

PALMER STATION MONTHLY SCIENCE REPORT
June 2008



*Looking out over Arthur Harbor, as the sun sets on Palmer Station.
Photo courtesy of Christopher Seliga.*

NEWS FROM THE LAB

Christopher Seliga, Winter Assistant Supervisor Laboratory Operations

June was a busy month for the two research groups on station, B-037-P (Detrich) and B-022-P (Amsler/Baker/McClintock), finishing up their work and sending their science samples back home. The *Laurence M. Gould* helped B-037-P conduct two fishing cruises in June, along with a visit to the Ukrainian research station, Vernadsky, to drop off their replacement cook. A good number of Palmer residents got to go on this trip, which was enjoyed by everyone who went.

On station, personnel celebrated our annual Mid-Winters Day dinner on June 20th, with a fabulous three-course meal, prepared by our two amazing chefs, Diane Curran and Eric Cooper. After the dinner, a select group of Palmerites, participated in a polar plunge to mark the shortest day of the year.

On June 21st, Palmer Station was the site for a very special event, the first ever, Antarctic Icefish Mid-Winters Day Marathon. It was conceived by visiting researcher, Dr. John Postlethwait,

Professor of Biology, at the Institute of Neuroscience at the University of Oregon. John, who's a life-long runner and 63 years young, was joined by 29-year-old Paul Queior, our new winter network engineer and first timer on the Ice, who ran the 26.2 miles together. They completed most of their marathon on top of the glacier in the backyard, before finishing up at the station after a course record of 6 hours and 45 minutes.

JUNE WEATHER

Payot Scheibe, Research Associate

June was a warm, windy month compared to past seasons. The -1.9°C average temperature for this month is above the 15-year average for June of -4.5°C. Temperatures were quite moderate throughout the month with the low temperature of the month only reaching -6.8°C. The peak wind gusts for the month were recorded on the 24th at 51 knots and the average wind speed was 13 knots.

The precipitation for June was 42.2 mm compared to 15-year average of 48 mm and 375 mm for the year compared with 395 mm historically. Several occurrences of rain and fog early in the month were replaced by snow by mid-June. Snowstake measurements varied throughout the month with the early rains and swirling winds later in the month taking a toll on the ground snow.

June's average sea surface temperature was -1.08°C, with a fairly rapid drop in temperature at the very end of the month. Pancake ice formations were seen on calm days. Large icebergs were seen occasionally during the month, with one medium sized berg taking up residence for several days on the far side of Bonaparte Point. The usual brash ice and bergy bits were observed throughout the month.

B-037-P: PROTEIN FOLDING AND FUNCTION AT COLD TEMPERATURE: CO-EVOLUTION OF THE CHAPERONIN CCT AND TUBULINS FROM ANTARCTIC FISHES

H. William Detrich, Principal Investigator
Dept. of Biology, Northeastern University, Boston, MA

Personnel on Station: H. William Detrich, Jorge Cuellar, Cayetano Gonzalez, John Postlethwait, Jonathan Wong, and Juan Carlos Zabala

During the month of June, our project was in full swing. Our overall goal is to understand the functioning of the microtubule cytoskeleton at the extremely cold body temperatures experienced by Antarctic fish. This work encompasses analysis of the transcription of tubulin genes, the folding of the tubulin proteins by the chaperonin CCT, and the role of microtubule-organizing centers (centrosomes and basal bodies) in the assembly and dynamics of cellular microtubules. At Palmer Station, Cuellar and Zabala refined the purification procedure for the protein-folding complex, CCT, from testis tissue of *Notothenia coriiceps* and of *Gobionotothen gibberifrons*.

They made four CCT preparations and numerous testis extracts for further study at our home institutions. Zabala also identified several of the tubulin folding co-factors in testis extracts by Western immunoblotting. Gonzalez continued isolating basal bodies from testis and centrosomes from spleen of the two fish species for use in microtubule-nucleation assays, and he fixed testis, spleen, and liver tissues for electron-microscopic analysis of their microtubule cytoskeletons. He also demonstrated the presence of gamma-tubulin in spleen centrosomes by immunofluorescence microscopy using the station's Nikon Eclipse 800.

John Postlethwait and Jonathan Wong arrived at Palmer Station on 2 June after a rough and slow crossing of the Drake Passage by the *ASRV Laurence M. Gould*. They began in vitro fertilization of *N. coriiceps* eggs so that our group can monitor the function of the microtubule cytoskeleton during early embryonic development. Two successful fertilizations were performed, separated by approximately 10 days, and embryo collection and fixation for return to CONUS continued throughout the reporting period. Wong also performed four tubulin preparations from brain tissues of *N. coriiceps* and of *G. gibberifrons* – these preparations will support our studies of tubulin folding, microtubule assembly, and microtubule nucleation at Northeastern University and in Spain.

The *ASRV Laurence M. Gould* engaged in two fishing trips in support of Project B-037 in June. From Tuesday, 3 June, to Friday, 6 June, we fished in Dallmann Bay. Two trap sets, each consisting of five groups of three traps, were conducted between 4-5 June, with splashing and recovery conducted during daylight hours. The traps yielded 82 fish, including 46 *N. coriiceps* (major target species), 4 *N. rossii*, 39 *G. gibberifrons*, 1 *Trematomus hansonii*, 1 *Chaenocephalus aceratus*, and 1 *Chionodraco rastrospinosus*. During nighttime hours, 18 Otter trawls were conducted at depths ranging from 152-178 m. The trawls produced 185 fish (7 *N. coriiceps*, 1 *N. rossii*, 1 *Dissostichus mawsoni*, 110 *G. gibberifrons*, 49 *C. aceratus*, 6 *Champscephalus gunnari*, 6 *C. rastrospinosus*, 1 *Pseudochannichthys georgianus*, 1 *Parachaenichthys charcoti*, and 3 *Gymnodraco acuticeps*). The complementary species' yields obtained by the two fishing methods are quite evident. The second fishing trip was conducted between 7 and 9 June. Traps (three sets of three each) were set in the Bismarck Strait at depths between 237 and 362 m. The target species was *Lepidonotothen kempi*; 11 were collected when the traps were recovered on 9 June.

The *ASRV Laurence M. Gould* departed Palmer Station on 15 June en route to Punta Arenas, Chile. Detrich, Cuellar, Gonzalez, and Zabala sailed northbound while Postlethwait and Wong remained on station to continue the *N. coriiceps* embryo experiments and tubulin preparations. Postlethwait and Wong will depart Palmer Station on 4 July with anticipated arrival in Punta Arenas on 8 July.

We thank the ship and station personnel for their superb help in making our field season a resounding success.

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

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

Bill Baker, Principal Investigator, University of South Florida

Personnel on station: Charles Amsler, Margaret Amsler, Jill Zamzow, Craig Aumack, Gil Koplovitz.

June was a transitional month in the laboratory in the field as three field members (C. Amsler, M. Amsler, and J. Zamzow) wrapped-up experiments and packed most of the laboratory items in preparation for redeployment on 15 June (LMG08-07). In the field, we completed 14 dives in June to collect macroalgae and invertebrates for use in laboratory experiments.

In the laboratory, amphipod feeding bioassays with macroalgae and with macroalgal extracts were conducted throughout the month. Studies of the palatability of tunicate tissues and extracts to amphipods, sea stars, and fish were also ongoing all month. Behavioral experiments examining amphipod host-choice and the influence of fish were finalized early in the month.

We are grateful for the generous and professional assistance of numerous RPSC staff. Chris Seliga, Amber Bates, Adam Swanson, and Neal Scheibe deserve special thanks for facilitating our laboratory and diving operations.

**PALMER STATION RESEARCH ASSOCIATE MONTHLY REPORT
June 2008**

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 project operated normally for 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 well throughout the month recording worldwide seismic events.

**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 became locked up early in the month, requiring disk maintenance on the control computer.

**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 every two weeks for intercomparison purposes.

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

All sampling occurred with no problems.

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 data collection computers quit responding early in the month, requiring reboot. A week of special broadband continuous data was collected at a grantee's request.

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 well throughout the month.

Cruise support SSMI images generated by the system were sent to LMG scientists daily.

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. There were several remote reboots of the control computer performed by the grantee.

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 system has operated well throughout 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. A three lamp calibration was carried out by the research associate at the end of 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 monitoring station operated normally during the month. There were several visits to the RASA room in TerraLab by the facilities and engineering group for maintenance and inspection.

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 equipment has operated normally this month, with the exception of one computer lockup resulting in a reboot.

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).

Isobaric charts were sent to R/V LAURENCE M. GOULD in support of the current cruise.

During a storm early in the month, ice formed on the anemometer, requiring removal by hand to resume normal function. The PalMOS computer became locked up and required reboot on June 7.