PALMER STATION MONTHLY SCIENCE REPORT

R/V Point Sur arrives at Palmer Station *(image credit: Jullie Jackson)***.**

NEWS FROM THE LAB
By Carolyn Lipke, Assistant Supervisor of Laboratory Operations

January was yet another busy month here at Palmer Station. The month began with welcoming the *ARSV Laurence M. Gould* (LMG) back to station for the annual Palmer Long Term Ecological Research (LTER) cruise. The arrival of the LTER cruise is somewhat of a family reunion, with many of the researchers returning year after year.

This month we also welcomed the *R/V Point Sur* to Palmer Station. The vessel transited here all the way from Moss Landing, California, and will be working along the peninsula through the end of February.

At the end of January we reached our maximum population of 52 people, and 8 research groups on station.

JANUARY 2013 WEATHER
By Glenn Grant, Research Associate

January weather was a mixed bag. The remarkably dry, sunny weather pattern of the previous month dissipated and was replaced by a succession of maritime storm fronts and low pressure systems. These fronts brought drizzle, gusty winds, and occasional rain or snow flurries, punctuated by sun breaks; in other words: normal January weather for Palmer Station. The average temperature for the month was 2.3° C, exactly the same as the historical 16-year average. The high temperature was 8.7° C (48° F) on the 8th, and the low was -0.9° C (30° F) on the 31st.

Measurable precipitation was recorded on 12 days, totaling 84.3 mm (3.3 inches). Two days had snowfall that briefly stuck, for a total of 5 cm, but it all melted within a few hours. Snowstake accumulation remained at or near zero. Small patches of drifted snow from the previous winter stubbornly hung on through the month, but otherwise the landscape is of bare rock and ice. Wind speeds averaged 7 knots, with a maximum gust of 42 knots on the 19th.

No sea ice was observed during the month. Bergy bits and brash ice of land origin, however, were abundant as the glaciers around Arthur Harbor and Wiley Bay calved regularly. Sea surface temperatures ranged from 0.4° C to 2.5° C.

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

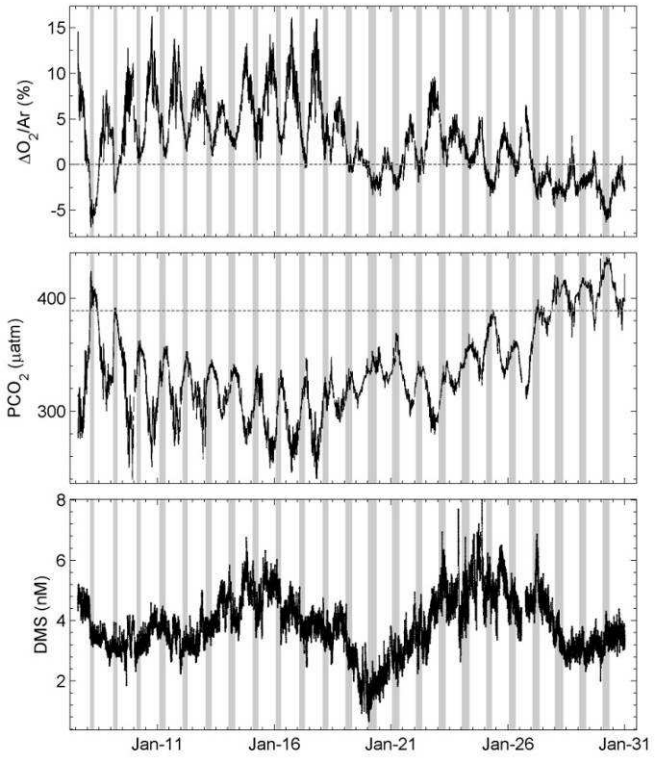
Personnel on Station: Philippe Tortell, Elizabeth Asher, and Jodi Young

This has been another very busy month for our group, with 3 people on station working intensively on a number of related projects. After some equipment problems in late December, our membrane inlet mass spectrometer is now fully functional, and continues to capture the high resolution dynamics of pCO_2, biological oxygen saturation (ΔO_2 /Ar) and dimethylsulfide (DMS). Following the huge phytoplankton bloom in November / December and the associated pCO_2 drawdown and O_2 accumulation, gas concentrations have been much closer to atmospheric saturation values. Primary productivity and phytoplankton biomass (Chl *a*) have been relatively low and constant, yet we continue to see significant diel cycles in surface water pCO_2 and ΔO_2 /Ar indicative a net production signal. Towards the end of the month ΔO_2 /Ar fell to values below zero, while pCO_2 increased above equilibrium values. These results suggest that the system may be moving towards a net heteterotrophic state where respiration exceeds photosynthesis. High frequency measurements of surface DMS concentrations resolve very interesting temporal dynamics, with concentrations ranging from ~ 1 to 8 nM.

We conducted our 3rd CO_2 incubation experiment, culturing natural phytoplankton assemblages for several weeks under 150, 350 and 800 ppm CO_2. We collected samples to quantify phytoplankton / bacterial biomass and productivity, as well as a suite of samples used for measurements of cellular inorganic C uptake properties and enzyme expression levels. We also continued weekly / bi-weekly sampling of phytoplankton productivity and inorganic C uptake characteristics (*e.g.* HCO_3^-/ CO_2 uptake ratios, carbonic anhydrase activity and kinetic properties of C uptake).

Work continues on characterizing the concentrations and turn-over rates of DMS and related compounds (DMSP/DMSO). In addition to our continuous measurements, we are also collected discrete samples for analysis at station B, and using an automated flow-through system for DMSP/DMSO. Over the past month, we conducted 3 successful grazer dilution experiments to examine the impacts of micro-zooplankton on DMS/P production and cycling. We also conducted 8 competitive inhibitor experiments and 9 isotope tracer experiments to examine the rates of net and gross DMS production / consumption, and to quantify the relative importance of

DMSP and DMSO as sources of DMS. Finally, we continue to maintain some enrichment cultures aiming to isolate novel bacteria that are capable of DMSO and $DMSO_2$ reduction.



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: Donna Patterson-Fraser, Shawn Farry, Ben Cook, and Darren Roberts

The arrival of the *ARSV Laurence M. Gould* on January 3rd briefly increased B-013 personnel at Palmer to six people. However, Jen Mannas and Cameron Rutt departed on the annual LTER cruise leaving four birders at Palmer Station for most of January.

Monitoring of Adélie penguin breeding chronology continued this month, as we obtained chick loss dates and 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 and Charcot Island measurements. 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. We also began diet sampling Adélie, gentoo and chinstrap penguins on Torgersen, Biscoe and Dream islands.

Skua work continued this month documenting 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 also continued. Satellite transmitters continue to be deployed on giant petrels, and our all-island giant petrel census that began in mid-December was completed. Our annual Humble Island giant petrel study began this month with documentation of petrel hatch dates and close monitoring of chick growth that will continue through the end of the season.

Monitoring of marine mammals continued with large numbers of leopard seals and humpback whales observed throughout the month. Lab work continued this month dominated by penguin diet sample processing. We also participated in tour ship outreach activities during the Veendam, Corinthian II and Ushuaia visits.

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: Nicole Couto, Filipa Carvalho, and Mikaela Provost

Regular LTER sampling at Stations B and E continued twice weekly during January. Additionally, we continued our study of the Palmer Deep, the canyon south of Anvers Island. This canyon is thought to be a biological hotspot as it provides predictable food resources and drives penguin foraging locations. However, the physiology and composition of these blooms and the mechanism driving them are not yet known. Two main hypotheses for the driving mechanism are being evaluated in this study. The blooms are being controlled by the upwelling of nutrients (due to bathymetry or the canyon circulation) or they are driven by the shoaling of the Upper Circumpolar Deep Water (UCDW) below surface waters in the canyon creating a shallow mixed layer, affecting the light available for phytoplankton. In order to test these two hypotheses, we deployed 2 gliders, equipped with CTD, fluorescence, backscatter; ADCP and FIRe (Photo 1) to map the center, along the edges and outside of the canyon, and capturing localized regions of high biological activity “hotspots” using chlorophyll as indicator.

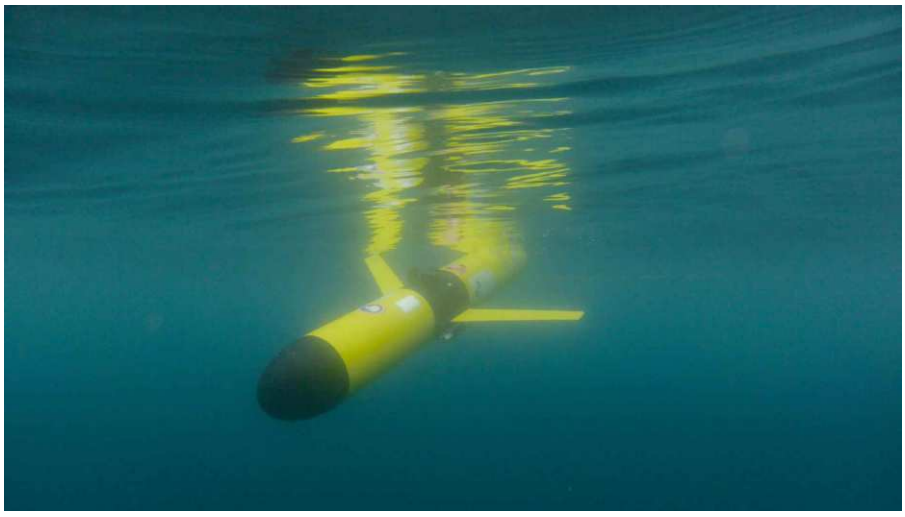


Photo 1: Glider ru24 diving with FIRe sensor.

This study also included two sets of 7-days incubation experiments to determine the response of natural phytoplankton communities to various nutrient (dilutions with deep and nutrient rich water) and different light regimes. In the first incubation experiment, water was collected on board the *ARSV Laurence M. Gould* on the first day of the LTER cruise and water for the second experiment was collected aboard the *R/V Point Sur* (Photo 2).

Photo 2: Collecting water aboard the *R/V Point Sur*.

Both experiments used three nutrient treatments (100% deep water, 100% surface water and a mix of 50% surface and 50% deep (nutrient rich) water along with three light treatment (100%, 50% and 10% of light) using screenings on the carboys. 21 20L carboys were filled and screened according to the scheme bellow (Figure 3).

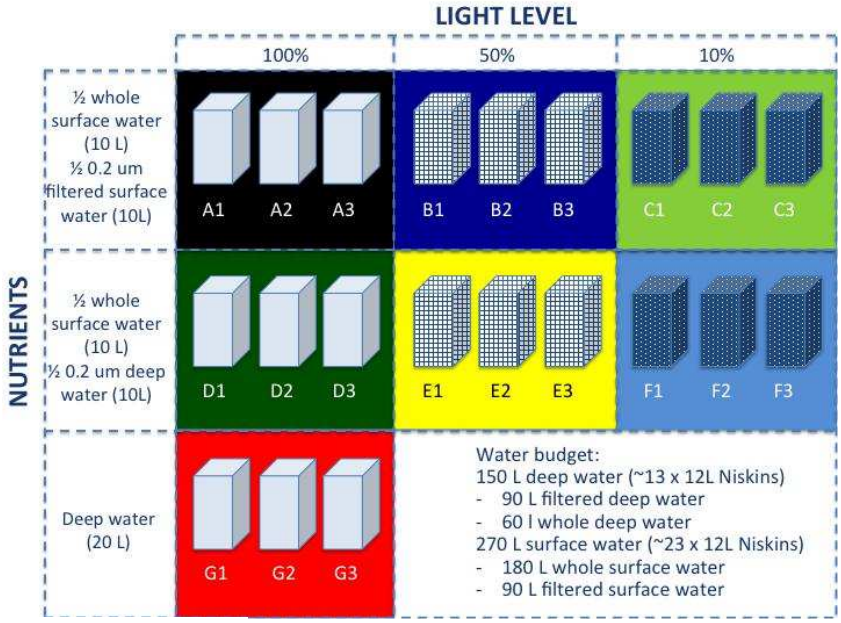


Figure 3: Incubation Experimental design.

All incubation carboys were sampled on day 0, 1, 2, 4 and 7 (Photo 4). Water was filtered for chlorophyll, HPLC, POC, nutrients and genomics. Primary productivity was evaluated through 24h incubations with C14 and water samples were preserved for flowcytometry and phytoplankton community structure studies. FIRe measurements were also made. Most samples are being shipped and analyzed back at Institute of Marine and Coastal Sciences, at Rutgers University.

Photo 4: Sampling carboys from incubation tank.

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

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

Personnel on station: Kim Bernard and Dominique Paxton

This season we are focusing on the krill prey field in relation to top predator foraging activity. The objective of this study is to determine whether or not there is any resource partitioning, particularly between the two dominant penguin species in the region, the Adélie and gentoo penguins. With the Adélie penguin population declining in the region and the gentoo penguin population on the rise, we are interested to find out whether or not the gentoo's have a competitive advantage over the Adélie's with respect to their foraging.

We are using acoustics to survey the krill distribution patterns, abundances and biomass and also to describe the aggregations that they form. We are conducting visual observations of foraging Adélie and gentoo penguins as well as other top predators (including chinstrap penguins; humpback and Minke whales; crabeater, leopard and fur seals; and Wilson's storm petrels and Antarctic terns) within a 50 m radius of the zodiac while we are running the acoustic transects. Foraging predators are then associated with nearby krill aggregations (within 500 m of each other) and we will later examine any relationships between krill aggregation parameters (e.g. depth, width, length, biomass, abundance, etc.) and predator foraging behavior (e.g. foraging at surface, diving, bubble feeding, lunge feeding, etc.).

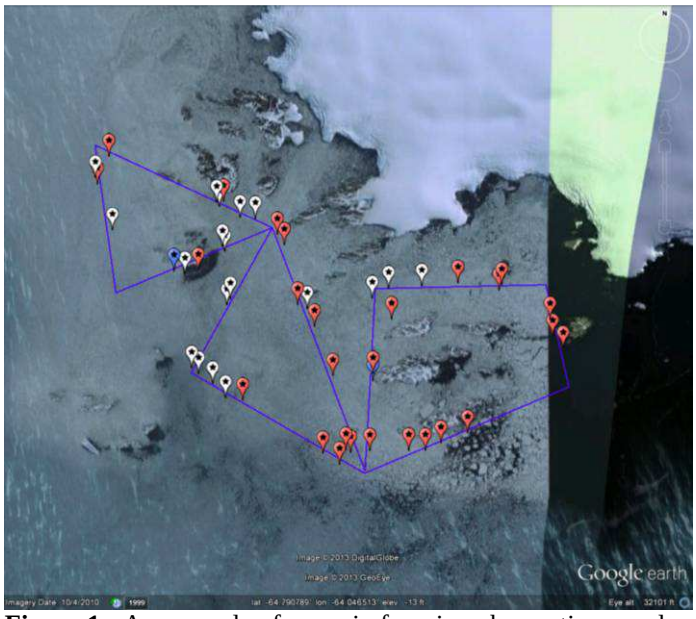


Figure 1: An example of penguin foraging observations made on December 13, 2012. Orange markers represent gentoo penguins, white are for Adélie penguins and blue markers are for chinstrap penguins.

To date, we have conducted 19 acoustic surveys of krill aggregations in the waters off Palmer Station since arriving in early December 2012. We have sampled 4 diurnal and 4 semi-diurnal tidal phases. We have encountered 2821 aggregations of krill in total and have observed 490 foraging top predators. We have most frequently encountered foraging gentoo penguins (45% of all foraging top predators observed were gentoo penguins), followed by Adélie penguins (26%) and chinstrap penguins (11%). Humpback and Minke whales are observed less frequently (2% and 1%, respectively). Wilson's storm petrels and Antarctic terns are also observed foraging less frequently (1% for each), and we have only observed a single crabeater seal foraging on a krill aggregation to date.

We have collected krill for length frequency measurements during every diurnal tide and have used these data to estimate abundances and biomass of krill in aggregations encountered acoustically. Krill length frequencies have typically been dominated by the 20 – 30 mm size class (see Figure 2). The Diurnal 2 catch, however, was dominated by three size classes; 12 – 14 mm, 21 – 23 mm and 32 – 34 mm. Krill are caught with a 1 m ring net (2 mm mesh size) hauled by hand from the zodiac. We measure the length of an individual krill from the anterior tip of the rostrum to the posterior tip of the uropod.

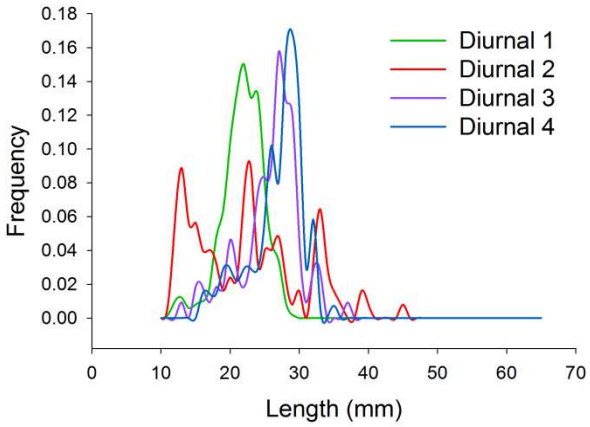


Figure 2: Krill length frequencies for periods sampled from December 10, 2012 to January 24, 2013.

Figure 3: Kim empties krill caught by the IKMT net from the cod-end into a bucket onboard the *R/V Point Sur*.

In addition to our zodiac based study we conducted acoustic surveys from both the *ARSV Laurence M. Gould* and the *R/V Point Sur*. Both surveys focused on the region of the Palmer Deep canyon, looking at distribution patterns and aggregation structure of Antarctic krill in and around the canyon. The purpose of these surveys was to further understand the role that the canyon plays in concentrating krill and in delivering it to the nearshore during diurnal tides. In addition to acoustics, we conducted net tows from both vessels to collect krill for length frequency measurements. We used a 2 m Metro net (on the *ARSV Laurence M. Gould*) and an Isaacs-Kidd Midwater Trawl (IKMT) net (on the *R/V Point Sur*).

Figure 4: Domi prepares a sub-sample of the krill for length measurements in the laboratory onboard the *R/V Point Sur*.

Figure 5: Antarctic krill prepared for length measurements.

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, Stefanie Strebel, and Lara Vimercati

Early January marked the beginning of the annual month-long LTER cruise along the Antarctic Peninsula. Before departing on the cruise, the *ARSV Laurence M. Gould* (LMG) dropped off a number of new personal on station, including Lara Vimercati who joined B-045-P.

Throughout the month of January, B-045-P and B-019-P continued biweekly LTER sampling. As part of the LTER, B-045-P samples biweekly for bacterial productivity, bacterial and phytoplankton abundance, dissolved organic carbon, particulate organic carbon and nitrogen, and nutrients. Bacterial productivity and abundance both appeared to have stabilized following the massive spike in mid-December.

Towards the end of January, Stefanie Strebel boarded the *R/V Point Sur* for a four-day cruise from Palmer Station to Palmer Deep. Along with assisting B-019-P and B-020-P in their science, Stefanie collected bacterial and phytoplankton samples from 15 stations. We would like to thank all of the ASC employees for their continued support of our research.

O-176-P SUBMARINE GROUNDWATER AND FRESHWATER INPUTS ALONG THE WESTERN ANTARCTIC PENINSULA

Dr. Reide Corbett, Principal Investigator, and Dr. Kimberly Null, Co-PI, Institute for Coastal Science and Policy, East Carolina University

Personnel on station: Reide Corbett, Jared Crenshaw, David Hawkins, and Leigha Peterson

As I write this report, we are actively packing away our equipment and cleaning the laboratory…we leave on the *ARSV Laurence M. Gould* (LMG) in two days time. Amazing how quick time passes here at Palmer…when I wrote the last report I had very little to report since we had essentially just arrived. As was stated last month, the overarching goal of our project is to quantify the rate and chemical signature of the freshwater discharging into the coastal area near Anvers Island, on the Western Antarctic Peninsula. Last month, I provided some background and data on the work we conducted off the LMG during the 5-days of science offshore of Anvers Island. On the LMG, we were collecting data to evaluate the rate that water is mixing from the shoreline across the continental shelf. Over the last 5 weeks, we have been working within the boating limits of Palmer to begin evaluating the amount and source of freshwater entering the coastal waters. Like our work on the LMG, here at Palmer Station we have been collecting water samples throughout the safe boating region for analysis of two primary freshwater tracers; radium (Ra), specifically the short-lived Ra-224, and the radioactive gas radon (Rn), Rn-222. Other samples to be analyzed back home include those for nutrients (nitrate, orthophosphate, silicate, and ammonium), helium (He), and isotopes of oxygen (O-18) and hydrogen (H-2) that will help decipher the source of the water.

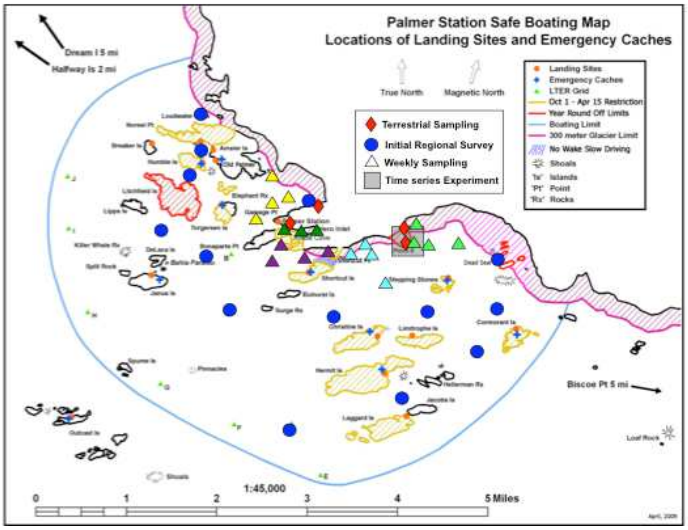


Figure 1: Location of sites sampled during our time at Palmer. Sites include the initial regional survey, weekly transects, samples collected from streams on land, and time-series measurements at Point 8.

Our initial survey (Figure 1, circles and triangles) of the waters was designed to help us focus on areas within the safe boat region that had higher tracer activities, suggestive of greater groundwater/surface water interactions. As expected, our initial survey showed several locations nearshore that had significantly higher activities then the remaining region. Based on this survey, we set up 5 "transects" (Figure 1, colored triangles) that we began sampling weekly in late December to evaluate changes associated with tide and weather conditions, including potential snow and glacial melting from Anvers. These transects are set up to allow us to create individual geochemical box-models, providing boundary conditions for calculating freshwater inputs. As part of these calculations, an end-member signature of the water entering the coastal ocean is required. Therefore, we spent some of our time trying to locate streams and porewaters (groundwater) we could sample. We were lucky enough to find two locations in the Backyard of Palmer Station to sample water that was moving directly from the glacier into surface water.

Figure 2: Sampling water exiting the toe of the glacier and approaching the waterfall that spring created.

The most recent site we located was a spring of freshwater coming directly from the toe of the glacier and cascading into Arthur Harbor (Figure 2). We were able to sample it as it exited the glacier and just before entering the ocean, providing some interesting data on changes to the tracers due to the water-rock interaction just over the short distance to the water. This data will

provide important constraints on our end-member activities for closing the geochemical box models.

Finally, one of our goals was to try to evaluate how groundwater discharge along the coast changes with tides. The plan...we want to measure all the chemical tracers (noted above) in the surface water and groundwater every two hours over a 36 hour time period, while imaging the subsurface using resistivity.

Tides can have significant influence on the rate of submarine groundwater discharge and can significantly alter the concentrations of the tracers we are measuring. As the tide changes, so does the interaction of the surface water and groundwaters. As the tide rises, surface water tends to move into the sediments. In contrast, as the tide drops, groundwater is more likely to discharge into surface water. This back and forth movement of the water is often referred to as tidal pumping. We wanted to evaluate whether this process was occurring here and the possible changes in water chemistry during the process.

So, the site chosen was one of the few areas around Palmer Station that actually has a sandy beach. This area was recently exposed due to the retreating glacier, so it offers a great opportunity to study a type of landform that is likely to be exposed more and more as this and other glaciers continue to retreat. The area is known as Point 8, named by the Navy during early surveys of the area (Figure 3).

Figure 3: Preparing for the Point 8 time-series. Note the red buoy offshore where surface water samples were collected. Sandy beach is located just seaward of ice blocks and extends offshore approximately 15m.

Surface waters were collected directly with a pump and groundwaters using a drive point sampler (a pvc pipe we worked into the sediment about 30 cm). From these we can evaluate changes in the tracers and nutrients as the tide changes. We also measured the resistivity of the subsurface. This is a method that allows us to evaluate the difference between saltwater and

freshwater beneath the ground. Doing this over the course of the tidal cycle provides direct evidence of subsurface mixing and discharge of water. A significant freshwater lens was evident in the resistivity data during low tide (Figure 4). This freshwater lens retreated shoreward as the tide rose, altering tracer concentrations in the porewaters and surface water.

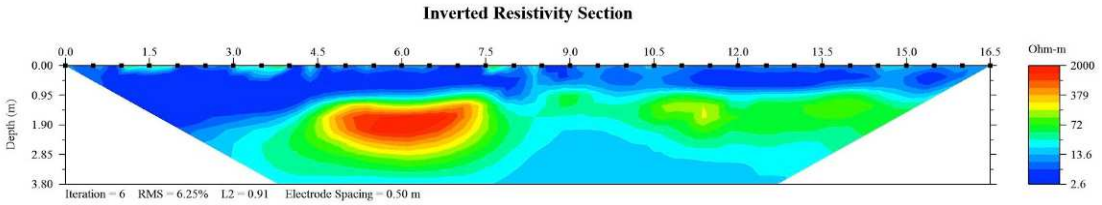


Figure 4: One resistivity image collected near low tide on 1/17/31. Offshore is to the left. The far right side represents the high high tide line. The cool colors are saltier water and the warm colors are fresher water. At this time period, the last 6 meters of the cable (left side of image) is submerged.

Finally, I have tried hard to bring much of this science to many of the regional K-12 schools back in eastern North Carolina. As part of our outreach efforts, we had a live broadcast into several classrooms. The "program" was hosted by David Sybert, UNC Coastal Studies Institute. This was a 30 minute show that featured project details, videos and photos on the project and a live feed from Antarctica with myself, Reide Corbett. Students from throughout NE North Carolina were watching and posting questions via the chat room on Ustream. If you are interested, feel free to have a look at http://www.ustream.tv/channel/unc-coastal-studies-institute.

As we pack our gear to leave Palmer Station, I want to thank all the staff and scientists that we have had the good fortune to work and interact with. This is a fantastic place to work. We would never have been able to get the amount of work done without everyone's help. Thank you again and look forward coming back next year!

PALMER STATION
RESEARCH ASSOCIATE MONTHLY REPORT
January 2013
By Glenn Grant

G-090-P: GLOBAL SEISMOGRAPH NETWORK (GSN) SITE AT PALMER STATION.
Kent Anderson, Principal Investigator, Incorporated Research Institutions for Seismology (IRIS)

Station PMSA is one of more than 150+ sites in the GSN, monitoring seismic waves produced by events worldwide. Real-time telemetry data is sent to the U.S. Geological Survey (USGS). The Research Associate operates and maintains on-site equipment for the project.

The system operated normally throughout the month. The seismic vault was inspected.

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.

All data collection operations were normal. The system was reset twice to correct data transfer problems.

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 was restarted for the winter season and is operating 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 O_2 (detected through changes in O_2/N_2 ratio), which can help to determine rates of marine biological productivity and ocean mixing as well as terrestrial and oceanic distribution of the global anthropogenic CO_2 sink. The program involves air sampling at a network of sites in both the Northern and Southern Hemispheres. The Research Associate collects samples fortnightly from both TerraLab and the VLF Building.

Air samples were collected normally 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 TUVR radiometer also continuously measure hemispheric solar flux within various spectral ranges. The Research Associate operates and maintains on-site equipment for the project.

The UV monitor collected data normally throughout the month. Normal biweekly scans and system maintenance was conducted. The roofbox housing the instrument was inspected. Palmer's facilities personnel re-sealed the roofing material near the instrument.

O-283-P: ANTARCTIC AUTOMATIC WEATHER STATIONS (AWS).
Mathew Lazzara, Principal Investigator, University of Wisconsin

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

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

T-295-P: GPS CONTINUOUSLY OPERATING REFERENCE STATION.
Joe Pettit, Principal Investigator, UNAVCO

Continuous 15-second epoch interval GPS data files are collected at station PALM, compressed, and transmitted to the NASA-JPL in Pasadena, CA. The Research Associate operates and maintains on-site equipment for the project.

The GPS receivers operated normally for the month. A survey of the glacier terminus in Palmer's "backyard" was completed.

A-336-P: ELF/VLF OBSERVATION OF LIGHTNING DISCHARGE, WHISTLER-MODE WAVES AND ELECTRON PRECIPITATION AT PALMER STATION.
John Gill, Principal Investigator, Stanford University

Stanford University has been operating a Very Low Frequency (VLF) receiver antenna at Palmer Station since the 1970's. By receiving naturally and manmade signals between 1 and 40 kHz, the Stanford VLF group is able to study a wide variety of electromagnetic phenomenon in the ionosphere and magnetosphere. The Research Associate operates and maintains on-site equipment for the project.

The VLF cable and antenna system were inspected. The guy-wires holding the mast upright were adjusted, and the cable running up the glacier was maintained. The system collected data normally during January.

T-312-P: TERASCAN SATELLITE IMAGING SYSTEM
The TeraScan system collects, processes, and archives DMSP and NOAA satellite telemetry, capturing approximately 25-30 passes per day. The Research Associate operates and maintains on-site equipment for the project.

The TeraScan system operated normally throughout the month.

A-357-P: EXTENDING THE SOUTH AMERICAN MERIDIONAL B-FIELD ARRAY (SAMBA) TO AURORAL LATITUDES IN ANTARCTICA
Eftyhia Zesta, Principal Investigator, University of California Los Angeles

The three-axis fluxgate magnetometer is one in a chain of longitudinal, ground-based magnetometers extending down 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 Grzymski, 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. An additional mid-week cleaning and data download was performed in an effort to improve system performance.

T-998-P: INTERNATIONAL MONITORING STATION (IMS) FOR THE COMPREHENSIVE NUCLEAR TEST BAN TREATY ORG. (CTBTO)
Managed by General Dynamics

The IMS Radionuclide Aerosol Sampler and Analyzer (RASA) is part of the CTBTO verification regime. The automated RASA continually filters ambient air and tests for particulates with radioisotope signatures indicative of a nuclear weapons test. The Research Associate operates and maintains the instrument.

The system operated normally throughout the month.

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 data storage method was changed. The tide gauge now stores data to a local disk instead of the station network, preventing software failures due to LAN unavailability. After this change, data collection performance improved significantly.

METEOROLOGY
The Research Associate acts as chief weather observer, and compiles and distributes meteorological data. Weather data collected using the automated electronic system is archived locally and forwarded twice each month to the University of Wisconsin for archiving and further distribution. Synoptic reports are automatically generated every three hours by the Palmer Meteorological Observing System (PalMOS) and emailed to the NOAA for entry into the Global Telecommunications System (GTS).

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