

PALMER STATION MONTHLY SCIENCE REPORT

December 2007



Whales frequently visited the waters around Palmer Station. Photo courtesy of Stacie Murray.

NEWS FROM THE LAB

Philip Spindler, Senior Assistant Supervisor Laboratory Operations

Activity increased all around Palmer Station in December. A large phytoplankton bloom brought in schools of krill to the area. This impetus flooded the area with wildlife- peeping chicks, blowing whales, and inquisitive Gentoo penguins. The activity around station also picked up with cruise ship visits from the *National Geographic Endeavour* (twice), *Orlova*, *Explorer II*, and the *Rotterdam*.

December was a mostly cloudy and cold month with typical summer weather finally showing up around the end of the month. This made the holidays cozy and winter-like, so it wasn't all bad. We enjoyed a lovely holiday dinner. Our New Year celebration was spirited as we celebrated with a live band performance from the community.

Work picked up at the end of the month for everyone. Science groups and support staff prepared for the upcoming LTER cruise, and growing animal activity kept everyone running around as well. Science field work intensified along with general wildlife viewing.

From Palmer Station, we wish you all the best in your New Year.

DECEMBER WEATHER

Scott Walker, Research Associate

Summer was in full force by the end of December, with periods of sunshine, warm temperatures, more rain and no lasting snow. The windiest gust of 54 knots was recorded early in the month.

Brash continues to blow in and out of the area surrounding Palmer station in increasingly smaller pieces. The glacier calves often and much of the growlers and bergy bits around station originate from Arthur Harbor.

The coldest daily low temperature was on the 25th at -2.0C, while the warmest high was on the 20th at +7.2C. The average temperature for the month was 1.2C, which is two degrees warmer than last month. Palmer received 44.7 mm of melted precipitation, but only 7 cm of snow.

The following projects conducted research at Palmer Station during December:

B-013-P: LONG-TERM ECOLOGICAL RESEARCH ON THE ANTARCTIC MARINE ECOSYSTEM: AN ICE DOMINATED ENVIRONMENT (SEABIRD COMPONENT)

Dr. William R. Fraser, Principal Investigator, Polar Oceans Research Group, Sheridan, MT

Personnel on station: Jennifer Blum, Kristen Gorman, Hannah Lucas

Winds proved to be our adversary this month, as a number of field days were missed due to high winds. Despite these missed days, we were still able to continue most of the breeding chronology monitoring and sampling of our selected Adélie penguin nests locally and on Dream and Biscoe Islands, as well as the Chinstrap and Gentoo penguin nests on Dream and Biscoe, respectively. Hatch dates and measurements began with the Adélies this month and will continue into January for all 3 penguin species. We continue to monitor the number of depredated eggs from all 3 penguin species on all islands and continue to make collections of these depredated eggs for further analysis and collaborations. Preparations for the Humble Island Adélie penguin radio transmitter monitoring began with instrument, equipment and software checks/testing.

Our skua work continued this month, as we began monitoring hatches of Brown Skuas on local islands as well as on Dream and Biscoe Islands. Our South Polar Skua study on Shortcut intensified with recording nest initiation/lay dates for the entire island and collecting scat samples. Blue-eyed Shags hatched in early December and the censusing continued on Cormorant Island. An all-island Kelp Gull survey was completed in early December. More satellite transmitters were deployed on Giant Petrels on Kristy Cove and Shortcut Island starting at the beginning of the month; they have returned and have been redeployed numerous times. Our all-island census of Giant Petrels began in mid-December, and new breeders were banded. The Giant Petrel nest monitoring study on Humble Island began in mid-December.

Our monitoring of marine mammals continued this month and was highlighted by numerous sightings of Humpback whales in the Palmer area. Lab work has continued with the processing of new samples. LTER cruise preparations were also initiated this month.

RPSC continued their great support throughout the month of December; so many folks have enthusiastically helped out with particular projects and we greatly appreciate it. Special thanks to all volunteers who helped us in the field this month (and Phil Spindler for accommodating our needs by setting up/coordinating the schedule)!

B-028-P LONG TERM ECOLOGICAL RESEARCH ON THE ANTARCTIC PENINSULA, AN ICE DOMINATED ECOSYSTEM: PREY COMPONENT.

Robin Ross and Langdon Quetin, Principal Investigators, Marine Science Institute, University of California at Santa Barbara

Personnel on station: Langdon Quetin (team leader/PI), Shannon Rich, Albert Kao and Natashia Dallin (Marine Science Institute, University of California at Santa Barbara).

The month of December saw a marked increase in data collection. Our field team mastered the routine and protocols for monitoring and sampling the local krill (*Euphausia superba*) population and were able to complete most fieldwork largely independently of PI Langdon Quetin. Biweekly water sampling events at LTER stations B and E also increased to eight, the target number for the month, despite a few foul-weather days. This was also the case for completing our biweekly acoustic transects that allow us to monitor the density of krill schools in the Palmer Station vicinity and the variability in density throughout our field season.

We were able to sample a total of 12 different krill schools in December versus only four in November. We had the unexpected opportunity to complete one additional four-day growth experiment on krill young-of-the-year, as we have surprisingly continued to catch krill schools that are primarily composed of juvenile krill throughout December. In addition, we have sampled krill schools composed of a mixture of young-of-the-year and adult krill, as well as a few made up of mainly adults. This is partly due to an increase in the abundance of krill in the Palmer vicinity, which has appeared to coincide with an increase in the chlorophyll a concentrations measured in our water samples. We collected and measured the chlorophyll a concentrations in approximately 250 water samples, about half of which were obtained at LTER Stations B and E and the other half from water within krill schools.

We have continued to determine the length frequency of each krill school sampled, the relationship between total animal length versus animal mass, as well as measuring the feeding behavior of a subset of individuals from each school by using gut concentrations of chlorophyll a as an indicator for the presence of phytoplankton consumption.

Langdon Quetin and Natashia Dallin were also able to complete two survey dives this month. One to shoot underwater video of the benthos where the proposed new Palmer Station pier will be constructed, and the second to document the status of the seawater intake pipes.

We have received excellent support from RPSC, including Chuck Kimball and Ryan Wallace who have been especially helpful in making a few early morning sampling trips possible. Ryan Wallace has been very attentive to our boating needs and zodiac maintenance, while Stacie Murray ensures we get meals even when fieldwork keeps us out beyond scheduled mealtimes.

W-486-P FROZEN FIELD.

Kim Baranowski, Principal Investigator, Brooklyn, New York

During December, Kim completed an additional seven drawings of Antarctic seabirds for her upcoming exhibitions. Documentation images of her installations have been sent back to the US in preparation for a February exhibition in New York City.

Kim has begun the outreach component of her project dissemination by corresponding with students at MS 226, a middle school in South Ozone, Queens, NY about life at the Palmer Research Station. She has continued to write dispatches for her web-based field journal highlighting the wildlife in the Palmer Archipelago and science research she has witnessed in the area.

In addition, Kim has begun to compose an article about her experiences for a February publication of Time for Kids Magazine. Time for Kids is a weekly news magazine that focuses on current events. This piece will reach students in classrooms across the US.

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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. The 15-second epoch interval GPS data files were collected continually at station PALM throughout the month. Transmission of these files to the NASA/CDDIS data center in Reston, VA occurred without incident throughout the month.

The file transfer process was simplified by having the daily files uploaded directly from the reference station system. A new reporting system was also created to notify the RA of any file transfer issues.

Issues concerning security scan “vulnerabilities” on the GPS receiver continued to be unresolved. After several communications with Network Engineer and Information Security personnel, a risk acceptance request was submitted for the receiver.

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).

Preparations are being made to have the power rerouted from the T5 building to the TerraLab to the seismic vault. This switchover will require a visit to the vault and some work in the vicinity. The PIs for both the USGS and IMS has been notified work being done in the next few weeks.

**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 receiver, extracting Automated Weather Station information and low-resolution infrared imagery and sending the results to AMRC headquarters in Madison, WI.

The system operated normally throughout 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. 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 for intercomparison purposes with out any issues.

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

Charles Stearns, Principal Investigator, University of Wisconsin

The Research Associate monitors data transmissions for the project. AWS transmissions from Bonaparte Point were monitored using the TeraScan system. AWS data received is forwarded to UCSB for B-032-P (Smith).

The Bonaparte station failed to report accurate wind speeds during the month and had only a few non-reporting days in December. A new weather station has been assembled and will be shipped to Palmer Station in the next few months.

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.

VLF data acquisition ran normally throughout the month with only one day of non reporting on December 24. This was due to a software issue that was repaired remotely by the staff at Stanford.

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, NOAA and ORBVUEW-2 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). Sea ice images were provided to the LMG for cruise support.

The system ran normally during the month. The NASA Ocean Color images are being sent daily in support of the LTER cruise along with Microwave ice images and MODIS visible images.

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 performed normally throughout 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.who.edu/tsg/>.

The webcam and TSG system performed normally during the month. A few minor issues with the server at WHOI were quickly resolved by the PI's staff 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 are 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.

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 RASA system is in a standby mode awaiting the replacement of the cryogenic chiller. This replacement item is expected to be on station early January.

The seismic monitoring station operated normally during the month.

TIDE GAUGE

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 cannot be used. Correct salinity data can be found on the TSG system.

The tide gauge system ran normally throughout 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 are archived locally and forwarded twice each month to the University of Wisconsin for archiving and further distribution. Synoptic reports are automatically generated every six hours by the Palmer Meteorological Observing System (PalMOS) and emailed to the NOAA for entry into the Global Telecommunications System (GTS). Isobar images are sent to LMG for cruise support.

The ceilometer is now functioning properly. It was found that the connection between the weather station and the ceilometer was using the service port which is reset to a simple ASCII mode, on a power cycle, which is not compatible with the zeno data logger. Updates have been made in the SOP noting how to get the instrument working following a power failure.