

PALMER STATION MONTHLY SCIENCE REPORT
February, 2010



Whales feeding in Arthur Harbor.
Image Credit: Brian Nelson

NEWS FROM THE LAB

Phil Spindler, Assistant Supervisor of Laboratory Operations

The LTER cruise returned on February 3rd, greeted by an abundance of hungry whales in the area. The humpbacks fed around Palmer Station for days. Norbert Wu's IPY dive group was able to get some great photos of these creatures before they departed station mid-February aboard the *M/S Prinsendam*.

A few days later, we welcomed visitors from the LARISSA cruise. Their rendezvous with the *RV/IB Nathaniel B. Palmer* (NBP) was weathered out. They flew via twin otter to Rothera Base then to Palmer Station, landing on the glacier behind station. Ted Scambos and other members of this glaciological team presented on their work and instrumentation in the area. It was an interesting change from the heavy biological work being conducted and presented at Palmer. The team was shuttled back to the NBP aboard the *ARSV Laurence M. Gould* (LMG).

The LMG arrived mid-February bringing the Amsler-Baker-McClintock group (B-022-P) to conduct more chemical ecology work around Palmer. Also onboard were the Riggers to help maintain the rhombic antenna, mount the official Palmer Station Web Cam, install a wind monitoring device at Outcast Island, and shore up the VLF antenna.

The month ended with a tsunami warning from the incredibly powerful 8.8 earthquake that struck central Chile. Station members responded by moving zodiacs and hazardous material to higher ground. No noticeable tsunami was seen in the area. We were all relieved to hear that friends and family of our partners in AGUNSA and in Santiago came through safely without major losses.

Operationally, we are feeling the impacts. Incoming cargo was stalled, northbound samples sat in Punta Arenas, and our frozen food resupply for the winter thawed when the port it was sitting in lost power for a few days. The Logistics team and Kitchen staff are all working hard in remediating the issues and we thank them for all their hard work.

As the other USAP stations move into their winter seasons, Palmer's science season continues strong. The LTER groups are wrapping up their season's work as the next wave of field science ramps up with Amsler-Baker-McClintock (B-022-P) and Bill Detrich (B-037-P, arriving in April).

WEATHER SUMMARY

February, 2010

The introduction of rain and darkness this month gave the strong impression that the summer is waning. February saw more precipitation than previous months with 42.2mm melted, falling mostly as rain or sleet with a few dustings of snow, but it was still below average for this time of year. Temperatures were nearly identical to last month and normal for February, averaging 1.8 °C, with a maximum of 6.8 °C and minimum of -1.0 °C. Wind was generally low, with a few storms that passed through quickly. Average wind speed was 6 knots.

Sea conditions were also similar to January, with regular brash from glacier calvings and even fewer bergs in otherwise open water. Sea surface temperature didn't stray far from 1 °C.

THE FOLLOWING PROJECTS CONDUCTED RESEARCH AT PALMER STATION:

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, Kirstie Yeager

February was marked by the return of the Laurence M. Gould at the beginning of the month at the conclusion of the LTER cruise. Shawn Farry and Kristen Gorman returned to station for a brief time before departing for the season; Rick Smaniotto and Donna Patterson-Fraser also headed home. The remaining bird crew continued work throughout the month, hampered periodically by winds that prevented field operations on some days and a bit of wet weather that delayed specific work requiring handling of downy chicks.

The Adelie penguin work continued this month, highlighted by the chicks fledging. Adelie chick counts and measurements of chicks about to fledge were obtained on local islands until all of the

chicks departed. The penguin breeding chronology monitoring and sampling concluded near the beginning of the month. Our Adelie penguin radio transmitter study on Humble Island will continue into March.

Skua work continued with monitoring and banding of brown Skua chicks on local islands as well as on Dream and Biscoe Islands. Chick growth measurements and scat collections continue on Shortcut Island for south polar skuas. Monitoring of the blue-eyed shag colony on Cormorant Island continued and concluded at the end of the month. Our giant petrel satellite transmitter work finished up this month with the retrieval of all of our transmitters. Growth measurements of giant petrel chicks continue on Humble Island.

Monitoring of marine mammals continued, marked by some incredible humpback sightings in the local area in the early part of the month. Coordination with Norbert Wu's group continued, as we accompanied them on another trip to Dream Island. Sediment trap samples from Avian Island were processed and dried. Other lab work continued with Skua scat analysis and prepping samples for transfer to the NBP in March. Inventories of supplies for the NBP cruise commenced. Data analysis projects continue as well.

RPSC continued to provide great support this month; field volunteers were incredibly helpful during the Adelie fledgling period. Special thanks to Phil Spindler for coordinating the volunteer schedule.

B-019-P: Palmer Long Term Ecological Research (LTER): Looking back in time through marine ecosystem space, phytoplankton component.

Oscar Schofield, Principal Investigator, Institute of Marine and Coastal Sciences, Rutgers University

Personnel on station: Brian Gaas, Institute of Marine and Coastal Sciences, Rutgers University; Megan Cimino, California Polytechnic State University at San Luis Obispo

It has been a busy month in the two lab spaces occupied by B-019. The 2-member team ran four concurrent projects: photosynthetic pigment extraction and analysis; chlorophyll concentrations/photosynthetic efficiency/POC collection; phytoplankton mixing experiment; carbon fixation rates. Twice-weekly chlorophyll, HPLC, POC, and bio-optics sampling continued with B-045, though with reduced personnel on the Zodiacs to provide more personnel in the labs. The AOP optical profiler was lost during the LTER cruise, so only IOP bio-optics data were collected. Carbon fixation rates were calculated each week in February for 5 depths at time-series stations B and E.

Almost all of the efforts in the lab have been spent processing chlorophyll and HPLC samples from LTER and the Palmer Station time-series. The fluorometer used by B-019 at Palmer Station prior to the LTER cruise was required to stay on station for the mixing experiment. An apparent uncalibrated fluorometer on the ARSV L.M. Gould prevented discrete chlorophyll samples from being processed during the LTER cruise. Filtered water samples were frozen and kept on board for processing back at Palmer Station. As such, 290 LTER chlorophyll and HPLC samples and 180 additional chlorophyll samples from experiments during the cruise required processing. This is in addition to the 120 chlorophyll samples taken as part of routine sampling for the Palmer Station time-series stations B and E in February.

The arrival of the ARSV L.M. Gould after the LTER cruise also doubled the number of HPLC samples to be run, though this was expected. As of this time, 595 samples of extracted phytoplankton pigments have been processed by HPLC. There are an estimated 150 samples left, which will be processed in the next week and a half. The arrival of B-022 into the shared lab where the light-sensitive pigment extraction and processing is done required some lab space reorganization. Fortunately, the requirements of both B-019 and B-022 were such that a time-sharing agreement was reached quickly without sacrificing efficiency in either group.

The Lab Manager at Palmer Station was able to temporarily transfer an incubator from the L.M. Gould (currently docked at Palmer Station) to relieve an unanticipated shortage of incubators for the mixing experiment.

Most of the penguins have left the nearby island, so data collection for the remote sensing of penguin colonies has almost entirely ceased. The preliminary results from the “Penguins from Space” project were accepted for presentation as part of an IPY conference in Oslo, Norway in June.

Almost all of the data collected so far, with the exception of HPLC data, has been processed and converted into the format required for the LTER database. As soon as authorization is granted, the data from this season (chlorophyll and pheophytin concentration, photosynthetic efficiency, AOPs, IOPs, physical properties of water, carbon fixation rates) will be uploaded and accessible. HPLC data will be added before the end of the season.

B-022-P: THE CHEMICAL ECOLOGY OF SHALLOW-WATER MARINE MACROALGAE AND INVERTEBRATES ON THE ANTARCTIC PENINSULA

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

Bill Baker, Principal Investigator, University of South Florida

Personnel on station: James McClintock, Charles Amsler, Margaret Amsler, Jason Cuce, Alan Maschek, Ruth McDowell, Kate Schoenrock

We arrived at Palmer on the afternoon of 17 February with LMG10-02. Initial efforts centered on setting up our lab space, dive locker, and our portion of the aquarium building as well as on mandatory boat training. We began our diving equipment check out dives on 20 February and took advantage of a very good low tide early on 22 February to collect intertidal green algae to be used in artificial foods throughout the season.

From February 20-28 our group completed 12 dives including checkout dives off the Pier and several dives to collect organisms for laboratory studies. With assistance from Ryan Wallace, the Boating Coordinator, we deployed concrete substrates off the Bahia on 25 February for a six-week algal growth experiment. Algae for the experiment were collected on the 25th and out-planted back to the substrates on the 26th.

We are grateful for the generous and professional assistance of numerous RPSC staff. Phil Spindler, James Bucklin, Ryan Wallace, and Brian Nelson deserve special thanks for facilitating our laboratory and diving operations.

B-045-P: Palmer Long Term Ecological Research (LTER): Looking back in time through marine ecosystem space, microbial ecology component.

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

Personnel on station: Maggie Waldron and Dan Whiteley

Maggie and Dan returned to Palmer Station in early February, following the conclusion of the annual LTER cruise. We have continued our twice-weekly sampling at stations B and E, collecting water to measure bacterial abundance and productivity, dissolved organic carbon, and nutrients. Meanwhile, we have continued the dilution experiments designed to assess the growth rates of different components of the microbial assemblage in Arthur Harbor. With the end of the summer field season in sight, we are also beginning to organize and inventory supplies for overwinter storage.

In addition to our regular responsibilities, we also participated in a short cruise aboard the *Laurence M. Gould* to deploy a moored sediment trap at LTER grid site 585.135. This is normally an objective for the LTER cruise, but due to the failed recovery of the 2009 mooring we instead had to wait until the Gould's return from Punta Arenas with extra supplies. We trawled for the missing sediment trap with a grappling array designed by the Gould's marine technicians, though we were not able to recover it this time either. The 2010 sediment trap was successfully deployed on March 1st, 2010.

We wish to thank the RPSC staff, captain and crew of the *Laurence M. Gould* for their dedicated efforts in obtaining the supplies needed for our short cruise this month. As always, we are very grateful for the hard work of the RPSC staff at Palmer. Without their support, we could not accomplish all that we do.

Y-608-P IPY: Poles Apart: Visual documentation of the marine ecosystems of the polar regions

Norbert Wu, Principal Investigator, Artist and Writers Program, Pacific Grove, CA

Personnel on Station: Norbert Wu, Ryan Caldwell, Andrew Day, Martin Schuster

This group departed station on February 15th aboard the MS PRINSENDAM. They finished up a successful season.

PALMER STATION
RESEARCH ASSOCIATE MONTHLY REPORT
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Brian Nelson

G-295-P GPS CONTINUOUSLY OPERATING REFERENCE STATION.

Bjorn Johns, Principal Investigator, UNAVCO

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

The GPS operated normally for the duration of the month.

G-090-P GLOBAL SEISMOGRAPH NETWORK (GSN) SITE AT PALMER STATION.

Rhett Butler, Principal Investigator, Incorporated Research Institutions for Seismology (IRIS)

The Research Associate operates and maintains on-site equipment for the project. Station PMSA is one of more than 143 sites in the GSN monitoring seismic waves produced by events worldwide. Data files are recorded to tape and also sent real-time to the U.S. Geological Survey (USGS).

The seismometer operated normally for the duration of the month. Facilities Engineering finished installing a new power routing to the seismic hut. Power was transferred to the new cabling with no interruption of data. A fiber-optic data line was also installed but has not yet been put into use.

O-202-P ANTARCTIC METEOROLOGICAL RESEARCH CENTER (AMRC) SATELLITE DATA INGESTOR.

Mathew Lazzara, Principal Investigator, University of Wisconsin

The Research Associate operates and maintains on-site equipment for the project. The AMRC SDI 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 ingestor operated normally for the duration of 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 aid in determining rates of marine biological productivity and ocean mixing. The results are also used to help determine the

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. Palmer Station is especially well situated for resolving signals of carbon cycling in the Southern Ocean.

The Research Associate collects samples fortnightly from both TerraLab and the VLF Building. A goal is that all sampling will eventually be moved to TerraLab. Samples taken from the station are sent to Scripps where the analysis of O₂ and CO₂ content takes place.

Sampling equipment and operations were per plan throughout the month thanks to a fortuitous wind change on the final day of the month, providing a good sample.

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.

Palmer Station is one of many sites around the world providing data to support these projects. The Research Associate collects weekly air samples for Carbon Cycle Greenhouse Gases Group and fortnightly samples for Halocarbons & other Atmospheric Trace Species Group.

Carbon Cycle sampling occurred normally during the month. Halocarbons ran out of flasks due to a sample crate that was intended for Palmer, but was bundled with two other crates headed to Pole. This has caused one sample to be missed. New flasks are expected to arrive via the R/V Nathaniel B. Palmer just in time for the next sample cycle.

O-283-P ANTARCTIC AUTOMATIC WEATHER STATIONS (AWS).

Mathew Lazzara, Principal Investigator, University of Wisconsin

The Research Associate monitors data transmissions for the project and performs quarterly maintenance on the station at Bonaparte Point. 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 system collected data normally throughout the month.

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

Umran 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 (uppermost layer of the atmosphere ionized by solar radiation) and magnetosphere (the area surrounding the earth dominated by the Earth's magnetic field and particles trapped by it. Many of these studies relate to the energetic releases associated with lightning. For example, Palmer Station's unique location enables it to pick up small bits of radiation from lightning strikes as far away as Africa, the USA, or the Pacific Ocean.

The system collected data normally during the month. Regular antenna cable maintenance was necessary as the glacier continues to melt this season. New holes were drilled for the antenna anchor points.

T-312-P TERASCAN SATELLITE IMAGING SYSTEM.

The Research Associate operates and maintains on-site equipment for the project. Throughout the month, the TeraScan system collected, archived, and processed DMSP and NOAA satellite telemetry, capturing approximately 25-30 passes per day. A weekly 85GHz SSM/I ice concentration image was produced and transferred to UCSB for B-032-P (Smith).

The system collected data normally during 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. Palmer's magnetometer is also a conjugate to the Canadian Poste de la Baleine station, allowing the study of conjugate differences in geomagnetic substorms and general auroral activity. The station Research Associate maintains the on-site system.

The system operated normally during the month. Flags were installed around the sensor to discourage passers-by from walking too close.

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 real-time data, including graphs and web camera images of the ocean in the vicinity of Palmer Station, are compiled by a local server into web page format and relayed to a mirror site at Woods Hole Oceanographic Institute, which is a collaborator in the project. The URL for the WHOI mirror site is <http://4dgeo.whoi.edu/tsg/>.

The webcam and thermosalinograph operated normally during the month. The fluorometer was cleaned.

T-998-P: IMS RADIONUCLIDE MONITORING

Managed by General Dynamics

The International Monitoring System (IMS) radionuclide sampler is part of the Comprehensive Test Ban Treaty (CTBT) verification regime. The automated Radionuclide Aerosol Sampler and Analyzer (RASA) unit pumps air continuously through a filter for 24 hour periods, collecting particulates in the .2-10 micron range. The filter is then tested for particulates with radioisotope signatures indicative of a nuclear weapons test. The station Research Associate operates and maintains the instrument.

The system operated normally throughout the month.

ULTRAVIOLET (UV) SPECTRAL IRRADIANCE MONITORING NETWORK (UVSIMN)

A 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, while the sun is above the horizon. A BSI GUV-511 filter radiometer, which has four channels in the UV and one channel in the visible for measuring Photosynthetically Active Radiation (PAR), is located next to the SUV-100.

The UV monitor collected data normally during the month.

TIDE GAGE

The Research Associate operates and maintains on-site equipment for the project. Tide height and seawater temperature are monitored on a continual basis by a gauge mounted at the Palmer Station pier. Although salinity (conductivity) is also recorded by the tide gauge, the measurements are incorrect and should not be used. Correct salinity data can be found on the TSG system.

The tide gauge operated normally during the month.

METEOROLOGY

The Research Associate acts as chief weather observer, and compiles and distributes meteorological data. At the end of the month a summary report is prepared and sent to interested parties. 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).

Power was restored to the ceilometer, but no data was being sent from the instrument, so it has been removed and shipped back to the manufacturer for repairs.

Scheduled inspections were carried out at the Gamage Point tower. Weather updates and satellite imagery were forwarded to the R/V LAURENCE M. GOULD and the R/V NATHANIEL B. PALMER.