Measuring deep copepod populations with a 4-frequency echosounder mounted on a Slocum glider

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Abstract (Poster)

Long distance migration in marine species is a strategy to cope with highly variable resource distributions. A key goal of biological oceanography is to explain the oceanographic processes that drive variation in migratory species occurrence and resource use. North Atlantic right whales (Eubalaena glacialis) migrate seasonally into the Gulf of Maine and Atlantic Canada to feed on dense aggregations of planktonic calanoid copepods, including Calanus finmarchicus, in several regional habitats. Although relatively well studied, the oceanographic drivers of right whale distribution are not sufficiently described to make year-to-year predictions of their occurrence. One reason for this is a lack of tools and resources needed to measure this predator-prey association across regional habitats and throughout the long foraging season. The goal of this study is to evaluate the performance of a glider-mounted multifrequency echosounder as a tool to help extend measurement of the North Atlantic right whale habitat spatially and temporally. In this study, a 4-frequency (125, 200, 455, 769 kHz) Acoustic Zooplankton Fish Profiler (AZFP, ASL Environmental Sciences) mounted on a G3 Slocum glider (Teledyne Webb Research) was deployed in the Gulf of Saint Lawrence, Canada, for a total of 11 weeks in two different missions, one during the summertime and another during the fall of 2018. These specific frequencies were selected to differentiate volume backscatter strength between macrozooplankton and copepods, the latter of which are typically aggregated between 50 and 250-m depth. Some effort was undertaken to sample zooplankton from a vessel near the glider position, to help validate AZFP data and identify the acoustic signature of plankton. Glider and AZFP operational settings were optimized to extend the number of days at sea while being conservative with energy and storage requirements for the entire suite of sensors mounted on the glider (CTD, hydrophone system used for detecting and identifying baleen whale calls, echosounder, fluorometer and optode). This poster discusses some of the preliminary and promising results from the acoustic data that were collected during these first missions, as well as some of the technical issues that were encountered. Technical challenges arose during integration of the echosounder into the glider, deployment and data archiving. We discuss future plans, including more deployments associated with other sampling methods, which are scheduled for 2019 and 2020.