

PALMER STATION MONTHLY SCIENCE REPORT

OCTOBER 2017



Arriving to Palmer Station aboard the ARSV *Laurence M. Gould* in early October 2017. *Image Credit: Randy Jones*

NEWS FROM THE LAB

Randy Jones, Summer Laboratory Supervisor

The start of the Summer 2017-2018 season is upon us! The ARSV *Laurence M. Gould* (LMG) arrived to Palmer Station on 6 October bringing a fresh crew of ASC support staff, station visitors, and two grantees from the C-019-P (Schofield) grantee group, Schuyler Nardelli and Frank McQuarrie. As they set up their laboratory space and tested procedures and instruments, the science support staff team, Randy Jones (Lab Supervisor), Carly Quisenberry (Instrument Technician), and Marissa Goerke (Research Associate), got the laboratories ready for soon-to-be-arriving grantee groups. We're thankful to the efforts of the Winter 2017 crew in preparing the station for summer science activities. At month's end, the arrival of the LMG delivered four science groups enthusiastic and ready to start their science programs – B-032-P (Van Mooy), C-013-P (Fraser), C-020-P (Steinberg), and C-045-P (Ducklow).

Winter weather conditions continued throughout the month, which meant heavy snow accumulation, colder temperatures, and stronger winds. The opportunity to begin small boating and RHIB testing did arise for a short window during the middle of the month, but the waters of the region have been ice covered.

OCTOBER 2017 WEATHER

Marissa Goerke, Research Associate

Palmer Monthly Met summary for October, 2017

Temperature
Average: -3.4 °C / 25.9 °F
Maximum: 4.5 °C / 40.1 °F on 23 Oct 16:20
Minimum: -12.3 °C / 9.86 °F on 15 Oct 08:35
Air Pressure
Average: 979 mb
Maximum: 1004.9 mb on 28 Oct 00:52
Minimum: 952 mb on 4 Oct 07:18
Wind
Average: 11 knots / 12.7 mph
Peak (5 Sec Gust): 54 knots / 62 mph on 1 Oct 19:32 from NNE (23 deg)
Prevailing Direction for Month: SW
Surface
Total Rainfall: 56.1 mm / 2.21 in
Total Snowfall: 47 cm / 18.3 in
Greatest Depth at Snow Stake: 91.8 cm / 35.8 in
WMO Sea Ice Observation: Fast ice with open pack ice to seaward ice boundary, 1-5 ice bergs with bergy bits and growlers, ship in easily penetrable ice: conditions improving.
Average Sea Surface Temperature: -1.61 °C / 29.1 °F

October started very windy but tapered off with the arrival of the new crew, wind speeds peaked at 62 mph on the 1st and the average speed was 12.7 mph for the month. Temperatures warmed to an average of 25.9 °F. October brought 18.3 inches of snow this month, bringing our total snow accumulation up to 36 inches. The sea ice in Arthur Harbor and Hero Inlet have started to break up but the pack ice remains in varying concentrations.

C-019-P: PALMER, ANTARCTICA LONG TERM ECOLOGICAL RESEARCH (LTER): LAND-SHELF-OCEAN CONNECTIVITY, ECOSYSTEM RESILIENCE, AND TRANSFORMATION IN A SEA-ICE INFLUENCES PELAGIC ECOSYSTEM, PHYTOPLANKTON COMPONENT

Dr. Oscar Schofield, Principal Investigator, Rutgers University, Institute for Earth, Ocean, and Atmospheric Sciences, Department of Marine and Coastal Sciences

Personnel on station: Schuyler Nardelli and Frank McQuarrie

The Schofield lab is excited to be back at Palmer Station for its 10th season! Schuyler is a Ph.D. student in Oceanography at Rutgers University, and Frank is a recent Rutgers graduate with a B.S. in Biological Oceanography. Both Schuyler and Frank return for their second season at Palmer.

Since arrival to Palmer on LMG17-09, Schuyler and Frank have been busy setting up the lab and preparing for sampling to begin. Conditions have been fairly icy, but over the past week or so things have started to clear up and it looks like sampling is right on the horizon! This year LTER sampling will take place on the new RHIBs, Rigil and Hadar, and it has been exciting to watch the marine technicians work with the boats to get them ready to go for sampling.

This year we will be adding another valuable year of data to the LTER as we continue to monitor the health and productivity of the phytoplankton communities at stations B and E. Our goals are to further understand seasonal and interannual patterns and changes in the phytoplankton as well as the physical (temperature, salinity, light) properties that affect them. We will be deploying a CTD (conductivity, temperature, and depth sensor), AC9 (absorption and attenuation meter), and a C-OPS (radiometer), as well as Niskin bottles to collect water throughout the water column twice per week. In addition to our biweekly sampling we will have two gliders at Palmer this year. One will fly northward in mid-December, and the other southward to the British Rothera Station in late December.

The Schofield lab recently acquired an Imaging FlowCytobot (IFCB), which is an optical instrument that measures phytoplankton abundance and size, generating high-resolution images of phytoplankton that can be analyzed for species identification. For her Ph.D. research, Schuyler will be using the IFCB, in combination with a towed undulator and an EK80 echosounder on the RHIB, to conduct weekly grid surveys characterizing lower trophic level dynamics over the course of the season.

We'd like to thank everyone at Palmer and aboard the ARSV *Laurence M. Gould* for all their help and support over the past month, especially during the busy summer station turnover. We are looking forward to a fun and productive season!

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Marissa Goeke

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.

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/ELF system has operated well throughout the month. New hard drives were installed.

A-119-P: DEVELOPMENT OF ANTARCTIC GRAVITY WAVE IMAGER

Michael Taylor, Principal Investigator, Utah State University

The Gravity Wave Imager takes images of the night sky in the near infrared, observing the dynamics of the upper atmosphere. The camera takes one 20-s exposure image every 30s of a very faint emission originating from a layer located at ~55 miles of altitude.

The IR camera has operated well 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 though 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 was operational all month. It is still not on the network and awaiting a new Research Support Plan (RSP).

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 well throughout the month.

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 hung on 13 October, 2017 and began operating normally again after a system reboot.

O-264-P: A STUDY OF ATMOSPHERIC OXYGEN VARIABILITY IN RELATION TO ANNUAL 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.

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.

CCGG samples were taken once a week in favorable winds and HATS Air samples were taken every other week.



Arthur Harbor covered by sea ice. *Image Credit: Randy Jones*

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. The malfunctioning aspirating fan on the PSP was removed and replaced. The oscillating motor failed and was removed and replaced. A

new fuse and fuse box location were installed. Bi-weekly calibrations were completed as necessary.

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 well 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 imagery is still dropping out during certain passes and will be upgraded soon.

T-998-P: INTERNATIONAL MONITORING STATION (IMS) FOR THE COMPREHENSIVE NUCLEAR TEST BAN TREATY ORGANIZATION (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. A sampled filter was prepared and sent north with LMG17-10NB.

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.

Observations of sea ice around station were made daily and the tidegauge worked well throughout the month.

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 once per 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 and emailed to the National Weather Service for entry into the Global Telecommunications System.

The local weather station (PAWS) is working well. The Joubin site has come back online but the Wauwermans site has yet to become reliable. The observations are archived on the AMRC website: <ftp://amrc.ssec.wisc.edu/pub/palmer/>.