

PALMER STATION MONTHLY SCIENCE REPORT
May 2007



Leopard seal sighted at Gamage Point. Photo courtesy of Shawn Vainio.

NEWS FROM THE LAB

David Minor, Winter Assistant Supervisor Laboratory Operations

The month of May brought to Palmer Station cooler temperatures, the steady reduction of daylight, and the departure of two late season science groups on May 30th. The ARSV *Laurence M. Gould* made two port calls, a fishing cruise for B-036-P in Dallman Bay, and a cruise to search for seals for B-232-P. On May 27th, station science and RPSC personnel made a cruise to Vernadsky station to deliver fresh vegetables and enjoy a short visit with our fellow winter-overs.

On May 18th, the last fledgling support visit for B-013 (Fraser) to Humble Island discovered that all of the petrel chicks had finally left the nest, on their way to distant locales. Out of thirty chicks monitored over the course of the season, it appears that all survived to fledging.

The lab itself is being cleaned, equipment is being re-stocked, and supplies returned to inventory as preparation for the next summer season gets underway. SIP's were carefully reviewed, and planning was in progress for the upcoming science season. The outside aquarium spaces will be getting new plumbing installed this winter, and the indoor aquarium space will be cleaned and organized. New arrival to the tourist aquariums include four small octopi.

APRIL WEATHER

Lana Cohen, Research Associate

Daylight is fading fast as we head into winter. The temperatures have stayed relatively cold for most of the month, keeping much of the snowfall we received on the ground. An impressive frontal system went through the area on the 5th generating 81 knot gusts and over 55 knot sustained winds for nearly 2 hours. High pressure systems dominated the area a

couple of times this month, providing extended periods of sunny, calm weather and a notable 1027.7 mb maximum late in the month.

Sea surface temperatures continued to cool with a minimum -1°C occurring mid-month. Some grease ice started to form in the calm backwaters of Hero Inlet, but no significant sea ice is forming yet. Brash ice and bergy bits calved off from the glacier were present throughout the month. During the last week of the month a number of island-sized bergs could be seen several miles west and southwest of the station.

The coldest temperature was on the 27th at -9.1°C and the warmest was on the 6th at 4.3°C . The average temperature for the month was -1.9°C . Palmer received 16 cm of snowfall throughout the month and measured a total 46.2 mm of melted precipitation.

The following projects conducted research at Palmer Station during April:

B-232-L: HABITAT UTILIZATION OF SOUTHERN OCEAN SEALS: FORAGING BEHAVIOR OF CRABEATER AND ELEPHANT SEALS USING NOVEL METHODS OF OCEANOGRAPHIC DATA COLLECTION

Dr. Daniel P. Costa, Principal Investigator, University of California, Santa Cruz
Dr. Daniel E. Crocker, Principal Investigator, Sonoma State University, Rohnert Park, CA
Dr. Michael E. Goebel, Principal Investigator, Antarctic Ecosystems Research Division, NOAA, La Jolla, CA

Personnel on station: Dan Costa, Mike Goebel, Mike Fedak, Dave Shuman, Luis Huckstadt, Gitte McDonald

We arrived at Palmer station on April 15th aboard the R/V Laurence M. Gould (LMG07-05). We stayed at Palmer while project B-036-P went out to catch fish for their studies. During this time we took the boating training courses and prepared for the upcoming work by setting up the lab and field gear. Once we were set up we made daily excursions to the nearby islands looking for crabeater seals. We did see some leopard seals and fur seals but we had no luck finding crabeater seals. We departed Palmer station on the LMG April 20th and headed south in hopes of finding crabeater seals on nice floes.

We arrived to Crystal Sound the morning of the 21st and started searching for seals. We caught our first crabeater seal that afternoon. For the next 7 days we stayed in the region around Adelaide Island (primarily in Lallemand Fjord and LeBeauf Fjord) and caught between 1-3 seals a day. We were attaching satellite relay data loggers (SRDL's – Sea Mammal Research Unit) to the seals. The SRDLs collect, summarize, and transmit data on the animal's behavior (location, dive depth, dive duration) and environment (temperature and salinity) and transmit via the ARGOS satellite system. This allows for near real-time tracking and accurate geopositioning, in addition to collecting oceanographic data in regions that are hard to sample by traditional methods. Additionally, we took measurements and samples from the seals that will allow us to better understand their physiology, diet, and condition. At the end of this period we had deployed 9 instruments on 8 crabeater seals and

one Weddell seal. In addition to studying the seals we conducted CTD casts in areas where we were working during the evening once we were done for the day.

The LMG returned to Palmer station on the afternoon of the 28th. Since then we have processed samples that were collected on the ship to determine blood oxygen stores. We also continued looking for crabeater seals in the area. On April 30th we did find a small crabeater seal in the area that we caught and collected samples from, but decided not to attach an instrument due to the seals small size.

On May 5th the LMG departed for Punta Arenas bringing the first leg of our study to an end. We would like to thank the support staff at Palmer station and aboard the LMG for their help in making this a successful first leg. We are looking forward to another successful leg.

**B-022-P: THE CHEMICAL ECOLOGY OF SHALLOW-WATER MARINE
MACROALGAE AND INVERTEBRATES ON THE ANTARCTIC PENINSULA**

James McClintock and Charles Amsler, Principal Investigators, University of Alabama at Birmingham,

Bill Baker, Principal Investigator, University of South Florida

Personnel on station: Chuck Amsler, Jim McClintock, Maggie Amsler, Bill Baker, Craig Aumack, Alan Maschek, Philip Bucolo

March brought the arrival of Bill Baker and Alan Maschek on LMG07-03 (12 March) and Philip Bucolo on LMG07-04 (28 March).

In March our group completed 36 dives including checkout dives off the Pier for Baker and Bucolo and dives to collect amphipods, macroalgae, and sponges for laboratory studies. We expended considerable effort on gut content analyses of freshly caught amphipods both from macroalgae and sponges and on quantitative measurements of the densities of amphipods associated with sponges. We also initiated surveys of the percent incidence and abundance of filamentous macroalgae growing as endophytes within larger, chemically defended macroalgae. Endophyte-containing macroalgal thallus is being used to initiate cultures and also preserved in silica gel for DNA-based taxonomic analyses. Palatability bioassays of the few filamentous or filament-like non-endophyte macroalgal species present have been initiated using two species of herbivorous/omnivorous amphipods.

The arrival of Baker and Maschek combined with an increase in our project's lab space on 15 March allowed the natural products chemistry components of our project to begin. Two sponge species targeted for study this field season were collected for both chemical analysis as well as in vivo biosynthetic experimentation. Additional targeted collections of marine invertebrates were made to support ongoing chemical analyses.

We have also been active in educational outreach activities via our UAB in Antarctica web program (<http://antarctica.uab.edu/>). New journal entries about our group's science and also about life and operations in general at Palmer are posted every two days with new photos added every day or two. The site has been receiving low-hundreds to several thousands of

visits per day including from a number of school groups. During March it was featured on the CNN web site and in several other news outlets.

We are grateful for the generous and professional assistance of numerous RPSC staff. Phil Spindler, Dave Minor, Ken Keenan, Steve Barten, and Christina Hammock deserve special thanks for facilitating our laboratory and diving operations.

PALMER STATION RESEARCH ASSOCIATE MONTHLY REPORT

April 2007

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/CDDIS in Reston, VA.

The GPS base station continues to operate using the spare base station receiver with apparently normal data, but unconfirmed configuration settings. Plans to change the base station receiver from the obsolete Ashtech Z-12 backup to the new Trimble NetRS are still on hold pending receipt of directions from the new project PI.

Data were sent manually several times during the month due to missing epochs following Windows Update installations and restarts. There was one instance of failed data transfer during a period of IT security scans. Security vulnerability issues with the Trimble NetRS receiver were discussed with RPSC IT department and project PIs.

Support was provided to the University of Washington glaciology group regarding downloading Palmer GPS base station files from the UNAVCO website.

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 well throughout the month. Rock drilling for a new utilidor installation to the seismic vault was recorded, and it was confirmed with project PIs that the seismic data is not significantly affected by the drilling. Details concerning fiber optic and power cabling rerouting to the seismic vault were discussed with FEMC.

**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 system operated normally throughout the month. Some automatic data transferring processes within the local network failed following network drive remapping, but this did not affect any of data transfers to the UW ftp site.

**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

Air samples are collected on a semiweekly basis by the Station Physician.

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.

**O-264-P COLLECTION OF ATMOSPHERIC AIR FOR THE NOAA\CMDL
WORLDWIDE FLASK SAMPLING NETWORK.**

David Hofmann, Principal Investigator, Climate Monitoring and Diagnostics Laboratory,
National Oceanic and Atmospheric Administration

The National Oceanic and Atmospheric Administration (NOAA) Climate Monitoring and Diagnostics Laboratory continues its long-term measurements of carbon dioxide and other climate relevant atmospheric gases. The Palmer Station air samples are returned to the NOAA laboratory for analysis as part of NOAA's effort to determine and assess the long-term buildup of global pollutants in the atmosphere. Data from this experiment will be used in modeling studies to determine how the rate of change of these parameters affects climate. Air samples are collected on a weekly basis by the Station Physician.

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 were also forwarded to UCSB for B-032-P (Smith).

At the end of the month, the Bonaparte Point AWS has failed to transmit data for several days. Cycling power on the system has not ameliorated the problem and more involved troubleshooting will need to be performed.

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 computers were restarted a few times during the month after routine Windows Update installations. Several extra periods of interesting data were archived, and one week of extra data was recorded as per PI request. The synoptic data storage PC crashed once, resulting in a period of lost data. There was one instance of failed ftp data transfer following network drive remapping and Windows updates. Project data DVDs were prepared for shipment to go out on cruise LMG07-05.

The VLF antenna cable was serviced several times. New holes were drilled, posts erected, and the cable is now strung for the whole length of the glacier.

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 ORBVIEW-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).

The system operated well throughout the month. The ORBVIEW-2 SeaWiFS images were discontinued for the winter as of April 16th. Data tapes were packaged and sent out for

shipment to various PIs. System vulnerabilities concerning ssh upgrades on the Solaris system were discussed with RPSC Image Specialist.

Sea ice images were provided to PIs for project B-232-P and to the LMG captain for LMG07-05 cruise support.

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 system performed well throughout the month. The project computer was restarted several times after routine Windows updates. Data was backed up to disc.

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 system has operated well throughout the month. Seawater flow to the system required adjustment several times during the month. Some loss of data occurred during Denver network outage on April 19th.

The replacement fluorometer arrived and was fully installed but no data was being received. After communicating with project PIs and extensive troubleshooting, it has been determined that the fluorometer is functional and the problem is likely with the cabling between the fluorometer and nport server. Further work on this system is required in order to work around the existing cabling and permanently install the fluorometer.

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. Maintenance activity on the roof following the roof damage due to high winds was noted in the log.

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 equipment operated well throughout the month. Quarterly samples were prepared and packaged for shipment out on LMG07-05. A system reboot was performed as per PI request, and the procedure was added to on-site documentation.

TIDE GAUGE

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

The tide gauge operated normally throughout the month. Sea surface temperature data for the month of April were provided on request to PI project B-036-P. An investigation concerning the data quality of salinity/conductivity and sea surface temperature measurements from the sensor was begun.

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 the LMG each day for cruise support.

MAWS and PalMOS data acquisition computers were restarted a few times after routine Windows Update installations.

Continued problems with the intermittent failure of the present weather sensor throughout the month were noted. The problem of the quantum PAR (photosynthetically active radiation) sensor displaying units that are incorrect (display shows in W/m^2 instead of $\mu mol/s\ m^2$) was determined to be unable to fix without reprogramming the data acquisition software.

Following the network drive remapping this month, much work was required to modify the numerous batch files and Matlab scripts that run automated data transfers, processing, and archiving of the data.

A spreadsheet was created to keep track of routine maintenance and calibration scheduling for all of the PalMOS and MAWS sensors. This will also provide a schedule for upcoming maintenance and calibration tasking on these systems. Also, organization of all of the Palmer meteorological documentation and data products (historical and current) was begun. A winter project list for Palmer meteorological systems tasking was discussed with the Meteorological Coordinator.