

# Chukchi Borderland/Arctic Basin joint activities

-RUSALCA cruise cancelled 2016; no plans in 2017

-continued collaborations with Canada Basin observing studies

-NOAA Ocean Exploration (focused on Chukchi Borderlands and Arctic Basin)-biodiversity and ROV

[http://news.uaf.edu/researchers-investigate-mysteries-underwater-pockmarks-unique-biology-chukchi-borderlands-series-part-1/?utm\\_source=wysija&utm\\_medium=email&utm\\_campaign=Cstonestaff10\\_26\\_16](http://news.uaf.edu/researchers-investigate-mysteries-underwater-pockmarks-unique-biology-chukchi-borderlands-series-part-1/?utm_source=wysija&utm_medium=email&utm_campaign=Cstonestaff10_26_16)

- Planning Synoptic Arctic Survey (SAS)-2019; recent workshop in Sweden; could facilitate data information needs for decisions related to Central Arctic Ocean (CAO)

# Hidden Ocean 2016: The Chukchi Borderlands

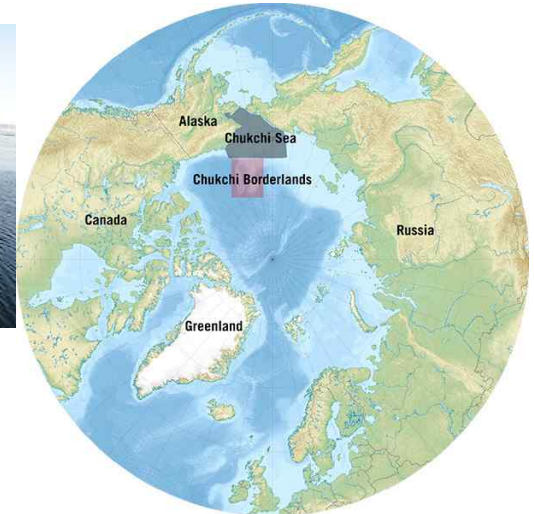
<http://oceanexplorer.noaa.gov/explorations/16arctic/welcome.html>

July 2 - August 10, 2016

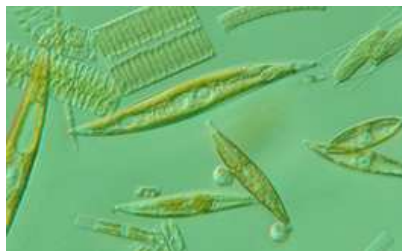
**Katrin Iken and Russ Hopcroft**

*Institute of Marine Science*

*University of Alaska Fairbanks*



This NOAA Ocean Exploration mission employed an ecosystem perspective to investigate microbial communities in sea ice, water, and seafloor environments; water column (planktonic) organisms; invertebrate and fish seafloor (benthic) communities; as well as conducted observations of marine mammals and seabirds.



# Synoptic Arctic *Survey*



*An international initiative for:* A coordinated multi-ship operation in the Arctic Ocean in the course of one summer season in one year.

*To obtain synoptic view of its:* Ecosystem  
Hydrography  
Biogeochemistry incl. carbon storage

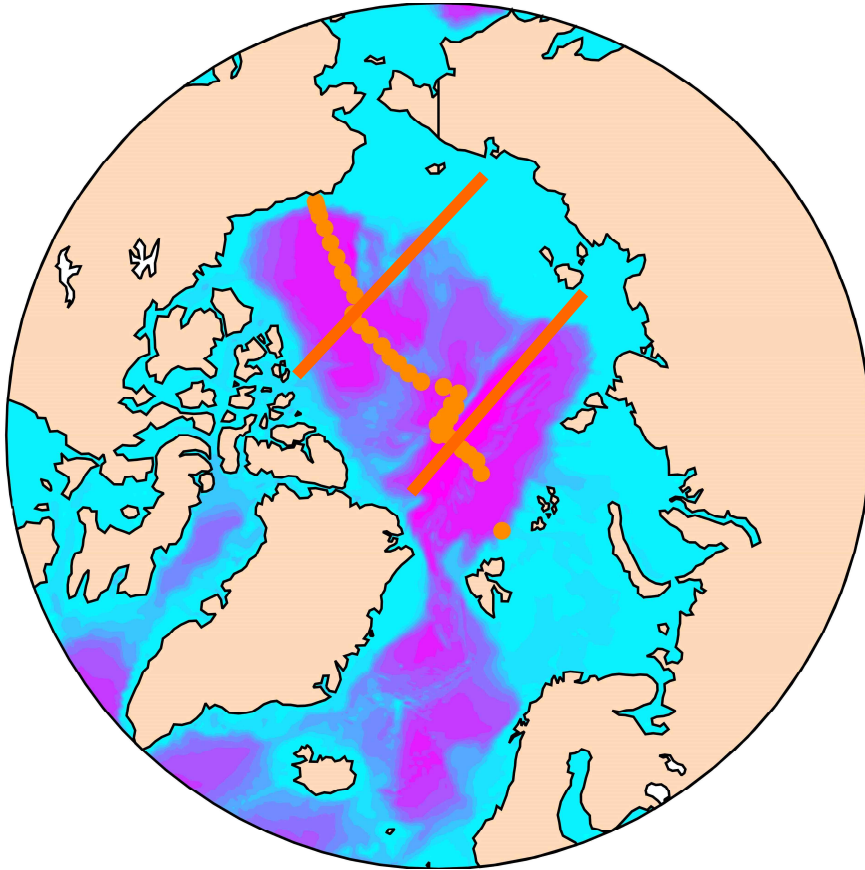
*To remedy the spotty data coverage in the Arctic*

*To pave the way for large-scale assessments*

*To create the observational fundament for future observing programs*

*To leave a legacy for future generations*

# The Arctic Ocean



An early warning sentinel of Climate change  
loss of sea ice & arctic amplification  
increased run off  
ocean acidification  
vulnerable ecosystems

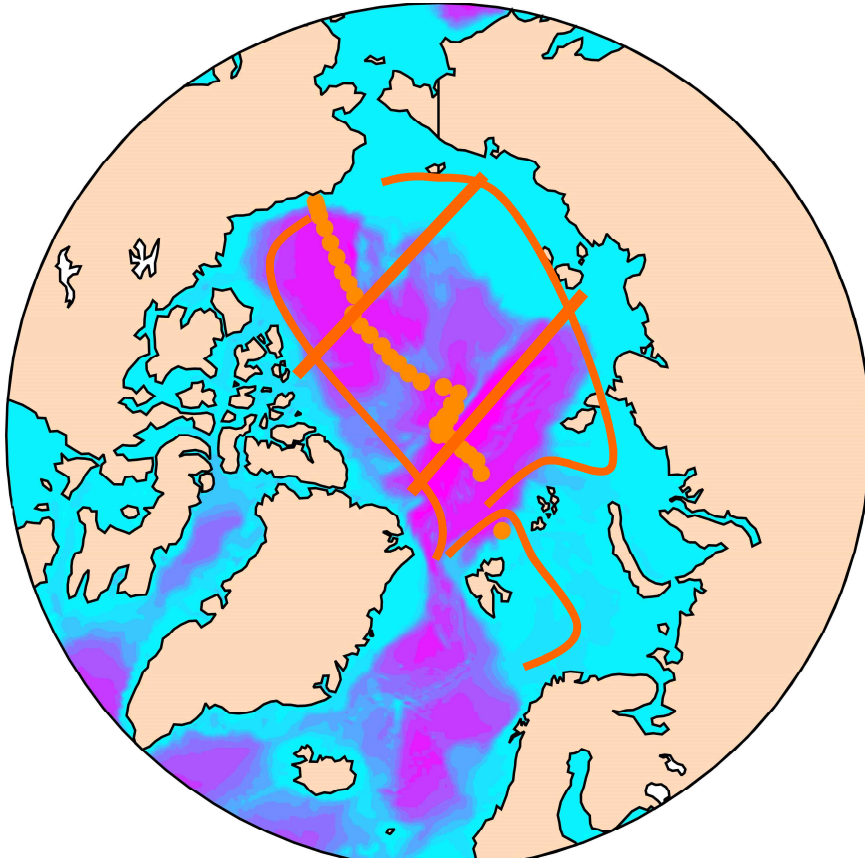
One of the regions that are most difficult to observe

- Ice cover
- Adverse weather and light (in winter)
- Remote
- Heterogenous

One of the oceans that are the easiest to observe

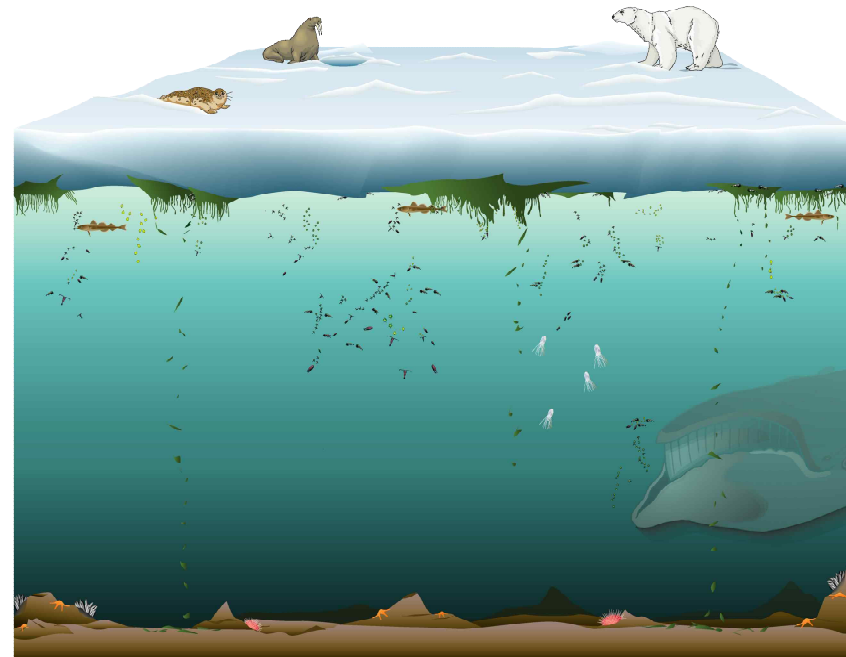
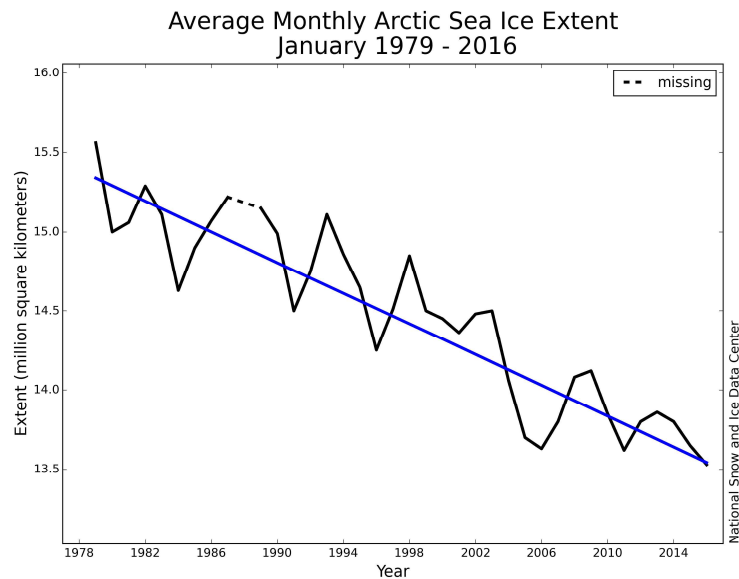
- 3% of the ocean surface
- 1.5% ocean volume
- Can be crossed with full depth profiles in a month

# An Arctic Synoptic Survey



# Changes in sea ice (and light) are the most obvious physical manifestation of climate change

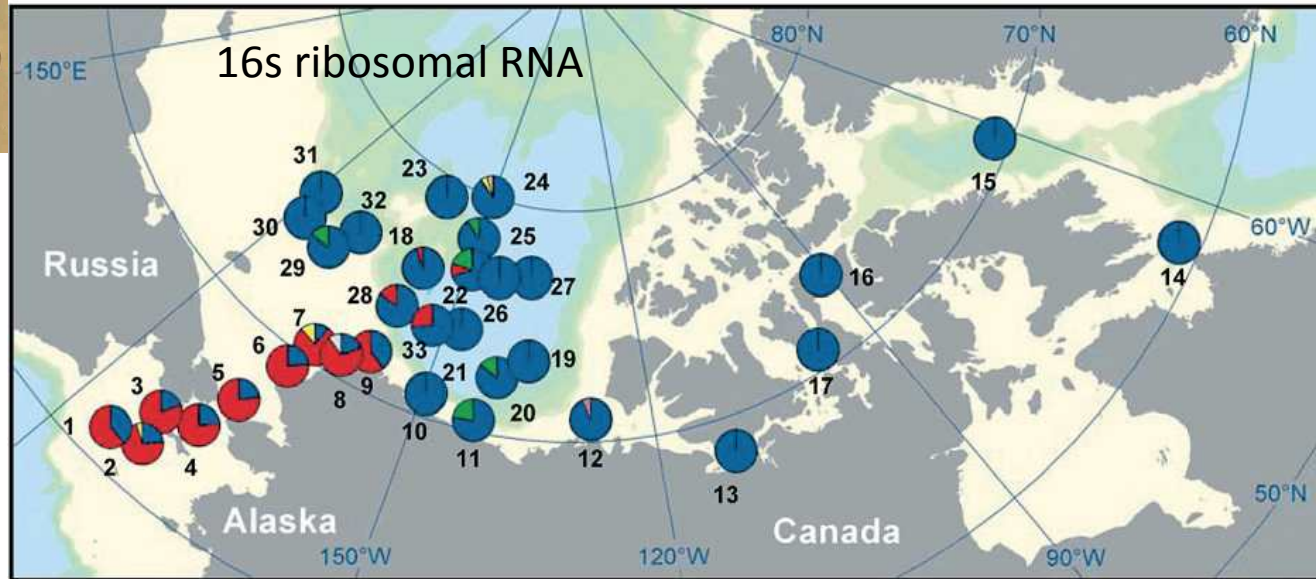
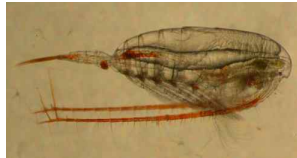
## January Sea Ice Maximum



## Other ongoing physical changes also can drive ecosystem changes

- Circulation and transport
- Temperature
- Stratification and stability
- Acidification

# What determines the ranges of organisms and how might these be modified under climate change?

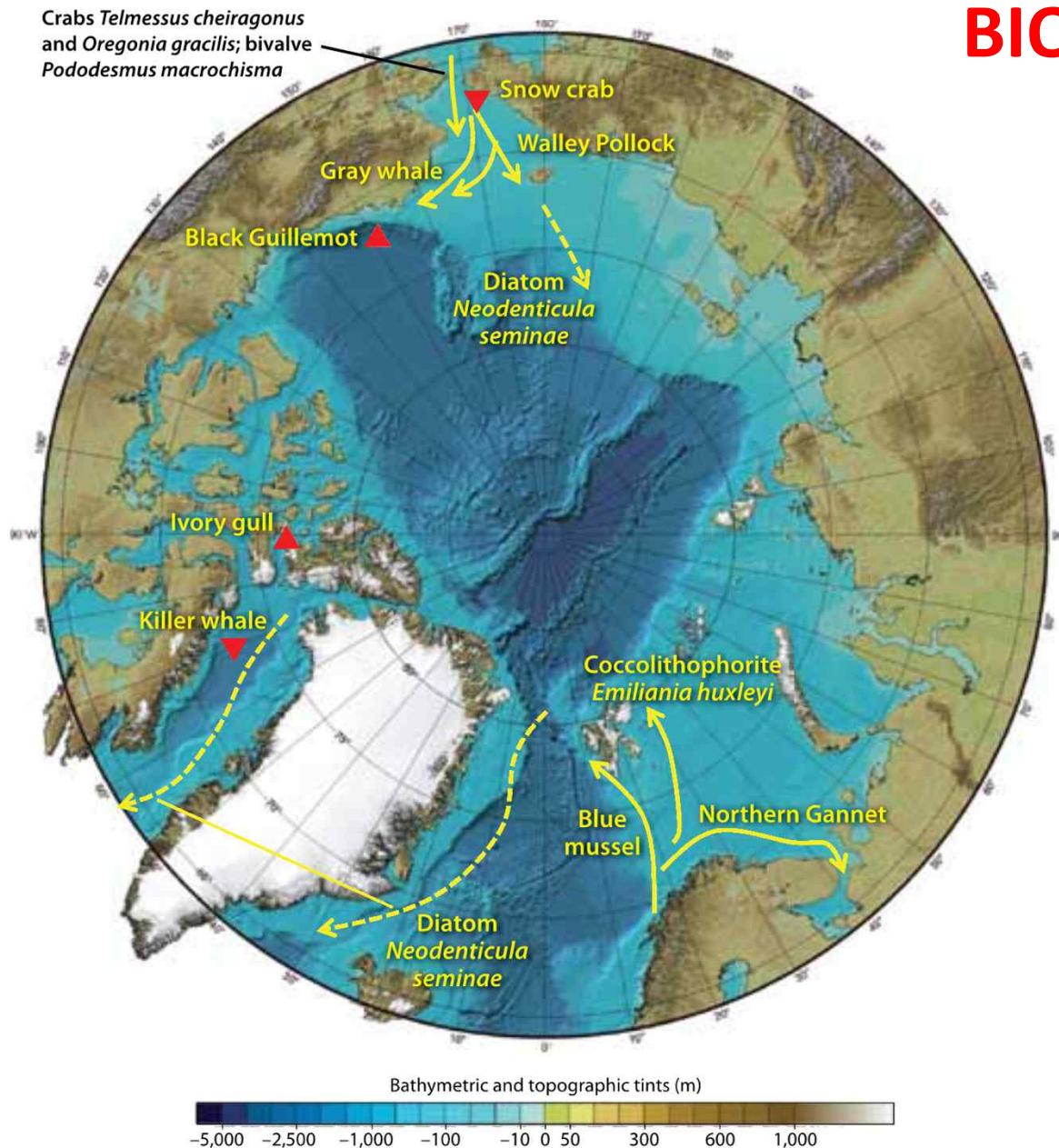


Nelson et al. 2009

- What maintains the persistent biogeographical patterns of distribution?
- Can species that are transported into the Arctic persist (reproduce successfully) and become endemic?
- Will climate change modify these patterns?

# Recent changes in species/population changes in the Arctic

## BIODIVERSITY ISSUES

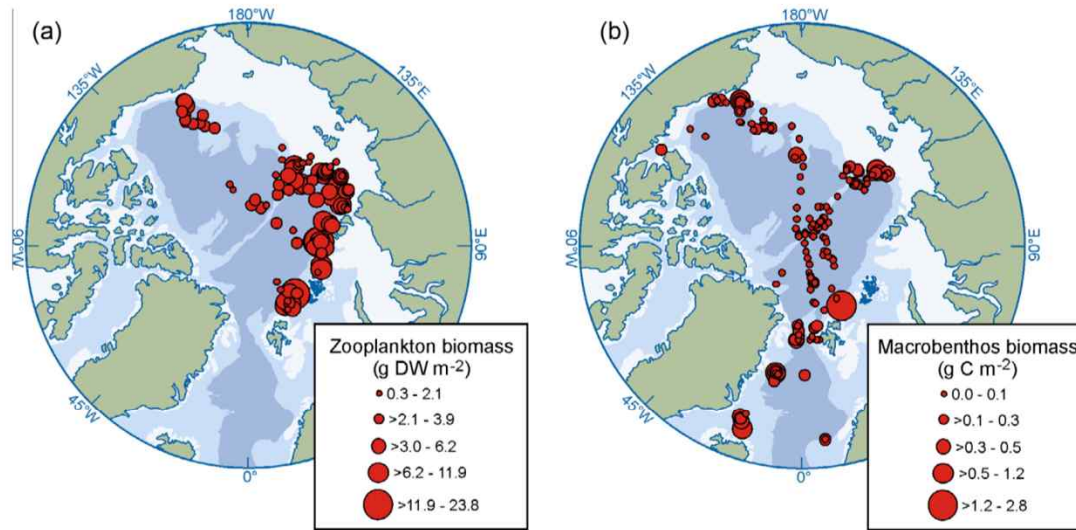


- **Yellow arrows** show the general direction of the species range change and end in the general area of the new occurrence (no arrow if uncertain)
- **Red triangles** indicate increases (▼) or decreases (▲) in population numbers or sightings

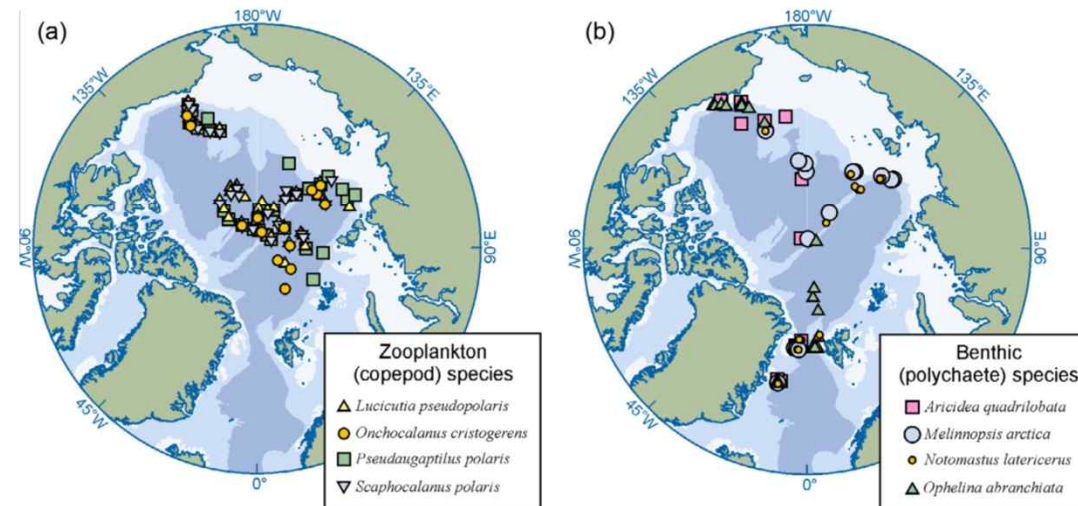
[Citations in Bluhm et al., 2011. Oceanography 24 (3):232–248]



# Limited pelagic & benthic data in shelf-slope and deep basin regions of Arctic Ocean



**Fig. 11.** Maps showing (a) zooplankton biomass ( $\text{g DW m}^{-2}$ ) (modified from Kosobokova and Hirche, 2009; Kosobokova and Hopcroft, 2010) and (b) infauna (macrofauna) biomass ( $\text{g C m}^{-2}$ ) (modified from Bluhm et al., 2011b) for the two Arctic basins. Biomass is concentrated along the shelf breaks and in inflow areas. Only records deeper than 500 m are shown.



**Fig. 13.** Map showing the distribution of some (a) pelagic and (b) benthic taxa occurring in the Eurasian and Amerasian basins. Taxa are identified in the legend. The distributions suggest that the Lomonosov Ridge does not serve as a distribution barrier. Note that for many other species, even fewer distribution records exist for the Arctic basins preventing a general conclusion on distribution patterns. Data from Bluhm et al. (2011b) and Kosobokova et al. (2011).

Thank you for your attention.

Any questions?