

**PALMER STATION MONTHLY SCIENCE REPORT**  
**July 2011**



**A team of winter-over personnel collect data at a remote soil climate station (G-239-E) located on Amsler Island near the old Palmer Station site.**

*Image Credit: Perri Barbour*

**NEWS FROM THE LAB**

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

Palmer Station became a winter wonderland during the month of July, ending the month blanketed in snow and surrounded by a frozen harbor and sea ice. The winter-over population welcomed the sun back over the glacier and enjoyed stunning sunrises and sunsets. The 15 member crew continued to focus on winter projects throughout the station and preparing for the early science group coming in August. There were no port calls for the month of July.

The animal population continued to dwindle during July. Only a few fur seals were seen resting in various locations and the elephant seal population on Elephant Rocks quieted. Conditions made it difficult to travel to the surrounding islands for any other seal, whale, or penguin sightings. Giant petrels, blue-eyed shags, snowy sheathbills, kelp gulls, and Antarctic terns were seen around the station during the month and a large flock of birds attracted the crew's attention towards the end of the month.

## **JULY 2011 WEATHER**

**By Neal Scheibe, Research Associate**

As sunshine returned to Palmer Station, the trend in July was for cooler temperatures and relatively calm days. The minimum temperature this month was  $-12.4^{\circ}\text{C}$  on the 31st and a high of  $1.1^{\circ}\text{C}$  came on the 8th. The average temperature of  $-6.4^{\circ}\text{C}$  is slightly below the average for July of  $-5.4^{\circ}\text{C}$ . The average wind speed for the month was 7 knots, predominantly from the northeast, but there were gusts as high as 42 knots late in the month.

Snow sprinkled down intermittently throughout the month, bringing the total accumulation to 38 cm, compared with the 48 cm that fell a year ago. Palmer Station has accumulated 111cm of snow so far for the year compared with the 15-year average of 202cm by this time. Some impressive drifting did occur after a blizzard on the 21st and the following windy days, forcing many people around station to add shoveling to their daily workout routine.

The average sea surface temperature for the month was  $-1.6^{\circ}\text{C}$ . Sea ice started to form multiple times, only to be swept away by winds from the northeast. This changed after the 23rd. A great display of heavy brash ice, several bergy bits, and a few bergs rolled into the Palmer boating area and stretched far off to the horizon. Winds died down and temperatures dropped, allowing sea ice to form around ice of land origin, acting like mortar to hold everything in place as the month ended.

## **PALMER STATION RESEARCH ASSOCIATE MONTHLY REPORT July 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 middle of the month, the data acquisition program was locked up, needing restart.

For two nights the light on the Earth Station was turned back on, with opaque sheets over the fixture to reduce light, in an attempt to access the effect of the light on the interferometer. The light was deemed to cause too much interference on the data being collected by the instrument in Terra Lab and was left off for the remainder of 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 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. A crate of flasks was prepared for shipment to Scripps.

**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. A crate of flasks was prepared for shipment back to NOAA.

**O-264-P: 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.

**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.

Batteries were recharged and replaced in the weather station on Bonaparte Point. The station had been not responding, but after returning the batteries to the system, data began flowing normally from the station. New batteries and a solar panel are en route at month's end.

### **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. Hard drives containing archived data was prepared for shipment back to Stanford.

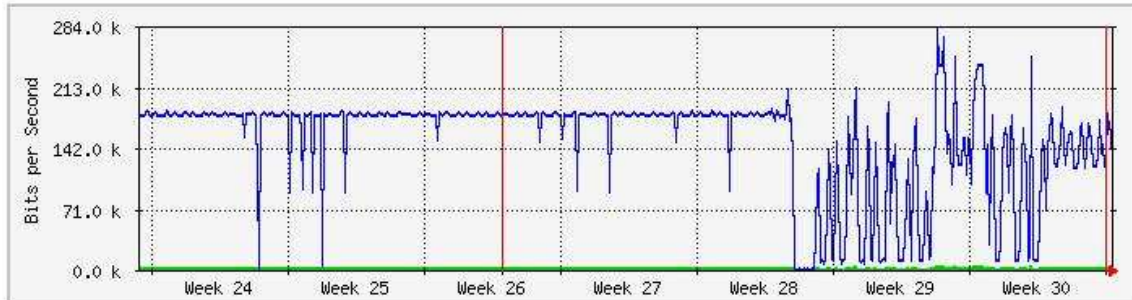
### **T-312-P TERASCAN SATELLITE IMAGING SYSTEM.**

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. Attempts were made to decrease the amount of network traffic coming from the system, a problem that arose at the beginning of the prior month. Various changes to the setup of the file transfer scripts in the software for the control computer only altered the shape of the data flow coming from TeraScan, but the actual amount of data only decreased slightly. A plot of the data flow for the last month is attached:



	Max	Average	Current
In	5048.0 b/s (0.2%)	2768.0 b/s (0.1%)	2176.0 b/s (0.1%)
Out	280.6 kb/s (8.4%)	152.3 kb/s (4.5%)	120.7 kb/s (3.6%)

### **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.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 Organization (CTBTO) 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 past two quarterly samples have been prepared for shipment once the authority arrived from the CTBTO. The samples will ship on the next northbound cruise.

On July 30, the RASA had a pronounced decrease in the pressure on the blower. The problem was found to be caused by a piece of filter media that had become twisted along the vent coming from the blower, causing a gap between the filter and blower. The filter was straightened over the blower vent, which returned pressure to normal. During the next day's filter advance the filter was manually helped through the rollers to keep the twist from reoccurring.

## **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, starting again at the end of the month.