NBP 21-13: 15 Nov. 2021 – 22 Dec. 2021, PAL LTER Cruise #29
Weekly Science Report V (Final)
(Dec. 13th to Dec 19th)

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)

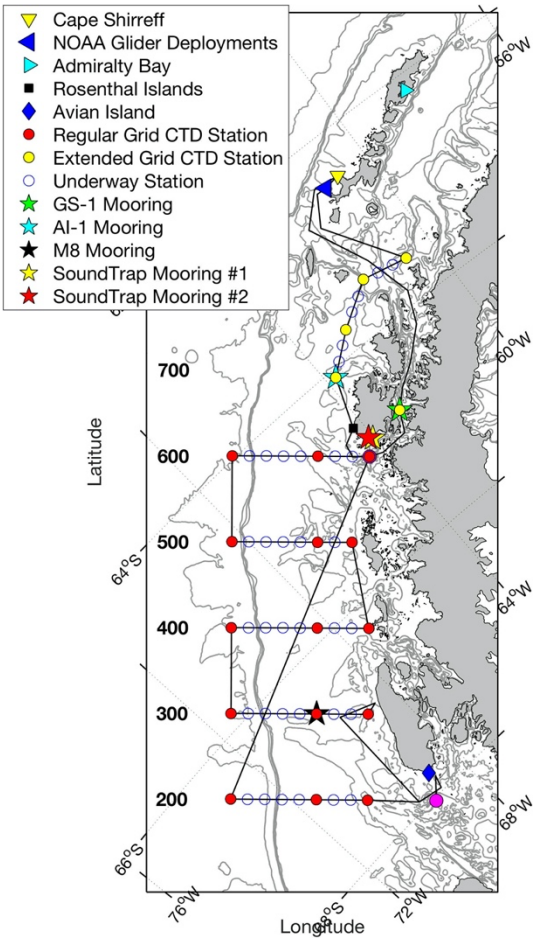


Figure 1: Cruise Plan. This week, we completed the first 4 stations (out of 5) of the extended grid, and the regular grid down to most of the 300 line.

During the last week of LTER science we finalized work in the Palmer Station area with seabird surveys and the deployment of a mooring for monitoring of noise as well as whale activity near the station. We left the Palmer area early in the afternoon of December 13th to sample the Gerlache Strait region. This is part of our efforts to expand the LTER grid northwards and understand exchange with Bransfield Strait.

We conducted two cross-channel sections in Gerlache Strait. The first at the site of the future deployment of the GS-1 mooring (see Figure 1) and the second off the northern coast of Brabant Island. A series of whale biopsies and sampling under an ice floe were also conducted along Gerlache Strait, as detailed below.

Weather conditions continued to be marginal to carry out sampling. We were aiming to conduct additional sampling at our Bransfield Strait station (831.-002), but high winds prevented us from deploying the zooplankton nets after the CTD profile was completed.

The LTER science activities ended with the recovery of the glider deployed in collaboration with NOAA. The glider was recovered on December 15th off Hoseason Island after waiting for a brief weather window that allowed small boat operations. After that, we transited to Cape Shirreff to recover a second glider and pick up the NOAA team that had been working there since November 20th. Recovery of the team and the glider was carried out as soon as a weather window opened at about 3 AM on December 18th. Shortly after the recovery of the glider at about 10 AM, we started our transit to Punta Arenas.

We continued to receive outstanding support from the ASC group as well as ECO.

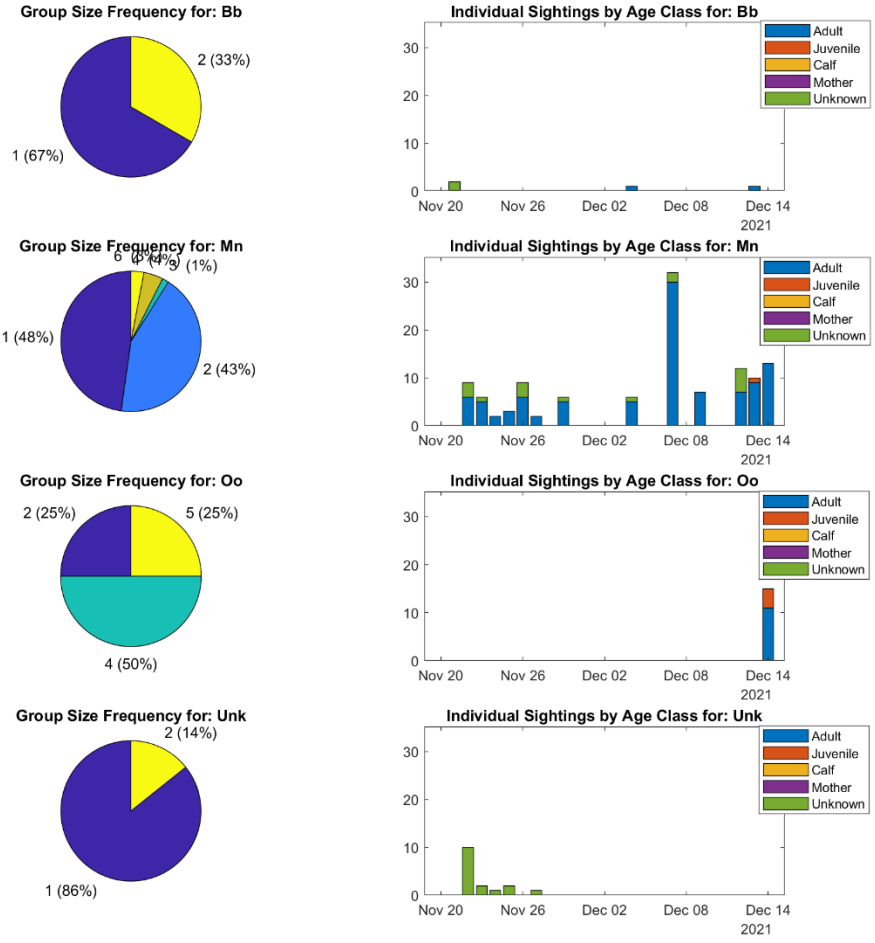
Group Reports

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

With continued work in the Palmer Station region, we were able to census Adelie and chinstrap penguin populations and identify skua breeding pairs at Dream Island, one of our main study sites. We were also able to count the number of giant petrel active nests and record band numbers at Elephant Rocks and Shortcut Island while we were recovering and deploying geolocation tags. This is work that is typically conducted by the field team stationed at Palmer Station. We also conducted our last predator visual surveys from Palmer Deep to the northern Gerlache at full grid and underway stations. The week ended with data management and inventorying, organizing, and packing samples and gear. We are very grateful for the boating and lab support from grantees, ECO, and ASC.

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

This week, the Whalers continued to conduct bridge surveys of cetaceans and pinnipeds. Sighting for the entire cruise (Figure 2) totaled four Antarctic Minke whales (Bb), one hundred and seventeen Humpback whales (Mn), fifteen orcas, and sixteen individuals of unknown cetacean species. Six biopsies were collected this week on 2 humpback whales and 4 orca while in the Gerlache Straight. This brings our cruise total to 11 cetacean biopsies. 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 through six 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 five humpback whales and 6 orca 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.

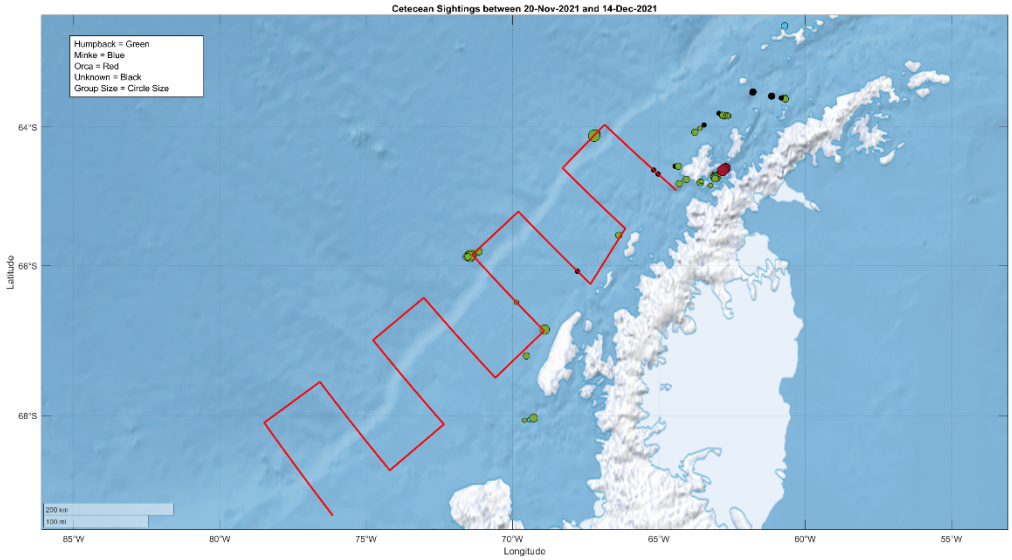


Figure 2: A sightings summary (top) of group size and species demographics, separated by species. A map of cetacean sightings (bottom) using bridge and small boat surveys in reference to the LTER grid.

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

As of December 20, 2021, the phytoplankton team has completed sampling. In addition to final sampling, our team conducted opportunistic ice sampling from small boats on December 14th (Figure 3). The ice was melted slowly at 4 degrees Celsius in a walk-in cooler, then the meltwater was filtered for later Chlorophyll-a and HPCL analysis. The phytoplankton team completed the last full CTD grid station in Bransfield Strait, station 831.-002, on the night of December 14th. On December 15th we completed the last two underway filtration measurements paired with radiometry while the ship was located in the lee of Hoseason Island. On December 16th and 17th we took our final four radiometry measurements (two per day) near Cape Shirreff.

Figure 3: Ice sampling of opportunity conduced from a small boat on 12/14/2021. Ice was melted slowly and meltwater was filtered for chlorophyll-a concentration and HPLC pigment analysis.

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

After we left the Palmer Station area, we aimed to conduct two cross-channel sections in Gerlache Strait with the goal of understanding the potential exchange between the Palmer Deep region and Bransfield Strait through the channel. A first, 5-station section was conducted across the planned GS-1 mooring site, which also allowed us to collect bathymetric data to inform the deployment. A second section was collected off the northern coast of Brabant Island. This location was chosen because it is a relatively shallow section of Gerlache Strait. Initial analysis of the sections shows clear evidence of cold Bransfield Strait water in the northern (Brabant) section, with isopycnals tilting in the cross-channel direction, an indication of lateral exchange flow. The southern section was dominated by warm modified Circumpolar Deep Water at depth, which might indicate that the Bransfield Strait water does not enter the Palmer Station area during this time of the year.

After the second CTD cross-section we headed north to collect additional data at the extended station 831.-002. High winds prevented the deployment of the zooplankton nets, but we were able to collect a full-depth CTD profile. A final CTD cast was collected off Hoseason Island to track the exchange between the LTER sampling region and Bransfield Strait.

The NOAA glider deployed on November 25th was recovered off Hoseason Island on December 15th. Marginal weather conditions forced us to wait about 16 hours for an opportunity for recovery, which was then conducted in less than an hour. Preliminary analysis of the data shows the glider successfully sampling the Southern Bransfield Front (SBF) that separates the cold, deep Bransfield Strait waters from the relatively warm deep waters of the regular LTER grid. We are grateful to our NOAA colleagues for the opportunity to sample this critical region.

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

During the final week of the cruise we finished our final grid station, and several reduced sampling CTD stations where we took water for nutrients and oxygen isotopes. We have packed up our samples and prepared them for shipping, as well as digitizing our sample logs. Further, we were able to inventory and pack our lab supplies up.

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

Two sets of 1- and 2-m tows were taken in the northern WAP: one set in the southern Gerlache Strait and one off Brabant Island. Catch was dominated by crystal krill (*Euphausia crystallorophias*), decapods (*Notocrangon* and *Chorismus*), and silverfish, taxa typically caught in the southern region of the standard LTER Grid. One specimen of an unknown artedidraconid, thought to be a new species, was found in the Gerlache samples.