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SEASONAL CHANGE OF SOUND SCATTERS DERIVED FROM ZOOPLANKTON IN THE SOUTHERN CHUKCHI SEA

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Changes in seasonal sea ice extent, water temperatures and so on are driving shifts in marine biota and material cycling in the Arctic Ocean. To predict future biota and impact of organisms on material cycling, basic biological information at present state, such as species composition, biomass, seasonal variability, behavior, or influence of sea ice upon organism, are needed. Although high pelagic-benthic coupling between water column carbon-production and benthic carbon-transformation and limited impact of zooplankton grazing have been revealed in the Chukchi Sea, recent researches indicate declining the pelagic-benthic coupling. On the other hand, recent increasing of zooplankton biomass due to invasion of large Pacific species and warmer temperature was suggested in the Chukchi Sea. In the future, it is possible that ecological impact of zooplankton will increase in the Chukchi Sea as well as other area of the Arctic Ocean. Hence, we investigated seasonal change of sound scatters mainly derived from zooplankton at the biological hot spot 3 established by DBO (Distributed Biological Observatory) in the southern Chukchi Sea.

Mooring observations using an upward-looking 125-kHz AZFP (Acoustic Zooplankton Fish Profiler, ASL Environmental Sciences Inc.) were carried out in the southern Chukchi Sea (67°42'N, 168°50'W or 68°02'N, 168°50'W) between 16 July 2012 and 19 July 2014. Bottom depths in the mooring sites were 50 or 59 m, respectively, and the AZFP was deployed at 6 m above the sea bottom. Backscattered acoustic signals from particles in the water column were digitized into 0.5 or 0.2 m depth bins, with sampling intervals of 1 or 2 minute, then converted to volume and area backscatterings (SV and SA). Sound data between 0 and 10 m were not used because of extremely high backscatters from air bubbles due to waves, and sounds between 0 and 20 m during the season of sea ice extended (>50% of sea ice concentration) were also excluded from the analysis. Environmental sensing was conducted using TSDO, turbidity and chlorophyll *a* sensors attached on the AZFP. SST and sea ice concentrations were also observed from satellite investigations.

Results of the first year are described here. Diel vertical migration of sound scatterer was observed, summer/autumn variations of backscatters and larger zooplankton (such as euphausiids) biomasses obtained by net samplings corresponded each other. These suggested that main scatterers were considered to be larger zooplankton. Area backscattering (SA) increased from July to September when chlorophyll *a* concentrations or turbidities were high. And the highest SA level among the first year was maintained between September and mid November. After late November when the sea ice concentration increased over 50%, SA decreased. The lowest SA level was observed from late March to mid May. In late May when sea ice concentration reduced below 50%, SA turned into increasing again. Just before the SA increasing, higher chlorophyll *a* was observed. From the year-round observation, it was suggested that initiations of increasing/decreasing of sound scatters were influenced by seasonal sea ice. Results in 2013/2014 will be also shown in the conference.