

PALMER STATION MONTHLY SCIENCE REPORT

March 2012



Members of Grimm (B-038-L/P), Postelthwait (B-029-U), and Detrich (B-037-L/P) received fish from a fishing cruise this month.

Image Credit: Janice O'Reilly

NEWS FROM THE LAB

By Janice O'Reilly, Winter Assistant Supervisor of Lab Operations

March was a busy month of port calls and transitions. Science groups and winter crew arrived to Palmer Station ready to begin work, while summer folks packed their bags for redeployment. Despite the busy turnovers and trainings, summer and winter personnel continued to support grantees for a successful month of science in the labs and the field.

On 2 March the *ARSV Laurence M. Gould (LMG)* returned to station after transporting the Blue Ribbon Panel, Palmer Area Director, and Summer Research Associate to King George Island, and retrieving the NOAA/AMLR group and field supplies from Cape Shirreff. On 5 March the *LMG* departed for her northbound transit from Palmer Station to Punta Arenas with one member of the Fraser group (B-013-P), the Summer Boating Coordinator, and the Cape Shirreff group. On the way, the Bockheim group (G-239) was let off at Primavera Station, where they completed the drilling of a new 15-meter bore hole for monitoring temperatures of the active permafrost layer.

On 10 March Palmer Station was visited by the *MV Ushuaia*, the final tourist ship of the summer season. Station personnel shuffled groups of tourists through presentations and tours; the Amsler/McClintock group (B-027-P) provided a touch tank display of marine invertebrates and shared details of their ocean acidification project.

Visiting grantees gave four science lectures during March. Jim McClintock (B-027-P) started the month with a presentation on the ecological impacts of climate change on marine ecosystems of the Antarctic Peninsula. He discussed the impacts of climate change on glaciers, ice shelves, and sea ice, then summarized how these physical changes have affected phytoplankton, krill, and Adélie penguin populations. He also addressed potential implications of ocean acidification and invasive king crabs to Antarctic marine communities. The following week, Chuck Amsler (B027-P) delivered a presentation with beautiful underwater slides and videos that showed the rich diversity and abundance of the local marine ecosystem. He also presented an overview of how the group uses diving to study these communities and briefly discussed their group's chemical ecology project (B-022-P) that has been working at Palmer since 2000, but does not have a field season this year. Catherine Luria gave a talk explaining some of the techniques used by B-045-P to measure marine microbial abundance and activity. She also presented early results from a carboy incubation experiment looking at the impact of sea ice meltwater on microbial communities. At the end of the month Maggie Amsler (B-027-P) shared interesting stories and photos of Palmer Station through the years. Her photos since the 1970s, showed how Palmer Station has transitioned through many structural and environmental changes. Despite the many changes and transitions, much of the culture of Palmer Station has been preserved through a core group of scientists and support staff who have returned year after year.

The end of the month became increasingly busy with the return of the *LMG* and the completion of two fishing trips. The *LMG* arrived to station on 22 March with the remaining winterover crew, three Riggers, and six members from Detrich (B-037-L/P), Postelthwait (B-029-U), and Grimm (B038-L/P). The incoming science groups launched into their work immediately after expedient off-loads of fish to the Aquarium Lab. While new research projects started, summer science groups finished experiments and packed science gear in preparation for their redeployment. Members of B-045-P (Ducklow) and B-019 (Schofield) diligently continued LTER water sampling through the last week of the season. Station personnel completed turnover tasks, End of Season Reports, and Emergency Team trainings.

Science groups departing Palmer Station on *LMG* 12-03 NB were Fraser (B-013-P), Schofield (B-019-P), Ducklow (B-045-L), Postelthwait (B-029-U) and three members of Amsler-McClintock (B-027-P). Several summer personnel also departed Palmer Station on this cruise. On the northbound transect the *LMG* stopped at Primavera Station to recover the Bockheim team (G-239-E), along with their field equipment.

During this time of transition from summer to winter, dramatic changes in the landscape and wildlife populations were observed. At the beginning of March several streams continued to flow from the glacier; however as air temperature decreased glacial streams disappeared and freshwater pond surfaces froze by the end of the month. The position of the sun gradually shifted to an oblique angle, casting long afternoon shadows, and creating pastel-colored sunsets and pink mountain tops. Adélie penguin colonies emptied out; however nesting giant petrels, blue-eyed shags, and brown skuas remained. Small numbers of kelp gulls, Wilson's storm petrels, and solo chinstrap penguins were also sighted on occasion. On the far shore of Arthur Harbor near the glacier a group of at least 100 Arctic and Antarctic terns congregated and were frequently

observed feeding at the surface of the nearby open water. Two sets of resident snowy sheathbill families remained on the station premises, each consisting of two parents and one offspring. The parents encouraged their offspring chicks to fledge the nest and forage for food this month. Members of B-013-P reported increased numbers of fur seals on the islands, and counted approximately 61 fur seals on Humble Island one day. Leopard seals were observed almost daily engaged in various activities, including hunting prey, napping on floating ice, and (one time) following a Zodiac boat with passengers. Other less-frequently seen marine mammals included an occasional Weddell seal resting on the shore of Bonaparte, clusters of elephant seals on various islands, crabeater seals on floating ice or ashore, and humpback whales, one near Shortcut Island and at least two southwest of Janus Island.

MARCH 2012 WEATHER

By Neal Scheibe, Research Associate

Though often cloudy, March had pleasant weather at Palmer Station. Even on the windiest days early and mid-month, there was modest precipitation and temperatures stayed warm. Melted precipitation was in the mid-forties, well short of the average of 77 mm.

The windiest day of the month was on the 9th at 55 knots from the north. Gusts over 40 knots occurred on nine different days. Amazingly though, the monthly average was only 10 knots, typical for March.

Air temperatures were relatively warm, averaging 1.4 °C, with a maximum of 8.9 °C and minimum of -4.6 °C. Temperatures tapered off as the month progressed, but rebounded a bit in the last few days. Sea ice conditions remain the same as February, with regular brash from frequent glacier calvings and sporadic bergs in otherwise open water. Sea surface temperature averaged 0.8 °C and dipped below zero a couple of days.

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: Jennifer Blum, Shawn Farry

The *ARSV Laurence M. Gould* departed on 5 March, and our field team decreased to two members as Donna Patterson-Fraser departed for the season. Weather conditions during March were not as optimal as in February; high winds and wet weather delayed some of our field work this month.

Adélie penguin work concluded this month, as the radio transmitter project on Humble Island came to a close. Equipment was removed from the island and data files processed. A telemetry scan was also performed to collect molted transmitters. Sediment trap contents were collected from gentoo colonies on Biscoe Island and chinstrap colonies on Dream Island. Sediment trap sample processing continued until the end of the month.

Skua work continued throughout the month with brown skua chick growth measurements; south polar skua scat collections also continued on Shortcut Island. Limpet trap contents were collected from kelp gull colonies on four local islands. Giant petrel chick banding was finished on the islands that weren't completed in February. Growth measurements of giant petrel chicks continue on Humble Island. We commenced preparations and training for contract winter personnel who will be continuing some measurements for this project.

Marine mammal monitoring continued, and we noticed the return of larger male elephant seals that have been mostly absent for the past couple of months. Labwork was finished near the end of the month; samples were stored and/or packed up and given to Logistics. Project gear and supplies were cleaned, inventoried and packed up; project cargo was sent north. Warehouse cargo was also packed up but will be sent north on the next ship. Data analysis and organization projects, other end-of-season inventories, and Lab/Polar Haven/boathouse organization/clean-up were also main activities. An end-of-season informal meeting occurred with the Lab Supervisors, Station Manager, IT/Comms personnel, and the Boating Coordinator.

RPSC continued to provide great support this month, and we'd like to thank everyone for their efforts and attitude throughout the entire summer. Special thanks to Carolyn Lipke for providing great support this entire season; to Paul Queior for his above-and-beyond efforts in assisting our project; and to Ryan Wallace for his enthusiastic and professional boating support. Ted McKinley, David Ensworth and John Evans provided timely and skilled renovations to the Polar Haven cover; thanks to the FEMC crew for the repairs.

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

Principal Investigator: Oscar Schofield

Personnel on Station: Travis Miles and Katie Brennan

March was the final month of LTER's 20th sampling season at Palmer Station. We continued sampling the water column at stations B and E for chlorophyll, HPLC, primary productivity, as well as optical and physical properties. Initial data processing was performed to submit this data to the Palmer LTER Data Zoo as part of our long-term dataset.

Also, we performed the final part of a 4 part experiment that was done 3 times on the *Gould* during the annual LTER cruise in January. This experiment was for Grace Saba, a Post Doc at Rutgers University. We collected water at station B and spiked it with stable nitrogen isotopes of Urea, Nitrate and Ammonium. We then incubated the sample bottles outside for 24 hours in a shaded water bath. Water samples from this experiment will be shipped back to Rutgers for analysis in order to determine the form and efficiency of nutrient uptake by phytoplankton off of Palmer Station. This experiment is a follow-up to a larger experiment on the effects of ocean acidification on phytoplankton communities.

We'd like to thank all of the Raytheon/Lockheed support from Palmer Station and the ARSV *Laurence M. Gould* for a successful sampling season and a historic glider sampling season.

Glider deployments this year reached their full potential with over 160 days in the water collecting data across vast regions of the WAP.

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, Nell Herrmann (PolarTREC participant), James McClintock, Kate Schoenrock, and Julie Schram.

In March our group completed 33 dives to collect organisms for laboratory studies, to work out field physiological measurements, and to deploy and recover outplanted experiments.

The bulk of our efforts have been spent assembling and calibrating our main ocean acidification and temperature manipulation set-up. We have had more problems with the set-up than anticipated, but these had been overcome by the end of the month, allowing the experiment to begin in the first week of April.

Nell Herrmann redeployed with LMG 12-02 on 5 March. James McClintock, Margaret Amsler, and Charles Amsler redeployed with LMG 12-03 on 29 March.

We are grateful for the generous and professional assistance of numerous RPSC staff. Carolyn Lipke, Janice O'Reilly, Lily Glass, Ryan Wallace, and Neal Scheibe deserve special thanks for facilitating our laboratory and diving operations.

B-037-L/P PROTEIN FOLDING AND FUNCTION AT COLD TEMPERATURE: CO-EVOLUTION OF THE CHAPERONIN CCT AND TUBULINS FROM ANTARCTIC FISHES

H. William Detrich, Principal Investigator
Depts. of Earth and Environmental Sciences and of Biology, Northeastern University, Boston, MA

Personnel on Station: H. William Detrich (B-037-L/P), Corey Allard (B-037-L/P), Jeffrey Grim (B-038-L/P), Irina Mueller (B-038-L/P), John Postlethwait (B-029-U), and Tom Titus (B-029-U)

N.B. Because B-029-U and B-038-L/P are projects affiliated with B-037-L/P, this report encompasses work by all three projects.

Our field season began on 17 March with the departure of the field team from Punta Arenas, Chile, on board the *ARSV Laurence M. Gould* at the start of Cruise LMG12-03. Remarkably, we sailed as scheduled despite disruption of the *LMG* port call by the Great Punta Arenas Flood. Both the incoming and outgoing shipboard personnel of RPSC and the personnel of AGUNSA worked diligently and quickly to accomplish the loading of cargo, provisions, and passengers in slightly over two days. Well done!

After a moderately lumpy crossing of the Drake Passage, the *LMG* arrived at the north shore of King George Island on 20 March at approximately 23:30 LT. Three Otter trawls at 250-350 m depth were unproductive (8 fish, including 4 humped rockcod *Gobionotothen gibberifrons* and 1 yellowbelly rockcod *Notothenia coriiceps*, two of our three target species), so we transited to the Low Island fishing grounds (outside ASPA 152, Western Bransfield Strait), arriving about 23:00 LT (21 March). We commenced trawling operations at 01:50 LT (22 March) and were immediately successful – three trawls at 150-200 m produced 75 fish, including 26 specimens of our third target species, the blackfin icefish *Chaenocephalus aceratus*. We departed Low Island at 07:00 LT (22 March) and arrived at Palmer Station at approximately 19:00 LT. Supported by *LMG* and Palmer logistics personnel, we off-loaded our fish to the Palmer Station Aquarium.

March 23-24 was spent setting up our laboratory facilities at Palmer Station.

While Mueller, Postlethwait, and Titus initiated our experimental program at Palmer Station, Detrich, Allard, and Grim sailed on 25 March at 08:30 local time (LT) for a fishing trip to Low Island. After arrival at the fishing grounds, four sets of four traps each were deployed, commencing at 20:25 LT, on a line of average depth 160 m. We then conducted eight trawls at depths of 155-175 m between 21:35 (25 March) and 07:45 (26 March) LT. The trawls were successful, yielding 37 specimens of *C. aceratus*, 25 of *G. gibberifrons*, and 2 of *N. coriiceps*. Recovery of the fish traps between 09:54 and 11:13 (26 March) added 37 *G. gibberifrons* and 2 *N. coriiceps* to our total catch. With this excellent catch on board, we sailed for Palmer Station, arriving there at 07:30 LT on 27 March. After off-loading our fish, the *LMG* and Palmer Station then commenced preparations for the ship's departure on 29 March.

During the remainder of March, we prepared fish for production of embryos by *in vitro* fertilization.

We have four major scientific Aims this season: 1) to examine the energetics and thermal optima of the folding of tubulin by the chaperonin CCT using proteins purified from *G. gibberifrons* (B-037-L/P); 2) to assess the effects of elevated temperature regimes on embryonic development of *N. coriiceps* with special attention to the rate of cleavage (B-037-L/P); 3) to determine the ontogeny of cartilage and bone formation by embryos of robustly ossified and poorly ossified Antarctic fishes (*N. coriiceps* and *C. aceratus*, respectively) (B-029-U); and 4) to explore the role of reactive oxygen species in the development of notothenioid embryos (B-038-L/P). Work on Aim 1 awaits the arrival of project personnel on LMG12-05. Experiments for Aims 2-4 are pending the production of embryos of the relevant species. We have also collected tissues (brain, bone, spleen, head kidney, trunk kidney, skeletal muscle, and testis) from the three fish species to support research in our CONUS laboratories. As of the end of March, we have successfully prepared for our experimental program through the remainder of the season, including research to be conducted by our three winter-over personnel.

The *ARSV Laurence M. Gould* departed Palmer Station on 29 March en route to Punta Arenas, Chile. Postlethwait and Titus sailed northbound, while Detrich, Allard, Grim, and Mueller remained on station to continue our research programs. We await the arrival of two team members, Mary Chamberlin (B-038-L/P) and Brian Eames (B-029-U), on Cruise LMG12-04. We thank the ship and station personnel for their excellent help in making the first part of our field season a great success.

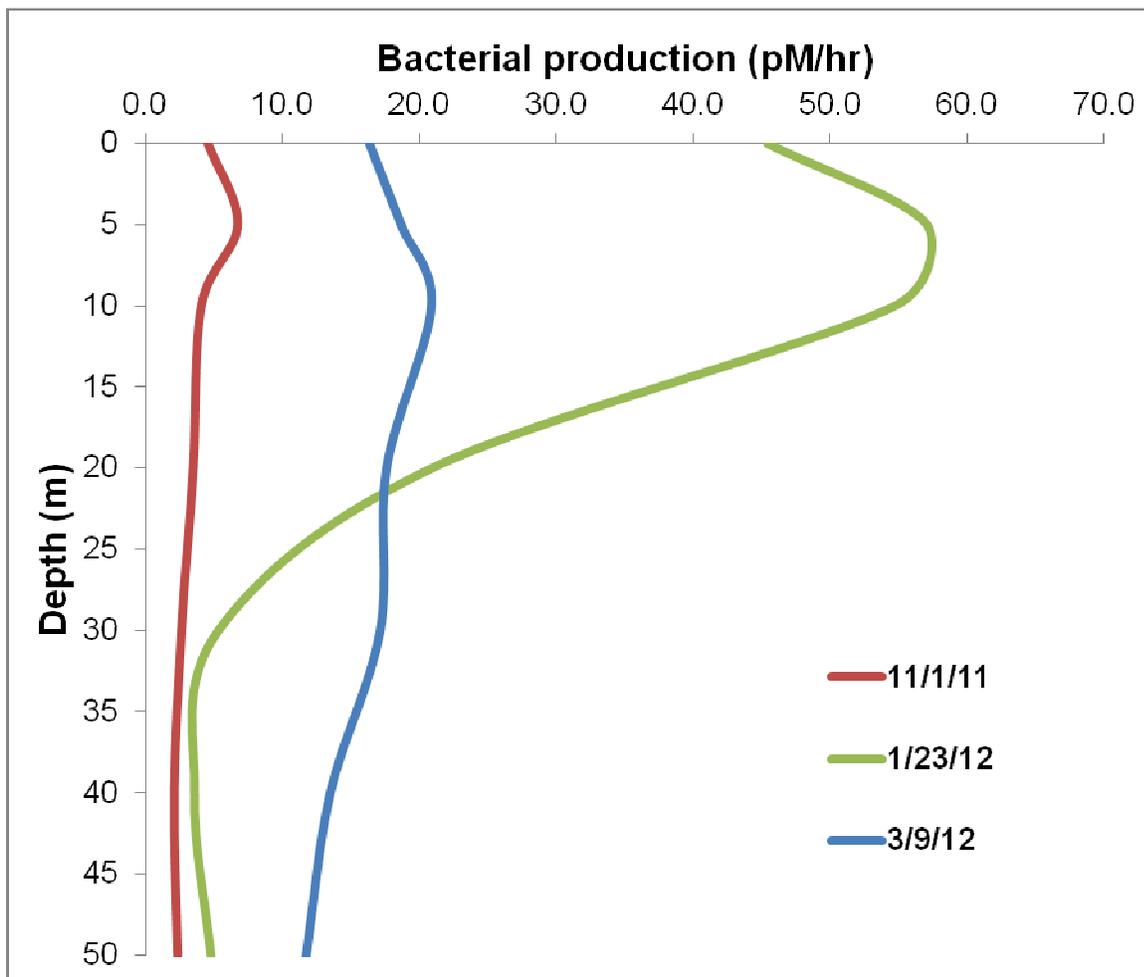
B-045-P: PALMER, ANTARCTICA LONG-TERM ECOLOGICAL RESEARCH (LTER): CLIMATE MIGRATION, ECOSYSTEM RESPONSE AND TELECONNECTIONS IN AN ICE-DOMINATED ENVIRONMENT: MICROBIAL / BIOGEOCHEMICAL COMPONENT

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

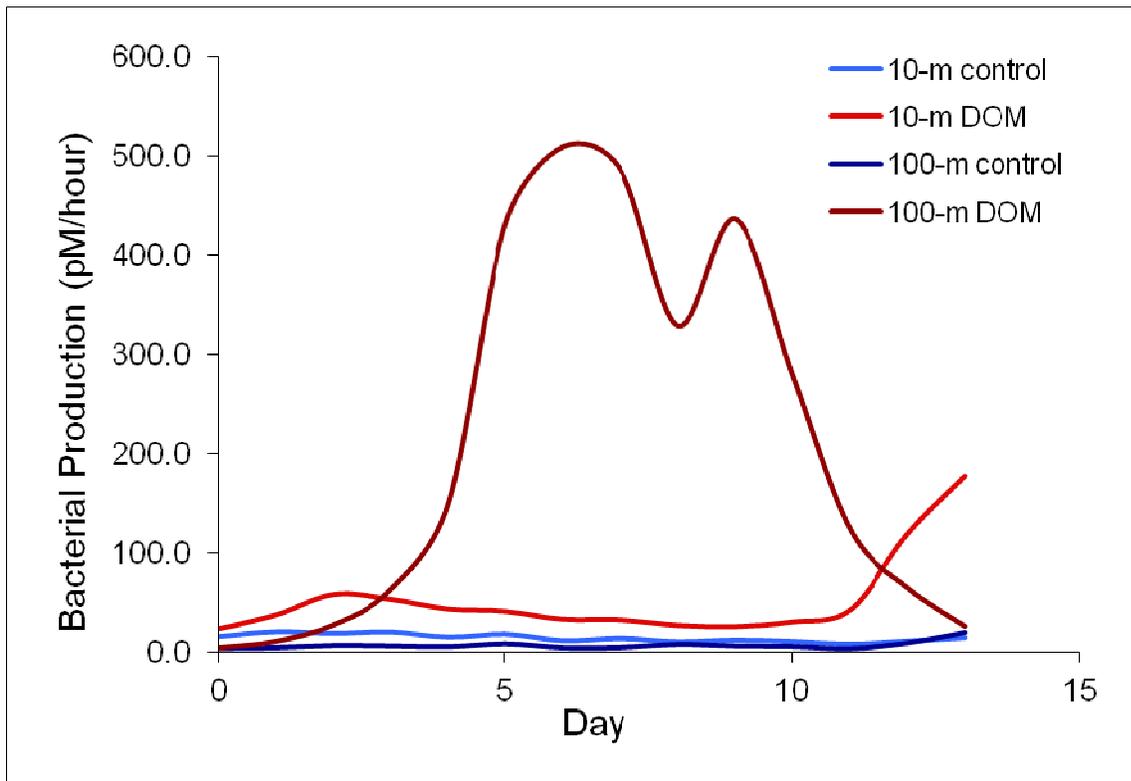
Personnel on station: Nikhil Murgai and Catherine Luria

We have reached the end of another productive LTER season for B-045. Over the course of the season, we made over 1000 discrete-depth measurements of bacterial production and flow cytometric determinations of bacterial and phytoplankton abundance. Samples being shipped to our home institution, the Marine Biological Laboratory in Woods Hole, will allow for 500 further measurements of dissolved organic carbon (DOC), dissolved nutrients, and particulate carbon and nitrogen. We will also sequence DNA from more than 100 bacterial samples in order to examine how bacterial communities change over the course of the LTER season or in response to experimental treatments.

In March, bacterial production began to drop from its peak values in January, but has not yet reached the low levels that we observed in the spring. Declining bacterial production might reflect reduced primary production due to light limitation and nutrient depletion.



We conducted 20 growth experiments over the course of the season, including two large carboy incubation experiments looking at the effects of sea ice and phytoplankton-derived carbon on marine bacterial communities. Our second large carboy incubation experiment was conducted in March. We harvested dissolved organic carbon (DOC) from diatom cultures to provide a realistic substrate for Antarctic marine bacteria. We added this DOC to seawater collected either at 10-m or 100-m. The rapid response of 100-m bacteria to this DOC addition (see figure below) suggests that the bacteria are carbon-limited and that bacterial metabolism is closely coupled to phytoplankton production. Further genetic analyses will reveal whether the addition of DOC causes these 100-m bacterial communities to more closely resemble 10-m communities that are not carbon-limited.



Again, we are very grateful to all of the USAP support staff who enable our work at Palmer Station and on the *ARSV Laurence M. Gould*. We hope to see you all again during the next LTER season.

G-239-E: ANTARCTIC PERMAFROST AND ACTIVE-LAYER DYNAMICS

Principal Investigators: Jim Bockheim (University of Wisconsin-Madison) and collaborator Goncalo Vieira, (University of Lisbon, Portugal)

Personnel on station: J. Bockheim, G. Vieira, N. Haus, K. Wilhelm, A. Trindade, and Stian Alesandrini

We stayed at Palmer Station from 17 Feb to 5 March 2012 and at Primavera Station (Argentina) from 6-30 March 2012. Our accomplishments during this time were as follows:

Our accomplishments at Palmer were as follows:

- (1) Drilled a 14.65 m borehole on the highest summit of Amsler Island (67 m above sea level) and fitted the borehole with a string of iButton thermistors at the following depths: 0.2, 0.4, 0.8, 1.2, 1.6, 2, 2.5, 3, 3.5, 4, 5, 6, 8, 10, 12.5, 14 m. The thermistors will be read in one year to ascertain the existence of permafrost and the temperature dynamics in the soils and bedrock of the Palmer Station area.
- (2) Serviced soil climate station by installing a second 12 v, 155 amp-hour battery and larger 70 watt solar panel. We collected hourly atmospheric and soil climate data for the periods 7 April-6 June 2011 and 7 October 2011-3 March 2012.
- (3) Downloaded time lapse photos of our snow stakes for modeling the effects of snow depth on active-layer dynamics.
- (4) Downloaded temperature data from and installed new iButtons in 10 shallow boreholes ranging from 1.0 to 1.6 m on Amsler and Hermit Islands and in the Palmer "Backyard" and installed one new borehole to 160 cm near the soil climate station on Amsler Island. The iButtons are installed at the following depths: 5, 15, 40, 60, 80, 100, 120, 140, and 160 cm, depending on site.
- (5) Installed localized air temperature stations and near-surface temperature plates estimating the N-factor, the ratio of the seasonal degree-day sum at the soil surface to that in the air at standard screen height for parameterizing the temperature regime at the ground surface, at seven of our borehole sites.
- (6) Installed iButtons at 10-cm intervals on three snow stakes in the valley for validating snow depths from the camera. An additional snow stake with iButtons was installed on the summit of Amsler Island for monitoring snow depth there.
- (7) Collected detailed data of the distribution of soils, geomorphic units, and vegetation on Amsler Island using a Trimble digital global positioning system and a high-resolution orthophotograph.
- (8) Sampled two additional soils from Amsler Island.

Our accomplishments at Primavera were as follows:

- (1) Drilled a 16 m borehole at 182 m above sea level and installed a string of iButton thermistors at the following depths: 0.2, 0.4, 0.8, 1.2, 1.6, 2, 2.5, 3, 3.5, 4, 5, 6, 7, 8, 10, 12.5, and 15 m. The thermistors will be read in one year to determine the depth at which permafrost exists in the Cierva Point area.

- (2) Installed a soil climate station similar to the one installed at Old Palmer. (air temperature, relative humidity, rainfall, solar radiation, wind speed and direction, soil moisture, temperature and electrical conductivity)
- (3) Installed eight shallow boreholes to 1.8 m, one to 1.52, and one to 1.35 m along an elevational gradient of 70, 120, 153, 182, 248, 275, 297, and 319 m. All shallow boreholes had thermistors at depths of 5, 15, 40, 60, 80, 100, 120, 140, 160, and 180
- (4) Installed one intermediate depth borehole to 4.22m at an elevation of 35m with thermistors at 5, 15, 40, 60, 80, 100, 120, 140, 160, 180, 200, 250, 300, 350, and 400 cm
- (5) Installed iButtons 1.4m above surface and 1cm below the surface on metal plates for estimating the N-factor at nine of the shallow boreholes.
- (6) Installed a time-lapse camera on the climate station, which is taking pictures once every three hours. The camera is aimed at six snow stakes to estimate snow depth.
- (7) Installed iButtons at 10-cm intervals on three of six snow stakes from 5 to 45 cm high for validating snow depths from the camera. An additional snow stake with iButtons was installed near the permafrost borehole at depths of 2, 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100, and 110 cm for monitoring snow depth there.
- (8) Collected detailed data of the distribution of soils and geomorphic units at Cierva Point using a hand held global positioning system and a medium-resolution ortho-photograph.
- (9) Described 28 soils in detail on 11 geomorphic surfaces and collected 94 soil samples for chemical, physical, mineralogical, and micromorphological characterization.

B-256-P: ROLE OF DEHYDRATION AND PHOTOPERIODISM IN PREPARING AN ANTARCTIC INSECT FOR THE POLAR NIGHT

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

Personnel on station: Yuta Kawarasaki

Decreasing temperatures in March resulted in the ground freezing on some days, which posed a challenge for sampling of *Belgica antarctica* larvae. However, sufficient numbers of larvae were collected to carry out our planned experiments designed to characterize the overwintering physiology of midge larvae.

Larvae occupy diverse types of microhabitats ranging from sandy soil to moss to detrital areas associated with penguin and seal colonies. These diverse substrates are hypothesized to affect the overwintering state of midges differently. In concert with laboratory experiments, we aim to make further inferences about the influence of microhabitat conditions on overwintering strategies of these midges.

We are grateful to station personnel for their support. Especially, we thank Carolyn Lipke, Janice O'Reilly, and Lily Glass for their assistance in the laboratory and Ryan Wallace for boating support. The field collection would not have been possible without help from Bill Burns, Shelby Cooper, Kerry Kells, Jen Kemper, Merci Levine, Carolyn Lipke, and Paul Queior.

PALMER STATION
RESEARCH ASSOCIATE MONTHLY REPORT
March 2012
Neal Scheibe

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 143 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 recently-installed STS 2.5 seismometer failed early in the month. The STS 2.5 is not sending out any data. Attempts at reseating all of the connections, power cycling the host box and resetting errors on the unit did not fix the issue. A new host box and STS 2.5 are being sent down.

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.

Data collection went as planned for the month. Large amounts of data were transmitted to the University of Florida at month's end.

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

The instrument ran well during the month with no issues to report.

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 had several days where it was not reporting any data from the Bonaparte Point weather station. Restarting the data collection computer and software multiple times resulted in the data collection resuming, but further investigation into the original cause of the issue is underway.

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.

Sampling occurred regularly throughout the month. Power is being left off in the Clean Air building during investigation of the fire system in the building. All flasks are being stored in the TerraLab building to avoid freezing of the flasks. Power is returned to the Clean Air building during air sampling periods.

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 normally during the month. Power is being left off in the Clean Air building during investigation of the fire system in the building. All flasks and the sampling unit are being stored in the TerraLab building to avoid freezing of the flasks.

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. Also collecting light spectra is a BSI GUV-511 filter radiometer, an Eppley PSP pyranometer, and an Eppley TUVR radiometer. The Research Associate operates and maintains on-site equipment for the project.

The UV monitor collected data normally for the month. The quarterly three lamp calibration was completed near month's end.

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 weather station ran normally during the month, though the data transmissions were interrupted as mentioned in the report above for the O-202-P Data Ingestor.

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 operated normally for the duration of the month. The roving GPS unit was used extensively for T-434-P around the Palmer Station boating limits.

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.

A power outage early in the month resulted in one of the data collection computers' power supplies to fail. A temporary replacement power supply was put into use until a new one could be sent to station. The computer was not on battery backup, but has since been placed on UPS.

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 for 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 system collected data normally during the month.

B-390-P: THERMO-SALINOGRAPH

Vernon Asper, Principal Investigator, University of Southern Mississippi

Sea water is pumped continuously through a thermosalinograph (TSG) sampling system, recording the temperature, conductivity, salinity, and fluorescence. The data and webcam images are sent to a mirror site (<http://4dgeo.who.edu/tsg/>) at Woods Hole Oceanographic Institute, which is a collaborator on the project.

The thermo-salinograph operated normally during the month.

T-434-M/P: POLAR GEOSPACIAL CENTER

Paul Morin, Principal Investigator, University of Minnesota

The Polar Geospatial Center provides geospatial support (in the form of mapping, data delivery, and GIS analysis) to science and logistics communities of the U.S. Arctic and Antarctic programs. The Research Associate has been requested to collect ground control points in the Palmer area throughout the 2011-2012 season.

Ground control points were collected on Laggard, Hermit, and Amsler Islands, as well as Shortcut Point. The only remaining high priority point left to be collected is on Stepping Stones Island, but the two sites there are near delicate wildlife nests so the decision has been made to wait until the wildlife moves on before collecting data on Stepping Stones Island.

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 was installed in the Palmer Aquarium. The Research Associate downloads data and cleans the instrument on a weekly basis.

The FRRF was cleaned weekly and data were sent to the PIs. The FRRF was affected by the power outage early in the month, but was returned to normal operation when it was discovered to not be working shortly after the outage.

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 RASA operated normally for the duration of the month. After the prior month's change out of the hardware for the seismic computers, the control computer for the RASA was found to have a network conflict with the seismic router. The computer was given a new IP address and no known issues resulted from this conflict.

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 tide gauge operated normally during 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 operated normally throughout the month. Scheduled inspections were carried out at the Gamage Point tower. Weather updates and satellite imagery were forwarded to the *ARSV Laurence M. Gould*.