

PALMER STATION MONTHLY SCIENCE REPORT

January 2012



Bill Fraser (B-013) measures a giant petrel egg on Humble Island. Fraser's research group has been studying this population of giant petrels for the past 21 years.

Image Credit: Alexandra Isern

NEWS FROM THE LAB

By Carolyn Lipke, Assistant Supervisor of Lab Operations

Our January here at Palmer Station was bookended with visits from the *R/V Laurence M. Gould* at the beginning and end of the 20th annual LTER cruise. Our streak of bad weather was finally broken with a handful of truly spectacular days, and we hosted several visiting cruise ships and yachts. The Birders (B-013/Fraser) completed two planned camping trips on Biscoe Island, allowing them to complete work at this site even when the weather forecast was grim.

Two science groups led by Matt Cottrell (B-026) and Rick Lee (B-256) spent the month here on station. All of the new arrivals added some fresh energy to station, which was wonderful. Station personnel enjoyed participating in the educational outreach activities led by the B-256 outreach coordinator Natalie Harr. She also taught us how to dance the Cha Cha. We had the pleasure of having an NSF representative, Alexandra Isern, on station this month. During a hike on Amsler Island Alex spotted some small mushrooms, something no one currently at Palmer has seen growing here previously. Samples of the mushrooms were collected for identification by Robert Blanchette at the University of Minnesota.

One of the highlights of the month was the Rutgers Slocum Glider (B-019/Schofield) completing its mission from Palmer Station to Rothera Base (British Antarctic Survey). The glider traveled over 1300 km during the 61 days of this mission making it the longest glider flight to date by this group in the Antarctic.

JANUARY 2012 WEATHER

By Brian Nelson, Research Associate

This January was the darkest in the past ten years. From 2003 to 2011, the light intensity data for January averages 183 W/m^2 . This January, it was 155 W/m^2 . For that same time period average melted precipitation for January is 35mm. This year we had 70mm. Average January snowfall is 4cm, this year we had 13cm. Winds averaged 7 knots, nice and calm, but not helpful for air sampling efforts. The maximum wind gust in January was 52 knots. Air temperature averaged $1.1 \text{ }^\circ\text{C}$, with a minimum of $-1.8 \text{ }^\circ\text{C}$ and a maximum of $6.4 \text{ }^\circ\text{C}$. Sea ice conditions consisted of some brash ice moving in and out with the wind and the tide. Sea surface temperature is now around $0.5 \text{ }^\circ\text{C}$, but still too cold for any sensible person to go swimming.

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, Bill Fraser, Kristen Gorman, Jen Mannas

The arrival of the Laurence M. Gould on January 2nd increased our personnel to five people. Kristen Gorman and Jen Mannas departed on the annual LTER cruise on January 4th. Weather conditions continued to be challenging for the first few weeks of January, with periods of high winds that postponed field operations and prevented access to our farther-ranging field sites. Heavy precipitation also postponed some of our more sensitive bird-handling tasks.

Monitoring of Adélie penguin breeding chronology continued this month, as we obtained crèche dates, continued indicator counts, and completed an all-colony chick census on local islands as well as on Dream and Biscoe Islands. Adélie chick measurements occurred in conjunction with our LTER cruise team's Avian Island measurements. Gentoo indicator counts continued, and a gentoo chick census was completed on Biscoe Island. Foraging ecology studies of Adélie and gentoo penguins continued this month with the deployment of presence/absence radio transmitters, satellite transmitters, and dive depth recorders, as well as the addition of diet sampling. The penguin foraging ecology work was successfully aligned with the B019 glider deployments. The Humble Island Adélie penguin radio transmitter project was interrupted for a short period mid-month as the equipment experienced a minor malfunction; with the assistance of Comms and IT, the system was back online shortly.

Skua work continued this month, as we continued observing hatches and monitoring chick growth of brown skuas on local islands as well as on Dream and Biscoe Islands. Similar nest monitoring as well as diet collections continue on Shortcut Island for south polar skuas. Monitoring of the blue-eyed shag colony on Cormorant Island continued. Satellite transmitters continue to be deployed on giant petrels, and our all-island giant petrel census that began in mid-December was completed. Hatch dates and chick growth measurements were obtained for giant petrels on Humble Island as part of our annual study.

Monitoring of marine mammals has continued and was highlighted by sightings of humpback whales throughout the month. Lab work continued this month with diet sample processing. We also participated in a few tour ship visits that occurred this month.

Thanks to RPSC for their continued support this month. Thanks to Rick Armendariz and Jeff Otten for their assistance troubleshooting the Humble Island system, and to our many field volunteers that assisted us throughout the month. We greatly appreciate Carolyn Lipke's persistent and successful juggling of our volunteer schedule. Special thanks to Graham Colegrove for his extra efforts as the boating coordinator this month; his diligent support has been critical for our operations.

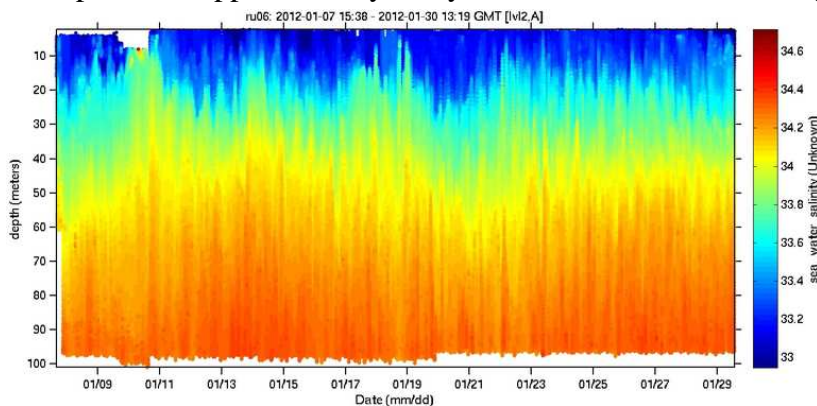
B-019-P PALMER LONG TERM ECOLOGICAL RESEARCH (LTER): LOOKING BACK IN TIME THROUGH MARINE ECOSYSTEM SPACE, PHYTOPLANKTON COMPONENT

Principle Investigator: Oscar Schofield, Rutgers University

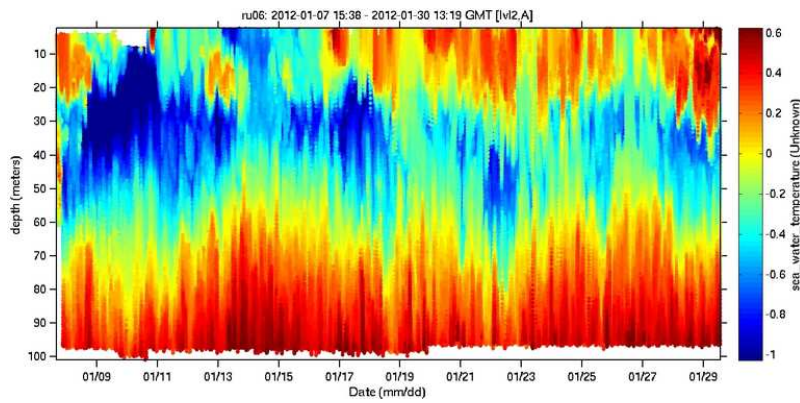
Personnel on Station: Katie Brennan, Nicole Couto, and Travis Miles

January was a month of intensive sampling and glider work at Palmer Station. Two new members joined us in the lab Katie Brennan, a Masters in Planning and Public Policy at the Rutgers Bloustein School and Nicole Couto, an Oceanography student in our group. Katie will be with us through March, helping with sampling but also doing an independent study on the economic impacts of Climate Change, on New Jersey in particular. Nicole is here for January and is starting a PhD with our group.

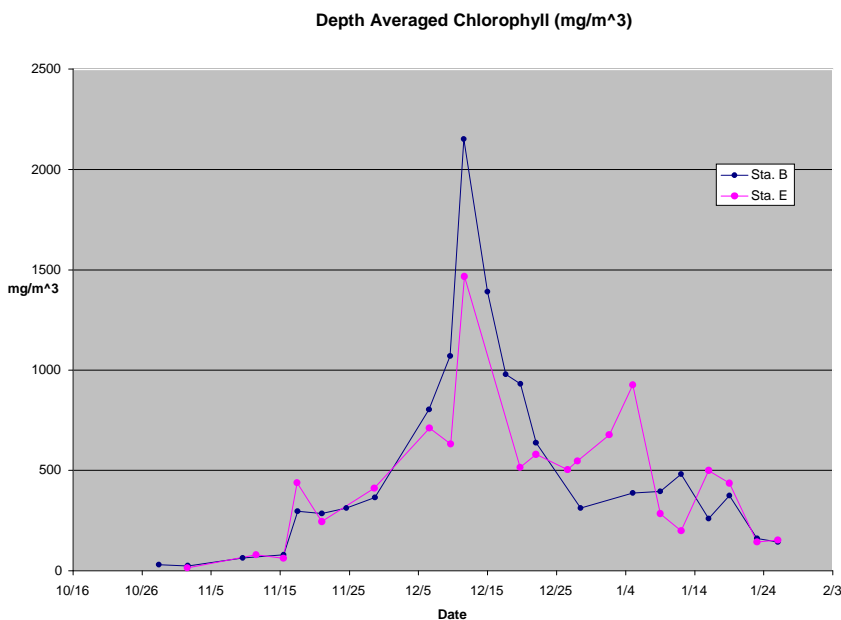
A field campaign was started in concert with other LTER groups, the Steinberg and Fraser groups in particular. We are seeking to identify the co-variations of hydrographic properties, phytoplankton, krill and penguin foraging on the Palmer Basin. Prevailing hypotheses are that tidal flushing and/or canyon dynamics drive phytoplankton growth in the region. This growth may scale up through the food web and result in penguin foraging on krill at different locations in the Palmer region. In order to study this we deployed 2 gliders to act as virtual moorings at different locations while satellite tags were deployed on penguins and a krill echosounder survey was done over different regions. Preliminary results (Figure 1) show mixed-layer variability with a period of approximately 4 days over the Bismark Strait region at the head of the canyon for a



large portion of the deployment, followed by a period of calm after a large warm eddy came through the region. Depth-averaged currents show flow is predominantly onshore except for current rotation timed with eddy passage.

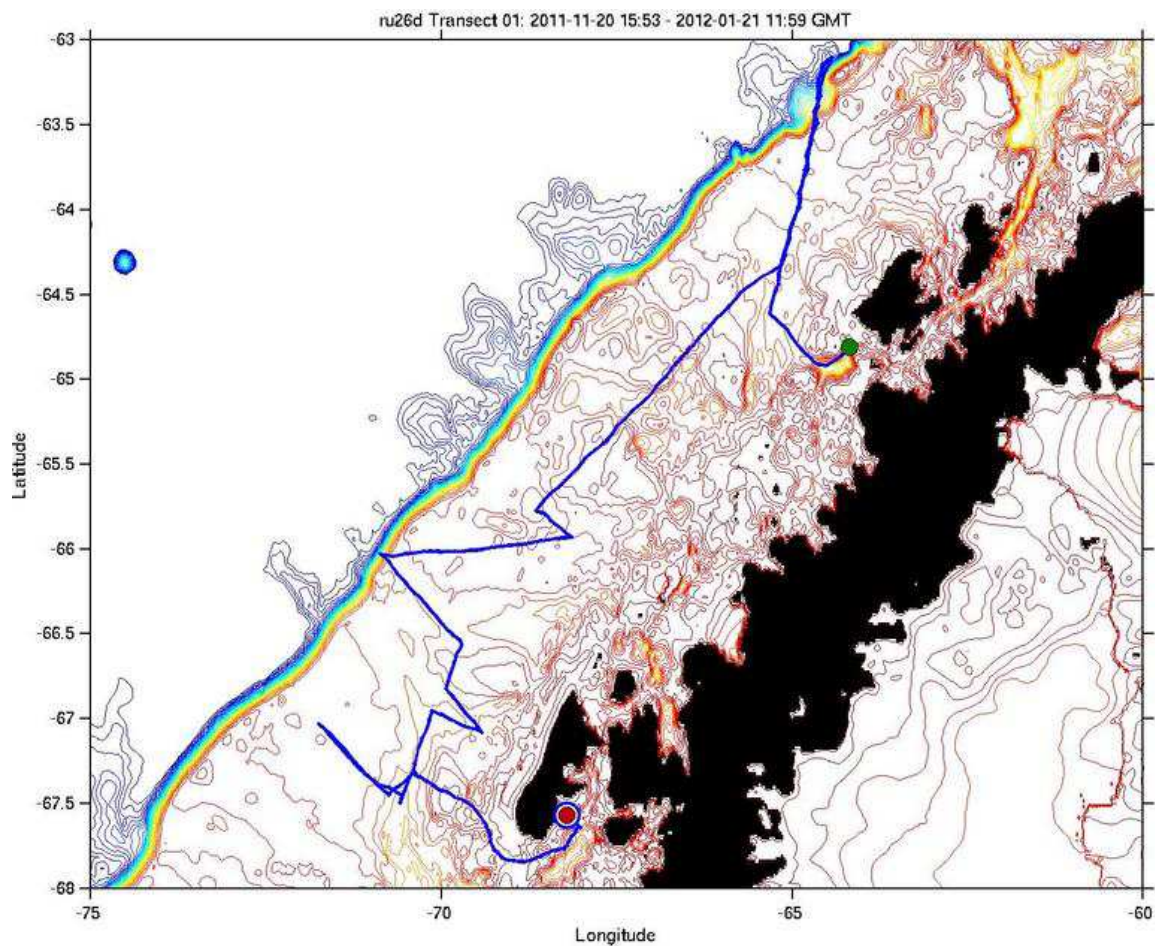


Regular time-series sampling showed a peak in phytoplankton biomass during mid December with a secondary peak in January, which has slowly decayed throughout the month.



Further data analysis will be needed to understand the dynamics forcing near shore variability. Data from a glider mounted Acoustic Doppler Current Profiler will be used to identify currents as well as krill aggregations from the January deployment. A FiRe sensor mounted on another glider also deployed over this month will be used to identify primary productivity during this time period.

Also this month, the British Antarctic Survey (BAS) at Rothera recovered RU26d, a glider deployed by our group at Palmer in November. In 61 days this glider flew over 1300 km sampling the continental shelf of the Western Antarctic Peninsula (WAP) serving to foster future collaborations with our neighbors to the south in understanding the physical and ecosystem responses of the WAP to climate change.



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

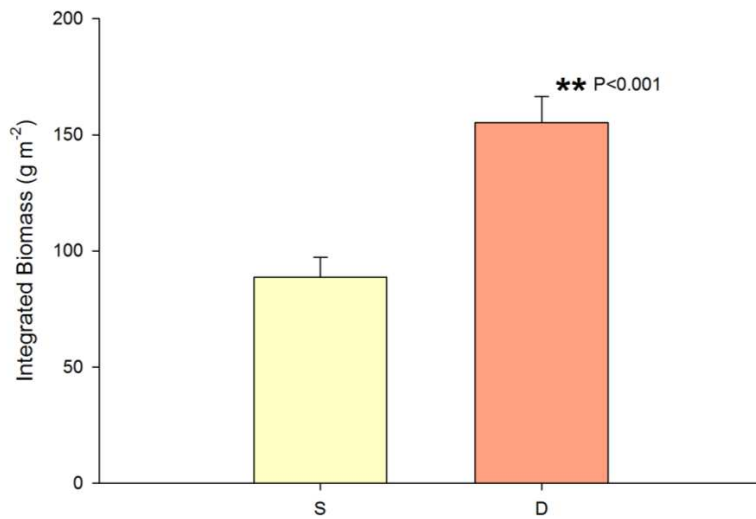
Personnel on station: Dr. Kim Bernard (Post-Doctoral Research Associate)

I sampled two diurnal/semi-diurnal tidal series during January. The first diurnal tidal phase began January, 4 and I was able to join the LTER annual cruise (LMG12-01) for their first sampling day at Process Station 1. With the LMG, we were able to sample a much larger scale grid over the head of the Palmer Deep Canyon. Unfortunately, the echo sounder malfunctioned part way through the survey. We were, however, able to successfully sample the first 3 major transects of the grid. For the remainder of that diurnal tidal phase as well as the following semi-diurnal phase, I sampled the standard near shore grids by zodiac.

For the second diurnal/semi-diurnal tidal series of the month, I decided to compare Biscoe to Palmer and conducted a grid in Biscoe Bay in addition to just one of the Palmer grids. During that study though, data from gliders deployed in the region suggested that an eddy came through. The currents reversed and the krill biomass dropped off significantly. At the end of semi-diurnal part of that tidal series, I again joined the LMG to conduct another offshore survey, this time in the region of the Wauermans Islands. Data from tagged penguins showed that a number of the birds were feeding in that region and we were interested to see if krill biomass was high there.

Preliminary results of the season's work suggest that krill densities increase significantly during the diurnal tidal phases in the Palmer Station region. It is yet to be determined whether this is due to the currents delivering the krill to the near shore, or whether the diurnal tides create conditions suitable for the formation of dense phytoplankton blooms, which the krill then move towards. Note though, that when the eddy came through the area and when gale force northerly winds prevailed, the krill were not able to maintain their position in the near shore and were consequently exported out of the area.

I am now preparing to depart on the north bound LMG12-01. This season has been extremely successful, and I owe a lot of thanks to the Raytheon support team as well as my fellow LTER field team members.



Error bars are 2 Standard Errors

Figure 1. Mean integrated (through the water column) krill biomass (g m^{-2}) in the near shore waters off Palmer Station for semi-diurnal (S) and diurnal (D) tidal phases. Note that values during the diurnal phase were significantly higher than those during the semi-diurnal phase ($p < 0.001$).

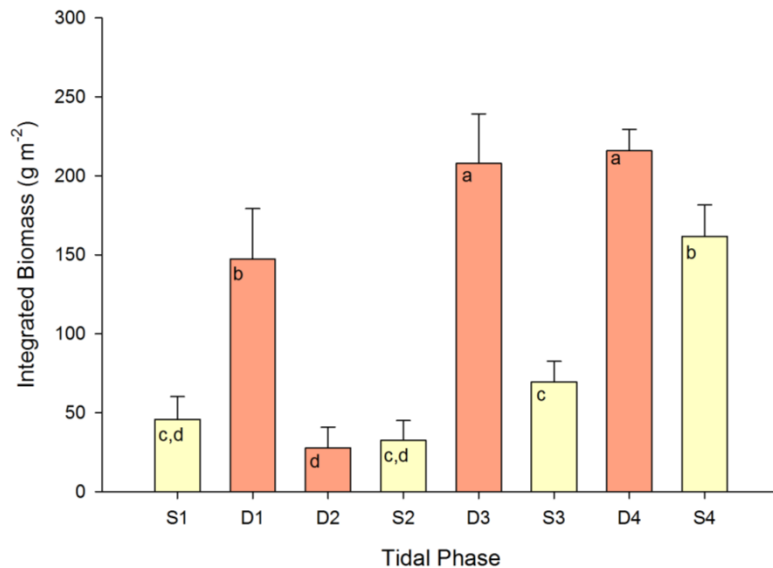


Figure 2. Mean integrated krill biomass (g m^{-2}) for the semi-diurnal (S1, S2, S3, S4) and diurnal (D1, D2, D3, D4) tidal phases survey during the season. Note that we were unable to sample the semi-diurnal tide between D1 and D2 as we were iced in for 10 days and then experienced 2 days of gale force (> 40 knots) northerly winds. The lowercase letters on the bars represent significant differences ($p < 0.05$).

B-026-P: PHOTOHETEROTROPHIC MICROBES IN THE WEST ANTARCTIC PENINSULA MARINE ECOSYSTEM

Matthew T. Cottrell, Principal Investigator, School of Marine Science and Policy, University of Delaware, Lewes, DE

Personnel on station: Matt Cottrell and Mrina Nikrad

The goal of this project is to examine the role of microbes that supplement their growth with light energy harvested from sunlight. About half of the bacterial cells in the surface waters of the ocean at lower latitudes are equipped with some form of light harvesting apparatus, but it is unclear if such photoheterotrophic microbes are also abundant in high latitude waters near the west Antarctic Peninsula as well. We expect that these microbes are abundant and actively growing in these waters, but the extent of their contribution to carbon cycling is unknown. One premise of our work is that seasonal variation in sunlight and ice cover will be reflected in the contribution of photoheterotrophic microbes to total microbial metabolism and C cycling. Our study uses seawater collected in coordination with the LTER group to take advantage of those time series core data and we hope to place our results within the broader context of the LTER time series. Our work this month has focused on three types of analyses, including bulk measurements aimed at determining in situ rates of metabolism, incubation experiments designed to assess the expression of photoheterotrophy genes and radiotracer assays to follow the incorporation of inorganic C into microbial biomass in the light and the dark. One type of photoheterotrophic microbe that we are focusing on is aerobic anoxygenic phototrophic (AAP) bacteria. AAP bacteria consume organic materials and harvest light using bacteriochlorophyll a (BChl a). This pigment fluoresces in the infrared, which allows us to enumerate them by infrared epifluorescence microscopy and image analysis. We are using radiolabeled compounds and epifluorescence microscopy to assess the abundance of BChl a-containing cells that actively

assimilate a variety of organic substrates and inorganic C in the light and the dark. The samples that we are collecting this month will be returned to our lab and analyzed using our microscope and image analysis system that has been newly upgraded with a high precision, computer controlled stage giving us the ability to repeatedly image cells that fluoresce with BChl a and determine if they actively take up organic substrates and inorganic C.

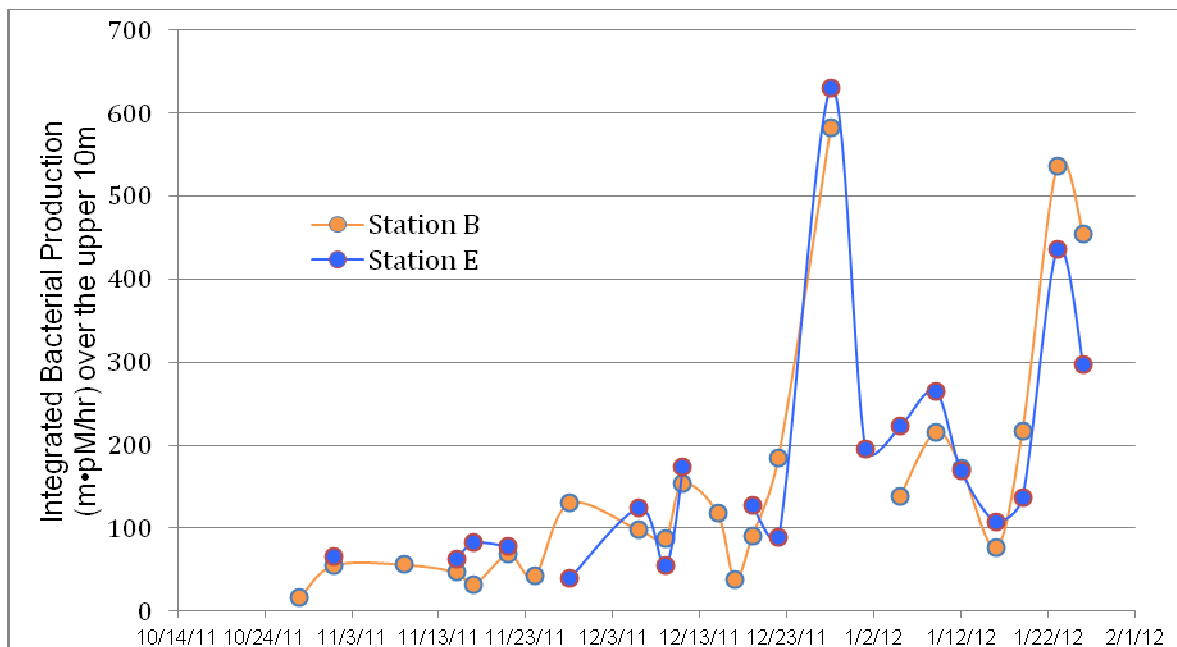
B-045-P: PALMER, ANTARCTICA LONG-TERM ECOLOGICAL RESEARCH (LTER): CLIMATE MIGRATION, ECOSYSTEM RESPONSE AND TELECONNECTIONS IN AN ICE-DOMINATED ENVIRONMENT: MICROBIAL / BIOGEOCHEMICAL COMPONENT

Principal Investigator: Dr. Hugh Ducklow (Ecosystems Center, MBL)

Personnel on station: Zena Cardman, Luke McKay, Nikhil Murgai

Our strong collaboration with the B-019 group continues to run smoothly as we share a sampling platform on the Bruiser zodiac and readily exchange data. This month we were happy to welcome the B-026 group to our semiweekly sampling operations, and together with B-019 our groups successfully sampled all of our planned sampling days in January.

Our leucine incorporation data indicates the second of two large peaks in surface water bacterial production occurring late this month (see graph below). These peaks, however, represent lower levels of microbial activity than are typical over the summer season in the Palmer area. Due to the occurrence of the LTER cruise and its use of our flow cytometer, we preserved additional samples from all depths at Stations E and B for future analyses of bacterial abundance. Additional surface water was collected from Station B every Monday to assess the persistence and population dynamics of bacteria and phytoplankton over the course of a 6-day growth experiment. These samples were also preserved for future flow cytometry analysis.



Seawater sampling this month was immensely improved by the addition of a new winch for the Bruiser zodiac platform, for which we are incredibly grateful! This allowed for both quicker and safer sampling operations.

In addition to our typical ocean sampling regime, we had the exciting opportunity to collect pristine glacier ice and surface snow for a state-side collaborator at Princeton University. These samples will be analyzed for isotopic abundance of naturally occurring Carbon-14. This would not have been possible without the magnificent support and eager-to-help attitude of the Glacier Search and Rescue team at Palmer Station.

We would like to take this opportunity to thank the National Science Foundation and Raytheon Polar Services Company for Palmer Station and the people who maintain it. It has been an absolute pleasure to work and live here.

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: Richard Lee, David Denlinger, Shin Goto, Natalie Harr

Winter survival for many polar organisms depends on a coordinated transition from feeding, growth and reproduction during short summers, to an energy-conserving dormancy coupled with enhanced resistance to environmental extremes during long, severe winters. Our project focuses on physiological and molecular mechanisms used by larval midges for winter survival. Although summer larvae are freezing tolerant, we recently demonstrated that they also have the capacity to cryoprotectively dehydrate. Consequently, we seek to determine whether larvae rely on freezing or dehydration for winter survival. Many temperate species rely on photoperiodic cues to trigger physiologic retooling in advance of winter, however few studies have specifically addressed the role of photoperiodic timers in polar animals. Our second major objective is to determine whether larvae have the capacity to use photoperiodic cues to trigger anticipatory preparations for winter.

The efficient support system at Palmer Station allowed us to begin field collections almost immediately upon arrival. During our first collecting trip, we found both adults and larvae of the wingless midge (*Belgica antarctica*), whose exceptional tolerance to a variety of environmental stresses comprises the focus of our research. Fly larvae are found in diverse microhabitats ranging from moss beds to mats of the terrestrial alga (*Prasiola*) to guano-rich sites adjacent to penguin rookeries. This month we began a series of field and laboratory investigations that will extend through May to investigate whether larvae survive winter by freezing or dehydration. We are also conducting field and lab experiments designed to track expression of the major clock genes and the proteins they encode. Currently, we are videotaping larvae and adults continuously over several days to assess whether daily rhythms of activity exist.

Our outreach efforts seek to connect the science activities of our team and other research projects on station with teachers and their students. Our website (www.units.muohio.edu/cryolab/) at Miami University provides K-12 classroom activities based on national and state standards. Natalie Harr, a first-grade teacher, serves as our educational outreach coordinator this year. Prior

to the team's departure, Lee and Harr visited Crestwood Local Schools and nearby schools to hold assemblies, visit classrooms, and conduct hands-on scientific investigations with more than 1900 students. Harr's outreach efforts target the youngest and most impressionable learners. Her website and blog are at www.crestwoodexplorestheworld.org, which has received up to 1,650 hits per day, uses interactive technology (ex. Skype sessions with classrooms, movies, slideshows, gigapan exploratory images) to connect 450 preschool to 2nd grade students on the critical role of 21st century scientists. To celebrate the school-wide reading of "Mr. Popper's Penguins," Palmer Station joined the Crestwood community in a "popcorn and pajama" showing of this newly released movie.

We are grateful to station personnel for their support and helpfulness during our third field season. Carolyn Lipke and Lily Glass provided efficient and prompt assistance that allowed us to quickly set-up our laboratory and begin research. Graham Colegrove provided prompt and efficient support for our boating needs. Distance learning sessions and gigapan photography were greatly facilitated by Jeff Otten and Paul Queior.

**PALMER STATION
RESEARCH ASSOCIATE MONTHLY REPORT
January 2012
Brian Nelson**

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.

Data collection occurred normally during the month. Work was done on the new fiber optic cables running to the seismic hut.

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. The data hard drive was replaced with a new one.

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 was powered back up in early January. A couple small issues arose shortly after, but were easily remedied.

**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 through 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.

Sampling occurred regularly throughout the month. The air sampling mast relocation was completed, and the first samples were taken in the new location.

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

James Butler, Principle 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.

O-264-P: ULTRAVIOLET (UV) SPECTRAL IRRADIANCE MONITORING NETWORK

James Butler, Principle 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.

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.

G-295-P: GPS CONTINUOUSLY OPERATING REFERENCE STATION.

Bjorn Johns, 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.

A-306-P: GLOBAL THUNDERSTORM ACTIVITY AND ITS EFFECTS ON THE RADIATION BELTS AND THE LOWER IONOSPHERE.

Umrans Inan, 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.

Data collection was normal throughout the month.

T-312-P: TERASCAN SATELLITE IMAGING SYSTEM

The TeraScan system collects, processes, and archives DMSP and NOAA satellite telemetry, capturing approximately 25-30 passes per day. The Research Associate operates and maintains on-site equipment for the project.

The TeraScan 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. The group is investigating recurrent spikes in the data.

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 the Outcast Islands.

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 operated normally through the month.

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.

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 R/V LAURENCE M. GOULD. The old PalMOS computer was virtualized and moved onto one of Palmer's servers.