

PALMER STATION MONTHLY SCIENCE REPORT
April 2009



*Southern giant petrel chick being weighed as part of a long-term study.
Photo courtesy of Ryan Wallace.*

NEWS FROM THE LAB

Pat McMillan, Winter Assistant Supervisor of Laboratory Operations

The month began with the return of the *ARSV Laurence M. Gould (LMG)* on April 4th from its successful cruise. We said goodbye to the summer station folks and the field science personnel on April 5. With the winter-over personnel on station we continued our training and practicing for our fire, trauma, SAR and port call teams. The *LMG* returned on April 21st bringing four station personnel plus the Kristin O'Brien and Doug Nowacek science parties. The O'Brien group is working with Notothenioid fishes and the Nowacek group is looking at the ecological role of a krill predator, the humpback whales. The two science groups alternate between being on station and the *LMG*.

The summer science groups concluded their research at the beginning of the month and by month end new researchers arrived. We are continuing the monitoring work on the giant petrel

chicks for Bill Fraser. The Blanchette science party, arriving early in the month, successfully collected their wood samples which were placed last year on three different islands. Notothenioid fish were successfully collected on the *LMG*, brought on station and the research on them has started. Calibration and testing of gear for whale observations was done prior to their cruise.

The month came to a close as we are awaiting the return of the whale science party to hear about their encounters and tagging success plus seeing their videos.

April WEATHER

Neal Scheibe, Research Associate

The departure of the summer crew marked the rapid shortening of the days on station. Temperatures steadily decreased during the second half of the month. High pressure systems dominated the area a couple of times this month, especially during the first week, providing extended periods of sunny, calm weather. The coldest temperature was on the 27th at -7.8°C and the warmest was on the 12th at 4.6°C. The average temperature for the month was -1.6°C, over a degree colder than last year.

No significant sea ice is forming yet. Brash ice and bergy bits calved off from the glacier were present intermittently throughout the month. The average sea surface temperature was 0.4°C, warm enough to prevent significant sea ice formation.

Our first snowstorm of the season yielded 26 cm of drift and accumulation at the snow stake on the 24th. Palmer received 15 cm of snowfall throughout the month and measured a total 21 mm of melted precipitation, both far below this time last year

THE FOLLOWING PROJECTS CONDUCTED RESEARCH AT PALMER STATION:

B-036-P: COLLABORATIVE RESEARCH: LINKAGES AMONG MITOCHONDRIAL FORM, FUNCTION AND THERMAL TOLERANCE IN ANTARCTIC NOTOTHENIOID FISHES

Dr. Kristin O'Brien, University of Alaska Fairbanks and Dr. Bruce Sidell, University of Maine, Principal Investigators

Personnel on station: Kristin O'Brien, Bruce Sidell, Elizabeth Crockett, Jody Beers, Jeffrey Grim, Irina Mueller, Megan O'Neill

Our field team arrived at Palmer Station on April 25, 2009. Immediately upon arrival, construction of the aquaria for thermal tolerance experiments began with the help of FEMC members at Palmer Station. In addition, laboratory equipment was set up in preparation for experiments. Five members of our field team departed for fishing in Dallmann Bay on *the Laurence M. Gould* on April 26, 2009. Two members remained at Palmer to continue laboratory set up and preparation of the aquarium room. The *LMG* returned on April 29, 2009 after a

successful fishing trip. Fish were immediately offloaded and are now being maintained in the aquarium room. Construction of the temperature tolerance fish tanks was completed.

Megan O'Neill, a member of our field team from Fairhope H.S. through the ARMADA program at the University of Rhode Island, submitted daily journal entries and photographs for websites both at Fairhope H.S. and ARMADA.

B-249-P: COLLABORATIVE RESEARCH: THE ECOLOGICAL ROLE OF A POORLY STUDIED ANTARCTIC KRILL PREDATOR: THE HUMPBACK WHALE, MEGAPTERA NOVAEANGLIAE

Douglas Nowacek, Ari Friedlaender and Patrick Halpin, Duke University and Meng Zhou, University of Massachusetts, Principal Investigators

Personnel on station: Douglas Nowacek Ari Friedlaender, Patrick Halpin, Meng Zhou, Yiwu Zhu, Colin Ware, Roland Arsenault, Boris Espinasse, David Johnson, Andrew Read, Reny Tyson, Eletta Revelli, Linsdey Peavey, Alison Stimpert

While at Palmer in April, the Multi-scale Study of Humpbacks and Prey (MISHAP) calibrated echosounder gear, tested gear, and continued data analysis software development in anticipation of our 30 April departure on the *Laurence M. Gould* for our first science operations of the cruise.

PALMER STATION RESEARCH ASSOCIATE MONTHLY REPORT

April 2009

Neal Scheibe

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.

A site visit was made early in the month by the principle investigator. A new Javad receiver was installed to allow more tracking capabilities. The TSCe GPS handheld controller was swapped for a newer TSC2 controller. Troubleshooting was performed on a software problem found in the Trimble receiver which resulted from the receiver being scanned by information security computers.

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 station operated normally throughout most of the month. On April 9th the station terminal locked up and was rebooted per instructions from Joel Edwards.

**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 throughout the month. Upgrades were installed remotely by the principle investigator that allows for data from Hugo Island to be viewed.

**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. On hand inventory was sent to grantees to insure that enough flasks will be available for the winter months.

**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.

Sampling occurred normally during the month. On hand inventory was sent to grantees to insure that enough flasks will be available for the winter months.

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.

A new system was installed on nearby Hugo Island. This data can also be tracked using TeraScan and the Data Ingestor, though routine maintenance is not possible.

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.

Two new computers were installed during a site visit by Dan Golden of Stanford. The old VLF_RECORD computer was replaced with a more modern computer and a new computer, VLF_AWDA, was installed to track the occurrence of whistlers. The antenna calibration was checked and various points around station were 'humsniffed' to find possible future locations for the antenna should it ever need to be moved. The data archiving was changed from six hours a day of continuous data to 23 hours a day, using the newly arrived hard drives for data storage.

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 data archiving to the tape drive stalled on several occasions during the month, requiring restarting of the writing processes, but no data was lost. Images were sent to the R/V Laurence M. Gould to aid in determining ice locations and concentrations in support of two science groups that are on the vessel: B-036 (O'Brien) and B-249 (Nowacek).

**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. A new battery has been requested and shipped for the uninterruptible power supply.

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 well 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 system operated normally throughout the month. New consumable supplies were received near the end of 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.