

**PALMER STATION  
MONTHLY SCIENCE REPORT  
MARCH 2016**



**The toothy yawn of a leopard seal in Hero Inlet.**      *Image Credit: Drew Spacht (B-256-P)*

**NEWS FROM THE LAB**

Carolyn Lipke, Summer Laboratory Supervisor

With the end of March comes the end of the summer research season at Palmer Station. It has been busy as always, and delightfully full of ice bergs, orcas, elephant seals on the front lawn, and amazing food. Fewer leopard seals and humpback whales were seen compared to recent years. Large numbers of terns are flocking up in the backyard, and the glacier has been doing some dramatic calving. Stormy weather increased toward the end of the month, and everyone is working to prepare station for winter weather as the snow starts to fly.

The ARSV *Laurence M. Gould* (LMG) will return in the first week of April to pick up the summer ASC staff and remaining grantee groups. We're looking forward to welcoming the winter crew and returning fish research groups.

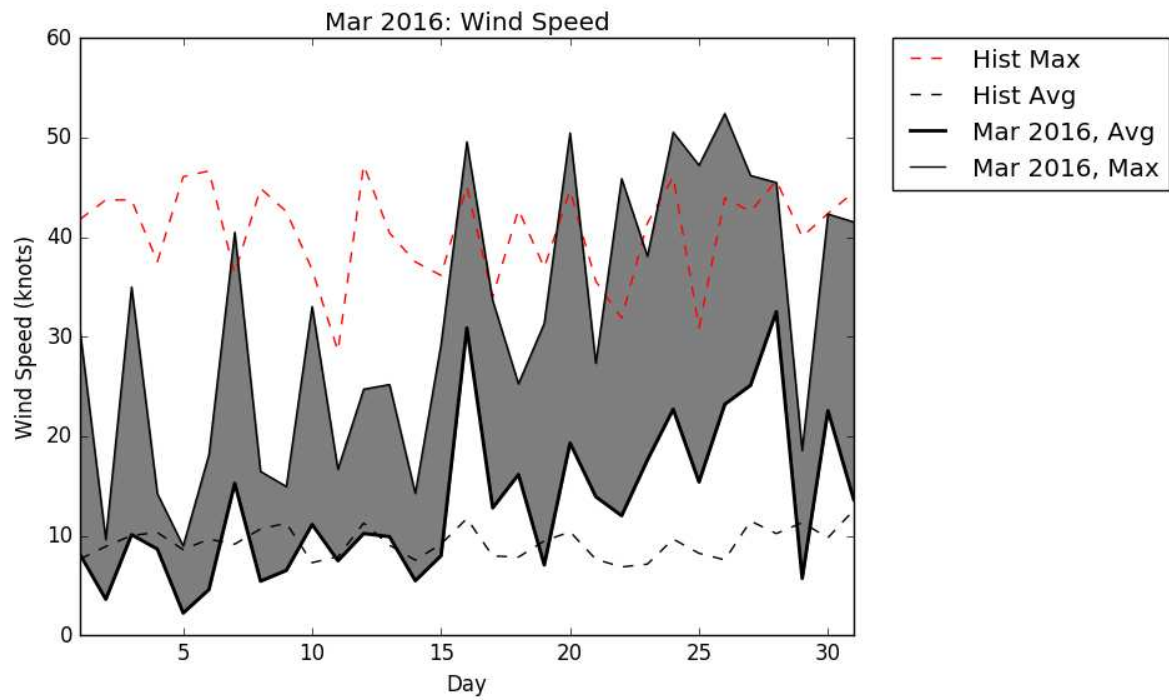
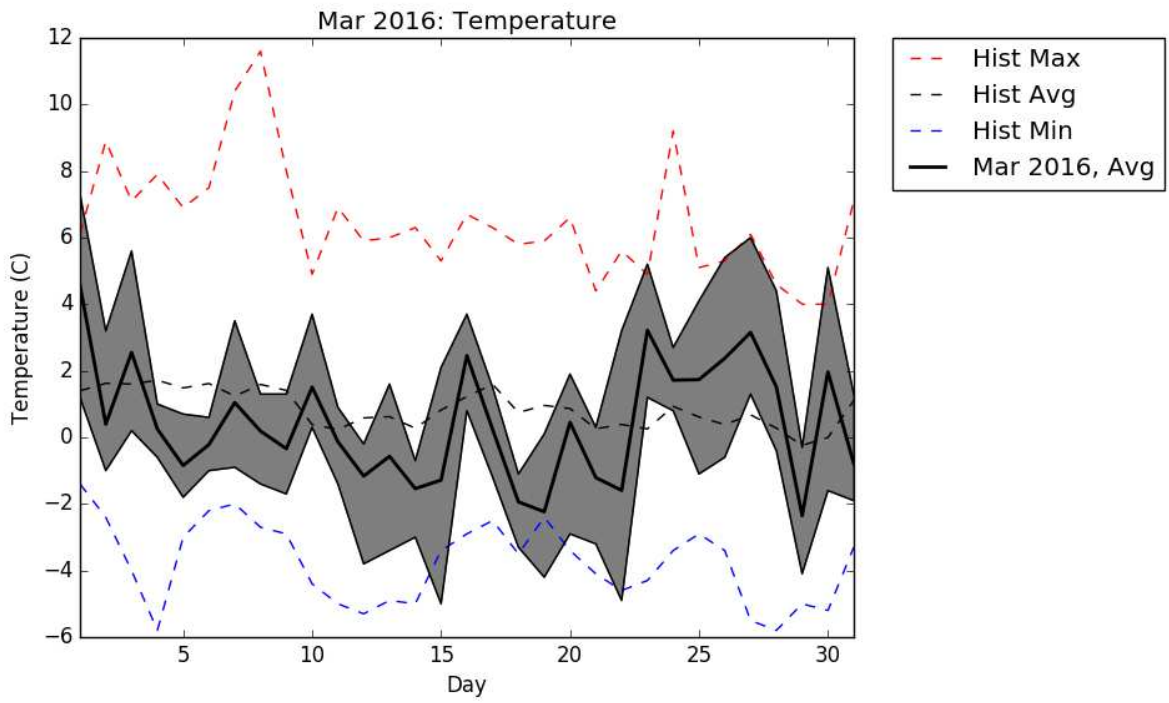
## MARCH 2016 WEATHER

Mark Dalberth, Research Associate

The following table gives the weather data for the month of March. The times are in UTC.

<b>Temperature</b>
<b>Average:</b> 0.3 °C / 32.5 °F
<b>Maximum:</b> 7.3 °C / 45.14 °F on 1 Mar 04:35
<b>Minimum:</b> -5.0 °C / 23 °F on 15 Mar 03:24
<b>Air Pressure</b>
<b>Average:</b> 978.2 mb
<b>Maximum:</b> 997.9 mb on 01 Mar 00:09
<b>Minimum:</b> 960.2 mb on 11 Mar 02:21
<b>Wind</b>
<b>Average:</b> 13.7 knots / 15.7 mph
<b>Peak (5 Sec Gust):</b> 66 knots / 76 mph on 19 Mar 02:14 from N (7 deg)
<b>Prevailing Direction for Month:</b> NW
<b>Surface</b>
<b>Total Rainfall:</b> 115.8 mm / 4.56 in
<b>Total Snowfall:</b> 29 cm / 11.3 in
<b>Greatest Depth at Snow Stake:</b> 10 cm / 3.9 in
<b>Sea Ice Observation:</b> All month there were more than 20 icebergs in the Palmer area.
<b>Average Sea Surface Temperature:</b> -0.21 °C / 31.6 °F

The following two plots show the month's average temperature and wind speed plotted against the historical average (where the historical average goes back to November 30, 2001). March was colder than average like other months this summer season. The daily average temperature was below the historical average for 20 days. The last half of March was quite windy. From the 15<sup>th</sup> to the 31<sup>st</sup> there were 11 days with a new maximum wind speed.



**B-022-P: COLLABORATIVE RESEARCH: THE CHEMICAL ECOLOGY OF SHALLOW-WATER MARINE MACROALGAE AND INVERTEBRATES ON THE ANTARCTIC PENINSULA**

Dr. Charles Amsler and Dr. Jim McClintock, University of Alabama Birmingham; Dr. Bill Baker, University of South Florida, Principle Investigators

Personnel on Station: Bill Baker, Charles Amsler, Maggie Amsler, Ryan Young, and Emily Olson

B-022 has been occupied with sample collections and chemical and biological analysis of collected specimens. Much of March provided good weather for scuba diving operations, allowing us to conduct nearly 100 person-dives, from 1 Mar through 7 Apr. Those dives achieved our sampling goals, with 18 distinct sites yielding our targeted macroalgae, *Plocamium cartilagineum*. At those sites, we quantitatively sampled the macroalgae, and most of the sites also yielded bulk samples of the alga. Quantitative samples were subject to amphipod enumeration and will undergo further chemical and genetic analysis at USF and UAB, respectively. Bulk algal samples will be returned to USF for chemical extraction and secondary metabolite isolation, in support of next year's field season. The Palmer GC was used to develop methods for chemotyping algal samples, also in support of next year's field goals. Please note that Emily Olsen joined B-022 at the conclusion of C-019's field season, to replace Charles Amsler when he unexpectedly redeployed on LMG16-02 NB.

We are grateful for the generous and professional assistance of numerous ASC staff in assisting our set-up activities. Carolyn Lipke, Gabby Inglis, Mark Dalberth, Dave Moore, and Jennie Mowatt deserve special thanks for facilitating our efforts.

**B-256-P: COLLABORATIVE RESEARCH: WINTER SURVIVAL MECHANISMS AND ADAPTIVE GENETIC VARIATION IN AN ANTARCTIC INSECT**

Dr. Richard E. Lee, Jr. and Dr. David L. Denlinger, Principal Investigators, Miami University, Oxford, Ohio and Ohio State University, Columbus, Ohio.

Personnel on station: J.D. Gantz and Drew Spacht

Field collections of midge larvae continued this month on numerous islands and peninsulas. We now have an extensive collection of larvae from different microhabitats within several islands as well as samples from most of the nearby islands. These samples will provide a robust data set for our studies of population structure and gene flow between islands, and adaptive genetic variation in diverse larval microhabitats. We also have preliminary results indicating that there are physiological differences between larvae from distinct microhabitats on different islands. These results suggest that individual populations are under different selective pressures because of their diverse microhabitats, which results in different physiological acclimation or genetic adaptation.

At the beginning of February, our team launched a new educational outreach website called "A

Fly on the Pole” ( [www.aflyonthepole.com](http://www.aflyonthepole.com)). This website features an interactive blog, photo and video galleries, and a variety of educational resources for K-12 teachers. The website continues to be updated by the educator on our team (Natalie).

We are grateful to station personnel for their continued support and helpfulness during our first field season on this project. Everyone here has been tremendous in supporting our needs. We also thank Logan Pallin and Erin Pickett for providing transportation to Halfway and Dream Islands.



Mushrooms, found on Cormorant Island. Photo by J.D. Gantz

### **C-013-P: PALMER LONG TERM ECOLOGICAL RESEARCH (LTER): LOOKING BACK IN TIME THROUGH MARINE ECOSYSTEM SPACE, APEX PREDATOR COMPONENT**

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

Personnel on Station: Ben Cook, Shawn Farry, Bill Fraser, and Carrie McAtee

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 as well as obtaining chick fledging weights.

Brown skua work also concluded this month with nest monitoring and growth measurements ending with the fledgling of our last study chick. Our south polar skua study on Shortcut Island continued through March with intensive chick monitoring, growth measurements, banding and sample collections.

Giant petrel chick banding on all local islands was completed this month while our intensive chick growth measurement study on Humble Island continued.

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 had been very low this season, however increased sharply in late March with observations of numerous humpback whales along with a few sightings of minke and killer whales.

Sediment trap contents were collected from Adélie colonies on Torgersen, gentoo colonies on Biscoe Island and chinstrap colonies on Dream Island. These Palmer area sediment trap samples as well as Avian Island samples were all processed for otoliths this month. Limpet trap contents were also collected from kelp gull colonies on four local islands. Project gear and supplies were cleaned, inventoried and crated in preparation for shipment north.

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 Carolyn Lipke for providing great support all season, Resident Marine Technicians Dave Moore and Jennie Mowatt for keeping us on the water, and to Chuck Kimball for all the help with the Humble Island telemetry equipment.

### **C-019-P: PALMER LONG TERM ECOLOGICAL RESEARCH (LTER): LOOKING BACK IN TIME THROUGH MARINE ECOSYSTEM SPACE, PHYTOPLANKTON COMPONENT**

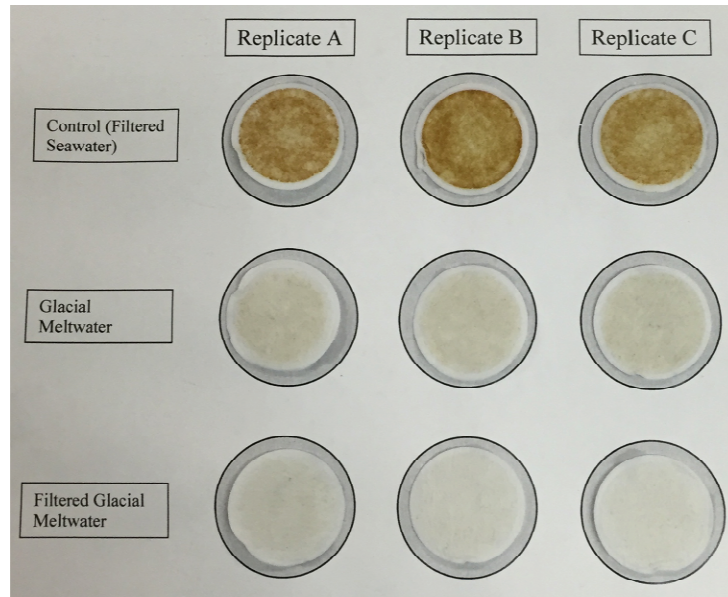
Dr. Oscar Schofield, Principal Investigator, Rutgers University, Institute for Marine and Coastal Sciences

Personnel on Station: Mike Brown and Emily Olson

Sadly this is our final report for the season, but we are looking forward to returning to Palmer later this year. We have had a very productive and successful season. We would like to thank all of those who made this possible, including all of the helpful Palmer staff, and the amazing LMG crew. See you all soon!

**LTER DATA:** Our final few weeks at Palmer were a success, as we were able to continue our station B and E sampling essentially twice a week, even given the unpredictable and stormy March weather.

**MELTWATER EXPERIMENT:** This month Mike was again able to wrap up another run of his incubation experiment, which consists of adding glacial meltwater to whole seawater in the attempt to initiate a change in phytoplankton community composition. Below are the filters for the final experiment day. As with the first run, you'll notice nice consistency within treatments, and differences between them. Lab work back at Rutgers will help determine to what extent the treatments differ, and what might have prompted those differences.



**GLIDER RETRIEVAL:** We retrieved our final glider, RU26d, after more than a month-long deployment. Many thanks to the Birders and Whalers for their help in the recovery, and ensuring this mission came to a successful close.

**C-024-P: PALMER LONG TERM ECOLOGICAL RESEARCH (LTER): LOOKING BACK IN TIME THROUGH MARINE ECOSYSTEM SPACE, WHALE COMPONENT**  
Dr. Ari Friedlaender, Principal Investigator, Oregon State University, Newport, OR

Personnel on Station: Logan Pallin and Erin Pickett

We've had a productive month continuing our two primary data collection modes for our project: humpback whale photo-id/biopsy sampling and krill surveys using the Simrad EK-60 echosounder system. We finished up our krill surveys mid-month and subsequently completed a final calibration of each of our echosounders. We conducted a total of 39 active acoustic surveys this season.

In continuing our daily surveys for whales this month we spent a total of 16 hours on the water. Due to poor weather (winds exceeding 20 knots) we were unable to be on the water for 13 out of 31 days in March. Despite this, we had a successful month collecting biopsy samples and re-sighting individuals. We collected biopsy samples from 22 animals, bringing our total as of April 1<sup>st</sup> to 48 samples. We are particularly happy to be collecting samples into the fall to add to our database. Up until this year we've had a relatively low sample size of fall samples compared to those collected in the summer. These data will provide us with a better idea of population demographics across seasons. In addition to an increase in humpbacks this month, we observed a single minke whale on three separate occasions.

Finally, we both contributed to and benefitted from collaborative assistance with other LTER projects operating at Palmer; the collaboration between and among the projects was evident and

helpful. Many of the whales we collected biopsy samples from this month were found in the extended boating area and we are grateful for the birders' assistance and patience in working with us so that we'd have a second boat in the area.

**C-045-P: PALMER, ANTARCTICA LONG-TERM ECOLOGICAL RESEARCH (LTER): CLIMATE MIGRATION, ECOSYSTEM RESPONSE AND TELECONNECTIONS IN AN ICE-DOMINATED ENVIRONMENT: MICROBIAL / BIOGEOCHEMICAL COMPONENT**

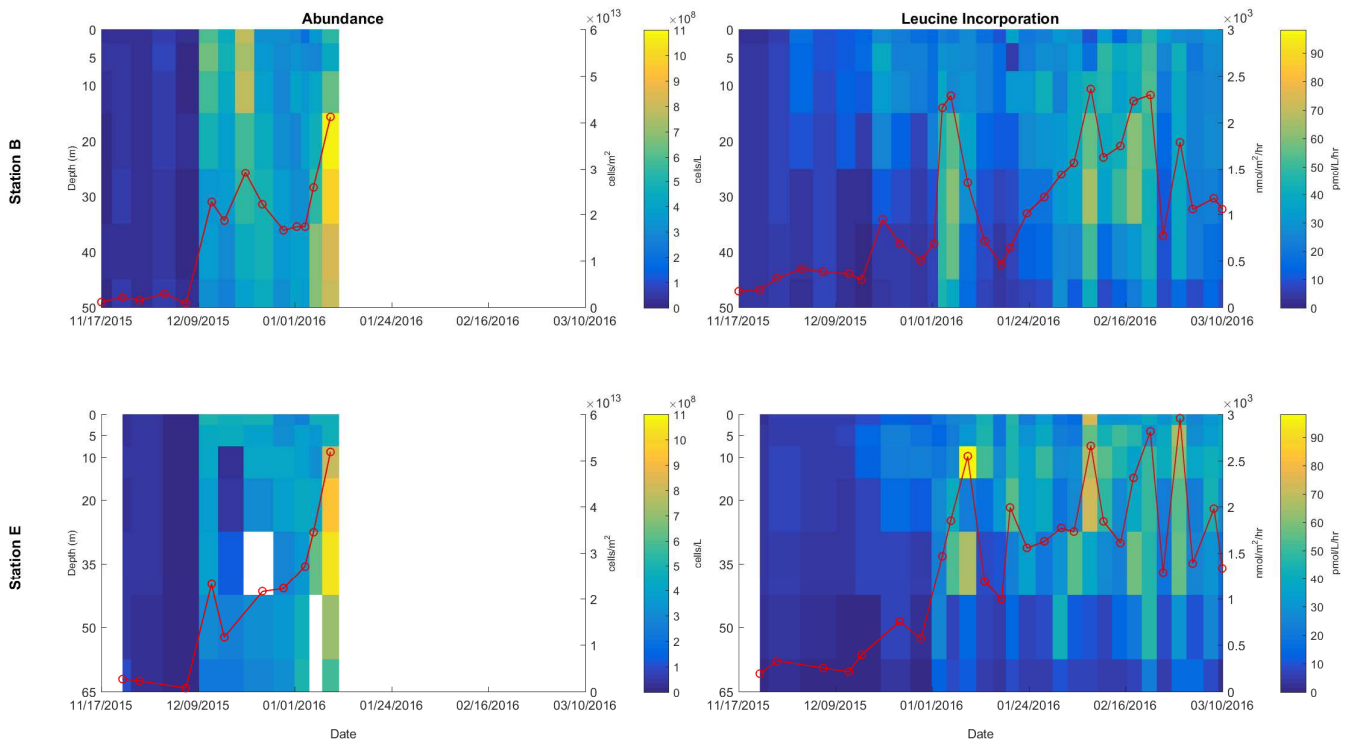
Dr. Hugh Ducklow, Principal Investigator, Columbia University, Lamont Doherty Earth Observatory

Personnel on Station: Rachel Kaplan and Conor Sullivan

March was a short month for C-045-P due to our scheduled departure on March 18. However, we were still able to complete four sampling days, three with the <sup>3</sup>H-Leucine assay we use to quantify bacterial production. We also took part in two outreach video teleconferences with New Jersey schools through LTER Outreach at Rutgers University. We fielded excellent questions from elementary, middle, and high school students, and were impressed by the level of engagement we saw. All in all, this was another excellent field season for C-045, from the opportunity to sample from the sea ice around Palmer Station in November, to the exciting and unusual sea ice conditions found during the LTER Cruise in January-February, to continued sampling at Palmer LTER stations B and E. As always, we want to thank the hard work and dedication of all the Palmer Station contractors, without which our work would be impossible.

See Figure 1 for final bacterial abundance and <sup>3</sup>H-Leucine incorporation data from Palmer LTER stations B and E.





**Figure 1:** Bacterial abundance and production (3H-Leucine incorporation) at PAL LTER stations B and E. The red line shows depth-integrated values at each sampling date (right vertical axis). The colored blocks show values at each discrete depth and sampling date (the intersection of depth and date for a given measurement falls within its corresponding block). White blocks signify missing data.

### **W-488-P: OBSERVING THE SNOWY SHEATHBILL AND ITS BEHAVIOR**

Ms. Susan McCarthy, Principle Investigator, San Francisco, CA; Ms. Terri Nelson, Collaborator, Portland, OR

Personnel on Station: Susan McCarthy and Terri Nelson

Our project has ended successfully. We've been able to make significant observations of sheathbill behavior, and will transmit video recordings to the Cornell Lab of Ornithology. The team has also taken reference photographs for artwork depicting sheathbills, in addition to field sketching and watercolor painting.

In the US we'll work with publishers to turn these observations (and our preliminary drafts) into the final published products.

If weather permits (which currently seems unlikely), we'll also stop briefly on the way north to visit Port Lockroy, a location where sheathbills did successfully produce chicks this year, and where there are still sheathbills nesting in a penguin colony. This would enable us to see

fledglings with their parents, and perhaps to see where sheathbills place their nests within a colony. This valuable opportunity was made a possibility with the strong support of Palmer Station personnel and NSF personnel, including Bob Farrell, Carolyn Lipke, Tim McGovern, and Peter West.

Our project has gotten such excellent support during our entire stay that we could enumerate the entire population here. We'd like to particularly mention Bill Fraser, Michiel Gitzels, Carrie McAtee, Jeff Otten, Tyler Regan, and Sarah Swan.

**PALMER STATION  
RESEARCH ASSOCIATE MONTHLY REPORT  
MARCH 2016**

Mark Dalberth

**B-005-P: IMPACTS OF LOCAL OCEANOGRAPHIC PROCESSES ON ADELIE  
PENGUIN FORAGING OVER PALMER DEEP: COASTAL OCEAN DYNAMICS  
APPLICATIONS RADAR (CODAR)**

Josh Kohut, Principal Investigator, Rutgers University

The CODAR system consists of three transmitters/receivers located on Anvers Island, Wauwerman Island and on Howard Island in the Joubins. The data from all three transmitters is compiled on computers in Terra Lab and plots of the surface currents over the Palmer Deep are generated.

The CODAR site on the Wauwermans is sending meteorological data, but not files called 'radial' files. The grantee has been asked about this and whether or not it is a problem for their data archiving.

**G-090-P: GLOBAL SEISMOGRAPH NETWORK (GSN) SITE AT PALMER STATION.  
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.

**A-109-P: ANTARCTIC EXTREMELY LOW FREQUENCY/VERY LOW FREQUENCY (ELF/VLF) OBSERVATIONS OF LIGHTNING AND LIGHTNING-INDUCED ELECTRON PRECIPITATION (LEP).**

Robert Moore, Principal Investigator, University of Florida

ELF/VLF radio wave observations at Palmer Station are used to provide a deeper understanding of lightning and its effects on the Earth's inner radiation belt. The Research Associate operates and maintains on-site equipment for the project.

The VLF/ELF system has operated well throughout the month. On one of my visits to the ELF dome, I had to lean two rocks against the lower part of the door. I think that the wind was vibrating the door which was loosening the screws.

**O-202-P: ANTARCTIC METEOROLOGICAL RESEARCH CENTER (AMRC) SATELLITE DATA INGESTOR.**

Mathew Lazzara, Principal Investigator, University of Wisconsin

The AMRC computer processes satellite telemetry received by the Palmer Station TeraScan system, extracting Automated Weather Station information and low-resolution infrared imagery and sending the results to AMRC headquarters in Madison, WI. The Research Associate operates and maintains on-site equipment for the project.

The data ingestor computer system has been operating normally all month.

**O-231-P: QUANTIFYING ATMOSPHERIC IRON PROPERTIES OVER THE WESTERN ANTARCTIC PENINSULA**

Yuan Gao, Principal Investigator, Rutgers University

The primary goal of this project is to quantify atmospheric iron properties in the marine atmospheric boundary layer of the Western Antarctic Peninsula (WAP). The specific objectives are to identify the sources of atmospheric iron; determine iron solubility, aerosol composition, and the iron-sulfur relationships; and to measure the temporal and spatial variability of atmospheric iron/dust fluxes.

I covered the samplers when the Gould was at the pier and when the incinerator was operating. I collected samples two times in March. Depending on the amount of precipitation there might not be enough clean sample bottles to last until the grantee visits Palmer in April. I supplied precipitation information from the rain bucket in the backyard.

**O-264-P: A STUDY OF ATMOSPHERIC OXYGEN VARIABILITY IN RELATION TO ANNUAL DECADAL VARIATIONS IN TERRESTRIAL AND MARINE ECOSYSTEMS.**

Ralph Keeling, Principal Investigator, Scripps Institution of Oceanography

The goal of this project is to resolve seasonal and interannual variations in atmospheric O<sub>2</sub> (detected through changes in O<sub>2</sub>/N<sub>2</sub> 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<sub>2</sub> 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.

I took the group's air samples this month. It was quite windy so it was easy to find a day with favorable conditions. We installed an antenna for the remote weather stations near the Scripps air sampling mast in February. They had agreed that it was alright to install it there, but I sent them a picture of the "as-installed" antenna. They said that it was fine.

**O-264-P: COLLECTION OF ATMOSPHERIC AIR FOR THE NOAA/GMD WORLDWIDE FLASK SAMPLING NETWORK**

Don Neff and Steve Montzka, Principal Investigators, National Oceanic and Atmospheric Administration / Global Monitoring Division; Boulder, CO

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 (N<sub>2</sub>O) and halogen containing compounds. The Research Associate collects weekly air samples for the CCGG group and fortnightly samples for the HATS group.

Samples were collected this month. I asked the grantee at the end of the month about a spare pumping suitcase. They said that they are working on having two different samplers- one for Carbon Cycle and one for Halocarbons and Atmospheric Trace Species. This started a discussion of possible contamination that the HATS group has been seeing in their samples. I suggested that we just replace the air sampling tube, and they agreed at the end of the month that this should happen.

**O-264-P: ULTRAVIOLET (UV) SPECTRAL IRRADIANCE MONITORING NETWORK**

James Butler, Principal Investigator, National Oceanic and Atmospheric Administration / Global Monitoring Division; Boulder, CO

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.

This month I needed to perform a calibration using three standard lamps. Usually the calibrations use only one lamp. During this process, we discovered that the shutter in the system was sometimes sticking open. I worked with the grantee to troubleshoot this problem. I was able to complete the three lamp calibration, but the procedure might need to be changed to accommodate the sticky shutter or the shutter might need to be replaced. The grantee is monitoring the situation and assessing the options.

### **O-283-P: ANTARCTIC AUTOMATIC WEATHER STATIONS (AWS).**

Mathew Lazzara, Principal Investigator, University of Wisconsin

AWS transmissions from Bonaparte Point are monitored using the TeraScan system and the University of Wisconsin's Data Ingestor system. Data collected from this station is freely available from the University of Wisconsin's Antarctic Meteorological Research Center (AMRC) website. The Research Associate monitors data transmissions for the project and performs quarterly maintenance on the station at Bonaparte Point.

The system operated normally throughout the month.

### **T-295-P: GPS CONTINUOUSLY OPERATING REFERENCE STATION.**

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 operated well throughout the month.

### **T-312-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.

The Terascan system worked well throughout the month. The ORCAS project and Lamanna cruise ended so the increased network traffic we were seeing from the system stopped.

**A-357-P: EXTENDING THE SOUTH AMERICAN MERIDIONAL B-FIELD ARRAY (SAMBA) TO AURORAL LATITUDES IN ANTARCTICA**

Eftyhia Zesta, Principal Investigator, University of California Los Angeles

The three-axis fluxgate magnetometer is one in a chain of longitudinal, ground-based magnetometers extending down through South America and into Antarctica. The primary scientific goals are the study of ULF (Ultra Low Frequency) waves and the remote sensing of mass density in the inner magnetosphere during geomagnetically active periods. The Research Associate maintains the on-site system.

The magnetometer was operational all month and detected some magnetic storms from coronal mass ejections.

**A-373-P: TROPOSPHERE-IONOSPHERE COUPLING VIA ATMOSPHERIC GRAVITY WAVES**

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. I sent photos to the grantee showing them what the antenna mounting points and cable runs looked like once the snow was gone. The grantee replied and requested some changes. I made the changes and sent more photos.

**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 operated normally throughout the month. I performed a filter change, but I was a few days late. I put a large note on the outside of the machine to tell next year's RA that the filters will need to be changed in Feb 2017. I also made a reminder in Outlook.

## **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.

I made observations of the ice around station.

The tide gauge data logger stopped sending data for a couple of days because there was a break in the communication cable. I fixed that and also added labeling to many of the wires. I documented what I learned so that the next person working on the system will understand how it is wired.

## **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 twice each 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 (PalMOS) and emailed to the National Weather Service for entry into the Global Telecommunications System.

The backyard weather station, PAWS (Palmer Automatic Weather Station), stopped working for a couple of days at the beginning of the month due to a break in the power cable and another in the data cable. I fixed them both problems after a little troubleshooting. The breaks were the result of bad solder joints. The station electrician made a new mounting plate for a terminal strip in one of the power junction boxes. While PAWS was offline, I was able to substitute the data from the remote weather station that is bound for the Rosenthals. We currently have it set up on the tower on Gamage Point.

The remote weather station on Howard Island in the Joubins went down for a few days. It came back online when the battery had been charged. There might have been snow and ice on the solar panel preventing it from charging effectively. The battery voltage is not logged by the software, so it was difficult to determine what was happening. It would be great if we had this capability.

The Wauwermans weather station also went offline sporadically. Mesotech, the manufacturer of the system, says that the station was re-booting itself. At present, we don't understand why this intermittent problem is happening.