

# PALMER STATION MONTHLY SCIENCE REPORT

JANUARY 2016



**Fatbody of the Antarctic midge, *Belgica antarctica*. The fatbody is analogous to the human liver.**  
*Image Credit: Drew Spacht (B-256-P)*

## NEWS FROM THE LAB

Carolyn Lipke, Summer Laboratory Supervisor

January finally started feeling like real summer here at Palmer Station. Another pod of five orcas was spotted in the eastern boating area, and humpback sightings increased (though we haven't seen as many around station as we have in recent years). There was an unexpected lightning sighting late on the night of Jan 2. Three flashes were seen within a cloud over Hermit Island. The sighting was witnessed by three station residents. Early in the month we had a port call with the ARSV *Laurence M. Gould* (LMG), as they set out for the annual LTER cruise. We welcomed the Lee (B-256-P) entomology and the Friedlaender (C-024-P) whale groups back to

Palmer Station. We also hosted two visiting Portuguese scientists who were working on Amsler Island for a few days. They are continuing the permafrost project started by Jim Bockheim from the University of WI (G-239-P) in 2012.

Visiting cruise ships and yachts have kept everyone busy this month. Some Palmer personnel got treated to a tour of the scenic Lemaire Channel while on board the *MS Zaandam*. As the snow finally melts off in earnest we are enjoying seeing the Antarctic hair grass and pearlwort green up, and getting a chance to peer at the moss, lichen, and interesting rocks in the backyard.

tiny green pearlwort  
clings to rock in a harsh place  
embracing summer

This month's science report challenge was to describe the work here at Palmer in haiku form. There are haikus from research groups and station staff throughout the report.

## JANUARY 2016 WEATHER

Mark Dalberth, Research Associate

January ice  
grease freezing between the brash  
coats harbor waters

low temperatures  
the ravines of drifted snow  
stripe the glacial till

the Station balanced  
on Gamage Point tips slowly  
between ice, snow, rain

|  |
|--|
| <b>Temperature</b>                               |
| <b>Average:</b> 0.8 °C / 33.5 °F                 |
| <b>Maximum:</b> 9.4 °C / 48.92 °F on 2 Jan 11:42 |
| <b>Minimum:</b> -4 °C / 24.8 °F on 12 Jan 02:54  |
| <b>Air Pressure</b>                              |
| <b>Average:</b> 984.9 mb                         |
| <b>Maximum:</b> 1001.2 mb on 31 Dec 22:02        |
| <b>Minimum:</b> 973.1 mb on 3 Jan 12:45          |
| <b>Wind</b>                                      |
| <b>Average:</b> 9.5 knots / 10.9 mph             |

|   |
|---|
| <b>Peak (5 Sec Gust):</b> 50 knots / 57 mph on 29 Jan 02:08 from NNE (16 deg)   |
| <b>Prevailing Direction for Month:</b> SW   |
| <b>Surface</b>  |
| <b>Total Rainfall:</b> 43.9 mm / 1.73 in  |
| <b>Total Snowfall:</b> 8 cm / 3.1 in  |
| <b>Greatest Depth at Snow Stake:</b> 84 cm / 32.8 in  |
| <b>Sea Ice Observation:</b> There have been >20 icebergs visible from station all month long. Brash has impeded boating throughout the month. |
| <b>Average Sea Surface Temperature:</b> 0.62 °C / 33.1 °F   |

**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: Richard Lee, David Denlinger, Natalie Ylizarde, J.D. Gantz, Drew Spacht

*Buggers' Quest*

the buggers are here  
Belgica midge genes beware  
we're coming for you

Survival of terrestrial polar organisms depends on a coordinated transition from feeding, growth and reproduction during short summers to an energy-conserving state coupled with enhanced resistance to environmental extremes during long, severe winters. Our recent work detailed molecular and physiological mechanisms that enable the midge, *Belgica antarctica*, to survive seasonal changes in temperature, dehydration and osmotic stress. Combined with our recent sequencing of the midge's genome, these data provide a firm foundation for our new project that focuses in three areas: 1) the role of aquaporin water channels during dehydration and freezing, 2) metabolic depression and survival during an extended winter dormancy, and 3) population structure, gene flow and adaptive genetic variation in diverse larval microhabitats.

The efficient support system at Palmer Station allowed us to begin field collections almost immediately upon our arrival. During our first collecting trip, we found both adults and larvae of the wingless midge, even though some previous collecting sites were inaccessible due to deep snow cover. Larvae were found in diverse terrestrial microhabitats ranging from moss beds to mats of terrestrial algae (*Prasiola crispa*) to guano-rich sites adjacent to penguin rookeries.



**Antarctic midge adult female. Photo by Drew Spacht.**

Our outreach efforts seek to connect the science activities of our team and other research projects on station with teachers and their students. Our website ([www.units.muohio.edu/cryolab/](http://www.units.muohio.edu/cryolab/)) at Miami University, provides K-12 classroom activities based on national and state standards. Natalie communicated via Skype with 200 students and staff at a high school using a combination of prerecorded video and real-time discussions. Children were able to ask questions during this live interactive session.

We are grateful to station personnel for their support and helpfulness during our first field season on this project. Carolyn Lipke, Gabby Inglis, Zee Evans and Adam Rivers provided efficient and prompt assistance that allowed us to quickly set-up our laboratory and begin research. Jennie Mowatt and Dave Moore ably supported our boating needs. Jeff Otten and Michiel Gitzels provided excellent assistance with computer set-up and a distance learning session.

**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, Carrie McAtee, Matthew Porter, and Darren Roberts

The arrival of Darren Roberts in early January briefly increased C-013 personnel at Palmer Station to six. However, on January 13<sup>th</sup> Carrie McAtee and Darren Roberts departed on the annual LTER cruise leaving four birders at Palmer Station for the remainder of January.

Calm weather conditions throughout most of January allowed boating field work on all but five days. Monitoring of Adélie, gentoo and chinstrap penguin breeding chronology continued this month with indicator colony counts as well as an all-colony chick census on local islands as well as on Dream and Biscoe Islands. Adélie chick measurements that typically occurred in conjunction with our LTER cruise team's measurements on Avian Island were delayed several days due to weather. Foraging ecology studies of Adélie and gentoo penguins continued this month with the deployment of presence/absence radio transmitters, satellite transmitters, and dive depth recorders. We also began diet sampling Adélie penguins on Torgersen Island and Gentoo penguins on Biscoe Island.

Skua work continued this month documenting hatches and monitoring chick growth of brown skuas on local islands as well as on Dream and Biscoe Islands and south polar skuas on Shortcut Island. Monitoring of the blue-eyed shag colony on Cormorant Island also continued this month. We also completed our local island giant petrel census and banding project that was initiated in December. Our annual Humble Island giant petrel study also began in January which closely records petrel chick survival and growth from hatching through fledging.

On January 5<sup>th</sup> we took advantage of a perfect weather day and made a trip to the Joubin Islands to conduct Adélie, gentoo and chinstrap penguin counts as well as a nesting giant petrel census. We also checked on the Joubins CODAR station and documented overwinter storm damage.

Monitoring of marine mammals continued in January with large numbers of crab-eater seals, however unlike last year, very few whales. Lab work continued this month dominated by penguin diet sample processing.

### **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, Nicole Couto, Chelsea Farischon, and Ashley Goncalves

Mike: here. Nicole: cruise.  
we continue to sample.  
soon: experiment.

We have had a productive and enjoyable January here at Palmer Station. At the beginning of the month we had a personnel change, with Mike Brown, a PhD student in the Schofield lab, replacing Nicole, who left station on the *ARSV Laurence M. Gould* to conduct research during the annual regional LTER cruise. This month we continued our weekly LTER sampling at

stations B and E, with the weather typically permitting us to reach our goal of two sampling events a week. We also started some new projects. Significant time was spent prepping for an experiment that Mike will be running at station. Additionally, we got our fleet of gliders ready for their impending deployment. To cap that off, we also got to participate in an ORCAS project overpass. All of these items are detailed below.

**LTER Data and Trends:**

At station E (Figure 1-3), the month began with a slight spike in chlorophyll concentrations (Figure 1) in the three shallowest depths (0m, 5m, 10m) with 20m surpassing every other depth by a large margin. This spike is closely linked to our CTD data (Figure 2) which shows a strong mixed layer from 0 to 20m in the temperature and density profile. Later in the month (Figure 3), we see a large increase in the mixing throughout the water column. Due to this event, there was an overall decrease in chlorophyll concentrations with the most notable decrease seen at 20m depth. Interestingly, 20m depth began the month as the chlorophyll maximum. At station B (Figure 4-6), the chlorophyll concentrations (Figure 4) have remained relatively constant. Our water column throughout the month has remained relatively stable with little mixing.

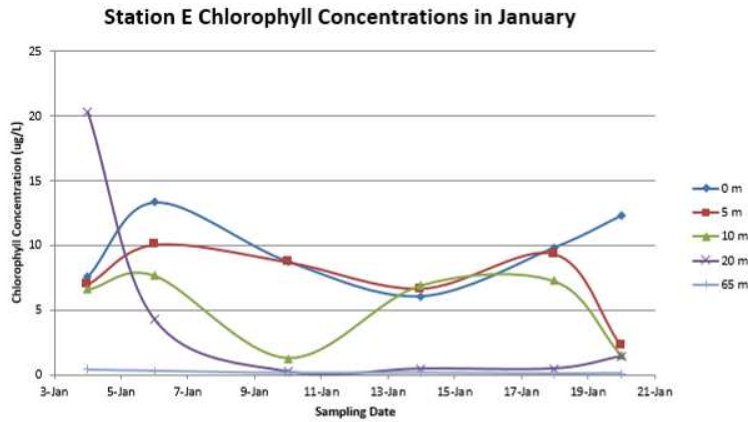


Figure 1

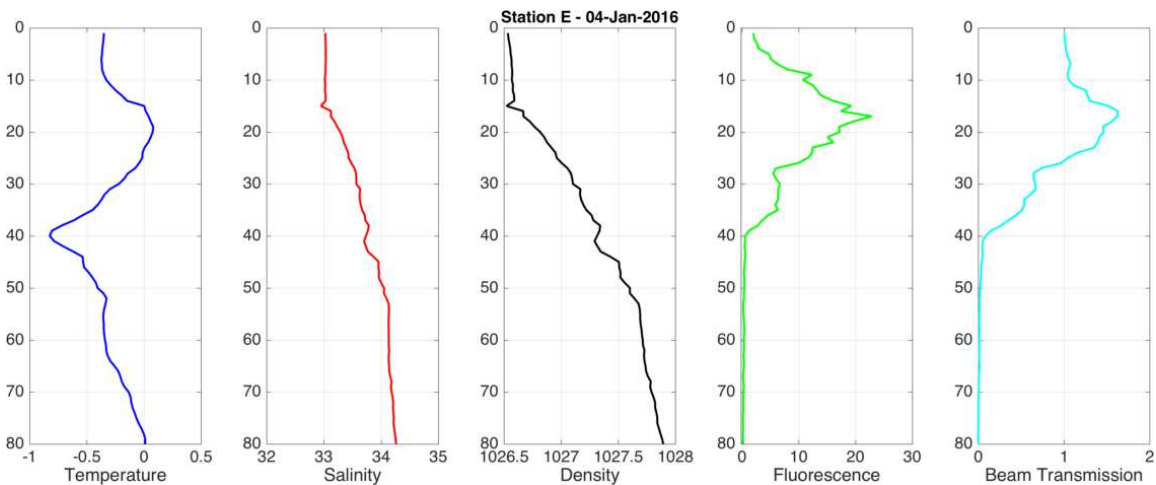


Figure 2

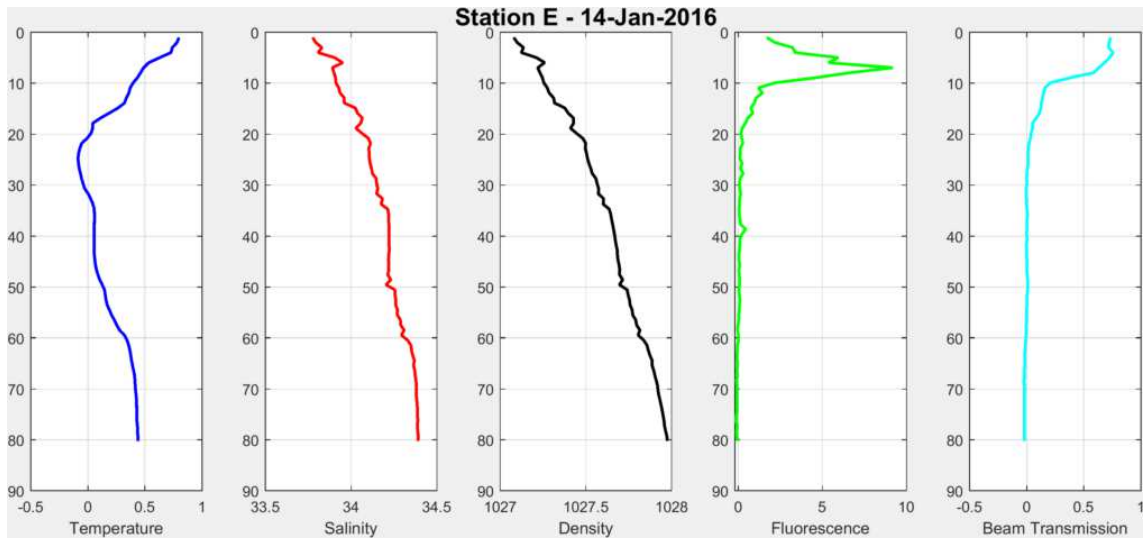


Figure 3

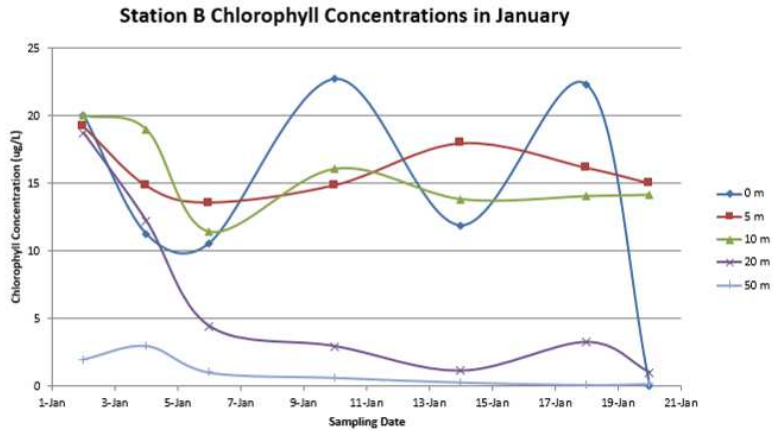


Figure 4

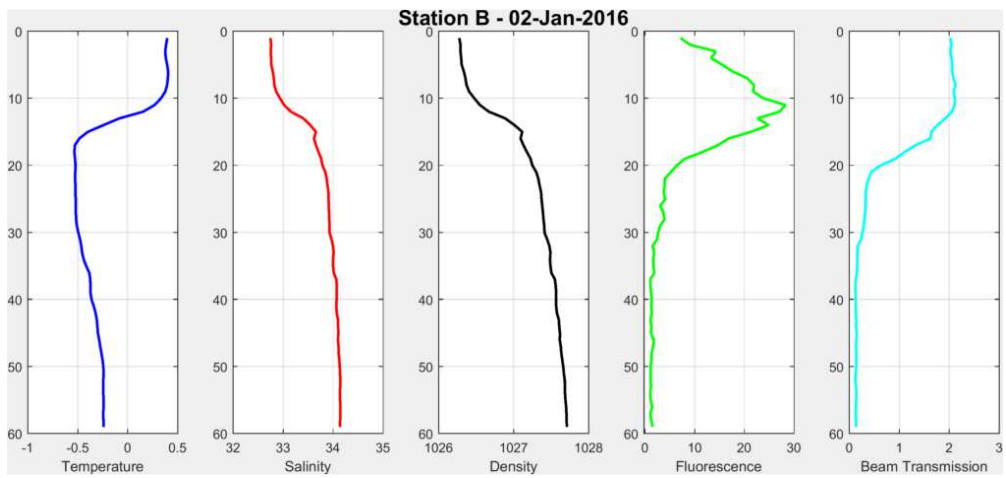


Figure 5

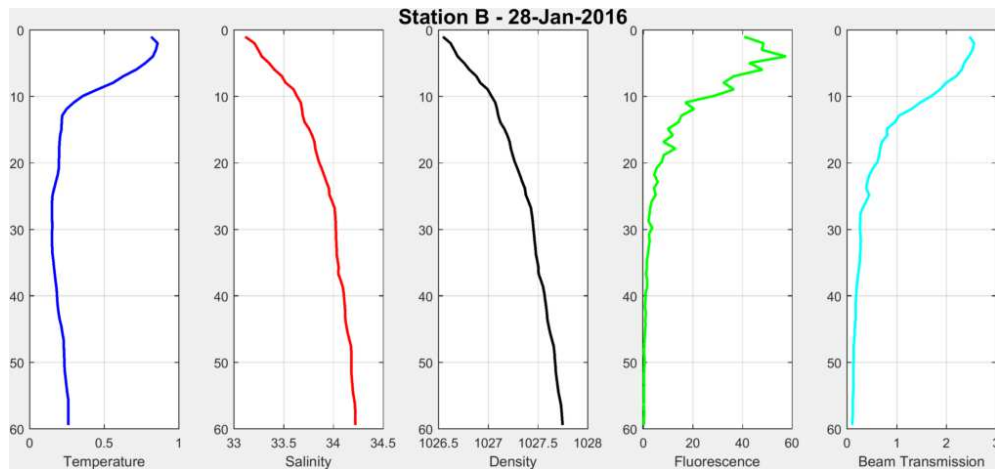


Figure 6

**Incubation Experiment:** For his PhD, one of Mike’s research interests is to what extent, and why, phytoplankton community composition is changing at Palmer and along the Western Antarctic Peninsula (WAP). Specifically, using a dataset collected by the Palmer LTER program, it has been demonstrated that cryptophytes, small flagellates, are an important component of the WAP phytoplankton community, along with the more recognized diatoms. Cryptophytes are often associated with cold and low salinity water, and therefore it is expected that they will increase in the WAP given projections of continued warming and sea and glacial ice melt contributions. This change in phytoplankton community composition could have important consequences for the WAP ecosystem. However, although the association between cryptophytes and low salinity water has been observed, a mechanistic link has not been identified. Much time this month has been spent preparing for an incubation experiment that will examine this issue. We will have updates in the February edition!

**Glider Deployment:** We have a fleet of three gliders here on station. Normally they are deployed in conjunction with start of the annual regional LTER cruise. However, the large amount of ice we have experienced this season prevented us from doing that safely. On the plus side, that allowed us to spend some time preparing the gliders for deployment. Specifically, we were able to calibrate a FIRE sensor on one of the gliders. FIRE stands for Fluorescence Induction and Relaxation, and will be used by Filipa Carvalho, another PhD student on the Schofield lab, to examine phytoplankton biomass and photophysiology along the WAP. The gliders are all ready to go, and will be deployed during the next available weather window to complement the data being collected during the ongoing annual regional LTER cruise. UPDATE: the gliders have been deployed!

**ORCAS Flyover:** Finally, this month we were presented with the unique opportunity to contribute to the [ORCAS](https://www.eol.ucar.edu/field_projects/orcas) ( [https://www.eol.ucar.edu/field\\_projects/orcas](https://www.eol.ucar.edu/field_projects/orcas) ) study during a flyover of the station. This study is focused on what controls the exchange of oxygen and carbon dioxide between the ocean and atmosphere in the Southern Ocean, and consists of airborne surveys between South America and Antarctica. Onboard the plane is a sensor that measures parameters that are similar to those we measure in the field. The flyover allowed us to collect an *in situ* dataset that will be used to calibrate and validate the sensor. It ended up being a beautiful day in the field, and we were happy to contribute to the study!

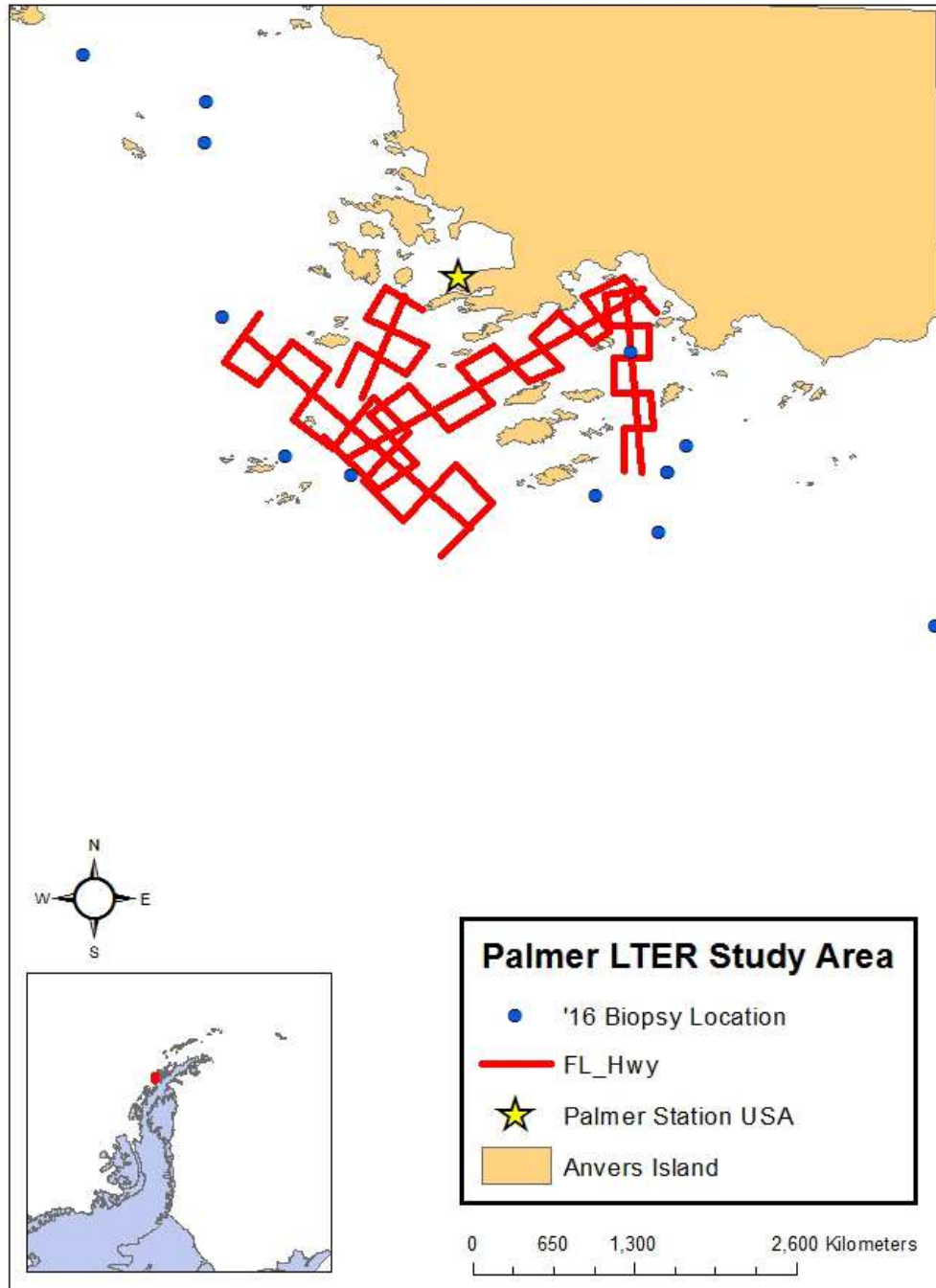


**C-024-P: PALMER LONG TERM ECOLOGICAL RESEARCH (LTER): LOOKING BACK IN TIME THROUGH MARINE ECOSYSTEM SPACE, WHALE COMPONENT**

Dr. Ari Friedlaender, Principal Investigator, Oregon State University, Newport, OR

Personnel on Station: Doug Nowacek and Logan Pallin

For the month of January, the ‘whalers’ stationed at Palmer as part of the LTER, project C-024, really got started in earnest on 14 January as Nowacek spent the first few days of the LTER cruise on board the LMG doing whale tagging and sampling with Friedlaender. After completing their boating training, Nowacek and Pallin, the 2016 C-024 contingent at Palmer Station, began the two primary data collection modes for the project: photo-id/biopsy sampling and krill surveys using the Simrad EK-60 echosounder system. We sampled several whales in the first 10 days of work, obtaining 13 biopsy samples and 12 fluke photos (Figure 1) for the online catalog of humpback whales that our group maintains. Throughout this 10 day period, we inter-mixed photo-id biopsy sampling with the krill echosounder surveys. From 24-31 January we did not find any whales within the confines of the boating area or the occasional trip to Biscoe Point or Dream Island, but we did conduct numerous echosounder surveys to document and measure the krill populations in the area. As of the end of January from Palmer Station, we had obtained 13 biopsy samples, and catalog quality identification photos for 13 whales; we also conducted 18 active acoustic surveys and 3 calibrations of the echosounders. 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.



**Figure 1. Map of the Palmer Station boating area and the lines (red) we have surveyed with the echosounders to measure krill distribution. Also, shown are the locations of biopsy samples taken (blue dots) from humpback whales.**



**Figure 2. Fluke photo-identification image taken during a sighting with a humpback whale in the Palmer boating area, we also collected a biopsy sample from this whale.**

**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: Ribanna Dittrich, Rachel Kaplan, and Conor Sullivan

in calm seas, blue skies  
we lower ocean sensors  
as old ice towers

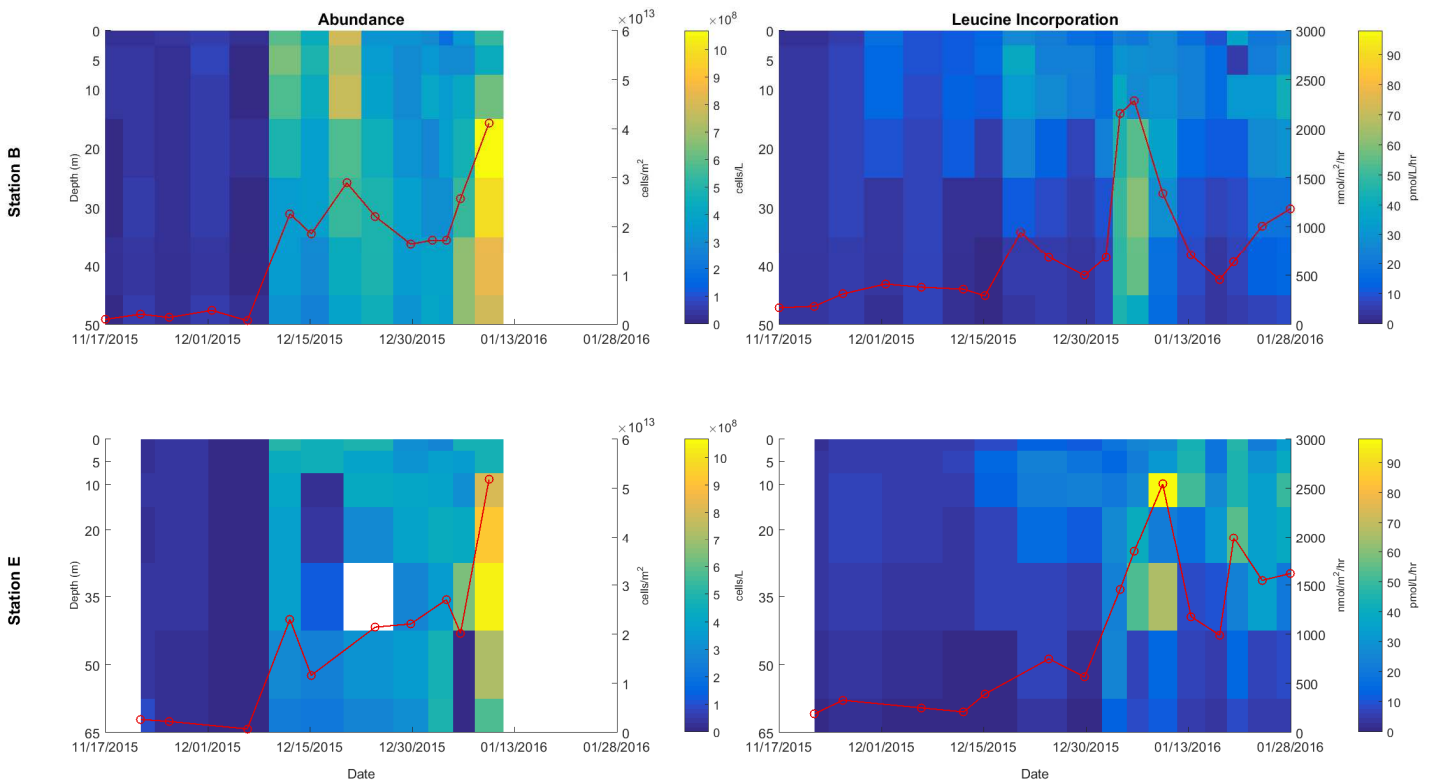
We rang in the New Year with a continuation of our biweekly sampling schedule and preparation for the 24<sup>th</sup> annual LTER cruise. On January 8<sup>th</sup>, the LMG arrived at Palmer for a short, busy, port call, during which we swapped supplies and personnel with the LMG Ducklow group: Ribanna Dittrich joined the ship, and Rachel Kaplan moved ashore to join the station team.

Generally calm weather this month has helped sampling days go smoothly, and we've enjoyed seeing how the many icebergs at stations B and E constantly rearrange themselves. On the 25<sup>th</sup> we did a special evening sampling timed with a flight gathering optical data for the ORCAS (O<sub>2</sub>/N<sub>2</sub> Ratio and CO<sub>2</sub> Airborne Southern Ocean) study. Figure 1 below shows Schofield and Ducklow field team members in action.



**Figure 1. Mike Brown (C-019-P) reads the PRR for deployment, and Conor Sullivan (C-045-P) prepares Go-Flo bottles before the ORCAS flyover.**

We observed a spike in bacterial production and abundance in the first week and a half of January (Fig. 2). Interestingly, this spike corresponded to higher production and abundance at depth compared to the top 10m of the water column. The spike observed in our data is also roughly contemporaneous with high levels of chlorophyll as measured by C-019-P. Unfortunately, our flow cytometer malfunctioned this month, forcing us to begin preserving samples on January 14, for subsequent analysis back at Lamont-Doherty.



**Figure 2. 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.**

## **O-231-P: QUANTIFYING ATMOSPHERIC IRON PROPERTIES OVER WEST ANTARCTIC PENINSULA**

Dr. Yuan Gao, Principle Investigator, Rutgers University

Personnel on Station: Yuan Gao and Shun Yu

Atmospheric sampling at Palmer backyard continue to operate during this month. In addition, snow samples were collected on the nearby glacier and around the station. Sample analyses in the lab have kept us extremely busy. Preliminary results we generated in the Palmer lab and from a test run at home are intriguing and promising, and we look forward to having more time focusing on data interpretation after this field season. During this month, however, we did face new challenges – gusting winds with rain happening at the same time caused some electronic problems with one of our samplers. Many thanks to Adam Rivers and Mark Dalberth for helping us with this problem!

## **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

high austral summer  
will small white birds have children?  
so keenly we watch

With the arrival of artist Terri Nelson, the sheathbill team is complete. Nelson has begun observing sheathbills, and making field sketches and watercolor paintings.

We have visited several areas that formerly served as sheathbill habitat, which no longer do so locally. These are Cormorant Island and Torgersen Island, where sheathbills at one time nested in the blue-eyed shag and Adélie penguin rookeries.

It's a time of great interest, as two of the three pairs on station seem on the point of hatching eggs. When one bird is on the nest, the other is out foraging. We've seen them interacting with other species (penguins, skuas, elephant seals). We've also observed and documented previously unnoted allogrooming behavior.

Locating sheathbills away from station continues unsuccessful, but the presence of the three pairs on station is extraordinarily productive.

## HAIKUS BY ASC STAFF

*Sea Ice Travel, by Sarah Swan*

i am on the ice  
i hear it creaking cracking  
does it also hear me?

*Lab Supervisor, by Carolyn Lipke*

clean, organize, swipe  
these are my days, but always  
a penguin outside

*Waste, by Nandor Kovats*

the chicken bucket  
burns like a bright orange sunrise  
o'er our waste kingdom

*Instrument Technician, by Gabby Inglis*

gear breaks in the lab  
the culprits: science, bad luck  
and salty water

*Galley, by Sarah Swan*

coffee with just cream  
i drink you to wake me up  
it has yet to work

work six days a week  
slice, dice, mince, chop, cook, bake, wash  
Sunday I will rest

**PALMER STATION  
RESEARCH ASSOCIATE MONTHLY REPORT  
JANUARY 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.

After the scheduled power outage on January 29, one of the system's control computers needed to be rebooted even though it never lost power. It had lost contact with Rutgers University. Once it restarted, it immediately regained contact.

**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 system operated normally this month.

**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-264-P: A STUDY OF ATMOSPHERIC OXYGEN VARIABILITY IN RELATION TO ANNUAL TO DECADEAL 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.

Air samples were taken on schedule this month.

**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 on schedule for both CCGG and HATS this month. The HATS sample flasks that the grantee shipped to Palmer were mistakenly sent to South Pole, and we received South Pole's HATS flasks on LMG16-01SB. The grantee has shipped a set of flasks to Port Hueneme to be sent to Punta Arenas on Comair. Also, I worked with Logistics to get the flasks at the Pole shipped to us. As of this writing, they are in Christchurch. I only have one set of HATS flasks left in Terra Lab, so I won't miss any sampling weeks if the flasks get here on the LMG16-02SB.

**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.

The system lost wavelength registration during a “regular wavelength scan”. This is run just before the absolute scans which are taken every two weeks. During the regular wavelength scan, I noticed that the system was not properly communicating to the Hewlett-Packard power supply. Its fuse had blown, and the fuse holder itself was damaged by high temperature. The grantee worked with me to correct the wavelength problem, and I also installed the back-up power supply.

### **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 although it continues to have erroneous temperature readings.

### **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 normally.

### **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 system has been operating well and its data has been used to support the ORCAS flights and will be used to support the Lamanna (G-182-N) cruise on the NBP.

**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 is operational again after the new Beaglebone computer was installed.

**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 normally this month. After the power outage, the morning network usage increased. This is similar to the problem we had last month where the operating system was getting updates every morning. The grantees are looking into it.

**B-466-P: FLUORESCENCE INDUCTION AND RELAXATION (FIRE) FAST REPETITION RATE FLUOROMETRY (FRRF)**

Deneb Karentz, Joe Grzyski, Co-Principal Investigators, University of San Francisco

The focus of this project is to identify and evaluate changes that occur in genomic expression and physiology of phytoplankton during the transition from winter to spring, i.e., cellular responses to increasing light and temperature. A Fast Repetition Rate Fluorometer (FRRF) with a FIRE (Fluorescence Induction and Relaxation) sensor is installed in the Palmer Aquarium. The Research Associate downloads data and cleans the instrument on a weekly basis.

The instrument has been sent back for repair.

**T-998-P: INTERNATIONAL MONITORING STATION (IMS) FOR THE COMPREHENSIVE NUCLEAR TEST BAN TREATY ORG. (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.

## **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.

Daily observations of the ice around station were made.

The tide gauge data logger was not functioning from January 30 to 31. I got it working again on February 1. After consulting with the manufacturer, I removed folders from the data storage card on the logger and it started working.

I sent ocean color images to the LMG every 2-3 days.

## **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 weather station in the backyard that went on line in September 2015 has been named Palmer Automatic Weather Station (PAWS). Previously, we had been referring to it as "new PalMOS" or "backyard PalMOS". By giving it a new name, we eliminate all confusion about what weather station is being referred to.

I've eliminated bad data points from the temperature data that are in the weather data base. For the bad temperature data, I also removed dew point since it's calculated from air temperature. I've kept track of the data that was eliminated to inform people who are interested in archived data. Before I adjusted the data, a search for the maximum temperature over the last 15 years gave a result > 80 F (27 C). Now, it's 52.9 F (11.6 C).

This season, grantees and station personnel have been using a forecast that is created through a collaboration between the Byrd Polar Research Center at Ohio State University and the National Center for Atmospheric Research. It's called the Antarctic Mesoscale Prediction System. I've written a script that will download the Palmer forecasts and send them to an email list. I've gotten positive feedback from grantees about this since it makes obtaining the forecasts more convenient.