

PALMER STATION MONTHLY SCIENCE REPORT
December 2008



*A Macaroni penguin visited Torgersen Island and milled about for a couple weeks.
Photo courtesy of Phil Spindler.*

NEWS FROM THE LAB

Philip Spindler, Senior Assistant Supervisor of Laboratory Operations

Pat McMillan, Winter Assistant Supervisor of Laboratory Operations

The month started out strong with visits from numerous ships. The *RVIB Nathaniel B Palmer* stopped by Palmer Station to drop off critical science cargo December 3rd. We also hosted a visit with the *Ushuaia* on December 2nd, two days before it ran aground in Wilhelmina Bay. The tour ship season picked up with other visitors including the *Andrea*, *Amsterdam*, *S/Y Commitment*, *S/Y Sarah H. Vorerk*, and *M/Y Hanse Explorer*.

Science on station was very successful and busy with their work over the month. Multiple species of chicks hatched including Gentoo, Adélie, Skua, and Blue-eyed Shag. Humpback whales returned to the area and sightings increased as the month progressed. We even had a visit from a Macaroni penguin on Torgersen Island. Schofield's field team (B-019) had great success with a 9-day underwater glider deployment/recovery in the area.

We saw a record-breaking amount of snowfall for December, measuring 42cm which buries the old record of 24cm. Though the month may have been uncharacteristically wet, it made for a lovely holiday season. We celebrated Hanukkah and Christmas with a family-style dinner, and folks from station performed live rocking music for a New Year's celebration. We ended the year with a stunning orange and pink horizon as the sun slowly set around midnight.

The month came to a close with both science and support personnel preparing for the upcoming Long Term Ecological Research cruise. From Palmer Station, we wish you a successful, productive, and happy New Year.

DECEMBER WEATHER

Louise Hamlin, Research Associate

The big story for December was the precipitation. A large snowfall on the 21st contributed to the wettest December since good record-keeping started in 1990. This adds to the trend of wetter springs and summers at Palmer.

Typical summer weather broke through on some days however with occasional sunshine, consistently warm temperatures and no lasting snow. The coldest temperature was on the 25th at -2.5C, while the warmest was on the 20th at +5.8C. The average temperature for the month was 0.7C, which is .5C cooler than average (1990-2008). Palmer received 56.4 mm of melted precipitation and 42 cm of snow; this blows away the old record of 24cm of snow. The windiest gust of 60 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 following projects conducted research at Palmer Station during December:

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, Kristen Gorman

Winds proved to be our adversary this month, as a number of field days were missed due to high winds and swell. Daily precipitation, primarily snow, also hampered some field activities. 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 Gentoos this month and will continue into January for all 3 penguin species. The Chinstrap peak egg census was completed at the beginning of the

month. We continue to monitor the number of depredated eggs from all 3 penguin species on all islands and continue to make collections 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. We have continued our Giant Petrel satellite transmitter deployments at Kristie Cove and Shortcut Island. 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; thanks to all volunteers who helped us in the field this month. Special thanks to Phil Spindler for coordinating the volunteer schedule and Pat McGuire for repairing some of our field gear!

B-019-P: PALMER LONG TERM ECOLOGICAL RESEARCH (LTER): LOOKING BACK IN TIME THROUGH MARINE ECOSYSTEM SPACE, PHYTOPLANKTON COMPONENT.

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

Personnel on station: Dr. L. Alex Kahl and Elizabeth Leonardis, Institute of Marine and Coastal Sciences, Rutgers University

On 13 December a new phase of the Palmer LTER was entered when B-019 (with support from the RPSC staff at Palmer) deployed an autonomous underwater vehicle (AUV) from station E. RU05, a buoyancy propelled underwater glider, was deployed from station E and flew a 9-day mission along the slope of an underwater basin. Driven by the Rutgers University Coastal Ocean Observation Lab in New Jersey, RU05 flew numerous transects across Adélie penguin foraging grounds at the edge of the basin. The glider's flight path was determined by analysis of foraging pattern data collected by Bill Fraser's group (B-013) during the 2006-2007 and 2007-2008 LTER studies. The transect consisted of more than 600 vertical profiles from the surface to 100 meters depth and resulted in the glider flying more than 160 km (> 100 miles). By comparison, previous LTER seasons at Palmer have resulted in less than 50 vertical profiles, per season, near station E. During the more than 600 vertical profiles, the glider measured salinity, temperature, backscatter, and chlorophyll fluorescence which in turn provided first sustained picture of the local upwelling hypothesized to support the nearby penguin populations.

In addition to the successful deployment and recovery of RU05, B-019 also sampled the water column at stations B & E on December 02, 05, 08, 15, 22, 26, and 28. At both stations, CTD and bio-optics (both inherent and apparent optical properties) vertical profiles up to 70 meters were conducted. Additionally, discrete samples were collected for determination of phytoplankton biomass, pigment composition, rate of primary production, particulate carbon (for Ducklow, B-045), microbial DNA (for B-045), and flow cytometry (for B-045).

Collection of all of these data would have been impossible without the support of the RPSC staff at Palmer Station. Particularly during the glider deployment and its subsequent recovery, the enthusiasm and extra-effort from the RPSC personnel was exceptional and contributed to ushering in a new era of Antarctic science.

PALMER STATION RESEARCH ASSOCIATE MONTHLY REPORT

Louise Hamlin, Research Associate

December 2008

- Arrival of the *RVIB Nathaniel B Palmer* on December 3rd allowed shipment northbound of: DVDs and external hard drive for A-306-P, air samples for O-264-P and data tapes for T-312-P.

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 system operated normally throughout 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.

**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 throughout 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 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.

**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 Research Associate collects weekly air samples for Carbon Cycle Greenhouse Gases Group and fortnightly samples for Halocarbons & other Atmospheric Trace Species Group.

Sampling equipment and operations were per plan throughout the month.

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.

The VLF_RECORD computer encountered several small issues throughout the month, resulting in data loss of a few hours each time. Per email discussion in mid-December, it was decided that a new VLF-RECORD computer will be sent down in the spring.

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.

The 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. 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. 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 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).

The weather station operated normally throughout the month. Scheduled inspections were carried out of the Gamage Point tower.