

PALMER STATION MONTHLY SCIENCE REPORT
September 2009



Sunset at Palmer Station with the Laurence M. Gould at the pier during a rare period of light winds and little swell.

Photo courtesy of Stacie Murray

NEWS FROM THE LAB

Tracey Baldwin, Supervisor of Laboratory Operations

September is the month of winters end and summers begin. The *Laurence M. Gould* (LMG) transported the majority of the Palmer Station summer support staff south and the winter support staff north. The port call was filled with turnover and cargo activities along with support of Dr. Colm Sweeney's (O-214-L) LMG based science work. Recreational activity continued in the wintry backyard with skiing and snowshoeing as time and sunlight levels allowed. Wildlife began appearing in earnest and the glacier was utilized as a means to traverse to Bonaparte Point before the annual closure.

Palmer Station support personnel are often involved in routine underway sampling and just recently participated in the 10 day Drake Passage full ocean depth profiling in support of Dr. Colm Sweeney's project titled "Surface pCO₂ and the effects of winter overturning in the Drake Passage". The community was fortunate to have Dr. Sweeney present the first in the summer science lecture series with a talk focused on this project. Colm specifically included the routine underway sampling and very recent full ocean depth profiling; illustrating the importance of this dataset and the role the Palmer Station community and marine technicians play in facilitating it. The lecture was well received and attended by the community.

Elephant seals nestled into their territories and penguins were seen porpoising in Arthur Harbor. One elephant seal couple became three individuals overnight, much to the delight of station personnel lucky enough to be in the backyard the days before and after the birth. Recreation activity is increasing as the days get longer and the weather permits trips into the backyard on snowshoe or ski. However, Bonaparte point and surrounding islands close to recreational travel with the coming of October. The local wildlife benefits from this ASMA restriction and we are

happy to oblige, admiring from afar.

While for the winterovers the LMG is a sign that “their ship has come in”, for the summer folks, it is time to get back to work in anticipation of a busy year of science support. Science events are lined up through the winter and once again, Palmer Station will be a buzz with science activity. We all eagerly await the arrival of the Long Term Ecological Research participants in October. Palmer continues to support the Terra Lab projects and their global networks as always.

SEPTEMBER WEATHER

Brian Nelson and Neal Scheibe, Research Associates

Snowfall for September was lower than average (22 cm compared to the average 42 cm). Year-to-date snowfall is still lower than the average (170 cm compared with 288 cm). There were several windy days with peak winds over 60 knots, the highest of which was 73 knots on the 15th. Average wind for the month was 12 knots. The last week of September was characterized by periods of high winds with freezing rain that turned much of the walkways into skating rinks.

The monthly average temperature for September was -4.4°C. The high temperature this month was +2.5°C and the minimum temperature was -14.1 °C.

Sea surface temperatures remained steady at -1.5°C throughout the month. The sea ice surrounding the station during September was mostly pack ice, with only a few days of open water. There have been several stationary icebergs visible throughout the month.

THE FOLLOWING PROJECTS CONDUCTED RESEARCH AT PALMER STATION:

PALMER STATION

RESEARCH ASSOCIATE MONTHLY REPORT

September 2009

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 system operated normally during 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 station operated normally throughout 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. Software enhancements were installed on the data ingestor computer, remotely by the PI.

**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 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.

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 O₂ and CO₂ 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 (N₂O) 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.

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 system collected data normally 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.

The system collected data normally during the month. Outgoing narrowband data transmissions were slower than normal for one week during the month, with no data loss. The root cause was never determined, but the problem no longer exists. Extra continuous data was transmitted to Stanford to capture an event in the ionosphere.

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 system operated normally throughout the month.

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 webcam and salinograph performed well during the month.

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 during the month. Turnover to the incoming Research Associate was started.

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 system operated normally throughout 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 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).

Melted precipitation data continues to be unreliable due to the snow being melted manually. The amount of snow melt being observed is substantially less than the historical amount anticipated with the given amount of snow.

The incoming summer Research Associate began handling the tasking for this project.

Scheduled inspections were carried out of the Gamage Point tower. Weather updates were forwarded to the R/V LAURENCE M. GOULD.