

PALMER STATION MONTHLY SCIENCE REPORT

SEPTEMBER 2015



Blocks of ice calve off the glacier and fall on top of the sea ice in Arthur Harbor. The sea ice continues to cover the area surrounding Palmer Station extending all the way to the horizon.

(Image Credit: Cynthia Spence)

NEWS FROM THE LAB

Emily Longano, Winter Laboratory Supervisor

After seven months at Palmer Station, the winter season is reaching its conclusion. At the beginning of October, the *ARSV Laurence M. Gould (LMG)* will steam south carrying cargo, fresh foods, and the fresh faces of the incoming summer crew. The vessel and those onboard will be greeted by a sprawling white landscape, as the sea ice continues to blanket the area surrounding Palmer. It has been a quiet but very productive three and a half months of isolation, and we are excited to welcome the return of the LMG.

SEPTEMBER 2015 WEATHER

Lance Roth, Research Associate

During the month of September a new suite of meteorological instruments was installed behind

Terra Lab. This new suite will replace the set on Gamage Point. Meteorological information on this report is from the Gamage Point installation. Information in the October report will be from the new suite of instruments in the backyard.

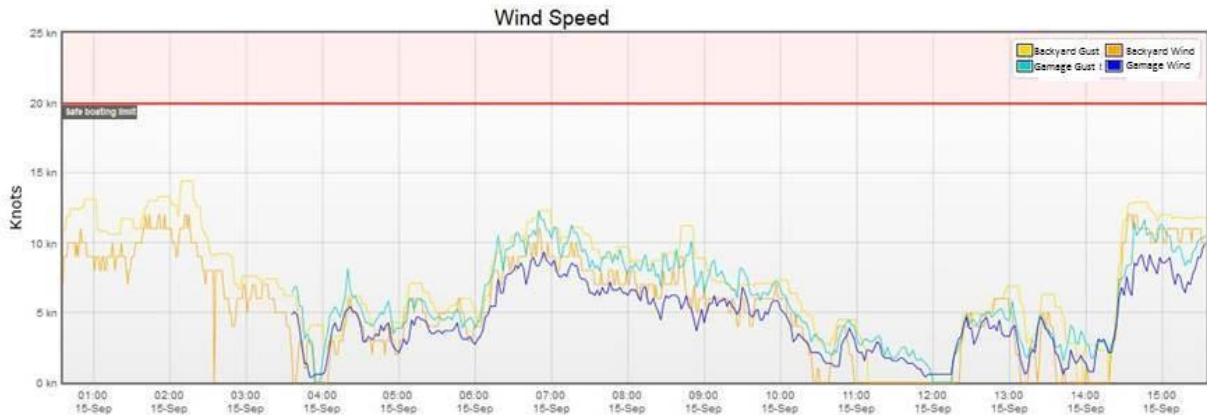


Figure 1: Initial wind speed comparisons between the meteorological system on Gamage Point, and the new system in the Palmer backyard.

Several big storms passed through this month bringing heavy precipitation and high winds. On the 29th the wind peaked at 65 knots (75 mph) depositing a large amount of snow around station. The average wind speed was 11.7 knots (13.5 mph) with a southwest prevailing direction. The average temperature was -9.3°C (15°F) but managed to rise above freezing at the end of the month.

Due to the above freezing temperatures at the end of the month, it rained 20.3 mm (0.8 in). We accumulated a total of 48 cm (18.9 in) of snow. The maximum temperature was 3.8°C (39°F) on September 29th, and the minimum temperature was -20.4°C (-5.0°F) on September 14th.

Sea ice was observed in Hero Inlet and Arthur Harbor for the entire month. The channel appears to be opening up with the warmer temperatures. The tide gauge on the pier measured an average sea surface temperature of -1.8°C (28.8°F). The minimum sea temperature recorded was -1.8°C (28.8°F), which was observed several times throughout the month, and the maximum sea surface temperature was -1.7°C (28.9°F)

Temperature:		
Average		-9.3°C / 15.0°F
Maximum	29 Sept	3.8°C / 39.0°F
Minimum	14 Sept	-20.4°C / -5.0°F
Pressure:		
Average		975.9 mbar
Maximum	28 Sept	1012.5 mbar
Minimum	01 Sept	953.2 mbar
Wind:		
Average Wind Speed		11.7 knots/ 13.5 mph

Prevailing Wind Directions		SW
Peak (5 second gust)	29 Sept	65 knots from 47 degrees
Surface:		
Total Rainfall		20.3 mm
Total Snowfall		48 cm
Greatest depth at snow stake	30 Sept	80 cm
Sea ice (end of reporting period)		11-20 large icebergs; young ice 10-30cm thick covering 9/10 th or more.

**PALMER STATION
RESEARCH ASSOCIATE MONTHLY REPORT
SEPTEMBER 2015**
Lance Roth

B-005-P: IMPACTS OF LOCAL OCEANOGRAPHIC PROCESSES ON ADELIE PENGUIN FORAGING OVER PALMER DEEP: COASTAL OCEAN DYNAMICS APPLICATIONS RADAR (CODAR)

Josh Kohut, Principal Investigator, Rutgers University

The CODAR system consists of three transmitters/receivers located on Anvers Island, Wauwerman Island and on Howard Island in the Joubins. The data from all three transmitters is compiled on computers in Terra Lab and plots of the surface currents over the Palmer Deep are generated.

The CODAR system operated normally throughout the month.

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

Kent Anderson, Principal Investigator, Incorporated Research Institutions for Seismology (IRIS)

Station PMSA is one of more than 150+ 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 Research Associate operates and maintains on-site equipment for the project.

The system operated normally throughout the month. The vault was entered by the Station Electrician throughout the month in order to complete a new meteorological installation. A successful calibration was done on the 21st.

A-109-P: ANTARCTIC EXTREMELY LOW FREQUENCY/VERY LOW FREQUENCY (ELF/VLF) OBSERVATIONS OF LIGHTNING AND LIGHTNING-INDUCED ELECTRON PRECIPITATION (LEP).

Robert Moore, Principal Investigator, University of Florida

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. The Research Associate operates and maintains on-site equipment for the project.

The VLF functioned normally this month. The antenna was checked twice and a gap in the door was reported to the grantees. More hardware will be sent down to repair the door. The ELF is fully functional and operating without any problems. The hard drives were swapped. A box of full hard drives was recovered and will be held at Palmer.

O-202-P: ANTARCTIC METEOROLOGICAL RESEARCH CENTER (AMRC) SATELLITE DATA INGESTOR.

Mathew Lazzara, Principal Investigator, University of Wisconsin

The AMRC 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 Research Associate operates and maintains on-site equipment for the project.

The data ingestor computer system operated normally throughout the month.

O-264-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 help to determine rates of marine biological productivity and ocean mixing as well as 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. The Research Associate collects samples fortnightly from Terra Lab.

The air samples were taken twice this month.

O-264-P: COLLECTION OF ATMOSPHERIC AIR FOR THE NOAA/GMD WORLDWIDE FLASK SAMPLING NETWORK

Don Neff and Steve Montzka, Principal Investigators, 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. The Research Associate collects weekly air samples for the CCGG group and fortnightly samples for the HATS group.

Samples were collected for the carbon cycle and the halocarbon and trace species projects. A few sampling periods were missed this month due to unfavorable conditions.

O-264-P: ULTRAVIOLET (UV) SPECTRAL IRRADIANCE MONITORING NETWORK

James Butler, Principal Investigator, National Oceanic and Atmospheric Administration / Global Monitoring Division; Boulder, CO

A Biospherical Instruments (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. A BSI GUV-511 filter radiometer, an Eppley PSP Pyranometer, and an Eppley TUVR radiometer also continuously measure hemispheric solar flux within various spectral ranges. The Research Associate operates and maintains on-site equipment for the project.

The system operated normally throughout the month. Absolute scans were performed as scheduled including the quadruple lamp scan on September 25th.

O-283-P: ANTARCTIC AUTOMATIC WEATHER STATIONS (AWS).

Mathew Lazzara, Principal Investigator, University of Wisconsin

AWS transmissions from Bonaparte Point are monitored using the TeraScan system and the University of Wisconsin's Data Ingestor system. Data collected from this station is freely available from the University of Wisconsin's Antarctic Meteorological Research Center (AMRC) website. The Research Associate monitors data transmissions for the project and performs quarterly maintenance on the station at Bonaparte Point.

The system operated normally throughout the month. Daily quality checks of the downloaded data were performed as scheduled.

T-295-P: GPS CONTINUOUSLY OPERATING REFERENCE STATION.

Joe Pettit, Principal Investigator, UNAVCO

Continuous 15-second epoch interval GPS data files are collected at station PALM, compressed, and transmitted to the NASA-JPL in Pasadena, CA. The Research Associate operates and maintains on-site equipment for the project.

The system operated normally throughout the month.

T-312-P: TERASCAN SATELLITE IMAGING SYSTEM

The TeraScan system collects, processes, and archives DMSP and NOAA satellite telemetry, capturing approximately 25-30 passes per day. The Research Associate operates and maintains on-site equipment for the project. The TeraScan weather and ice imagery is used for both research and station operations.

The system is having issues with tracking that may have been due to cold temperatures. More investigation will continue to take place to find the cause of the dropouts in the data when weather permits.

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. The Research Associate maintains the on-site system.

The magnetometer had to be rebooted several times this month, but it is now functioning normally.

A-373-P: TROPOSPHERE-IONOSPHERE COUPLING VIA ATMOSPHERIC GRAVITY WAVES

Vadym Paznukhov, Principal Investigator, Boston College

The goal of this project is to enhance the comprehensive research understanding of troposphere-ionosphere coupling via Atmospheric Gravity Waves (AGWs) in the Antarctic region. Both experimental and modeling efforts will be used on the Antarctic Peninsula to investigate the efficiency and main characteristics of such coupling and will address several questions remaining in the current understanding of this coupling process.

The system operated normally throughout the month.

B-466-P: FLUORESCENCE INDUCTION AND RELAXATION (FIRe) FAST REPETITION RATE FLUOROMETRY (FRRF)

Deneb Karentz, Joe Grzyski, Co-Principal Investigators, University of San Francisco

The focus of this project is to identify and evaluate changes that occur in genomic expression and physiology of phytoplankton during the transition from winter to spring, i.e., cellular responses to increasing light and temperature. A Fast Repetition Rate Fluorometer (FRRF) with a FIRe

(Fluorescence Induction and Relaxation) sensor is installed in the Palmer Aquarium. The Research Associate downloads data and cleans the instrument on a weekly basis.

The system had to be shut down. Data is no longer being collected and the instrument will need to be sent back for repair.

T-998-P: INTERNATIONAL MONITORING STATION (IMS) FOR THE COMPREHENSIVE NUCLEAR TEST BAN TREATY ORG. (CTBTO)

Managed by General Dynamics

The IMS Radionuclide Aerosol Sampler and Analyzer (RASA) is part of the CTBTO verification regime. The automated RASA continually filters ambient air and tests for particulates with radioisotope signatures indicative of a nuclear weapons test. The Research Associate operates and maintains the instrument.

The system operated normally throughout the month. Filters were prepared for future shipment.

OCEANOGRAPHY

Daily observations of sea ice extent and growth stage are also recorded, along with continuous tidal height, ocean temperature, and conductivity at Palmer's pier.

Daily observations of the ice around station were made. The new tide gauge is operating normally.

METEOROLOGY

The Research Associate acts as chief weather observer, and compiles and distributes meteorological data. 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 National Weather Service for entry into the Global Telecommunications System.

The old PalMOS operated normally and is no longer on the network. New PalMOS has fully replaced the old PalMOS and is functioning normally. Data is still available for both systems.