

**PALMER STATION MONTHLY SCIENCE REPORT**  
**May 2008**



*Sun rising in the Penola Strait with the Lemaire Channel in the distance.  
Photo courtesy of Christopher Seliga.*

**NEWS FROM THE LAB**

**Christopher Seliga, Winter Assistant Supervisor Laboratory Operations**

May brought another research group to Palmer Station, B-037-P (Detrich) after a five year absence. The *Laurence M. Gould* helped B-037-P conduct four fishing cruises in May with over 300 fish caught during that time. B-022-P (Amsler/Baker/McClintock) continued conducting their research on Station and made numerous dives to collect samples, with most occurring in the first two-thirds of the month, when the weather cooperated.

On station, personnel continued to be busy as a full winter of science got started. We still had time to continue something started with the previous summer season, by having a scavenger hunt one Sunday for various Hidden Art located on station, which everyone who participated enjoyed immensely.

There was also a rare sighting of a King Penguin on Torgersen Island, less than a mile from Station, which had the Station talking. The first significant snowfall of the winter season occurred in May. As the days get shorter and the temperature gets colder, it feels like winter is finally here.

## **MAY WEATHER**

**Payot Scheibe, Research Associate**

Several storms brought significant snow and rainfall this month, but the glacier remained bare until the last weekend due to the windy conditions and warm temperatures. The storms were separated by periods of clear skies and calm winds. Average temperatures in May remained similar to April, though there was a cooling trend as June approached. The coldest temperatures were at the end of the month, with the coldest day being the 30th and 31st at  $-7.1^{\circ}\text{C}$ . The warmest temperature was on the 3rd at  $5.4^{\circ}\text{C}$ . The average temperature for the month was  $-0.9^{\circ}\text{C}$ .

Sea surface temperatures hovered near  $-1^{\circ}\text{C}$  throughout the month. Some sea ice has formed in the calm backwaters of Hero Inlet, but there is no sea ice beginning to form anywhere else. Brash ice and bergy bits continue to calve off of the glaciers.

Palmer received 36 cm of snowfall throughout the month and measured a total 62.2 mm of melted precipitation.

The following projects conducted research at Palmer Station during May:

### **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, Joyce Lau, Sandra Parker, and Juan Carlos Zabala

Our field season began on 27 April with the departure of the field team from Punta Arenas, Chile, on board the *ARSV Laurence M. Gould* at the start of Cruise LMG08-06. We arrived at Palmer Station on 2 May after fishing en route for 18 hours north of King George Island. This Otter trawling was unproductive (12 fish, 3 being our major target species, *Notothenia coriiceps*), which was subsequently determined to be due to gear failure (see below). Fish were off-loaded to the Palmer Aquarium shortly after our arrival. We disembarked and began setting up the B-037-P laboratory.

Detrich and Lau sailed on 4 May for a fishing trip to Dallmann Bay. One set of baited traps was deployed and Otter trawling was conducted. The traps were very successful, yielding 44 specimens of *N. coriiceps*, *N. rossii*, and *Gobionotothen gibberifrons*. The trawls were again unproductive, yielding an additional 11 fish. Nevertheless, we returned to Palmer Station on the morning of 5 May with sufficient fish specimens to initiate our field research program.

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, Parker, and Zabala began purifying the protein-folding complex, CCT, from testis tissue of *G. gibberifrons* and of *N. coriiceps*. They also prepared 35S-labeled *N. coriiceps* tubulins for use as substrates in CCT-mediated folding reactions. Gonzalez began isolating basal bodies from testis and centrosomes from spleen for use in microtubule-nucleation assays. As of the end of May, we have met our objectives and have produced numerous samples for study at our home institutions.

Three other fishing trips were conducted during the remainder of Cruise LMG08-06: 1) On 9 May, Detrich and Lau sailed on the *LMG* for a second fishing trip to Dallmann Bay and Low Island. Two trap sets were performed in Dallmann Bay between 9 and 11 May. Meanwhile, *LMG* and B-037-P personnel determined that the midsection panels of our new net were improperly installed, which likely constricted the net and prevented it from sieving water and catching fish. We changed to an 18-ft Otter trawl net from the 2007 season and experienced a 10-fold improvement in fish yield while trawling at Low Island. 2) Between 14 and 17 May, we conducted our third fishing trip in Crystal Sound (between Lavoisier Island and the Antarctic Peninsula) in the 900-m deep “Banana Trench” that we had previously discovered in 1993. The catch consisted of 28 dragonfishes (Bathydraconidae) of three species, 23 plunderfishes (Arteidraconidae) of one species, 4 Antarctic toothfish (*Dissostichus mawsoni*), and 12 other nototheniids. 3) The fourth fishing trip to Dallmann Bay (17-19 May) was devoted primarily to trawling for icefishes, of which 47 were caught (7 *Champscephalus gunnari*, 33 *Chaenocephalus aceratus*, 6 *Chionodraco rastrospinosus*, 1 *Pseudochannichthys georgianus*). After four fishing trips, we have collected approximately 330 fish, including 59 *N. coriiceps*. All fishing gear is working effectively.

The *ARSV Laurence M. Gould* departed Palmer Station on 21 May en route to Punta Arenas, Chile. Parker and Lau sailed northbound, while Detrich, Cuellar, Gonzalez, and Zabala remained on station to continue the isolation and characterization of CCT, tubulin, centrosomes, and basal bodies. We await the arrival of our storm-tossed colleagues, John Postlethwait and Jonathan Wong, on Cruise LMG08-07. We thank the ship and station personnel for their excellent help in making the first part of our field season a great 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.

May was a busy month in the laboratory and, for the first three weeks, in the field. In the field, we completed 30 dives to collect macroalgae, invertebrates, and fish for use in laboratory experiments as well as underwater macroalgal photosynthesis data for comparison to laboratory data. However, because of high winds common for the last third of the month, only three of these dives were completed after 20 May. The underwater PAM fluorometry photosynthesis measurements accounted for 11 of the month's dives. Habitat-specific fish trapping for gut content analysis was completed for the season mid-month.

In the laboratory, amphipod feeding bioassays with small 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 ongoing all month. Behavioral experiments examining amphipod host-choice and the influence of fish were also continued throughout the month. Our mesocosm experiment examining the impact of mesograzers on macroalgae and their filamentous algal endophytes was completed 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  
May 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 and localized calving.

**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 well during 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 O<sub>2</sub> (detected through changes in O<sub>2</sub>/N<sub>2</sub> 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 CO<sub>2</sub> 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 O<sub>2</sub> and CO<sub>2</sub> 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 (N<sub>2</sub>O) 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.

In April, the system began experiencing signal loss from the antenna. A visiting grantee for this project, along with research associate, determined that the issue was due to problems in one section of cable leading up the glacier. That length of cable was replaced and data collection resumed on the 18<sup>th</sup> of May.

### **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.

### **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 grantee for this project will be visited the station early in May to perform annual maintenance. The grantee, aided by the research associate, removed the instrument from the roofbox, replaced various fitting, and performed software upgrades. The system has operated normally since the maintenance.



## **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.

After installing a new chiller last month, the system underwent three weeks of baseline measurements during the month of April. The RASA unit was returned to normal operation near the end of the month and has been running without problem since then. Inventory of the all available supplies was sent to the responsible sub-contractor.

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 equipment has operated normally this 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).

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