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Interactive comment on “Size distribution of particles and zooplankton across the shelf-basin system in Southeast Beaufort Sea: combined results from an Underwater Vision Profiler and vertical net tows” by A. Forest et al.

Anonymous Referee #1

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“Size distribution of particles and zooplankton across the shelf-basin system in Southeast Beaufort Sea: combined results from an Underwater Vision Profiler and vertical net tows” A. Forest, L. Stemmann, M. Picheral, L. Burdorf, D. Robert, L. Fortier, and M. Babin

General comments The authors have successfully combined in situ imaging and vertical net tows to capture the size distribution and abundance and total volume of large particles and mesozooplankton organisms across the Mackenzie Shelf from mid-July to end-August 2009. The study focussed on the three regions (shelf, slope, and basin)



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and investigated the composition of particles (non-living to living) as well as mesozooplankton composition across the three regions and within different depth intervals. This provided high vertical and spatial resolution showing that living particles made up a larger proportion of the total particles and that the particle sizes increased from shelf to basin. The Underwater Vision Profiler (UVP5) provided several interesting findings, i.e. support for recent conclusions by Jackson and Checkley (2011) suggesting that zooplankton act as “gatekeepers” for vertical export of organic matter, indications of a detritus-based food web below the euphotic zone, and indications for a diluted food web in the deep basin. Comparisons between net tows and the UVP5 returned good correlations for large particles, especially copepods in the size range 1-6 mm. The taxonomic determinations showed that the shelf region primarily had a herbivorous plankton community with high reproduction, indicating trophic transfer of organic matter. The off-shore region was dominated by carnivores, omnivores, and detritivores species, indicating a high-recycling and low-production food web, which generally results in a low export system. The manuscript is well written and the analysis and discussion of the results is of high quality and solid argumentation. I found the manuscript very interesting and the combined methods of in situ imaging and plankton net tows seems promising for obtaining the high resolution data which are needed for the understanding of zooplankton-particle interaction. These measurements are very important to understand the processes controlling the flux in the upper few hundreds of meters of the water column, which is where most of the flux attenuation takes place. Thus, the depth setting the magnitude of the biological pump. I recommend the manuscript for acceptance in Biogeosciences. I only have very minor suggestions (see below): Detailed comments Page 13, Line 19-22: Clarify the sentence to: “In the basin, zooplankton abundance and biovolume of copepods and protozoans were generally more similar compared to those over the slope, while other groups were much lower (Figs. 5, 6).” Page 16, Line 18: Erase “the”: “...profiles whose signal showed visible rise above ~ 10 m..”. Page 19, Line 4-6: Was this observed for both day and night profiles, or did you see a more pronounced anomaly during night as a result of intensified grazing?

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Page 23, Line 9-11: If you are in an area with large copepod species. Fig 3. Check if the full size range was 0.1 to 12 mm – looks like maximum size was 11 mm.

BGD

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8, C5412–C5414, 2012

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