

NBP 21-13: 15 Nov. 2021 – 22 Dec. 2021, PAL LTER Cruise #29

Weekly Science Report III

(Nov. 29th to Dec 5th)

LTER: Ecological Response and Resilience to “Press-Pulse” Disturbances and a Recent Decadal Reversal in Sea Ice Trends Along the West Antarctic Peninsula.

Overview (Carlos Moffat, Chief Scientist)

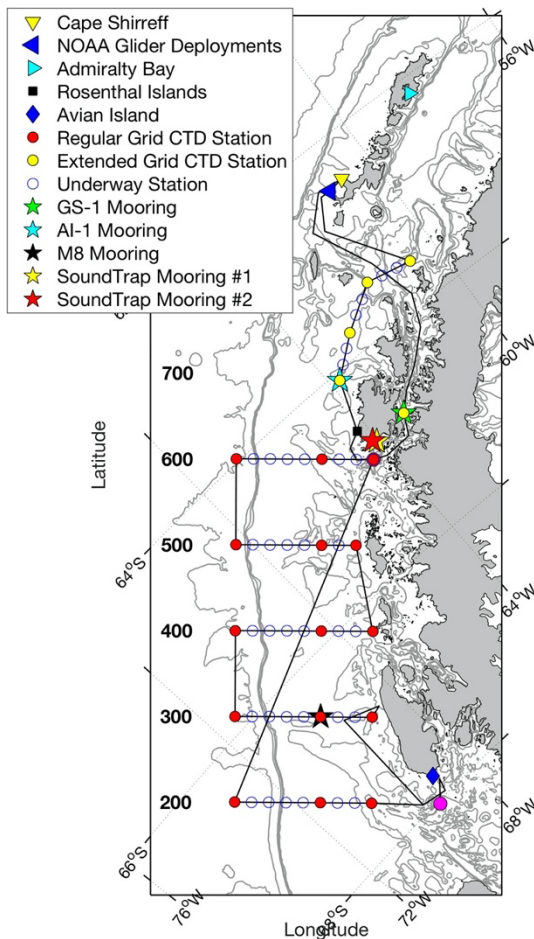


Figure 1: Cruise Plan. This week, we completed the first 4 stations (out of 5) of the extended grid, and the regular grid down to most of the 300 line.

The second week of LTER science resulted in the completion of the regular grid from the 200 to the 600 lines. The Cimino group (C-013) conducted a successful visit to Avian Island. On November 3–4, we also completed the first of two process stations, also near Avian Island (200.-040 grid station). The glider survey of the extended grid continues at a good pace.

We also suffered a setback as we were unable to recover the M7 mooring deployed in January. As a result of having to set aside some time for the recovery, we will not be conducting the high-resolution section off Adelaide Island.

Our next step is to finalize zooplankton sampling at an offshore station using the MOCNESS net before returning to Palmer Station for a 4–5 day process station.

Group Reports

C-013 Seabirds (Megan Cimino, LTER PI, UCSC)

The birder team continued to conduct seabird and marine mammal surveys from the bridge while underway between and at grid stations. From Nov. 30 to Dec 3, the team conducted research from a field camp at Avian Island. This work included censusing Adelie penguin colonies, collecting diet samples, recovering animal borne tags, and surveying seabird and marine mammals. While the weather was

suboptimal at times, we were able to watch blizzard condition impacts on individuals and breeding colonies. We are thankful for the support of grantees and ASC/ECO who helped set up and take down our camp.



Figure 2: Penguin colonies at Avian Island.

C-024 Whales (Ross Nichols, Friedlaender Group, UCSC)

This week, the Whalers continued to conduct bridge surveys of cetaceans and pinnipeds. This week, sighting totals for the LTER cruise total: three Antarctic Minke whales (Bb), forty-three Humpback whales (Mn) and sixteen individuals of unknown cetacean species. Humpbacks sighted have continued to be found in an equal ratio of solo and groups of two individuals performing both travelling and foraging behaviors, although some groups of three and four have also been sighted. Thus far, no surface feeding or bubble netting has been observed. However, surfacing breaching has been sighted on now four occasions. Photo identification data using fluke imagery has been collected on a total of three humpback whales. The whalers have deployed using small boat operations multiple times thanks to the continued support of the ASC/ECO staff and crew, of which much of this work was made possible.

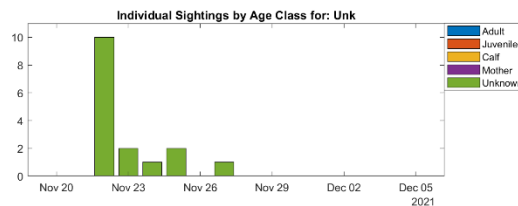
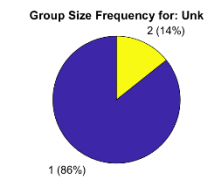
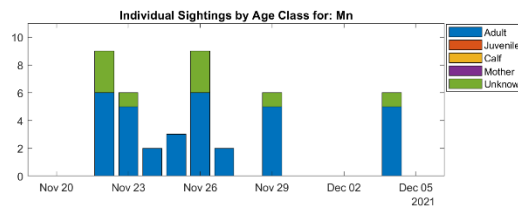
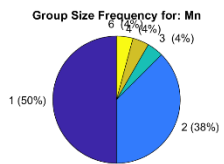
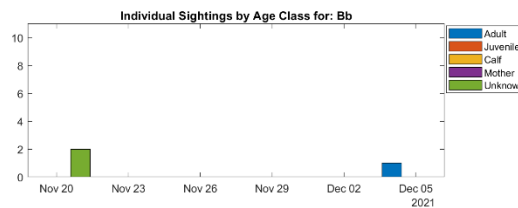
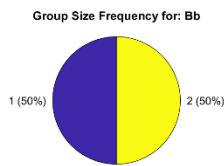
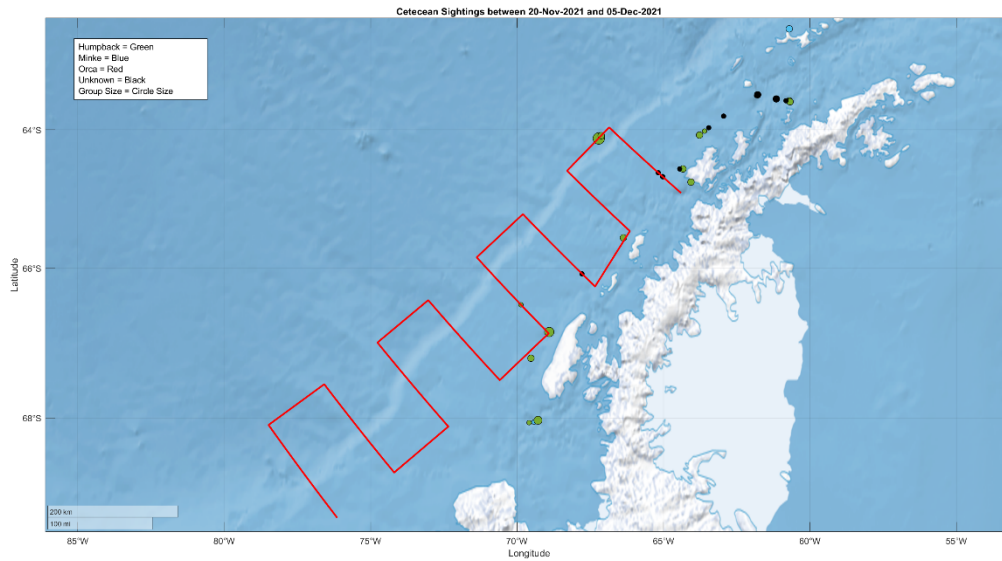


Figure X: A map of cetacean sightings (top) using bridge and small boat surveys in reference to the LTER grid. A sightings summary (bottom) of group size and species demographics, separated by species.

C-019 Phytoplankton (Jessie Taylor, Schofield Group, UCONN/Rutgers)

As of December 5, 2021, the phytoplankton team has sampled the LTER grid lines 200 through 600 as well as the extended grid to the north. In terms of surface chlorophyll concentration, we saw a similar spatial pattern to the first week in that the offshore slope stations generally had higher chlorophyll concentrations than the nearshore shelf stations, according to in situ

fluorometry (Figure 3). On December 4, 2021, we collected data from two full CTD-rosette casts at station 200.-040, the southernmost station near Avian Island. At station 200.-040, although surface chlorophyll concentrations were low (1.8 to 2 $\mu\text{g L}^{-1}$), the phytoplankton community was fairly diverse. The Imaging Flow CytoBot captured images of including pennate diatoms, *Corethron sp.* diatoms, large chain-forming diatoms, and mixed flagellates during the two CTD-rosette casts at station 200.-040 (Figure 4).

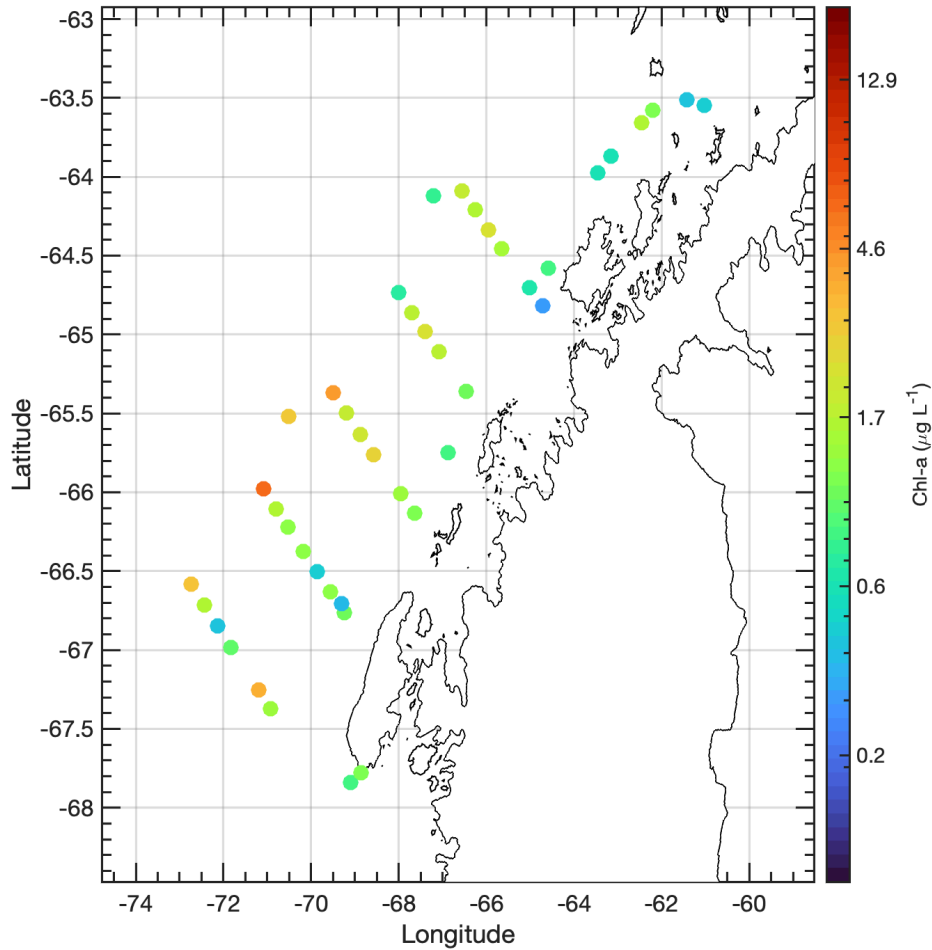


Figure 3: Surface chlorophyll concentration from the flow-through fluorometer at all grid and underway stations, with seawater intake at 7m depth.

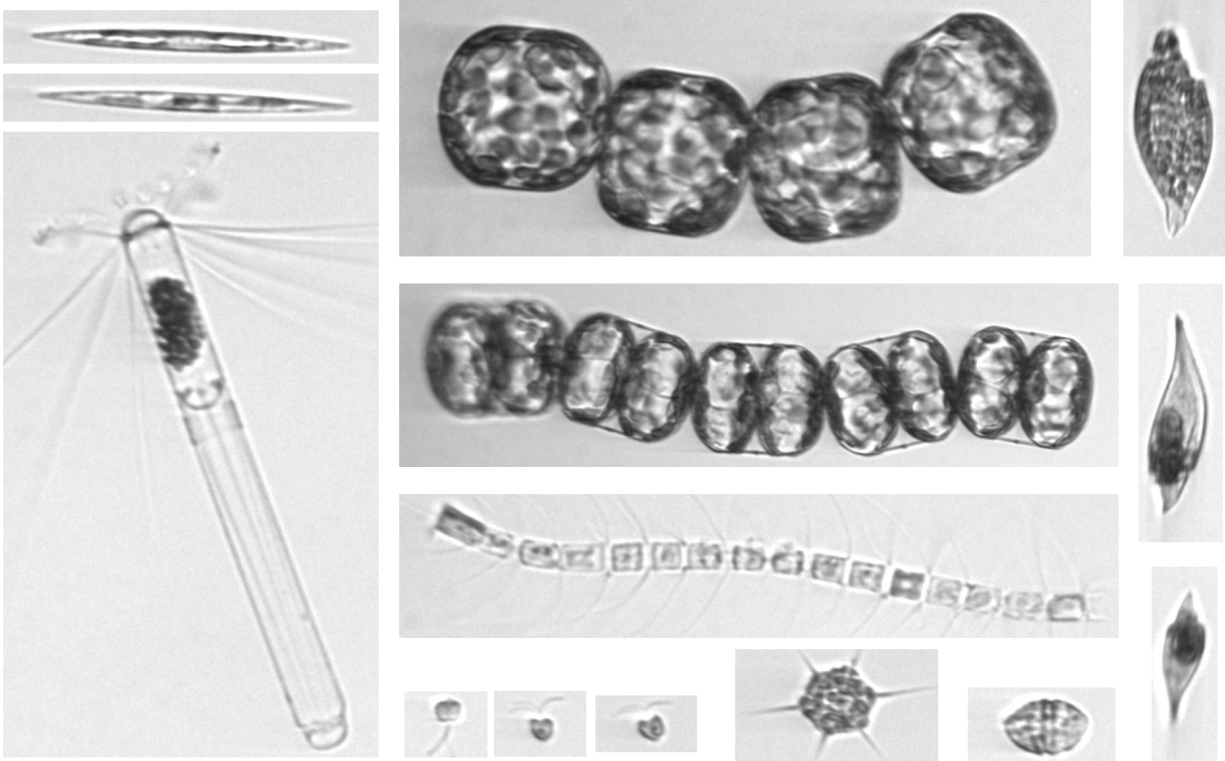


Figure 4: Phytoplankton photographed by the Imaging Flow CytoBot on December 4, 2021 at the Avian Island process station 200.-040, including pennate diatoms, Corethron sp. diatoms, large chain-forming diatoms, and mixed flagellates.

C-021 Physical Oceanography (Carlos Moffat, LTER PI, U. Delaware)

The glider deployed on November 25th in collaboration with NOAA continues to make good progress towards Bransfield Strait, and we expect it will soon cross the Southern Bransfield Front (SBF).

A main goal of the physical oceanography component was to recover the M7 mooring deployed with ASC support in January 2021. A first attempt at recovery was conducted on November 29th. While both acoustic releases reported having fired correctly, the mooring did not surface. With the weather worsening, a second attempt was scheduled for Dec 5th. This second attempt involved using a grappling rig to attempt to recover part or the entire mooring. However, the mooring failed to surface despite two 8-hour attempts at recovery.

C-045 Biogeochemistry (Shavonna Bent, Van Mooy Group, MIT/WHOI)

This week the Van Mooy lab completed the LTER grid for our standard measurements: nutrients, POC, oxygen isotopes, lipids, carbohydrates, and RNA.

We have found and imaged blooms of diatoms and rhizaria, the makeup of which changed with depth and distance from the shoreline. We observed their morphologies and sinking/swimming behaviors.

This week we also successfully started an incubation of trace metal clean, off-shelf water to test for iron limitation, B12 limitation, and co-limitation. The incubation will run for one week, and RNA samples will be collected at the end for analysis after the cruise for signals of limitation.

C-020 Zooplankton (Joe Cope, Steinberg Group, VIMS)

We finished the LTER standard grid, towing with both our 1- and 2-m Metro nets. As noted before, most of the Antarctic krill, *Euphausia superba*, that were caught are small juveniles. At the first Process Study station, 200.-040, we obtained a day/night pair of MOCNESS tows. Juvenile Antarctic krill were found in the 0 – 50 m depth interval, while adults were found at 50 – 100 m. Graduate student Tor Mowatt-Larsen completed two thermal tolerance experiments, one on an icefish and one on a nototheniid (a common Antarctic fish). Graduate student Maya Thomas completed another fecal pellet production on Antarctic krill. Animals were frozen at -80°C for gut fluorescence measurements and for future, yet to be determined measurements.