PALMER STATION MONTHLY SCIENCE REPORT

MARCH 2019

The high wind event of 26 March. This wind event set a new record, with wind speeds gusting up to 106kts. This wind event was followed by another of similar intensity on 29 March. *Image Credit: Randy Jones*

NEWS FROM THE LAB

Randy Jones, Summer Laboratory Supervisor

The end of the summer season is upon us, with groups concluding what has been a successful and rewarding season. The C-020-P (Steinberg) and C-024-P (Friedlaender) groups departed on the ARSV *Laurence M. Gould* at the end of the LMG19-02 cruise on 15 March. The remaining summer grantees, B-086-P (van Gestel), C-013-P (Fraser), C-019-P (Schofield), and C-045-P (Ducklow), will depart on the *Gould* on 5 April following the turnover port call. It is always remarkable to survey the accomplishments of the grantee teams, and note how their achievements in the field and in the labs have been impressive.

Many thanks go out to the support staff for their efforts to enable and support high-quality science. I would like to extend special thanks to Research Associate Marissa Goerke, Instrument Technician Carolyn Lipke, and Peninsula S&TPS Implementation Manager Jamee Johnson for their efforts.

MARCH 2019 WEATHER
Marissa Goerke, Research Associate

Temperature
Average: 0.8 °C / 33.5 °F
Maximum: 5.1 °C / 41.2 °F on 4 Mar 20:20
Minimum: -3.5 °C / 25.7 °F on 30 Mar 10:47
Air Pressure
Average: 986.1 mb
Maximum: 1010.9 mb on 23 Mar 19:24
Minimum: 960.8 mb on 30 Mar 22:51
Wind
Average: 15.5 knots / 17.9 mph
Peak (5 Sec Gust): 106 knots / 122 mph on 26 Mar 21:11 from NE (37 deg)
Prevailing Direction for Month: NNE
Surface
Total Rainfall: 102.9 mm / 4.05 in
Total Snowfall: 27.0 cm / 10.5 in
Greatest Depth at Snow Stake: 25.4 cm / 9.9 in
WMO Sea Ice Observation: No sea ice in sight with 1-5 ice bergs and bergy bits.
Average Sea Surface Temperature: 0.62 °C / 33.1 °F

Temperatures peaked at 5.1° C on 4 March and reached a low of -3.5° C 30 on March. The wind broke a record by reaching 122 mph on 26 March (Fig. 1) and averaged 17.9 mph for the month. The prevailing wind direction for the month was from the north-north-east. We accumulated 27.0 cm of snow and had 4.1 inches of rain fall. The snow field measured by the snows takes has still not melted. There has been brash ice in the area occasionally as well as several large icebergs in the area.

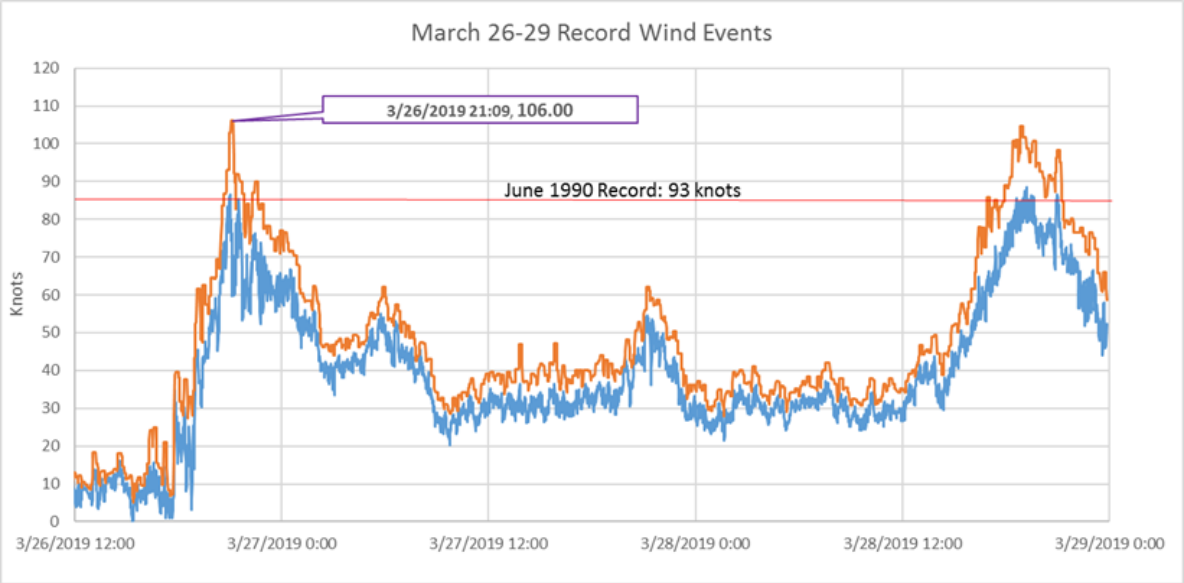

Fig. 1 – The record-breaking wind events between 26-29 March, recorded by the Backyard Automated Weather Station near Palmer Station. Wind speed (blue line; knots) and wind gust (orange line; knots). Image Credit: Marissa Goerke.

B-086-P: ANTARCTICA AS A MODEL SYSTEM FOR RESPONSES OF TERRESTRIAL CARBON BALANCE TO WARMING

Dr. Natasja van Gestel, Principal Investigator, Texas Tech University

Personnel on Station: Kelly McMillen and Natasja van Gestel

Plant Physiology

Aside from our weekly ecosystem-level measurements in the field, we also examined plant capabilities in terms of carbon uptake using a portable photosynthetic system in the lab. We measured whole-plant net photosynthetic rates of at least six individuals of the two vascular plant species that inhabit Antarctica. The two vascular plant species, growing only on the Antarctic Peninsula, are *Deschampsia antarctica* (Antarctic hairgrass) and *Colobanthus quitensis* (Antarctic pearlwort; Fig. 2).

To determine what the plants are capable of given enough light and high CO_2, we ran two types of photosynthetic response curves on the portable photosynthesis system (Licor LI-6800). First

Fig. 2 – The two vascular plant species in Antarctica: Antarctic pearlwort (upper right) and Antarctic hairgrass (lower right). The left photo shows the two species growing together.

are the light-response curves using a red/blue light-source, which measures how net photosynthetic rates change in response to diminishing light levels inside the plant chamber (Fig. 3). As with the field-measurements, the light-response curves provide information on dark respiration of the plant, the light compensation point (LCP; above what light level net photosynthesis starts), and the maximum photosynthetic rates at saturating light level (A_{sat}). We took photosynthetic measurements at three different temperatures to examine how these variables change accordingly.

The second type of photosynthetic curve are the CO_2-response curves, whereby CO_2 rather than light levels are altered. The CO_2 response curves generate information on enzyme kinetics and maximum possible photosynthetic rates (A_{max}), and thus provide complementary information to what is gained from the light-response curves.

Fig. 3 – Kelly McMillen taking a photo of Antarctic pearlwort prior to measuring net photosynthetic rates (left image). Antarctic pearlwort inside the whole-plant chamber, exposed to red-blue light (right image). The ambient temperatures of the outside deck were used to measure light- and CO_2-response curves at the coldest temperatures.

Completion of field experiment

On 21 March, we disassembled the field experimental setup, as snowfall was becoming more frequent and started to accumulate on the ground (Fig. 4). We were thus able to use the entire summer season for our warming experiment: from the moment the ground was (relatively) snow-free up to when the ground became covered again.

Fig. 4 – Take-down of field sites in the Palmer Backyard (left image), and returning from our Litchfield Island sites (right image), which has our highest productivity site.

Daily Antarctic blog

My daily Antarctic blog (natasjavgestel.github.io/) reached 1306 users from 33 countries (as of 31 March 2019; Fig. 5).

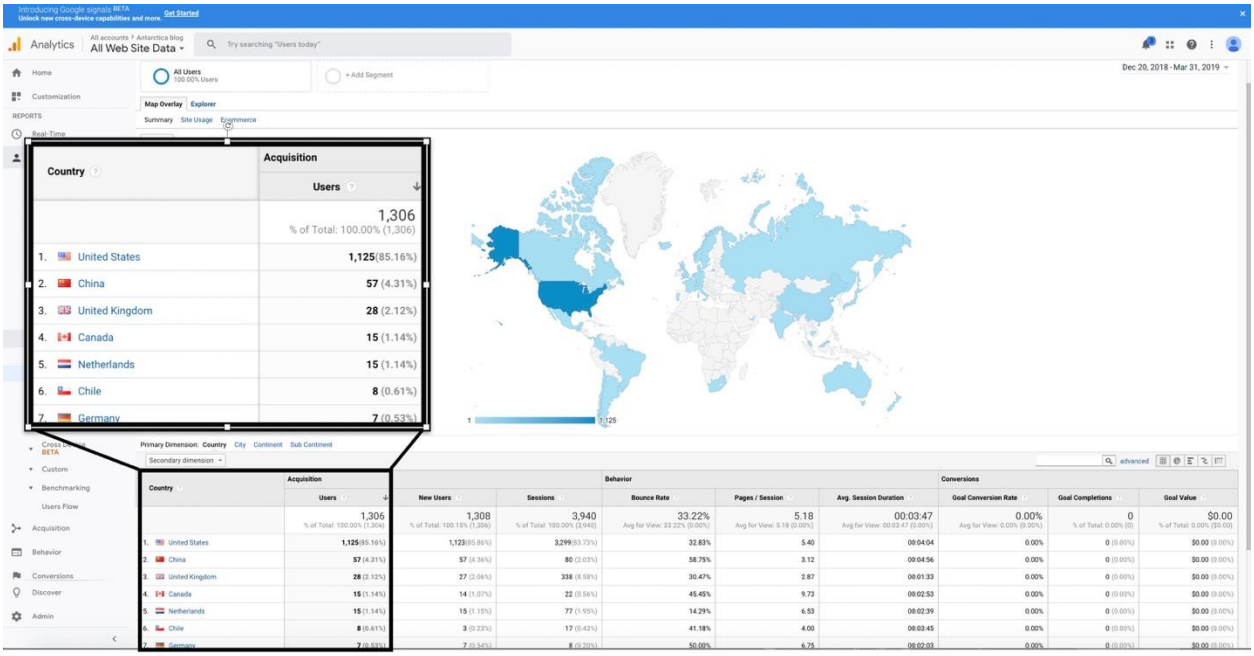

Fig. 5 – Country and user statistics for my daily Antarctic blog.

C-013-P: PALMER, ANTARCTICA LONG TERM ECOLOGICAL RESEARCH (LTER): LAND-SHELF-OCEAN CONNECTIVITY, ECOSYSTEM RESILIENCE, AND TRANSFORMATION IN A SEA-ICE INFLUENCED PELAGIC ECOSYSTEM – APEX PREDATOR COMPONENT

Dr. William R. Fraser, Principal Investigator, Polar Oceans Research Group

Personnel on station: Donna Patterson-Fraser, Darren Roberts, and Megan Roberts

Adélie penguin work concluded this month with the fledgling of all chicks ending our presence/absence radio transmitter study on Humble Island. Gentoo penguin breeding was slightly behind Adélie penguins this year with work during March focused on obtaining adult diet samples and chick fledging weights on Biscoe Point and in the Joubin Islands.

Brown skua work also concluded this month with nest monitoring and growth measurements of breeding pairs from the Joubin Islands to Biscoe Point. Our south polar skua study on Shortcut Island also continued into, and concluded in March.

Brown skua work in the Joubin Islands. *Image Credit: Fraser group*

Giant petrel chick banding on all local islands was completed in March. We were also able to extend chick banding to the Gosler Islands this year. Thanks to volunteers from Station, our intensive giant petrel chick growth study on Humble Island will continue through April. We deployed our last GPS loggers on giant petrels this month concluding all bird tagging for the season.

Marine mammal monitoring continued with observations of large numbers of fur seals, rapidly declining elephant seal numbers, sporadic leopard seal and crab-eater seal sightings and a return of a few Weddell seals to the area. Whale observations in the Palmer area decreased during March with sporadic sightings of humpback and minke whales.

Adélie penguin and marine mammal monitoring on Christine Island. *Image Credit: Fraser group*

Sediment trap contents were collected from Adélie colonies on Torgersen Island, gentoo colonies on Biscoe Point and chinstrap colonies on Dream Island. These Palmer area sediment trap samples as well as Avian Island samples will be processed for otoliths. Limpet trap contents were also collected from kelp gull colonies on four local islands.

ASC continued to provide great support this month and we'd like to thank everyone on station for their efforts throughout the entire summer. We would like to specifically thank Station Manager Bob Farrell for his support throughout the season.

C-020-P: PALMER, ANTARCTICA LONG-TERM ECOLOGICAL RESEARCH (LTER): LAND-SHELF-OCEAN CONNECTIVITY, ECOSYSTEM RESILIENCE, AND TRANSFORMATION IN A SEA-ICE INFLUENCED PELAGIC ECOSYSTEM – ZOOPLANKTON COMPONENT

Dr. Deborah Steinberg, Principal Investigator, College of William & Mary, Virginia Institute of Marine Science

Personnel on Station: Jack Conroy and Leigh West

The zooplankton team conducted 28 net tows and spent 7 sampling days on the water in March. We finished summer field operations on 11 March and departed Palmer Station on 14 March. Throughout the summer we conducted a total of 370 net tows, and our complete field season activities are summarized below.

We sampled the zooplankton community at LTER time series Stations B and E on 35 dates between 6 November 2018 and 11 March 2019. In addition, we sampled the zooplankton community in Adélie and Gentoo penguin foraging regions (outside of the historic Palmer standard boating area) on 10 dates from 2 January 2019 to 9 March 2019. We collected 223 net samples to quantify zooplankton species abundance along with concurrent bioacoustic data to assess krill distribution. Extended bioacoustic surveys were also conducted in each penguin

foraging region weekly since early January (C-019-P [Schofield] has continued this work since our departure).

In addition to identifying zooplankton species, we collected zooplankton biomass and grazing data at LTER Station B and E. At Palmer Station we analysed 364 individual animals (mostly krill) to estimate grazing rates using the gut fluorescence method. We applied this same method to 293 size-fractionated samples to assess grazing by mixed taxa. We paired all size-fractionated samples with wet and dry biomass measurements completed at Palmer Station.

Throughout the austral summer, we conducted five experiments to examine how phytoplankton community structure, a collaboration with C-019-P (Schofield), and phytoplankton lipid profiles, a collaboration with B-032-P/L (Van Mooy), impact krill feeding. We collected 16 krill samples for stable isotope analysis to assess krill trophic role. We measured over 4000 individual krill to quantify growth through austral summer. On four occasions we collected krill fecal pellets to assess their contribution to deep ocean carbon export, a collaboration with C-045-P (Ducklow).

We extend sincere thanks to Palmer Station personnel whose expertise and enthusiasm made our summer successful and enjoyable. We thank our LTER colleagues for invaluable support and friendship.

C-024-P: PALMER, ANTARCTICA LONG-TERM ECOLOGICAL RESEARCH (LTER): LAND-SHELF-OCEAN CONNECTIVITY, ECOSYSTEM RESILIENCE, AND TRANSFORMATION IN A SEA-ICE INFLUENCED PELAGIC ECOSYSTEM – WHALE COMPONENT

Dr. Ari Friedlaender, Principal Investigator, University of California, Santa Cruz, Santa Cruz, CA

Personnel on Station: Greg Larsen and Ross Nichols

Whale Survey, Photo-ID, Biopsy Efforts

March saw the conclusion of a very successful season for the C-024-P (Friedlaender) group. Data collection continued until the LMG19-02 northbound port call on 10 March 2019, whereupon Greg Larsen and Ross Nichols concluded operations, packed and closed the laboratory workspace, and on 13 March 2019 departed station on the ARSV *Laurence M. Gould*.

The main research hypotheses this season were focused on understanding the ecology and demography of baleen whales in the waters around Palmer Station and the potential for competition among krill predators. The primary objectives are addressed through a combination of visual survey, tissue biopsy collection, photographic-ID, UAS measurement, suction cup behavior recording tags, and linking this information to oceanographic parameters (e.g., krill abundance measured from echosounders) and the foraging behavior of other local predators. In addition to the field team at Palmer Station, multiple team members and collaborators were deployed on LMG19-02 to collect similar information on the foraging behavior and ecology of the Antarctic minke whales and humpback whales.

Until 10 March, we continued to conduct visual surveys of the Palmer boating area, conducting photo-ID, biopsy sampling, and UAS photogrammetry opportunistically whenever whales were

encountered. In the month of March until our departure, we encountered fewer and fewer whales, despite maintaining a regular presence on the water.

Over the course of the 2019 summer season, Logan Pallin, Greg Larsen, and Ross Nichols spent a total of ~265 hours on the water surveying for whales. In the 63 days of the field season, they observed 607 humpback whales, collecting 118 biopsy samples and 255 photo identifications of individual whales. We only observed one other cetacean species, the Antarctic minke whale. We have observed nine minke whales over the last two months and collected two tissue samples (Table 1, Fig. 6).

The biopsy samples will be used for genetic and hormone analyses to assess changes in cetacean population demography and reproductive rates over time as they recover from commercial whaling. This information will also be linked to interannual variability in environmental conditions to better understand the influence that changes in the timing and extent of winter sea ice have on humpback whales. These samples will also be used in other research projects to test for persistent organo-pollutants and the presence of endocrine disruptors that may indicate exposure to microplastic pollution.

Table 1 – Field summary statistics for the C-024-P (Friedlaender) team stationed at Palmer Station.

Total Effort Time	265:45:00

	Total Whales Sighted	Total Calves	Total Adults	Full Photo ID
Humpback	607	70	537	255
Minke	9	0	9	
Orca	0	0	0	Drone Photogrammetry
Fin Whale	0	0	0	34
Unknown	0	0	0	
Totals	**616**	**70**	**546**	

Biopsies Palmer	Total Samples
Humpback	118
Minke	2

Biopsies All Platforms	Total Samples
Humpback (w/ tagging)	175
Humpback (w/o tagging)	161
Minke	2

Unoccupied Aerial Systems Operations

Unoccupied Aerial Systems (UAS) operations continued at Palmer until 7 March, when the vehicle experienced a mechanical failure that precluded any further UAS data collection. Until that date, however, we were able to collect high-resolution photogrammetric data on humpback whales and carry out pinniped habitat mapping missions. Cetacean photogrammetric data are collected by placing the drone directly over a whale with the camera pointed at nadir with a laser range-finder (here used as a precision altimeter). By accounting for lens distortion and measuring the dimensions of the whale's body image in pixels of known area, these images can be used to determine the length and width of a whale to within 1 cm. This season we were able to collect photogrammetric data on 34 different humpback whales.

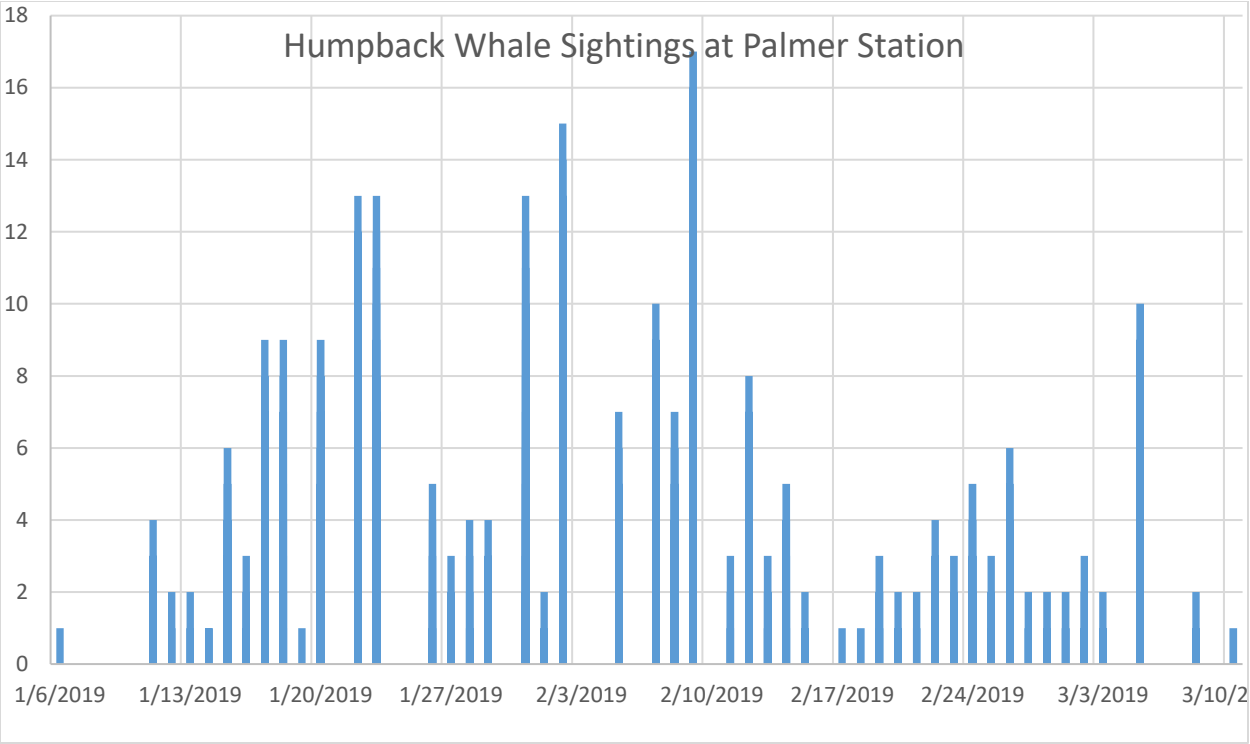

Fig. 6 – Total whale sightings recorded by the whale team at Palmer Station from 5 January 2019 to 10 March 2019. Two large spikes were seen this year in whale abundance in late January and early February. Data gaps are from days with weather conditions too inclement to perform a survey in the boating area.

These data allow us to characterize the range and variability of humpback whale morphology within our population, but more importantly, our temporally explicit sampling throughout each season will allow us to characterize how body condition changes as humpback whales forage in this area, and how these changes differ among demographics - especially for growing calves and their nursing mothers. When these photogrammetry data are combined with our fluke cataloging efforts, we can measure individuals across years and characterize interannual changes in body condition. When these data are combined with our biopsy efforts, we can measure individuals of known sex and pregnancy status and characterize how these demographic statuses correspond to differences in body shape and condition. Future studies are likely to examine cortisol levels in blubber and determine whether stress correlates with trends in body condition. Some of these research questions are most clearly germane to cetacean science and methods, but their application in this location, first and foremost, will advance our understanding of the whale population along the Antarctic Peninsula with respect to its overall health and structure, how this annual foraging period factors into the life history of these animals, and what changes might be observable if and when foraging conditions change.

We also conduct pinniped mapping missions by flying our UAS over these habitats in automated grid-mapping missions, and obtaining high-resolution orthomosaics and digital surface models of the terrain and substrates that comprise these terrestrial habitats, in addition to the position of each animal within these habitats. These data will be used to survey both species abundance and species distribution within these islands. Individual surveys inform how animals associate with specific substrates and with each other, while repeat surveys allow us to understand how local species abundance and habitat use change over the course of the season. These data can describe not only how a greater number of marine predators use terrestrial habitats near Palmer Station for critical behaviors and life history periods, but also how different species might compete for

optimal terrestrial habitats - or partition habitat use spatially or temporally. This season we were able to conduct sever island mapping missions.

C-045-P: PALMER, ANTARCTICA LONG-TERM ECOLOGICAL RESEARCH (LTER): LAND-SHELF-OCEAN CONNECTIVITY, ECOSYSTEM RESILIENCE, AND TRANSFORMATION IN A SEA-ICE INFLUENCED PELAGIC ECOSYSTEM – MICROBIAL / BIOGEOCHEMICAL COMPONENT

Dr. Hugh Ducklow, Principal Investigator, Columbia University, Lamont Doherty Earth Observatory

Personnel on Station: Shuai Gu

The field season of C-045-P (Ducklow) came to a successful end in March, marked by the last sampling completed on 28 March. Another eight sampling events occurred at LTER Stations B and E aboard the RHIBs throughout the month, collecting samples of nutrients, Oxygen-18, fixed cytometry, and DNA.

Noon and midnight molecular samples were collected from the pump house intake at Palmer Station for analysis of microbial community structures in seawater. Begun in early January, these samples will provide us an insight into the daily shift of microbial community structures from summer to fall.

The O_2/Ar ratio measured by the EIMS (Equilibrator Inlet Mass Spectrometer) increased to over-saturation in mid-March, indicating higher net community production in the water column. However, the ratio decreased to under-saturation again in late March, when more noticeable storms accelerated the water mixing with deeper layer.

Several measurements were conducted using the FARACAS (Flow-Through Incubation Acetylene Reduction Assays by Cavity Ring Down Laser) system either in continuous mode or discrete mode, however no significant N_2 fixation signal was observed. Thus, more efforts were paid on the $^{15}N_2$ incubation experiment. Nine $^{15}N_2$ incubation experiments were conducted in March, adding the total number to 18 experiments completed during the entire season since late January.

Lastly, great thanks to the support from everyone at Palmer Station for making this field season such a success!

PALMER STATION
RESEARCH ASSOCIATE MONTHLY REPORT

March 2019
Marissa Goerke

A-111-P: THE NEXT GENERATION OF GEOSPACE RESEARCH FACILITIES AT PALMER STATION
Dr. Andrew Gerrard, Principal Investigator, New Jersey Institute of Technology

The ionosphere-thermosphere-magnetosphere (ITM) region of Earth's atmosphere, which is part of the larger geospace environment, is the portal through which the solar wind can enter and impact our planetary system. Though space weather research over the past decades has greatly increased our understanding of a wide variety of phenomena associated with ITM physics, the sum of these individual processes occurring in the geospace environment does not replicate the rich diversity and scope of this complex region. Thus, a more holistic approach to ITM research is necessary, one that integrates clustered instrumentation at multiple locations to simultaneously look at the interactions within the entire system. Using coordinated and collaborative instrumentation currently installed in Antarctica, researchers will study interrelated ITM phenomena observed at high latitudes. The goal of this research effort is a better understanding of the energy transfer and modulation of the geospace system.

Both the ELF/VLF were shut down shortly for four planned power outages. The system came back online and operated normally through the rest of the month.

A-119-P: CONTINENTAL-SCALE STUDIES OF MESOSPHERIC DYNAMICS USING THE ANTARCTIC GRAVITY WAVE INSTRUMENT NETWORK (ANGWIN)
Dr. Michael Taylor, Principal Investigator, Utah State University

The Antarctic Gravity Wave Imaging Network (ANGWIN) is a cooperative effort of six international Antarctic programs to collect continent-wide gravity wave measurements. This network capitalizes on existing optical and radar measurement capabilities at McMurdo, Palmer, South Pole, and six other research stations: Halley (UK), Syowa (Japan), Davis (Australia), Rothera (UK), and Ferraz (Brazil). Infrared (IR) all-sky mesospheric OH (hydroxyl) imagers are installed at Davis, McMurdo, and Halley stations. The network quantifies the properties, variability, and momentum fluxes of short-period (less than one hour) mesospheric gravity waves and their dominant sources and effects over the Antarctic continent. An all-sky near-IR imager is also installed at Palmer Station to augment the existing instrumentation and create a capability for studying gravity wave properties at each site.

The system was turned back on with the return of darkness. The system is still experiencing some issues with a Windows 10 update.

A-373-P: TROPOSPHERE-IONOSPHERE COUPLING VIA ATMOSPHERIC GRAVITY WAVES
Dr. Vadym Paznukhov, Principal Investigator, Boston College

The goal of this project is to enhance the comprehensive research understanding of troposphere-ionosphere coupling via Atmospheric Gravity Waves (AGWs) in the Antarctic region. Both experimental and modeling efforts will be used on the Antarctic Peninsula to investigate the efficiency and main characteristics of such coupling and will address several questions remaining in the current understanding of this coupling process.

The system operated well throughout the month, until it was shut down and packed up on 6 March. All equipment was removed from the field and Terra Lab, and returned to the home institution.

G-090-P: GLOBAL SEISMOGRAPH NETWORK (GSN) SITE AT PALMER STATION
Mr. Kent Anderson, Principal Investigator, Incorporated Research Institutions for Seismology (IRIS)

Station PMSA is one of more than 150+ sites in the GSN, monitoring seismic waves produced by events worldwide. Real-time telemetry data is sent to the U.S. Geological Survey (USGS). The Research Associate operates and maintains on-site equipment for the project.

The system operated normally throughout the month.

O-264-P: A STUDY OF ATMOSPHERIC OXYGEN VARIABILITY IN RELATION TO ANNUAL DECADAL VARIATIONS IN TERRESTRIAL AND MARINE ECOSYSTEMS
Dr. Ralph Keeling, Principal Investigator, Scripps Institution of Oceanography

The goal of this project is to resolve seasonal and interannual variations in atmospheric O_2 (detected through changes in O_2/N_2 ratio), which can help to determine rates of marine biological productivity and ocean mixing as well as terrestrial and oceanic distribution of the global anthropogenic CO_2 sink. The program involves air sampling at a network of sites in both the Northern and Southern Hemispheres. The Research Associate collects samples fortnightly from Terra Lab.

Air samples were taken twice this month. Four sampled flask boxes were shipped out on LMG19-02NB.

O-264-P: COLLECTION OF ATMOSPHERIC AIR FOR THE NOAA/GMD WORLDWIDE FLASK SAMPLING NETWORK
Mr. Don Neff and Dr. Steve Montzka, Principal Investigators, National Oceanic and Atmospheric Administration / Global Monitoring Division

The NOAA ESRL Carbon Cycle Greenhouse Gases (CCGG) group makes ongoing discrete measurements to document the spatial and temporal distributions of carbon-cycle gases and provide essential constraints to our understanding of the global carbon cycle. The Halocarbons and other Atmospheric Trace Species (HATS) group quantifies the distributions and magnitudes of the sources and sinks for atmospheric nitrous oxide (N2O) and halogen containing compounds. The Research Associate collects weekly air samples for the CCGG group and fortnightly samples for the HATS group.

CCGG samples were taken once a week during favorable winds and HATS Air samples were taken every other week. One crate of HATS and one crate of CCGG flasks were shipped north on LMG19-02NB.

O-264-P: ULTRAVIOLET (UV) SPECTRAL IRRADIANCE MONITORING NETWORK
Dr. James Butler, Principal Investigator, National Oceanic and Atmospheric Administration / Global Monitoring Division

A Biospherical Instruments (BSI) SUV-100 UV spectroradiometer produces full sky irradiance spectra ranging from the atmospheric UV cutoff near 290nm up to 605nm, four times per hour. A BSI GUV-511 filter radiometer, an Eppley PSP Pyranometer, and an Eppley TUVR radiometer also continuously measure hemispheric solar flux within various spectral ranges. The Research Associate operates and maintains on-site equipment for the project.

The system operated normally throughout the month. Bi-weekly absolute scans were completed as necessary. The five lamp calibration was completed before the arrival of the grantee for a site visit.

R-938-P: TERASCAN SATELLITE IMAGING SYSTEM

The TeraScan system collects, processes, and archives DMSP and NOAA satellite telemetry, capturing approximately 25-30 passes per day. The Research Associate operates and maintains on-site equipment for the project. The TeraScan weather and ice imagery is used for both research and station operations.

System hung twice, but otherwise operated normally throughout the month.

T-295-P: GPS CONTINUOUSLY OPERATING REFERENCE STATION.
Mr. Joe Pettit, Principal Investigator, UNAVCO

Continuous 15-second epoch interval GPS data files are collected at station PALM, compressed, and transmitted to the NASA-JPL in Pasadena, CA. The Research Associate operates and maintains on-site equipment for the project.

The system hung once, but otherwise operated normally throughout the month.

T-998-P: INTERNATIONAL MONITORING STATION (IMS) FOR THE COMPREHENSIVE NUCLEAR TEST BAN TREATY ORGANIZATION (CTBTO)
Managed by General Dynamics

The IMS Radionuclide Aerosol Sampler and Analyzer (RASA) is part of the CTBTO verification regime. The automated RASA continually filters ambient air and tests for particulates with radioisotope signatures indicative of a nuclear weapons test. The Research Associate operates and maintains the instrument.

The system has operated normally throughout the month. The system weathered four planned power outages and returned to normal operation smoothly.

OCEANOGRAPHY
Daily observations of sea ice extent and growth stage are also recorded, along with continuous tidal height, ocean temperature, and conductivity at Palmer's pier.

Observations of sea ice around station were made daily and the tide gauge has operated normally throughout the month.

METEOROLOGY

The Research Associate acts as chief weather observer, and compiles and distributes meteorological data. Weather data collected using the automated electronic system is archived locally and forwarded once per month to the University of Wisconsin for archiving and further distribution. Synoptic reports are automatically generated every three hours by the Palmer Meteorological Observing System and emailed to the National Weather Service for entry into the Global Telecommunications System.

The local weather station (PAWS) is working well. Observations are archived on the AMRC website: ftp://amrc.ssec.wisc.edu/pub/palmer/.