

# On-shelf transport of oceanic zooplankton in the Eastern Bering Sea

G.A. Gibson<sup>1</sup>, K.O. Coyle<sup>2</sup>, K. Hedstrom<sup>3</sup> and E. N. Curchitser<sup>4</sup>

<sup>1</sup>International Arctic Research Center, University of Alaska, Fairbanks, AK 99775-7340, USA.

<sup>2</sup>Institute of Marine Science, University of Alaska, Fairbanks, AK 99775, USA.

<sup>3</sup>Arctic Region Supercomputing Center, Fairbanks, AK, 99775, USA.

<sup>4</sup>Institute of Marine and Coastal Sciences, Rutgers University, New Brunswick, New Jersey, 08901, USA.

The Eastern Bering Sea shelf is divided into distinct hydrographic domains by structural fronts. Despite frontal obstructions to cross-shelf transport, each year large oceanic copepods—primarily *Neocalanus* spp. (Figure 1)—are known to dominate the biomass of the outer-shelf zooplankton communities, and in some years are advected into the middle-shelf domain. Using ROMS (the Regional Ocean Modeling System), coupled with a float tracking model designed to represent ontogenetic vertical migration behavior of *Neocalanus*, we explored the mechanisms, timing, and location of the transport of oceanic zooplankton onto the eastern Bering Sea shelf from overwintering sources along the Gulf of Alaska and Bering Sea shelf breaks, under a variety of environmental conditions. Our float tracking experiments suggest that the timing of on-shelf transport and the distribution of oceanic zooplankton on the shelf can vary substantially between one year and another. The Bering, Pribilof, and Zhemchug Canyons and Cape Navarin were all regions of elevated on-shelf float transport. Wind direction was the primary factor controlling inter-annual variability in the timing, amount, and location of the on-shelf transport of our *Neocalanus* floats. Float transport across the northern and southern shelves responded in opposite directions to inter-annual differences in wind forcing: southeasterly wind enhanced on-shelf transport of the *Neocalanus* floats along the southern shelf but suppressed on-shelf transport over the northern shelf. Conversely, northwesterly wind suppressed on-shelf zooplankton transport onto the southern shelf but promoted enhanced transport around Cape Navarin on the northern shelf. Transport of the *Neocalanus* floats onto the shelf can be very episodic, reflecting the short duration of winds that promote on-shelf transport. Relatively short (days to weeks) periods of southeasterly wind between March and April significantly impacted the number of floats transported onto the shelf. The relative importance of different source areas to supplying oceanic zooplankton to the Bering Sea shelf does not appear to vary much from year to year. Our model results suggest that the *Neocalanus* found on the southern shelf most likely originate from overwintering sites in the Alaska Stream or the Eastern Bering Sea shelf break south of the Pribilof Islands, while *Neocalanus* found on the northern shelf most likely originate from sites north of the Pribilof Islands (Figure 2).



Figure 1. *Neocalanus* - a large bodied oceanic zooplankton

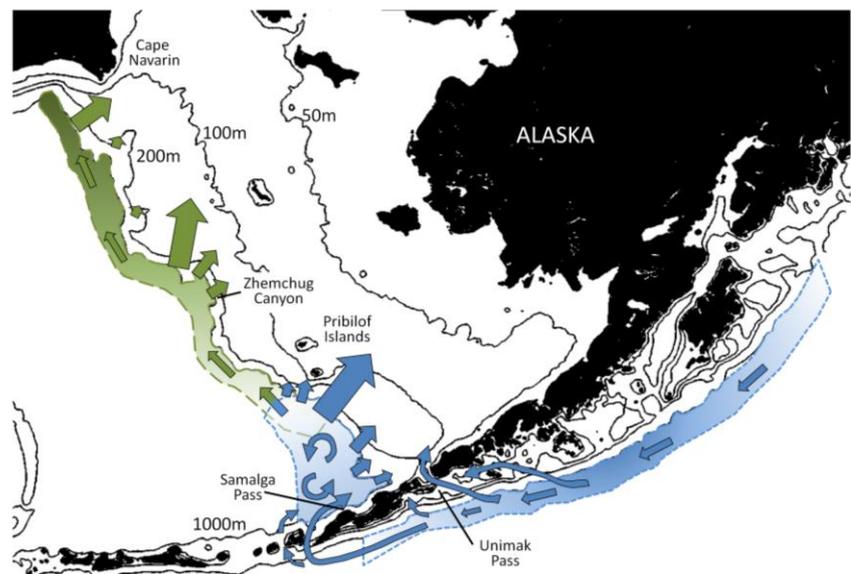


Figure 2. Conceptual diagram of oceanic zooplankton transport pathways onto the eastern Bering Sea shelf. Shaded regions indicate likely source areas

## Reference

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