"This project is funded from Norway Grants in the Polish-Norwegian Research Programme operated by the National Centre for Research and Development"

Centre for Polar Studies

Assessement of climate change impact on size structure of benthic communities

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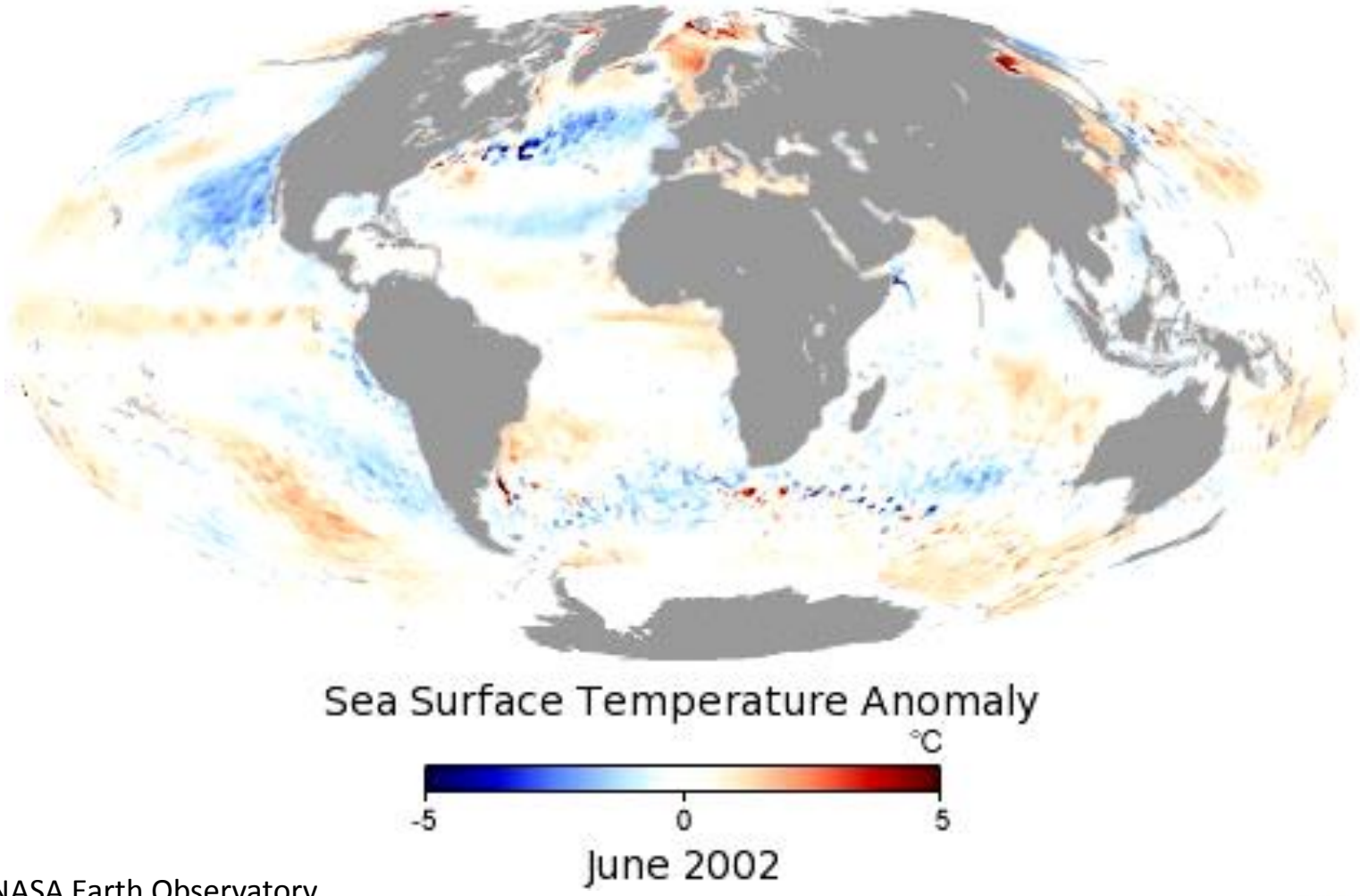
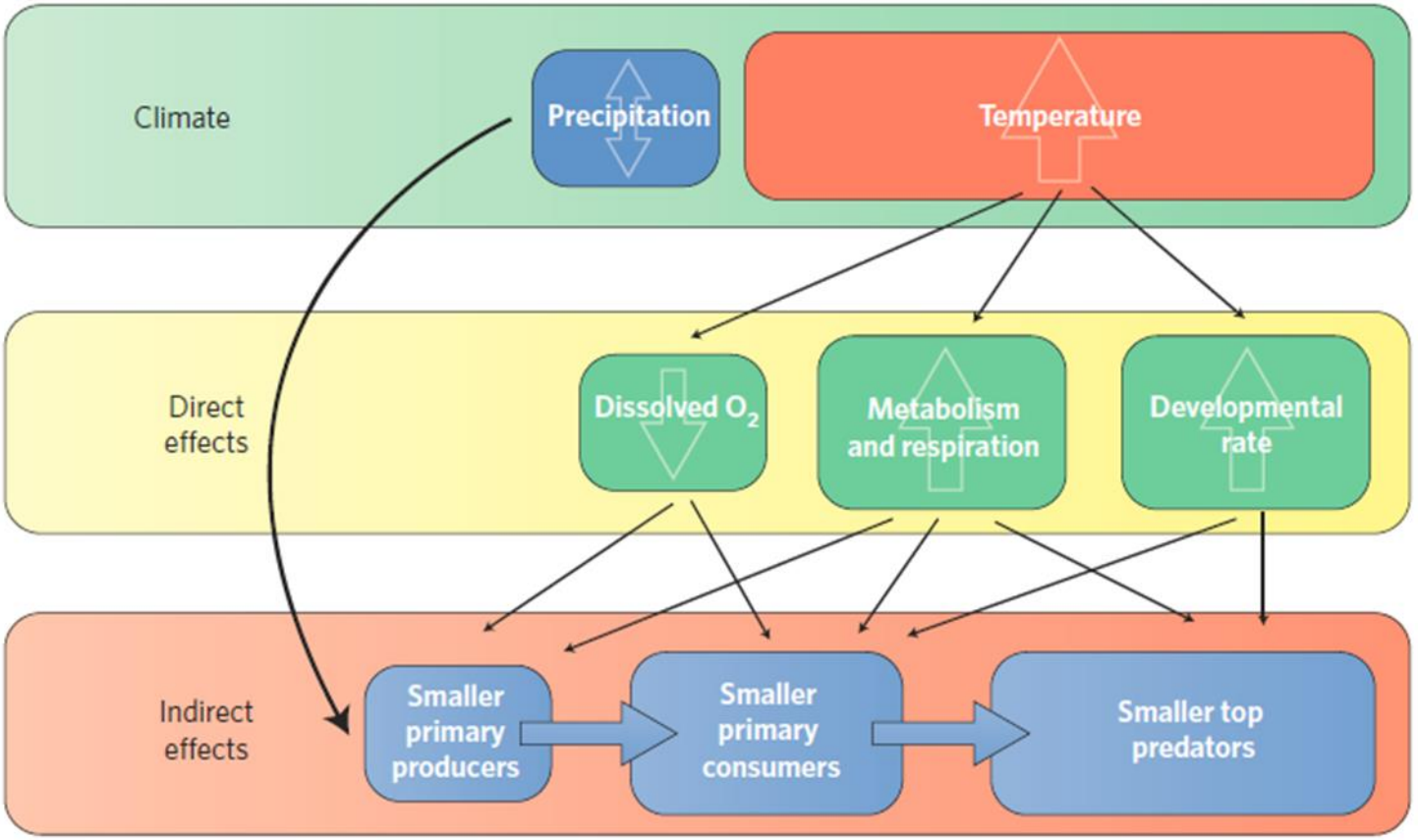
Getting warmer



Courtesy of NASA Earth Observatory

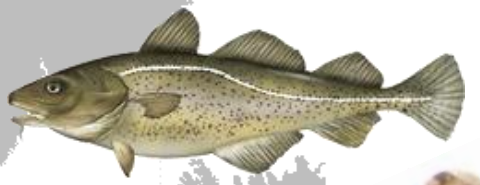
Direct and indirect effects of temperature



(Sheridan & Bickford 2011)

Consequences

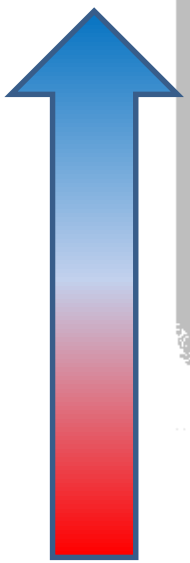
Northward range expansion of boreal species



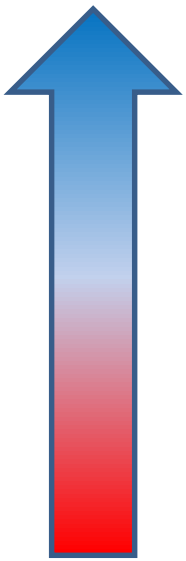
Atlantic cod

Blue mussel

Calanus finmarchicus



Consequences



Atlantic cod

Blue mussel

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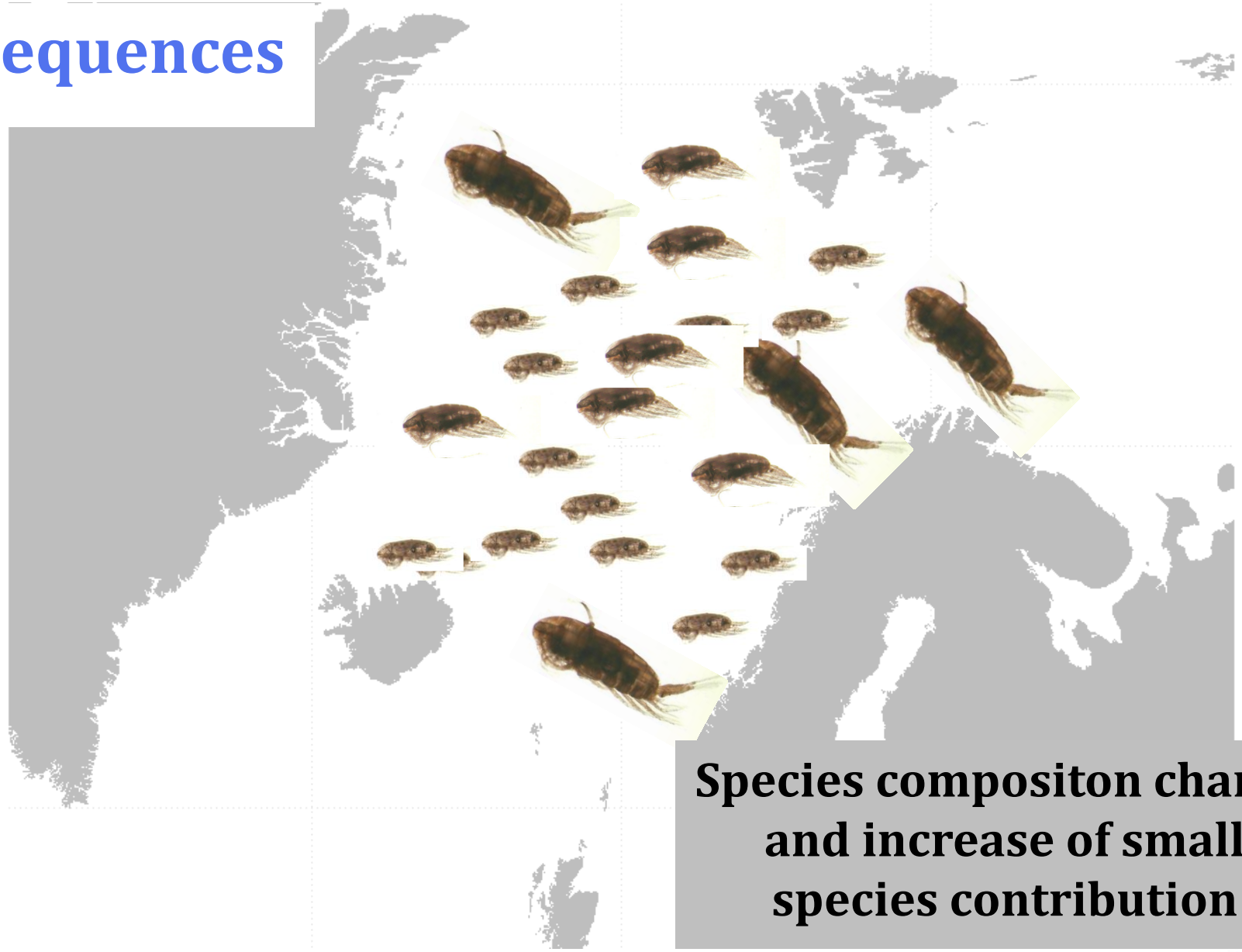
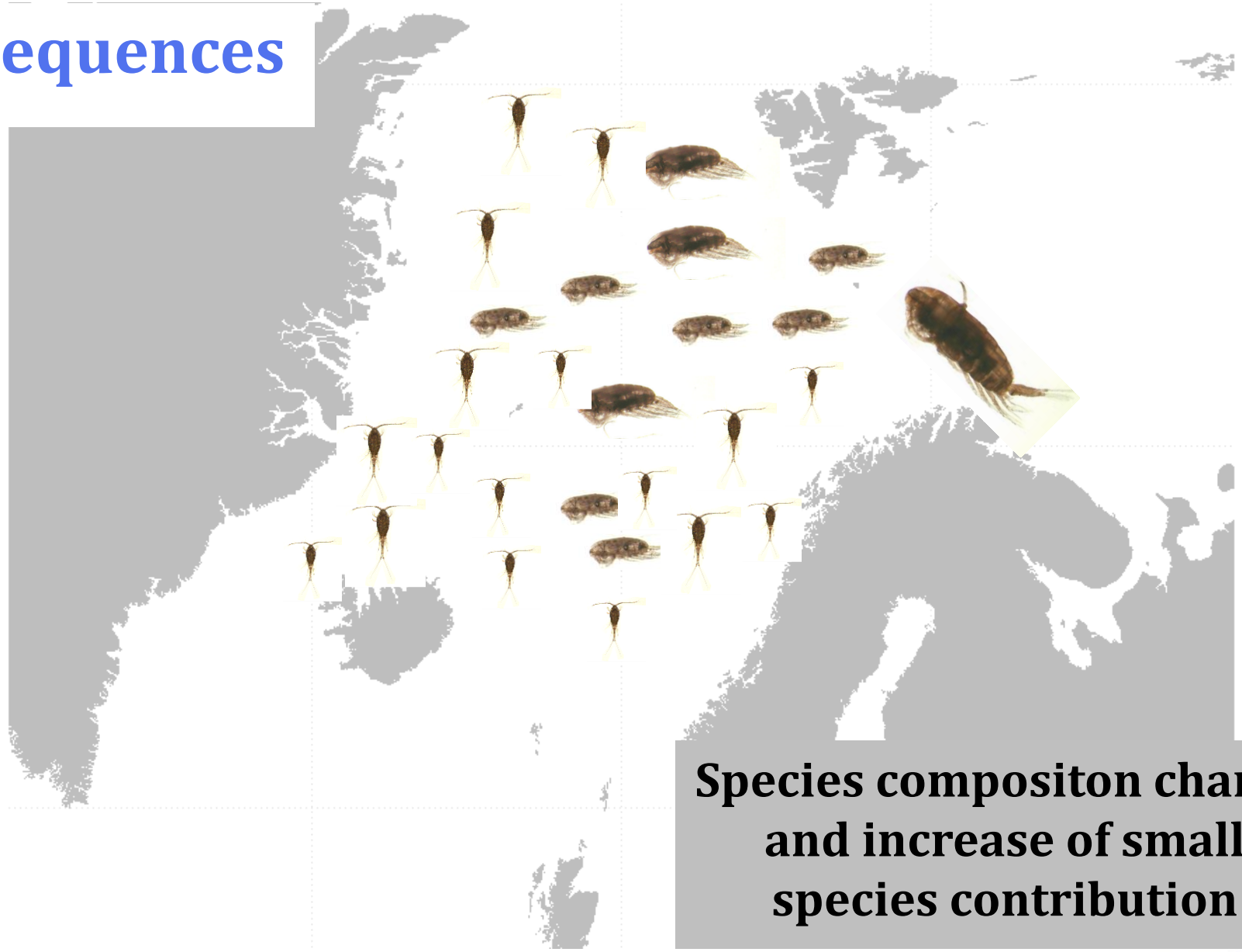
Northward range expansion of boreal species

Consequences



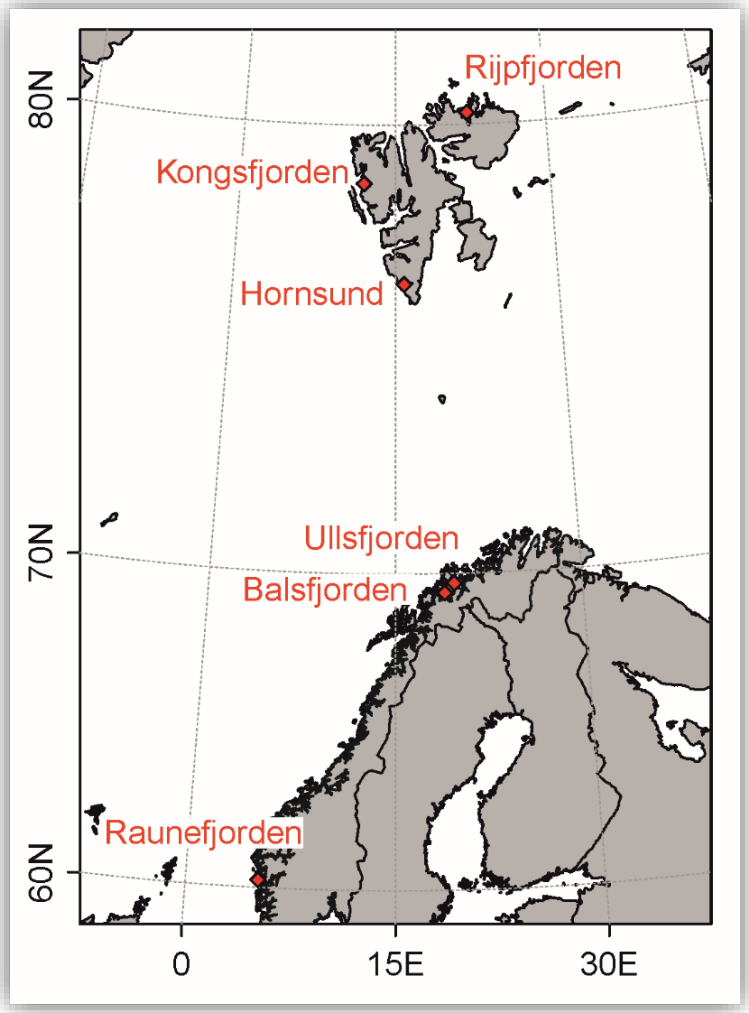
Species compositon change and increase of small species contribution

Consequences



Species compositon change and increase of small species contribution

Sampling

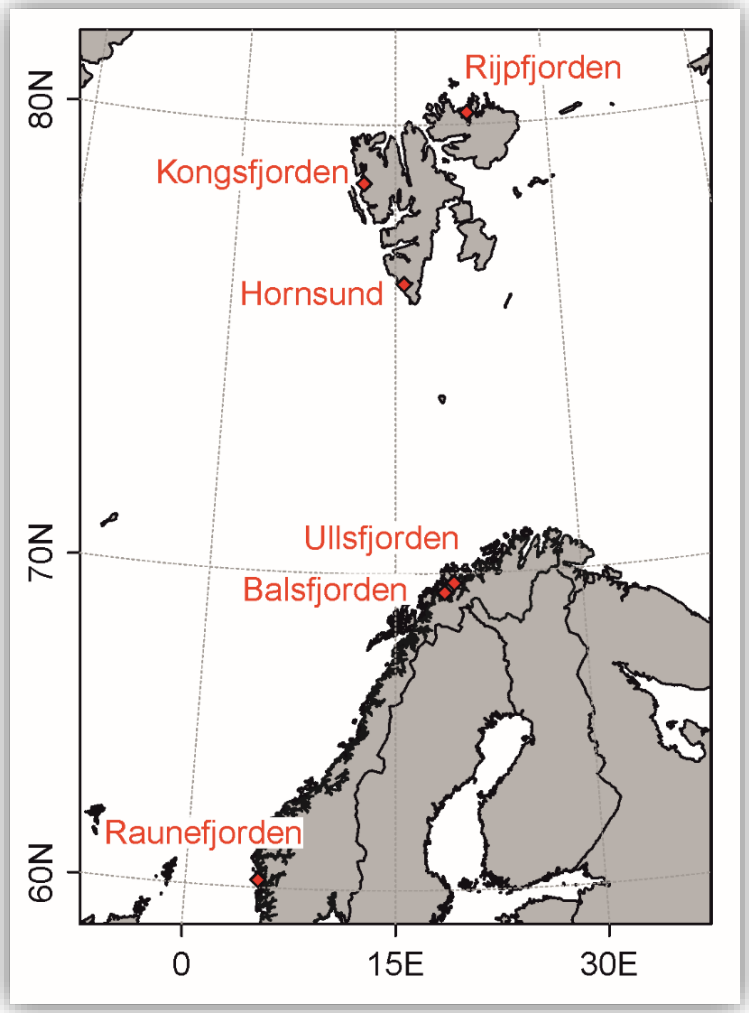


- Summer 2014: Ullsfjorden, Hornsund, Kongsfjorden, Rijpfjorden
- Winter 2015: Kongsfjorden
- Summer 2015: Raunefjorden, Balsfjorden

R/V Oceania

R/V Helmer Hanssen

Sampling



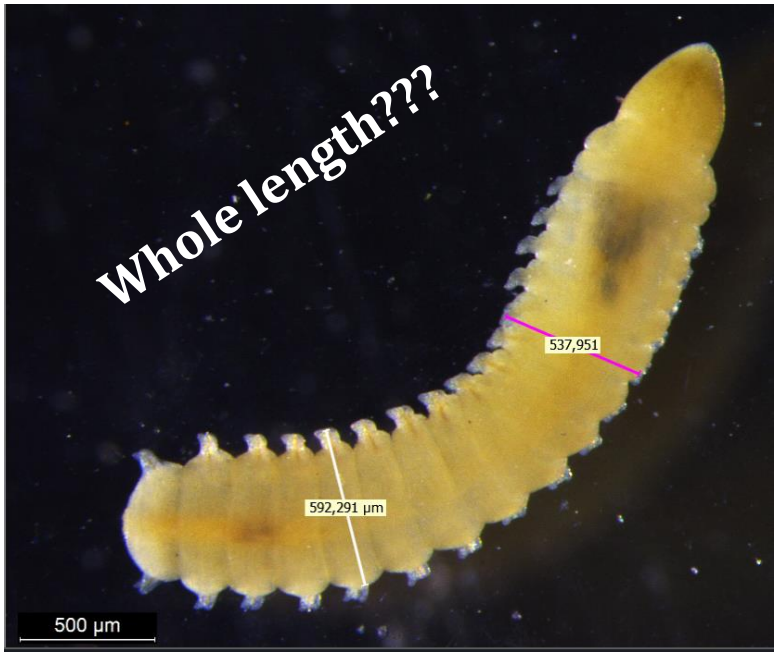
3 stations at each fjord:

- Macrofauna (van Veen)
- Sediment samples:
  - POC, $\delta^{13}C$
  - Photosynthetic pigmnets
  - Grain Size
  - ^{210}Pb, ^{234}Th
- CTD

Methodology

Measurements of individual size

Methodology



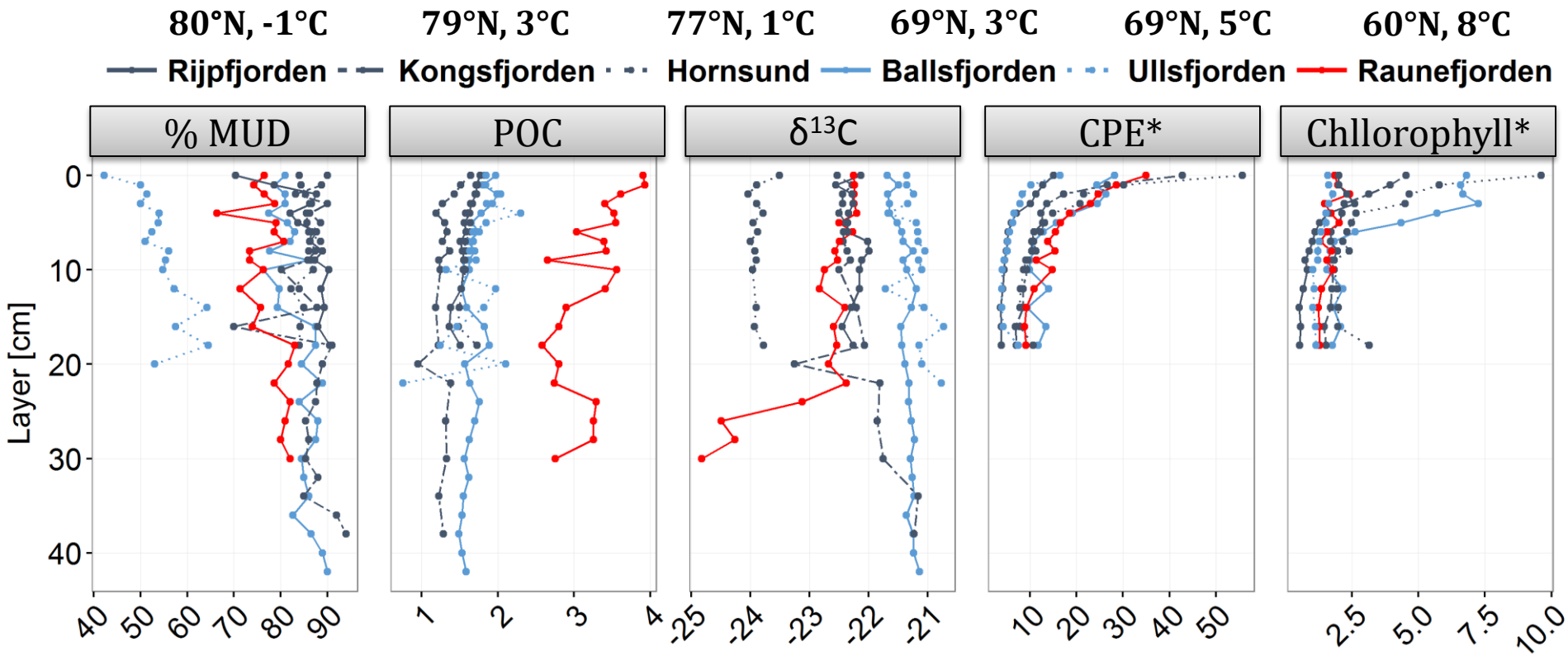
Measurements of individual size

Biovolume calculations

Biomass of each specimen

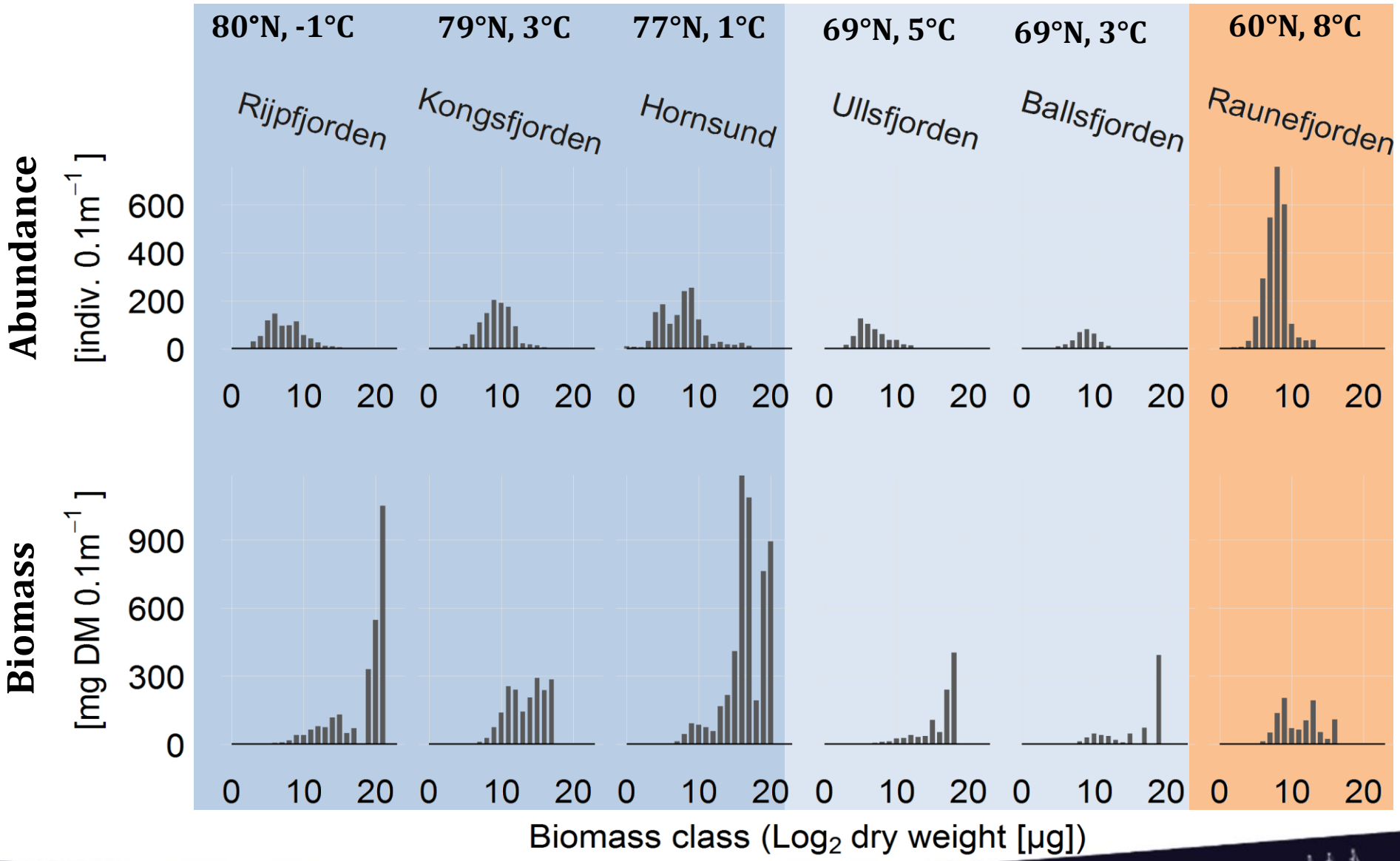
Family	equation	chetiger	r	p	r^2	N
Capitellidae	L = 4985.757 + 13.640*chet	chet 1	0.697	<0.001	0.486	23
	L = 6571.730 + 9.336*chet	chet 2	0.594	0.004	0.352	22
	L = 6626.593 + 8.962*chet	chet 3	0.609	0.003	0.371	22
	L = 6644.671 + 8.961*chet	chet 4	0.607	0.005	0.369	20
	L = 6680.113 + 8.936*chet	chet 5	0.609	0.004	0.371	20
	L = 6509.111 + 9.530*chet	chet 6	0.651	0.002	0.424	20
	L = 6143.365 + 10.735*chet	chet 7	0.661	0.003	0.437	18

Characteristics of sediments

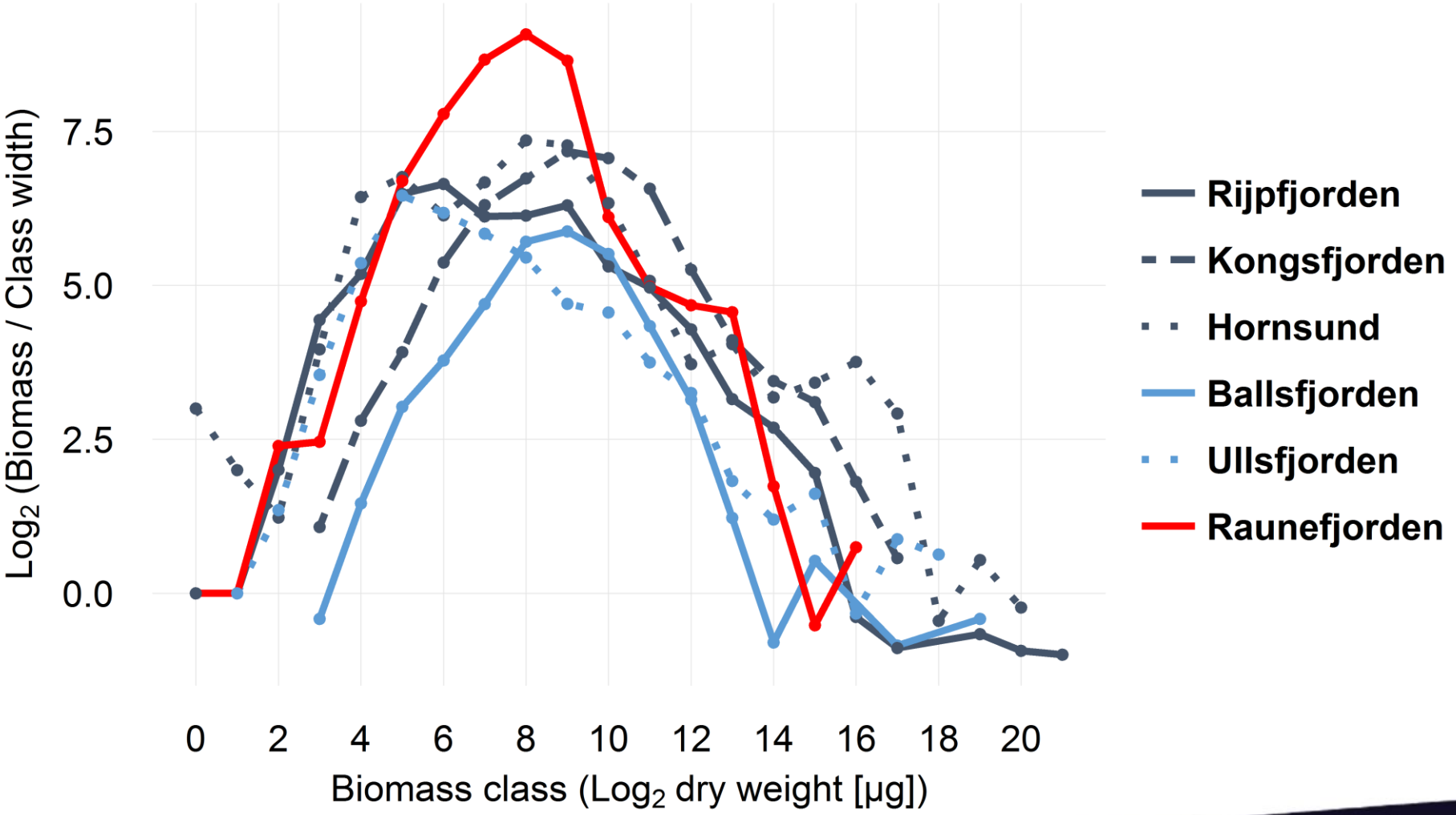


* µg g sediment^{-1}

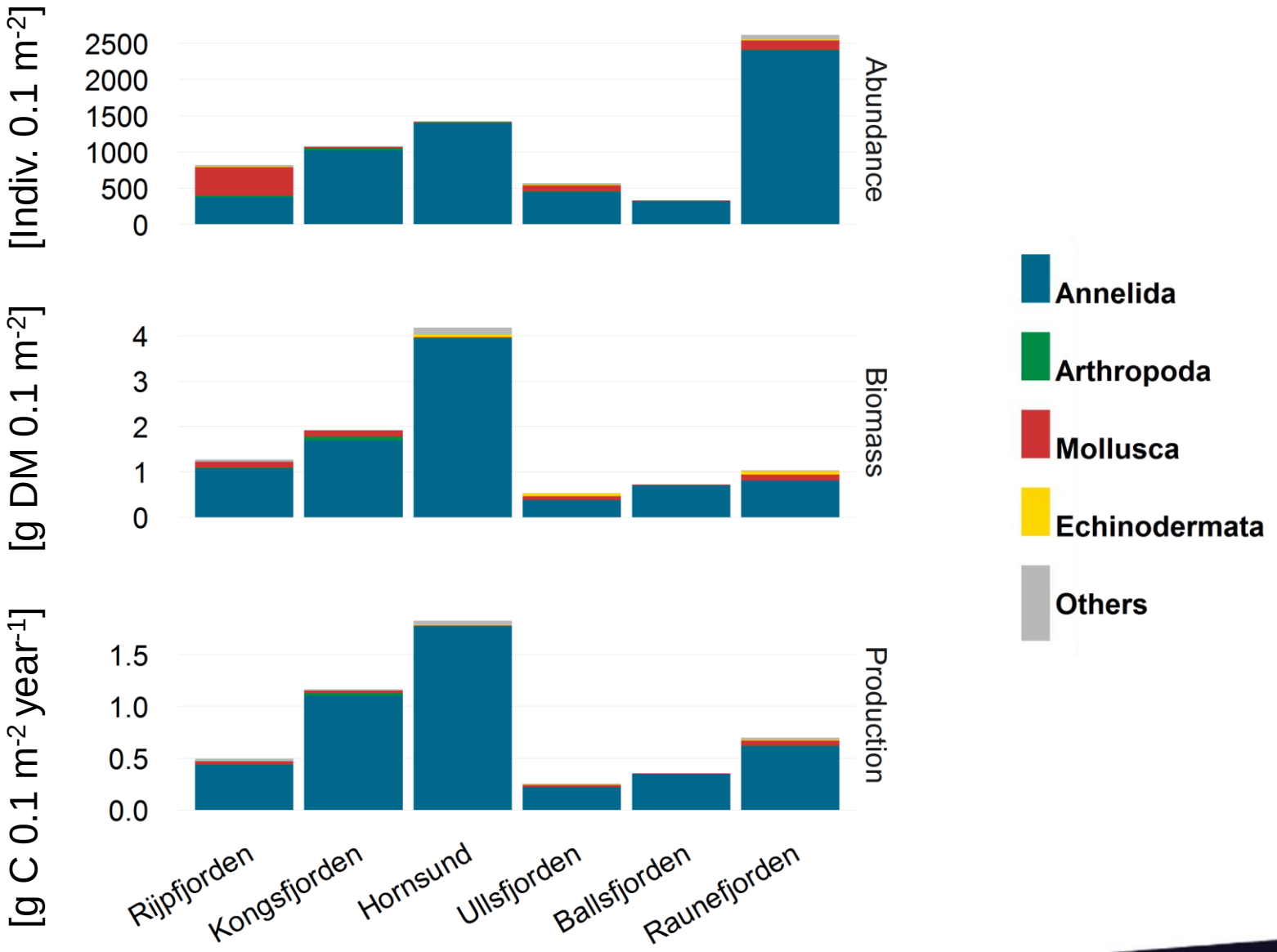
Size spectra



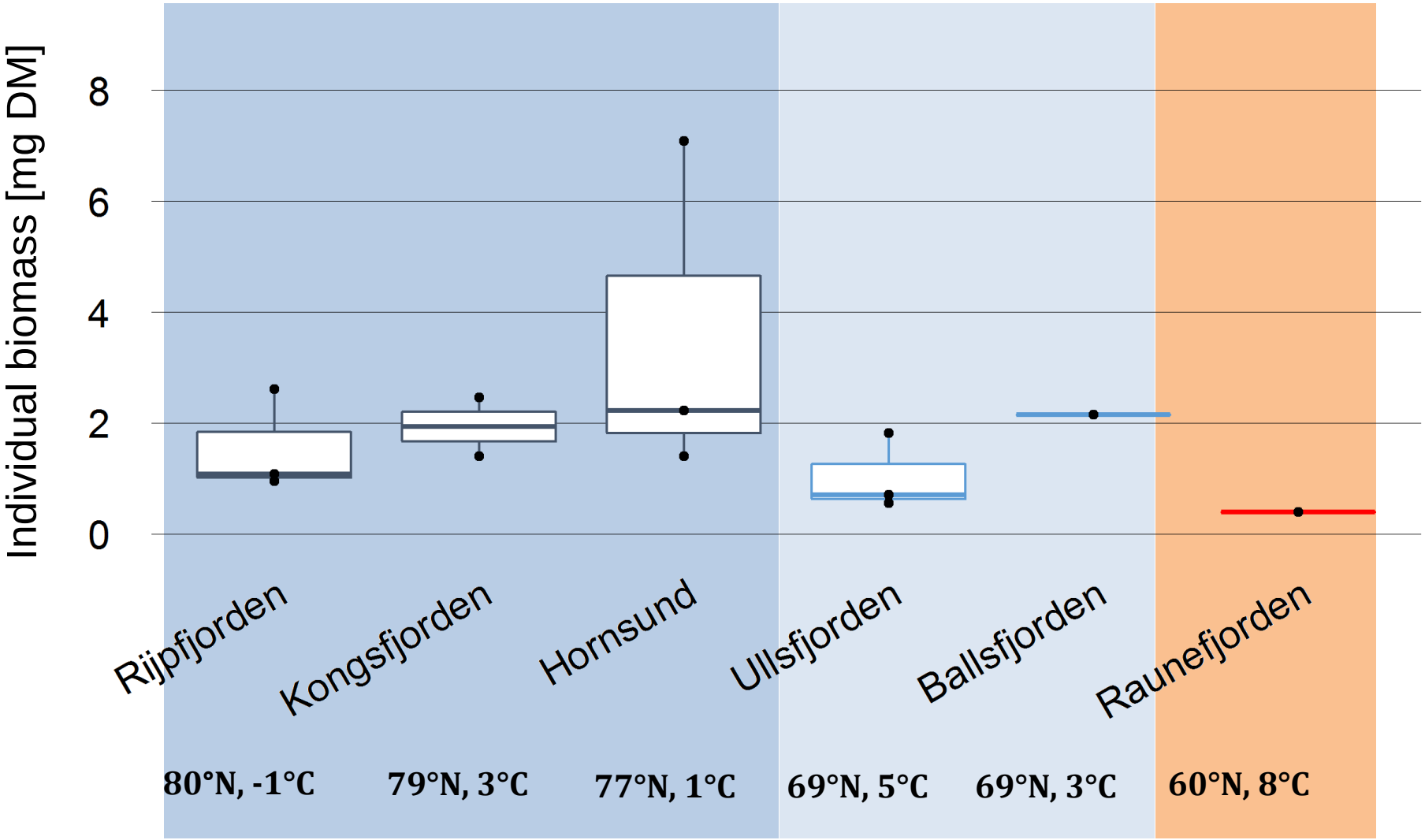
Normalised Biomass Size Spectra



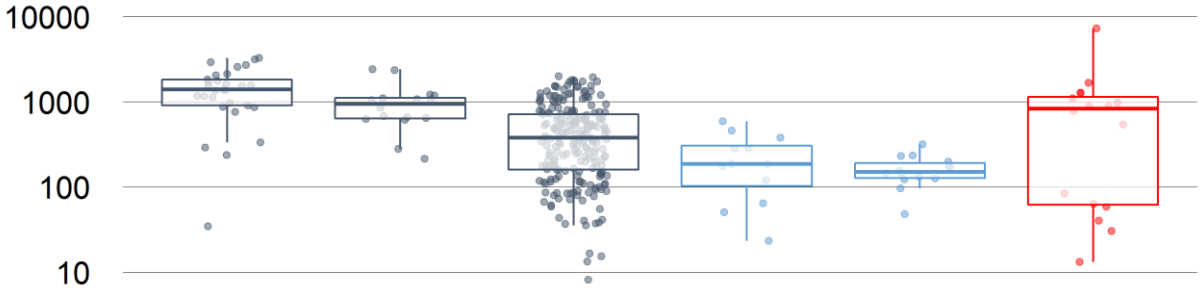
Abundance, Biomass & Production



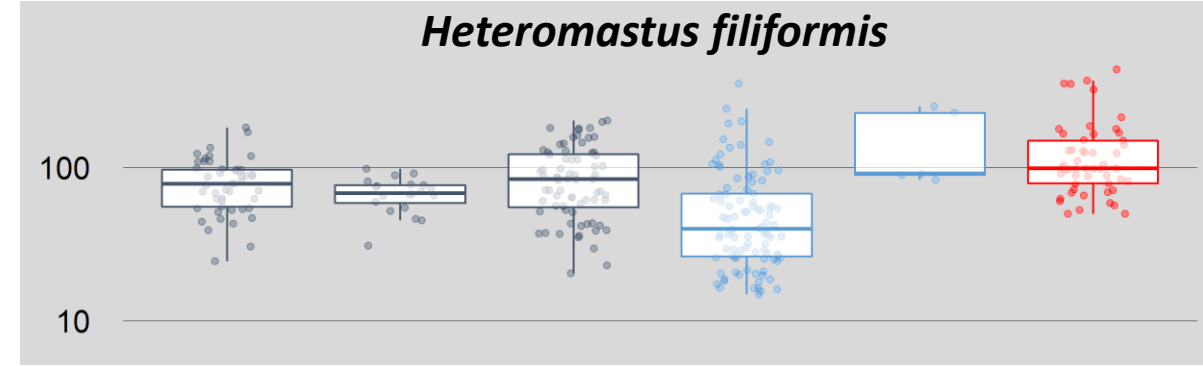
Mean individual biomass



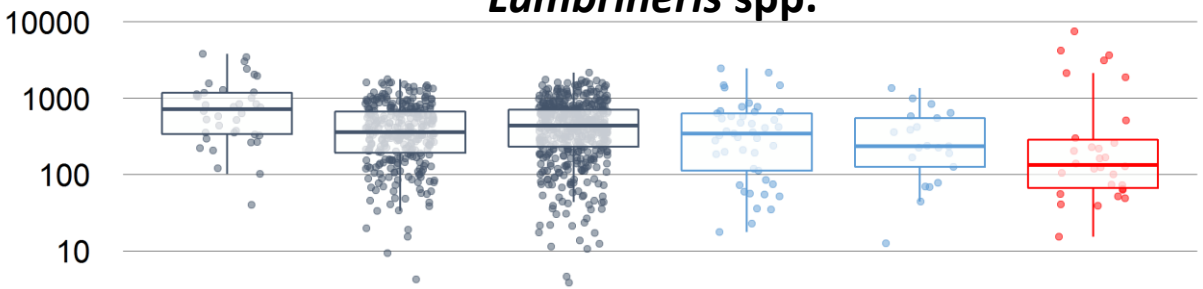
Chaetozone spp.



Heteromastus filiformis



Lumbrineris spp.



Individual biomass [µg DM]

Rijpfjorden
Kongsfjorden
Hornsund
Ullsfjorden
Ballsfjorden
Raunefjorden

Conclusions

- The temperature regime seems to play an important role in shaping the size structure of benthic communities
    - especially regarding the contribution of the biggest organisms
- Also the productivity and supply of organic matter appears to be of great importance
- The response of benthic species on climate warming by decreasing in size may not be as general as predicted

Thank you