PALMER STATION MONTHLY SCIENCE REPORT

DECEMBER 2016

***Belgica antarctica* larvae displaying varying degrees of melanization.** *Image Credit: JD Gantz*

NEWS FROM THE LAB

Randy Jones, Summer Laboratory Supervisor

From the arrival of the ARSV *Laurence M. Gould* at the start of the month (LMG16-12) to preparations for the start of the LTER cruise (LMG17-01) at the end, it has been a busy time. The laboratories at Palmer Station have been alive with science and the Zodiacs have been out plying the waters of the boating area. Both the Countway (B-028-P) and the Lee (B-256-P) groups arrived on LMG16-12 in early December with completed experimental setups and field sampling occurring by the middle of the month. Colin Harris and Katharina Lorenz (ERA) completed a highly successful visit during the LMG16-12 port call. They visited many of the surrounding islands to assess whether policies in the Antarctic Conservation Act plan remain effective, and began drafting updates based upon their observations of ASMA and ASPA areas. Their visit included an overnight trip by the ARSV *Gould* to the Rosenthal Islands, where they visited representative islands in the chain.

DECEMBER 2016 WEATHER
Liz Widen, Research Associate

Palmer Monthly Met summary for December, 2016

Temperature
Average: 0.9 °C / 33.6 °F
Maximum: 6.4 °C / 43.52 °F on 18 Dec 12:24
Minimum: -3.4 °C / 25.88 °F on 16 Dec 08:20
Air Pressure
Average: 988.3 mb
Maximum: 997.7 mb on 13 Dec 11:38
Minimum: 968.6 mb on 17 Dec 03:38
Wind
Average: 4.8 knots / 5.5 mph
Peak (5 Sec Gust): 45 knots / 52 mph on 5 Dec 08:56 from N (5 deg)
Prevailing Direction for Month: ESE
Surface
Total Rainfall: 5.8 mm / 0.23 in
Total Snowfall: 1 cm / 0.4 in
Greatest Depth at Snow Stake: 47 cm / 18.3 in
WMO Sea Ice Observation: Sea ice present in concentrations less than 3/10, very open pack ice with more than 20 bergs, with growlers and bergy bits.
Average Sea Surface Temperature: 0.07 °C / 32.1 °F

The following two plots (Figs. 1 and 2) show the month's average temperature and wind speed plotted against the historical average (where the historical average goes back to November 30, 2001). Overall, temperatures and wind speeds were close average for most of the month, but there were a couple above average days that matched their historical max. Both Arthur Harbor and Hero Inlet have had brief periods of sea ice when winds were prevailing from the southwest, but they have been clear of ice for the majority of the month.

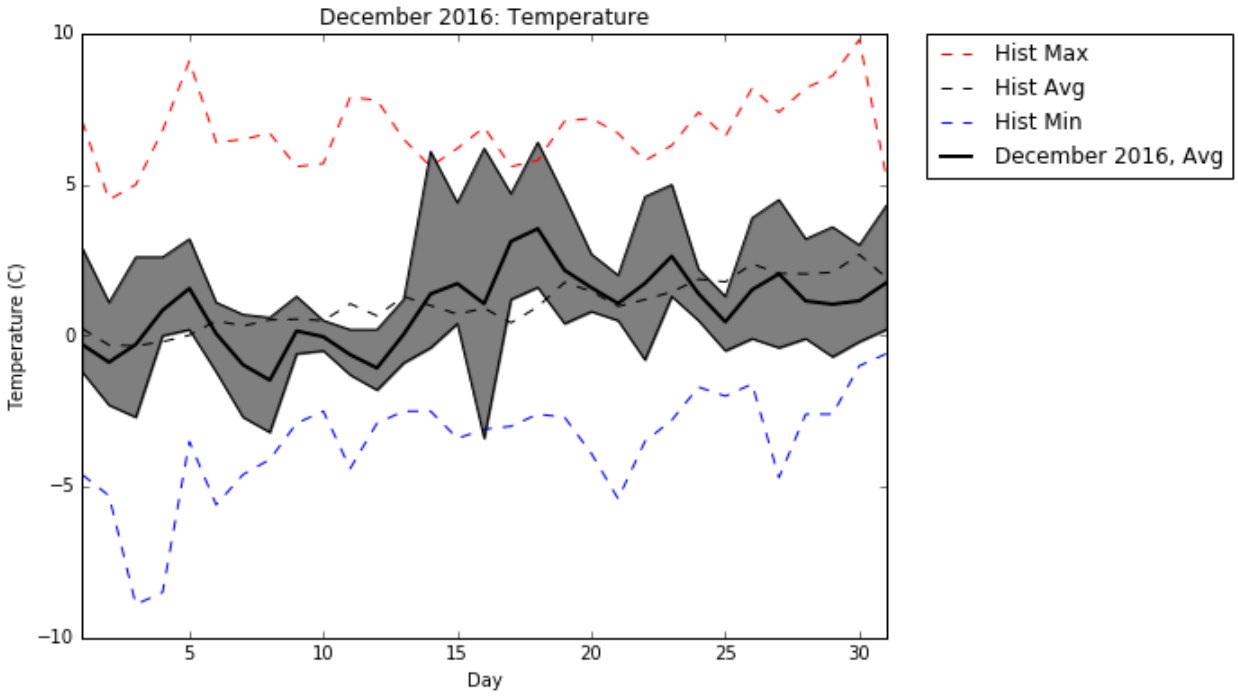


Fig. 1 – Plot of daily temperature in December 2016. Shown in black/shaded gray are the daily average, the minimum, and the maximum for this year. The dotted lines on the graph indicate average, minimum, and maximum values for "historical values" for 2002 to 2016. (We thank Liz Widen for providing this data and the figure.)

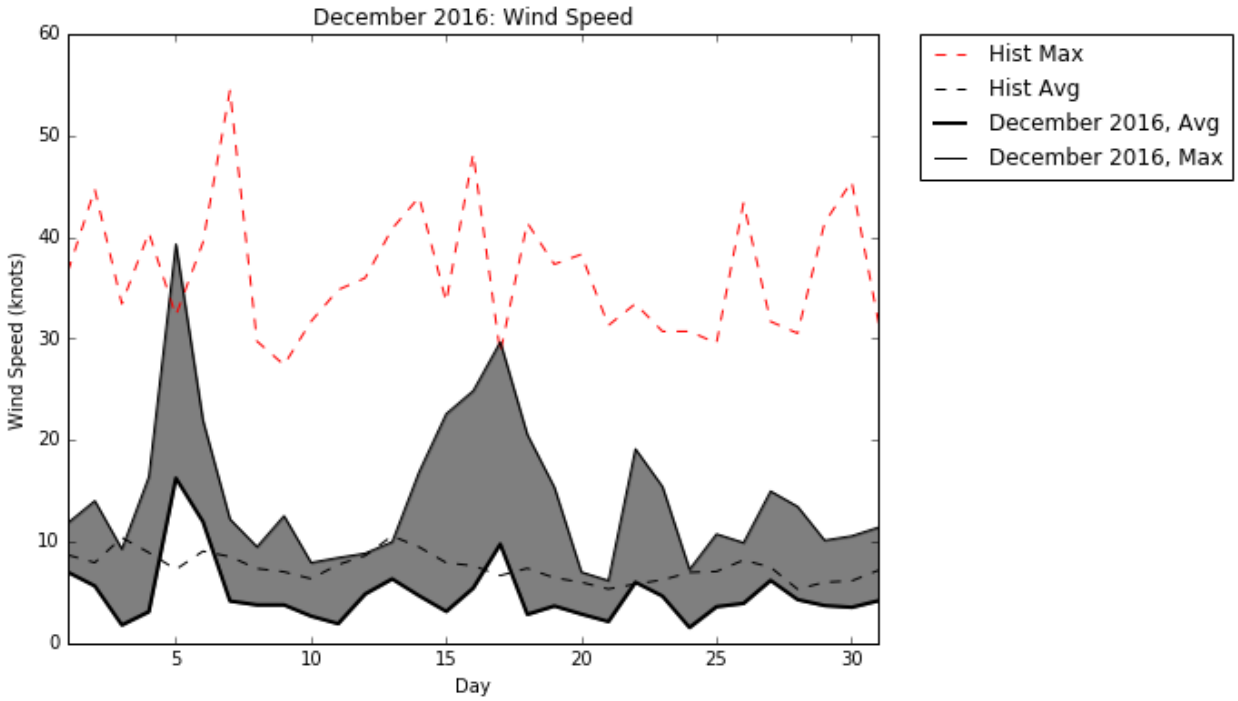


Fig. 2 – Plot of daily wind speed in December 2016. The daily averages are shown in black with grey shading indicating gusts. The dotted lines on the graph indicate average and maximum values for "historical values" for 2002 to 2016. (We thank Liz Widen for providing this data and the figure.)

B-028-P: ANTARCTIC MICROBIAL NETWORKS AND DMSP: LINKING DIVERSITY, BIOGEOCHEMISTRY, AND FUNCTIONAL GENE EXPRESSION

Dr. Peter D. Countway and Dr. Patricia A. Matrai, Principal Investigators, Bigelow Laboratory for Ocean Sciences, East Boothbay, Maine

Personnel on Station: Peter Countway, Patricia Matrai, Carlton Rauschenberg, and Kathryn Moore

Arrival and Setup of the 'Antarctic Ecostat'

The Bigelow Laboratory research team arrived at Palmer Station on Wednesday, Dec. 7th, and we immediately began unpacking and setting up our equipment. The centerpiece of our experimental platform, the 'Antarctic Ecostat' (Fig. 3), is a continuous-cultivation system designed to maintain incubated seawater samples (12 x 4L each) at ambient temperatures and light levels, with gentle rocking. The rocking motion prevents sinking of cells to the bottom of incubation vessels, provides mixing of the plankton community with continuously-supplied seawater medium, and simulates water motion due to tides and currents. Indoor components of the Ecostat include environmental controls, seawater medium supply, and peristaltic pumps. The Ecostat system was designed to circulate water in a closed-loop between an indoor-based environmental control unit and the outdoor-based incubation chamber. Initial testing indicated that the chiller was able to maintain the Ecostat at approximately 2°C, however during our testing the seawater passing through the evaporator side of the chilling unit froze – causing the PVC housing around the evaporator coil to fracture. As a result of this equipment breakdown, we had to rely upon the seawater supply from the Aquarium Lab to cool the Ecostat incubation chamber in a flow-through setup. FMC staff at Palmer Station were key in helping us set-up the Ecostat.

Fig. 3 – The Antarctic Ecostat at Palmer

Sampling at Station 'E' for the first Ecostat Experiment

We conducted several practice deployments of the ECO-Rosette and the PRR-800 on the Landing Craft at the mouth of Arthur Harbor prior to sampling at Station 'E'. These short trips familiarized our group with the use of the Palmer Station sampling and overboard deployment equipment and helped to establish best practices for our group. Our first large-scale sampling was conducted at Station 'E' on December 20th and included 1) a light profile to 30 m with the Biospherical PRR-800, 2) multiple casts with the ECO-Rosette sampler to collect incubation water at 5 m, and 3) a 20 µm plankton tow from ~5 m. Water sampling entailed the collection of ~170 liters of seawater via eight casts of the ECO-Rosette. Seawater was transported back to Palmer Station for processing and experimental setup.

Plankton tows conducted in Arthur Harbor and from Station 'E' in mid-December indicated the presence of numerous large diatoms including *Corethron*, *Thalassiosira*, and *Coscinodiscus* (among others; Fig 4). After several days in the Percival incubator – colonies of colonial *Phaeocystis* became visible. It is likely that the *Phaeocystis* was already present as single cells, or smaller colonies possibly stuck to other cells and therefore not easily visible. Many of the

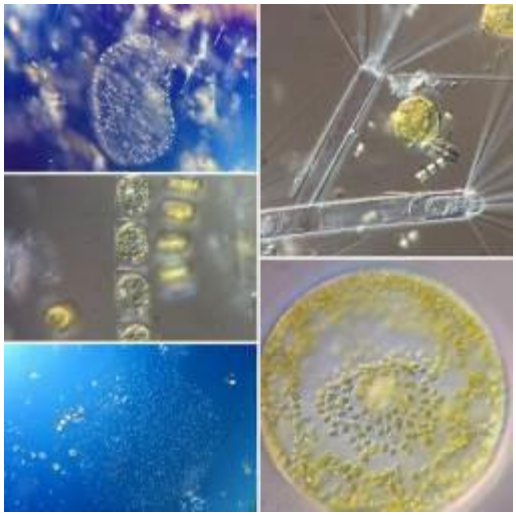


Fig. 4 – Phytoplankton from Arthur Harbor including diatoms and colonial *Phaeocystis*.

phytoplankton species we observed can produce the compatible solute DMSP and are likely responsible for the high values of DMS that we have already observed in our samples.

Ecostat Experiment #1 – Biogeochemistry and 'Omics
We completed the first Ecostat experiment on December 28th. The experimental, continuous-mode bottles were monitored on a daily basis to determine when a community steady state was achieved. The outflow of these bottles was sampled daily for *in vivo* fluorescence, chlorophyll, and DNA/RNA. Large-scale sampling efforts for biogenic sulfur compounds, microbial abundance, chlorophyll, fluorescence, bacterial productivity, DOC, DNA/RNA, and large-volume 'omics were restricted to T-zero, T-mid, and T-final time-points due to volume considerations.

The response to the different dilution rates was evident in our chlorophyll data and will allow us to test hypotheses about the effects of the supply rates of specific growth substrates (e.g., DMSP and inorganic nutrients) in controlling the structure of Antarctic microbial communities. We are ready for our next experiment!

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

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. This season, we aim to examine the effects that different microhabitats have on the genetics, ecology, and physiology of our midges. The locations we find *B. antarctica* vary widely in temperature, snow cover, solar radiation, wind, and vegetation due to their positioning on the islands and the degree of use by other animals. Additionally, because these midges are not very mobile, we think that gene flow among populations is uncommon. We also have preliminary results indicating that there are physiological differences between larvae from distinct microhabitats on different islands. Thus, we have been collecting larvae from many locations around station and setting up experiments to determine what effects these habitat differences might have.

We are grateful to station personnel for their support and helpfulness during our first field season on this project. Randy Jones and Carly Quisenberry provided efficient and prompt assistance that allowed us to quickly set-up our laboratory and begin research. Michael Tepper-Rasmussen and

Rosemary McGuire ably supported our boating needs. Jeff Otten and Michiel Gitzels provided excellent assistance with computer set-up.

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: Shawn Farry, Ben Cook, Carrie McAtee, Darren Roberts

Weather and ice conditions in the Palmer Station area were near perfect during December allowing boating and field work for 25 days this month. We continued the daily monitoring of nesting Adélie penguins on Humble and Torgersen Islands as well as maintaining regular censuses of all local Adélie colonies. We also completed weekly trips to Dream Island to conduct Adélie and Chinstrap penguin counts and to Biscoe Island for Adélie and Gentoo penguin counts.

A peak egg census was completed during December for Chinstrap penguins on Dream Island and for Gentoo penguins on Biscoe Island. Preparations for the Humble Island Adélie penguin radio transmitter project continued; equipment was installed on Humble Island and remote data collection and transfer was tested. We also prepared for the deployment of satellite transmitters and dive depth recorders on Adélie and Gentoo penguins, which will begin in early January.

In addition to our local penguin work, with the support of the ARSV *Laurence M. Gould*, we were able access the Rosenthal Islands on the southwestern side of Anvers Island to conduct counts of nesting Chinstrap, Adélie, and Gentoo penguins. Closer to home, excellent weather also allowed access to the Joubin Islands to conduct penguin and giant petrel counts.

Skua work continued this month as we began checking nests for newly hatched brown skua chicks on local islands, as well as on Dream and Biscoe Islands. Our south polar skua mark-recapture and breeding monitoring study on Shortcut Island continued with nest initiation checks and band recording. Our census of the blue-eyed shag colony on Cormorant Island continued with the first chicks of the season observed in early December. A gull survey was completed at all local kelp gull colonies as well as on Dream Island.

Our all-island census of giant petrel nests was started in December; breeding pairs were identified and new breeders were banded. Foraging ecology studies of giant petrels were also conducted in December with satellite transmitter deployments at Kristie Cove and Shortcut Island.

C-019-P: PALMER, ANTARCTICA LONG TERM ECOLOGICAL RESEARCH (LTER): LAND-SHELF-OCEAN CONNECTIVITY, ECOSYSTEM RESILIENCE, AND TRANSFORMATION IN A SEA-ICE INFLUENCES PELAGIC ECOSYSTEM, PHYTOPLANKTON COMPONENT

Dr. Oscar Schofield, Principal Investigator, Rutgers University, Institute for Earth, Ocean, and Atmospheric Sciences, Department of Marine and Coastal Sciences

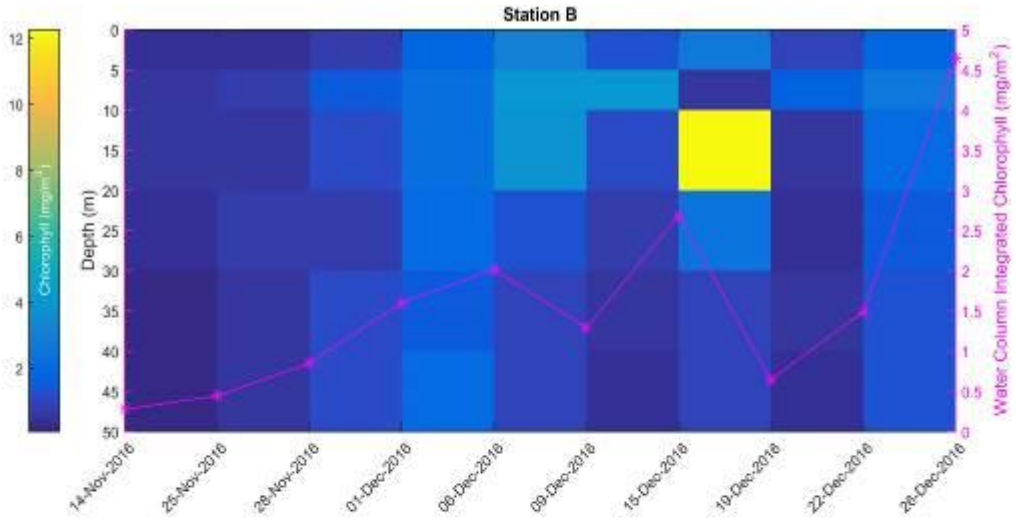
Personnel on Station: Nicole Waite, Mike Brown, and Colette Feehan

We welcomed Dr. Colette Feehan to the group at the beginning of December. Colette is a postdoctoral fellow in the Department of Marine and Coastal Sciences at Rutgers University and will be working with us for the remainder of the season at Palmer Station on the LTER.

This month was a busy month for us. The ice lingered at the start of the month, but then moved out allowing us to get out on the water for sampling – a total of eight days this month. We sampled at Station B on all eight of those days and at Station E on six of the eight days.

Phytoplankton has remained low throughout December with chlorophyll concentrations relatively similar at Stations B and E. Chlorophyll remained relatively low, with some increases and decreases occurring throughout the month (Fig. 5). Slight increases on Dec 6th occurred following a two-week period of little to no ice in the area. However, as ice moved back after that, a slight decline in chlorophyll concentrations was observed. Concentrations are beginning to increase again as we reach the end of the month, following a period of ice-free waters. The very high chlorophyll concentrations observed at Station B on December 15th are intriguing as this was a day that the area was covered with a lot of brash ice. Primary production mimicked chlorophyll concentrations (Fig. 6).

A)



B)

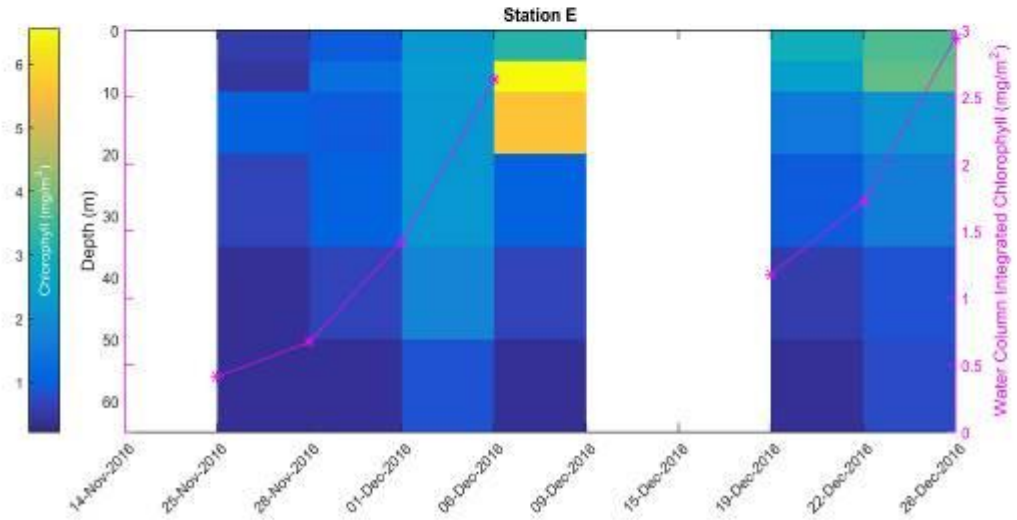
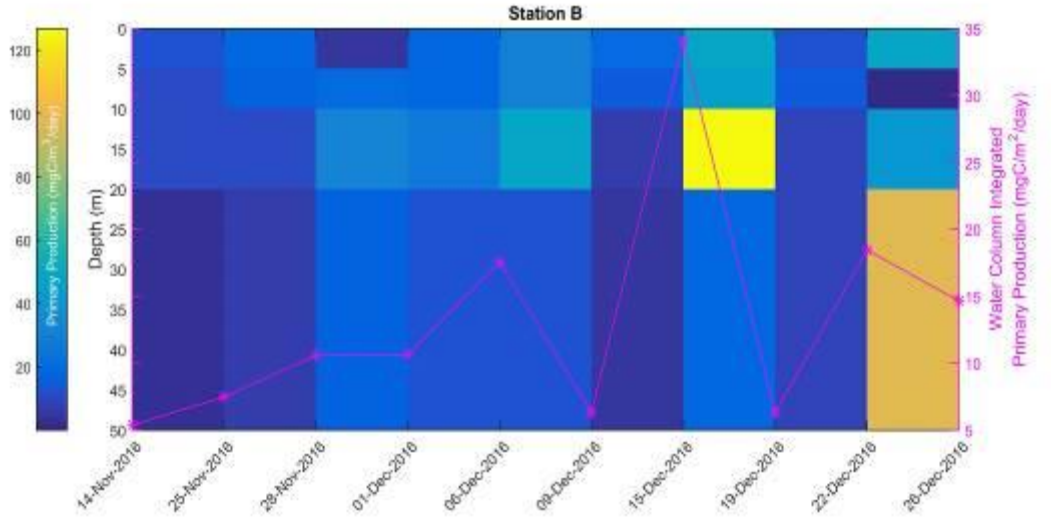


Fig. 5 – Chlorophyll (in mg m^{-3}) at Stations B (A) and Station E (B) throughout the water column for the period from Nov 14, 2016 through Dec 26, 2016 are shown using a color bar. Water-column integrated chlorophyll concentrations (mg m^{-2}) are shown as a pink line.

A)



B)

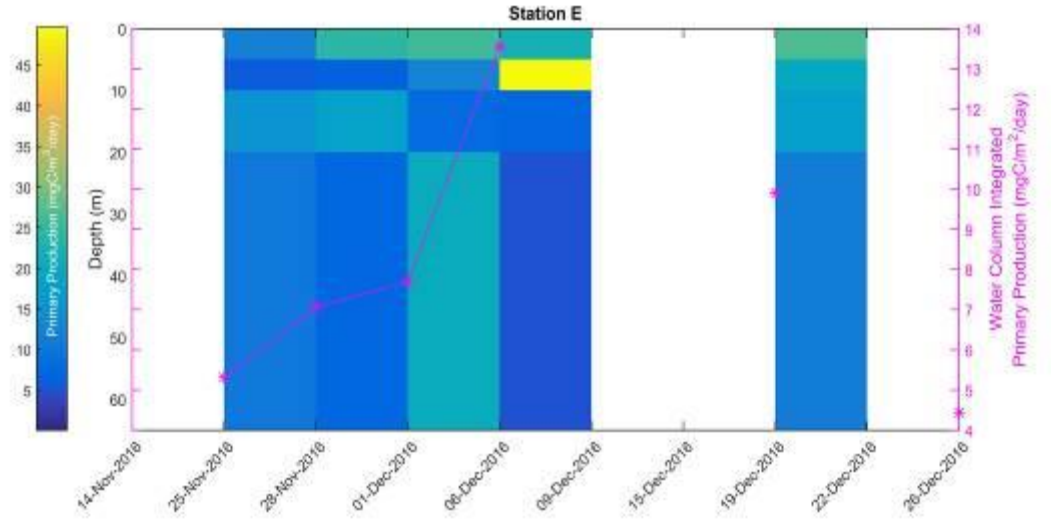


Fig. 6 – Primary Production (mg C m^{-3} day^{-1}) at Stations B (A) and Station E (B) throughout the water column from Nov 14, 2016 through Dec 26, 2016 are shown using a color bar. Water-column integrated chlorophyll concentrations (mg C m^{-2} day^{-1}) are shown as a pink line.

Mike Brown has continued his work incorporating DNA/RNA and size-fractionated chlorophyll and HPLC measurements into the routine LTER sampling. Below is a figure showing size-fractionated chlorophyll at Stations B and E for the past few weeks (Fig. 7). As you can see, the phytoplankton community has been primarily dominated by smaller cells, less than 20 µm. As the typical seasonal bloom progresses, we are beginning to see larger cells increase in relative abundance.

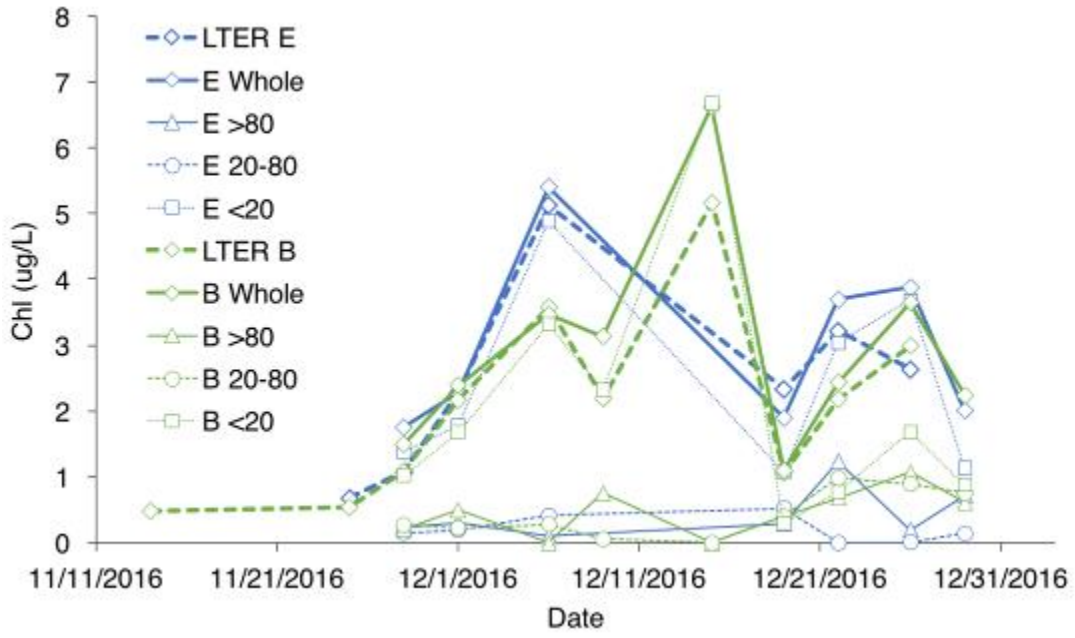


Fig. 7 – Size-fractionated chlorophyll (µg L^{-1}) at Station B and E at 0-10 m depth showing a trend of increased relative abundance of large diatoms beginning in late December.

Mike also has been working to incorporate routine microscopy into the LTER sampling, which should allow for the unambiguous determination of phytoplankton community composition. Below are two representative images from a Station B sample on December 29, 2016 showing large diatoms among many smaller cells (Fig. 8). Finally, in the coming week Mike will begin an incubation experiment to examine the impact of glacial meltwater on phytoplankton community composition. More on that in next month's report!

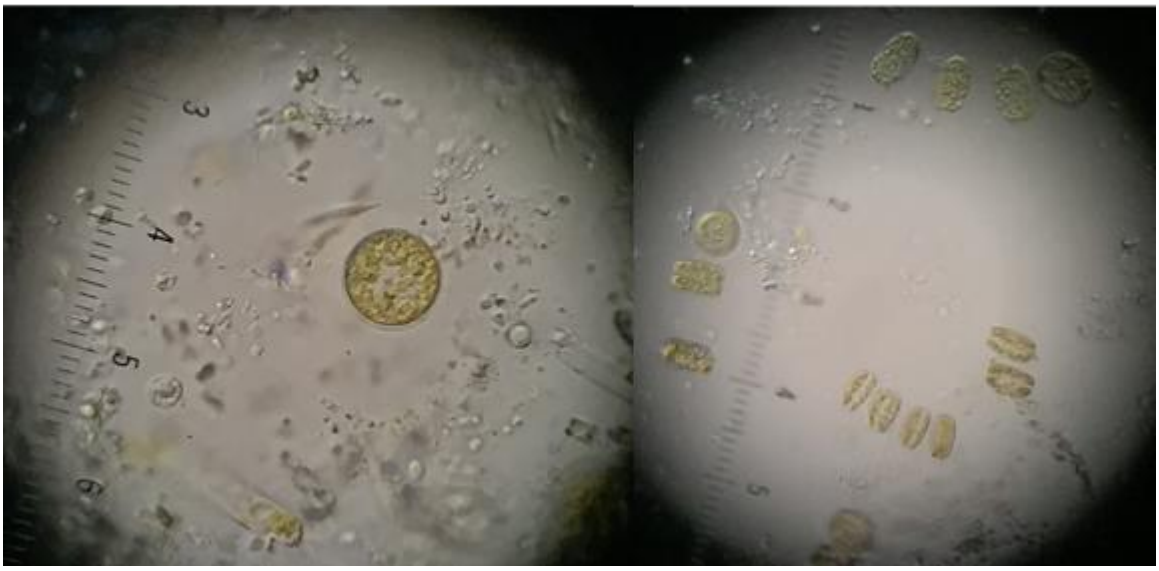


Fig. 8 – Differential interference contrast (DIC) microscopy showing large diatoms amongst smaller cells at Station B on December 29, 2016.

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: Adrian Jaycox, Leigh West

Following our first field days last month, December has brought much more cooperative ice and wind conditions for our sampling efforts, allowing us to continuously collect data from Stations B and E. We've begun observing trends in our bacterial data, with bacterial production fluctuating throughout December, but generally trending upward (Fig. 9).

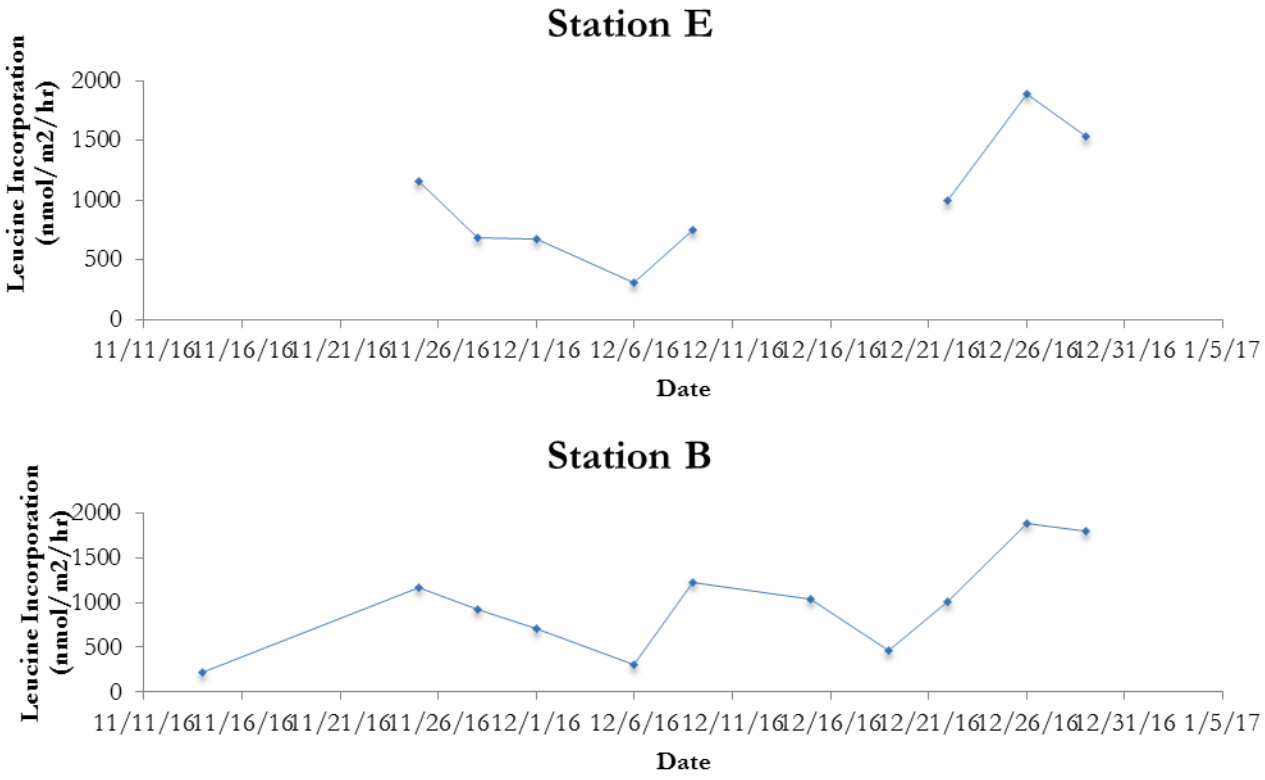
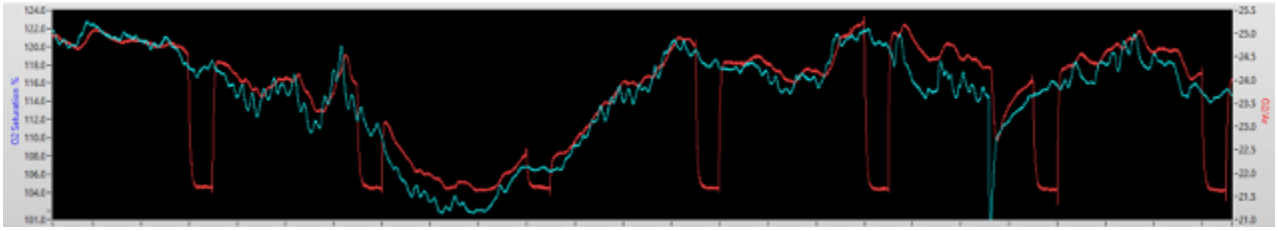


Fig. 9 – Bacterial production, measured by leucine incorporation (nmol m^{-2} hr^{-1}) at Stations B and E measured between November 14st, 2016 and December 29th, 2016.

Unfortunately, some of our instruments have been less cooperative than the weather. Our flow cytometer began giving unreliable readings midway through the month, and we have been unable to determine the source of the problem so far. We have preserving our samples for later analysis, and will continue to do so throughout the month of January when the LTER cruise takes the instrument on board the ARSV *Laurence M. Gould*.

Additionally, at the end of the month, our equilibrator inlet mass spectrometer (EIMS) also malfunctioned, meaning we had to shut down the instrument until team members on the LTER cruise arrived to help us repair it. Thankfully, we collected some interesting data while the EIMS was functioning properly (Fig. 10). We've seen mainly net autotrophic waters, meaning that the water contains many primary producers, such as phytoplankton (Figure 10A). However, we have also observed net heterotrophy, meaning that there are more organisms undergoing cellular respiration than photosynthesis, such as zooplankton (Figure 10B).

A.



B.

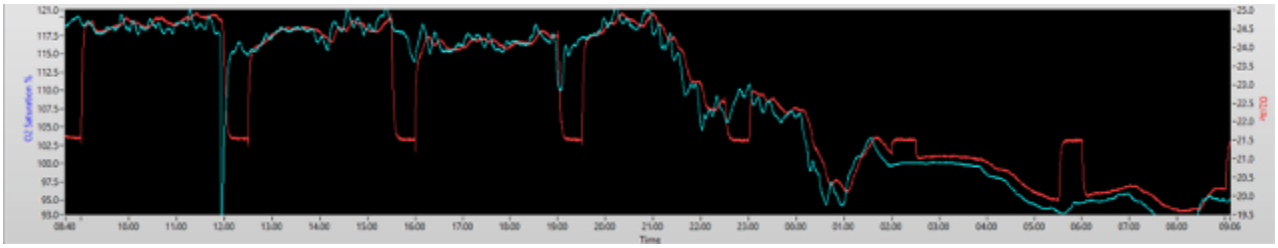


Fig. 10 – Graphs depicting the oxygen/argon ratio in the water near Palmer Station. The sporadic horizontal, flat red lines depict air calibrations and the data in between represents the gasses in the water. When the oxygen/argon ratio is higher in the water than the air (A), the water is net autotropic. When the oxygen/argon ratio is higher in the air than the water, the water is net heterotrphic (B).

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

Dr. Yuan Gao, Principal Investigator, Rutgers University, Department of Earth and Environmental Sciences

Personnel on Station: Isatis Cintron Rodriguez, Yuan Gao

Atmospheric sampling at the Palmer Station backyard platform continues to operate well in December. On one occasion earlier this month, it snowed sufficiently enough for us to get another set of fresh snow samples collected! Later in the month, more aerosol particle sampling was added to the existing sampling network. Although the ambient temperature has gradually increased as the austral summer has progressed, the high temperature inside the enclosure (a concern of ours) that holds all of our electronic devices including three powerful pumps that generate a lot of heat stayed below 90°F and that has been great! Apparently the newly-installed fan on the enclosure is efficient enough to ventilate the heat generated inside the enclosure - Thanks to Bill Burns for setting up this powerful fan! Thanks also to Carly Quisenberry and Randy Jones for setting up temperature loggers inside the enclosure that helped better monitor the heat situation. The temperature inside the enclosure is a critically important matter for maintaining normal operation of the major instruments on the platform. From now on, we would expect a smooth sailing of the operation toward the end of the season. During this month, the PI gave a science talk and discussed major operating instruments on the platform and some new

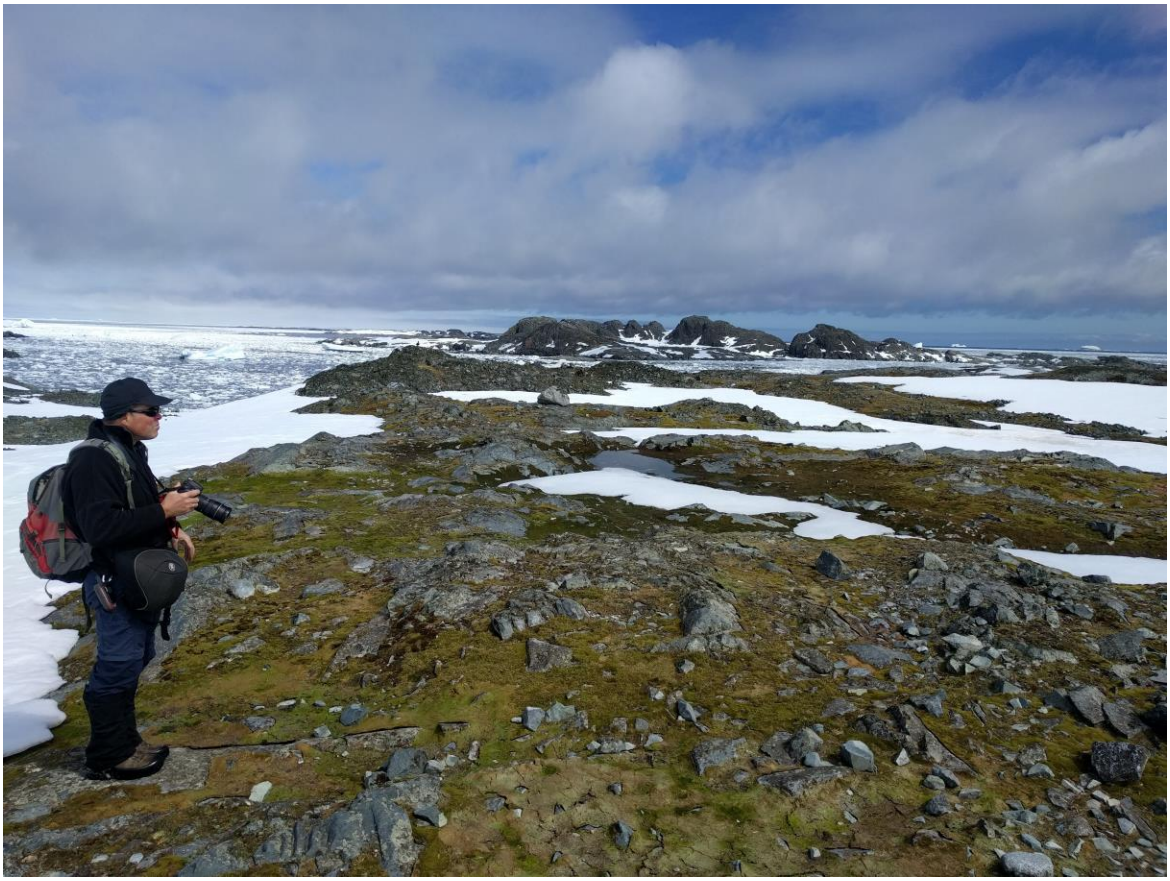
aerosol data; more data generated from Palmer backyard will be presented at the ASLO 2017 Aquatic Sciences Meeting in Hawaii in Feb 2017.

PALMER STATION
RESEARCH ASSOCIATE MONTHLY REPORT
December 2016
Liz Widen

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 system operated normally throughout the month.



Colin Harris (ERA) surveys vegetation on Litchfield Island. *Image Credit: Randy Jones*

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.

A-119-P: DEVELOPMENT OF ANTARCTIC GRAVITY WAVE IMAGER.
Michael Taylor, Principal Investigator, Utah State University

The Gravity Wave Imager takes images of the night sky in the near infrared, observing the dynamics of the upper atmosphere. The camera takes one 20-s exposure image every 30 seconds of a very faint emission originating from a layer located at ~55 miles of altitude.

The system has finished operation for the winter season; system is off for the summer.

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 sends 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 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_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.

Arthur Harbor with Amsler and Torgeson Islands in the background. *Image Credit: Randy Jones*

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 (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 regularly and HATS Air samples were taken twice this month.

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 operated normally throughout the month. Bi-annual lamp calibration was completed.

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.

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 though 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.

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.

Exploring the Backyard. *Image Credit: Randy Jones*

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 is having grounding issues with the blower causing dead time in the data, but has been stabilizing over the last month. The blower motor controller will be replaced in April.

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 worked well 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 (PalMOS) and emailed to the National Weather Service for entry into the Global Telecommunications System.

The local weather station (PAWS) is working fine. Both AWS systems in the Wauwermans and the Joubins are showing continuous data. The temperature sensor at the Joubins weather station was replaced and temperature data has resumed.