

PALMER STATION MONTHLY SCIENCE REPORT
September 2008



*Large iceberg seen south of Palmer Station.
Photo courtesy of Christopher Seliga.*

NEWS FROM THE LAB

Christopher Seliga, Winter Assistant Supervisor Laboratory Operations

The month of September brought a very busy IPY winter to an end. The 2008 Winter Season saw four major research groups and 25 different scientists use Palmer Station as a base to conduct research. Overall it was a very successful season and further proof that major scientific research could be conducted and supported at Palmer Station throughout the winter season.

The *Laurence M. Gould* returned this month, bringing the incoming summer crew to station and an artist, Scott Sternbach (W-484-P) and taking a very hard working group of winter-overs back to Chile. On station, personnel conducted turnover with the incoming crew and started getting ready for the summer season and the next two groups that arrive on station in October, B-013-P (Fraser) and B-019-P (Schofield). These two groups are both a part of the Palmer Long Term Ecological Research Project and studying seabirds and phytoplankton, respectively. Also on station, photographer, Scott Sternbach, started taking black and white photos of various personnel on station in their work environment, with his large view camera. This camera uses 8x10" negatives and can get very intricate detail of the subject.

SEPTEMBER WEATHER

Louise Hamlin and Payot Scheibe, Research Associates

Snowfall for September was right in line with average snowfall (45 cm compared to the average 42 cm), with half of the snow coming in a one-day storm mid-month. Year-to-date snowfall is still lower than the average (238 cm compared with 288 cm). Melted precipitation was up for August measuring 83 mm compared to the average of 52.7 mm, but the year-to-date accumulation of 470 mm was still behind the average measuring compared to 554 mm. The last week of September was characterized by periods of high winds with freezing rain that turned much of the walkways into skating rinks.

The monthly average temperature for September was -1.0°C , much warmer than the 15-year average for September of -5.1°C . The high temperature this month was $+5.5^{\circ}\text{C}$ and the minimum temperature was -18.9°C .

Sea surface temperatures remained steady at -1.20°C throughout the month. The sea ice surrounding the station during September was typically small bergy bits with some short lived areas of pack ice. Open areas of water became more prevalent as we progressed through the month. There has been a single large iceberg residing a few miles directly south of the station for the duration of the month.

The following projects conducted research at Palmer Station during September:

B-005-P: ENVIRONMENTAL, ORGANISMAL AND EVOLUTIONARY PHYSIOLOGY OF FREEZE AVOIDANCE IN ANTARCTIC NOTOTHENIOID FISHES

A.L. DeVries, Principal Investigator, Dept. of Animal Biology, University of Illinois, Urbana-Champaign

Personnel on Station: A. DeVries and Chris Cheng

We completed the temperature acclimation of the notothenioid fishes *Notothenia coriiceps* and *Trematomus hansonii*, and two species of eelpouts. Blood serum were collected, frozen and packaged for shipment to our lab at the University of Illinois, where analyses for ions and antifreeze activity will be done. A comparison of the results of the same analyses of McMurdo Sound *T. hansonii* will allow us to determine whether there are any differences in the acclimatory responses of these two geographically distant populations, where local ambient water temperatures also differ substantially, by 1°C higher in the Peninsula habit for this species than its counter part in McMurdo Sound.

Tests for splenic ice in wild caught *N. coriiceps* continued whenever it was feasible to catch more specimens. From about two dozen individuals, we found only ~10% contained ice in the spleen, even though it is winter. This is in contrast to McMurdo Sound species which tested

almost always 100% positive for splenic ice even in austral summer. Although ice entry into *N. coriiceps* is at much lower frequency, antifreeze protection would still be needed at all times since when the fish will encounter ice is unpredictable.

The construction of a BAC library for the basal S. American notothenioid *Eleginops maclovinus* progressed with the stage of preparative partial digestion. The agarose-embedded, different fragment size fractions have been preserved and will be eluted for ligation and transformation upon return to our laboratory at the University of Illinois.

We emptied out and cleaned up our lab space and the aquarium in the final week, and departed Palmer on LMG08-11 northbound on Sept. 24, 2008. A number of icefishes were retained in one tank for the enjoyment of the Palmer residents and summer tourists that will be coming. It has been a great and successful field season, and we thank all Palmer and LMG staff for their support.

B-229-P: BACTERIOPLANKTON GENOMIC ADAPTATIONS TO ANTARCTIC WINTER

Alison Murray, Principal Investigator, Desert Research Institute, Reno, Nevada
Hugh Ducklow, Principal Investigator, The Ecosystems Center, MBL, Woods Hole, MA

Personnel on Station: Alison Murray, Joseph Grzyski, and Vivian Peng

After a busy September, B-229-P finished breaking down all of their experiments and collecting their data and got ready to return home. They hope the research they conducted at Palmer Station during this IPY winter season, will eventually lead to further funding and even more research involving bacterioplankton in future winter seasons here.

W-484-P: ANTARTICA IN BLACK AND WHITE

Scott Sternbach, Principal Investigator, LaGuardia Community College, Long Island City, NY

Personnel on Station: Scott Sternbach and Homero Campos

In spite of a hurried departure from the New York metro area and some near misses in airport connections, things have fallen into place nicely for my student / assistant Homero Campos and myself.

My project which involves documenting the people of Palmer Station using my Wisner 8x10" view camera began at a frenzied pace. With all of the science personnel at Palmer about to leave within a few days, we began shooting right off of the Gould. We did gain quite a bit of practice shooting in difficult conditions on the way to Palmer by photographing many of the people who make the Gould the great ship that it is. Of note was a portrait of Guillermo Pizarro, deck hand on the Gould. His portrait is certainly a classic. At Palmer portraits were taken of Art and Chris DeVries. Although they were extremely busy completing their work with local fish, they were especially accommodating to us. Alison Murray and her associates, scientists Joe Grzyski and

Vivian Peng bent over backwards to make my project a reality. I extend many thanks to all of these great scientists.

Since the initial rush of activity we have settled in and are methodically photographing many of the people here who support the work being done. Perhaps one of the finest portraits I created is of Eric Cooper, the cook extraordinaire of Palmer. His powerful, intelligent almost Hitchcockian intensity made for a great portrait.

My typology of these local Antarctic heroes of the efforts to understand our planet is meeting my expectations and with quite a bit more time ahead prior to departure, I expect that the portraits taken so far are only the “tip of the iceberg”.

PALMER STATION RESEARCH ASSOCIATE MONTHLY REPORT September 2008

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 project operated normally for 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 system operated normally throughout the month. Data tapes were shipped to the USGS. The terminal screen locked up twice, requiring remote reboot by grantees.

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

Charles Stearns, 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 most of the month. There was an error with the ingestor computer near the end of September which caused it to not download all of the satellite images. Troubleshooting on this problem is still ongoing with the help of a grantee.

**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. Samples taken from the station are sent to Scripps where the analysis of O₂ and CO₂ content takes place.

Samples were taken on both the new and old systems every two weeks for intercomparison purposes. Feedback from samples sent earlier in the season have led to changes in the sampling criteria. Now there are more restrictions on samples taken during winds below 5°, which will help exclude the earth station and hazardous chemical building.

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

Dr. David Hofmann (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 Palmer Physician collects weekly air samples for Carbon Cycle Greenhouse Gases Group and fortnightly samples for Halocarbons & other Atmospheric Trace Species Group.

All sampling occurred with no problems. New flasks were received on station while full flasks were shipped back to Boulder.

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

Charles Stearns, 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 station transmitted data normally during 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.

New mass data storage devices are now being used in parallel to the old system of burning data to DVDs. After verification of the data by Stanford, the mass storage system will replace DVDs. The scripts handling the data transfer have been updated to reflect the addition of the new system.

T-312-P TERASCAN SATELLITE IMAGING SYSTEM.

Dan Lubin, Principal Investigator, Scripps Institution of Oceanography

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 NASA MODIS subset for Palmer was increased to enhance scientific activities on and around the peninsula. This subset is available via the internet for science groups on and off the ice.

Cruise support SSMI images generated by the system were sent to LMG scientists daily.

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 magnetometer operated well 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 salinograph performed normally during the month.

T-513-P: ULTRAVIOLET (UV) SPECTRAL IRRADIANCE MONITORING NETWORK (UVSIMN)

Charles Booth, Principal Investigator, Biospherical Instruments, Inc

The Research Associate operates and maintains on-site equipment for the project. 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. Data from the GUV-511 instrument is made available on a daily basis on the project's website at <http://www.biospherical.com/nsf>.

The UV monitor operated normally throughout the month. The lamp calibrations were completed successfully.

T-998-P: IMS RADIONUCLIDE MONITORING

Michael Pickering, Principal Investigator, 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 monitoring station operated 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 equipment has operated normally this 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).

Isobaric charts were sent to R/V LAURENCE M. GOULD in support of the current cruise.

The wind bird on Gamage Point became covered in ice on a few instances, which caused wind data to be reported incorrectly as 0 knots.