Gliders and the U.S. AMLR Program

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Abstract (Oral Presentation)

From 1988 – 2016, the U.S. Antarctic Marine Living Resources (AMLR) Program conducted annual surveys around the South Shetland Islands, Antarctica to estimate the biomass of krill in areas where krill-dependent penguins and seals forage. These estimates are used to advise the Commission for the Conservation of Antarctic Marine Living Resources on management of the krill fishery. Static budgets and increased costs prompted transition to an autonomous observing system using long-range underwater gliders. Our initial glider fleet consisted of two deep (1000 m) Slocum G3 gliders, each equipped with extended primary lithium batteries, a pumped Sea-Bird CTD, a WET Labs ECO puck, an Aanderaa oxygen optode, and a three-frequency (38, 67, and 125 kHz) ASL Acoustic Zooplankton Fish Profiler (AZFP). Between our introduction to gliders in February 2018 and our first Antarctic deployment in December 2018, we trained with Teledyne Webb and the glider team at Rutgers and then conducted several short deployments off San Diego to develop necessary skills and deployment and recovery protocols from a Mark V Zodiac. Our small team consists of three "Mission Planners," who design our sampling protocols and determine tracks, and three "Glider Pilots," who maintain the gliders, prepare them for deployment, and execute our missions. Our Pilots determined which glider features (e.g., autoballast, current correction) resulted in desired performance, and our Planners developed "rules of thumb" that specify default dive and data-telemetry parameters. The size and mass of our gliders pose special challenges. For example, unusually warm water off San Diego precluded training deployments in August because the gliders were not sufficiently buoyant. Prior to deployment in Antarctica, our Planners developed a GIS to map bathymetry, currents, wind, and iceberg locations in near real time. We use TWR's SFMC to pilot our gliders and have modified the SOCIB (V1.31) software to pre-process our data. During our first Antarctic field season, two gliders were deployed from mid-December through mid-March 2019, and iceberg locations were updated as often as remotely-sensed images were available from Polar View and the U.S. National Ice Center. Two additional gliders have already been purchased, and we aim to annually deploy 4-6 gliders starting in December 2019. Authors are listed alphabetically by last name.