Background

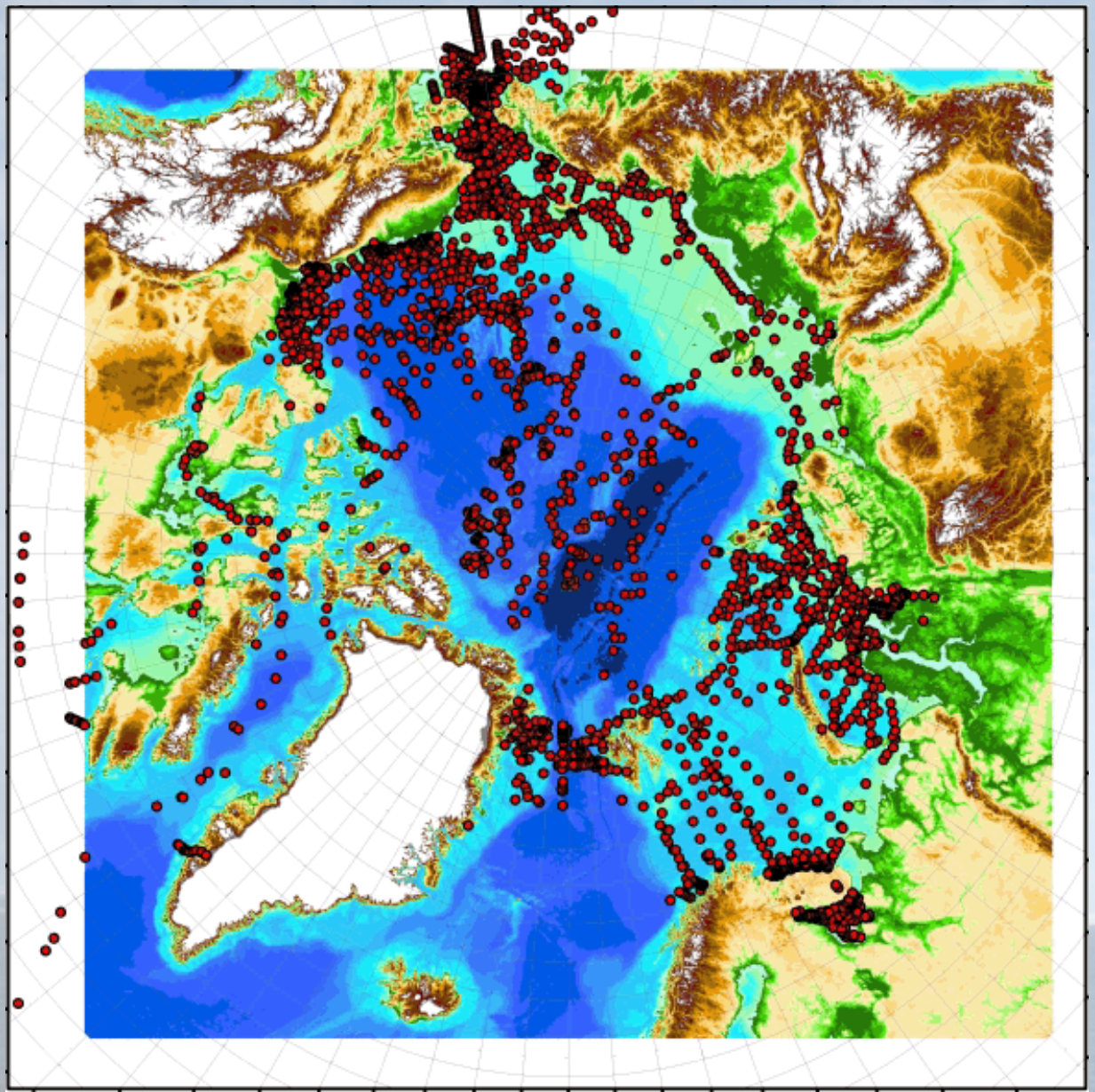
The Arctic Council asked for a plan to be developed and adopted by member nations to monitor biodiversity in the Arctic (CBMP)

http://www.caff.is/marine/marine-monitoring-plan

Approach

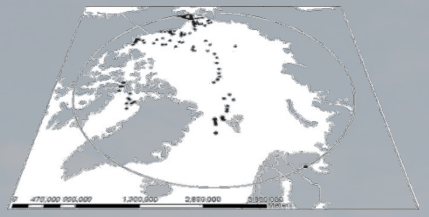
- Register of species (established by CoML)
- Broken into a number of working groups
- Plankton, Benthos, Sea ice, Fish, Seabirds, Marine Mammals (polar bears separate)
- Data consolidation to look for patterns in terms of key species or ecosystem indices

e.g. Consolidation of (zoo)plankton data



- 2 large datasets prepared & standardized datasets now prepared for public access
- Working with Axiom to allow exploration of this and other datasets

Use environmental layers to define niche habitat & predict species distribution



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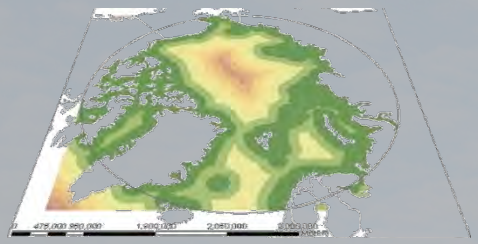

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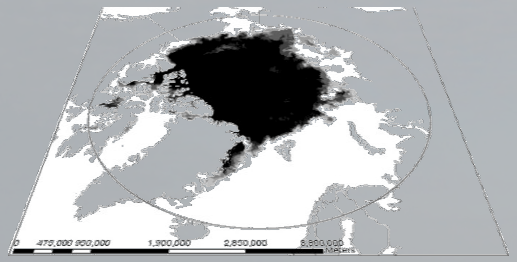


Abundance Data

+

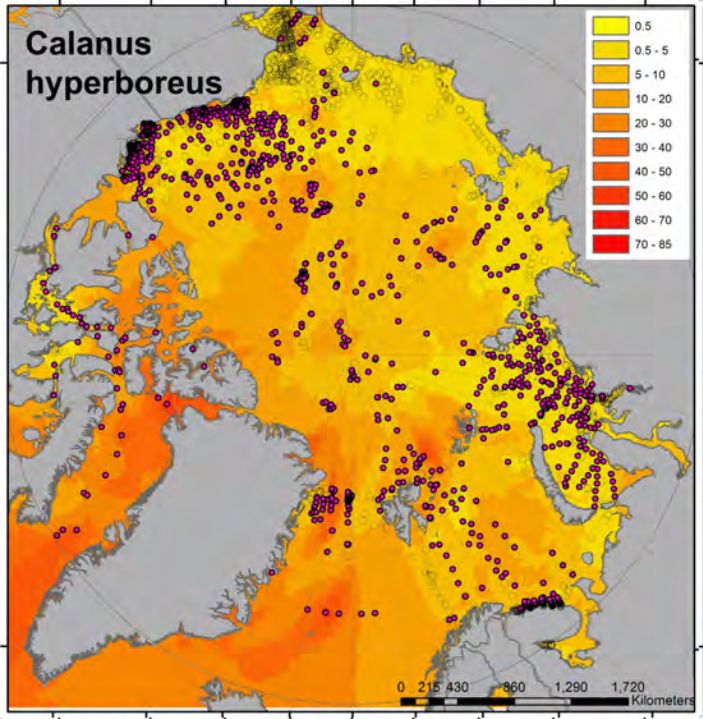
Distance to Coastline

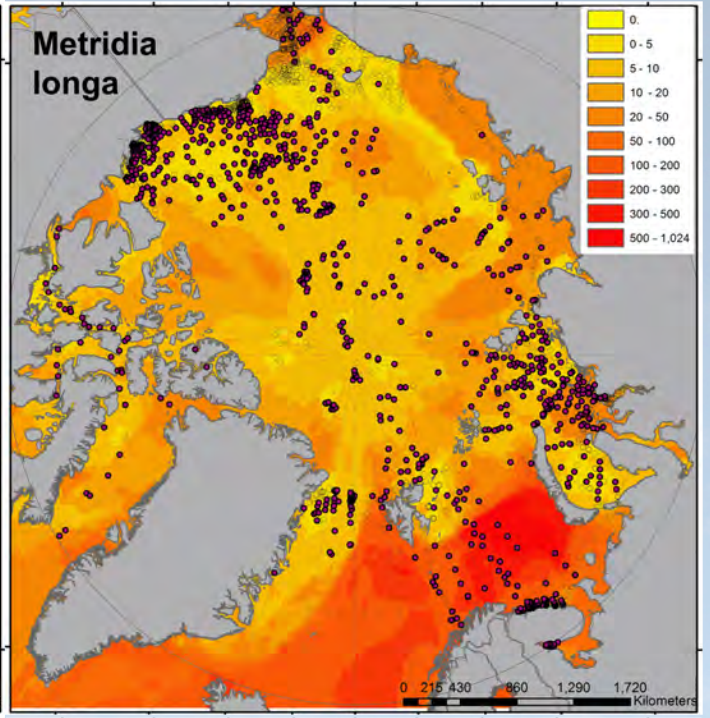
+

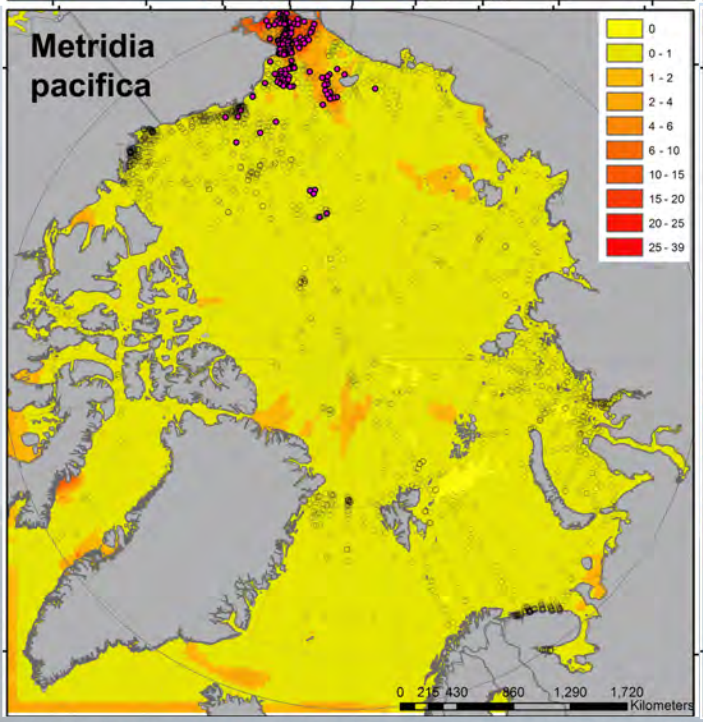
Sea Ice Cover

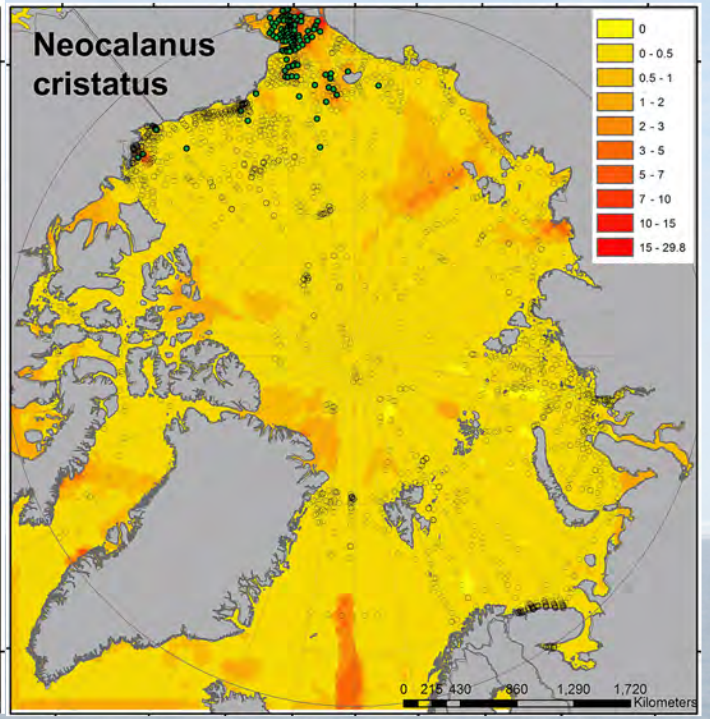
TreeNet

Prediction









Abundance maps of zooplankton nearing completion – some issues still to be resolved

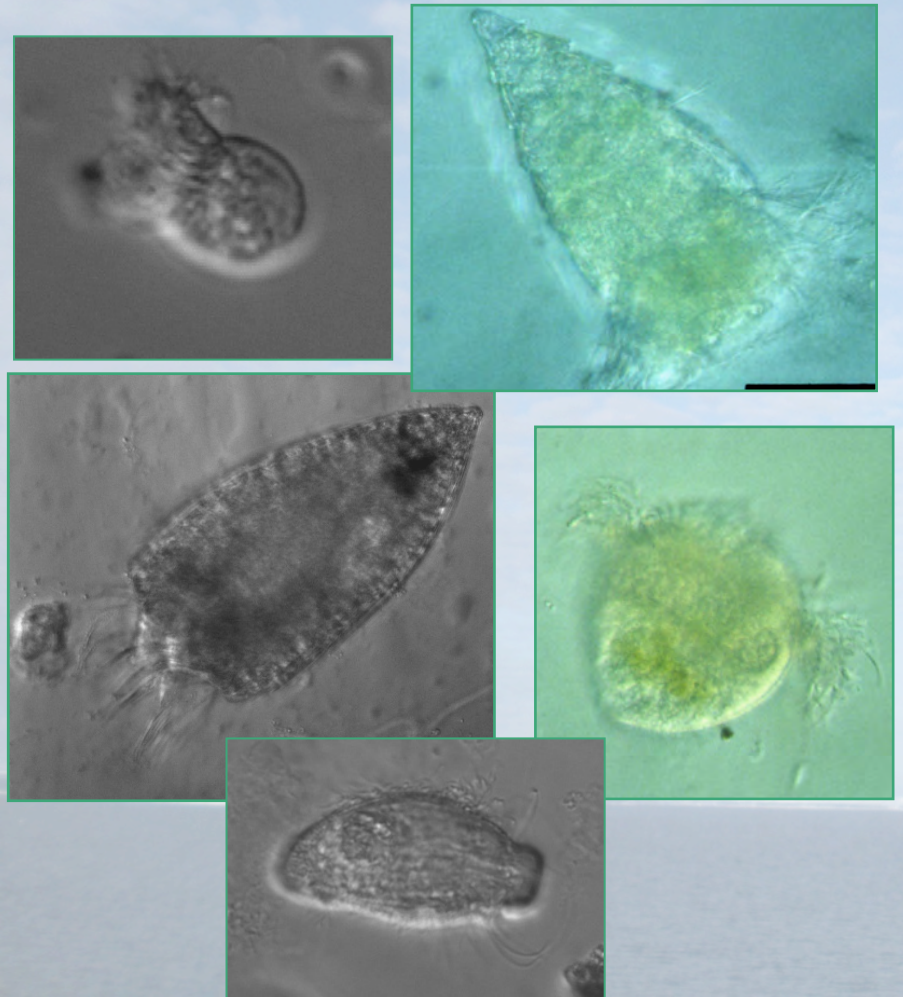
Data progress

- Axiom portal
- http://portal.aoos.org/staging.php?v=rand&portal_id=19#map?lg=f48be264-49a9-11e4-be04-00219bfe5678

Marine Arctic Microbial Eukaryotes: biodiversity and distribution

From microscopy:

- Accurate identification difficult
- N = few
- Statistics challenging



Cecilie von Quelfeldt:

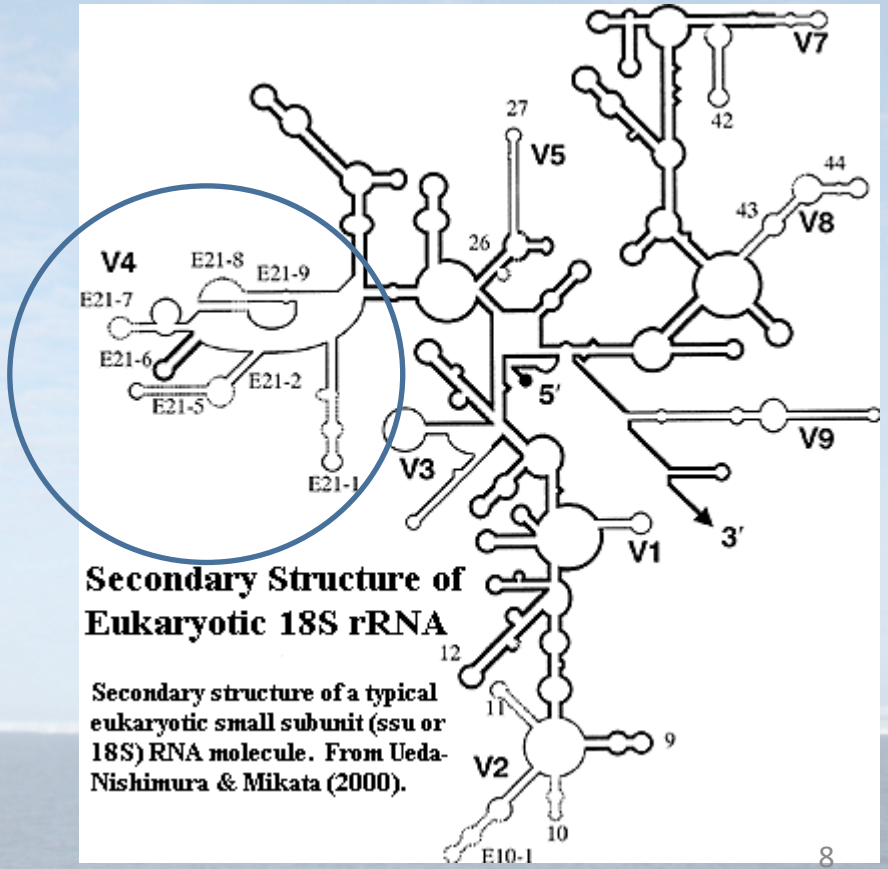
Review published papers and grey literature

Contact outside experts and locate data sets.

Baseline data:

Technological advances in DNA sequencing

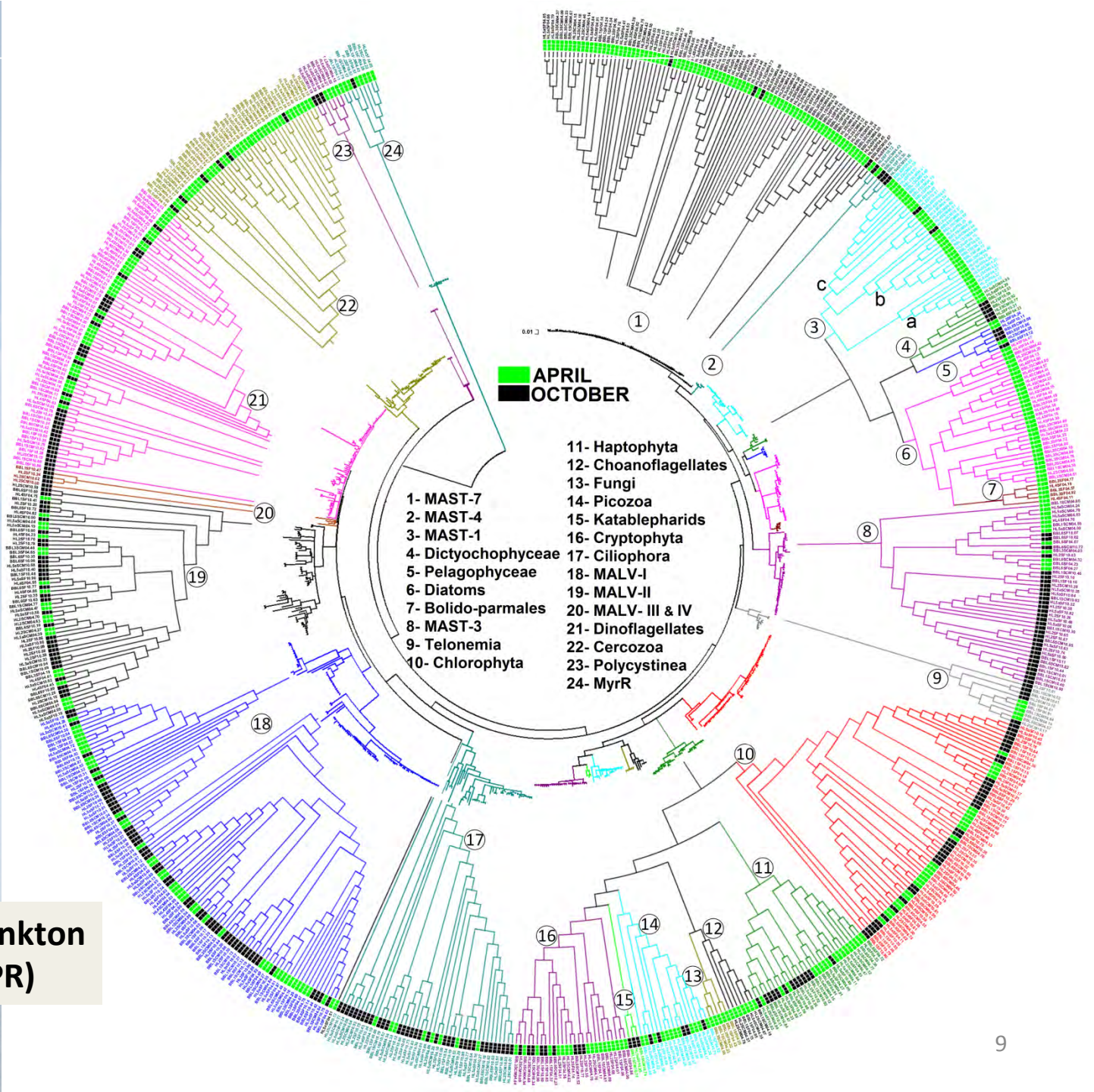
18S rRNA gene and 18S rRNA



Secondary Structure of Eukaryotic 18S rRNA

Secondary structure of a typical eukaryotic small subunit (ssu or 18S) RNA molecule. From Ueda-Nishimura & Mikata (2000).

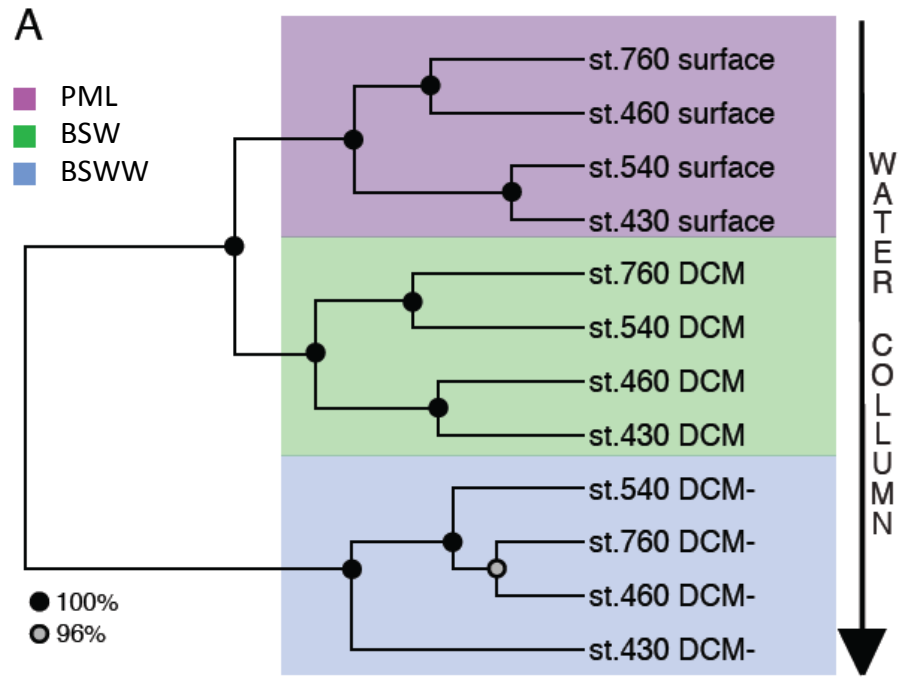
Clone Libraries: Species information

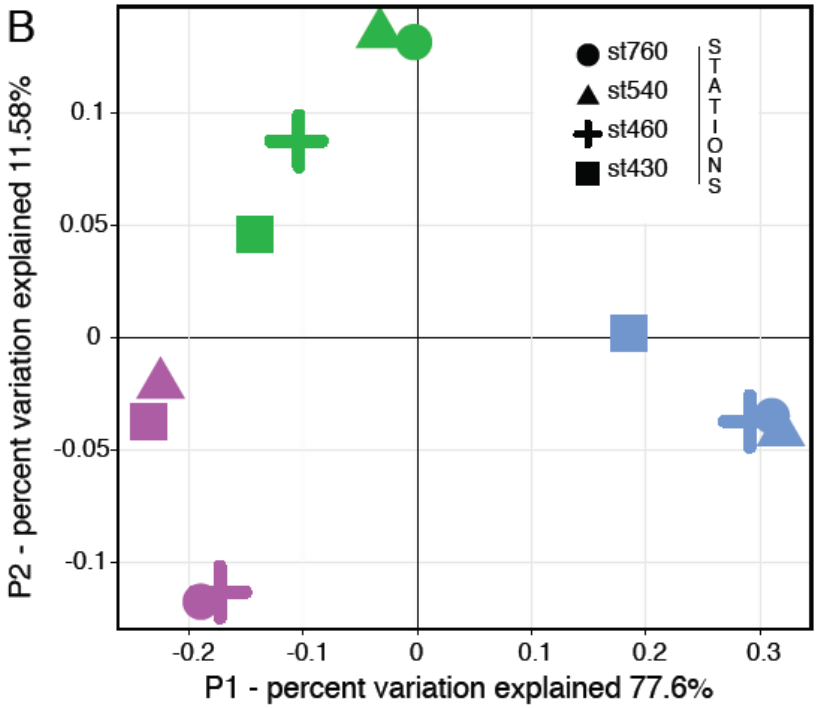


Sciotia Shelf phtyoplankton Dasilva et al. 2013 (JPR)

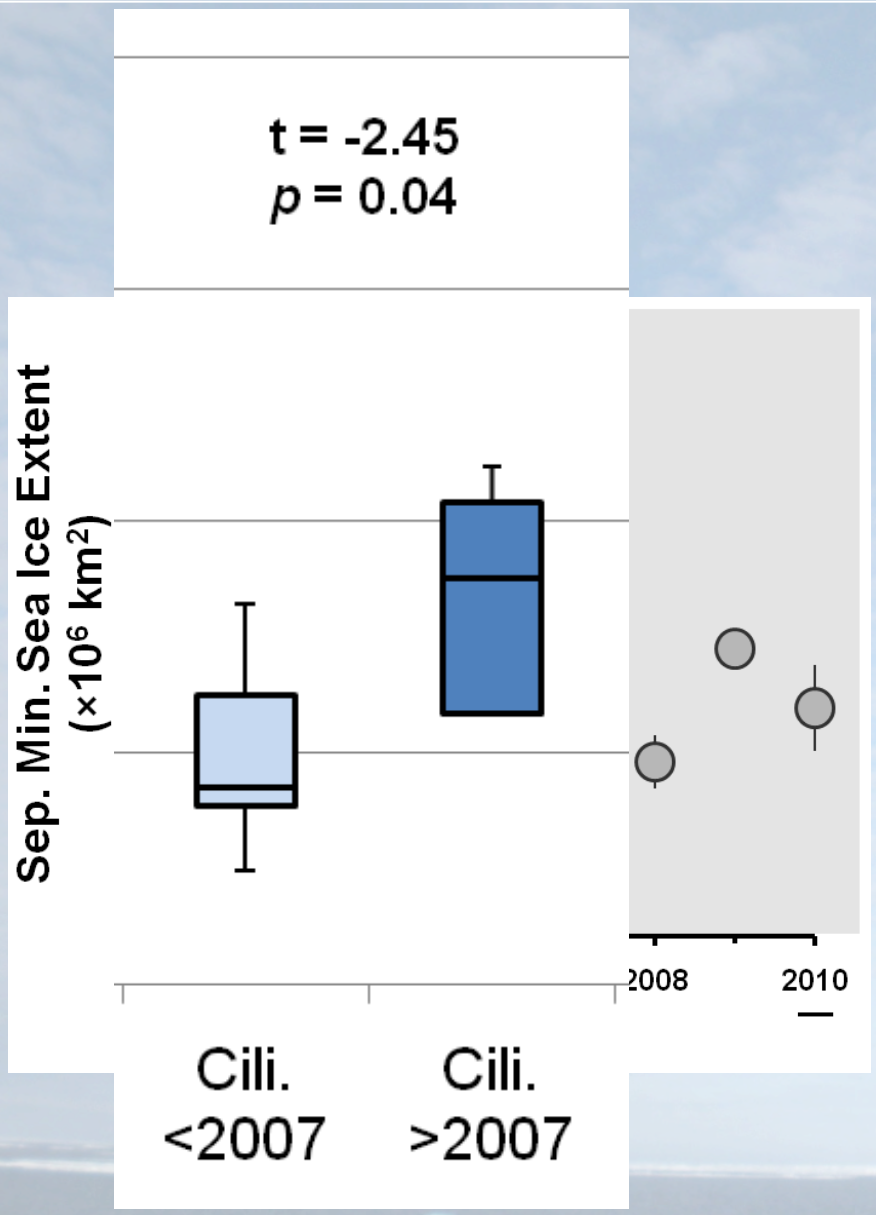
SEQUENCING is getting cheaper
From 20-96 samples for less than 1 k$

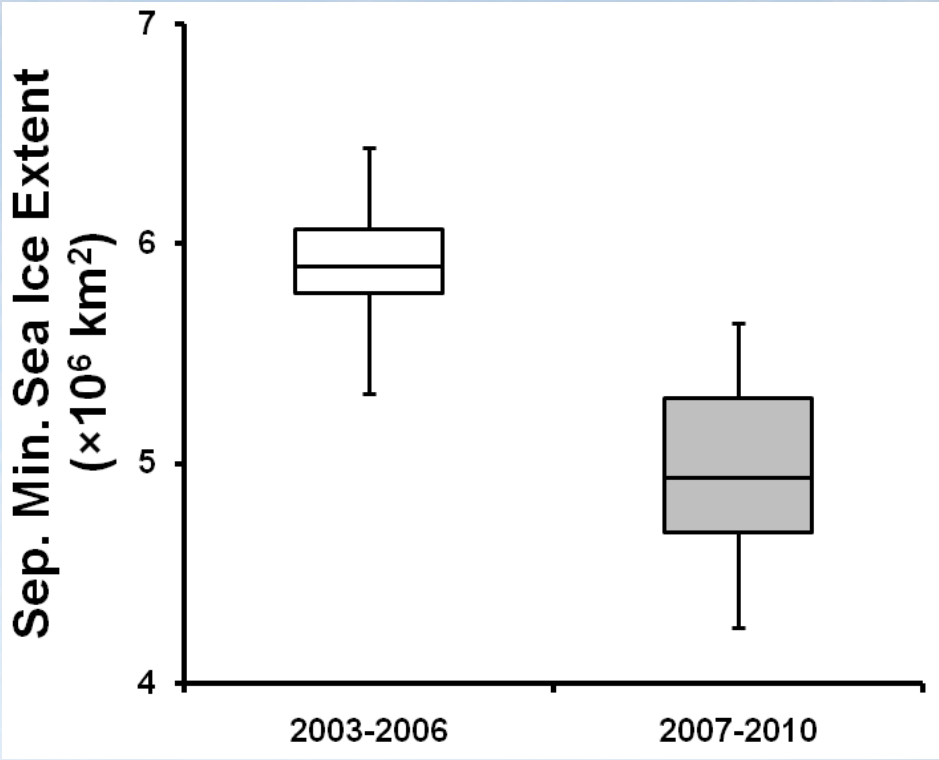
Water column heterotrophic flagellates cluster by water mass.



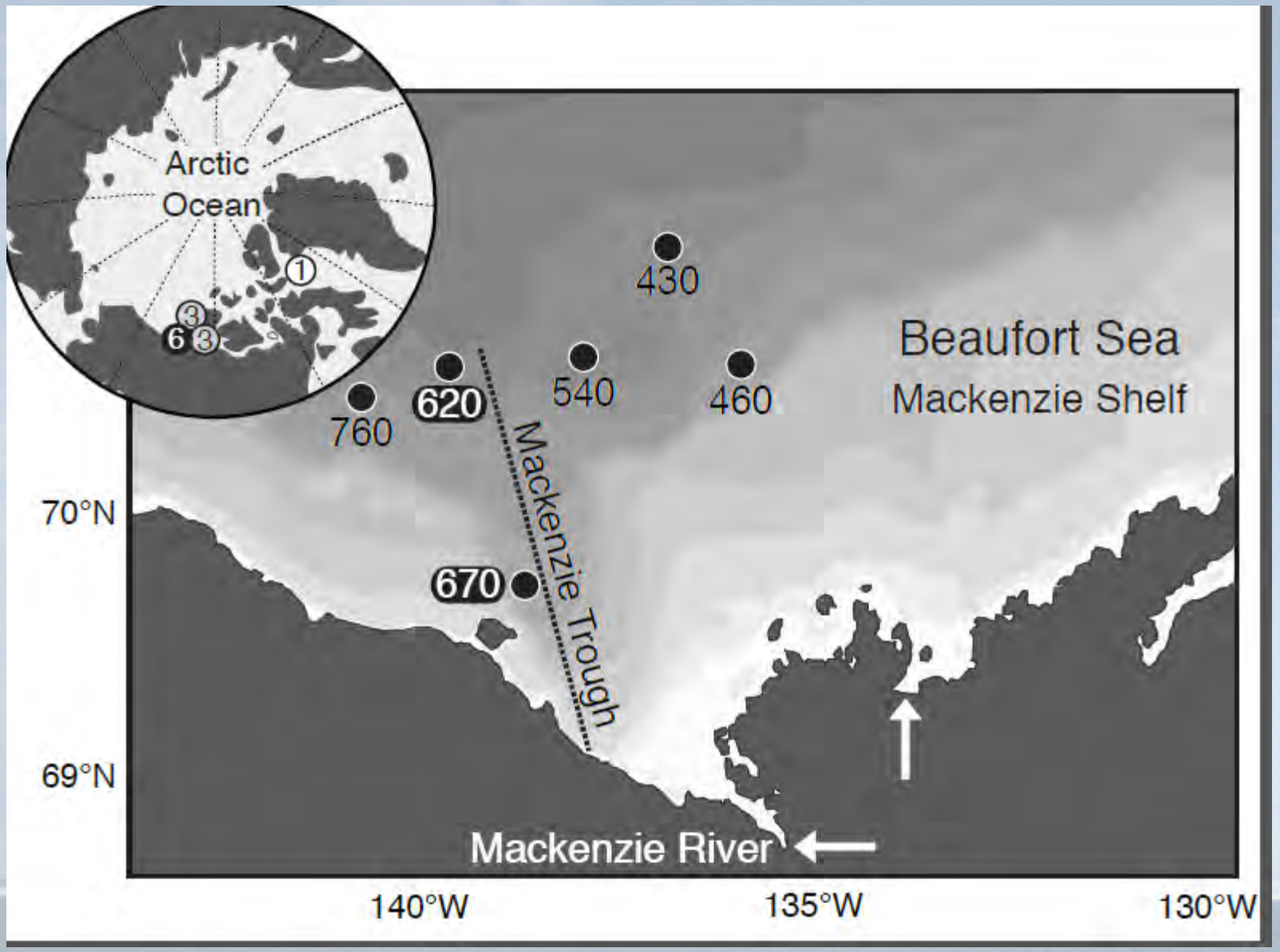


Monier et al. 2013 Biogeosciences





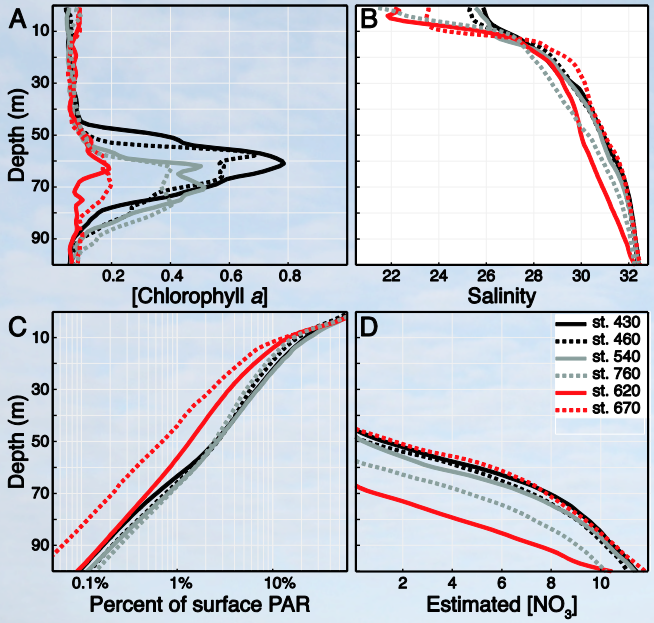
Comeau et al 2011 PLoS One


Arctic
Ocean
1
3
6 3
430
760
620
540
460
Beaufort Sea
Mackenzie Shelf
Mackenzie Trough
70°N
670
69°N
Mackenzie River
140°W
135°W
130°W

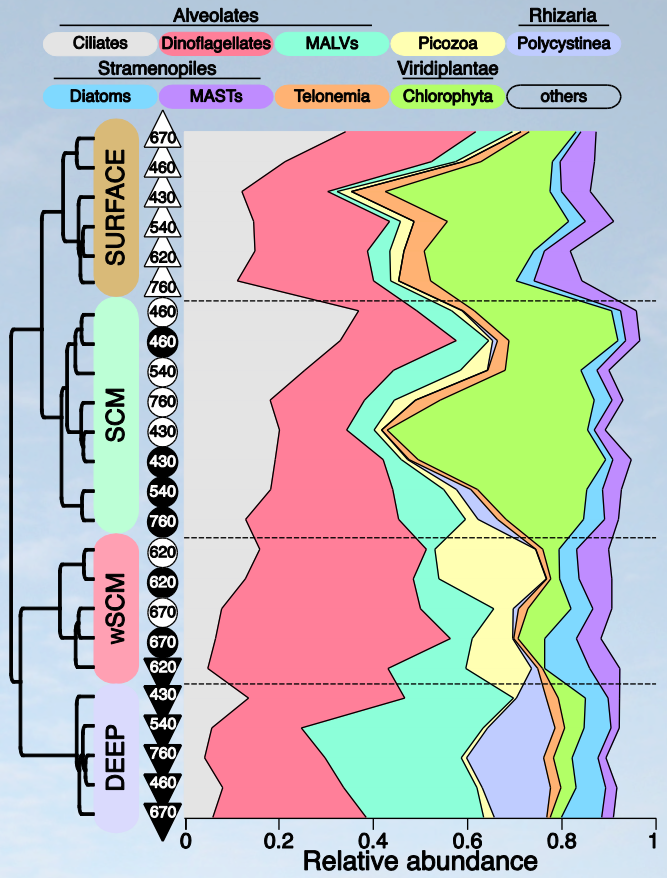
Communities follower their water mass, except in the the SCM where environmental selection becomes significant if the Pacific Water mass becomes light or nutrient limited.

Monier,
Compte,
Babin,
Forest,
Matsuoka,
&
Lovejoy

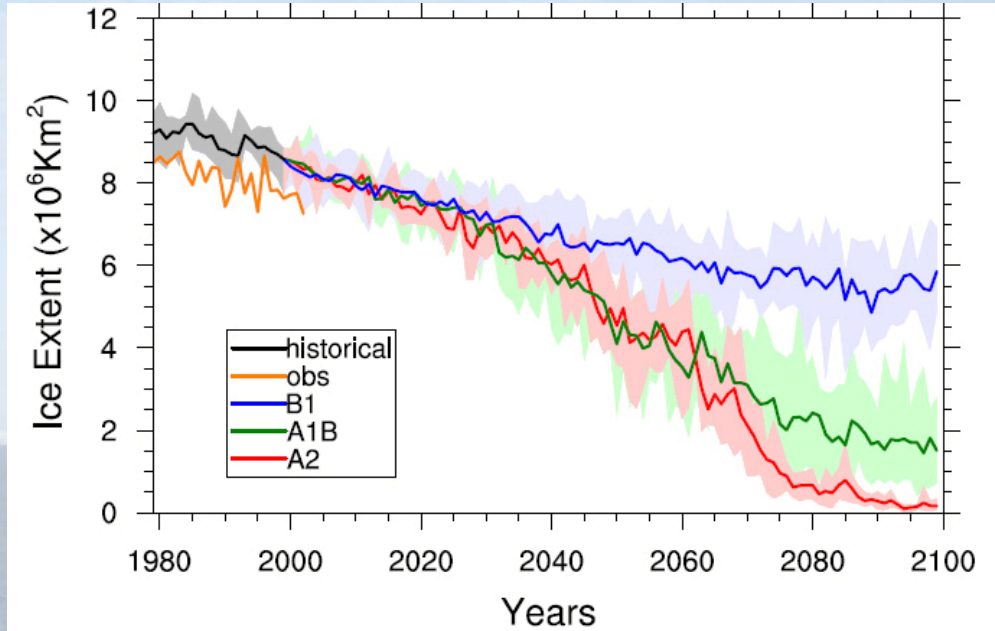
In press.
ISME Journal



Chlorophyll *a*. **B.** Salinity (**C.** % surface Profiles **A**AR. **D.** Nitrate co The red lines indicate weak SCM stations



Taxonomic differences among Beaufort Sea microbial communities. Areas represent the relative abundances of the main microbial eukaryotes. Left dendrogram represents the hierarchical clustering output of the comunities by zone

Climate Change?

- Once “accurate” create past and present observation and environmental layers
- Create IPCC scenario layers for future distributions