



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

Principal Investigator: dr hab. Maria Włodarska-Kowalczyk

Presentation: Prof. Paul Renaud



Call: Core 2012 Call of *the Polish-Norwegian Research Programme* implemented under the *Norwegian Financial Mechanism*

Area: Climate change including polar research

Programme operator: The National Center for Research and Development

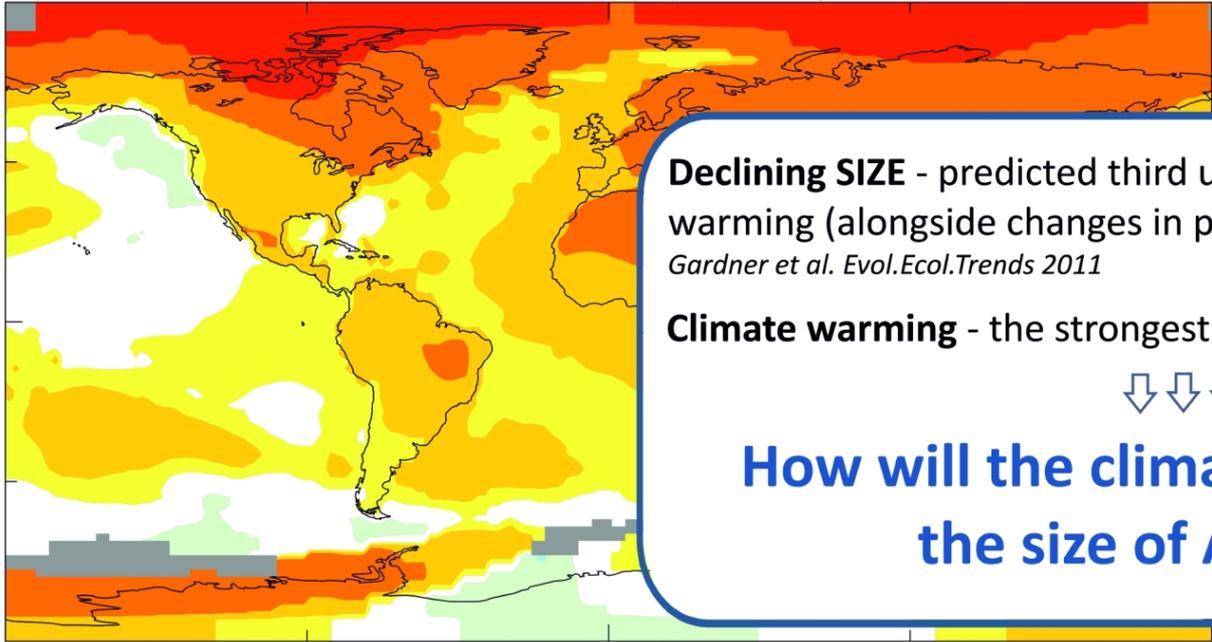
Duration: 36 M (February 2014 – January 2017)

Budget: 3 956 989 PLN

Project Promoter: Institute of Oceanology PAN

Project Partners: Norwegian Institute for Nature Research (NINA), Tromsø
University of Oslo (UiO)
Akvaplan-niva (APN), Tromsø

Annual J-D 2006-2012 L-OTI(°C) Anomaly vs 1951-1980 0.58



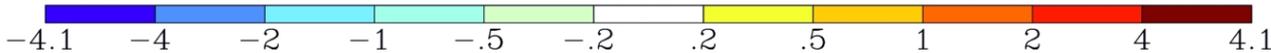
Declining SIZE - predicted third universal response to climate warming (alongside changes in phenology and species distributions)

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?

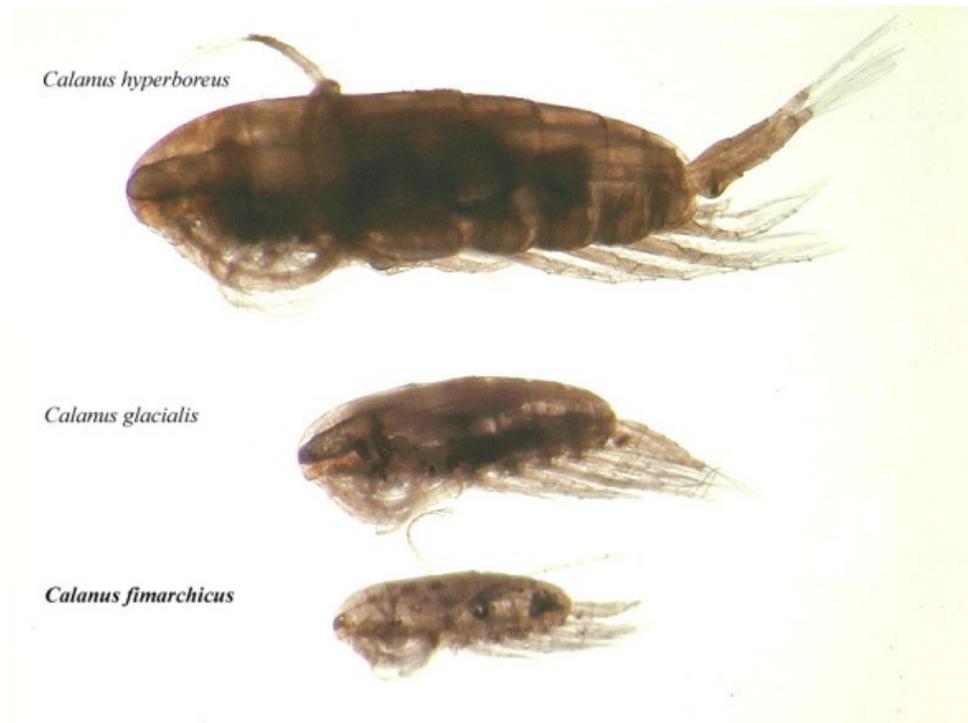


Average surface temperatures from 2006-2012 compared to a base period of 1951-1980.
courtesy of **NASA Goddard Institute for Space Studies**

Two ecological rules:

1. Bergmann's rule = body size increase towards colder areas (*In ectotherms often called Bergmann clines*)

2. Temperature-size rule (TSR) = ectotherms grow larger if kept at lower temperatures;



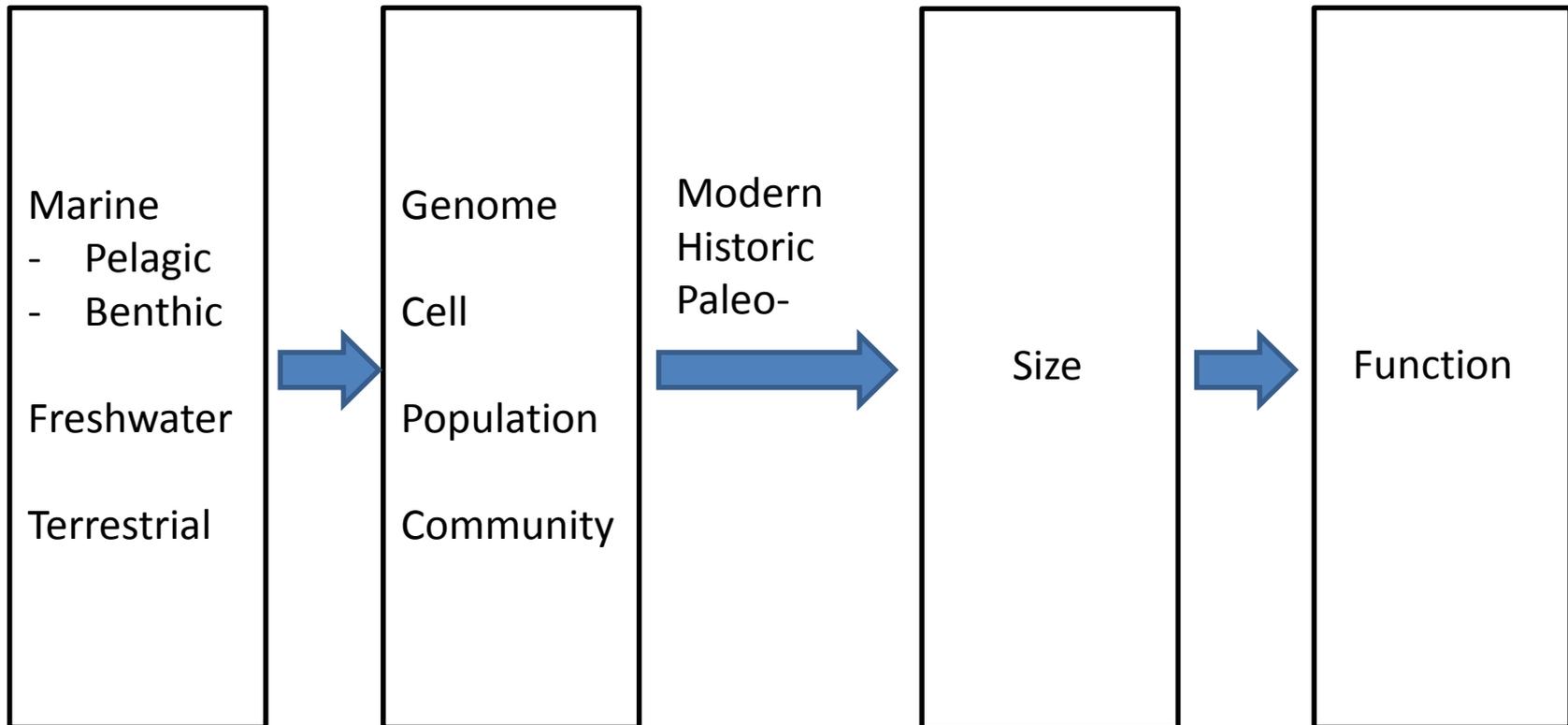
„**SIZE** is a supreme regulator of all matters biological” – Bonner, 2006
determines the rates of basic processes (metabolism, generation time, longevity, locomotion speed, ...)

SIZE structure shapes ecosystem functioning (e.g. energy flows in food-webs)



Big Fish Eat Little Fish, Peter Bruegel the Elder, 1557

DWARF hypothesis: Elevated temperatures will result in decreased sizes of a wide range of high-latitude ectotherms





Hypogastrura viatica

- TASKS:**
- Latitudinal gradient: mainland Norway-Svalbard
 - body-, cell- and genome- size distribution analyses of populations
 - experimental studies



the dung fly
Scatophaga furcata



WP1 Leader:
Prof. Hans P. Leinaas
University of Oslo



WP2 Leader:
Dr Martin A. Svenning
NINA Tromsø

TASKS:

- Latitudinal gradient: mainland Norway-Svalbard
- Char: body size, cell size and genome size analyses
- Invertebrates: body size, cell size and genome size analyses
 - experimental studies



Salvelinus alpinus



Gammaracanthus loricatus



Lepidurus arcticus



Mysis relicta



WP3 Leader:
Dr Sławek Kwaśniewski
IOPAN, Sopot

TASKS:

- Latitudinal gradient: mainland Norway-Svalbard
- Size/biomass structure of mesozooplankton community
- Effects on food-web interactions and energy flow

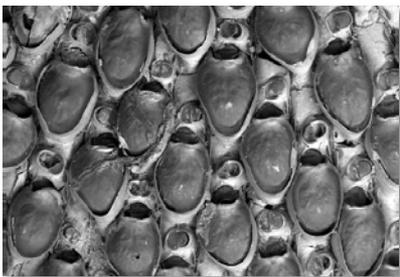




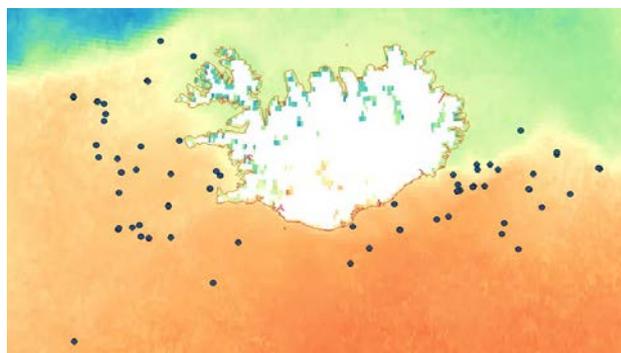
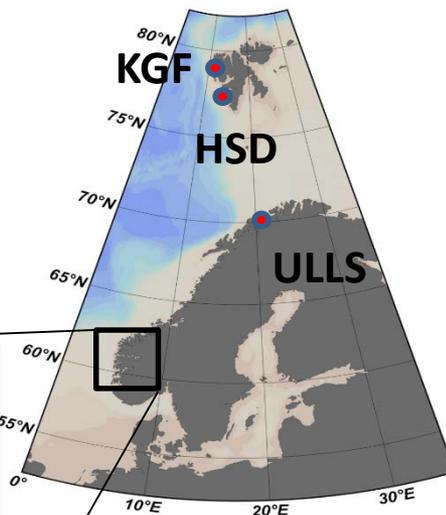
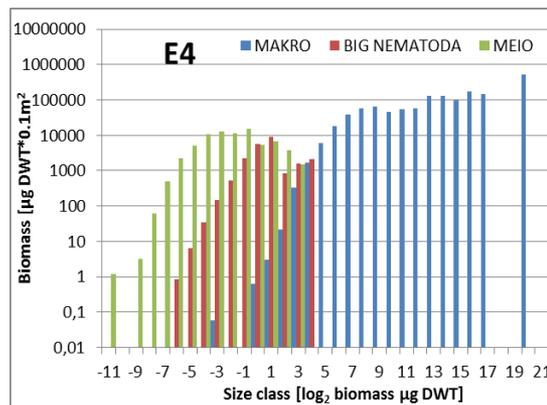
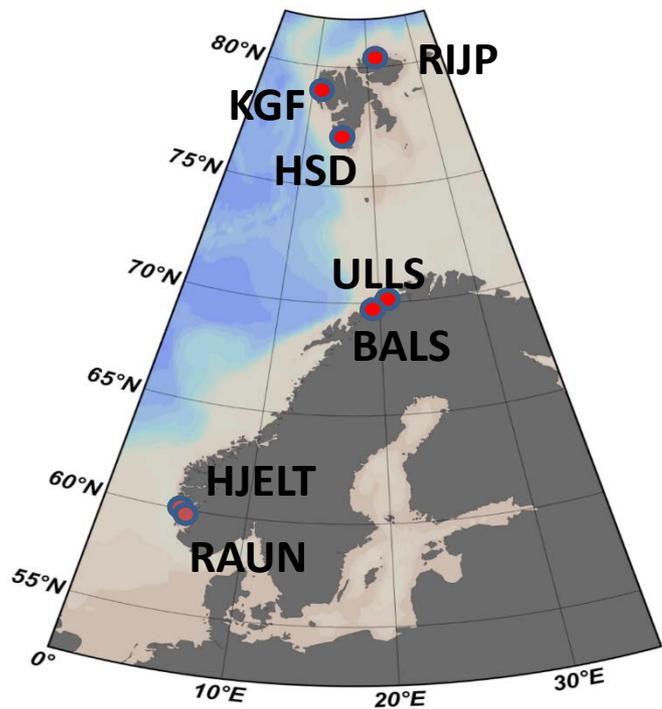
WP4 Leader:
Dr M. Włodarska
-Kowalczyk
IOPAN, Sopot

TASKS:

- Latitudinal gradient: mainland Norway-Svalbard
- Size/biomass structure of populations, and of macro- and meio- faunal communities
 - Implications for secondary production, bioturbation, respiration
- Historical and modern analysis of bryozoan zooid size as related to environmental conditions

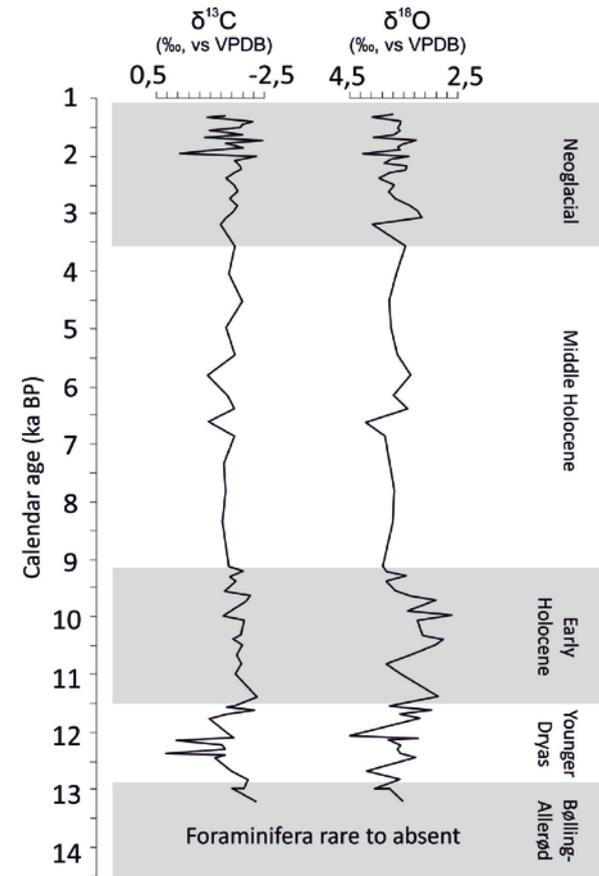


WP3 and WP4 sampling – 2014 and 2015

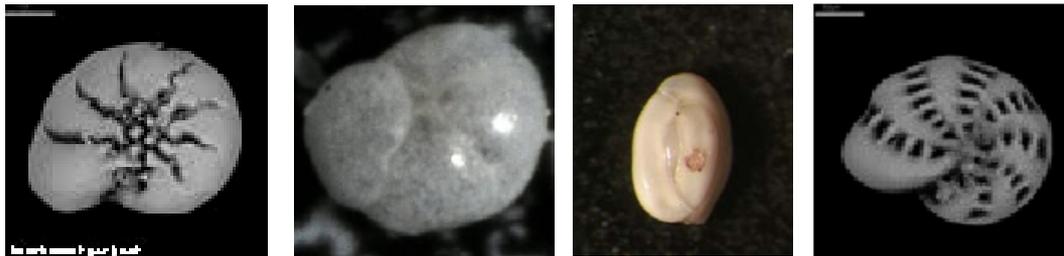


TASKS:

- 3 sediment cores spanning 12k years
- Size structure of whole community and of key populations
- Assessment of test size as proxy for climatic conditions



WP5 Leader:
Joanna Pawłowska
IOPAN, Sopot

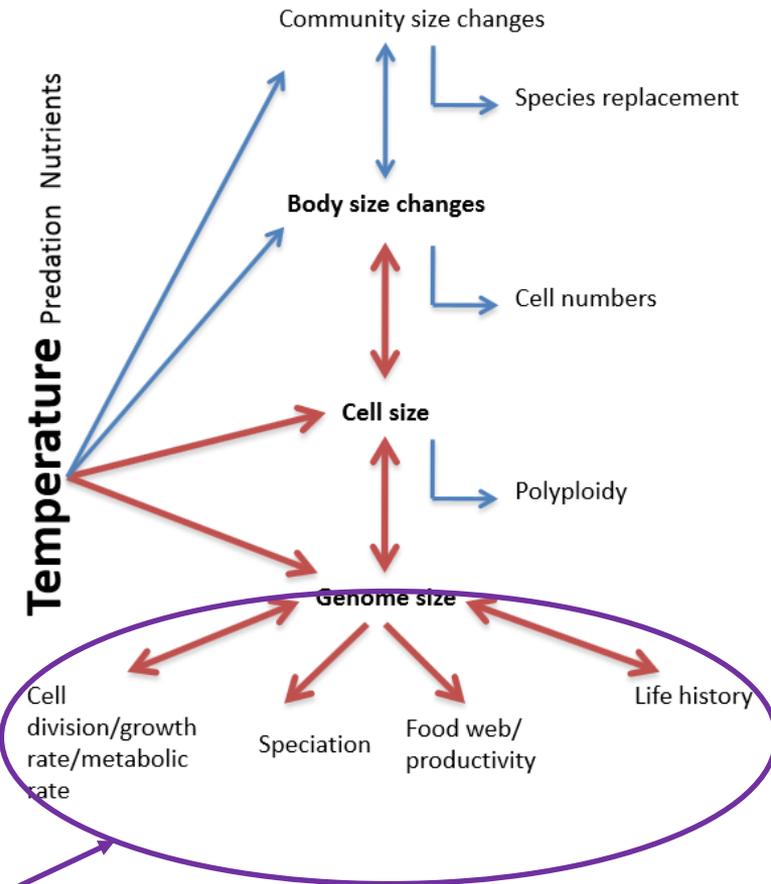




WP6 Leader:
Prof. Dag Hessen
University of Oslo

TASKS:

- Analysis of genome sizes (www.genome.com; 4972 species)
- Relating cell and genome sizes to temperature and body size
- Ecological/evolutionary implications





WP7 Leader:
Prof. Jan Marcin
Węśławski
IOPAN, Sopot

TASKS:

- Integration and synthesis of research results
- Scientific and popular dissemination
- Cooperation with schools
- Web-based communications
- Management advice



VENUE
DATES AND DEADLINES
REGISTRATION
TRAVEL
ACCOMMODATION
PROGRAM
ABSTRACT FORMAT

LARWOOD SYMPOSIUM

12-13 June 2014, Sopot, Poland

For the symposium we booked two of the institute guest rooms which will be available to students attending symposium for free. They will be offered on the basis "first come - first served". Please let us know if you are interested.

Following hotels are situated in the nearest vicinity of conference venue. Book your reservation please, by contacting the chosen hotel before the 30th of January 2014. Mid May is already the touristic season in Sopot, and places are quickly getting short.

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DWARF

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<http://www.iopan.gda.pl/projects/Dwarf/index.html>

<https://www.facebook.com/PROJECT.DWARF>