

**PALMER STATION MONTHLY SCIENCE REPORT**  
**June 2011**



**The June full moon rises over Anvers Island**  
*Image Credit: Edward Quintanilla*

**NEWS FROM THE LAB**

**By Melinda Piuk, Winter Assistant Supervisor of Lab Operations**

June started with a flurry of activity in the labs as the Amsler/Baker/McClintock group (B-022-P), the Cottrell group (B-026-P), the O'Brien group (B-036-P), and the Lee group (B-256-P) packed up their gear and samples and boarded the *ARSV Laurence M. Gould* (LMG) for their trip home. The few remaining summer personnel were persuaded onto the boat as well, leaving behind 15 crew members to keep the station operating over the winter. This is the first time since September 2009 that Palmer Station has been without an active science group on station; however, data collection continues year round.

The winter-over staff is catching up on inventory, maintenance, and cleanup. We are enjoying our multi-faceted jobs and the beautiful winter scenery; however, the highlight of the month was our mid-winter celebration. As June drew to an end, we kept our eyes trained and cameras ready for rare clear skies that provide brilliant star gazing and spectacular dawns and dusks.

## **JUNE 2011 WEATHER**

**By Neal Scheibe, Research Associate**

June weather was predominantly cold and windy, with a brief break from the winds coming mid-month. Even the calm days were overcast, creating the feeling that the sun had left station earlier than normal. The average temperature for this month was  $-4.2^{\circ}\text{C}$ , with a low of  $-11.9^{\circ}\text{C}$  just at the end of the month and a high of  $1.6^{\circ}\text{C}$  barely a week earlier. The peak wind gust for the month was recorded on the 26th at 61 knots and the average wind speed was 11 knots.

The melted precipitation for June was 20.3 mm and 214.3 mm for the year, both down from this time last year. There was 22 cm of snowfall recorded, with heavy drifting seen around station for the second half of the month.

June's average sea surface temperature was  $-1.0^{\circ}\text{C}$ , with no days above freezing. Despite the cooler temperatures, very little sea ice was seen during the month. The back of Hero Inlet did freeze up near the end of the month. A few smaller bergs were seen floating through the boating area throughout the month.

## **PALMER STATION RESEARCH ASSOCIATE MONTHLY REPORT June 2011**

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).

Data collection occurred normally during the month.

### **A-132-P FABRY-PEROT INTERFEROMETER**

Qian Wu, Principal Investigator, National Center for Atmospheric Research

The Research Associate operates and maintains on-site equipment for the project. The Fabry-Perot Interferometer observes mesospheric and thermospheric neutral winds and temperatures at Palmer Station.

The chiller ran low on coolant near the middle of the month, causing a shutdown of the chiller. The coolant was topped off and normal chiller function resumed. Periodic inspection of the coolant level has been added to the checklist for this project.

Near the end of the month, the data acquisition program was locked up, needing restart.

### **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 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 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.

**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 on Bonaparte Point was found to be not responding. Inspection of the system revealed that the batteries were dead and there was corrosion on the solar panel. The batteries were brought back to Palmer Station for recharging, but a return trip to Bonaparte Point has not been made by month's end. New batteries and a solar panel are being shipped down by the Principle Investigator.

**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 went as planned for 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 system performed normally throughout the month. A section of unused data cable that remained between two junction boxes at the base of the glacier was coiled up and returned to TerraLab for possible future use.

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

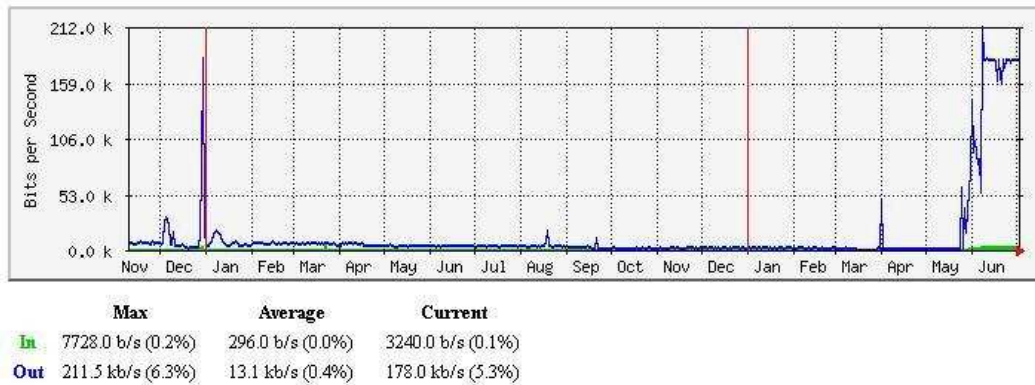
The Research Associate operates and maintains on-site equipment for the project. Throughout the month, the TeraScan system collected, archived, and processed DMSP and NOAA satellite telemetry, capturing approximately 25-30 passes per day. A weekly 85GHz SSM/I ice concentration image was produced and transferred to UCSB for B-032-P (Smith).

The system collected data normally during the month. The cloned system that was running for the prior few weeks was replaced at the beginning of the month with the old system containing a new motherboard.

On May 11, a station-wide power outage caused the system to lose functionality briefly, with no loss of data. The system was not on uninterruptible power supply (UPS) backup due to old batteries that were scheduled to be replaced with newly-arrived units. The new UPS was installed after the power outage and now protects the system from future outages.

The TeraScan system has been operational for the duration of the month. The amount of data coming from the system early in the month, possibly as a result of the data outage from the previous month, was extremely high. The cause of the increase in data size was investigated, but no cause was discovered. A cap on the amount of data that can come from the system was instituted as further investigation continues. A graph of the network usage of the TeraScan system over time is displayed below:

### 'Yearly' Graph (1 Day Average)



### **A-357-P EXTENDING THE SOUTH AMERICAN MERIDIONAL B-FIELD ARRAY (SAMBA) TO AURORAL LATITUDES IN ANTARCTICA**

Efthyhia 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.whoi.edu/tsg/>.

The thermosalinograph operated normally during the month.

### **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. The past two quarterly samples have not been shipped out due to the CTBT not yet requesting the samples. Contacts at General Dynamics have been notified. The samples remain in storage until the shipment notice is received.

## **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 scheduled 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. Weather updates and satellite imagery were forwarded to the R/V LAURENCE M. GOULD.