Glider-based acoustics in the Antarctic

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Abstract (Oral Presentation)

While many debate whether gliders can or should replace research vessels for some missions, it is not debatable that gliders offer unique opportunities and specific advantages. Antarctic krill are targeted by a commercial fishery, and this resource has traditionally been surveyed using ship-based active acoustics. The U.S. Antarctic Marine Living Resources (AMLR) Program conducted many such surveys, but in 2019 we transitioned to glider-based surveys. Rather than rely on the speed of a research vessel to obtain a quasi-synoptic snapshot of krill biomass, we are relying on a fleet of gliders to take something more akin to a set of time-lapse photos. A nice advantage of using a glider fleet is that we can survey multiple locations at the same time, and we can easily embed high-resolution observations within a lower-resolution sampling scheme. We are actively developing new approaches to analyzing glider-based acoustic data, but, as far as possible, we are using the same methods to process glider-based acoustic data as we did for ship-based data (e.g., using Echoview software templates created from ship-data processing schemes). That is, we apply calibration gain offsets, filter the data for background and impulse noise, and calculate differences of volume backscattering strength (dSv). Krill targets are identified in glider data using two- and three-frequency dSv methods. Limits for dSv were set based on predictions from the Stochastic Distorted Wave Borne Approximation model for the three frequencies specific to our gliders (38, 67.5, 125 kHz), two of which differ from those on the ship (38, 120, 200). We integrate glider acoustic data over 5-m vertical bins and within individual yos. Thus, each yo can be treated as a point sample of krill density. Preliminary results from simulated glider sampling indicate that this approach can satisfactorily recover the time-series variation in krill density we previously estimated from our vessel-based surveys. Authors are listed alphabetically by last name.