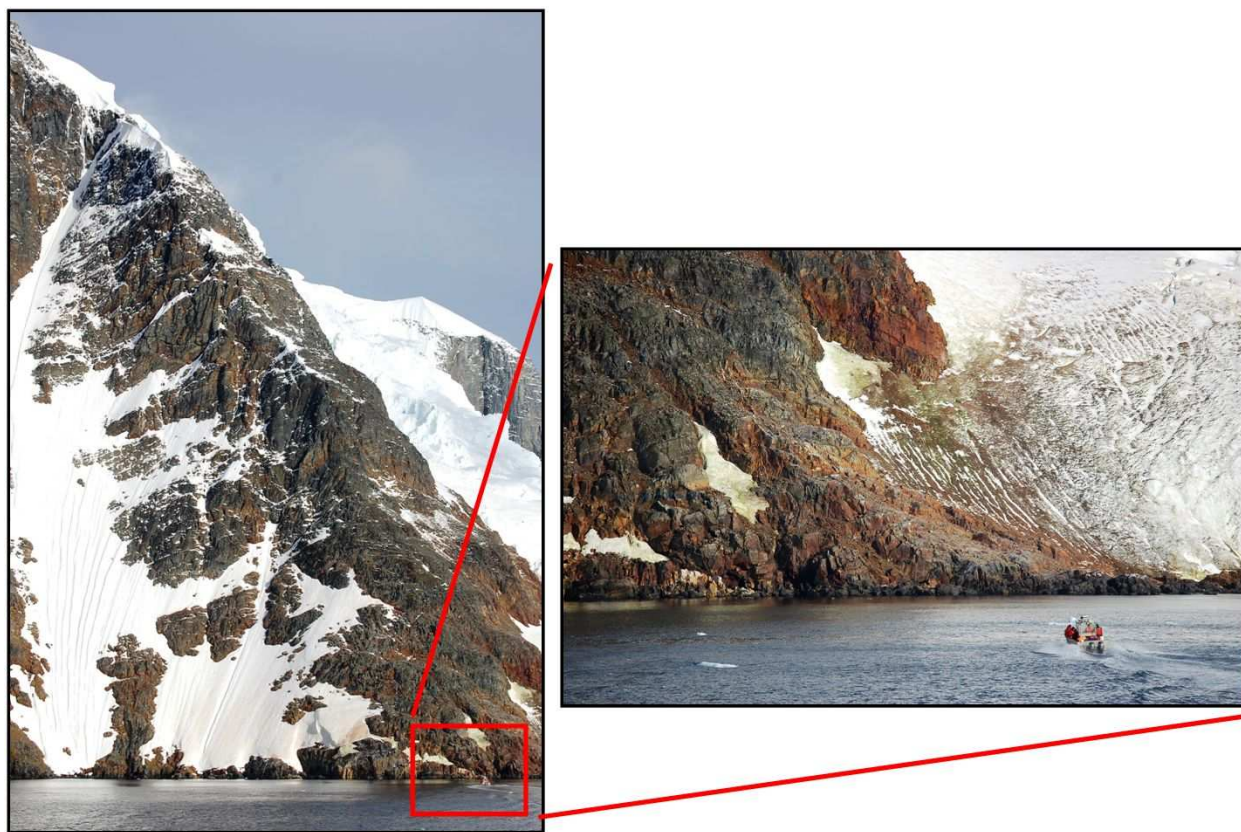


PALMER STATION MONTHLY SCIENCE REPORT
March, 2010



Dive group approaching the sheer cliffs of Booth Island in the Lemaire Channel.
Image Credit: Alan Maschek

NEWS FROM THE LAB

Phil Spindler, Assistant Supervisor of Laboratory Operations

The winter light, temperature, and storms with the changing season have arrived. However, we have not taken on the usually slower winter pace of life. We said *Goodbye* to the summer LTER groups and *Hello* to the science dive group Amsler-Baker-McClintock (B-022-P).

Both the *Laurence M. Gould* (LMG) and the *RV/IB Nathaniel B. Palmer* (NBP) conducted port calls with station. The NBP conducted cargo operations in support of the science groups working onboard (Torres:B-258-N, Buessler:B-288-N, Simms:G-116-N). The LMG was operating in an open period with no science onboard. This facilitated the opportunity to support exploratory dive operations outside the two-mile zodiac limit. The dive group conducted dives from the LMG landing craft in the Lemaire Channel (pictured above) and in the Joubin Islands. The LMG was also able to support the deployment of the LTER sediment trap.

Roberta Marinelli conducted a site visit to Palmer Station for almost two weeks. She went north with the LTER groups March 21. The evening prior to departure we celebrated in style with an array of performances lasting over three hours. Musical acts included solos and duets of drums, accordion, guitar, mandolin, banjo, piano, and even some yodeling. The evening ended with a

group performance from the Palmer Band that included folks from the ship and recent arrivals to station from the dive group.

We are looking forward to the arrival of the next LMG cruise which brings Bill Detrich's team (B-037-P) and a flurry of activity with fishing cruises, station fueling, and station staff turnover.

WEATHER SUMMARY

March, 2010

The weather this March was downright dreary. One storm system after another seamlessly enveloped Palmer Station in cloud, precipitation and wind. The second half of the month saw freezing temperatures that at least turned the drizzle to big flakes of snow, quickly adding up to 34 cm of snowfall for the month, well over the average of 21. Melted precipitation was in the high thirties, only half the average of 77 mm.

The wind was a predominant feature this month, changing erratically and preventing boating on half the days of the month. Gusts over 40 knots occurred on nine different days, with the peak at 57 knots. Amazingly, though, the monthly average was only 10 knots, typical for March.

Temperatures were also typical, averaging 0.8 °C, with a maximum of 9.5 °C and minimum of -8.5 °C. Sea conditions remain the same, with regular brash from glacier calvings and sporadic bergs in otherwise open water. Sea surface temperature has begun rolling off from 1 °C, even dipping below zero on a few days.

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

Weather continued to hamper field operations this month, with high winds delaying trips locally and also to some of the more distant islands; periods of rainy weather also interfered with specific work that required handling of downy chicks. Despite some delays, field work for this month was completed; however, the early departure of the LMG this season resulted in some studies getting cut a bit short.

Adelie 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, chinstrap colonies on Dream Island, and Adelie colonies on Torgersen Island. Repairs were made to one of the traps; one was completely replaced. Sediment trap sample processing continued until right before our departure.

Skua work continued throughout the month with both brown and south polar Skua chick growth monitoring and banding. 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 completed on all local islands. Growth measurements of giant petrel chicks continue on Humble Island. We commenced preparations and training for RPSC winter personnel who will be continuing some measurements for this project.

Marine mammal monitoring continued, highlighted by a sighting in Arthur Harbor of a leopard seal consuming a small crabeater seal. Lab work continued and intensified throughout the month as samples were processed. Supplies, gear, and samples were packed up for transfer to NBP10-02. Other project gear and supplies were cleaned, inventoried and packed up; project cargo was sent north. 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 outbrief with science, station management, and the NSF was attended.

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 Stacie Murray and Diane Curran for their fabulous cuisine all season; Phil Spindler for his extra efforts, especially in coordinating our volunteer schedule; Ryan Wallace for his positive boating support this second half of the season, and to Bob DeValentino for his efforts in assisting with our Canadian sample shipments.

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

The group completed their season successfully and departed station on March 21.

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, and Kate Schoenrock; James McClintock redeployed with LMG10-02 on 21 March.

With relatively good weather luck we completed 56 research SCUBA dives during March including four in the northern Lemaire Channel and three in the Joubin Islands supported by the Laurence M. Gould. Concrete substrates for algal outplant growth rate experiments were deployed at Norsel Point and in Hero Inlet followed shortly thereafter in each case by transplanted macroalgae for the experiments. Algae from both those experiments as well as one at the Bahia outplanted in March were successfully recovered for interim measurements and redeployed for further growth. A day vs. night amphipod vertical distribution experiment was also begun at the end of the month in shallow waters directly off the boathouse.

Diving also supported collections for numerous laboratory experiments including several different sets of amphipod feeding experiments on live macroalgae and on semi-purified compounds from sponges. A suite of laboratory assays to examine oxidative burst responses of freshly-collected macroalgae continued throughout the month.

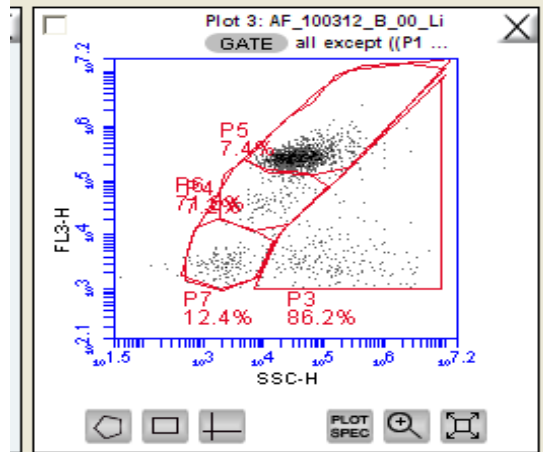
We are grateful for the generous and professional assistance of numerous RPSC staff and the crew of the Laurence M. Gould. Phil Spindler, James Bucklin, Ryan Wallace, and Brian Nelson deserve special thanks for facilitating our laboratory and diving operations at Palmer and we are very grateful to Eric Hutt, Toby Koffman, and Chance Miller for diving support from the LMG.

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

Summer season 2009-10 for B-045-P concluded in late March with completion of our ninth season at Palmer Station. Due to the efforts of the science and support staff at Palmer and long streaks of cooperative weather, we have one of the most complete datasets to-date, with a total of 20 weeks of sampling at stations B and E. In addition, we completed 17 incubation experiments designed to examine growth rates of different components of the microbial assemblage in Arthur Harbor.



Autofluorescent cells at Station B, surface water from March 12, 2010.

Our field work was augmented during the later half of the season with the addition of an Accuri C6 flow cytometer. With this instrument, we were able to run live samples from stations B and E as well as from our dilution experiments. The Accuri provides nearly-real time data about the bacterial and phytoplankton community activity in Arthur Harbor. We are using these live abundance data in conjunction with our productivity measurements to derive a conversion factor with which we can calculate bacterial production in carbon units (e.g., $\mu\text{gC l}^{-1} \text{h}^{-1}$) from rates of molar isotope incorporation (e.g., $\text{pmol leucine l}^{-1} \text{h}^{-1}$). Preliminary analysis of the full season's data suggests a moderately productive bacterial community with just a few episodes of enhanced activity.

We are very grateful for the hard work of the RPSC staff at Palmer. This has been an immensely productive season for our project and it would not have been possible without the efforts of each individual on the science support team, but Phil Spindler, George Ryan and Ryan Wallace deserve special recognition for all of time and energy they devote to helping us accomplish our goals.

PALMER STATION
RESEARCH ASSOCIATE MONTHLY REPORT
March 2010
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. An inoperable handheld survey device was shipped back to UNAVCO and a replacement was received.

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. Archive data tapes were shipped back to the Albuquerque Seismological Lab.

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. Full sample flasks were shipped back to Scripps.

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. New Halocarbons flasks arrived and sampling resumed after one month of missed samples (two sampling periods). The missed samples were due to the mis-shipment of a crate of sample flasks intended for Palmer that was bundled with two other crates headed to South Pole station.

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. Archive data was shipped back to Stanford. Much end-of-season work was done on the VLF antenna. All the cable posts and antenna anchor posts were reset in preparation for the winter season. The riggers replaced some frayed guy ropes, in addition to straightening and tightening the tower itself.

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 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. 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.

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.

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. The blower motor was lubricated per the biannual schedule. A specially requested sample was collected and shipped to a radionuclide lab in Canada.

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. The quarterly three-lamp calibration scanning was performed.

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).

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.

Erroneous counts from the rain gauge prompted the installation of a resistor in series with the signal line to absorb any voltage spikes not associated with rainfall. So far, the modification is working.