ASL Environmental Sciences

Solutions Newsletter

June 2018

June 2018 ASL Newsletter. This issue:

Comprehensive Glider-Based Ecosystem Study in Terra Nova Bay, Ross Sea

On January 9th, 2018, a post-doctoral researcher and undergraduate student of Dr. Grace Saba (Assistant Professor, Rutgers University, Center for Ocean Observing Leadership) deployed a Teledyne Webb Slocum Glider with an integrated ASL Acoustic Zooplankton Fish Profiler (AZFP) with three frequencies: 38, 125, and 200 kHz in the Terra Nova Bay (Ross Sea, Antarctica). . The deployment lasted three weeks and the glider was recovered on January 31, 2018. The purpose of this deployment was to obtain mesoscale and sub-mesoscale measurements of oceanographic processes and simultaneous biological distributions and abundance. From the resulting data, the researchers will examine the interactions between multiple trophic levels (phytoplankton, zooplankton and fish) and their relationships to the physical hydrographic driving forces such as sea ice and currents.

A key component to this investigation is the AZFP's ability to differentiate key species within this important Antarctic food web. Species of specific interest include various copepods, crystal krill (*Euphausia crystallorophias*), and Antarctic silverfish (*Pleuragramma antarcticum*). The glider was also instrumented with a CTD, a WET Labs BB2FL ECO puck to measure phytoplankton biomass and an Aandera Optode dissolved oxygen sensor.

To validate glider acoustic-based species, size and abundance data, a coordinated ship-based acoustic and net sampling program was conducted in close proximity to the autonomous glider.

Open accessible automated hydrographic data produced during this project are available through RUCOOL (Rutgers University Center for Ocean Observing Leadership) and THREDDS (Thematic Real-time Environmental Data Distribution Services). The production of consistent, vertically-resolved, high resolution glider-based acoustic measurements will define a successful outcome of this project that will pave the way for cost-effective, automated examination of entire food webs and ecosystems in regions all over the global ocean and serve a wide range of users including academic and government scientists, ecosystem-based fisheries managers, and monitoring programs.

Slocum Glider secured on deck.

Photo credit: Corie Charpen (post-doc research associate at Rutgers University)

Slocum Glider deployment.

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Field Services and Custom Moorings

One of ASL's main consulting services is assisting clients with their metocean mooring projects. We offer everything from mooring design and numerical modelling, to the purchasing of components, system integration, logistics, shipping, and field services.

Over the past year we have worked with clients on several major projects including custom bottom frame moorings in west Greenland, AZFP taut-line moorings in the Canadian Arctic, metocean moorings in Hudson Bay, and near-bottom/turbidity flow studies on the west coast of British Columbia. Often the moorings are customized for the specific requirements of the client.

ASL can take some of the worry out of your field program and our experience helps ensure high data recovery rates. And in the end, isn't that what it's all about: data—good complete data?

Deepwater metocean mooring ready for deployment.

ASL crew calibrating an ADCP compass in the high Arctic.

New Additions to ASL's Metocean Equipment Lease Pool

ASL is always adding to and upgrading our equipment lease pool. Over the last year we have added the following:

Three Nortek Aquadopp current meters. These are great for when you need only a single point measurement and offer a less expensive alternative to the profilers.

A four frequency (200-769-1250-2000 kHz) acoustic water column profiler called the Multifrequency Ultrasonic Device (MUD) was developed specifically for sediment studies such as turbidity flows.

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New Additions to ASL's Metocean Equipment Lease Pool (Continued)

More added instruments include the following:

Four Deepwater Buoyancy stainless steel cages for WHADCP. You can never have enough small ADCP cages. Add a couple of floats above and you are more than halfway there to a mooring.

A Teledyne RDI WHS600 ADCP, 6000 m rated, with high-accuracy bottom track, 4 GB memory, and external battery case. This ADCP is designed for deep-water projects such as deep-sea mining and the bottom-track can be useful for turbidity flow studies.

Two Edgetech PACS deck boxes and four Edgetech PORT LF acoustic releases. These join our inventory of almost fifty CART/PORT releases and nine deck boxes.

Raft-mounted Multifrequency Acoustic Zooplankton Fish Profiler with Cellular Modem

The National Research Institute of Fisheries Engineering (NRIFE, Kamisu) of the Japan Fisheries Research and Education Agency (FRA, Yokohama) has deployed an ASL multifrequency Acoustic Zooplankton Fish Profiler (AZFP 125, 200, 455 and 769 kHz) in Yamada Bay, 450 km north of Tokyo since 2013. The collected data are being used to understand seasonal variations of zooplankton in the water column. As the AZFP is battery-powered and enclosed in a pressure case, periodic recovery was necessary to access the data.

Test mooring of raft-mounted AZFP equipped with cellular modem used to study zooplankton in the water column, Yamada Bay, Japan, June 2016. Note that, in subsequent tests, the solar panel array was modified and expanded.

To help the scheduling of the release of hatchery reared juvenile salmon and increase their survival in the sea, upgrades were purchased by FRA scientists in 2016 which included a solar-powered datalogger with a cellular modem for the AZFP and a Conductivity Temperature (CT) sensor. The datalogger acquires raw data from the AZFP and then averages the data into 1 m bins over a ping interval of 30 pings. These data are then retrieved on demand via a cellular modem and downloaded to the NRIFE's offices.

The deployment of this upgraded system in 2016 was successful and, as a result, FRA purchased a second ASL-built solar-powered datalogger with a cellular modem in 2017 for deployment in the spring 2018.

The raft-mounted system includes a solar panel, a charge controller, rechargeable batteries, a datalogger with AZFP data software, serial connections to the CT sensor and AZFP and a cellular modem all in two weather-proof enclosures.

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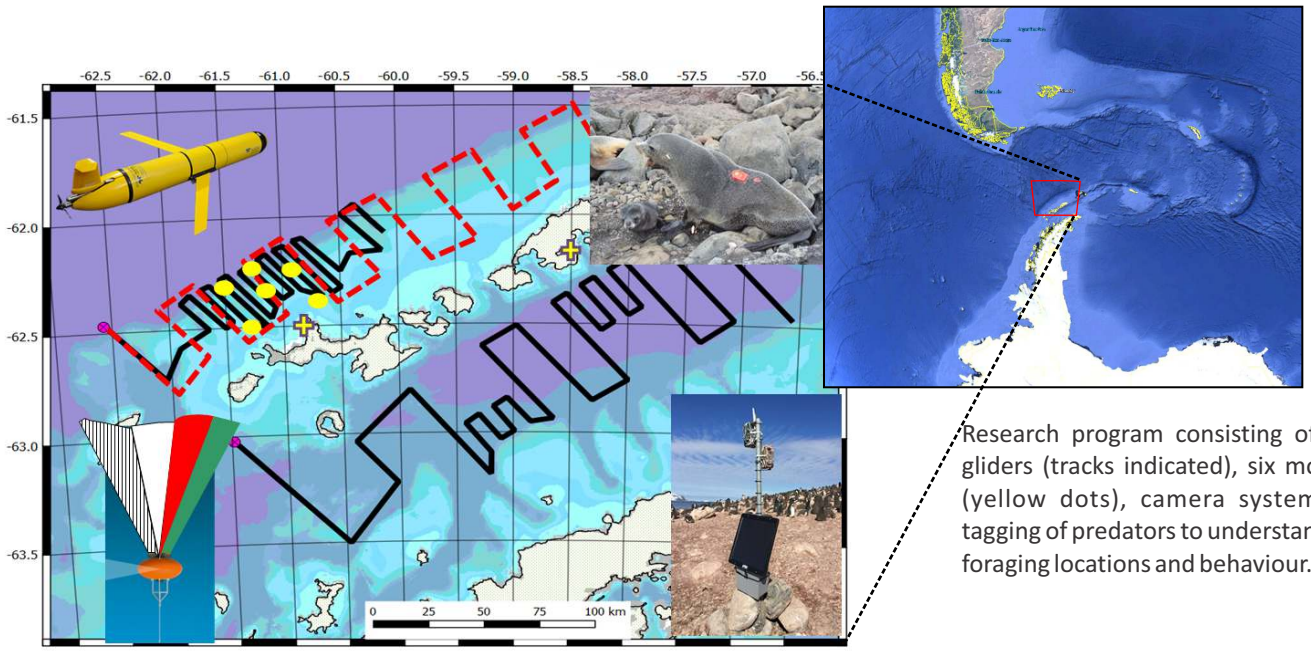
NOAA to Use ASL's Acoustic Zooplankton Fish Profiler in Proposed Strategy to Examine Spatial and Temporal Distribution of Krill in Antarctic

The Antarctic Ecosystem Research Division (AERD) of the NOAA Fisheries Service has managed and implemented the U.S. Antarctic Marine Living Resources (AMLR) Program since 1986. Data collected from this Program are used to advise the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) on establishing catch limits and the spatial distribution of these limits for the Antarctic krill fishery.

Climate changes have altered the distribution, intensity and timing of the krill fishery when compared to historical data. The fishery season, for example, has expanded as both sea ice extent and distribution have declined. This expansion leads to a potential negative impact on ecosystem health such as known areas of krill-dependent predators.



Research program consisting of three gliders (tracks indicated), six moorings (yellow dots), camera systems and tagging of predators to understand their foraging locations and behaviour.

Several fishing companies such as those from Norway, China and South Korea have worked through the Association of Responsible Krill harvesting companies (ARK) to provide acoustic surveys to estimate krill biomass prior to and during the fishing season. Although these data have been useful, the acoustic data collected come from a variety of vessels and may have varying quality, making it difficult to compare datasets year to year. In an effort to systematically provide research-based independent surveys outside of the commercial fishery, and over a longer sampling season, the U. S. AMLR Program has implemented a krill research program that will utilize an array of moorings and gliders around the Antarctic Peninsula. Data collected from this research will replace traditional ship-based surveys and will provide standardized spatial and temporal data to better understand the consequences of overlap among krill, predators, and the krill fishery, and provide other dynamic oceanic attributes of the study area. Along with ADCPs and CTDs, the gliders will be equipped with ASL's AZFP using three acoustic frequencies (38, 67 and 125 kHz) to record backscatter of krill biomass. This sampling Program will commence in October of 2018 and is expected to provide the framework for sustained ecosystem monitoring using autonomous platforms.

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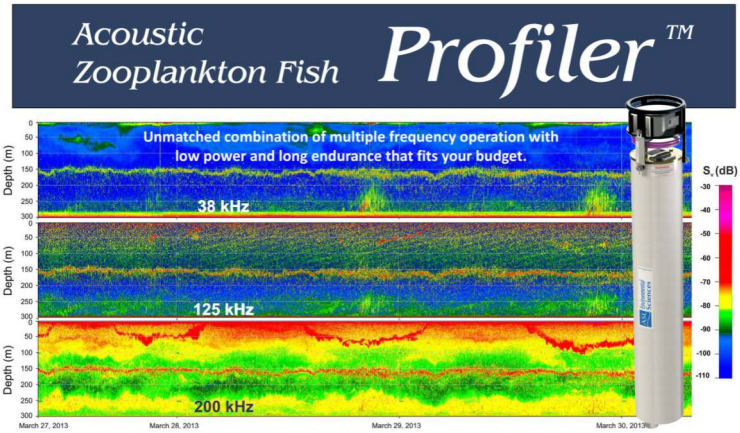
Enter ASL's 2018 Early Career Scientist Contest to Win the Use of the Autonomous Scientific Echo Sounder for Three Months

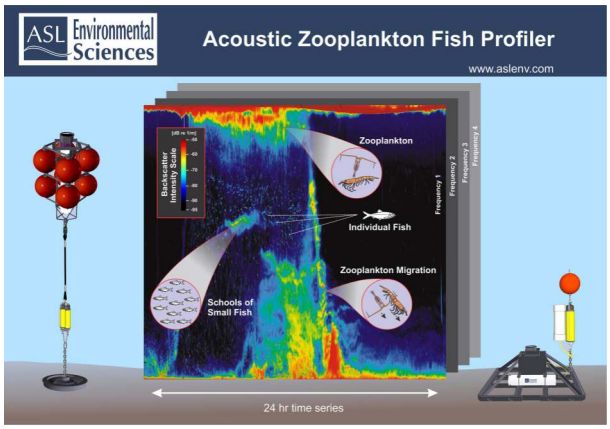
The goal of this open proposal program is to support the oceanographic research community by lending, free of charge, a battery-powered AZFP 125/200/455/769kHz or 38/125/200/455kHz mooring cage and battery for a three-month maximum deployment period along with the support from ASL's team of experts. This instrument loan program is open to early-career scientists and engineers, graduate students, post-doctoral fellows and others involved in oceanographic or freshwater work.

With the unmatched combination of multiple frequency operation and low power and extended endurance, the ASL Acoustic Zooplankton Fish Profiler (AZFP) offers a new, economical way of obtaining reliable measurements of marine environmental conditions in the water column. The AZFP can monitor the presence and abundance of zooplankton and fish within the water column by measuring the acoustic backscatter returns at multiple ultrasonic frequencies. Other targets realized from the sonar backscatter data include bubbles and suspended sediments. The AZFP is a powerful tool for scientific research and environmental monitoring in oceans, lakes and rivers. For more details on the AZFP, refer to our product brochure.

To apply for this program, send a summary proposal (maximum length four pages) of your study and a description on how it would benefit from the use of the AZFP's capabilities. The selection criteria involve a number of factors:

- Relevance of the project: the measurements obtained should advance the understanding of physical and/or biological phenomena of importance to the aquatic environment
- Innovation of the project including scientific merit
- The ability of the party to deploy and recover the instrument.





Acoustic Zooplankton Fish Profiler (AZFP) data time series and example mooring configurations.

Interested applicants may send proposals before June 15, 2018.

Contact Jan Buermans to apply jbuermans@aslenv.com

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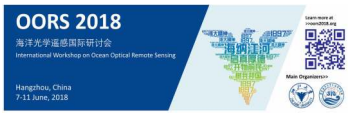
Invited Talk on Water Colour Time Series in Biological Studies

ASL's Dr. Gary Borstad has been invited to the 2018 International Workshop on Ocean Optics Remote Sensing (OORS2018) June 8th and 9th, organized by the Second Institute of Oceanography and Zhejiang University, in Hangzhou China. There will only be about 25 invitees, half from outside China.

The purpose is to exchange ideas on advancement of ocean colour and LiDAR satellites, in the context of sensors being currently planned in China. Gary will be presenting a talk focused on the importance of water colour time series in biological studies. Examples of various projects will be given, including our LakeView project.

http://www.oors2018.org/



ASL Annual Beach Clean-up (Coles Bay Regional Park in North Saanich, BC)

Beach clean-up crew.

ASL employees and family members spent this last Saturday (June 9, 2018) combing the beach and area at Coles Bay Regional Park looking for debris. Several buckets were filled with tin cans, plastic bottles, and other garbage including some large foam panels. Special thanks to Liz Belcher of the Capital Region District (CRD) who provided our staff with all the necessary items for this clean-up effort.

International Conferences

Recently Attended

- Ocean Sciences Meeting (ASLO 2018) Feb 11–16, 2018 Portland, Oregon
- Society for Ecological Restoration—Western Canada (SER–WC), February 13–17, 2018 Burnaby, BC
- Oceanology International (OI 2018) March 13–15, 2018 London, UK
- OTC 2018 (Ocean Technology Conference)
- April 30–May 3, 2018 Houston, Texas
- COSIA Innovation Summit 2018 June 7–8, 2018 Calgary, Alberta

Upcoming

- CMOS 2018 (Canadian Meteorological and Oceanographic Society) June 10–14, 2018 Halifax, Nova Scotia
- ASLO 2018 Summer Meeting (Association for the Sciences of Limnology and Oceanography) June 10–15, 2018 Victoria, BC
- ISOPE 2018 (International Society of Offshore and Polar Engineers) June 10–15, 2018 Sapporo, Japan

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