Tracking krill distributions using a glider in Palmer Deep canyon, a West Antarctic Peninsula penguin and whale foraging hot spot

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Abstract (Oral Presentation)

Antarctic krill (Euphausia superba) are a keystone species within the Southern Ocean food web, providing the major link between primary producers and top predators including whales, penguins, and seals. Despite their importance, mapping krill abundance and distribution remains a challenge, as krill aggregations are often patchy and ephemeral. Ship-based techniques, including net tows and acoustic echosounders, offer a glimpse into krill dynamics over large spatial scales, but research cruises offer only a snapshot in time. Autonomous underwater vehicles equipped with acoustic technology offer a cost-effective solution to maximize Oral spatial and temporal resolution in remote Antarctic waters. We integrated a multi-frequency echosounder, the Acoustic Zooplankton and Fish Profiler (AZFP, ASL Environmental Sciences; 38, 125, 200 kHz), into a Slocum Webb G2 glider. Echosounder data was accompanied by existing glider sensors including a CTD and an optics puck (chlorophyll fluorescence, optical backscatter, CDOM), and ground-truthed by ship-based acoustics and net tows. In January 2018, it was deployed for the first time in Antartica, in Terra Nova Bay in the western Ross Sea, providing information on the interactions between ocean physics, phytoplankton, and zooplankton species including krill, silverfish, copepods, and pteropods. In January 2019, it was deployed again in the Palmer Deep canyon south of Anvers Island on the West Antarctic Peninsula to determine krill aggregation dynamics in a highly productive penguin and whale foraging hot spot. Preliminary results from Palmer Canyon show that krill tend to aggregate at the mixed layer depth, where chlorophyll is often at its maximum, and tend to reach greatest abundance when wind mixing is low and chlorophyll is high. In addition, krill tend to be aggregated at the slopes of the canyon where bathymetry shallows. Using cost-effective AUVs to study krill greatly increases the resolution of data collected, offering an opportunity to better our understanding of krill aggregation dynamics and thus food availability for predators in a region highly vulnerable to climate change.