# Krill (animal) eating under-ice algae (plants)

Foto Credit: H. Flores from AWI.de

# Ice algae at bottom “brownish” ice core

http://www.arctic.noaa.gov/essay_krembsdeming.html

# Ice algae obtained from melted “brownish” ice

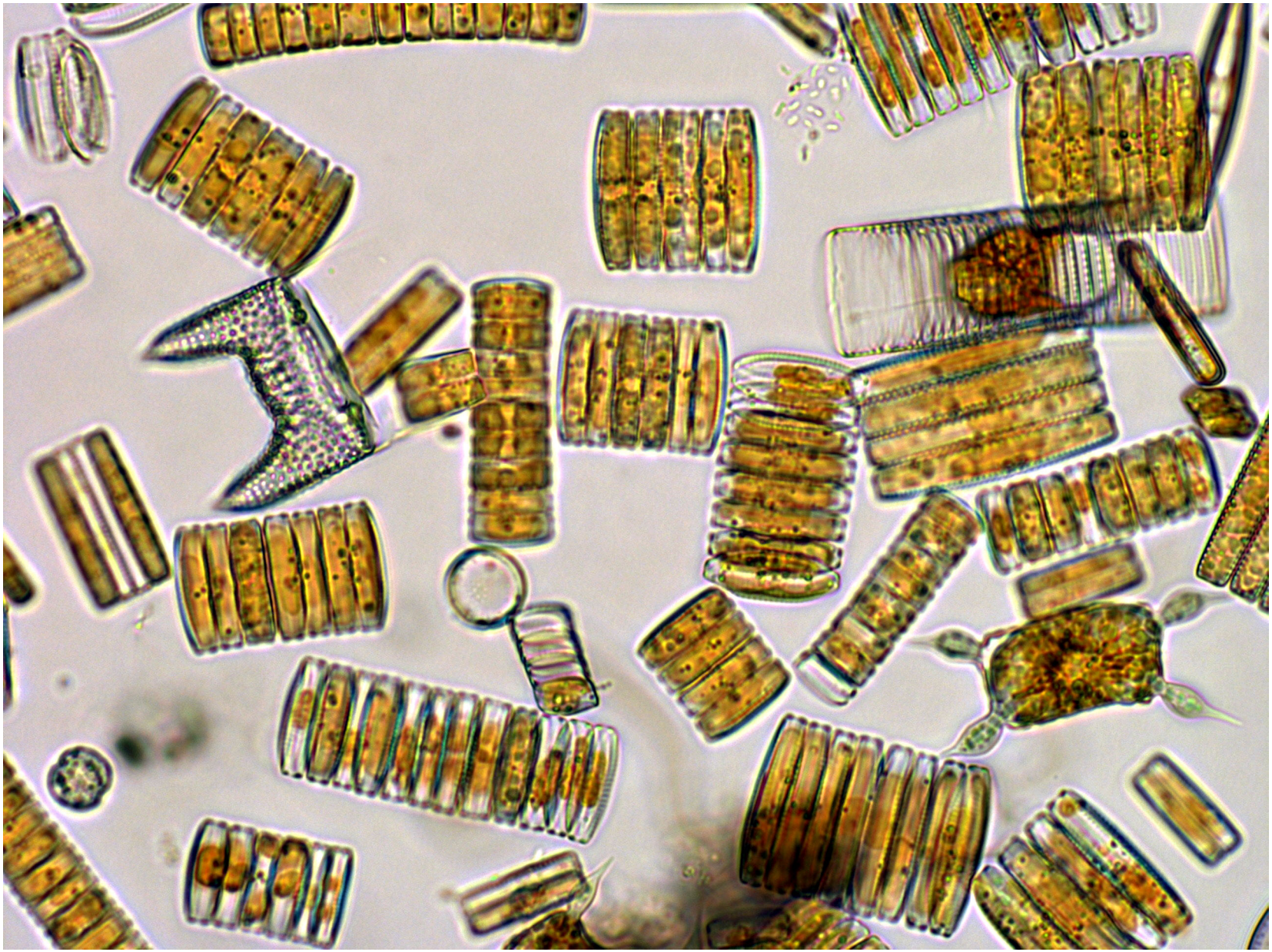
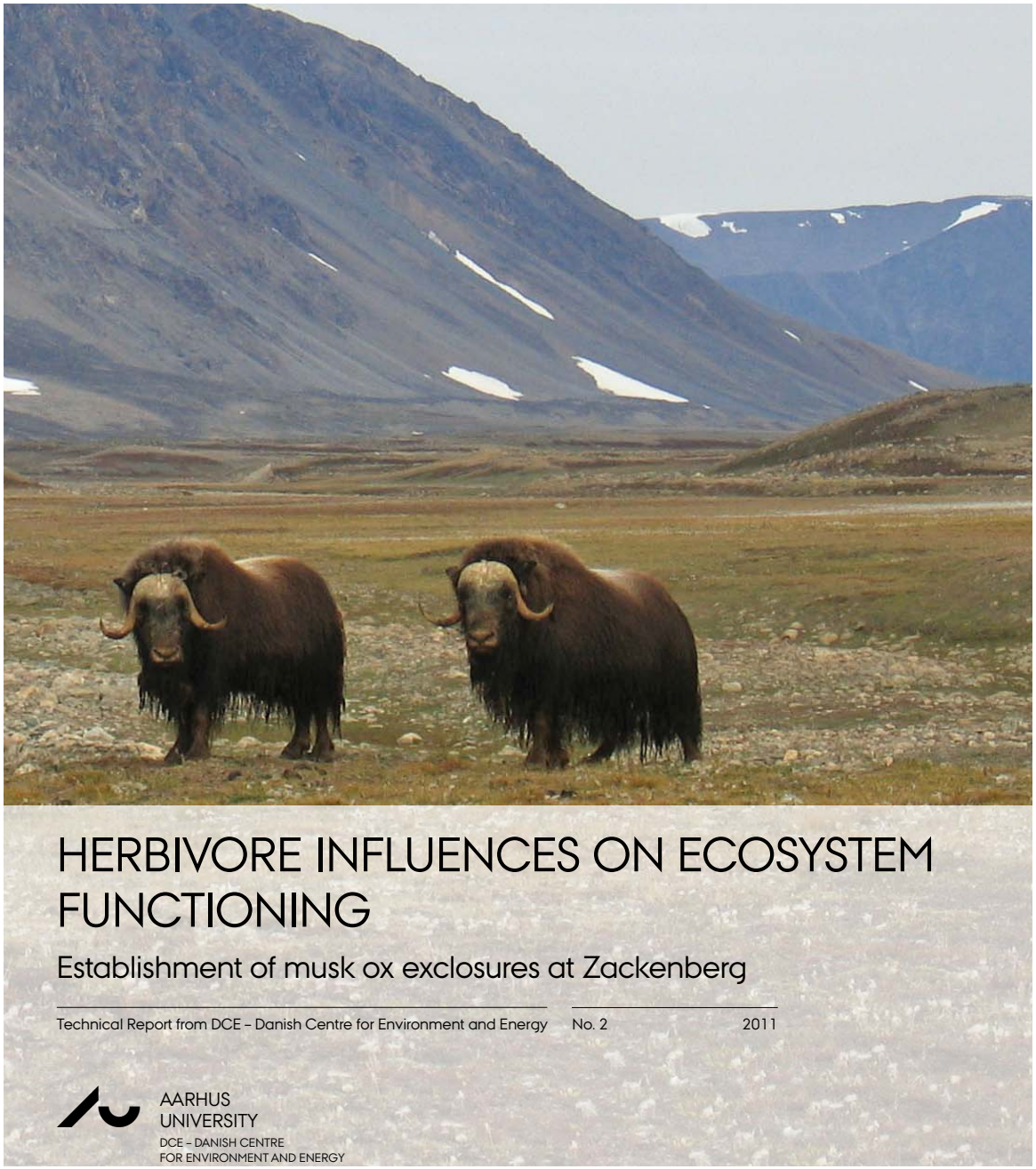


Foto Credit: U. Freier from AWI.de




New learning for a Physical Oceanographer, 4:36pm, Nov.-18, 2014

Schmidt et al. (2011)

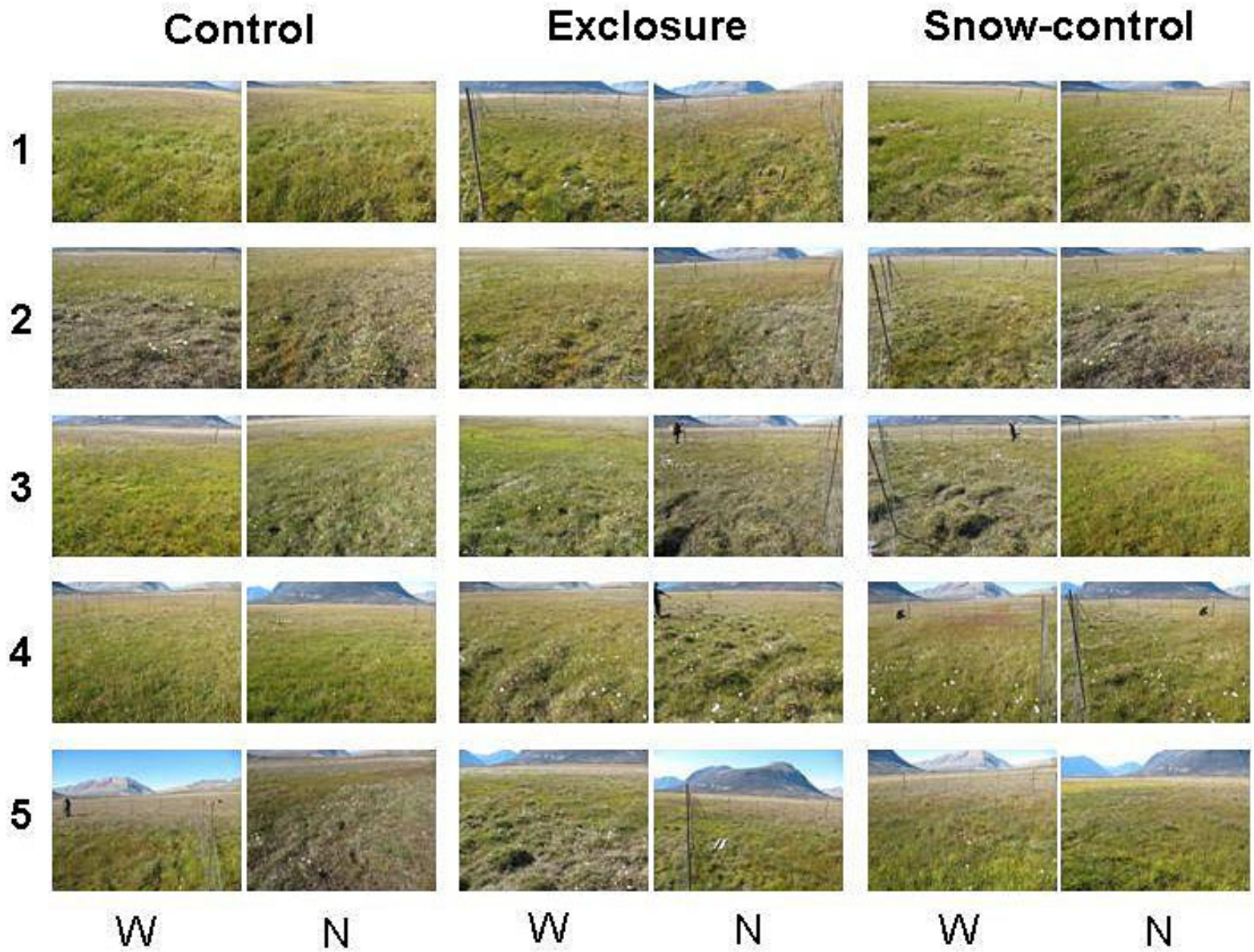



**Figure 7.** Photo documentation of plots in 2010. Numbers indicate Block number, while W indicates that the photo was taken towards the West, and N that the photo was taken towards the North.

Schmidt et al. (2011)

http://phenocam.sr.unh.edu/webcam/

# Erosion of community diversity and stability by herbivore removal under warming

Eric Post

Department of Biology, Penn State University, 208 Mueller Laboratory, University Park, PA 16802, USA

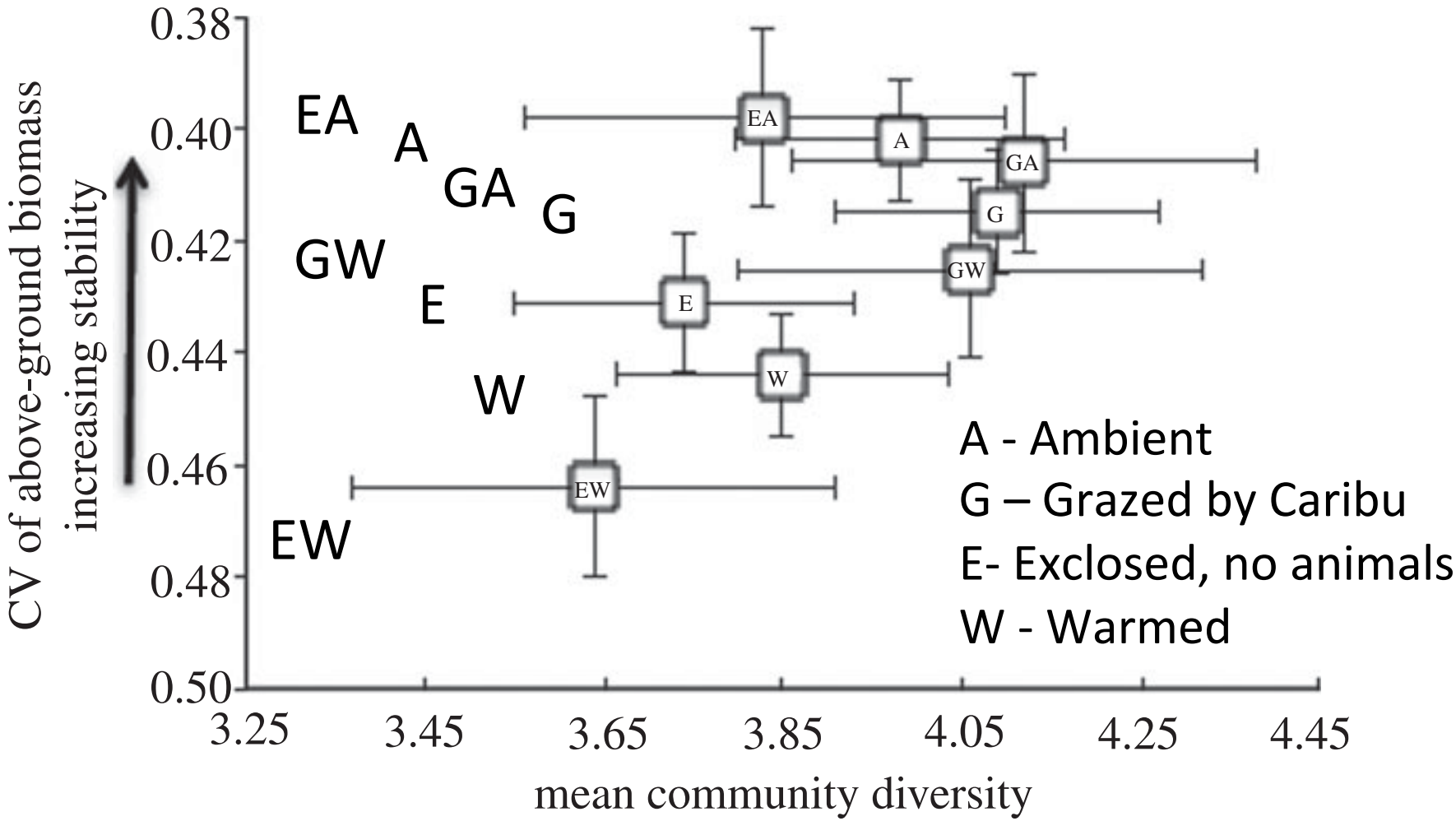
Climate change has the potential to influence the persistence of ecological communities by altering their stability properties. One of the major drivers of community stability is species diversity, which is itself expected to be altered by climate change in many systems. The extent to which climatic effects on community stability may be buffered by the influence of species interactions on diversity is, however, poorly understood because of a paucity of studies incorporating interactions between abiotic and biotic factors. Here, I report results of a 10-year field experiment, the past 7 years of which have focused on effects of ongoing warming and herbivore removal

Herbivore
=
Plant-eating animal

Post et al (2013b)

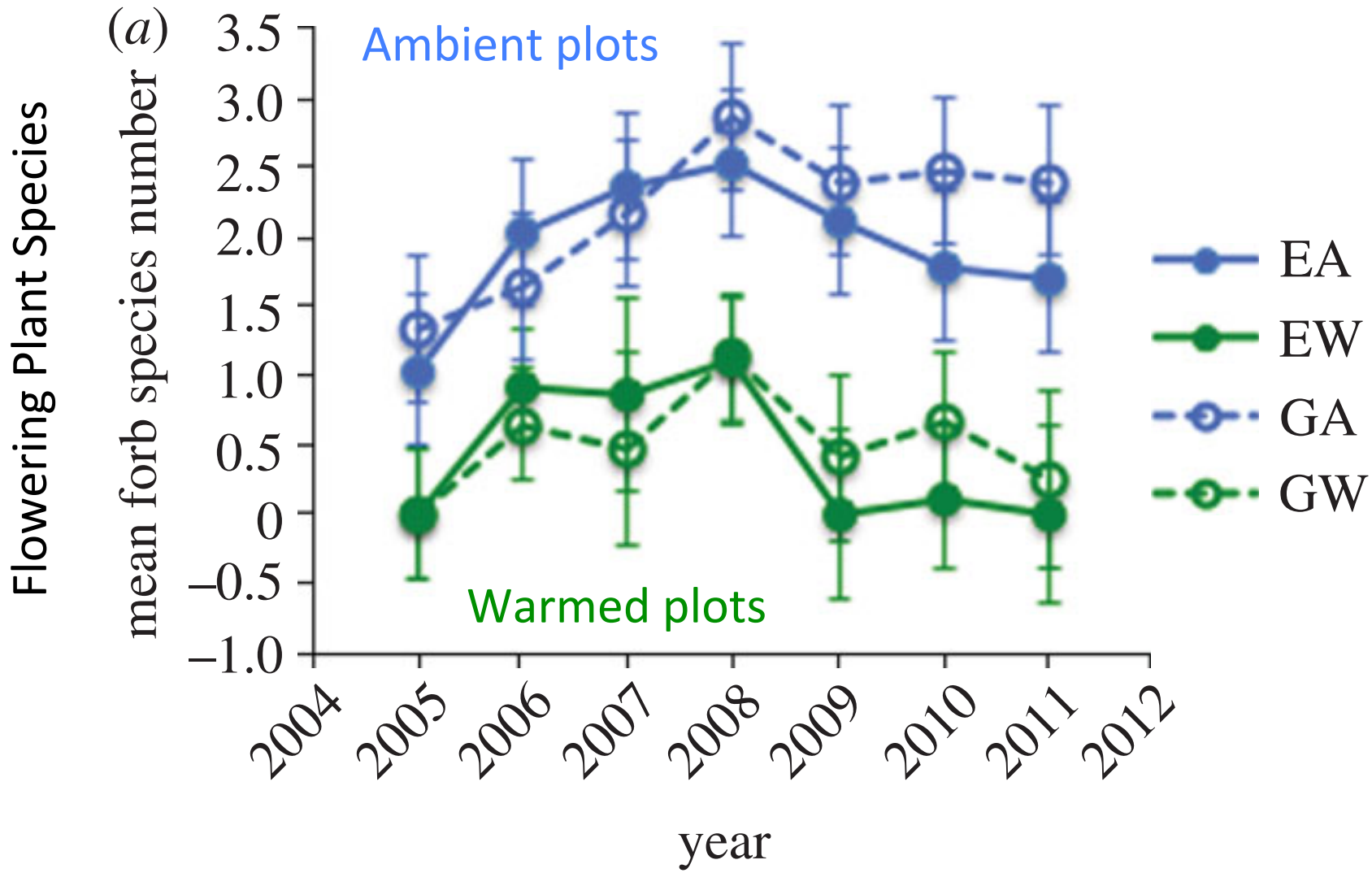
# Community Stability versus Diversity

7-year controled plant-caribu experiments




Post et al (2013b)

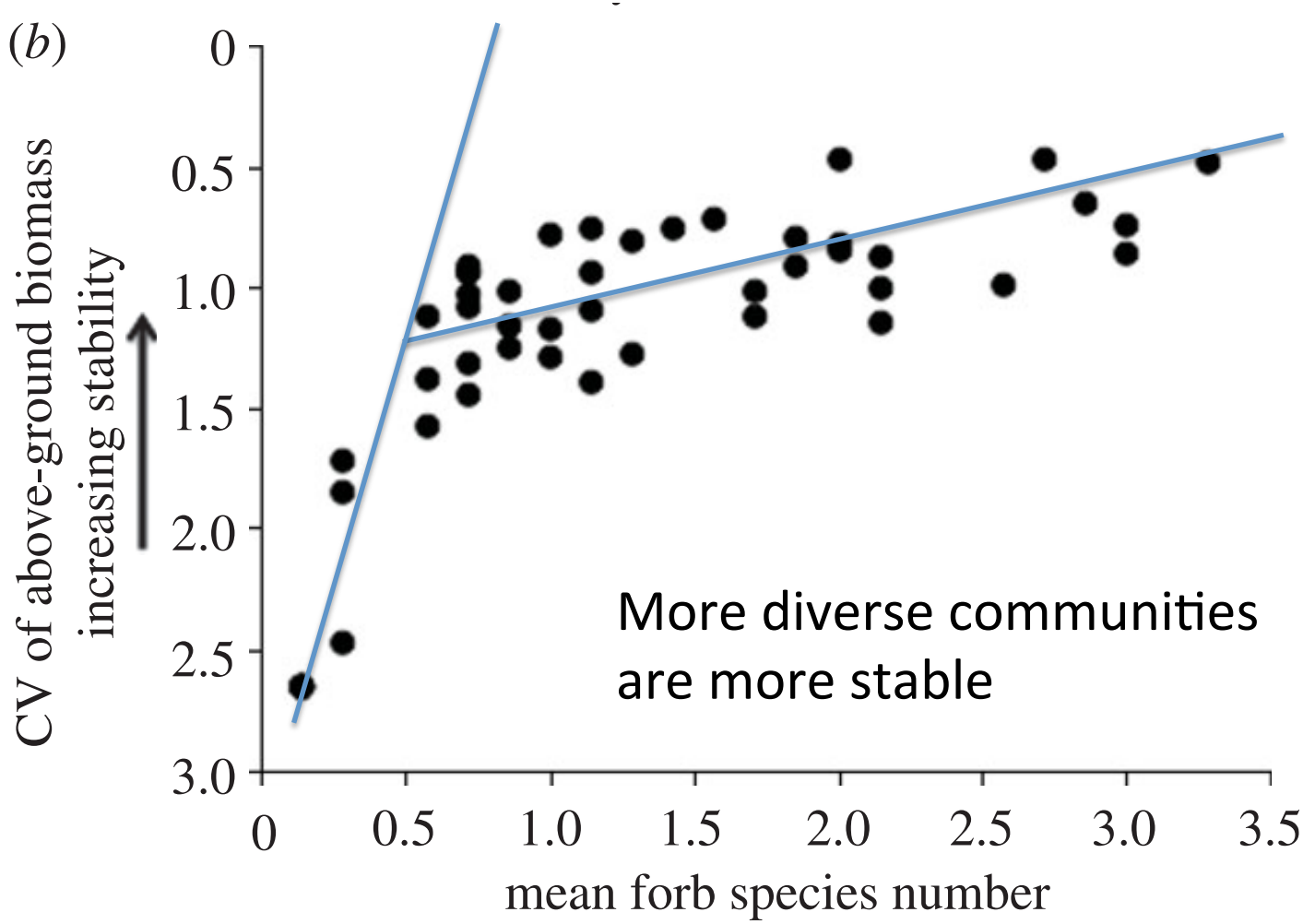
# Interannual variability of flower plant species




Post et al (2013b)

# Community Stability versus Diversity

7-year controled tundra experiments




Diversity (# if flowering plant species)

Post et al (2013b)

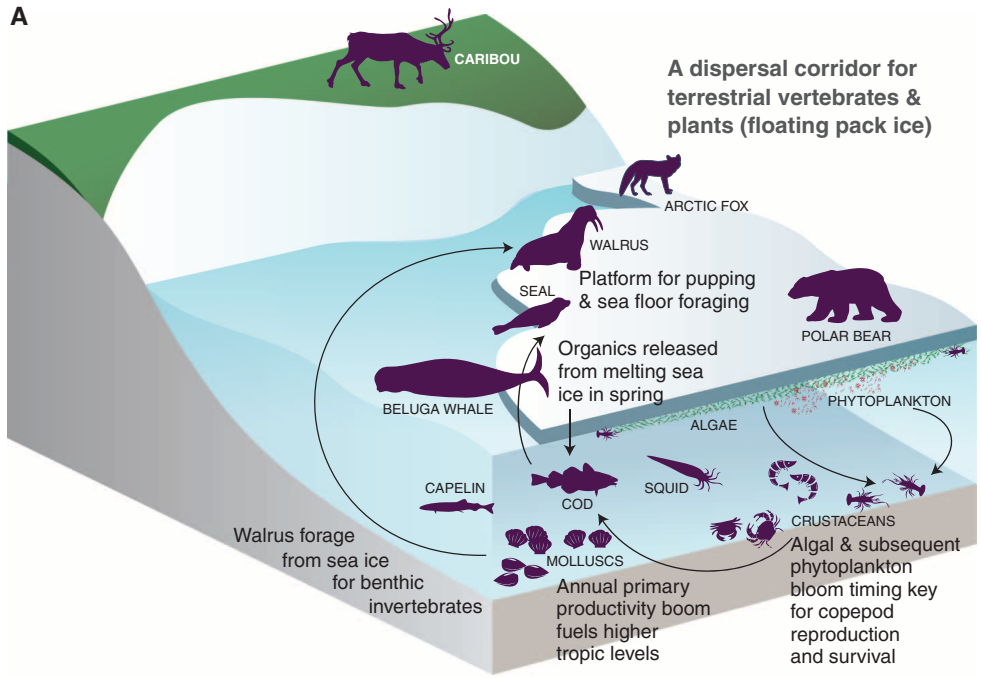
REVIEW

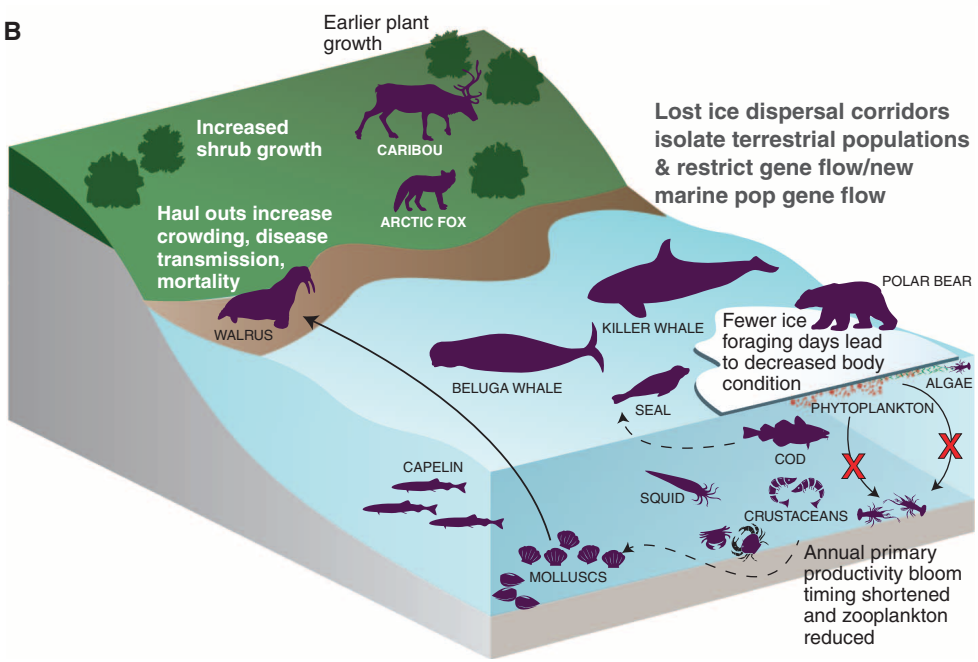
# Ecological Consequences of Sea-Ice Decline

**Eric Post,[1]* Uma S. Bhatt,[2] Cecilia M. Bitz,[3] Jedediah F. Brodie,[4] Tara L. Fulton,[5] Mark Hebblewhite,[6] Jeffrey Kerby,[1] Susan J. Kutz,[7] Ian Stirling,[8] Donald A. Walker[9]**

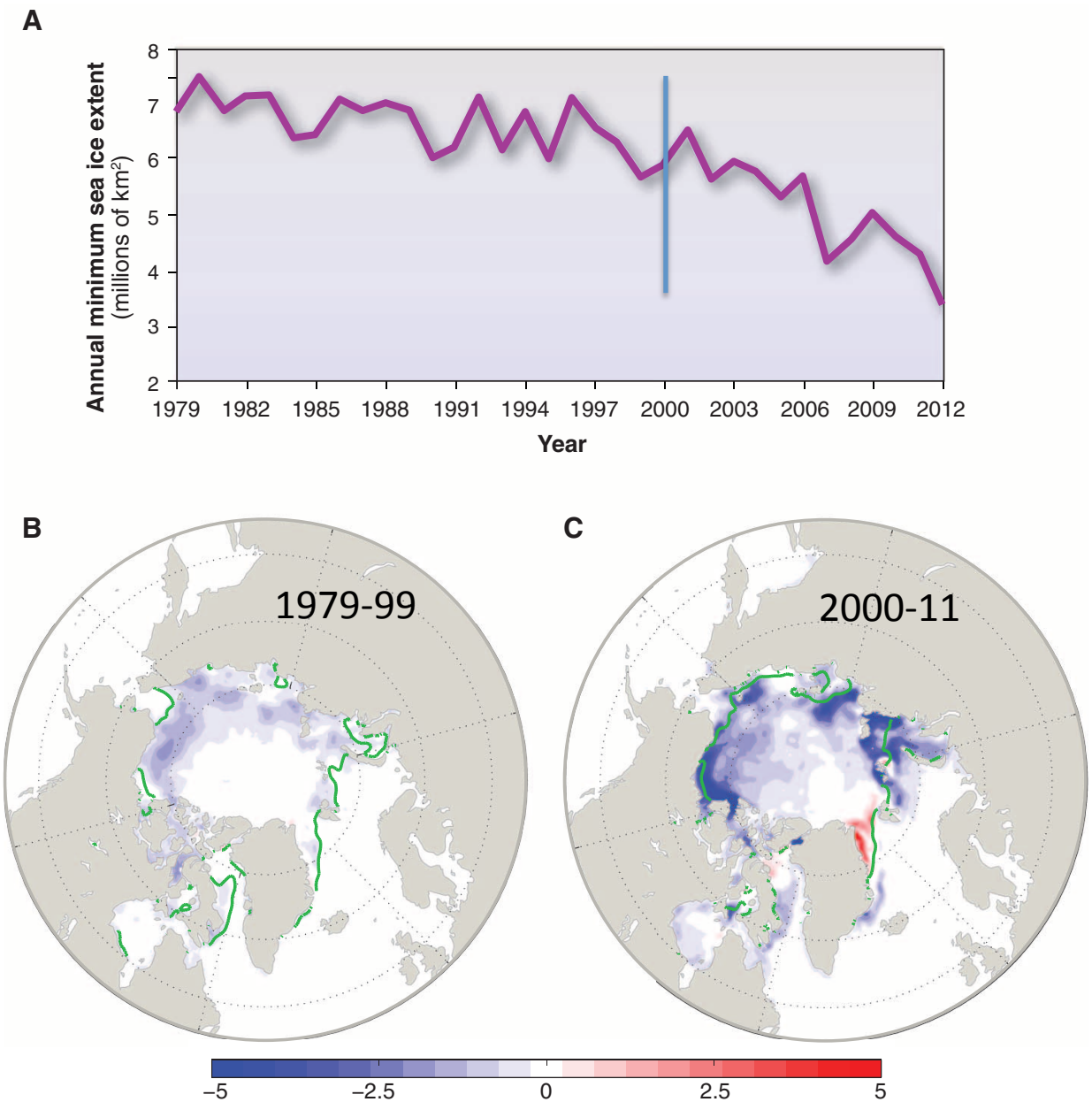
After a decade with nine of the lowest arctic sea-ice minima on record, including the historically low minimum in 2012, we synthesize recent developments in the study of ecological responses to sea-ice decline. Sea-ice loss emerges as an important driver of marine and terrestrial ecological dynamics, influencing productivity, species interactions, population mixing, gene flow, and pathogen and disease transmission. Major challenges in the near future include assigning clearer attribution to sea ice as a primary driver of such dynamics, especially in terrestrial systems, and addressing pressures arising from human use of arctic coastal and near-shore areas as sea ice diminishes.

Post et al (2013)



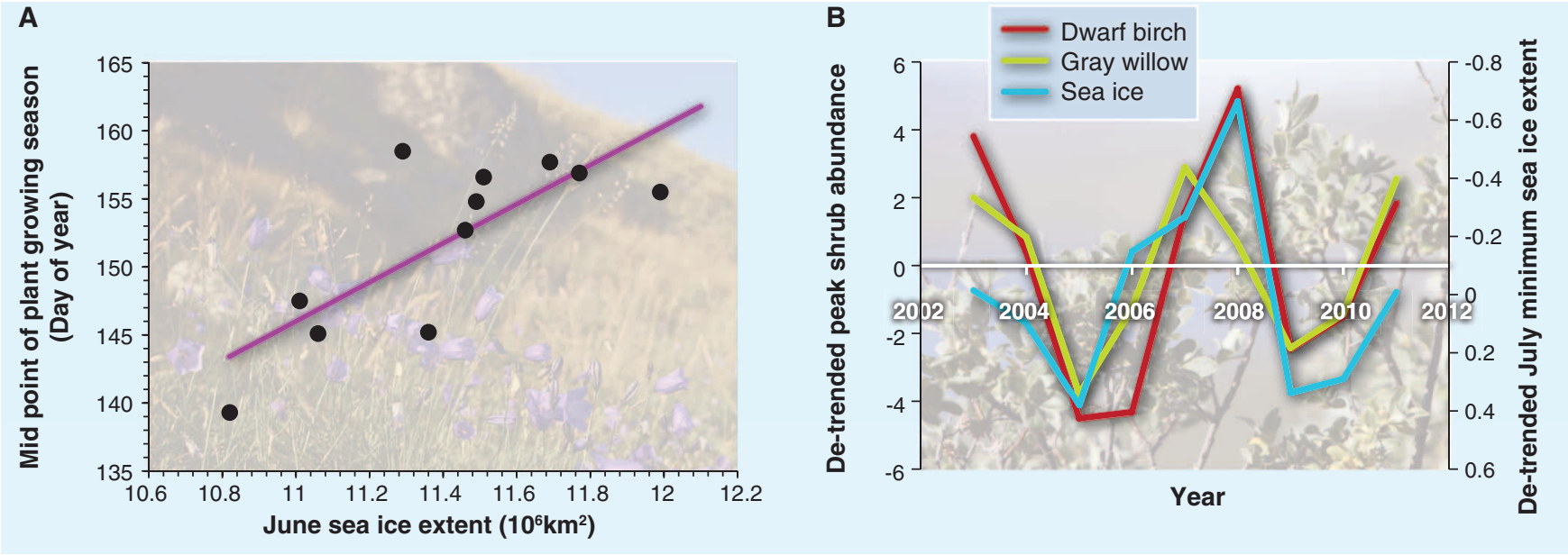




Post et al (2013)

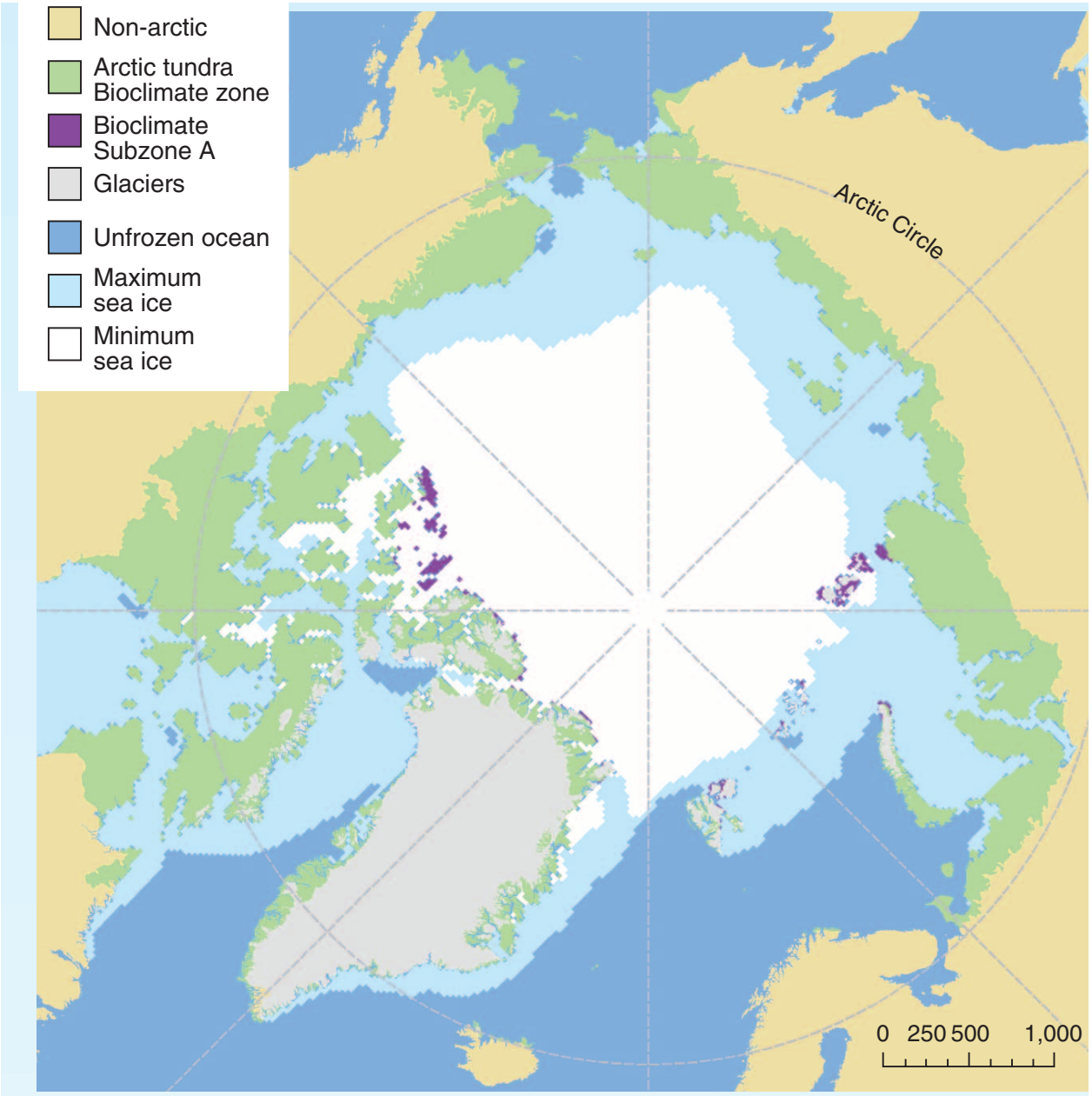



Percent ice concentration change per year

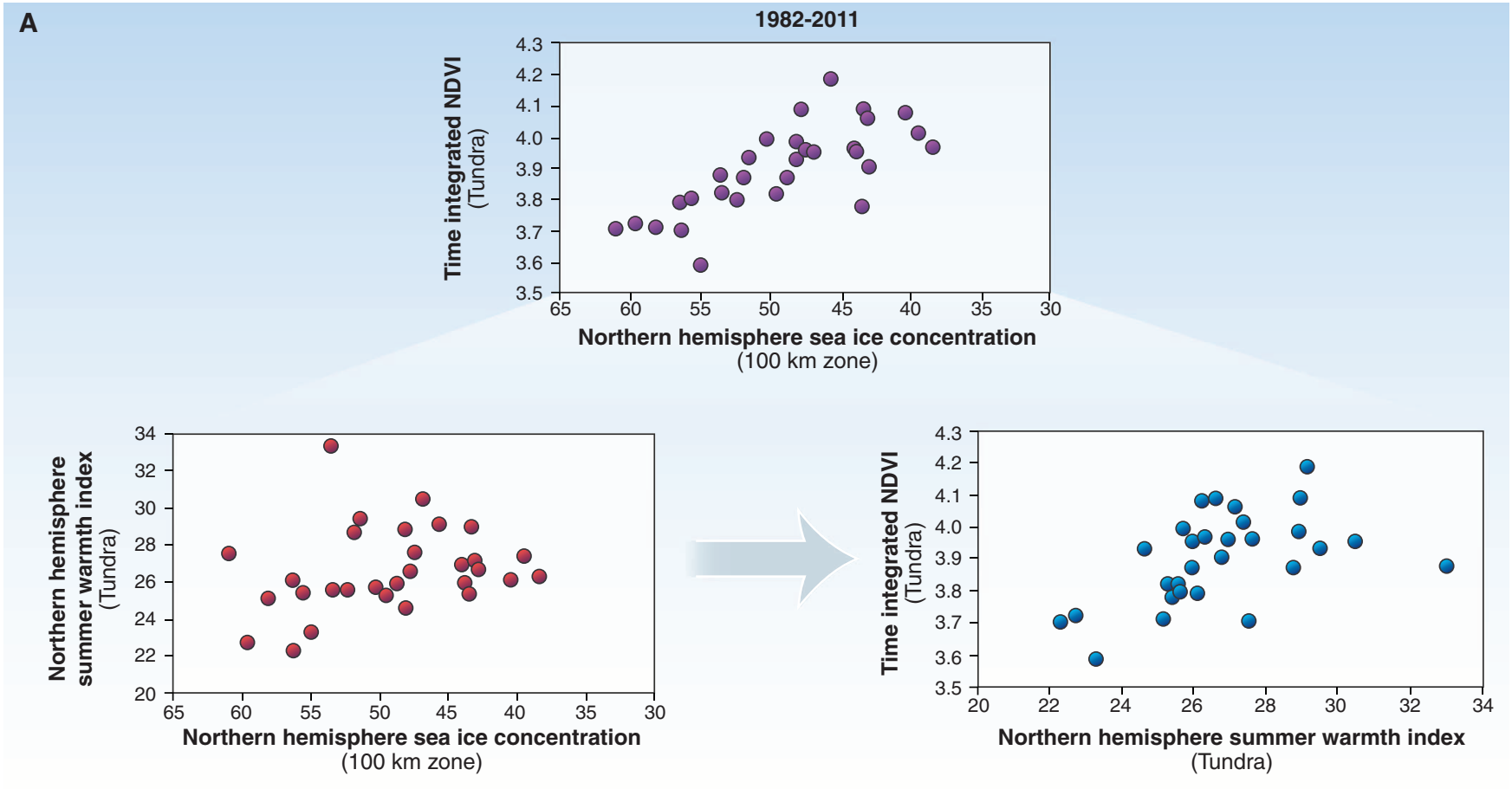
Post et al (2013)



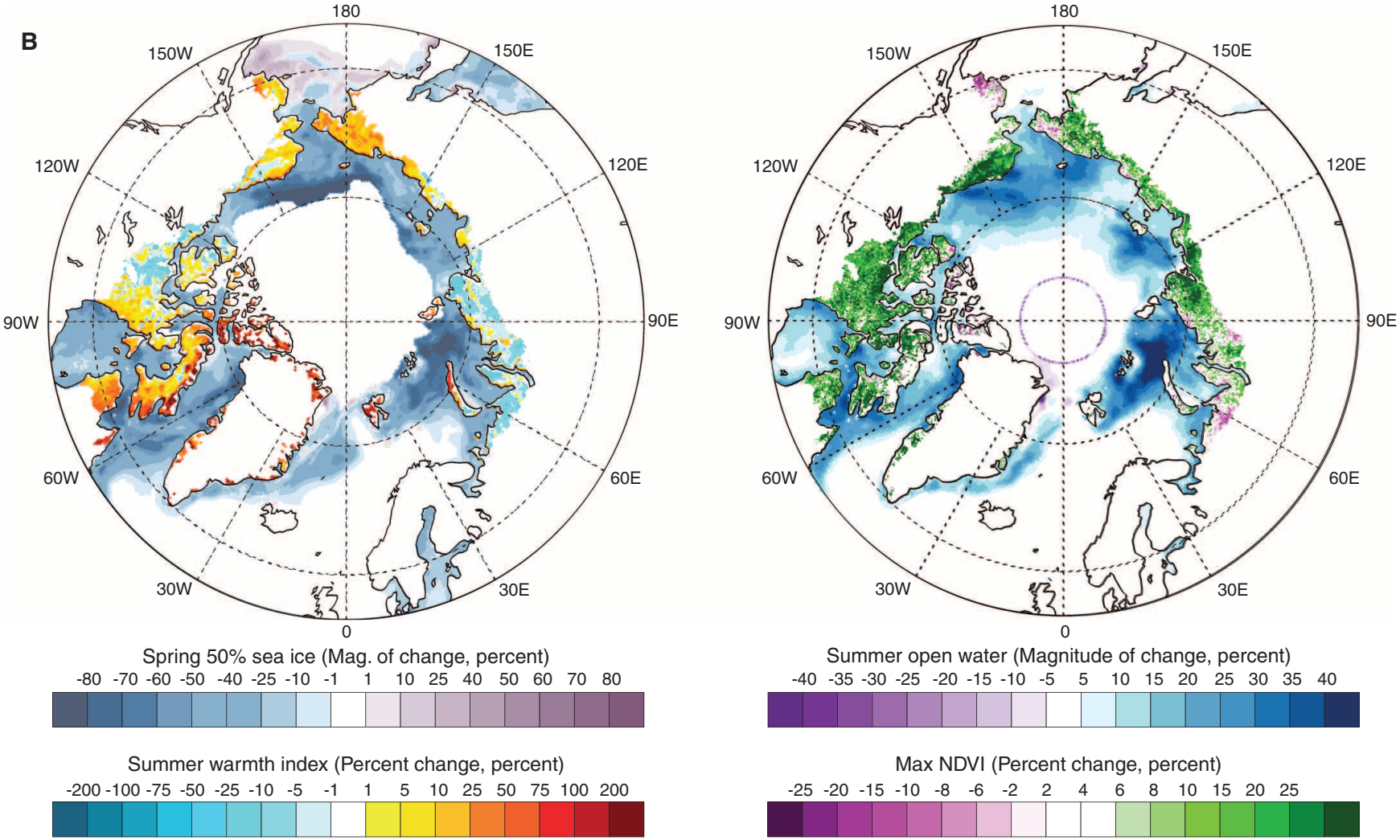

Post et al (2013)




Post et al (2013)




Post et al (2013)




Post et al (2013)

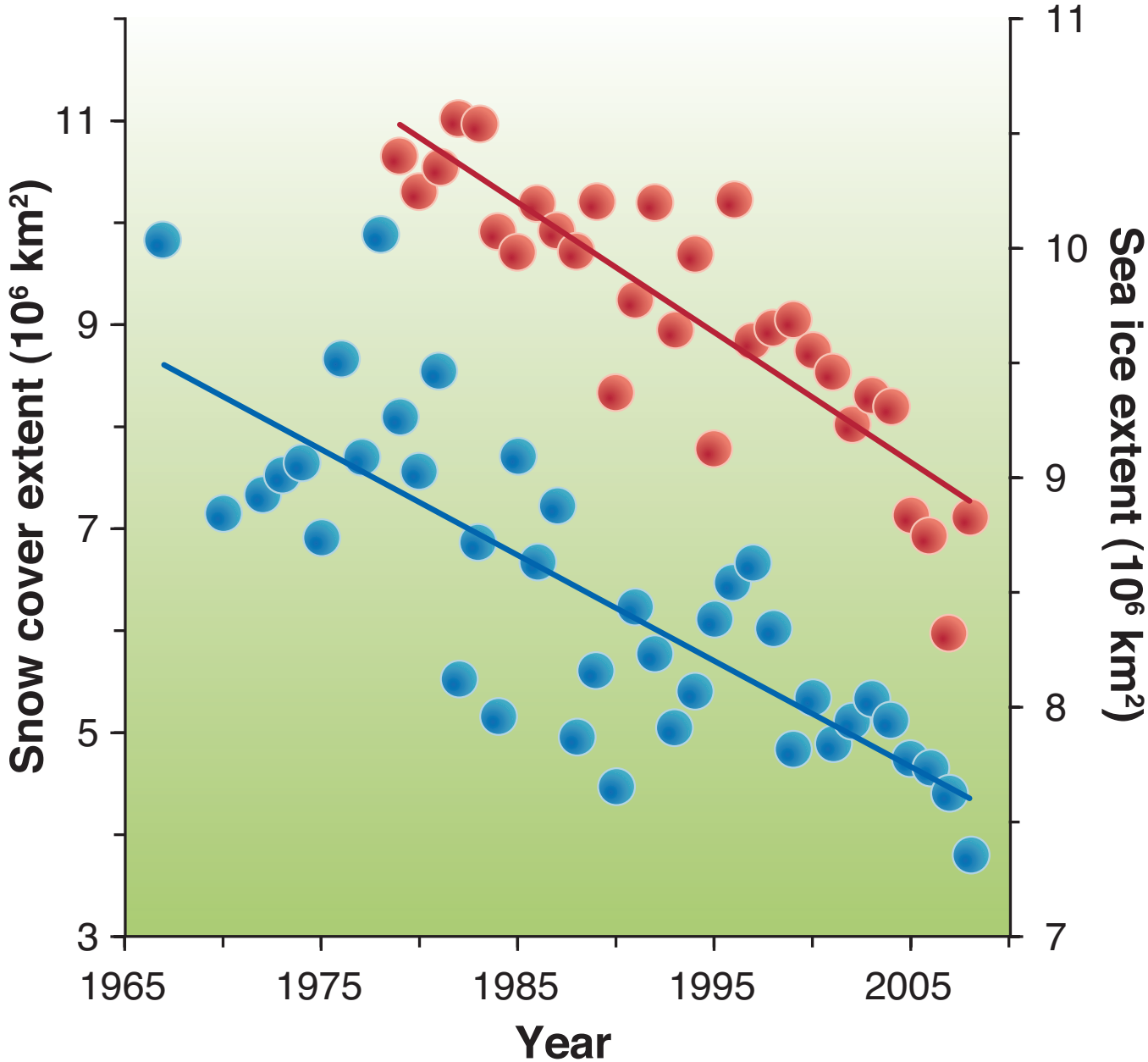
# Ecological Dynamics Across the Arctic Associated with Recent Climate Change

**Eric Post,[1,2]* Mads C. Forchhammer,[2] M. Syndonia Bret-Harte,[3] Terry V. Callaghan,[4,5] Torben R. Christensen,[6] Bo Elberling,[7,8] Anthony D. Fox,[9] Olivier Gilg,[10,11] David S. Hik,[12] Toke T. Høye,[9] Rolf A. Ims,[13] Erik Jeppesen,[14] David R. Klein,[3] Jesper Madsen,[2] A. David McGuire,[15] Søren Rysgaard,[16] Daniel E. Schindler,[17] Ian Stirling,[18] Mikkel P. Tamstorf,[2] Nicholas J.C. Tyler,[19] Rene van der Wal,[20] Jeffrey Welker,[21] Philip A. Wookey,[22] Niels Martin Schmidt,[2] Peter Aastrup[2]**

At the close of the Fourth International Polar Year, we take stock of the ecological consequences of recent climate change in the Arctic, focusing on effects at population, community, and ecosystem scales. Despite the buffering effect of landscape heterogeneity, Arctic ecosystems and the trophic relationships that structure them have been severely perturbed. These rapid changes may be a bellwether of changes to come at lower latitudes and have the potential to affect ecosystem services related to natural resources, food production, climate regulation, and cultural integrity. We highlight areas of ecological research that deserve priority as the Arctic continues to warm.

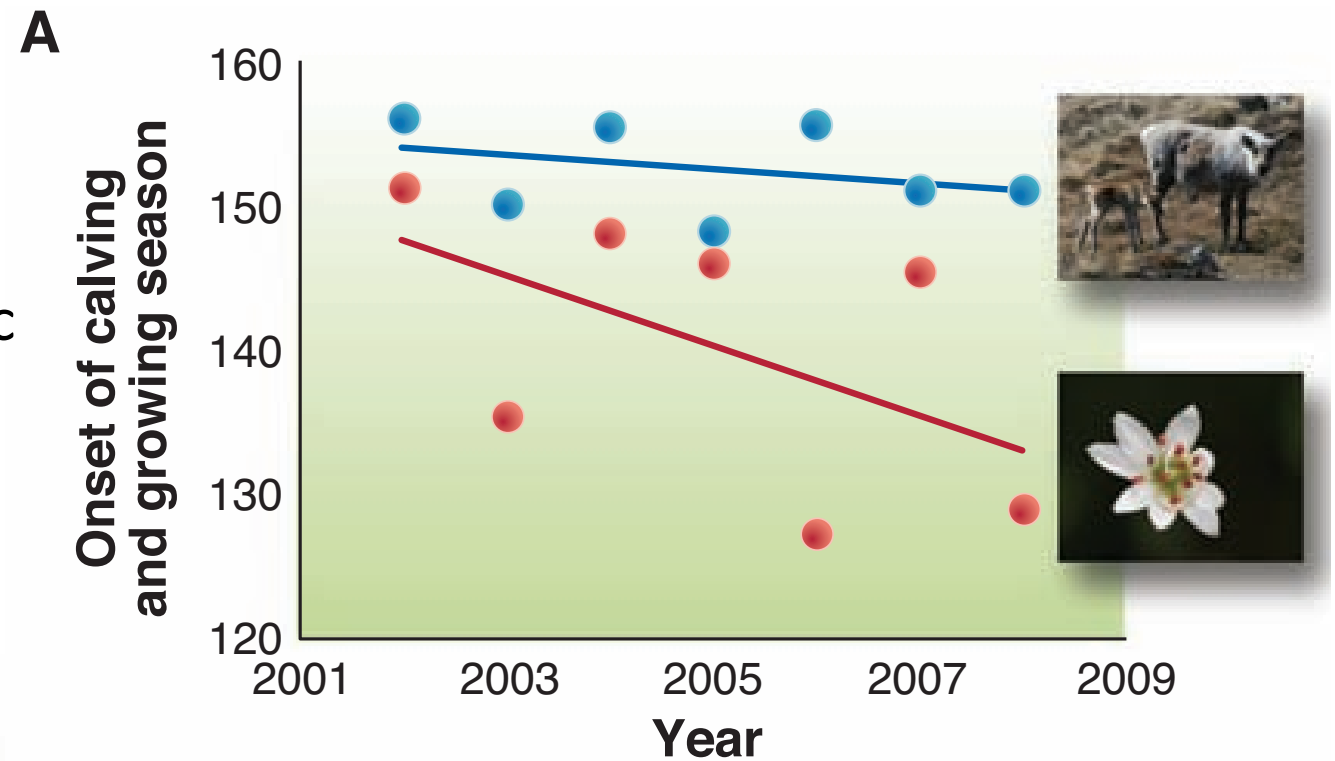
Post et al (2009)

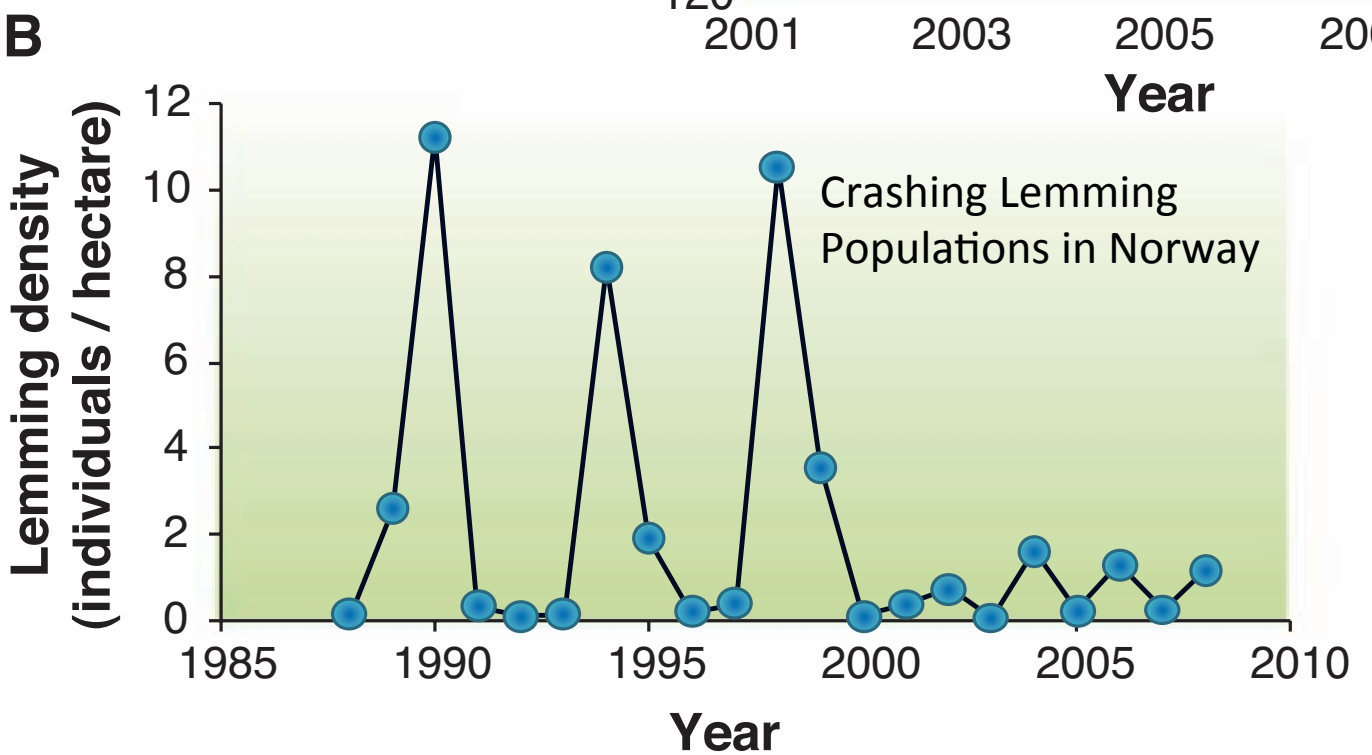
# Climate Change: Snow and Ice Extent Decreasing




Post et al (2009)

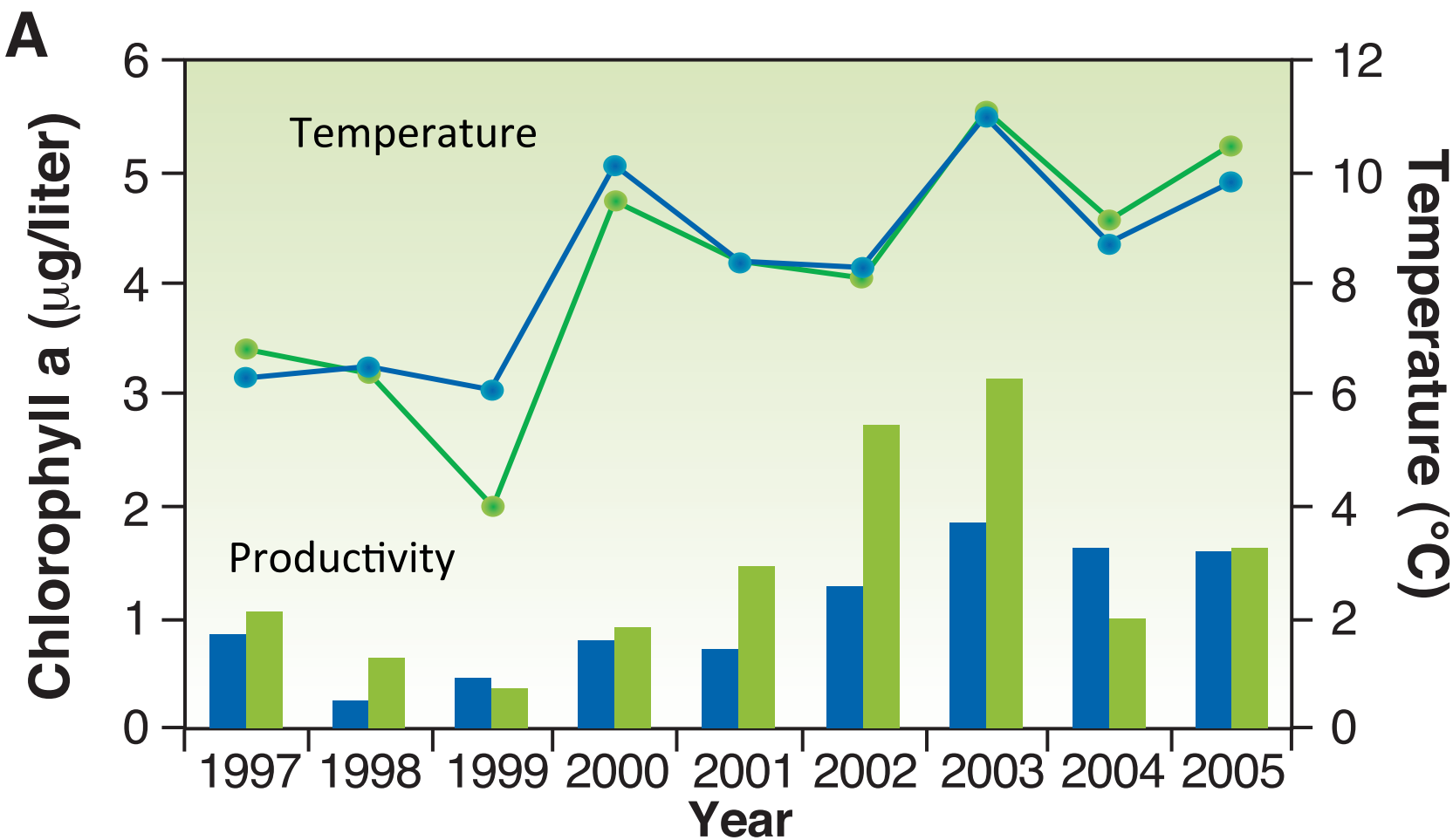
Mis-matched trophic
Response to Change



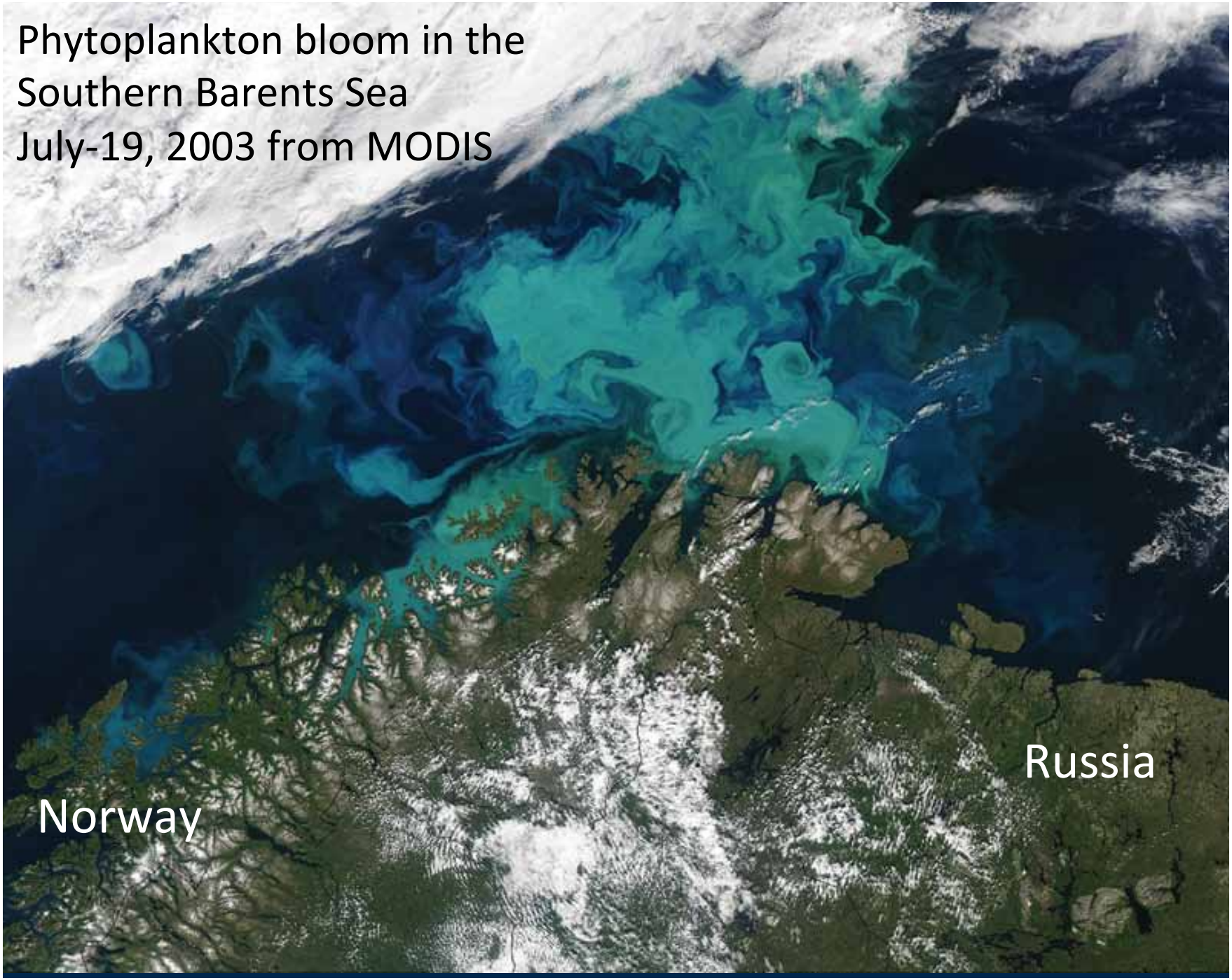




Post et al (2009)

# Greenland Lake with (green) and without (blue) fish

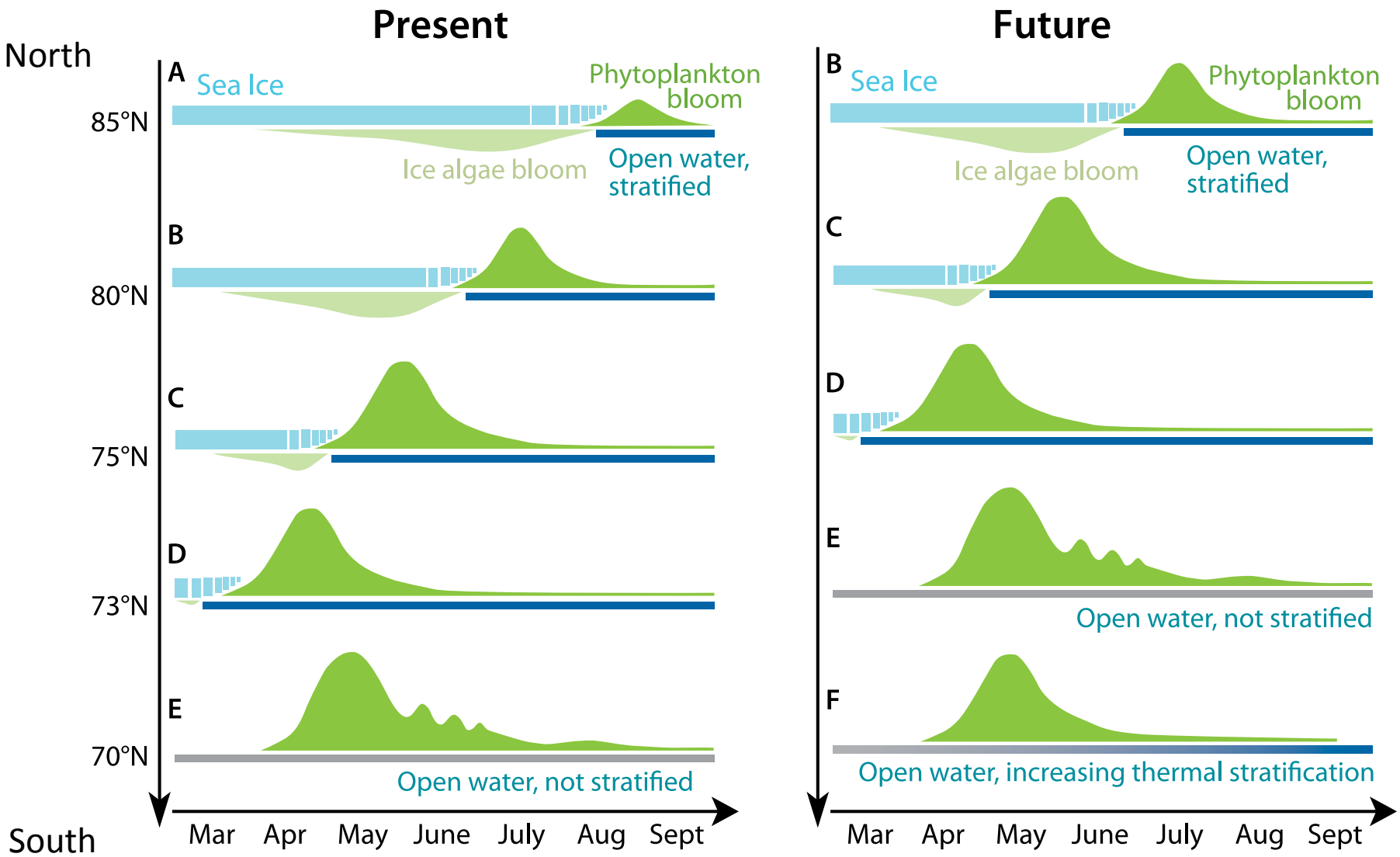



Post et al (2009)

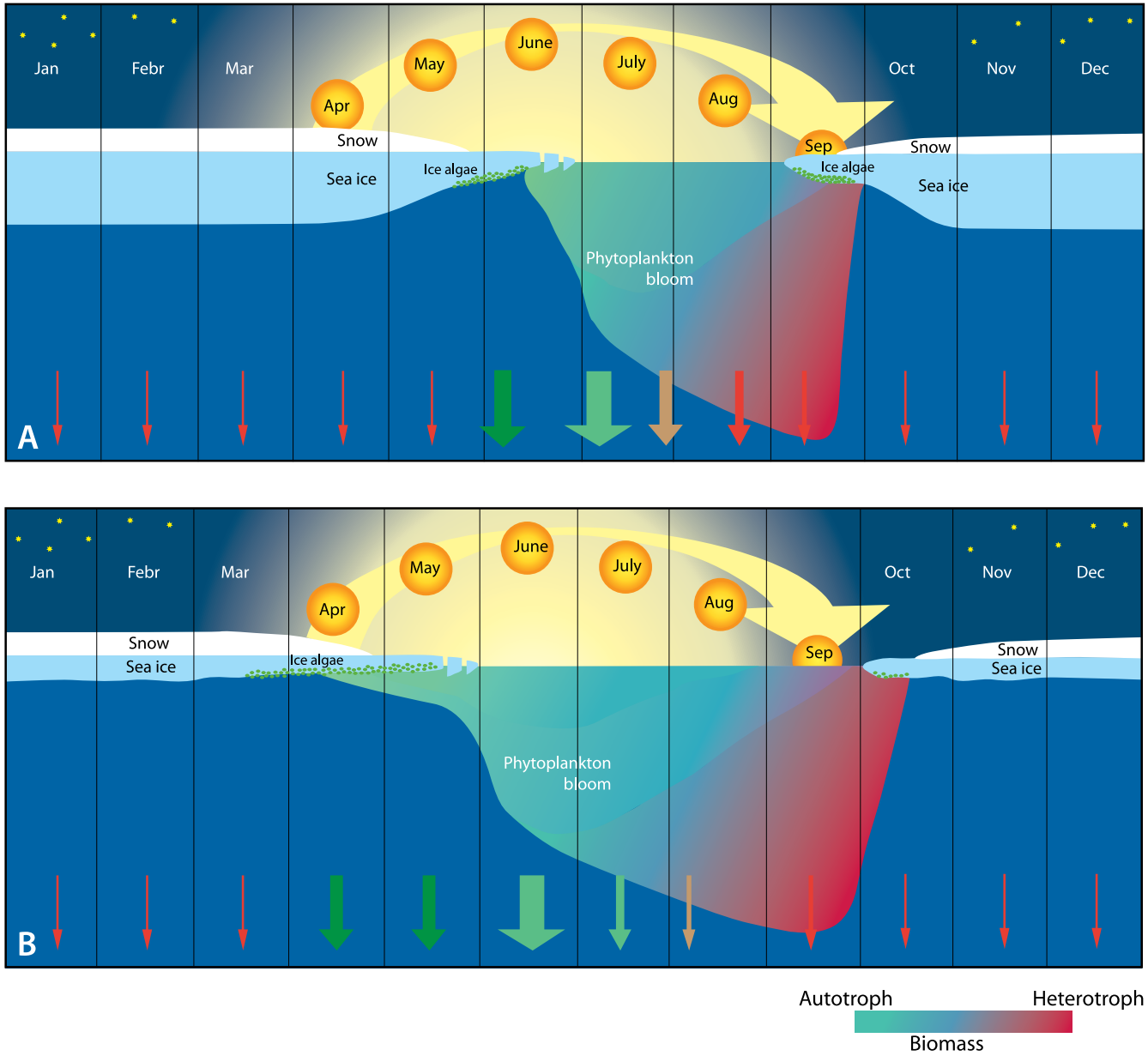



Wassmann and Reigstad (2011)

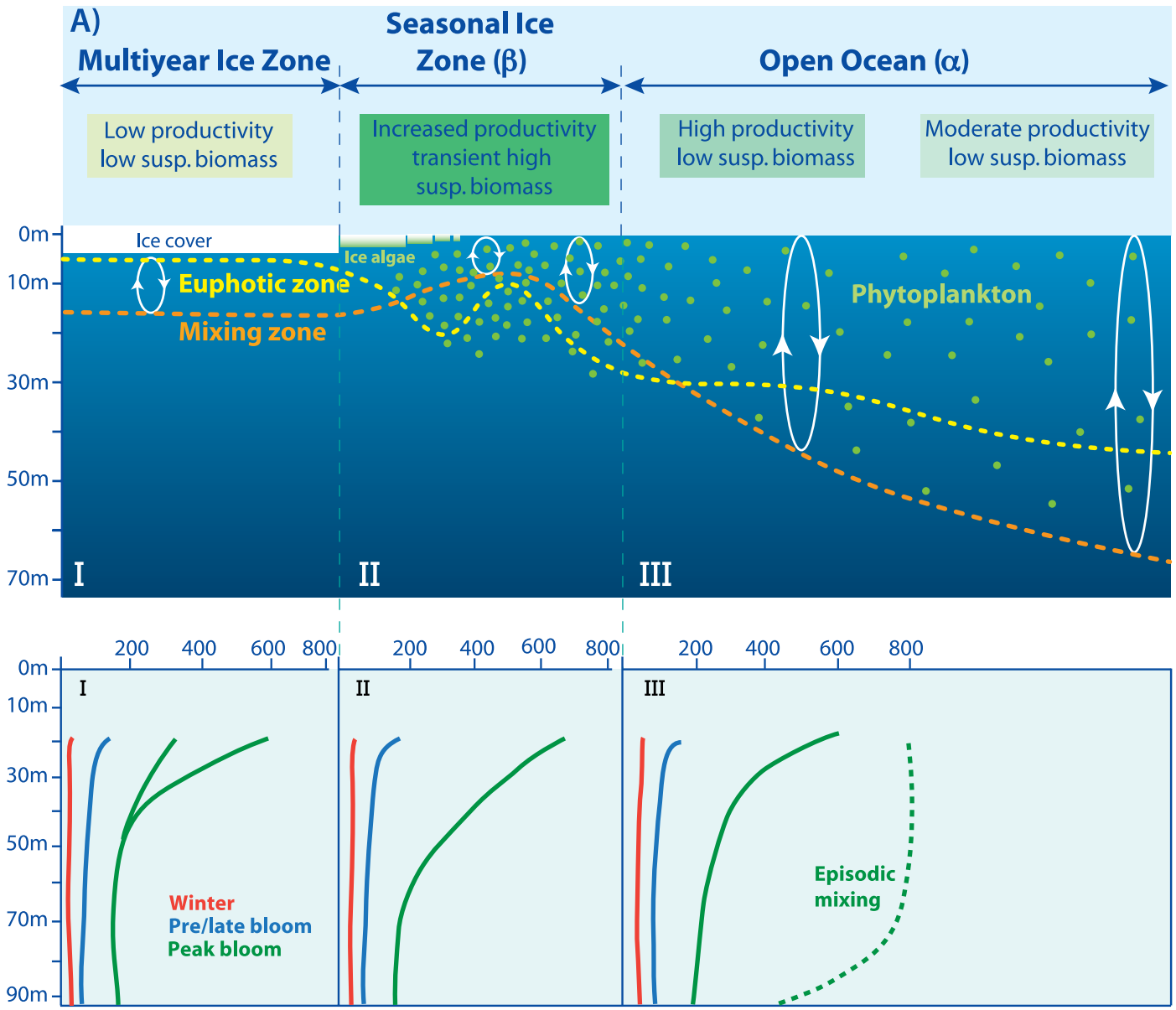
# Timing of ice algae and phyotoplankton blooms



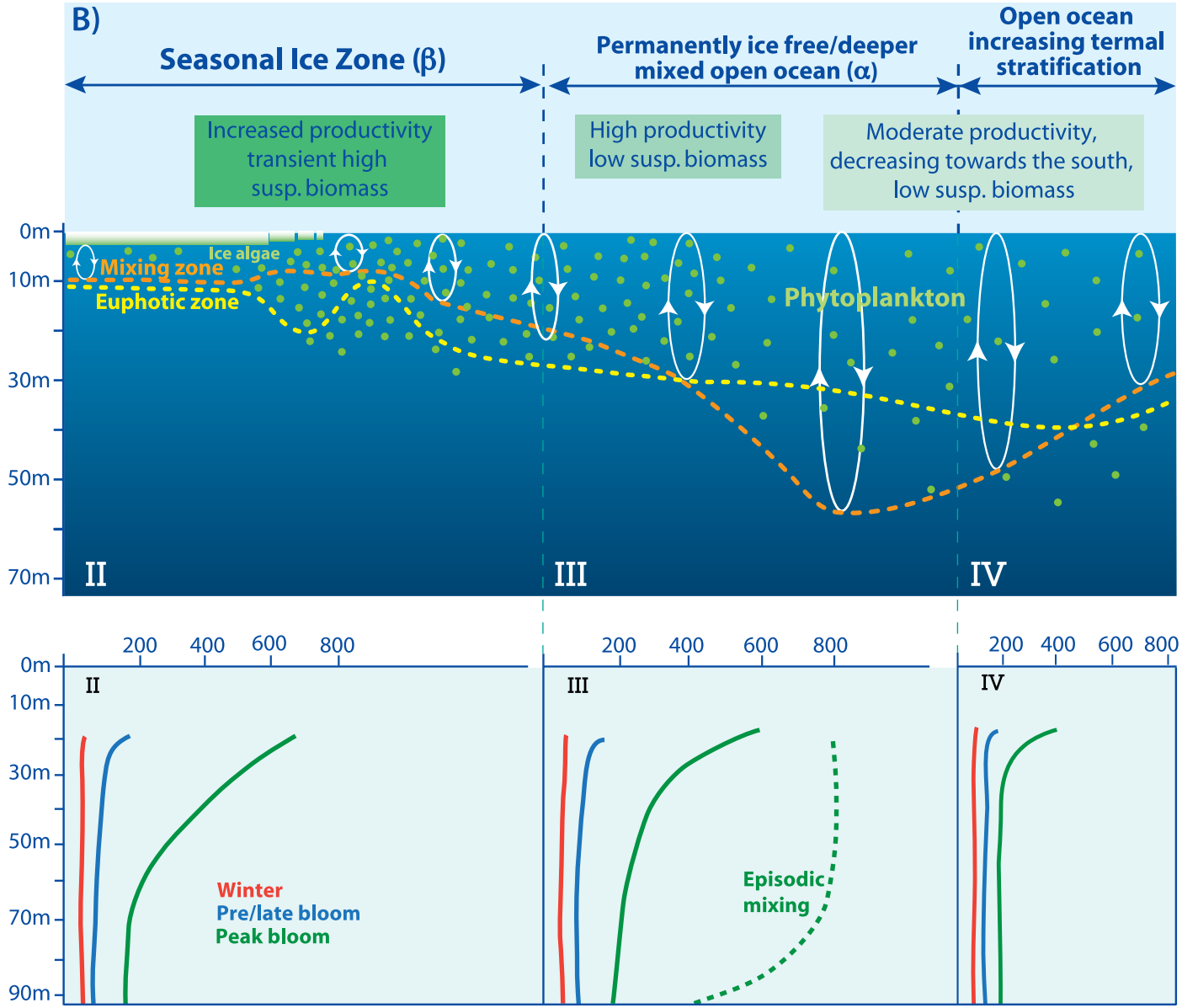

Wassmann and Reigstad (2011)




Wassmann and Reigstad (2011)

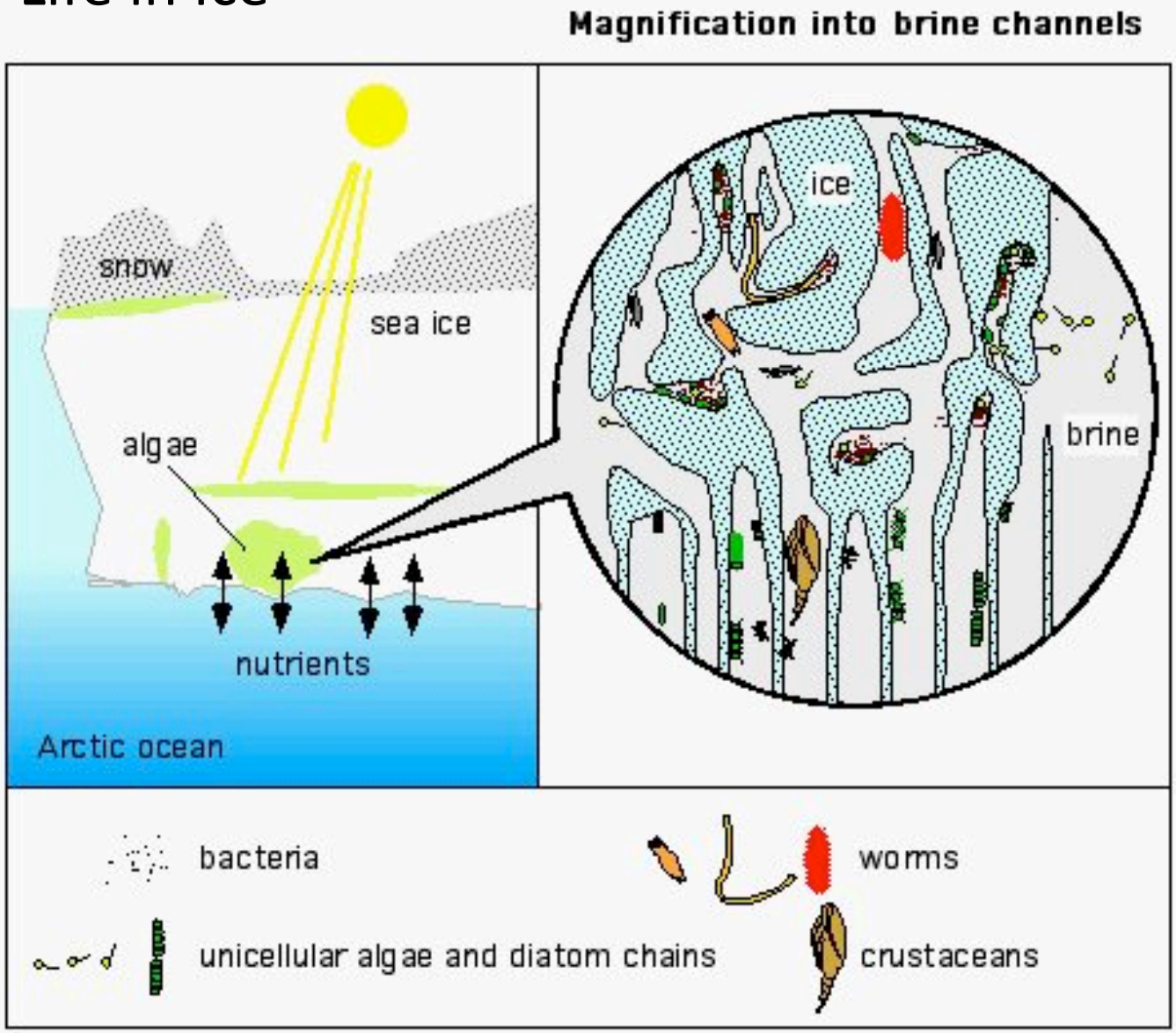



Wassmann and Reigstad (2011)




Wassmann and Reigstad (2011)

# Life in Ice




http://www.arctic.noaa.gov/essay_krembsdeming.html