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

Will the warming influence the size in Arctic meiofauna?

- patterns in biomass and production size spectra along the latitudinal gradients (60 – 80 °N)

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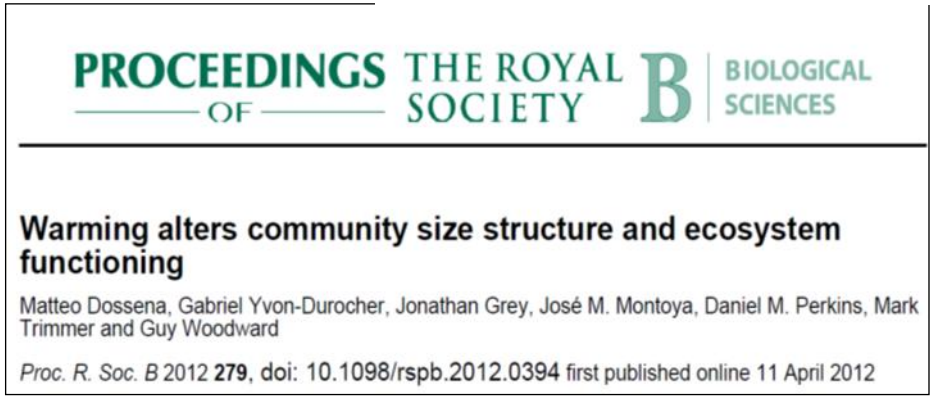
SIZE matters!

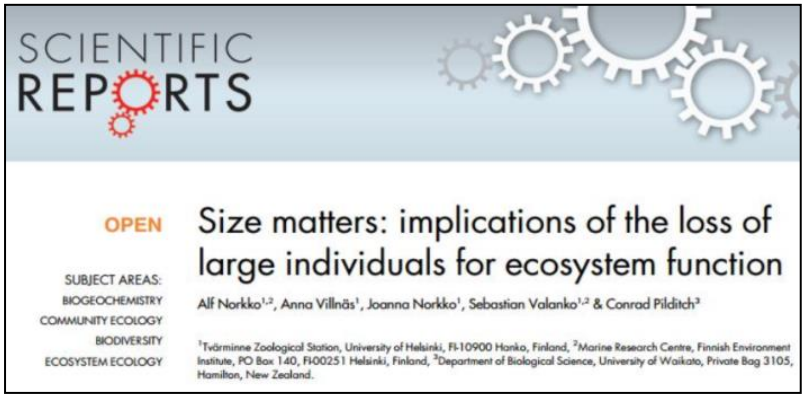
‚SIZE is a supreme regulator of all biological matters' – Bonner, 2006 – determines rates of an organism basic processes (metabolism, generation time, longevity, locomotion speed, …)

SIZE structure in communities and populations shapes ecosystem functioning (e.g. energy flows in food-webs, …)

Shrinking body size as an ecological response to climate change

Jennifer A. Sheridan* and David Bickford*

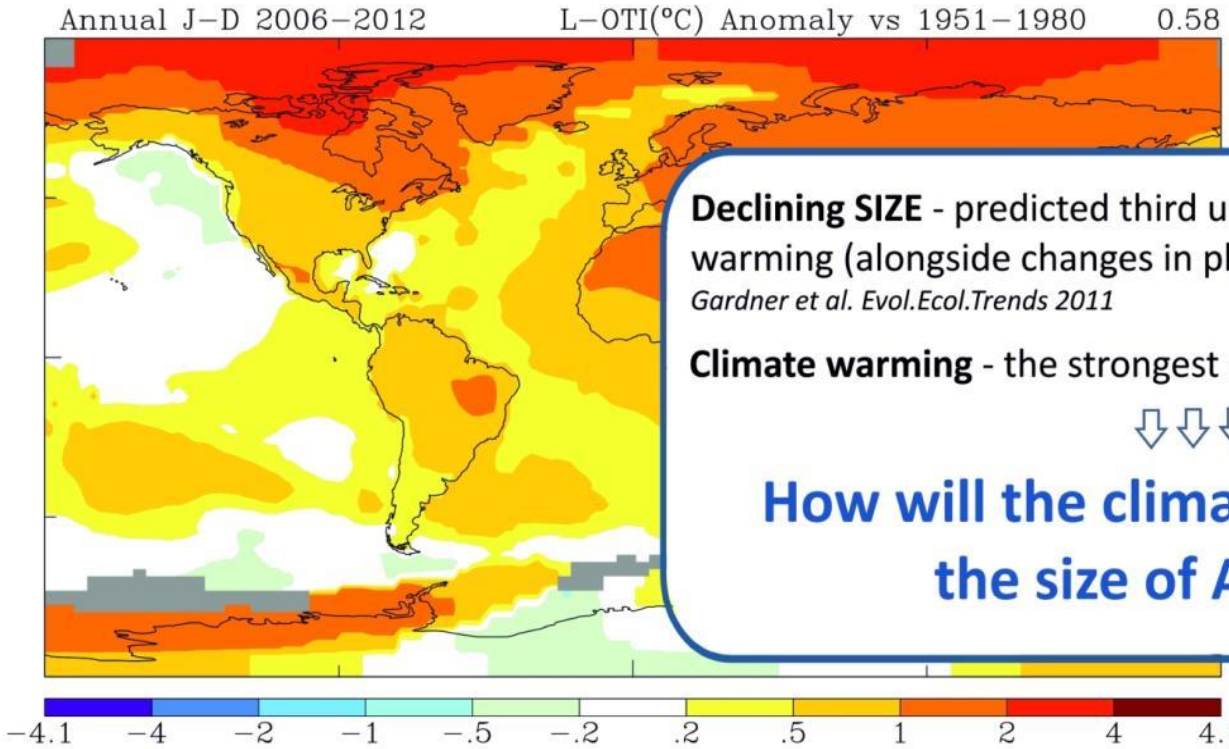




DWARF

Declining size – a general response to climate warming in Arctic fauna? (DWARF)

Hypothesis: **elevated temperatures will induce size reductions in large range of high latitude ectotherms**



Average surface temperatures from 2006-2012 compared to a base period of 1951-1980.
courtesy of ***NASA Goddard Institute for Space Studies***

Declining SIZE - predicted third universal response to climate warming (alongside changes in phenology and species distributions)
Gardner et al. Evol.Ecol.Trends 2011

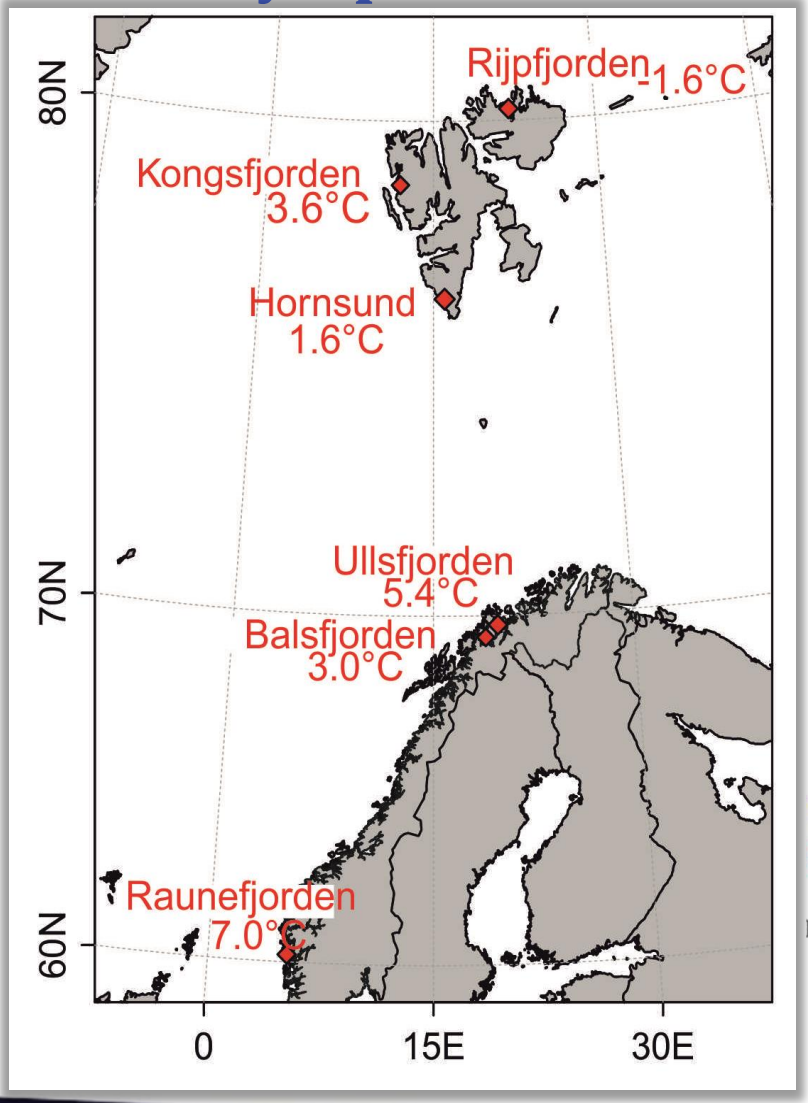
Climate warming - the strongest effects in **Arctic regions**

⇩⇩⇩

How will the climate warming affect the size of Arctic biota?

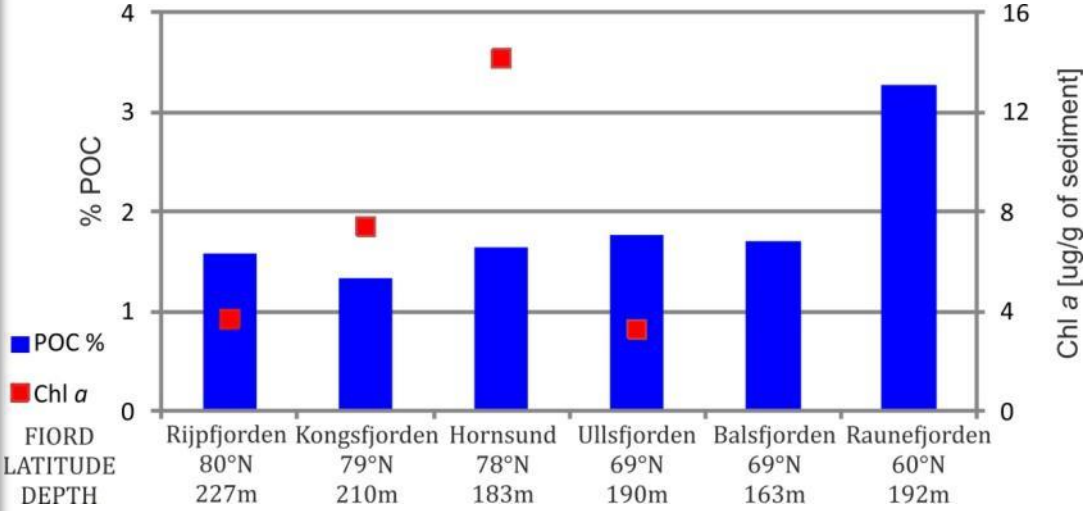
DWARF

DWARF - benthic communities size structure - large scale survey ‚space for time' analogue approach to study temp. effects



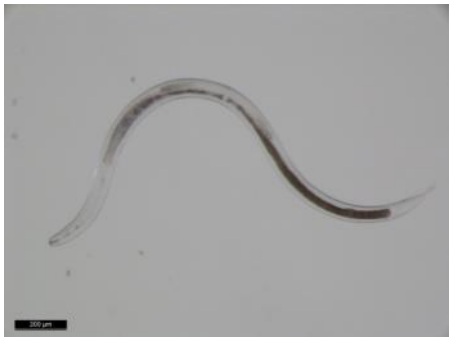
R/V Oceania

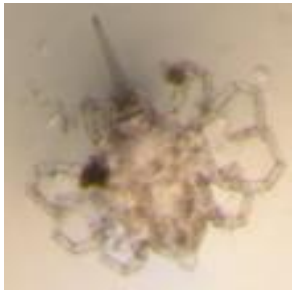
R/V Helmer Hanssen

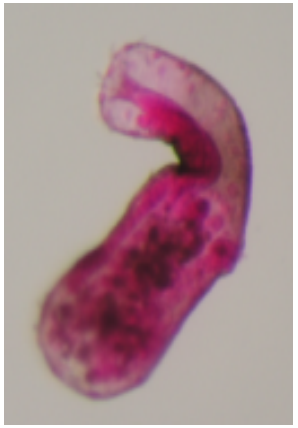


Methodology


box corer







Measurements of individual size

Biovolume calculations

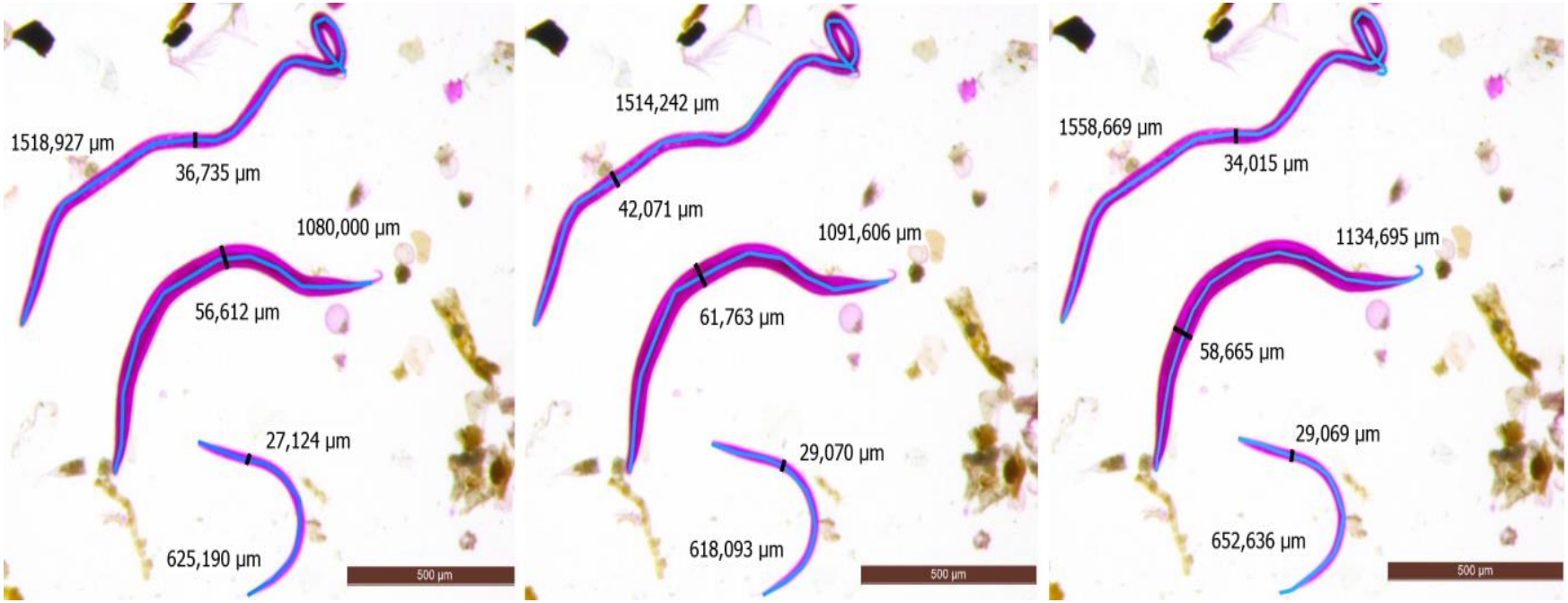
Biomass of each specimen

Benthic Biomass Size Spectra

Secondary production estimations

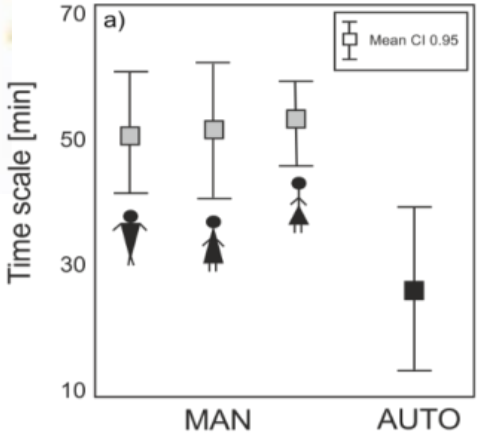
DWARF

Manual measurments



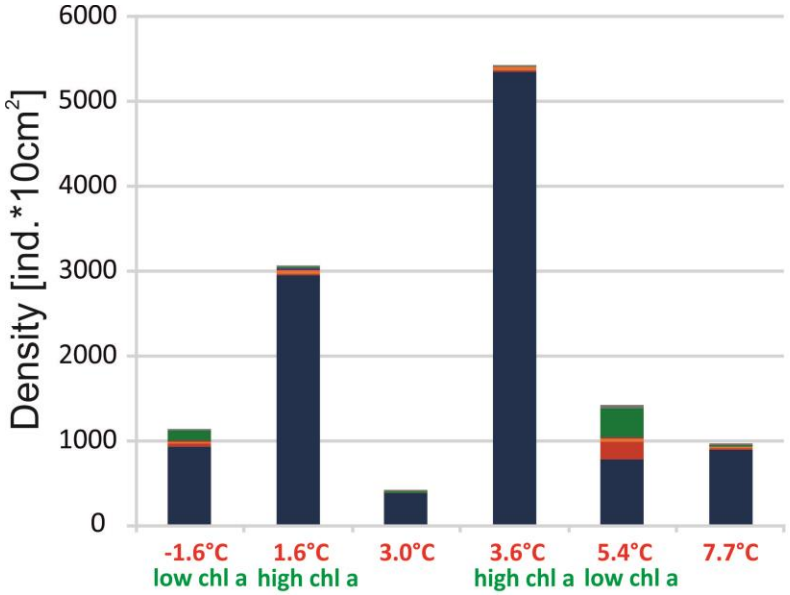
The same picture with three nematodes measured manually (length and width at the widest point) by three scientists

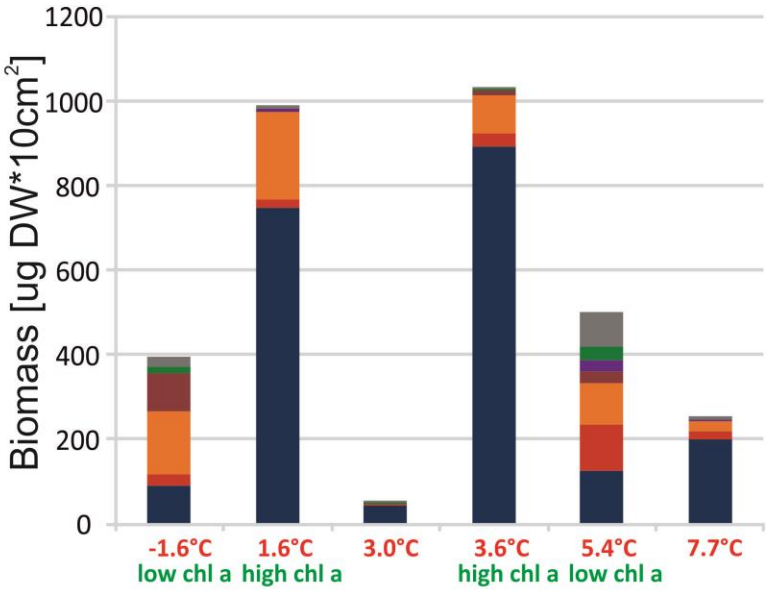
Semi-automated measurments of nematodes using Leica software with Image Analysis module

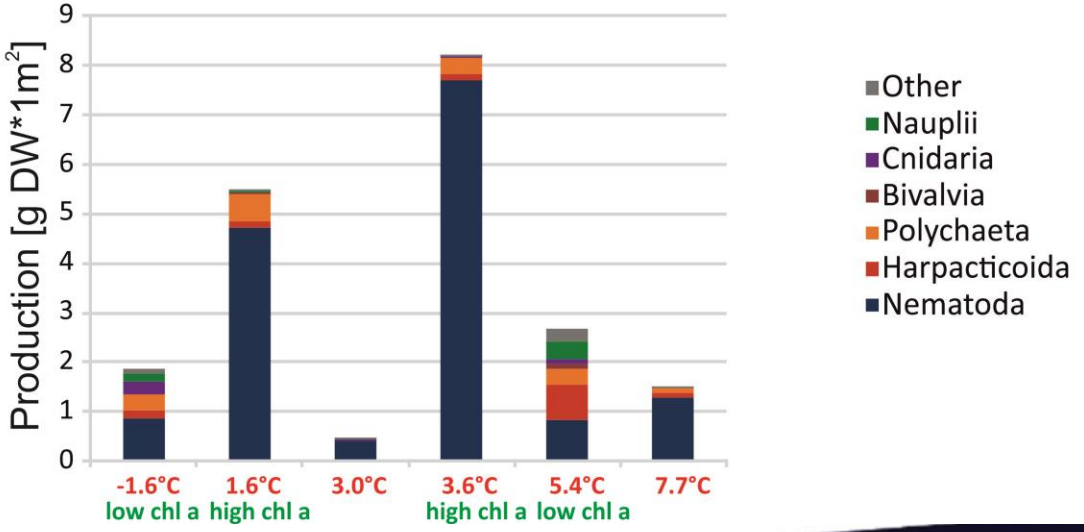


Mazurkiewicz M., Górska B., Jankowska E., Włodarska-Kowalczuk M. *Assessment of nematode biomass in marine sediments - semi-automated image analysis method.* Limnology and Oceanography: Methods (in press)

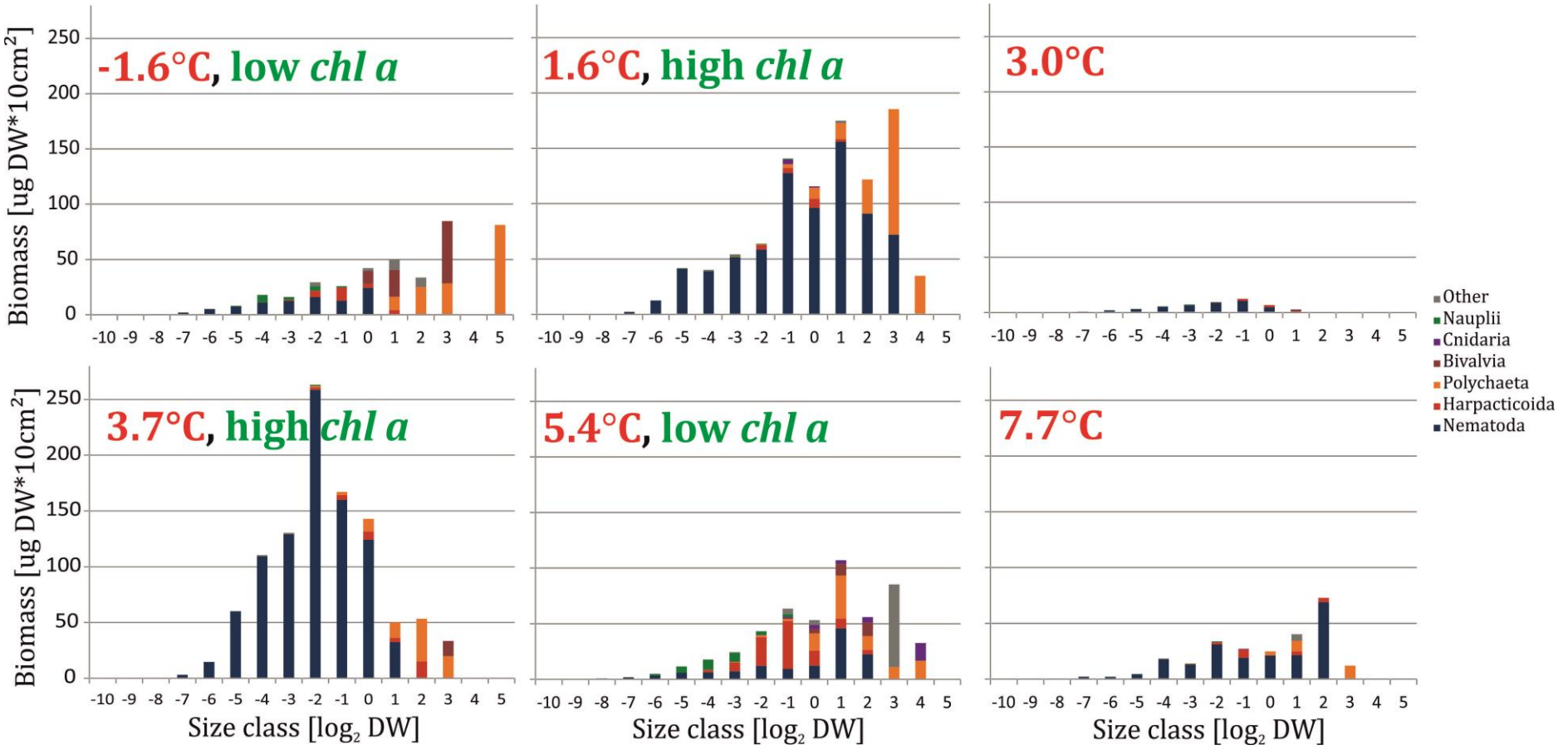
Density, biomass and secondary production



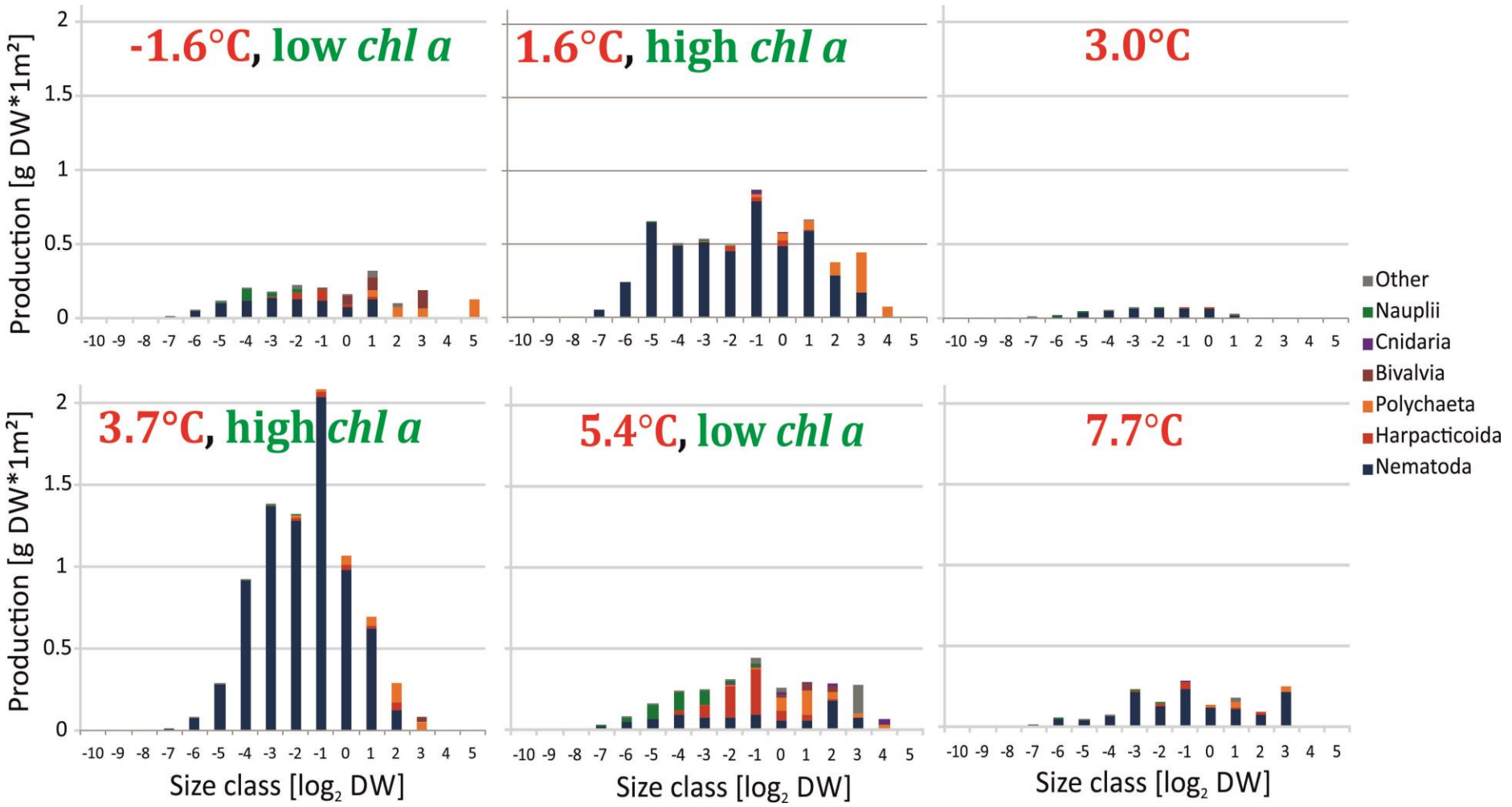




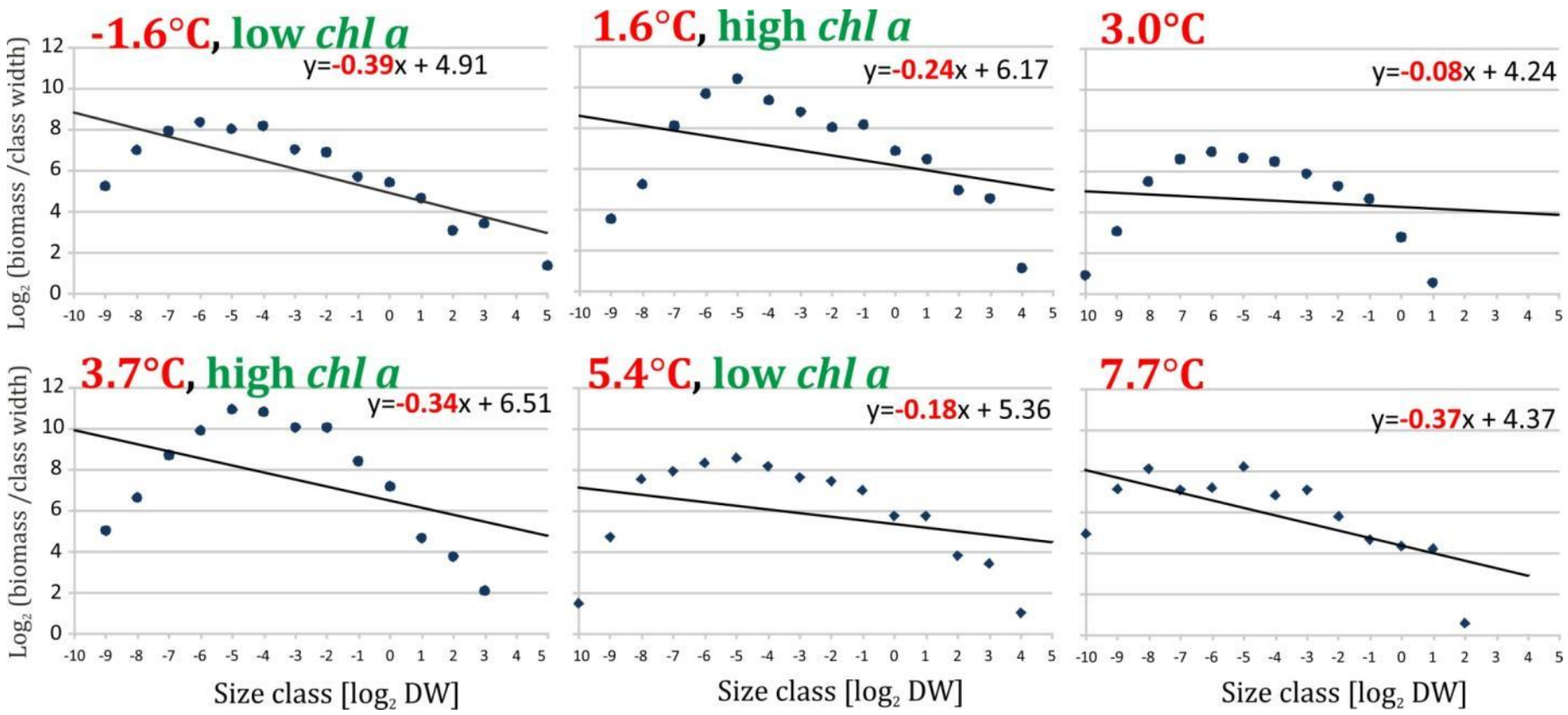
Biomass size spectra



Production size spectra



Normalized biomass size spectra



Conclusion

- No clear effect of latitude/temperatue on meiofaunal size spectra

- Food availability impact meiofauna biomass and secondary production

Increased supply of fresh, plant-origin organic matter (enhanced by increase of primary production driven by climate change) may cause an increase of meiofaunal biomass and secondary production

Thank you

http://**www.iopan.gda.pl/projects/Dwarf/**