

Does the size really matters?

The effects of climate variability on the size of benthic foraminifera.

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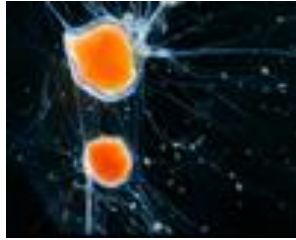
INSTITUTE OF OCEANOLOGY
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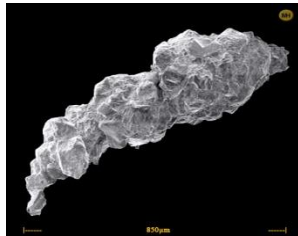
Why Foraminifera?

Test type:

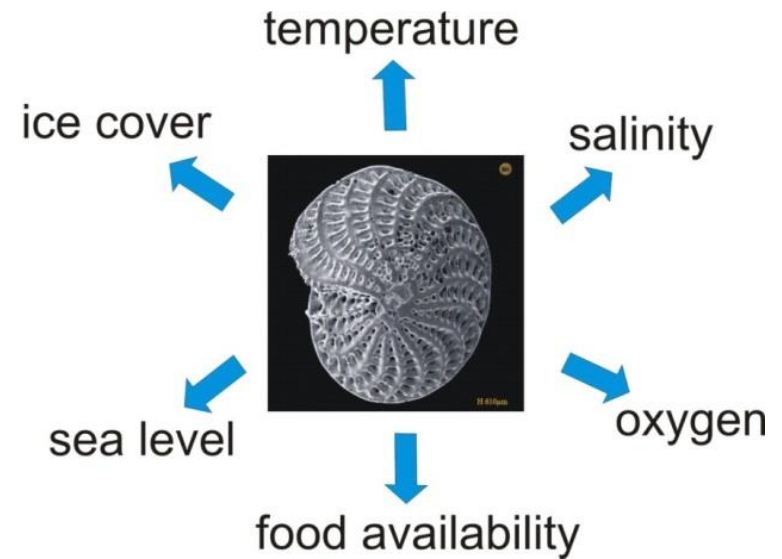
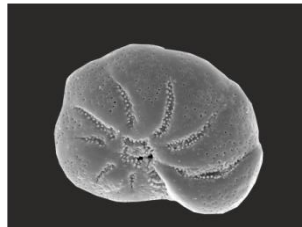
Organic



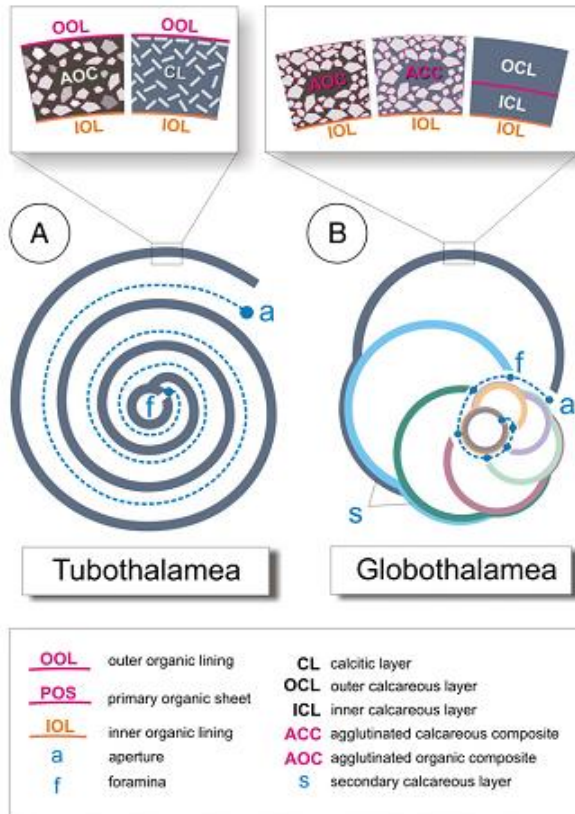
Agglutinated



Calcareous



Foraminifera test size: environmental controls



- **Food availability** (Boltovskoy and Wright, 1976)
- **Light** (Hallock, 1981)
- **Temperature** (Murray, 2006)
- **Salinity** (Nigam et al., 2006)
- **pH** (Kuroyanagi 2009)

DWARFISM (Boltovskoy and Wright, 1976)

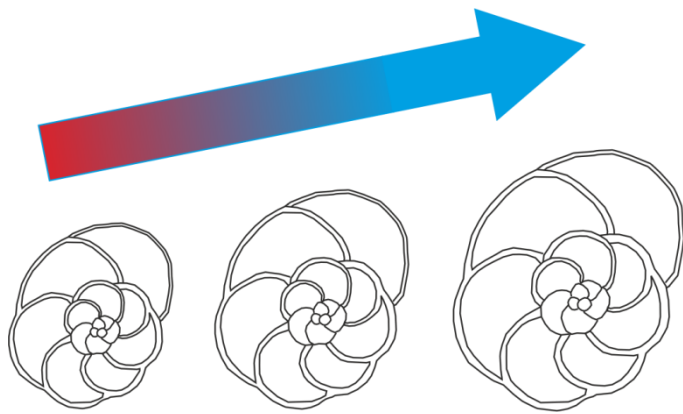
- 1) Environmental stress limits growth and reproduction
- 2) Optimal conditions results in faster growth and earlier reproduction

Pawlowski et al., 2013

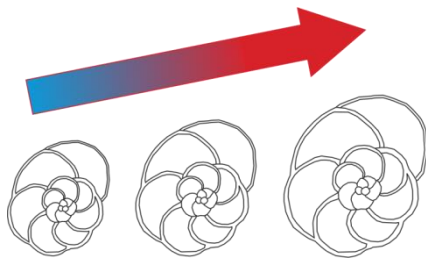


Bergmann's rule (1847)

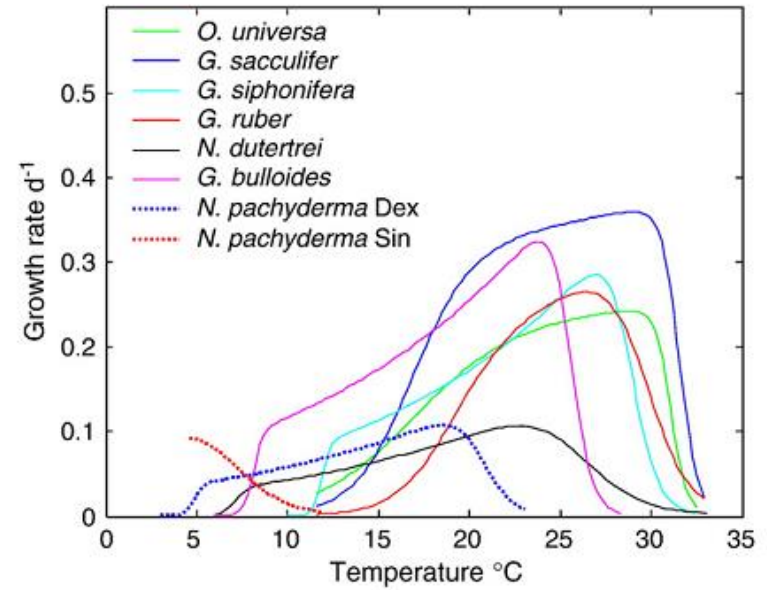
Smaller size are found in warmer regions.



Rhumbler 1911
 Bradshaw 1955, 1961
 Bandy 1963
 Levis and Jenkins 1969
 Murray 2006
 Nigam et al. 2006, 2008



Phleger and Hamilton, 1946
 Theyer, 1971



Lombard et al., 2009



Postglacial variability in near-bottom current speed on the continental shelf off south-west Spitsbergen

JQS

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Received 19 May 2014; Revised 24 September 2014; Accepted 26 September 2014

Clim. Past, 11, 587–603, 2015
www.clim-past.net/11/587/2015/
doi:10.5194/cp-11-587-2015

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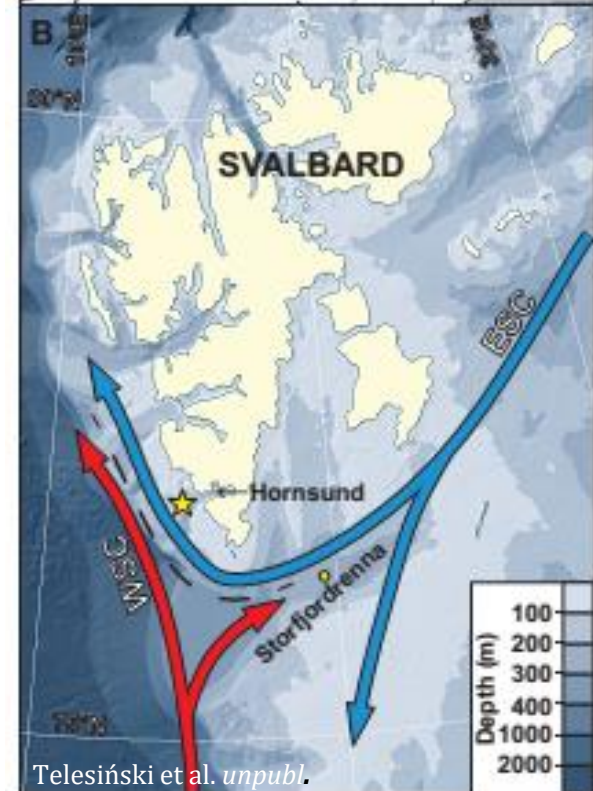
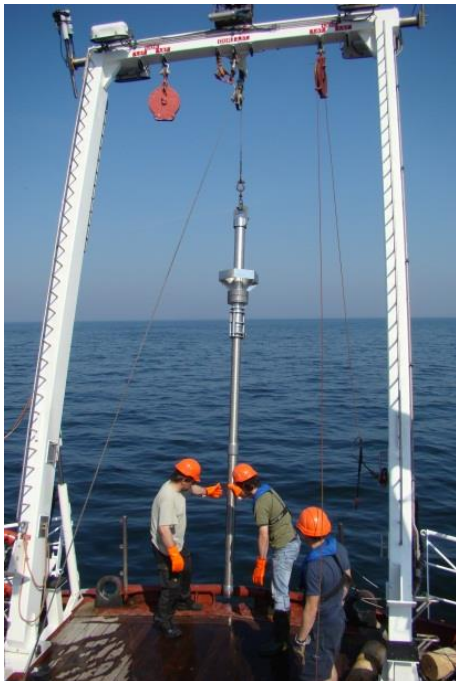
Late Weichselian and Holocene palaeoceanography of Storfjordrenna, southern Svalbard

M. Łącka¹, M. Zajęczkowski¹, M. Forwick², and W. Szczuciński³

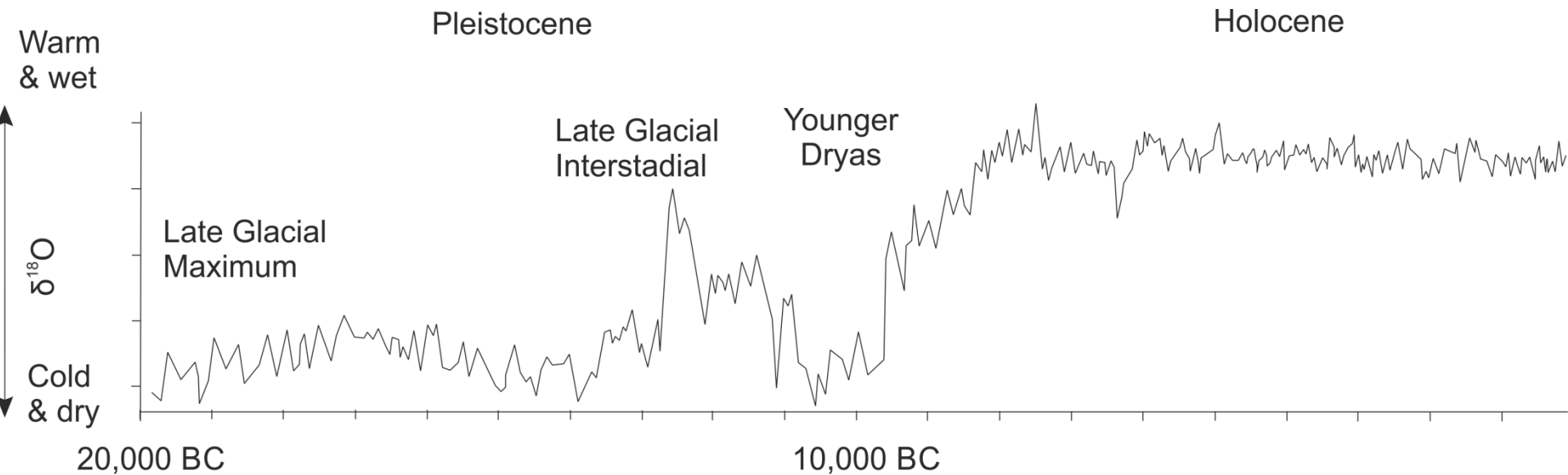
¹Institute of Oceanology, Polish Academy of Sciences, Powstańców Warszawy 55, 81-712 Sopot, Poland

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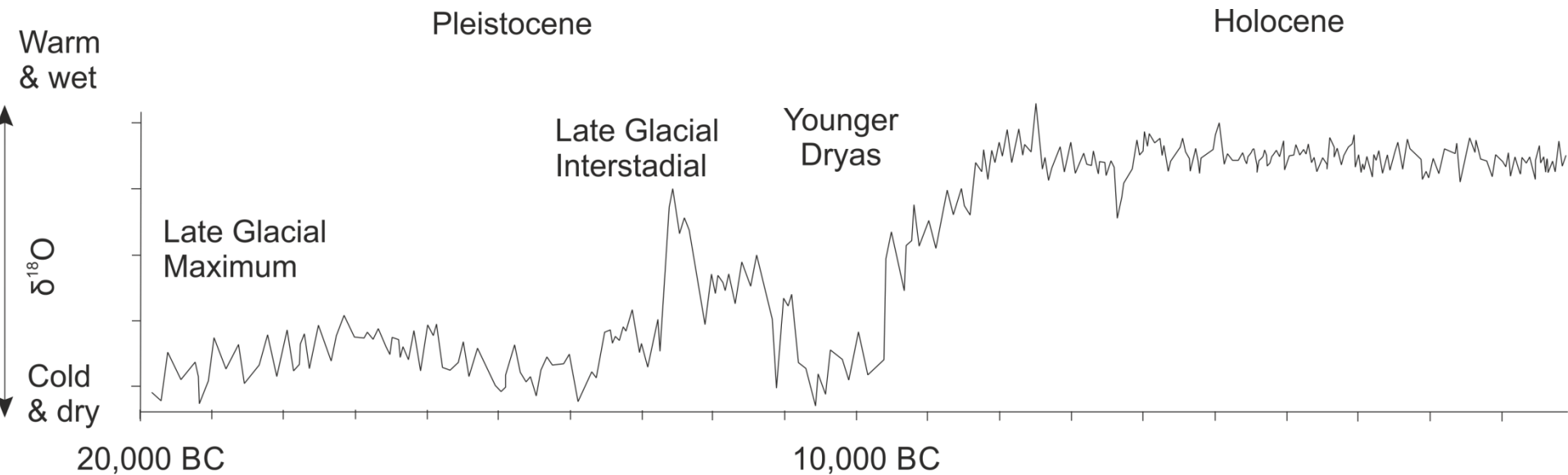


Telesiński et al. unpubl.



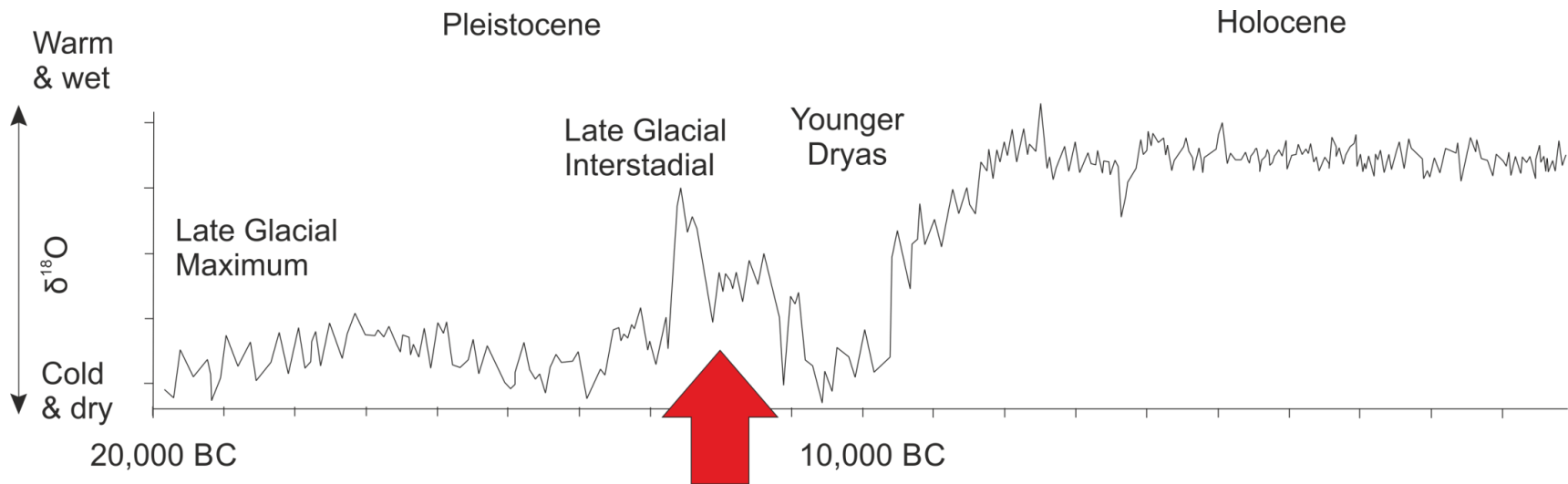
How the size structure of benthic community off west Spitsbergen responded to climate-driven environmental changes since the last glaciation?



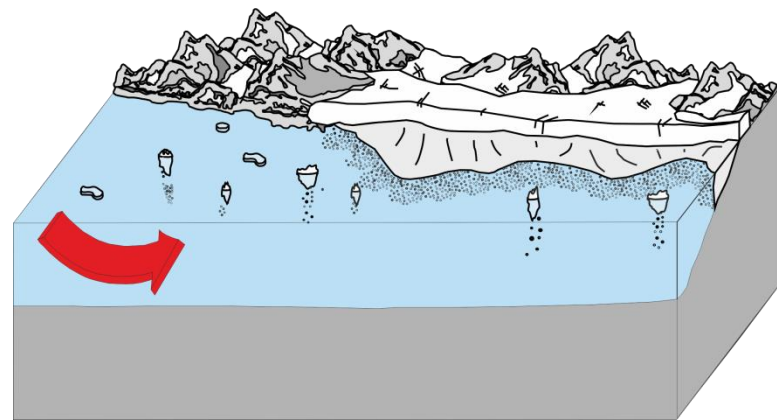


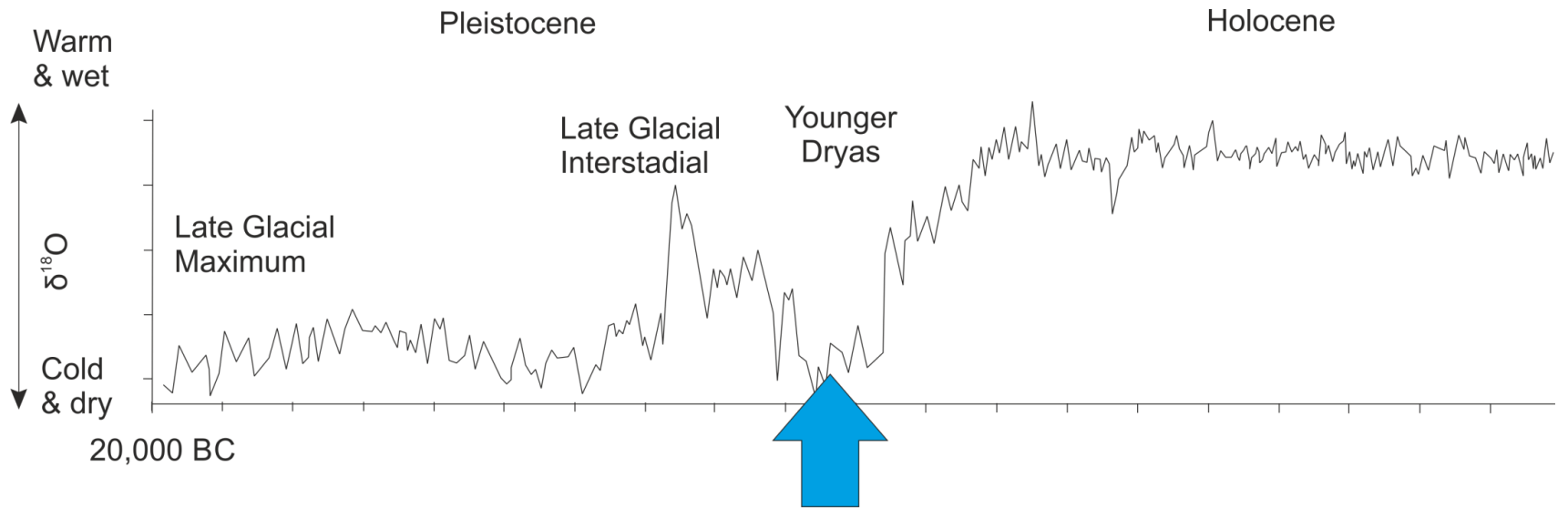
Paleoceanographic changes off Svalbard coasts depended mainly on the intensity of Atlantic and Arctic waters inflow, the influence of sea ice processes and tidewater glaciers activity (meltwater and iceberg discharge).



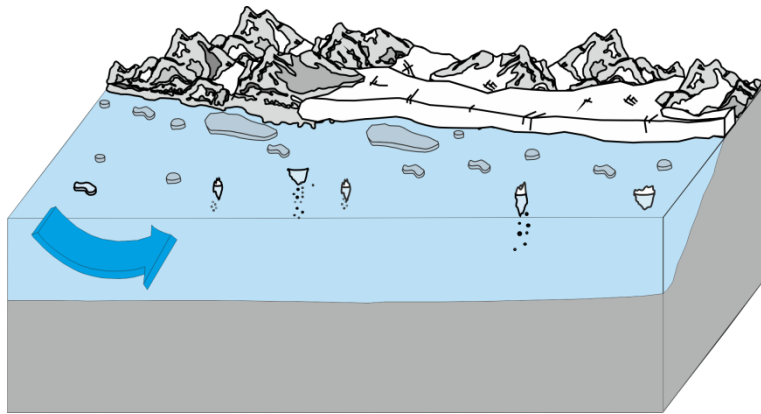


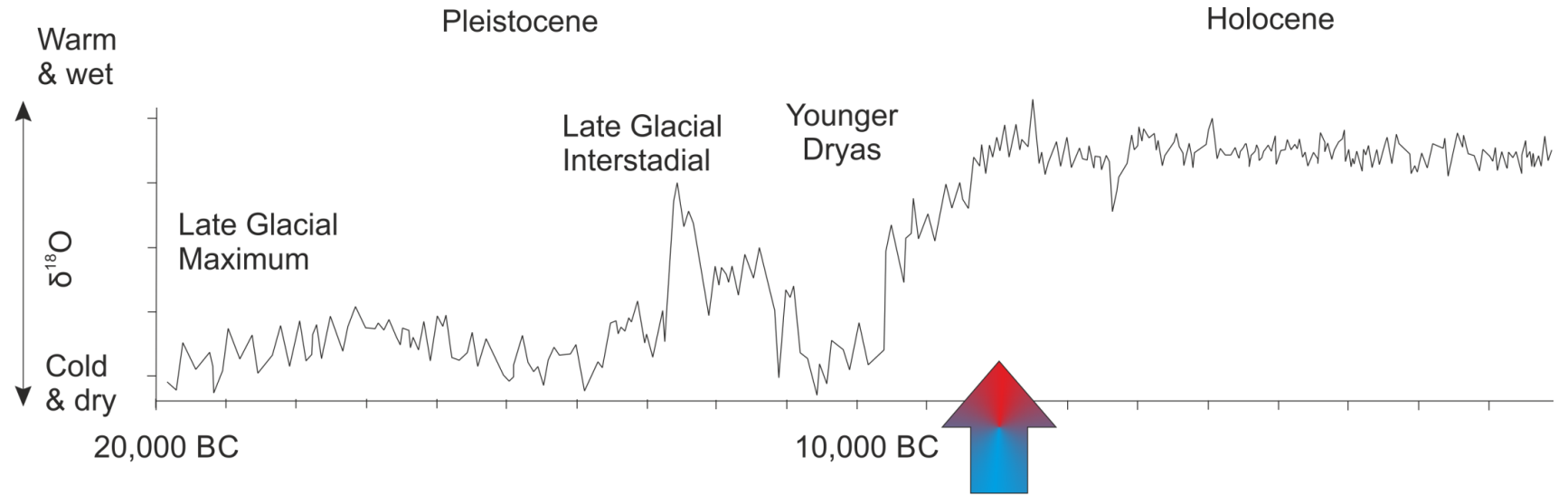
Glaciomarine conditions
Gradually increasing inflow of Atlantic water



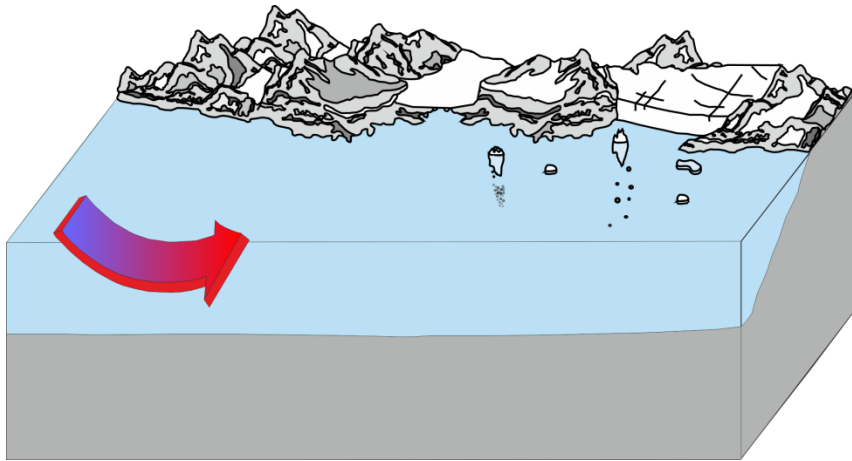


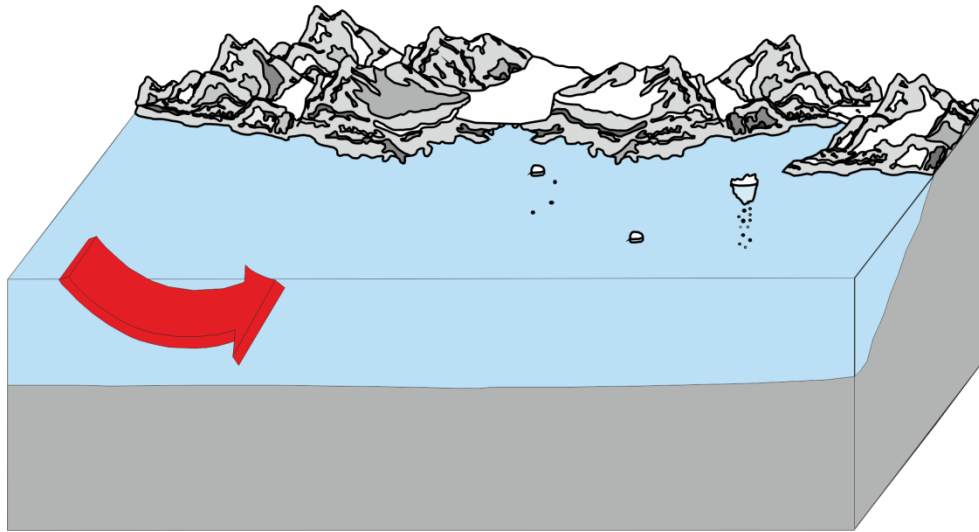
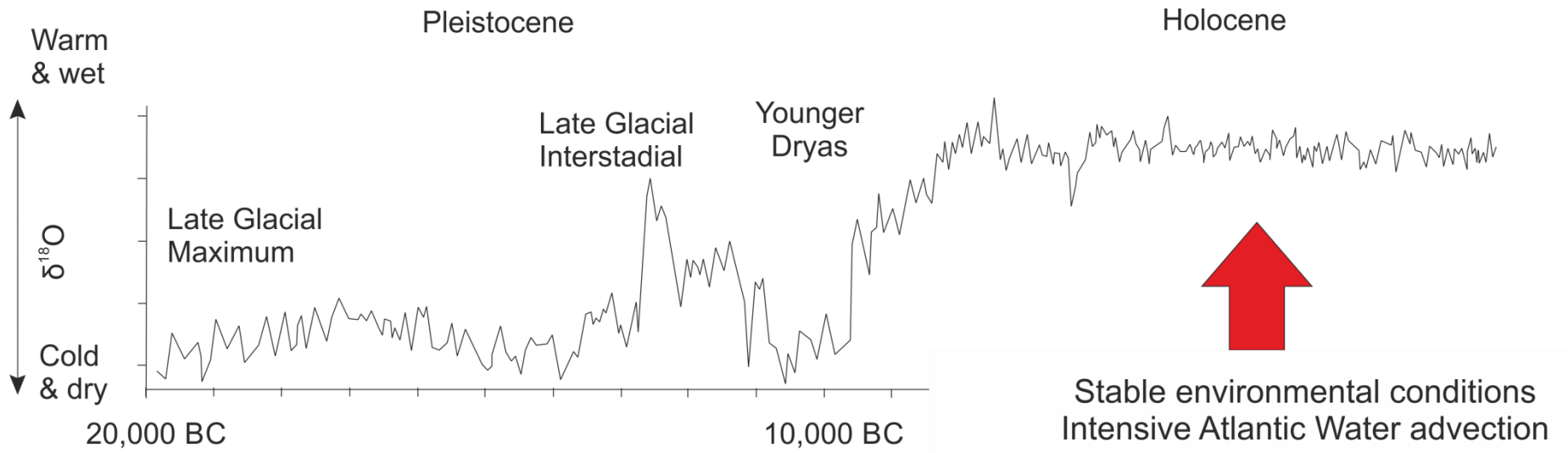
Rapid short-term cooling
 Reduction of Atlantic water transport to the north
 Dominance of Arctic water



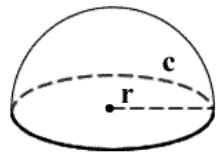
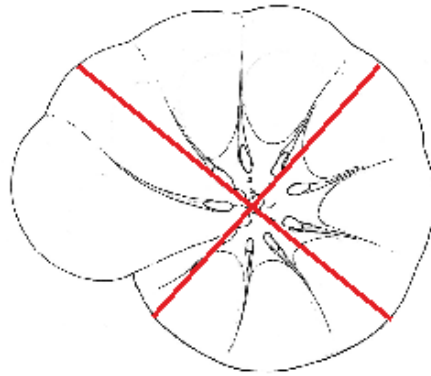


Intensification of Atlantic water inflow
Glaciers recession

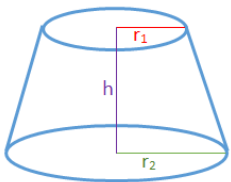




TEST SIZE = TEST VOLUME



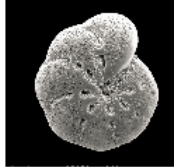
$$\text{Volume} = 0.5(4/3\pi r^3)$$



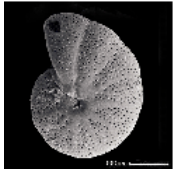
$$\text{Volume} = [1/3\pi h(r_1^2 + r_1r_2 + r_2^2)]$$
$$r_2 = 0.4 r_1$$

Hannah et al., 1994

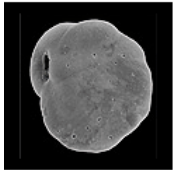
Elphidium excavatum



Melonis barleeanum



Cassidulina reniforme



Islandiella norcrossi



Cibicides lobatulus



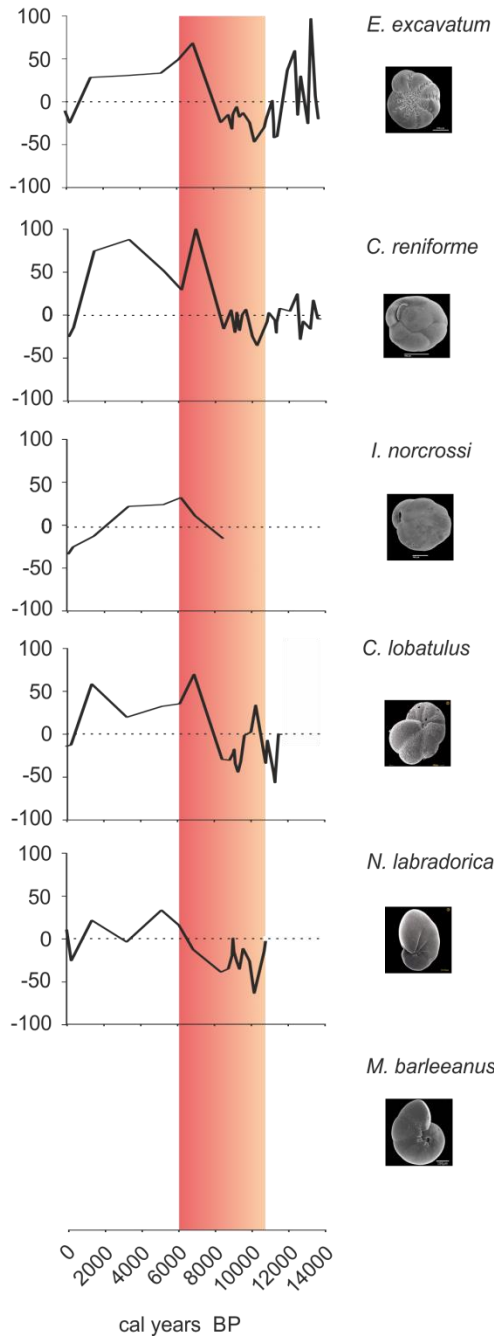
Nonionellina labradorica



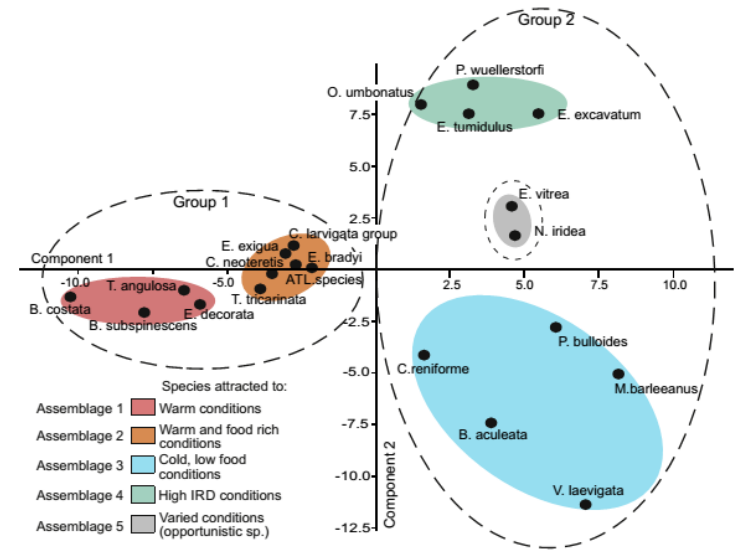
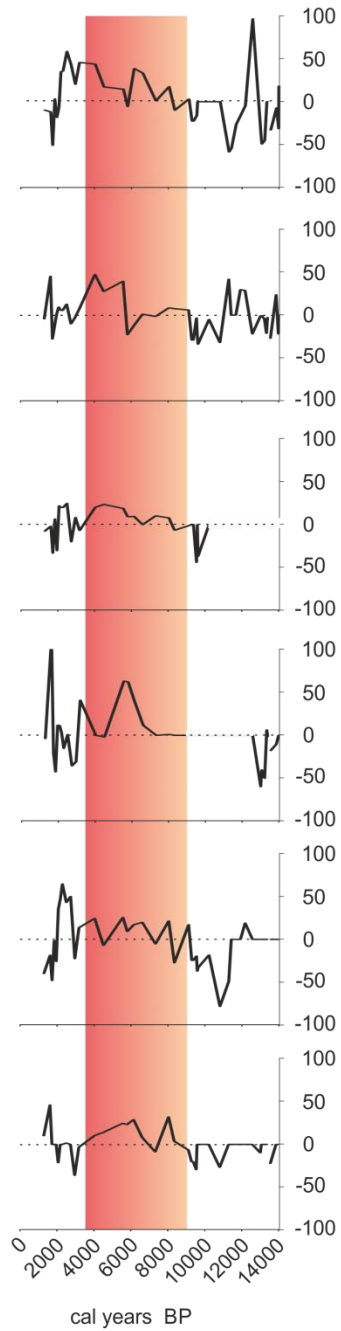
photo © www.foraminifera.eu



West Spitsbergen shelf



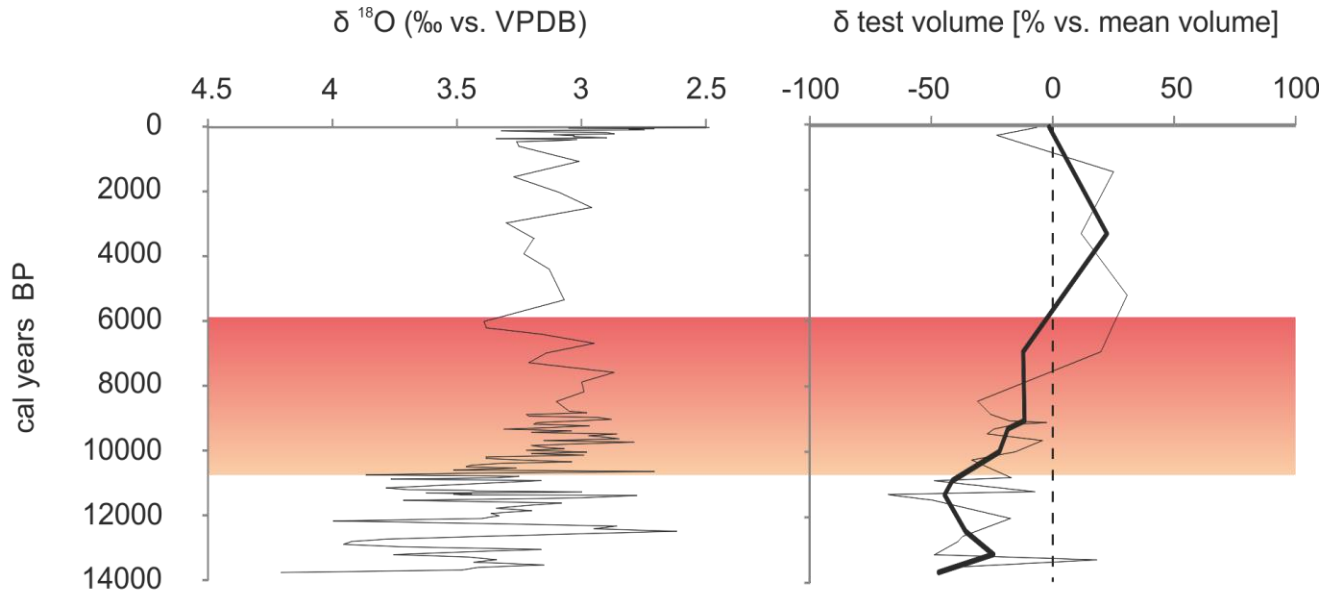
Strofjordrenna



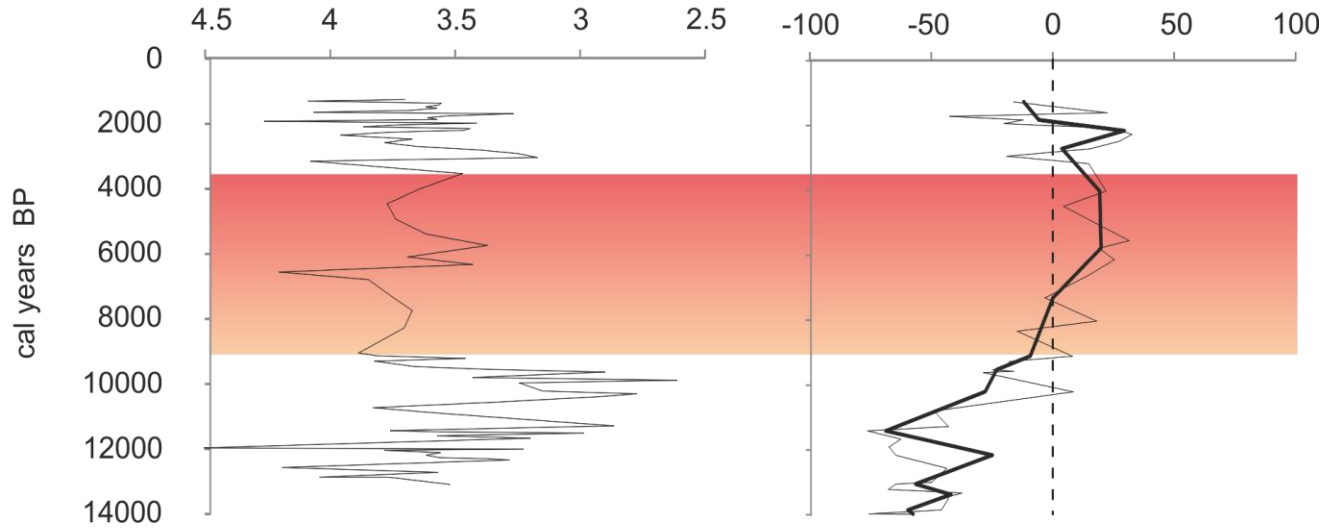
Rasmussen et al., 2017



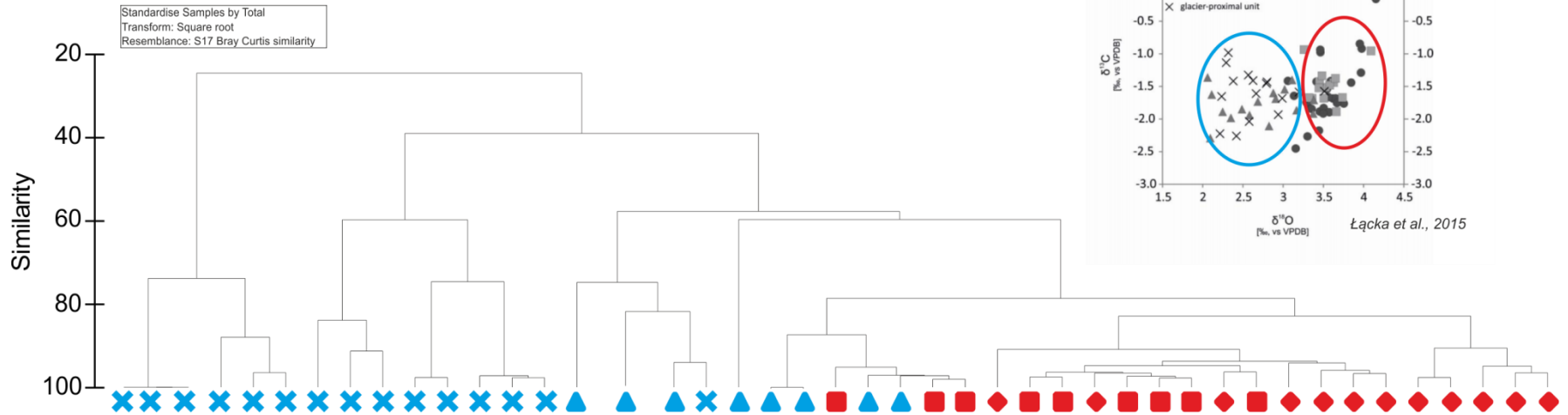
WEST SPITSBERGEN SHELF



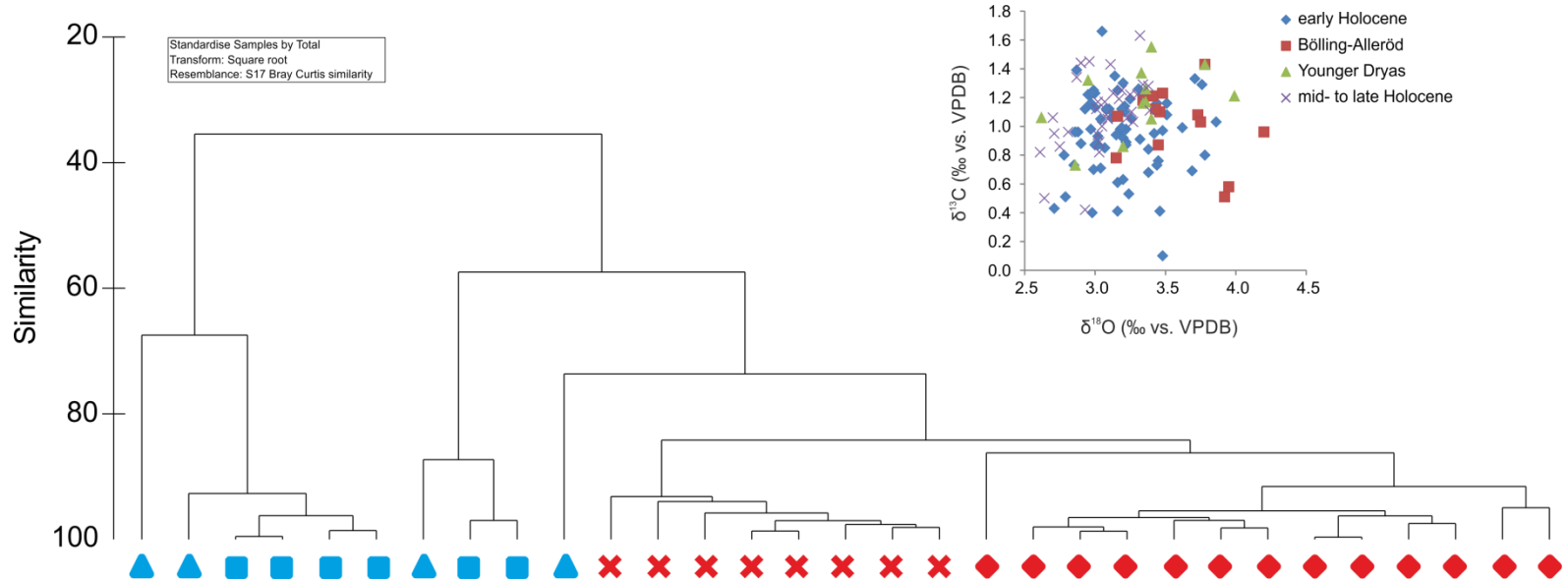
STORFJORDRENNA



Storfjordrenna



West Spitsbergen shelf



Thank you for your attention!

