

PALMER STATION MONTHLY SCIENCE REPORT

February 2013



Erin Shea (G-432-U, Barbeau) identifies lithologies for geologic mapping of Torgersen Island. Weathering and alteration of rocks often makes mapping a challenge, but once one gets around those obstacles, they can find a compelling story. *(image credit: Marissa Wright)*

NEWS FROM THE LAB

By Carolyn Lipke, Assistant Supervisor of Laboratory Operations

February was a busy month here at Palmer Station, with several port calls by the *ARSV Laurence M. Gould* (LMG) and the *R/V Point Sur*. At the beginning of the month Reide Corbett's group (O-176-P) departed station after a productive field season, and later Debbie Steinberg's group (B-020-P) also concluded their season. Dave Barbeau's geology team (G-432-U) spent the month on station, creating a geologic map of Palmer's backyard and some of the nearby islands. This group brought lots of energy, helping out all over station and hosting a karaoke night (where we discovered most of us should not quit our day jobs). The McClintock/Amsler/Angus group (B-027-P) arrived mid-month and, after a few quick dives in the Palmer Station area, had the opportunity to travel on the *R/V Point Sur* to dive in the Lemaire channel.

The pair of snowy sheathbills nesting on station produced two sheathbill chicks this year. This month they have become increasingly bold and now regularly venture out of the nest. Snow flurries and grey skies are returning, but there are still a handful of beautiful days. We were also treated to two sunset sightings of the green flash.

At the end of the month the *R/V Point Sur* departed Palmer Station to begin her journey back to California. All science groups that worked from the vessel were very pleased with the work they were able to accomplish and had great praises for her crew.

FEBRUARY 2013 WEATHER

By Glenn Grant, Research Associate

February's weather was almost an exact repeat of January's wet, blustery conditions, only a bit colder. Warm, wet storm fronts spiraled in from the west, rinsing the station with frequent rain, drizzle, and occasional snow flurries. A high pressure system asserted itself briefly at the end of the month, drying things out, but was soon pushed aside by a strong low pressure system carrying heavy rains. Direct sunshine was rare.

The average wind speed was 7 knots (the same as January), with a maximum gust of 41 knots on the 18th. The average temperature was 1.8° C (35° F), with a maximum of 6.6° C (44° F) on the 20th and a minimum of -2.4° C (28° F) on the 19th.

Melted precipitation, mostly rain, totaled 51.8 mm. 3 cm of new snow was measured before it melted away in the persistent drizzle. The maximum snowstake depth observed was 1 cm.

Sea ice observations are made once each day, and during February no sea ice was seen during these times. However, glacial calving produced heavy brash ice throughout the month, and boaters reported that the brash had cooled the sea surface sufficiently to cause localized ocean freezing. The maximum recorded sea surface temperature (at 1800 UTC) was 1.9° C, and the minimum was -1.0° C. At the end of the month, two large ice bergs had grounded themselves near Gamage Point, providing a spectacular view from Palmer's galley.

B-003-P: THE SEASONAL DYNAMICS OF CO₂, PRIMARY PRODUCTION, AND DMS IN THE WESTERN ANTARCTIC PENINSULA: MEASUREMENTS OF POOLS AND PROCESSES USING MASS SPECTROMETRY

Dr. Francois Morel, Principal Investigator, Princeton University; Dr. Philippe Tortell, Co-PI, University of British Columbia; Dr. John Dacey, Co-PI, Woods Hole Oceanographic Institution

Personnel on Station: John Dacey, Elizabeth Asher, Johanna Goldman, and Stefanie Strebel

This month marked a large turnover in personnel. Tortell and Young departed in early Feb., and Asher left later in the month after over 5 months on station. John Dacey (WHOI) and Johanna Goldman (Princeton U.) are now moving the project forward into the home stretch.

We continue to collect high frequency surface gas measurements via membrane inlet mass spectrometry (MIMS), using water from the seawater supply to the aquarium room. $p\text{CO}_2$ and $\Delta\text{O}_2/\text{Ar}$ (biological oxygen saturation) continue to hover close to atmospheric equilibrium, though we continue to see strong diel (*i.e.* day – night cycles). DMS concentrations have varied somewhat, with maximum levels of ~ 8 nM. We had some electronic noise in the MIMS data that we resolved by replacing one of the system components.

Additional sulfur measurements on our chemiluminescence detector were stopped by two simultaneous problems in the detector. High pressure readings on the detector's pressure transducer shut off the detector. We were able to override the transducer signal and to determine that the problem lay in the transducer, not in the vacuum system. That override together with changing a catalytic ceramic tube returned the detector to good working order. Unless the transducer gets even more aberrant, the detector should be operating until the end of the project.

While both Dacey and Asher were on station, we conducted a number of deuterated tracer experiments to examine the effect of krill grazing on DMS/DMSP production in seawater. Our experiments (3) demonstrate a strong increase in DMS production in the presence of krill compared to control (phytoplankton / bacteria only) treatments. This information will help constrain a potentially important term in the DMS cycle in surface waters adjacent to Palmer.

Bi-weekly sampling at station B continued during this period and showed a low biomass (Chl) during the whole month. Assays for phytoplankton productivity (^{14}C and ^{18}O methods), carbonic anhydrase activity, Michaelis-Menton kinetics, and isotope disequilibrium were also performed.

Our fourth and last incubation experiment has been set up, and consists of culturing the community of phytoplankton (collected from station B) at different pCO_2 levels: 100ppm, 400ppm and 800ppm. The pHs for those conditions are respectively 8.15, 7.7 and 7.45. For this incubation, additional bottles will be added at 400ppm and 800ppm, where pH will be set around 8.1. These will allow us to look at the separated effects of pH and pCO_2 by comparing the effects of pH at constant pCO_2 and the effects of pCO_2 at constant pH.

B-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: Bill Fraser, Shawn Farry, and Ben Cook

February began with the return of the *ARSV Laurence M. Gould* (LMG) to Palmer Station at the conclusion of the LTER cruise. Jen Mannas and Cameron Rutt briefly returned to station on the LMG before departing for the season with Darren Roberts and Donna Patterson-Fraser. Principal Investigator Bill Fraser arrived at Palmer on February 16th joining Shawn Farry and Ben Cook for the remainder of the season.

Adélie penguin work continued this month with indicator colony counts and counts and measurements of chicks about to fledge. Penguin foraging ecology studies continued through February with our Adélie penguin radio transmitter study on Humble Island and gentoo penguin satellite tag deployments and diet sampling on Biscoe Island. Chinstrap penguin diet samples were also collected this month on Dream Island.

Skua work continued with monitoring and banding of brown skua chicks on local islands as well as on Dream. Despite the loss of all active south polar skua nests on Shortcut Island, band resighting and diet sample collections continued. Monitoring of the blue-eyed shag colony on Cormorant Island concluded at the end of the month with the fledging of chicks. Kelp Gull

surveys and chick counts were also completed for local islands. Our giant petrel satellite transmitter work finished up this month with the retrieval of all of our transmitters. We also made our second trip of the season to the Joubin Islands to conduct a giant petrel chick census on known and suspected breeding Islands. The weather for the Joubins trip was perfect and in addition to enjoying a flat smooth zodiac ride we were treated to a rare sighting of a King penguin.



Giant petrel chick banding began mid-month on all local islands and should be completed by early March. Growth measurements of giant petrel chicks continue on Humble Island.

Monitoring of marine mammals continued in February with exponential increases in fur seal numbers on many of the area islands and decreases in elephant seal numbers following the completion of molt.

ASC continued to provide great support this month with special thanks to Carolyn Lipke for coordinating the birder volunteer schedule and to the many birder volunteers who helped us weigh and measure over 150 Adélie chicks during the fledging period.

B-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

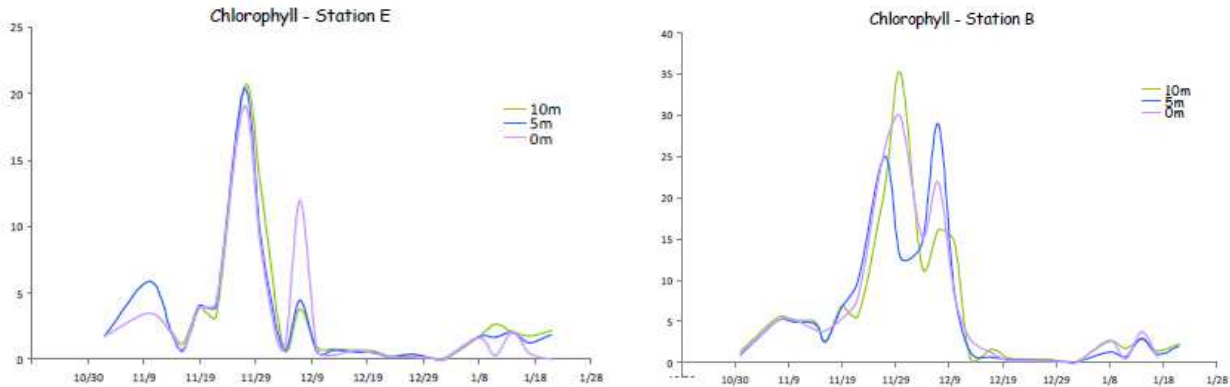
Personnel on Station: Mikaela Provost

This month we saw the end of a successful LTER cruise on the *ARSV Laurence M. Gould* and bid goodbye to Nicole and Filipa. Both Nicole and Filipa ended their season at Palmer Station and departed on their journey back to Rutgers University where they will continue their graduate classes. They are greatly missed on station! Early in February all glider operations ended and the gliders were packed up for shipment north. Mikaela will continue to carry out the sampling for B-019 throughout the rest of the season.

This month B-019-P continued sampling bi-weekly at stations B and E with B-045-P. Calm, sunny days have become scarce this month. High winds, snow, and ice accompany more and

more sampling days at stations E and B. Chlorophyll samples indicate there is still no sign of a second bloom this season, and as we approach the beginning of March our expectations of seeing another bloom are diminishing.

Figure 1. Chlorophyll levels taken at stations E and B throughout the 2012-2013 summer season at Palmer Station.



B-020-P: PALMER LONG TERM ECOLOGICAL RESEARCH (LTER): LOOKING BACK IN TIME THROUGH MARINE ECOSYSTEM SPACE, ZOOPLANKTON COMPONENT

Dr. Deborah K. Steinberg, Principal Investigator, Virginia Institute of Marine Science, VA

Personnel on station: Kim Bernard and Dominique Paxton

Our season at Palmer Station has come to a close; we had our last sampling day on February 15. The last few surveys have seen very limited numbers of foraging predators, particularly penguins. This is primarily because they are either beginning to leave the region or are staying on land to molt (*pers. comm.* Shawn Farry, B-013).

This season we focused on the krill prey field in relation to top predator foraging activity. The objective of this study was to determine whether or not there is any resource partitioning, particularly between the two dominant penguin species in the region, the Adélie and gentoo penguins. Preliminary analysis of the data suggests that Adélie and gentoo penguins forage on similar krill aggregation types. Within the survey area gentoo penguins typically dominated foraging in the south-eastern sector, while Adélie penguins were observed more frequently in the north-western sector. Krill biomass encounter rate was often greatest over the south-

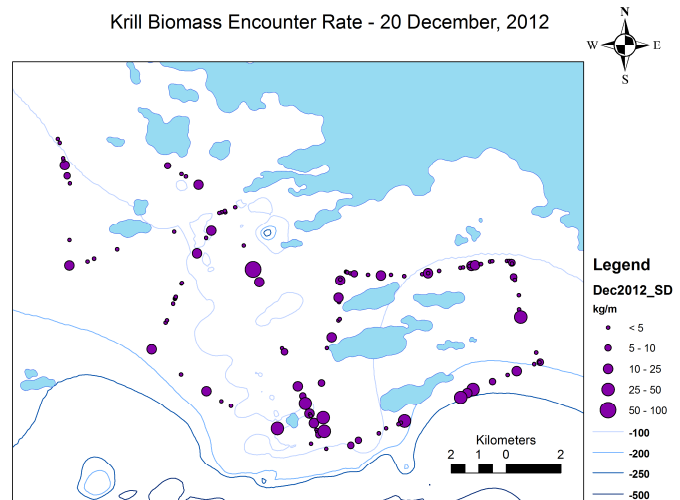


Figure 1. Krill biomass encounter rate (kg m^{-3}) for 20 December, 2012.

eastern sector (see Figure 1, for example), though this was not always the case. Overall, we encountered foraging gentoo penguins more frequently than Adélies.

Early on in the season (in December) we observed Minke whales lunge feeding on layers of shallow, dispersed krill covering large areas during diurnal tides. However, Minke's were not observed throughout the remainder of the season. Humpback whales were recorded in the region more frequently, primarily during diurnal tides. We observed humpbacks bubble net feeding and lunging at the surface when krill were in similar large, shallow, dispersed layers (during the early part of the season); when layers of krill aggregations were deeper, we recorded humpbacks diving and presumably foraging while underwater for some time. While we typically only observed whales feeding in the vicinity of krill layers (either at the surface or sub-surface), we recorded penguins feeding on various krill aggregation types from shallow layers to deeper dense balls.

Our data require further analyses to better interpret our results and this will be the focus of the next few months.

Overall, this season was highly successful for B-020-P and we owe our gratitude to the ASC staff at Palmer Station for their continued support of and enthusiasm for our research. As always it has been an absolute pleasure conducting research from Palmer Station and we look forward to returning soon.

B-027-P: THE EFFECTS OF OCEAN ACIDIFICATION AND RISING SEA SURFACE TEMPERATURES ON SHALLOW-WATER BENTHIC ORGANISMS IN ANTARCTICA

James McClintock, Charles Amsler, and Robert Angus, Principal Investigators, University of Alabama at Birmingham

Personnel on station: Charles Amsler, Margaret Amsler, Kate Schoenrock, Julie Schram, Kevin Scriber

B-027 arrived at Palmer on the morning of 16 February with LMG13-02. Initial efforts centered on setting up our lab space, dive locker, and our portion of the aquarium building as well as on mandatory boat training. We also prepared for and spent two days on the *R/V Point Sur* in the northern end of the Lemaire Channel.

From February 19-28 our group completed eight dives from Palmer Station including checkout dives off the Pier and dives to collect organisms for laboratory studies. We also completed nine dives on 21-22 February in the northern Lemaire Channel supported by the *R/V Point Sur* to collect, enumerate, and document an unusual macroalgal that occurs there.

The bulk of our efforts have been spent assembling and calibrating our main ocean acidification and temperature manipulation set-up. This has been going well and we hope to have it finished in time to start one of our two main experiments in early to mid-March.

We are grateful for the generous and professional assistance of numerous ASC staff. Carolyn Lipke, Mark Dalberth, David Moore, Julie Jackson, and Glenn Grant deserve special thanks for

facilitating our laboratory and diving operations. We are also grateful to the Master and Crew of the *R/V Point Sur* for supporting our Lemaire Channel diving operations.

B-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, The Ecosystems Center, Marine Biological Laboratories, Woods Hole, MA

Personnel on station: Sarah Laperriere and Lara Vimercati

The beginning of February concluded the annual LTER cruise along the Antarctica Peninsula. Stefanie Strebel, a member of our team, joined B-003-P (Morel) to assist in their research.

Throughout the month of February, B-045-P and B-019-P (Schofield) continued biweekly LTER sampling. As part of the LTER, B-045-P samples biweekly for bacterial productivity, bacterial and phytoplankton abundance, dissolved organic carbon, particulate organic carbon and nitrogen, and nutrients.

Bacterial abundance and productivity remained fairly stable throughout the month of February. No large blooms were observed.

Typical of the end of summer, the end of February brought a shift in weather. Winds and precipitation increased. On 21 February, Lara Vimercati departed station on the *ARSV Laurence M. Gould*.

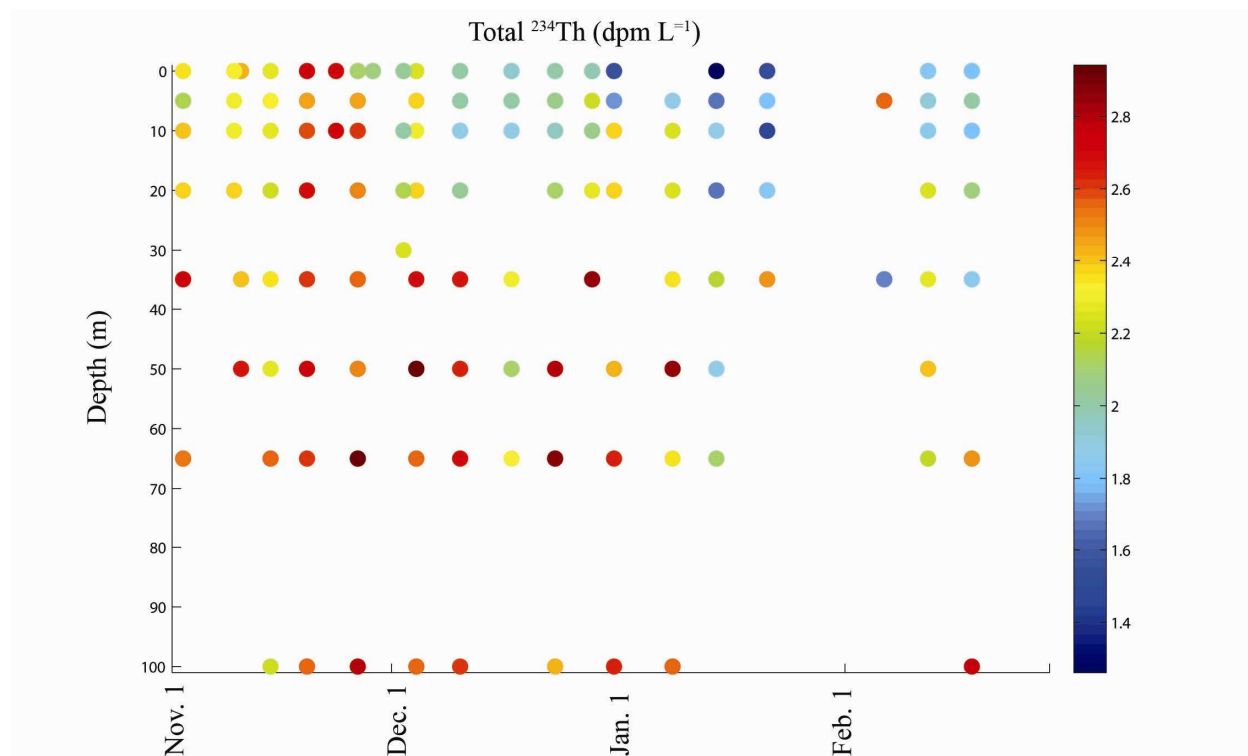
We would like to thank all of the ASC employees for their continued support of our research.

B-252-P: THE SEASONAL CYCLE OF EXPORT PRODUCTION IN AN ANTARCTIC COASTAL MARINE ECOSYSTEM

Dr. Hugh Ducklow, Principal Investigator, The Ecosystems Center, Marine Biological Laboratories, Woods Hole, MA

Personnel on station: Mike Stukel

We have continued our measurements of new and export production with weekly measurements of ^{234}Th concentration (8 depths – 0, 5, 10, 20, 35, 50, 65, 100m) and twice weekly measurements of $^{15}\text{NO}_3$ uptake (0, 5, 10, 20, 65m). Preliminary results (shown in figure) are indicative of strong drawdown of ^{234}Th , in late November, which coincided with the crash of a large diatom bloom (though we must caution that until we conduct background counts and yield analyses, the error bars on our measurements should be considered $\pm 0.25 \text{ d pm L}^{-1}$).



Particulate ^{234}Th measurements indicate that water column thorium was predominantly in the dissolved phase, except during the height of the diatom bloom (late November) when nearly half of the ^{234}Th in the upper water column was adsorbed onto particles.

G-432-U: DID ANTARCTICA HOST SIGNIFICANT ICE SHEETS IN THE CRETACEOUS?: AN INTEGRATED TEST OF EVIDENCE FROM THE ANTARCTIC PENINSULA

Dr. David Barbeau, Principal Investigator, Department of Earth and Ocean Sciences, University of South Carolina, Columbia, SC

Personnel on station: Benjamin Oliver, John Evans, Erin Shea, Malka Machlus, Jonathan Pratt, Marissa Wright

Despite our inability to set up our planned field camp on Snow Hill Island, our team was able to acquire over 75 samples from the western Antarctic Peninsula, many of which will be useful for the thermochronology/exhumation rate component of the original project. At each location, we attempted to sample a likely high-zircon felsic lithology for thermochronology (granites where possible, but primarily tonalites), as well as any other lithologies we observed. We took larger volumes of these rocks than are strictly needed for thermochronological analysis in the hope that future workers on the igneous processes of the region might be able to use our samples. We were also able to ground truth several outcrops on existing BAS maps, and found many to have been mis-mapped by past workers. The support of the *R/V Point Sur* and her crew was invaluable in executing our backup plan after the failure of our field camp put-in, and I have only the highest recommendation for the utility of a *Point Sur*-sized vessel for single-team research on

the western side of the Peninsula. I also have strong praise for the *R/V Point Sur's* captain, Rick Verlini, and her crew, who were amazingly flexible and easy to work with.

On station, we were able to map the bedrock of the Palmer backyard and most of the islands in the boating area that weren't closed by ASPA or ASMA. We found that the area primarily consists of several related tonalitic to dioritic lithologies, most likely related to a single plutonic system. Torgersen Island proved to be unique, as it appears to host conglomerate and sandstone lithologies unobserved anywhere else within the Palmer boating area. At present, we are still evaluating the implications of this finding and the relationship between these apparently sedimentary rocks and the predominating igneous lithologies found everywhere else in the area. Erin Shea deserves special mention for leading this project, both with her expertise in igneous rocks and her initiative in keeping the project on the right track. We plan to make an electronic version of our geologic map with explanation as an outreach tool to inform both scientific and tourist visitors to station about the local geology. We have also put together a document on the glacial features of the backyard, an effort spearheaded by Malka Machlus, and a detailed explanation of the igneous features of the backyard, again led by Erin Shea.

PALMER STATION
RESEARCH ASSOCIATE MONTHLY REPORT
February 2013
By Glenn Grant

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.

Seasonal maintenance was performed on the VLF antenna and cable; additional details are provided below in the A-336-P section.

A-132-P: FABRY-PEROT INTERFEROMETER (FPI)

Qian Wu, Principal Investigator, National Center for Atmospheric Research

The Fabry-Perot Interferometer observes mesospheric and thermospheric neutral winds and temperatures at Palmer Station by measuring the wind-induced Doppler shift in the air's nightglow emissions. The Research Associate operates and maintains on-site equipment for the project.

The system operated normally.

**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 operated normally for the month.

**O-204-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 O₂ (detected through changes in O₂/N₂ 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 CO₂ 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 both TerraLab and the VLF Building.

Air samples were collected on schedule throughout the month.

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

James Butler, Principal Investigator, 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.

Carbon Cycle and Halocarbon sampling occurred on schedule during the 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 TUVB radiometer also continuously measure hemispheric solar flux within various spectral ranges. The Research Associate operates and maintains on-site equipment for the project.

The UV monitor collected data normally throughout the month. Biweekly absolute scans and system maintenance were performed, as scheduled.

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 Data Ingestor system. Data collected from this station is freely available from the University of Wisconsin's AMRC website. The Research Associate monitors data transmissions for the project and performs quarterly maintenance on the station at Bonaparte Point.

The Bonaparte Point automated weather station is currently at the home institution for refurbishment.

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 GPS receivers operated normally for the month.

A-336-P: ELF/VLF OBSERVATION OF LIGHTNING DISCHARGE, WHISTLER-MODE WAVES AND ELECTRON PRECIPITATION AT PALMER STATION.

John Gill, Principal Investigator, Stanford University

Stanford University has been operating a Very Low Frequency (VLF) receiver antenna at Palmer Station since the 1970's. By receiving naturally and manmade signals between 1 and 40 kHz, the Stanford VLF group is able to study a wide variety of electromagnetic phenomenon in the

ionosphere and magnetosphere. The Research Associate operates and maintains on-site equipment for the project.

The system collected data normally. The VLF antenna, also used by project A-109-P, rests at the top of the glacier behind Palmer Station. A cable runs up the glacier to provide power to the antenna's preamplifier and carry signals back to the recording instruments in the laboratory. During austral summers, the support posts for the mast and cable melt out, causing the mast to become unstable. Before winter begins again, the posts are re-mounted into the glacier to elevate the cable off the ice and secure the mast. With the help of station personnel, post holes were re-drilled for the cable and the mast's guy-wire posts. This season the cable was moved approximately 10 meters towards the center of the glacier to avoid new crevasse activity.

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 system operated normally 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 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 operated normally throughout the month.

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 FRRF was cleaned on a weekly basis and the data sent to the PIs.

**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. One special filter sample, requested by CTBTO, was expedited north for analysis.

TIDE GAGE

Tide height and seawater temperature are monitored on a continual basis by a gauge mounted at the Palmer Station pier. The Research Associate operates and maintains on-site equipment for the project.

The system performed 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 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 NOAA for entry into the Global Telecommunications System (GTS).

The weather station was inspected and cleaned. The system operated normally.