Epibenthic megafauna and food web structure in the Chukchi Sea – a temporal comparison

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Introduction

The Russian-American-Long-term-Census-of-the-Arctic (RUSALCA) aims at building a time series of environmental and biotic conditions on the Arctic Chukchi Sea shelf. This area experiences substantial climate change with mostly unknown effects on the biota. Here we present a first comparison of data from 2004 and 2009 regarding

1. *epibenthic community structure (abundance and biomass)*
2. *food web structure in relation to water mass characteristics*

Methods

1. Epibenthos sampled with beam trawl (7 mm mesh, 4 mm cod liner) at 7 repeat stations in south-central Chukchi Sea. Catch sorted, counted and weighed on board.

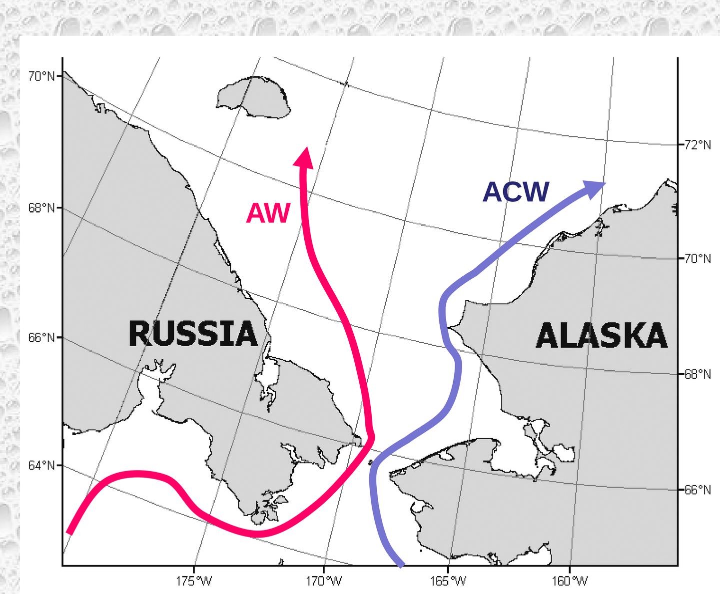
2. Body tissues sampled, dried, acid-treated for the removal of carbonates and measured for stable isotope ratios ($\delta^{13}C$ and $\delta^{15}N$) at the Alaska Stable Isotope Facility.

Study Area

Key water masses on the Chukchi Sea shelf:

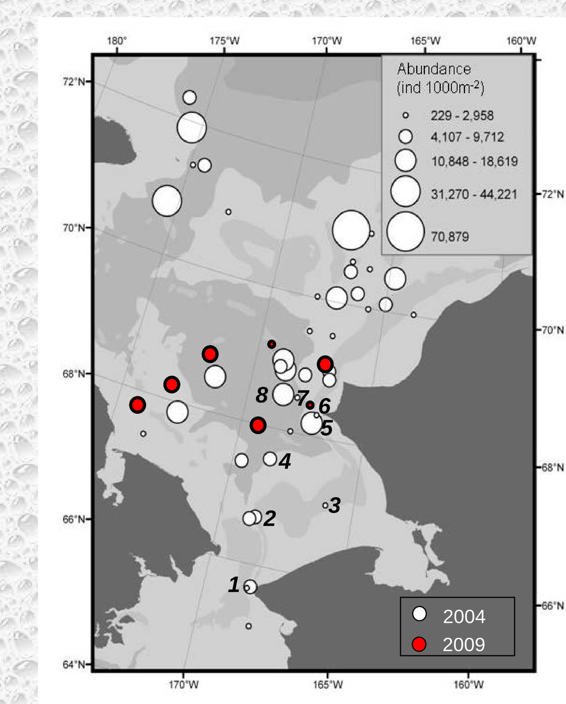
Anadyr Water (AW)
~20 µM NO_3
~470 g C m^{-2} yr^{-1} primary productivity
Bottom salinity ≥32.5

Alaska Coastal Water (ACW)
<1 µM NO_3
~60 g C m^{-2} yr^{-1} primary productivity
Bottom salinity <31.8

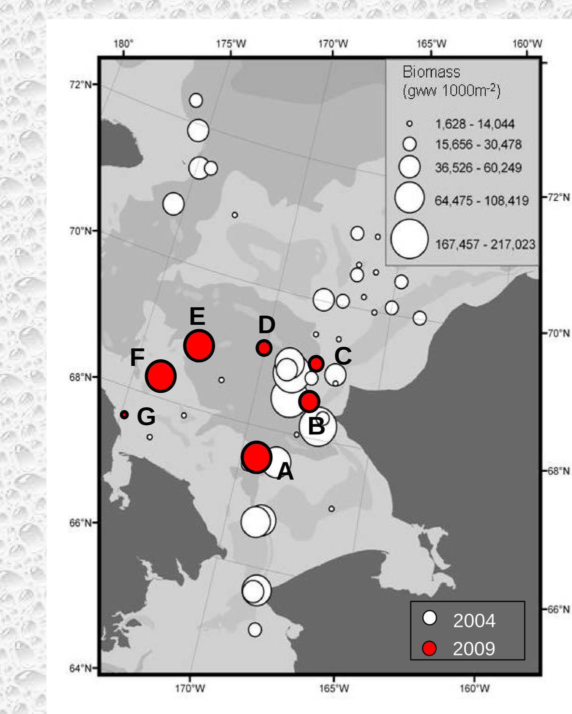


Results — Epibenthic community composition

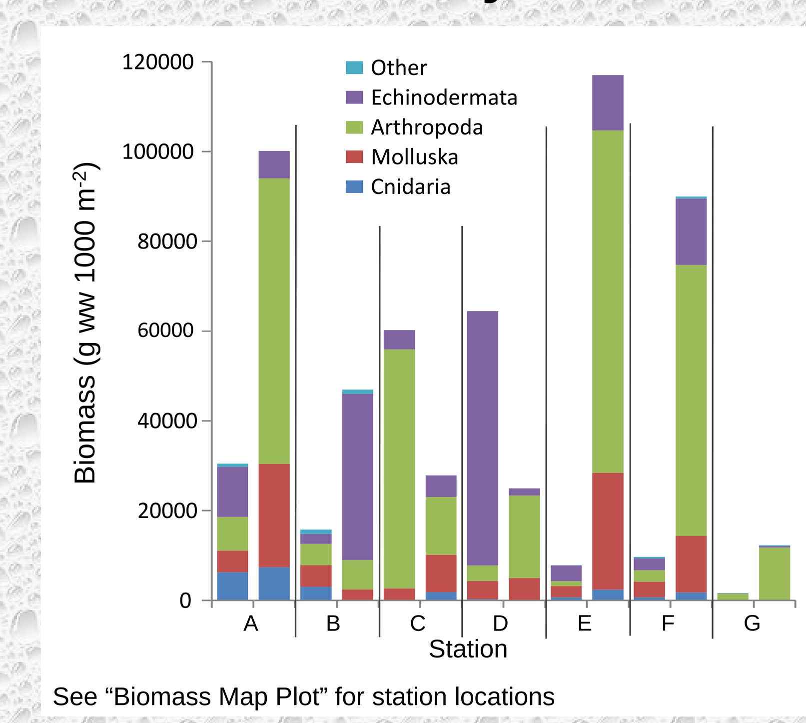
Abundance



Biomass

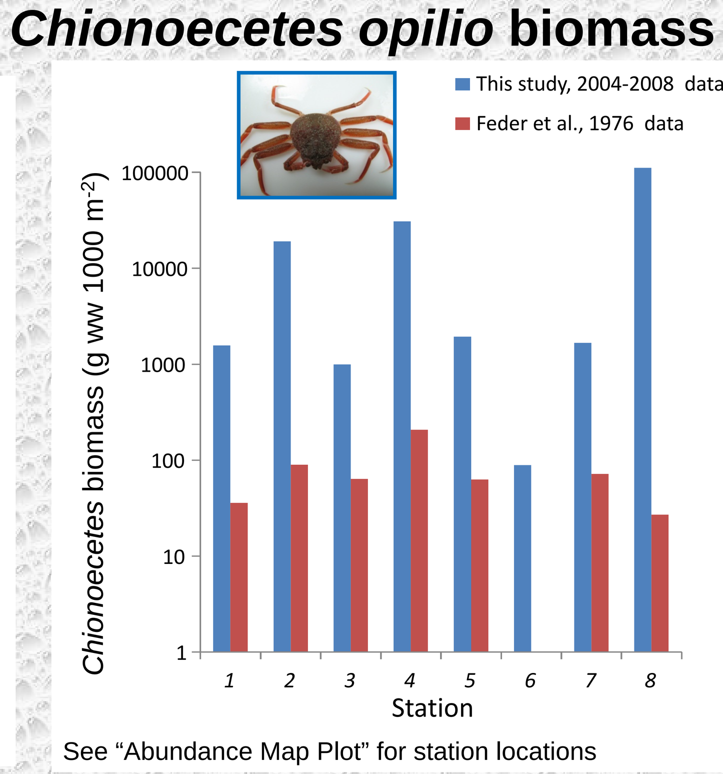


Biomass by taxa



See "Biomass Map Plot" for station locations

Chionoecetes opilio biomass

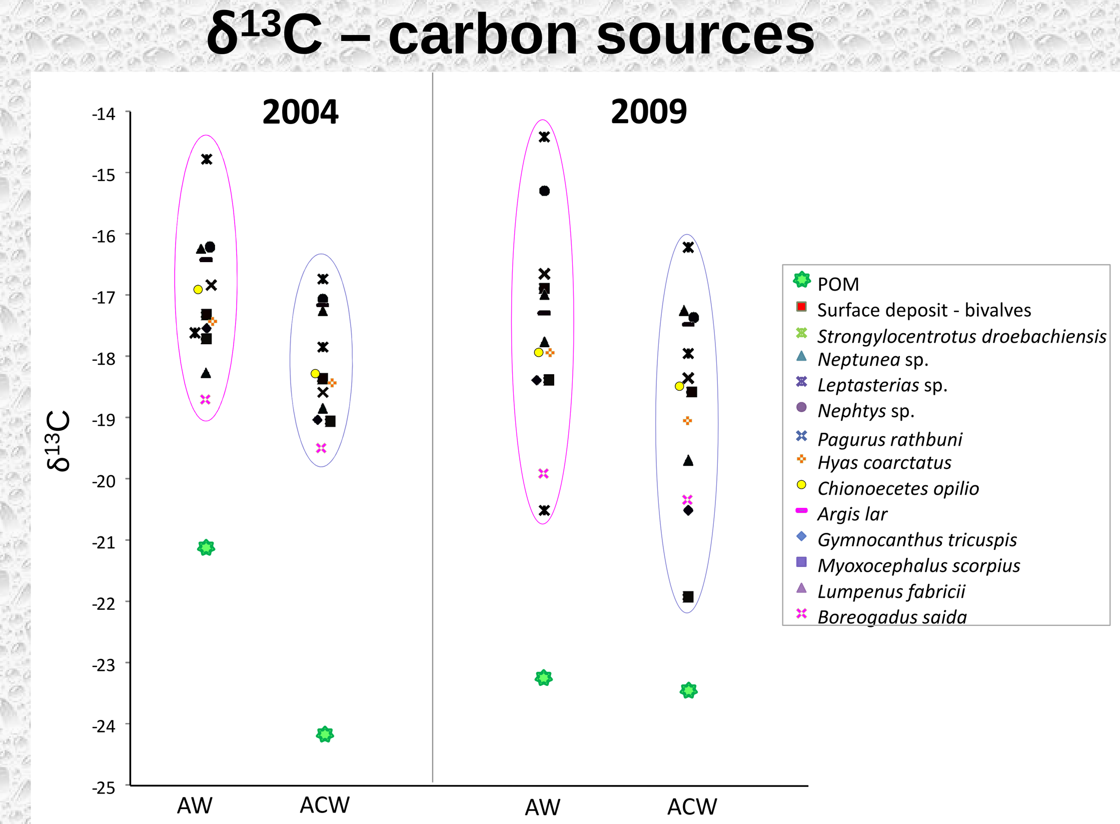


See "Abundance Map Plot" for station locations

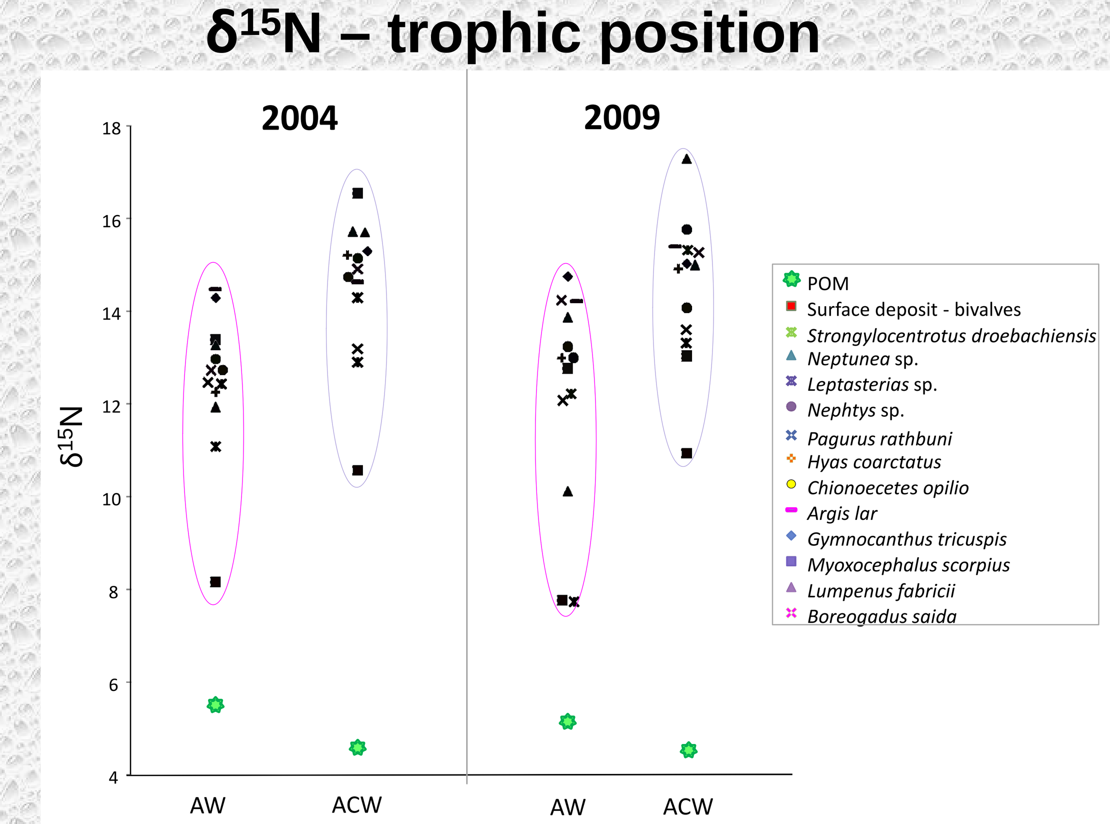
- Abundance mostly unchanged between years
- Biomass higher at most stations in 2009
- Higher biomass mainly due to higher snow crab (*Chionoecetes opilio*) biomass
- Snow crab biomass also increased compared to mid-70's

Results — Food web structure

$\delta^{13}C$ – carbon sources



$\delta^{15}N$ – trophic position



- Consumer $\delta^{13}C$ depleted in ACW in both years relative to AW– possible freshwater signal in ACW
- Depleted $\delta^{13}C$ POM signal in AW more depleted in 2009 – strong freshwater signal detected in 2009
- Little difference between years: AW consumers depleted in $\delta^{15}N$ compared to ACW in both years
- Use of fresher (=isotopically lighter) material through shorter food chains in AW

Conclusions

- **Epibenthic communities increased in biomass but not abundance over time, especially in snow crab**
- **Isotopic differences detected in the food source, but overall food web structure remained stable**
- **Need to determine if these community and food-web patterns indicate interannual variability or long-term change**

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