Basin-shelf connectivity of the zooplankton community in Bering Canyon, Alaska USA

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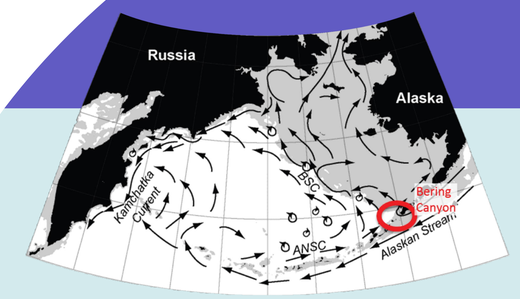


Introduction

- Cross-shelf exchange through sub-marine canyons is hypothesized as a mechanism transporting basin-origin, lipid rich zooplankton onto the shelf, contributing to the high productivity of this region.
- Basin-origin copepods with seasonal life cycles such as *Neocalanus* species may be particularly influenced by transport through canyons. They feed and grow in the spring and go dormant in the fall/winter.
- It is important to investigate mechanisms of transport of zooplankton onto the shelf as they are a critical food source for fish, seabirds and marine mammals.

Methods

- Multinet was towed obliquely 0 – 300m or 10m off bottom (when bottom depth < 300m) with 333 µm mesh
- Depth bins sampled: 0-25, 25-50, 50-100, 100-200 (shown), 200-300m (shown)
- Zooplankton analysis focused on the two bottom depth bins as mean on-shelf flow occurs at depth (>180m) (Figure 2).
- The five species shown (Figure 1) are the most abundant at depth and include lipid rich copepods (*Neocalanus* species), non lipid rich copepods (*Eucalanus bungii*, *Metridia pacifica*) and the chaetognath *Eukronia hamata*. *Neocalanus* and *Eucalanus* species are also basin-origin.

Research Questions:

- What zooplankton species are abundant at depth in Bering Canyon? What species are likely transported on to the shelf with the deep, on-shelf flow?
- Are these species of high nutritional value as prey (lipid rich)? Are they basin-origin?

Results: Most Abundant Species at Depth

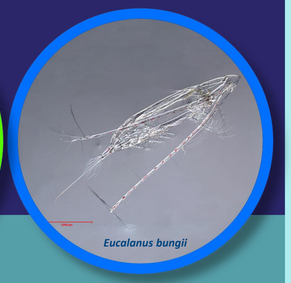
Photos: Hopcroft/UAF/CoML


Metridia pacifica


Neocalanus cristatus


Neocalanus plumchrus


Eukrohnia hamata


Eucalanus bungii

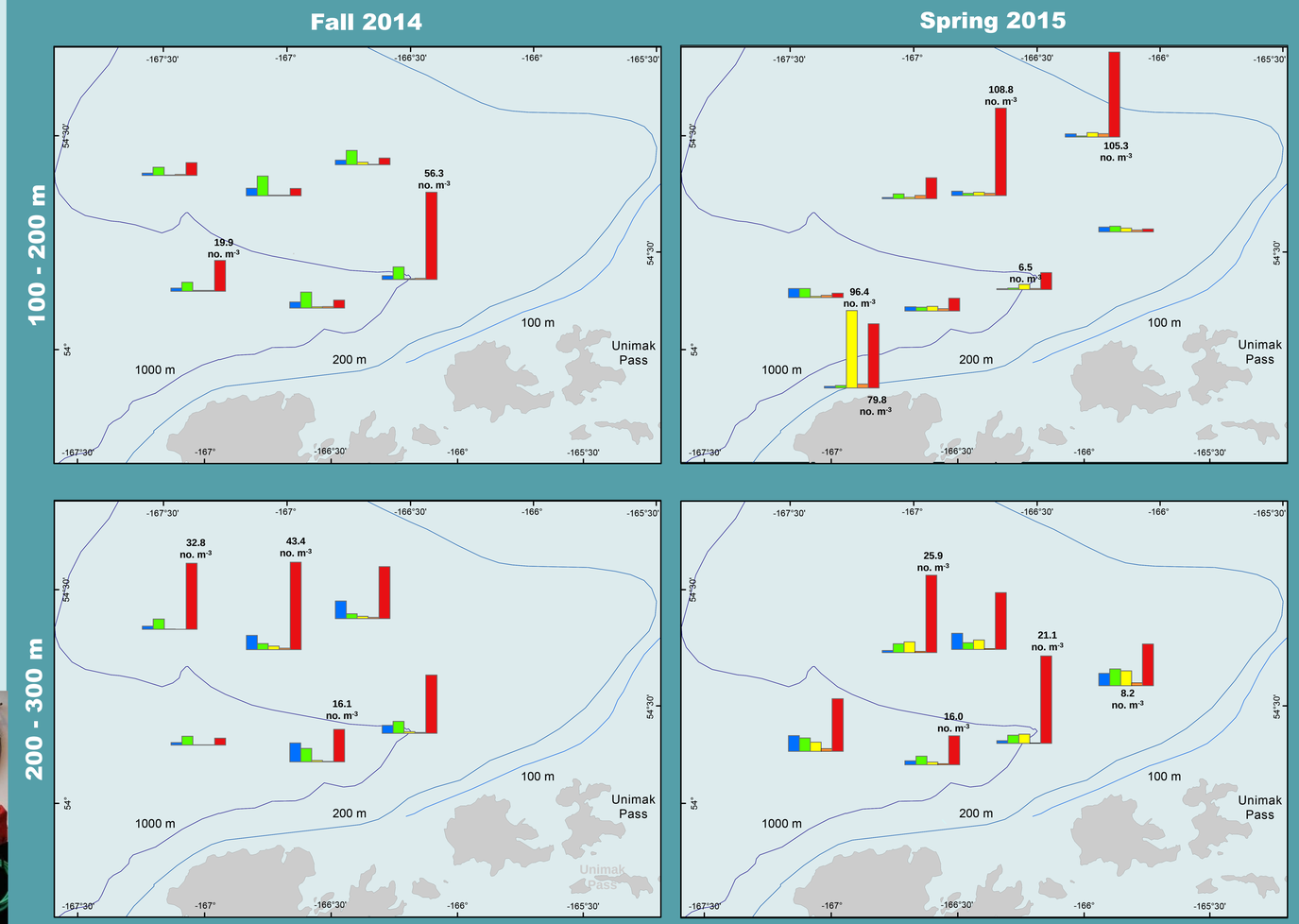
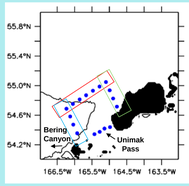


Figure 1: Top five most abundant zooplankton species at depth in Bering Canyon. Selected peak abundances (no. m^{-3}) labeled to provide context. Note: bar chart scales differ between maps, see labeled abundance peaks.

Abundance no. / m^{-3} — *Metridia pacifica* | *Neocalanus cristatus* | *Neocalanus flemingeri / plumchrus* | *Eukronia hamata* | *Eucalanus bungii*

Basin-origin water (denser than 26.2 σ_t) flows up onto the shelf through Bering Canyon at depth (> 180m).



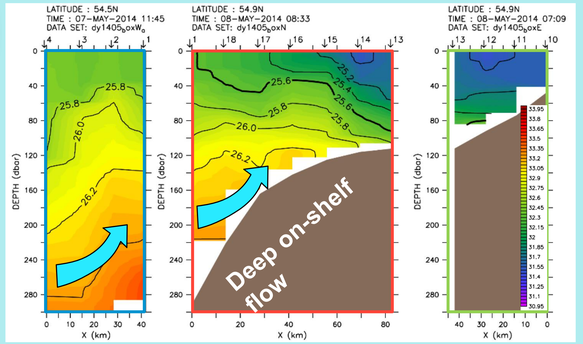


Figure 2: Salinity psu (color) and density σ_t (contours) data from CTD casts in May 2014 around Unimak Pass, just East of Bering Canyon.

Conclusions

- *Metridia pacifica* are abundant in both seasons and depths. *Neocalanus* species (lipid rich) are most abundant in spring (Figure 1), as expected by this copepod's life history.
- Results show basin-origin zooplankton (*Neocalanus* species and *Eucalanus bungii*) abundant in Bering Canyon.
- Our findings indicate these five most abundant species groups at depth are being transported up onto the Bering Sea shelf with the deep on-shelf flow.
- This mechanism provides lipid rich (*Neocalanus* species) and other zooplankton prey for fish, seabirds and marine mammals in the Bering Sea shelf ecosystem.

Future Directions:

- How is the transport of these zooplankton species important to the shelf ecosystem? Predator diet and timing links?
- How will oceanographic warming affect the on-shelf flow and zooplankton species observed patterns?

Acknowledgments

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