

PALMER STATION MONTHLY SCIENCE REPORT

March 2013



A blond fur seal (a rare color morph) was spotted in the Palmer Station area several times during March. *(image credit: Michiel Gitzels)*

NEWS FROM THE LAB

By Carolyn Lipke, Assistant Supervisor of Laboratory Operations

March marks the end of the Palmer Station summer season, but the lab will be anything but quiet this upcoming winter. The McClintock/Amsler/Angus (B-027-P) group will continue their work here on station and the Postlethwait group (B-029-P) has just arrived. Three additional groups will arrive on later cruises.

At the end of the month, five science groups (Fraser B-013-P, Schofield B-019-P, Ducklow B-045-P, Ducklow B-252-P, and Morel B-003-P) departed along with the summer ASC support staff. We wish the new support staff and science groups a safe and productive winter season.

MARCH 2013 WEATHER

By Glenn Grant and Graham Tilbury, Research Associates

March's weather remained blustery and wet, with temperatures cooling slightly compared to February. Westerly storm fronts continued passing over the station, bringing warm, wet conditions to the peninsula. Frequent rain, drizzle, and occasional snow flurries persisted for most of the month. Occasional fog on some mornings soon evaporated with the rising sun

The average wind speed for the month was 8 knots, similar to the previous month, but the month ended with a maximum gust of 56 kts on the 30th. The average temperature was 1.4 C, with a maximum of 6.6 C on the 20th and a minimum of -2.2 C on the 24th.

March turned out to be a very rainy month. A total melted precipitation of 95.5mm, mostly in the form of rain, was recorded. 14 cm of new snow fell, but was mostly melted away by month's end. The maximum snowstake depth observed was 7cm.

Sea ice observations were made daily. During the month no sea ice was seen in the waters extending from the station out to the horizon. Throughout the month, glacial calving produced heavy brash ice, at times filling Arthur Harbor. The maximum recorded sea surface temperature observed, was 1.6 C, and the minimum -1.2 C. During the month several large ice bergs appeared in the waters off the station, but were driven off by strong Northerly winds. A single well weathered berg remains grounded just off Bonaparte Point.

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 and Johanna Goldman

We collected high frequency surface gas measurements via membrane inlet mass spectrometry (MIMS) using water from the seawater supply to the aquarium room until we began to shut systems down in the last week of March. $p\text{CO}_2$ 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.

The chemiluminescence detector operated fitfully in early March but finally failed by the middle of the month. This slowed our processing of Station B data. Our analytical emphasis shifted to our prototype purge and trap Capillary Inlet Mass Spec system.

In February we confirmed the potential for grazing by krill to influence water column DMS/DMSP dynamics - accelerating DMSP flux to DMS. In March with more limited manpower, our focus shifted to another herbivore important in these waters – the benthic amphipods. Although the weight-specific concentrations of DMSP in the most of the local marine macrophytes are lower than in the plankton, the sheer biomass of these plants makes them a potential factor. In collaboration with Chuck and Maggie Amsler (both at Palmer Station since late February, and macrophyte and amphipod experts respectively) we have evidence of a quite contrary process – retention of DMSP rather than DMS release.

Bi-weekly sampling at station B continued during the first three weeks of March despite harsh weather conditions. The chlorophyll data showed a small phytoplankton bloom occurring in early March. Assays for phytoplankton productivity (¹⁴C and ¹⁸O methods), carbonic anhydrase

activity, Michaelis-Menton kinetics, and isotope disequilibrium were performed to record this bloom.

Our last incubation experiment was conducted for 3 weeks, with a dilution at the end of the first 2 weeks to keep the cells in exponential phase. The community of phytoplankton collected from station B was grown at different pCO₂ levels: 100ppm, 400ppm and 800ppm. During the last 2 weeks of incubation the number of bottle at the condition 800ppm was extended to allow the study of 2 different pHs at this pCO₂ level. Preliminary results showed an increase of the growth rate with increasing pCO₂ level during the first week, while the difference was not as important between 400ppm and 800ppm during the third week of incubation. It also showed that at 800ppm, the phytoplankton were growing faster at a higher pH than at the naturally low pH associated with this pCO₂ level. Assays for phytoplankton productivity were performed at the end of each week, while assays for carbonic anhydrase activity, Michaelis-Menton kinetics, and isotope disequilibrium were performed at the end of the 3 weeks incubation.

As we close out our season at Palmer Station, we wish to thank all of the Palmer ASC staff for their enthusiastic and skilled support, in particular the Instrument Techs (Mark Dalberth & Juliet Alla) and the Lab Coordinators (Carolyn Lipke and Janice O'Reilly) who solved so many problems day to day. Palmer Station is a wonderful place to conduct research, made better by the people who keep it running.

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

Adélie penguin work concluded this month with the end of the presence/absence radio transmitter study on Humble Island. Gentoo Penguin breeding was slightly behind Adélie penguins this year with work during March largely focused on determining the timing of chick fledgling and obtaining fledging weights.

Brown skua work also concluded this month with nest monitoring and growth measurements ending with the fledgling of our last study chick. For the second year South polar skuas had a complete breeding failure on Shortcut Island, however scat collections and band observations continued throughout March.

Giant petrel chick banding on local islands was completed this month while growth measurements of giant petrel chicks continued on Humble Island.

Marine mammal monitoring continued with observations of large numbers of fur seals, rapidly declining elephant seal numbers, sporadic leopard seal and crab-eater seal sightings and a return of a few Weddell seals to the area.

Sediment trap contents were collected from Adélie colonies on Torgersen Island, gentoo colonies on Biscoe Island and chinstrap colonies on Dream Island. Local sediment trap samples as well

as Avian Island samples were all processed this month. Limpet trap contents were also collected from kelp gull colonies on four local islands. Project gear and supplies were cleaned, inventoried and crated in preparation for shipment north.

ASC continued to provide great support this month and we'd like to thank everyone on station for their efforts and attitude throughout the entire summer. Special thanks to Carolyn Lipke for providing great support this entire season, Resident Marine Technicians Jullie Jackson, Dave Moore and Hannah Gray for keeping us on the water and to Jeff Otten and Chuck Kimbell for all the IT and communication support. Also special thanks to all the I&O staff that were involved in the new floating dock. B-013 was on the water 130 days this season and the new dock greatly improved the safety and efficiency of our activities.

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

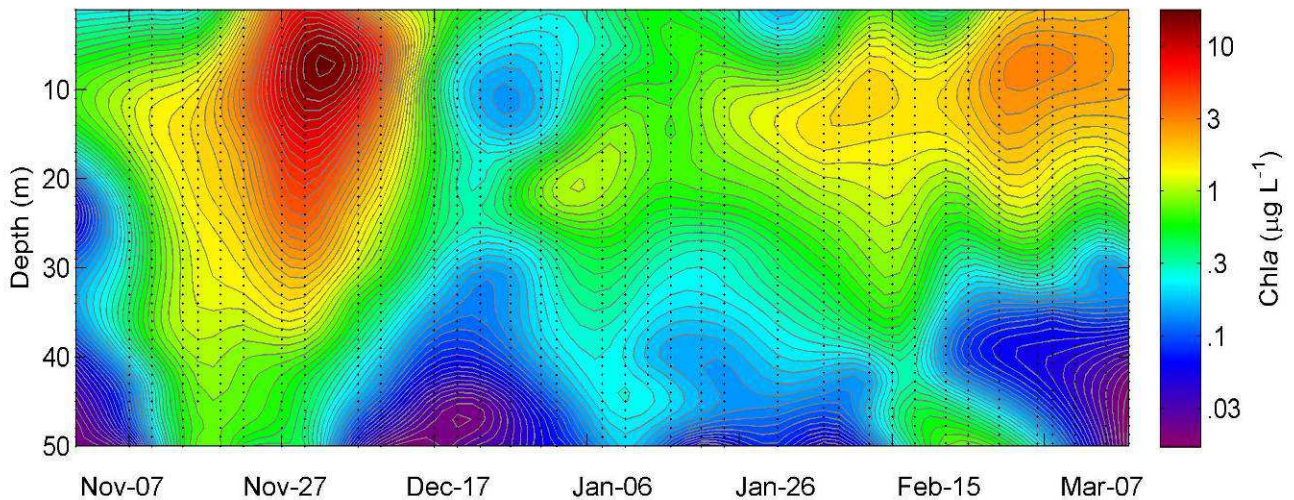
Personnel on Station: Mikaela Provost

This month B-019 continued sampling bi-weekly at stations B and E with B-045. Fortunately, high winds and brash ice were at bay for most of the month, allowing us to hit every sampling day. By the end of March, chlorophyll samples indicated a small surface bloom had occurred at station B (Fig 1). This is the second bloom of the season, though it was much smaller and confined to the top 10 meters in the water column compared to the first bloom which penetrated nearly 30 meters down. We were thrilled to catch this last bloom just weeks before the sampling season ended.

Overall, the 2012-2013 LTER season has been remarkably successful for our group. Long-term sampling at stations B and E continued from November 2012 through March 2013, Filipa Carvalho conducted an ambitious incubation experiment to test the combined effects of different nutrient and light levels on phytoplankton throughout the water column, and we were able to carry out two successful glider deployments. It is exciting to see what we've been able to accomplish in a relatively short amount of time and we are looking forward to next season.

Lastly, we would like to thank all everyone on station who helped support our science on the water and in the labs. Our work would not be possible without your dedication and hard work. Thank you!

Figure 1. Chlorophyll levels taken at stations E and B throughout the 2012-2013 summer season at Palmer Station (image created by Philippe Tortell).



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, Kevin Scriber, Kate Schoenrock, and Julie Schram.

The bulk of our efforts in early March focused on finishing assembly and calibration of our main ocean acidification and temperature manipulation experiment (“microcosm experiment”) and amassing the organisms needed for it. This was completed and the experiment started mid-month. Time zero measurements were completed and daily monitoring of water chemistry parameters continues.

In March we also set up and initiated calibration of our second main experiment. This “mesocosm experiment” is larger scale but will run for a shorter time. We expect to begin the experiment during the first week of April.

During March we completed 27 dives to collect macroalgae and amphipods for laboratory studies along with fresh macroalgal food for experimental amphipods.

We are grateful for the generous and professional assistance of numerous ASC staff. Carolyn Lipke, Mark Dalberth, David Moore, Hannah Gray, Glenn Grant, Janice O’Reilly, Juliet Alla, and Graham Tilbury deserve special thanks for facilitating our laboratory and diving operations.

B-029-P: DEVELOPMENTAL MECHANISMS FOR THE EVOLUTION OF BONE LOSS

Dr. John H. Postlethwait, Principal Investigator, Institute of Neuroscience, University of Oregon, Eugene, and Dr. H. William Detrich, Co-PI, Northeastern University

Personnel on station: John H. Postlethwait, H. William Detrich, and Thomas Desvigne

Our field season began on 10 March with the departure of the field team from Punta Arenas, Chile, on board the *ARSV Laurence M. Gould* (10:00 LT) en route to Palmer Station to commence cruise LMG13-03. Three members of science project B-029 deployed to Palmer Station on the cruise: (John Postlethwait, PI; Bill Detrich, Co-PI; Thomas Desvignes, post-doc). After a gentle crossing of the Drake Passage, the *LMG* arrived at the fishing grounds southwest of Low Island on 13 March at approximately 22:00 LT. We set 16 traps and then fished by trawling all night (8 trawls total), returning the next day to retrieve the traps. We obtained an excellent catch of red- and white-blooded notothenioids, which we then transported alive to the Aquarium at Palmer Station, Antarctica. We thank the Marine Projects Coordinator, the Marine Techs, and the volunteers from the *LMG*, whose skill and dedication are impressive.

The goal of our project is to understand the developmental genetic mechanisms that led, as the Southern Ocean cooled, to the evolution of neutral buoyancy in the icefish from an ancestor that was denser than seawater and that lacked a swim bladder. A major strategy was the loss of heavily mineralized bone, which eliminates the densest tissue of the body. We are collecting bone samples from two species of icefish and two species of rockcod – which have retained the ancestral, densely mineralized bone trait – for comparative gene expression analyses with the goal of identifying the genetic regulatory mechanisms underlying the evolutionary change in bone mineral density. For example, consider the teeth: Figure 1 shows the difference in bone mineral density of icefish and rockcod teeth. Our hypothesis is that the same genes that evolved towards reduced bone mineral density in icefish are responsible for age-related decrease in bone robustness in ageing Americans.



Figure 1. The poorly mineralized teeth of the icefish (left, no red staining) contrast with the teeth of the rockcod (right) that are heavily mineralized and stain darkly with the Alcian-Alizarin stain for calcium in bone.

To investigate the developmental genetic basis of the evolved loss of skeletal mineralization, we study two species of icefish with reduced bone mineral density (the blackfin icefish *Chaenocephalus aceratus* and the mackerel icefish *Champsocephalus gunnari*), and we compare them to the robustly mineralized skeletons of two rockcod species (the humped rockcod *Gobionotothen gibberifrons* and the yellow-belly rockcod *Notothenia coriiceps*) (Figure 2). Our fishing at Low Island successfully recovered numerous specimens of three of these species, but few *N. coriiceps*. In addition, we recovered eight individuals of *Pseudochaenichthys georgianus* (South Georgia icefish), a species we have rarely captured at this location in the past.



Figure 2. The icefish *C. aceratus*, left, and the rockcod *N. coriiceps*, right, at approximately the same magnification.

After sailing through the Neumayer Channel, we arrived at Palmer Station in the morning of March 16. Supported by *LMG* and Palmer logistics personnel, we off-loaded fish to the Palmer Station Aquarium facilities. The *LMG* then commenced cargo operations to resupply Palmer Station.

The B-029 team spent March 17 setting up our workstations and March 18 to 20 caring for fish and collecting bone and tissue samples for our genetic analyses. Due to the success of fishing southbound in transit to Palmer Station, the planned mid-cruise fishing trip was cancelled. Post-doctoral fellow Thomas Desvignes moved onto station, where he cared for fish and continued to collect samples, while Postlethwait and Detrich, berthed on the *LMG* due to the full housing situation on station, sailed with the *LMG* for cGPS station servicing and installation at Vernadsky Station and Spring Point in support of Project C-515-L (Domack). The *LMG* left Spring Point and returned to the Palmer Station pier about 08:00 LT, March 23. Saturday and Sunday mornings involved further sample collections.

On Monday March 25, B-029 personnel, with substantial help from the Palmer Station IT staff, particularly Jeff Otten, conducted a Skype video conference with two classrooms at the Lincoln K-8 Choice school in Rochester, Minnesota, in two 30-minute sessions, one with about fifty 4th and 5th grade students, and one with about fifty 6th through 8th grade students (Figure 3). The current curriculum of the younger students focuses on climate change and the older students are preparing for a research project with local madtom catfish and are investigating



Figure 3. Videoconference with Lincoln K-8 Choice school.

evolution. The B-029 team began the videoconference on board the *LMG* and discussed the collecting of fish, walked across the gangplank to show students glaciers viewed from Palmer Station accompanied by a discussion of glacier retreat, and then showed students anaesthetized fish, discussing the characteristics of the icefish and rockcod, their future in the face of a changing climate, and what investigations of these fish can tell us about human bone loss

disease. Students then asked questions, some of which they had prepared and written out in advance, demonstrating that they had had considerable teaching time dedicated to providing background for the conference.

On Tuesday March 26 at 08:00 LT, the *LMG* left Palmer Station for a second fishing cruise with B-029 personnel Postlethwait and Detrich on board. At about 13:00 LT, Marine Technicians, with the help of *LMG* personnel on the bridge, deployed 16 pots along a line near the Astrolabe Needle in Dallmann Bay. The *LMG* then transited to Low Island and commenced fishing by Otter trawl at about 21:00 LT, and fishing continued with five trawls until 07:00 LT on March 27. Trawling was successful with many icefish and rockcod collected. Returning to the traps at Dallmann Bay, we found large numbers of our target species, especially 'cories' (*N. coriiceps*) and numerous specimens of the congener *N. rossii*.

Arriving at Palmer Station about 22:30 LT on March 27, we found that the Palmer community had outfitted two additional outdoor aquaria to house our fish. Despite the late hour, the *LMG* crew and ASC ship and shore personnel off-loaded the fish to the new aquaria with alacrity. Thank you very much, Palmer Station and *LMG*!

The remaining days between March 27 and April 1 were spent collecting samples for the bone loss investigation and beginning to pack samples for the scheduled return to Punta Arenas on April 2. In addition, we conducted a formal Science Lecture to Palmer Station explaining our project and demonstrated the dissection of a fish to the curious residents of Palmer Station, at their request, to familiarize them with the goals our project.

B-029 thanks the dedicated *LMG* staff and crew, and the cheerful and skillful Palmer Station laboratory, plumbing, and administrative support staff for their important contributions to making the science here possible, productive, and enjoyable!

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

The month of March marked the end of LTER sampling for the season. Our last sampling day was 21 March.

Throughout the month of March, 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. A small bloom was seen in mid-March.

After packing up the lab, Sarah Laperriere will be departing station on 3 April, heading north on the *ARSV Laurence M. Gould*.

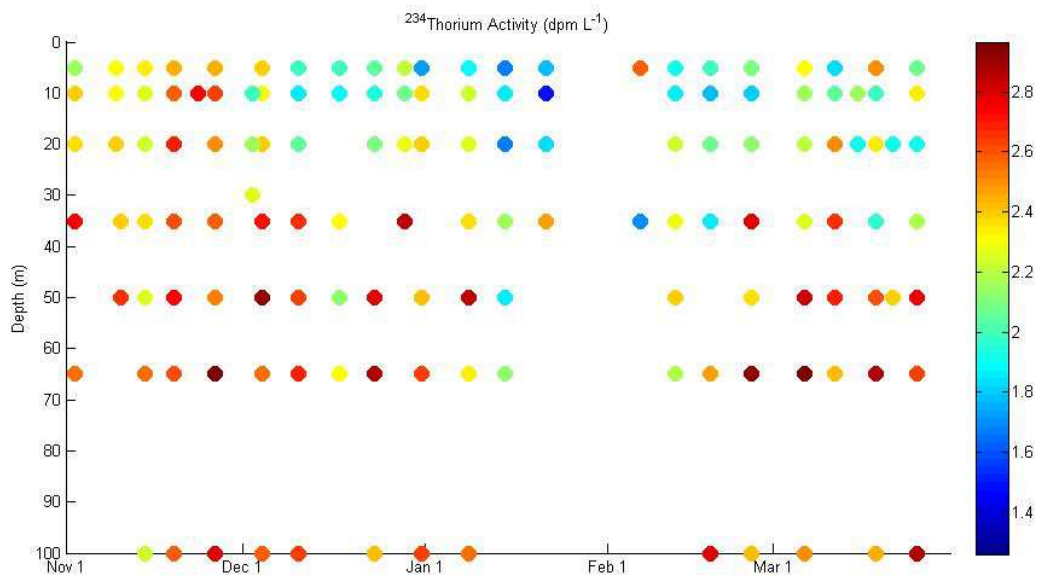
We would like to thank all of the ASC employees for their continued support of our research.

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

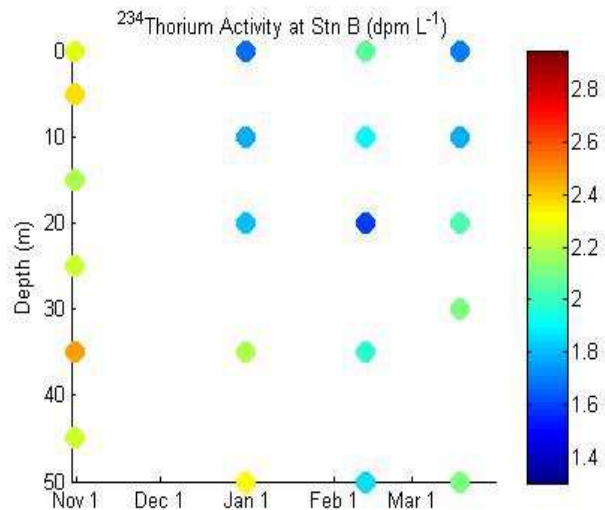
Dr. Hugh Ducklow, Principal Investigator, The Ecosystems Center, Marine Biological Laboratories, Woods Hole, MA

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 followed by a gradual ingrowth of ^{234}Th in 2013 indicating low export since early January (though we must caution that until we conduct background counts and yield analyses, the error bars on our measurements should be considered $\pm 0.25 \text{ dpm L}^{-1}$).



To assess the potential role of lateral advection as an input of ^{234}Th at Station E, we have also taken monthly measurements of ^{234}Th activity at Station B. The results show similar ^{234}Th activities early in early November, but lower ^{234}Th inshore throughout the rest of the season, indicating that vertical flux at Station B may have been higher than at Station E. We have also continued sediment trap deployments (which were made semi-continuously) at station E from mid-



December until mid-February and sporadically at Station B during late November - early December and late February – mid March).

**PALMER STATION
RESEARCH ASSOCIATE MONTHLY REPORT
March 2013**

By Glenn Grant and Graham Tilbury

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 and the seismic vault was inspected as part of the turnover training.

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.

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 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 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. The seasonal triple absolute scan was performed.

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.

A new GPS receiver was installed by the visiting representative from UNAVCO.

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.

Additional maintenance was performed on the VLF antenna and cable several times during the month. The mast guy-wires were tightened, the base of the antenna was moved and re-anchored following slippage due to glacial melting, and the signal cable leading up the glacier was reattached to the support posts. The antenna loops were adjusted to be aligned geographically north/south and east/west, and the final positions recorded using a roving GPS system. The VLF computer was rebooted on several occasions to correct data transfer errors.

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.

Satellite passes were captured normally throughout the month, however orbital elements did not update as scheduled due to problems with the automated FTP process. The problem is being diagnosed.

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 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.

A serial I/O error on the RASA was corrected once during the month; otherwise all operations were normal.

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 collected data throughout the month, requiring one restart to fix a software error.

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).

Problems with spurious system resets were diagnosed and corrected. As of the end of the month the system is operating normally.