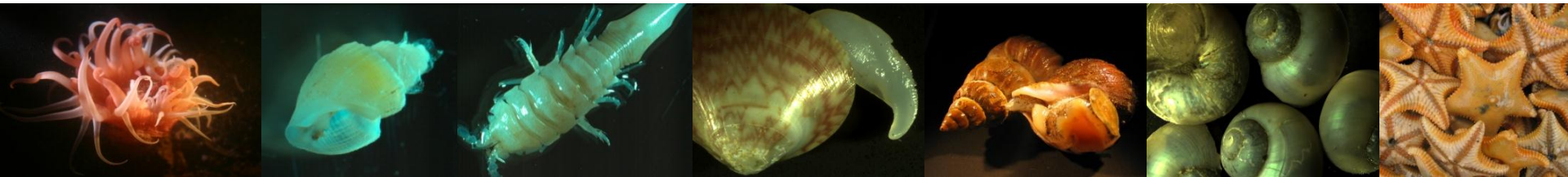


# Temporal trends in epibenthic megafauna and food web structure in the Chukchi Sea



K Iken, BA Bluhm, BI Sirenko, S Gagev,  
SM Hardy, BA Holladay, K Dunton

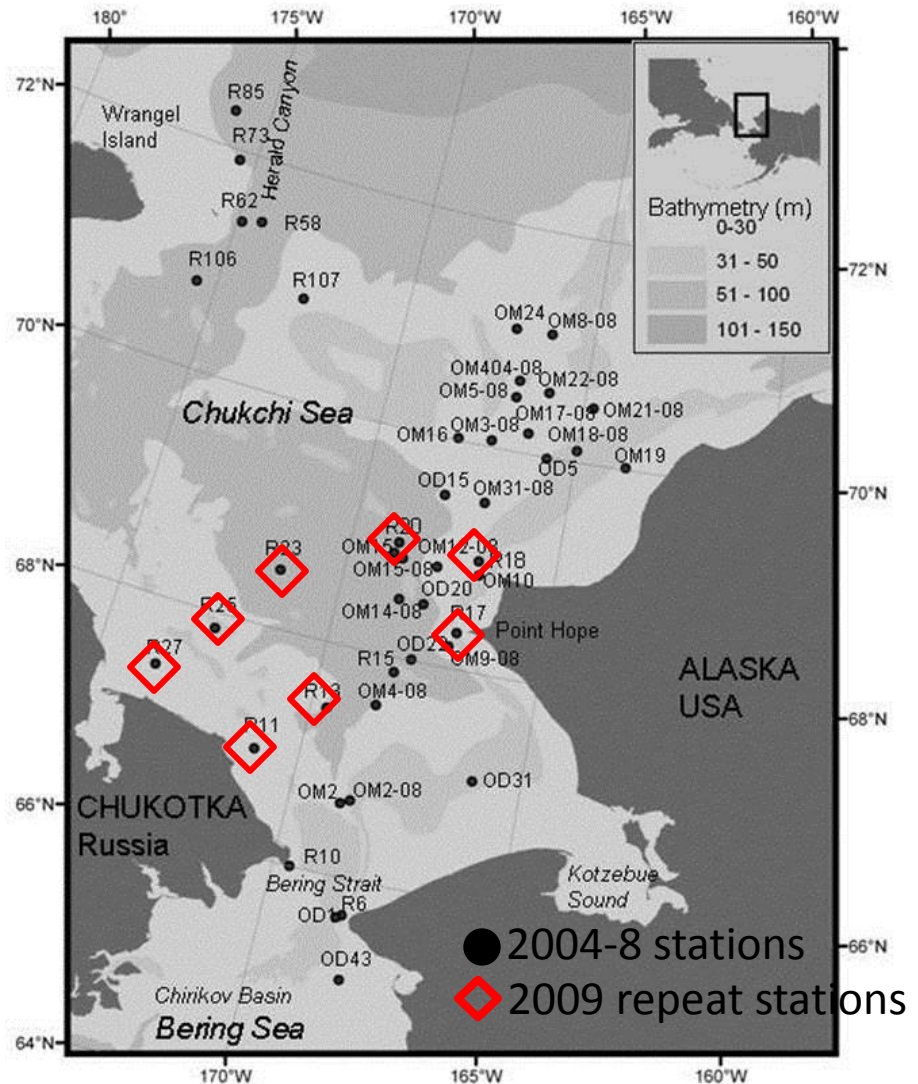
University of Alaska Fairbanks, Zoological Institute RAS St. Petersburg, University of Texas



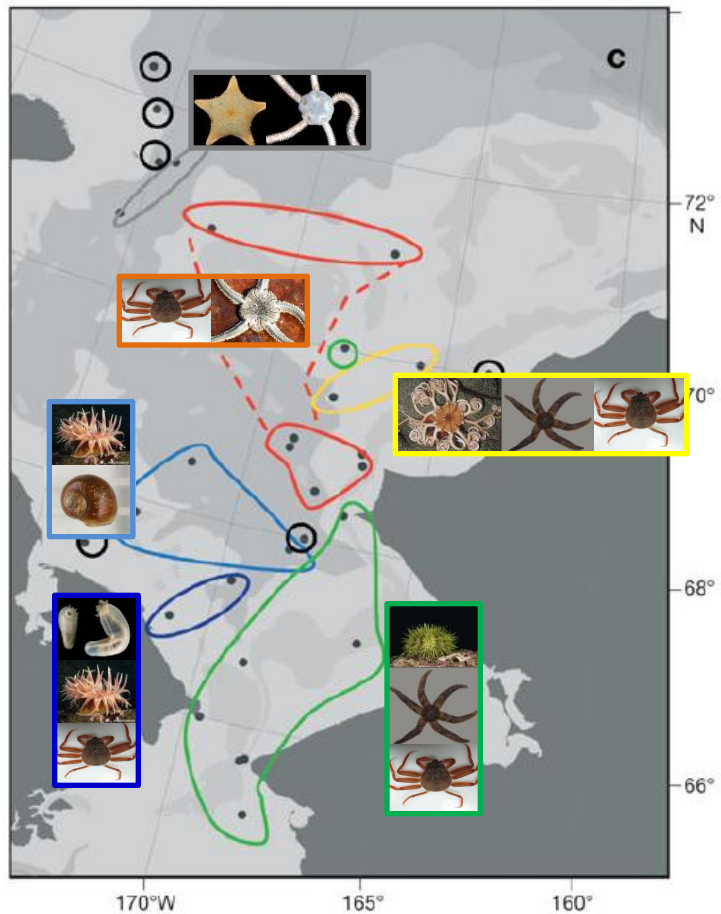
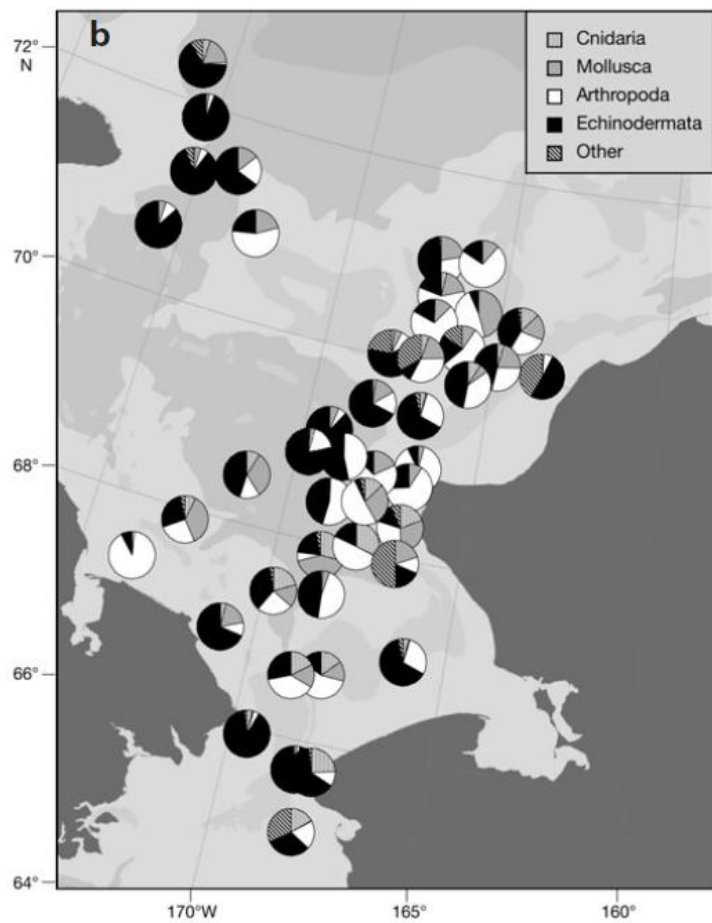
# Objectives

## Russian-American Long-Term Census of the Arctic (RUSALCA)

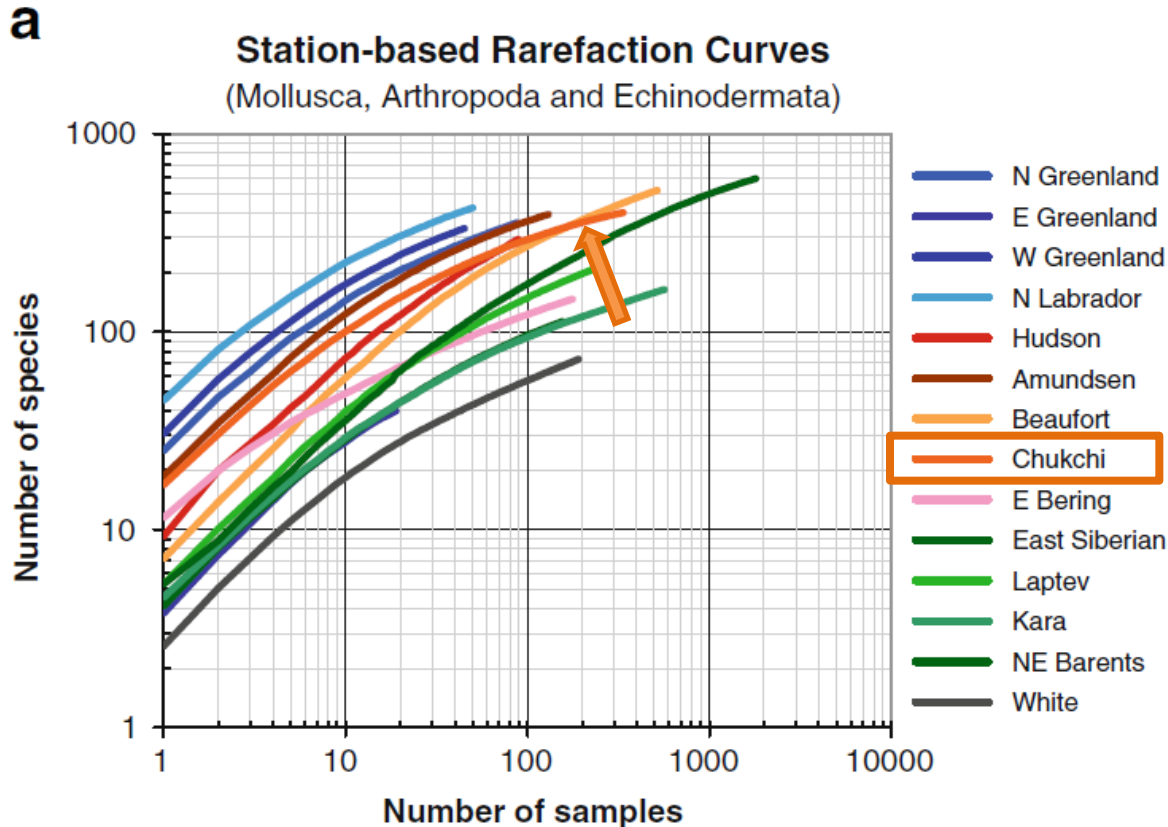
- Epibenthic invertebrate community structure of Chukchi Sea shelf
- Characterize food web structure ( $\delta^{13}\text{C}$ ,  $\delta^{15}\text{N}$ ), relate to water mass characteristics
- Interannual differences: repeat stations 2004 and 2009



# Epifaunal Communities



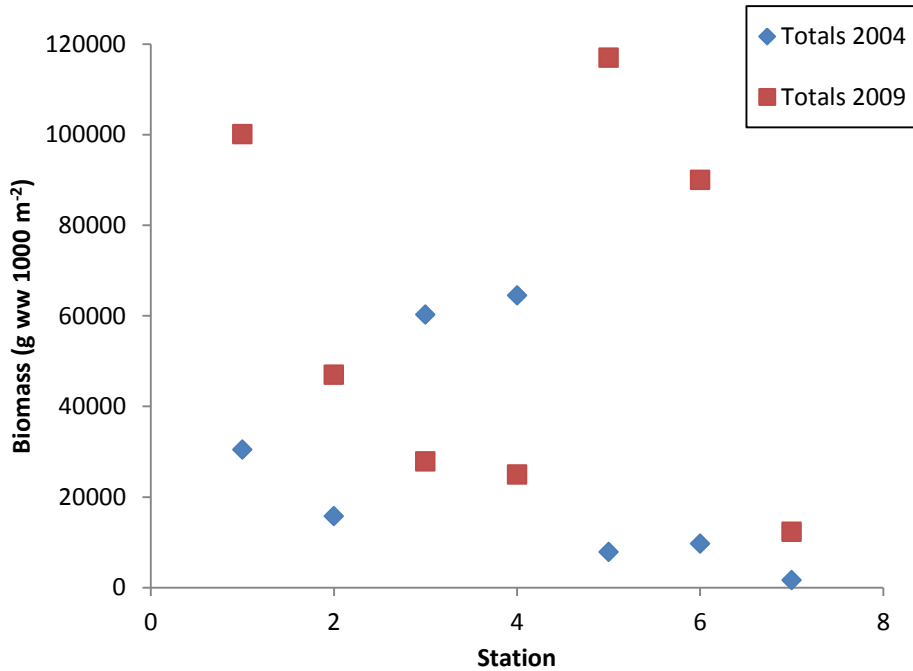
# Chukchi Sea inventory in Arctic context



Piepenburg et al. (2011) **Towards a pan-Arctic inventory of the species diversity of the macro- and megabenthic fauna of the Arctic shelf seas.** *Marine Biodiversity* 41:51-70

# 2004 – 2009 Epibenthic Comparison

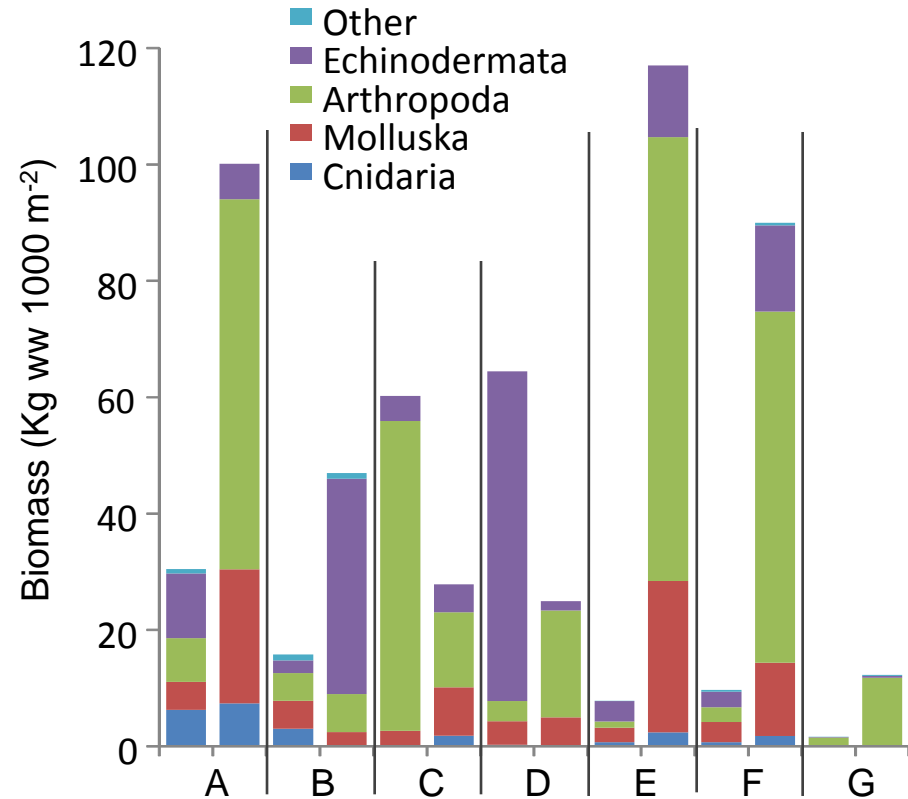
## Biomass



2009:  
5 sites higher  
2 sites lower

**Limitations: no trawl replicates;  
only two years for comparison**

## Biomass by taxa



Snow crab  
*Chionoecetes opilio*

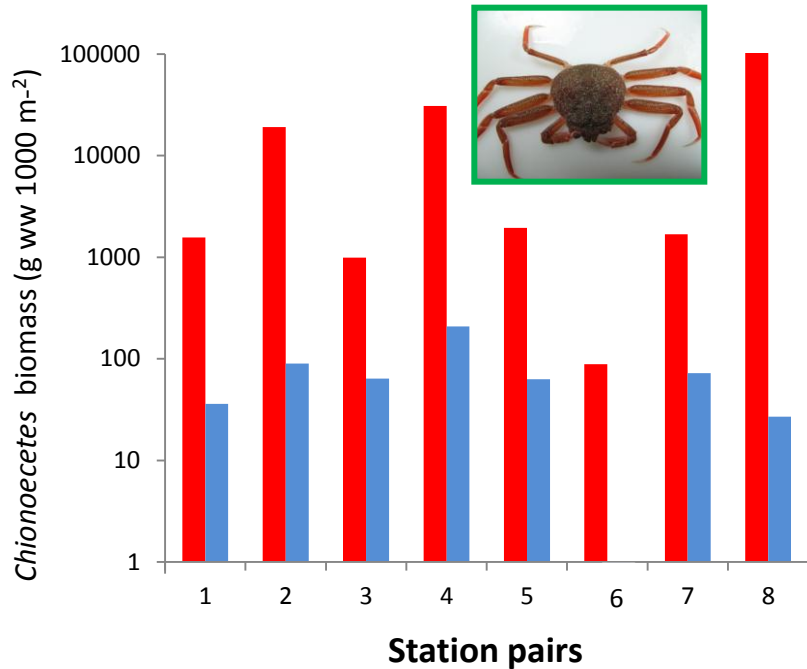


Sea stars

Station

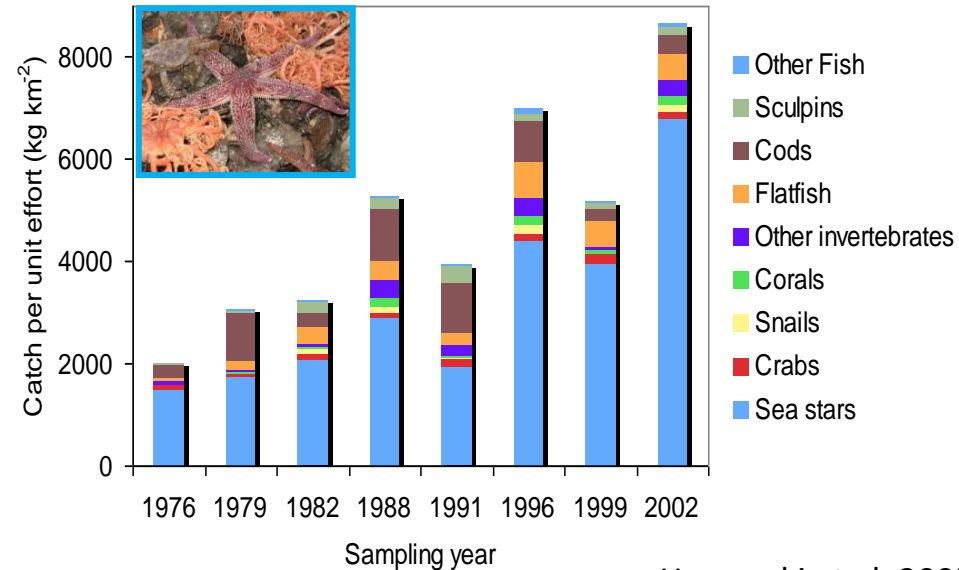
# Epifauna changes

## ➤ possible long-term trends



■ This study, 2004-2008 data

■ Feder et al., 1976 data



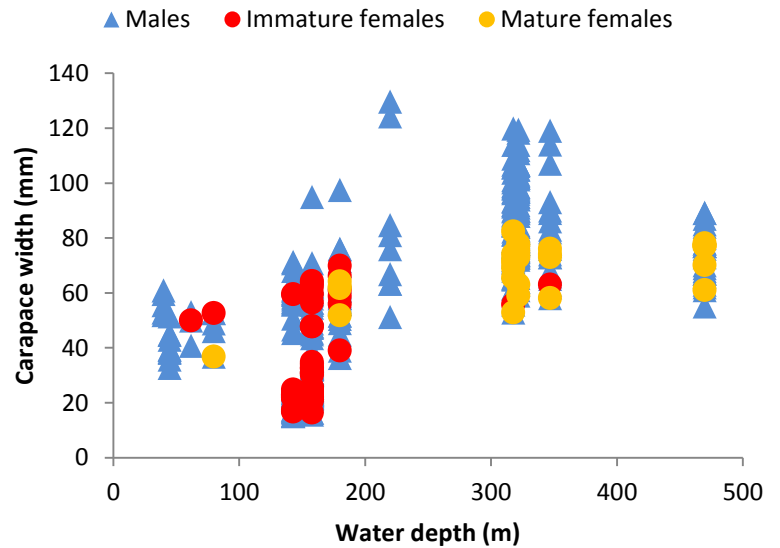
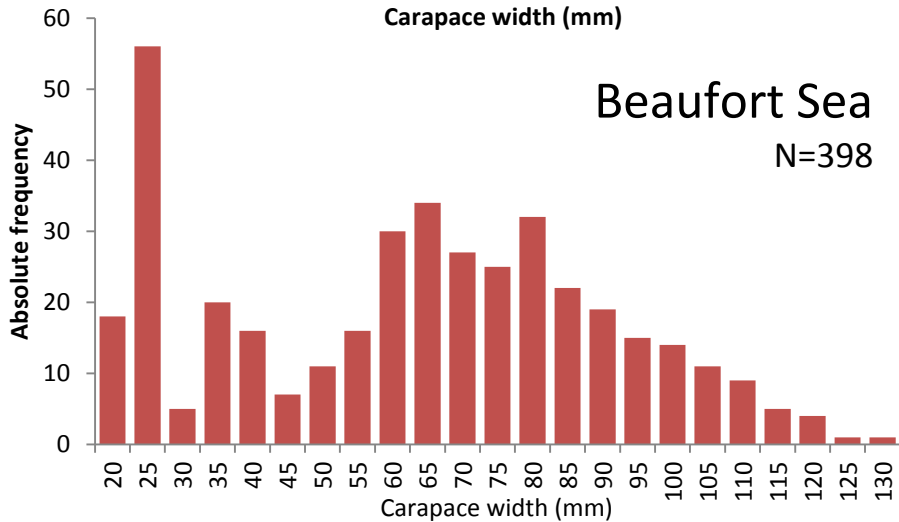
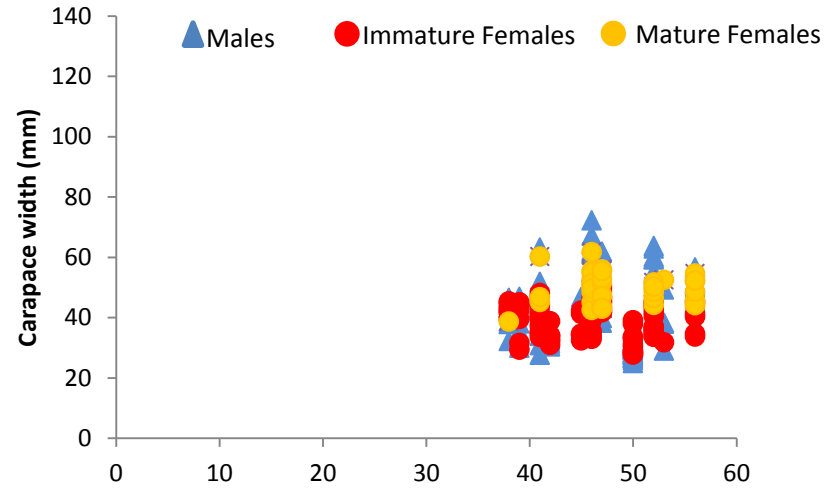
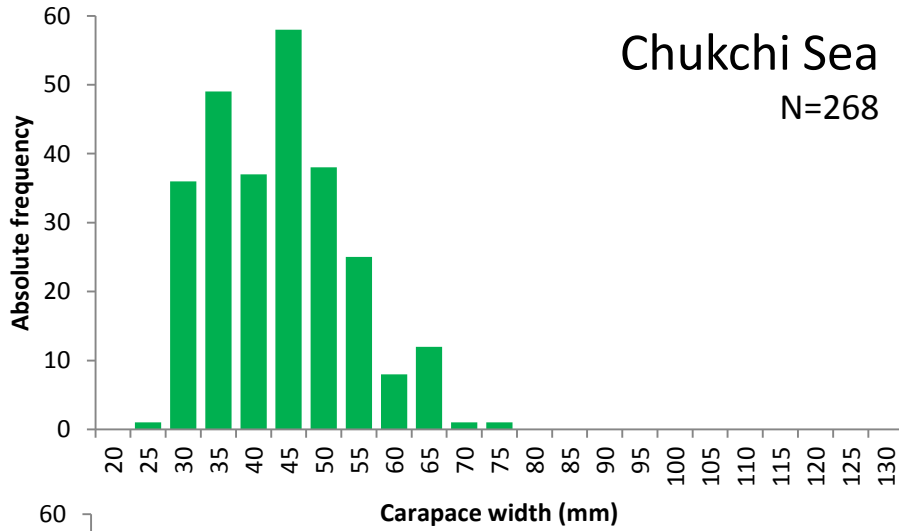
Hamazaki et al. 2005

\* Higher *C. opilio* biomass in 2000s than 1976 at comparable stations

\* Epifauna (sea star) increase in Norton Sound since 1976



# *Chionoecetes opilio*



# Benthic Food Web Structure

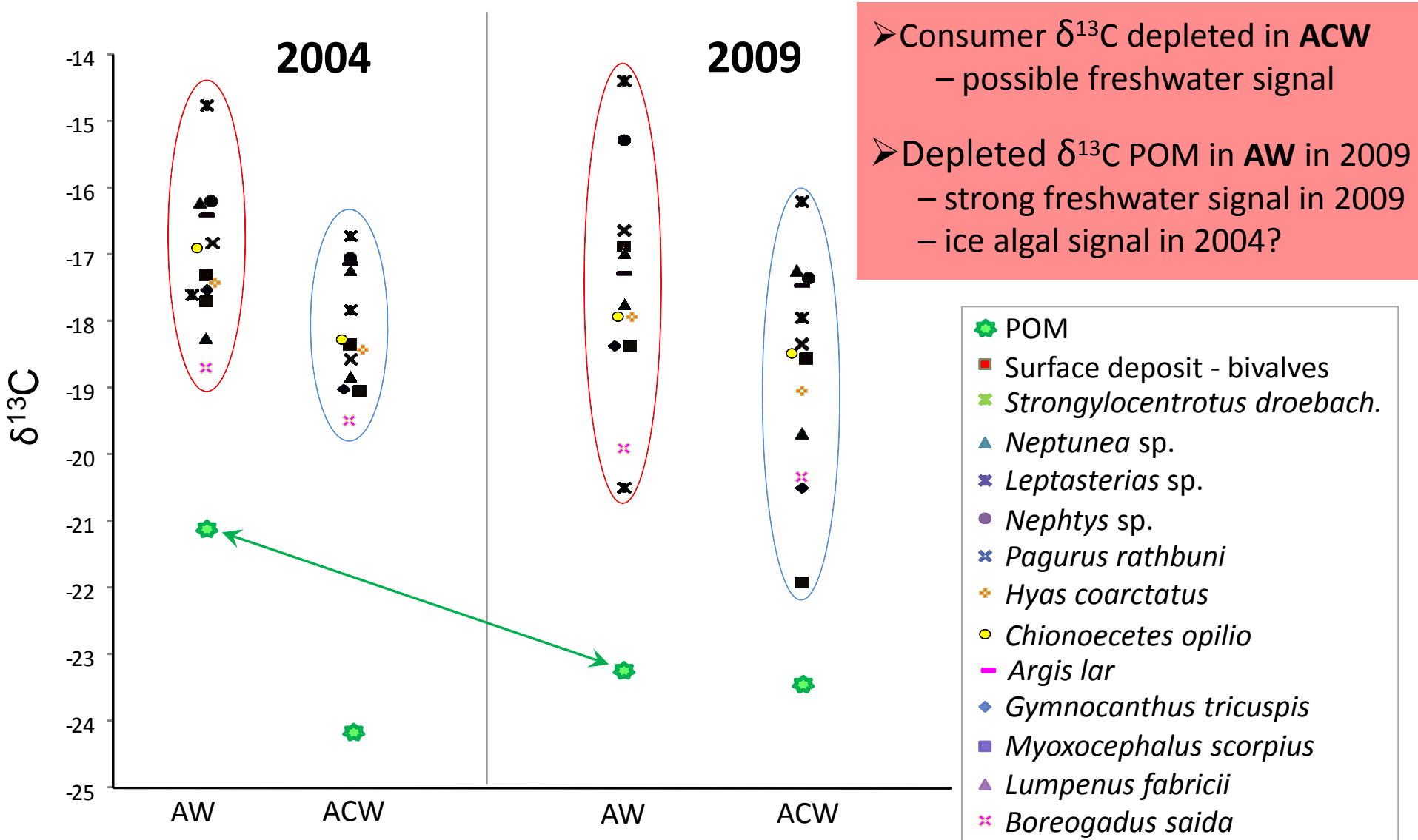
- Indicator of water mass characteristics
- Indicator of long-term change
- Use of carbon and nitrogen isotope ratios ( $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ )
- $\delta^{13}\text{C}$  as indicator of food sources
- $\delta^{15}\text{N}$  represents trophic level (3-4‰ enrichment per trophic level)





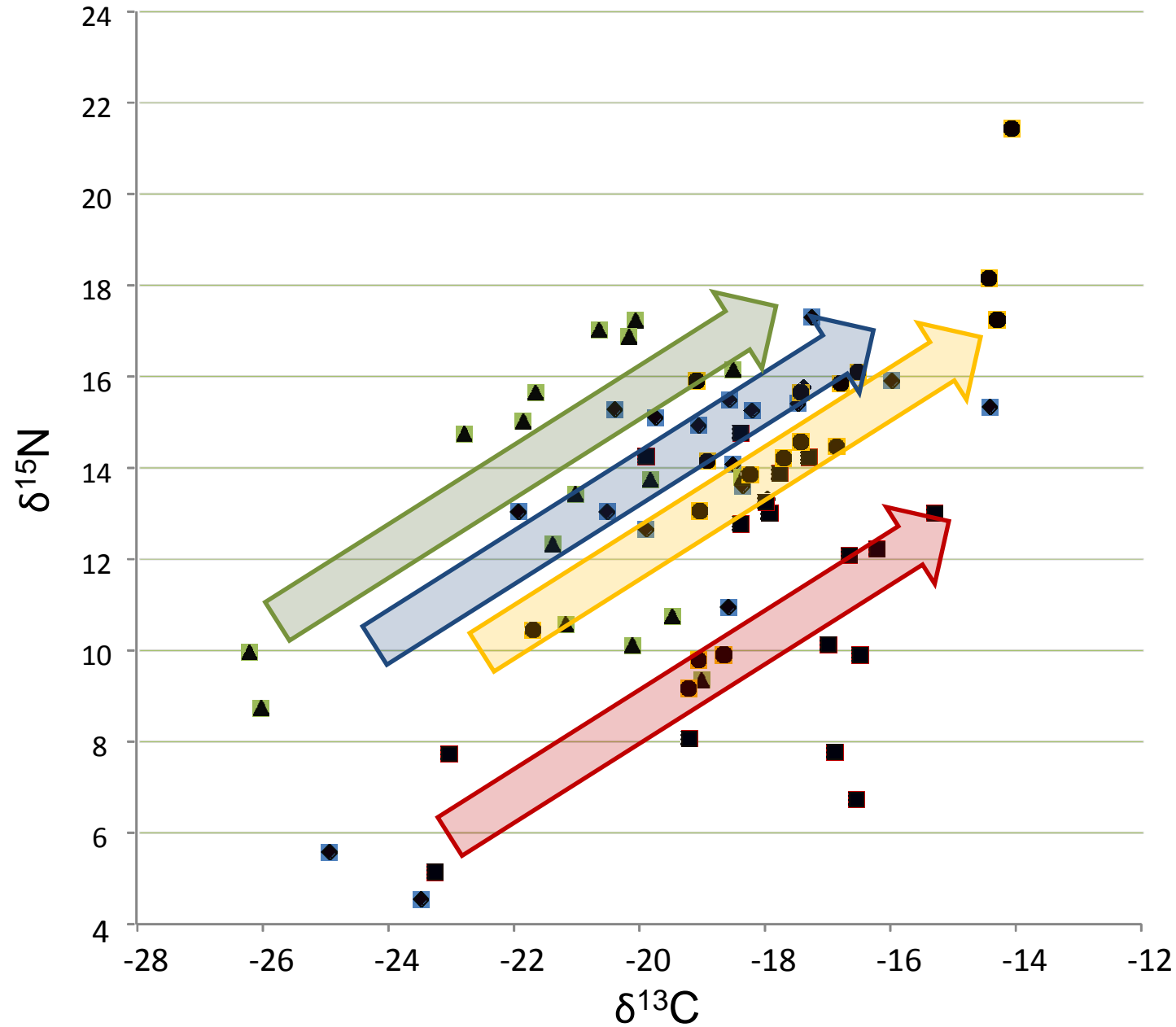


# $\delta^{13}\text{C}$ – Carbon Sources

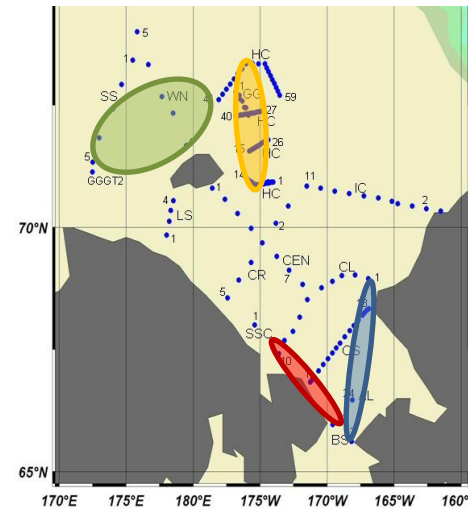




# Chukchi Shelf Food Web Structure



- ACC
- AW
- HC
- WW

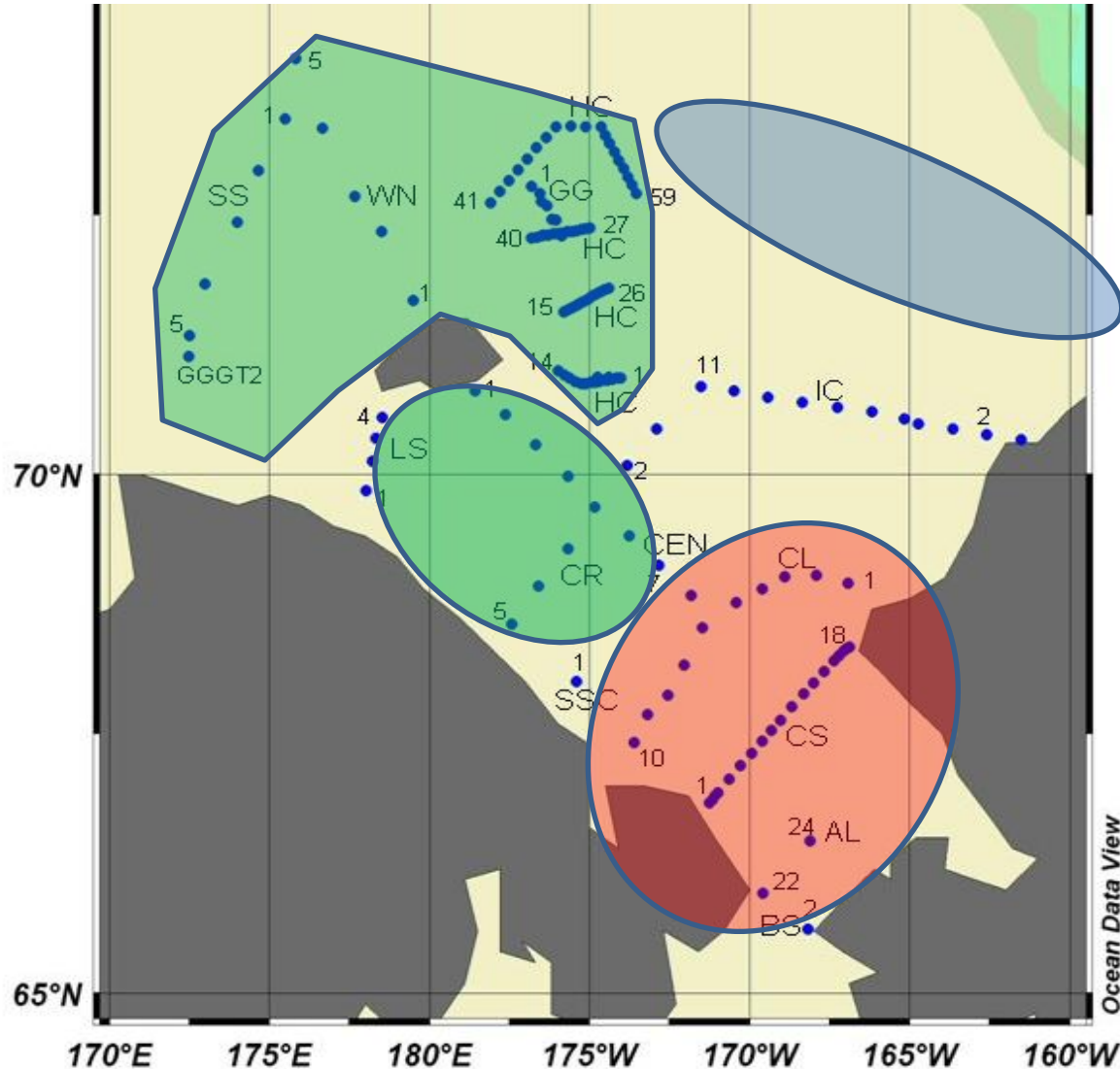


# Summary

- \* Differences in snow crab and sea star biomass 2004/9 match bigger picture (of increase), too early to speak of change/trend
- \* ACW and AW differences in food sources ( $\delta^{13}\text{C}$ ) – freshwater influence, ice algal influence?, inter-annual variability
- \* Lower  $\delta^{15}\text{N}$  ratios in AW indicate use of fresh, labile material
- \* Overall stable food web structure between 2004/09
- \* Siberian Shelf food web structure similar to Anadyr Water region



# What's next? – RUSALCA 2012



Repeat southern Chukchi Sea lines

If US side only:  
Shelf break

If Russian side only:  
Western Chukchi  
Herald Canyon  
East Siberian Sea

# Thanks!

- Funding: NOAA/CIFAR (RUSALCA), CIFAR IPY (Hondolero), UAF (IPY postdoc for SMH), CMI (crab project BB, KI), BOEM (Beaufort Sea sampling), CoML (pan-Arctic diversity)
- Field work: J Weems, D Hondolero, P Drobny, L Carrothers, J Richar (all UAF)
- B Konar, A Blanchard, C Parris: supported snow crab collection
- Lab volunteers: M Wenzel, G Hartleben, J vMeltzer
- Vessel operations: Captains, chief scientists and crew of Prof. *Khromov*, *Oshoru Maru*, *Oscar Dyson*
- B Holladay & B Norcross (UAF) for joint trawl processing

