

PALMER STATION MONTHLY SCIENCE REPORT

July 2012



A beautiful morning sunrise over icy Arthur Harbor on 16 July.

Image Credit: Perri Barbour

NEWS FROM THE LAB

By Janice O'Reilly, Winter Assistant Supervisor of Laboratory Operations

July marked the beginning of the winter season at Palmer Station. After the departure of the last ship in late June station quieted down a bit, allowing for the seventeen-member crew to focus on winter projects. While Infrastructure and Operations (I & O) continued progress on the remodeling of the Aquarium Lab, the two winter-over members from B-037-P (Detrich) and B-038-P (Grim) remained dedicated to their ice fish research. It was a busy and productive time for both staff and scientists.

Winter work projects and research kept everyone busy and focused during the work day; however evening meals brought the winter-overs together for good food, social interactions, and a few festivities. Palmer Station celebrated the 4th of July with a traditional picnic in the boathouse that included hamburgers, hot dogs, baked beans, coleslaw, chips, and decorated cupcakes. Five birthdays were celebrated in July with delectable meals by Russell Freeman, the winter chef, and exquisite cakes created by Dr. Irina Mueller, one of the winter-over grantees.

The below-freezing seawater and air temperatures created perfect conditions for sea ice to form around Palmer Station. Sheltered water bodies remained covered in sea ice for several days at a time including Hero Inlet, where a Weddell seal was seen resting on the sea ice on two different days, the 1st and the 29th of the month. On 10 July one leopard seal was observed resting on a bergy bit near the seawater pumphouse for most of the day; there were no other leopard seal reports for the month. Elephant seals were seldom heard from Elephant Rocks, and by the end of the month there were no signs of elephant seals near Palmer Station. There was one report of a crabeater seal in Hero Inlet and no reports of fur seals. On 5 July two minke whales were spotted in Christie Cove. The only record this month for Adélie penguin observations was on 7 July, when eighteen Adélie penguins were counted and photographed from a Zodiac on the southwest side of Torgersen Island. Some giant Antarctic petrels remained in the area, often seen gliding by station or heard squawking from distant Shortcut Island. An uncommonly seen white giant Antarctic petrel was identified flying along Bonaparte on 28 July. Near the end of the month a flock of approximately 40 Antarctic terns circled the backyard for at least 10 minutes, occasionally congregating on the rocky terrain facing Arthur Harbor. One or two kelp gulls could be seen almost daily. On 29 July two diving kelp gulls were feeding at the open water surface, directly in front of station. Other birds still present in the nearby Palmer Station vicinity included blue-eyed shags, snow petrels, and snowy sheathbills. Overall, fewer marine animals were observed in the Palmer Station area during July, compared to recent months. Wildlife sightings were usually limited to Palmer Station, the Backyard, and Bonaparte because of limited boating opportunities.

JULY 2012 WEATHER

By Neal Scheibe, Research Associate

The daylight hours began to lengthen noticeably as July brought Palmer Station an array of weather conditions. Early in the month there were several days of cold, calm, picturesque weather. Those conditions gave way suddenly to icy, violent winds, which were in turn replaced by a warm, rainy storm. The wet weather quickly morphed into a blanket of snow and finally cool, steady winds finished the month. The minimum temperature this month was -9.3°C on the 6th and a high of 3.0°C came on the 18th. The average wind speed for the month was 12 knots, predominantly from the northeast, but there were gusts as high as 63 knots mid-month.

More than half of July's snowfall came in the days following the rains on the 18th, with a total accumulation of 34 cm. Palmer Station has accumulated 177cm of snow so far for the year compared with last year's 111cm by this time.

The average sea surface temperature for the month was -1.6°C. Sea ice started to form multiple times, only to be swept away by winds from the northeast. Palmer Station ended the month surrounded by thick brash ice pushed in by westerly winds and sea ice tucked back into Arthur Harbor and out to Torgersen Island.

B-037-P MICROTUBULE FUNCTION, PROTEIN FOLDING, AND EMBRYOGENESIS IN ANTARCTIC FISHES: AN INTEGRATIVE APPROACH

H. William Detrich, Principal Investigator, Depts. of Earth and Environmental Sciences and of Biology, Northeastern University, Boston, MA

Personnel on Station: Corey Allard (B-037-P Detrich) and Irina Mueller (B-038-P Grim)

N.B. Because B-029-U and B-038-P are projects affiliated with B-037-P, this report encompasses work by all three projects.

We continued our acclimation experiments throughout the month of July. Red-blooded notothenioid fish embryos (*Notothenia coriiceps*), obtained from crosses earlier in the season, were held at ambient temperature and elevated temperatures and monitored throughout the month of July to determine the effect of temperature on their developmental progress (B-037-P). Throughout the acclimation experiments embryos were also sampled to a) determine the overall expression pattern as well as the localization of genes involved in the development of Antarctic fishes and b) to address the role of reactive oxygen species in the development of Antarctic notothenioid fishes (B-038-P).

Progress was made on developing a protocol for monitoring reactive oxygen species production in intact Antarctic fish embryos and we were able to successfully localize the production of reactive oxygen species in embryos sampled for project B-038-P. In addition, we successfully troubleshooted a protocol for measuring catalase activity in Antarctic fish embryos, allowing us to quantify catalase activity in frozen embryos collected for project B-038-P throughout their development.

Furthermore, we finished the sampling process of tissues and blood samples from several white- and red-blooded Antarctic fish, caught on our fishing trips earlier in the field season.

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Neal Scheibe

G-090-P: GLOBAL SEISMOGRAPH NETWORK (GSN) SITE AT PALMER STATION.
Kent Anderson, Principal Investigator, Incorporated Research Institutions for Seismology (IRIS)

Station PMSA is one of more than 143 sites in the GSN, monitoring seismic waves produced by events worldwide. Real-time telemetry data is sent to the U.S. Geological Survey (USGS). The Research Associate operates and maintains on-site equipment for the project.

The system ran normally for the month.

A-109-P: ANTARCTIC EXTREMELY LOW FREQUENCY/VERY LOW FREQUENCY (ELF/VLF) OBSERVATIONS OF LIGHTNING AND LIGHTNING-INDUCED ELECTRON PRECIPITATION (LEP).

Robert Moore, Principal Investigator, University of Florida

ELF/VLF radio wave observations at Palmer Station are used to provide a deeper understanding of lightning and its effects on the Earth's inner radiation belt. The Research Associate operates and maintains on-site equipment for the project.

The data collection computer power supply failed during the month. A new power supply was installed from a spare available on station and data collection resumed normally.

A-132-P: FABRY-PEROT INTERFEROMETER (FPI)

Qian Wu, Principal Investigator, National Center for Atmospheric Research

The Fabry-Perot Interferometer observes mesospheric and thermospheric neutral winds and temperatures at Palmer Station. The Research Associate operates and maintains on-site equipment for the project.

The instrument ran well during the month.

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

Mathew Lazzara, Principal Investigator, University of Wisconsin

The AMRC 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 Research Associate operates and maintains on-site equipment for the project.

The data ingestor operated normally for 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 help to determine rates of marine biological productivity and ocean mixing as well as 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. The Research Associate collects samples fortnightly from both TerraLab and the VLF Building.

Sampling occurred regularly throughout the month.

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

James Butler, Principal 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. The Research Associate collects weekly air samples for the CCGG group and fortnightly samples for the HATS group.

Carbon Cycle and Halocarbon sampling occurred normally during the month.

**O-264-P: ULTRAVIOLET (UV) SPECTRAL IRRADIANCE MONITORING
NETWORK**

James Butler, Principal Investigator, National Oceanic and Atmospheric Administration / Global Monitoring Division; Boulder, CO

A Biospherical Instruments (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. Also collecting light spectra is a BSI GUV-511 filter radiometer, an Eppley PSP pyranometer, and an Eppley TUVR radiometer. The Research Associate operates and maintains on-site equipment for the project.

The UV monitor collected data normally for the month.

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

Mathew Lazzara, Principal Investigator, University of Wisconsin

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 Research Associate monitors data transmissions for the project and performs quarterly maintenance on the station at Bonaparte Point.

The weather station ran normally during the month.

T-295-P: GPS CONTINUOUSLY OPERATING REFERENCE STATION.

Joe Pettit, Principal Investigator, UNAVCO

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

The GPS operated normally for the duration of the month.

A-336-P: ELF/VLF OBSERVATION OF LIGHTNING DISCHARGE, WHISTLER-MODE WAVES AND ELECTRON PRECIPITATION AT PALMER STATION.

John Gill, 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 and magnetosphere. The Research Associate operates and maintains on-site equipment for the project.

Data was collected normally during the month.

T-312-P: TERASCAN SATELLITE IMAGING SYSTEM

The TeraScan system collects, processes, and archives DMSP and NOAA satellite telemetry, capturing approximately 25-30 passes per day. The Research Associate operates and maintains on-site equipment for the project.

The TeraScan system operated normally for the month.

A-357-P: EXTENDING THE SOUTH AMERICAN MERIDIONAL B-FIELD ARRAY (SAMBA) TO AURORAL LATITUDES IN ANTARCTICA

Efthya 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. The Research Associate maintains the on-site system.

The magnetometer collected data per plan for 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 data and webcam images are sent to a mirror site (<http://4dgeo.who.edu/tsg/>) at Woods Hole Oceanographic Institute, which is a collaborator on the project.

The TSG operation was shut off near month's end to accommodate construction and reorganization activities in the Aquarium Lab. The webcam stopped working at the beginning of the month when it was briefly taken offline. When it was restarted, it could no longer be accessed or only worked intermittently. It is believed that the webcam is nearing end of life for the device. There are no plans for returning this project to operation or for continued reporting in this venue.

T-434-M/P: POLAR GEOSPACIAL CENTER

Paul Morin, Principal Investigator, University of Minnesota

The Polar Geospatial Center provides geospatial support (in the form of mapping, data delivery, and GIS analysis) to science and logistics communities of the U.S. Arctic and Antarctic programs. The Research Associate has been requested to collect ground control points in the Palmer area throughout the 2011-2012 season.

All data points are collected and being processed by the Polar Geospatial Center.

B-466-P: FLUORESCENCE INDUCTION AND RELAXATION (FIRe) FAST REPETITION RATE FLUOROMETRY (FRRF)

Deneb Karentz, Joe Grzyski, Co-Principal Investigators, University of San Francisco

The focus of this project is to identify and evaluate changes that occur in genomic expression and physiology of phytoplankton during the transition from winter to spring, i.e., cellular responses to increasing light and temperature. A Fast Repetition Rate Fluorometer (FRRF) with a FIRe (Fluorescence Induction and Relaxation) sensor was installed in the Palmer Aquarium. The Research Associate downloads data and cleans the instrument on a weekly basis.

The FRRF was cleaned weekly and data were sent to the PIs. There was an issue mid-month with the FRRF not displaying the purple light indicative of normal operation. The system was powered down and powered back up again and began operating normally.

T-998-P: INTERNATIONAL MONITORING STATION (IMS) FOR THE COMPREHENSIVE NUCLEAR TEST BAN TREATY ORG. (CTBTO)

Managed by General Dynamics

The IMS Radionuclide Aerosol Sampler and Analyzer (RASA) is part of the CTBTO verification regime. The automated RASA continually filters ambient air and tests for particulates with radioisotope signatures indicative of a nuclear weapons test. The Research Associate operates and maintains the instrument.

The RASA operated normally for the duration of the month.

TIDE GAGE

Tide height and seawater temperature are monitored on a continual basis by a gauge mounted at the Palmer Station pier. The Research Associate operates and maintains on-site equipment for the project.

The tide gauge operated normally during the month.

METEOROLOGY

The Research Associate acts as chief weather observer, and compiles and distributes meteorological data. 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 at the Gamage Point tower.