

**PALMER STATION MONTHLY SCIENCE REPORT**  
**August 2010**



Spectacular sunset over Arthur Harbor.

*Image Credit: Christopher Seliga*

**NEWS FROM THE LAB**

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

During the month of August, Palmer Station continued preparations for the upcoming science-packed summer season. As the daylight hours lengthened, we wrapped up winter projects, finished preparing the labs, updated inventories and started deep-cleaning the entire station. Spring is quickly approaching and many of the winter-overs have started thinking about their plans off the ice. It was exciting to have ongoing winter science in the labs this season. This allowed Bill Detrich's group (B-037-P) to continue their Antarctic fish embryo research which started in April.

Lots of birds have been seen during the last month, including blue-eyed shags flying in large flocks or congregating on various islands. Other commonly seen birds around Palmer Station in August were giant petrels, sheathbills, kelp gulls, and Antarctic terns. We even had some Gentoo and Adélie penguin sightings on various islands and porpoising in the water near station. Weddell, Fur, Leopard, and Elephant seals were all seen in the local area as well. It feels as if summer is right around the corner.

## **AUGUST WEATHER**

**Neal Scheibe, Research Associate**

August weather was characterized by clear, calm days due to a persistent high pressure system for much of the month. Only a couple of quickly moving storms broke up the largely tranquil month. Relatively little precipitation for the historically snowy month left the total snowfall at 24cm, but that was still enough to get to 202cm total for the year.

The average temperature for the month was  $-3.9^{\circ}\text{C}$ , slightly warmer than the 15-year average for August of  $-5.9^{\circ}\text{C}$ . The coolest days came in the middle of the month, followed by several warm windy days. The high temperature this month was  $2.1^{\circ}\text{C}$  on the 3<sup>rd</sup> while the minimum temperature was  $-14.5^{\circ}\text{C}$  a few days later on the 16<sup>th</sup>.

Sea surface temperatures averaged  $-1.5^{\circ}\text{C}$ . The month started with the southern sea covered in a frozen layer, but that was broken up by the end of the first week. Wispy veins of brash ice did continue to pass through the Palmer Station boating area throughout the month. A large berg dominated the view past DeLaca Island and was frequently highlighted during sunsets.

### **THE FOLLOWING PROJECTS CONDUCTED RESEARCH AT PALMER STATION:**

#### **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: Corey Allard

During the month of August, I continued my studies of several clutches of *Notothenia coriiceps* embryos. I have continued to collect embryos from suprphysiological temperature treatments, for gene expression analysis both on station and back at Northeastern University. I have begun performing DNA extractions on *N. coriiceps* embryos for gene mapping experiments to be completed at the University of Oregon. I have begun experimenting with possible means of transporting live embryos back the University of Oregon for further testing.

I would like to again thank the Palmer Station personnel for their excellent help in making my winter research program a great success.

**PALMER STATION**  
**RESEARCH ASSOCIATE MONTHLY REPORT**  
**August 2010**  
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.

The GPS operated normally for the duration of the month.

**G-090-P GLOBAL SEISMOGRAPH NETWORK (GSN) SITE AT PALMER STATION.**

Kent Anderson, 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. Real-time telemetry data is sent to the U.S. Geological Survey (USGS).

The requirement to archive the seismic data to tape has been removed by the USGS. All tapes have been removed from the data processing unit and set aside for future handling instructions. Data collection occurred normally during the month.

**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 for the duration of 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.

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 O<sub>2</sub> and CO<sub>2</sub> content takes place.

Sampling equipment and operations were per plan throughout the month.

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

Carbon Cycle and Halocarbon sampling occurred normally during the month. One sample from the CCGG group was found to have moisture inside the flask, so a new sample was taken with a different set of flasks.

**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.

The weather station ran normally during the month.

### **A-109-P ANTARCTIC EXTREMELY LOW FREQUENCY/VERY LOW FREQUENCY OBSERVATIONS OF LIGHTNING AND LIGHTNING-INDUCED ELECTRON PRECIPITATION.**

Robert Moore, Principal Investigator, University of Florida

Extremely Low Frequency/Very Low Frequency (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. Lightning source currents are estimated or directly measured by experimental observations of individual natural and rocket-triggered lightning flashes in North America. Together, the North American and Antarctic data sets are used to experimentally identify and analyze the components of lightning and the effects of lightning, such as lightning-induced electron precipitation, that are observed in the Antarctic, more than 10,000 km distant.

Data collection continued throughout 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.

Sporadic lockup issues persist with the data collection computer. New computers are being shipped down as replacement. Approximately 20 hours of data was lost during the month due to the lockup problem.

### **T-312-P TERASCAN SATELLITE IMAGING SYSTEM.**

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 system operated normally during the month. The data archive tape was changed per schedule.

### **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 collected data normally 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.who.edu/tsg/>.

The thermosalinograph operated normally during the month. The webcam remained offline during the month during construction in TerraLab while the network rack is repositioned. The webcam will be returned to normal operation once construction has completed.

### **T-998-P: IMS RADIONUCLIDE MONITORING**

Managed by 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. Much of the construction taking place within the RASA room during the month has completed. No impact on data collection occurred. Examination of the chiller filter showed minimal dust, so efforts to keep the RASA room clean during construction were successful.

## **ULTRAVIOLET (UV) SPECTRAL IRRADIANCE MONITORING NETWORK (UVSIMN)**

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.

The UV monitor collected data normally for the month and all schedule calibrations were carried out.

## **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).

Scheduled inspections were carried out at the Gamage Point tower.

The temperature sensor on the PalMOS system is still reporting faulty data. All reports are generated using the backup modular automatic weather system (MAWS) for temperature data.