Triconia conifera	*Jaschnovia brevis*
Microsetella norvegica	*Scaphocalanus* polaris
Amphipoda	
Andaniexis abyssi	Lysianassidae indet.
Euphausiacea	
	Nematoscelis megalops
Hydrozoa	
Plotocnide borealis	*Lensia conoidea*
Nectadamas diomedeae	*Marrus orthocanna*
	Crossota norvegica
	Beroe abyssicola