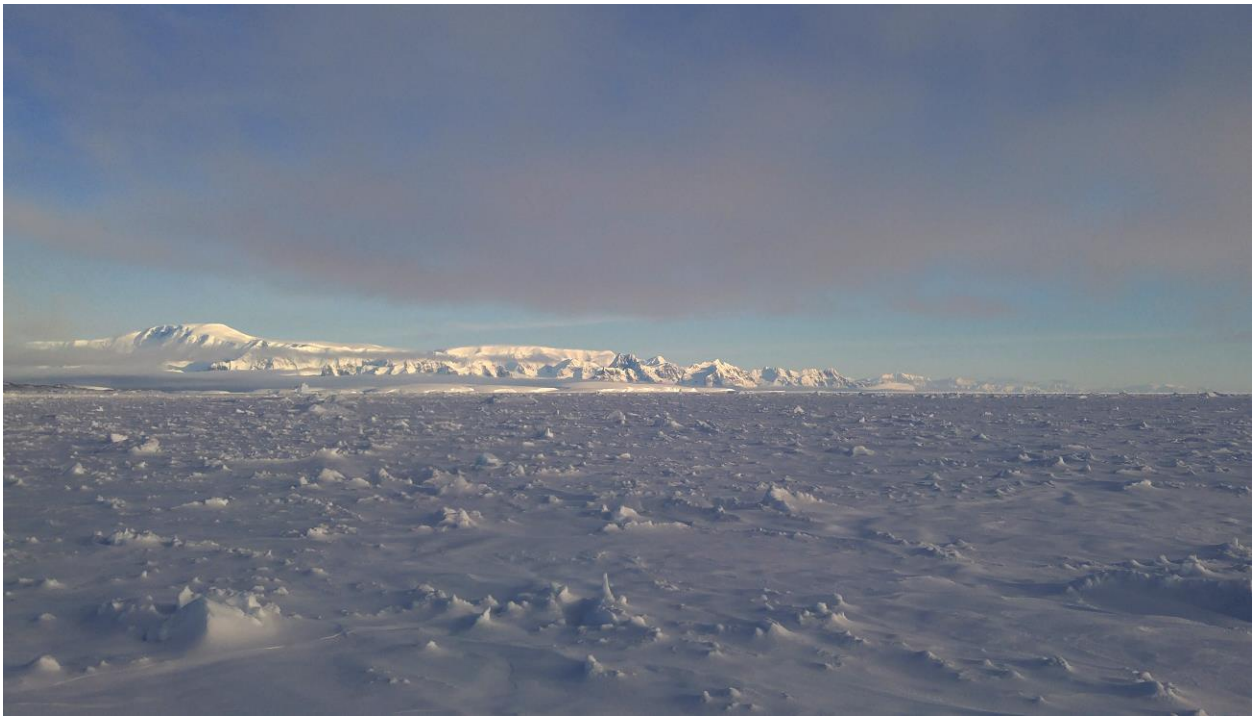
PALMER STATION MONTHLY SCIENCE REPORT

September 2017



Sea ice stretched from the far reaches of Anvers Island to shores of the Antarctic Peninsula itself during the month of September. *Image Credit: Emily Olson*

NEWS FROM THE LAB
Emily Olson, Winter Laboratory Supervisor

Ice is life for the inhabitants of the Antarctic Peninsula, but you wouldn't guess that if you were looking around Palmer Station for the first time this September. The landscape would seem empty as you strained but failed to spot a single fluke of a whale, a splash from a porpoising penguin, or a flyby of a skua. The wind rushing past, at an average of 21kn, would likely be the only noise you heard, masking the infrequent cries of the few remaining gulls and carrying no bellows from the elephant and fur seals that had long since departed. What you would see was ice stretching as far as the horizon, punctuated only by snow covered islands and distant entrapped icebergs, and when the wind stopped, an almost deafening silence would descend.

For nearly the full month of September, snow and ice filled in every spot of open space it could find, from our boardwalks along Station to the now-solid sea itself. A small army of Palmerites dedicated itself to shoveling the station free each morning, only to have 40+ knot winds blow it right back into inconvenient 3 meter drifts almost every night. With no active science for the full month of September, we focused on maintaining the station both inside and out. We have well prepared for the Gould's imminent arrival during the first week of October and are ready to welcome our summer counterparts and the first grantees from C-019-P (Schofield)… and to hand them a shovel!

Palmer Monthly Met summary for September 2017

Temperature
Average: -7.6 °C / 18.2 °F
Maximum: 1.4 °C / 34.52 °F on 5 Sep 01:27
Minimum: -20.9 °C / -5.62 °F on 13 Sep 10:33
Air Pressure
Average: 972.8 mb
Maximum: 1006.1 mb on 30 Sep 13:49
Minimum: 941.5 mb on 17 Sep 19:02
Wind
Average: 18.7 knots / 21.6 mph
Peak (5 Sec Gust): 75 knots / 86 mph on 22 Sep 05:04 from N (352 deg)
Prevailing Direction for Month: N
Surface
Total Rainfall: 122.4 mm / 4.82 in
Total Snowfall: 40 cm / 15.6 in
Greatest Depth at Snow Stake: 77.2 cm / 30.1 in
WMO Sea Ice Observation: Sea ice present <8/10, first year ice 10-30cm thick, 1-5 bergs, with growlers and bergy bits.
Average Sea Surface Temperature: -1.75 °C / 28.8 °F

September was another windy month, with wind speeds up to 86 mph on the 22nd and an average speed of 21.6 mph making work outside very difficult. Temperatures dropped down to -5.62 °F with an average of 18.2 °F. These cooler temperatures brought 15.6 inches of snow this month, bringing our total snow accumulation up to 30 inches. Arthur Harbor and Hero Inlet have developed sea ice in the form of nilas and ice rinds reaching far out into the open ocean.

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W. Lance Roth

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 waiting a new 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 has been operating normally all month.

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 O_2 (detected through changes in O_2/N_2 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 CO_2 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 when the winds were favorable and HATS Air samples were taken twice this month.

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 aspirating fan on the PSP stopped working and needs a new fuse.

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 need to 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.

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 tide gauge 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 and Wauwerman sites are beginning to come back online as the sun rises higher in the sky. The observations are archived on the AMRC website: ftp://amrc.ssec.wisc.edu/pub/palmer/

An intrepid Palmerite doing her best against the rising tide of snow. *Image Credit: Melody Abel*