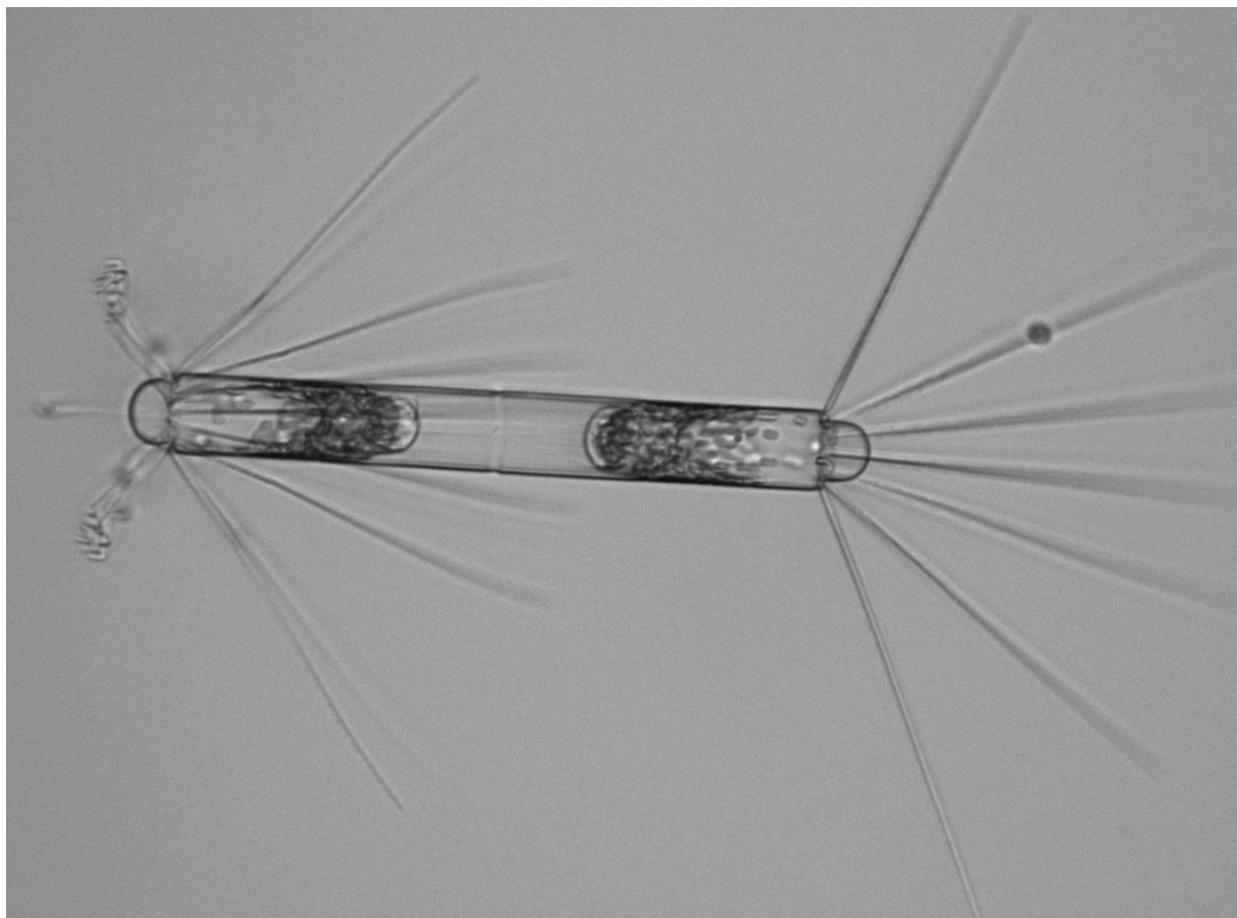


# PALMER STATION MONTHLY SCIENCE REPORT

OCTOBER 2018



The C-019-P (Schofield) group began utilizing their Imaging Flow Cytobot (IFCB) to produce stunning images of phytoplankton; above a *Corethron* spp. Image Credit: Schofield group

## NEWS FROM THE LAB

Randy Jones, Summer Laboratory Supervisor

The start of the month saw the return the ARSV *Laurence M. Gould* (LMG), bringing the new and returning ASC Summer staff to relieve the winter-overs, several ASC visitors, and two grantees from the C-019-P (Schofield) group, Anna Bashkirova and Marie Zahn. While working to setup their laboratory space and test procedures and instruments, the science support staff team, Randy Jones (Lab Supervisor), Carolyn Lipke (Instrument Technician), and Marissa Goerke (Research Associate), got the laboratories ready for grantee groups arriving later in October. We'd like to express our thanks for 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 three science groups enthusiastic and ready to start their science programs – B-234-P (Young), C-020-P (Steinberg), and C-045-P (Ducklow).

## OCTOBER 2018 WEATHER

Marissa Goerke, Research Associate

### Palmer Monthly Met summary for October, 2018

<b>Temperature</b>
<b>Average:</b> -2.6 °C / 27.3 °F
<b>Maximum:</b> 5.9 °C / 42.62 °F on 27 Oct 16:02
<b>Minimum:</b> -14.1 °C / 6.62 °F on 4 Oct 22:48
<b>Air Pressure</b>
<b>Average:</b> 990.9 mb
<b>Maximum:</b> 1014.2 mb on 17 Oct 11:28
<b>Minimum:</b> 963 mb on 30 Oct 11:35
<b>Wind</b>
<b>Average:</b> 9.3 knots / 10.7 mph
<b>Peak (5 Sec Gust):</b> 56 knots / 64 mph on 30 Oct 11:45 from N (1 deg)
<b>Prevailing Direction for Month:</b> NW
<b>Surface</b>
<b>Total Rainfall:</b> 39.1 mm / 1.54 in
<b>Total Snowfall:</b> 40 cm / 15.6 in
<b>Greatest Depth at Snow Stake:</b> 129.6 cm / 50.5 in
<b>WMO Sea Ice Observation:</b> Sea ice in concentrations of 6/10 to <3/10
<b>Average Sea Surface Temperature:</b> -1.49 °C / 29.3 °F

Temperatures peaked at 42.6 °F on October 27<sup>th</sup> and reached a low of 27.3 °F on October 4<sup>th</sup>. The wind peaked at 64 mph on the 30<sup>th</sup> and averaged 10.7 mph. The prevailing wind direction for the month was from the northwest. We had storms move through bringing our monthly snow accumulation up to 15.6 inches and our total accumulation to over 50.5 inches. Sea ice conditions slowed from close pack ice covering 8/10 of the surrounding area to almost completely open water and then back to 8/10 several times. Several large icebergs have approached the area.

## **B-037-P: ANTARCTIC NOTOTHENIROID FISHES – SENTINEL TAXA FOR SOUTHERN OCEAN WARMING**

H. William Detrich, Principal Investigator, Marine Science Center, Dept. of Marine and Environmental Sciences, Northeastern University

Personnel on Station: Jacob Grondin (NU), Nathalie R. Le François (Biodôme de Montréal), and Margaret Streeter (NU)

The month of October was a busy one for B-037-P (Detrich). In addition to completing our thermal experimentation on embryos of the Bullhead notothen, *Notothenia coriiceps*, Le François, Grondin, and Streeter were busy packing our samples and our incubator system and preparing the appropriate transport documentation for return of these precious commodities to the laboratory at our University. Furthermore, the B-037-P chemical inventory was purged, with some common chemicals placed in the Palmer chemical inventory and the remainder packaged as hazardous waste for retrograde to the continental US. Finally, all Palmer equipment was returned to station inventory, and laboratory spaces were cleared for incoming grantees.

Le François departed Palmer Station on LMG18-08NB, and Grondin and Streeter departed on LMG18-09NB, thus ending the B-037-P field season.

We heartily thank the summer and winter personnel of the Antarctic Support Contract and the captain and crew of the ARSV *Laurence M. Gould* for their excellent support throughout our 2018 field season!



**Jacob Grondin (left) and Margaret Streeter (right) demonstrate their incubator setups during a tour of their science efforts. Image Credit: Randy Jones**

**C-019-P: PALMER, ANTARCTICA LONG TERM ECOLOGICAL RESEARCH (LTER): LAND-SHELF-OCEAN CONNECTIVITY, ECOSYSTEM RESILIENCE, AND TRANSFORMATION IN A SEA-ICE INFLUENCED 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: Anna Bashkirova and Marie Zahn

Back for its 11<sup>th</sup> season, the Schofield lab has returned to Palmer for another productive summer. We are excited to resume our research of phytoplankton—those special organisms that form the basis of the Antarctic food web. Marie has worked for the last two summers (one at Palmer and one aboard the LMG) for the Ducklow lab (C-045-P/L) studying microbial biogeochemistry; she is thrilled to step up a trophic level, now investigating phytoplankton and has plans to begin graduate school next fall 2019. This is Anna's first arrival to the ice. She is a Rutgers University student, majoring in Ecology and Evolution. Schuyler Nardelli, a Ph.D. student in Oceanography, and Hailey Conrad, an undergraduate at Rutgers, will operate the lab for the second half of the season.

Since their arrival to Palmer on LMG18-08, Anna and Marie have set up the lab, calibrated instruments, and prepared for sampling. The first week at Palmer offered a glimpse of summer to come with clear skies, warm winds, and relatively little sea ice. It wasn't long, though, before station became iced-in with 40kn winds. With equipment at the ready, the group is now waiting for an opportunity to go out on the water.

This season marks another year that C-019-P (Schofield) adds to the LTER dataset as we continue to study the phytoplankton communities at Stations B and E. Our lab's objective is to understand the seasonal and interannual changes in phytoplankton as well as the biophysical conditions that affect them, including temperature, salinity, and light. As with previous years, we will sample water and deploy optical instruments (AC9, C-OPS, and CTD) biweekly and analyze phytoplankton growth in the lab. Our Imaging Flow Cytobot will help us understand what phytoplankton species are present and these data will inform the creation of an automated species ID program.

In addition to our biweekly sampling, we will collect water and a CTD profile for Nardelli's Ph.D. research at four locations—two inshore (north and south) and two offshore (north and south) with respect to Palmer. Come December, we will deploy an acoustic glider to survey regions in Palmer Canyon. We are excited to participate in collaborative projects throughout the season with the C-013-P (Fraser), C-020-P (Steinberg), C-024-P (Friedlaender), and C-045-P (Ducklow) labs that will explore the interactions between the mixed layer depth, krill distributions, and penguin foraging patterns in the extended boating area and in Palmer Canyon.



**Schofield grantee Anna Bashkirova testing the AC-9 optical instrument in the Aquarium (left), Marie Zahn and Anna Bashkirova flash freeze samples following bi-weekly sampling (right).**  
*Image Credit: Schofield group*

Ultimately, this season promises to be a fun and productive one! We want to thank everyone at Palmer and aboard the LMG for their ongoing help and support for our lab, especially during turnover when schedules are busy and time is limited.

**PALMER STATION**  
**RESEARCH ASSOCIATE MONTHLY REPORT**  
**October 2018**  
Marissa Goerke

**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-111-P: THE NEXT GENERATION OF GEOSPACE RESEARCH FACILITIES AT PALMER STATION**

Andrew Gerrard, Principal Investigator, New Jersey Institute of Technology

The ionosphere-thermosphere-magnetosphere (ITM) region of Earth's atmosphere, which is part of the larger geospace environment, is the portal through which the solar wind can enter and impact our planetary system. Though space weather research over the past decades has greatly increased our understanding of a wide variety of phenomena associated with ITM physics, the sum of these individual processes occurring in the geospace environment does not replicate the rich diversity and scope of this complex region. Thus, a more holistic approach to ITM research is necessary, one that integrates clustered instrumentation at multiple locations to simultaneously look at the interactions within the entire system. Using coordinated and collaborative instrumentation currently installed in Antarctica, researchers will study interrelated ITM phenomena observed at high latitudes. The goal of this research effort is a better understanding of the energy transfer and modulation of the geospace system.

The C:\ drive on the VLF/ELF computer filled up with data causing the software to crash. The issue was resolved once the data was moved to the external raid system. All other systems operated normally throughout the month.

**A-119-P: CONTINENTAL-SCALE STUDIES OF MESOSPHERIC DYNAMICS USING THE ANTARCTIC GRAVITY WAVE INSTRUMENT NETWORK (ANGWIN)**

Michael Taylor, Principal Investigator, Utah State University

The Antarctic Gravity Wave Imaging Network (ANGWIN) is a cooperative effort of six international Antarctic programs to collect continent-wide gravity wave measurements. This network capitalizes on existing optical and radar measurement capabilities at McMurdo, Palmer, South Pole, and six other research stations: Halley (UK), Syowa (Japan), Davis (Australia), Rothera (UK), and Ferraz (Brazil). Infrared (IR) all-sky mesospheric OH (hydroxyl) imagers are installed at Davis, McMurdo, and Halley stations. The network quantifies the properties, variability, and momentum fluxes of short-period (less than one hour) mesospheric gravity waves and their dominant sources and effects over the Antarctic continent. An all-sky near-IR

imager is also installed at Palmer Station to augment the existing instrumentation and create a capability for studying gravity wave properties at each site.

The system operated normally throughout the month.

### **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-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<sub>2</sub> (detected through changes in O<sub>2</sub>/N<sub>2</sub> 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<sub>2</sub> 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. Two shipments of winter samples were sent north.

### **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 (N<sub>2</sub>O) 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 during favorable winds and HATS Air samples were taken every other week. Winter samples were shipped north.

## **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 TUVB 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. Bi-weekly absolute scans were completed as necessary. The system hung on both absolute scans this month but was recovered quickly and returned to normal operation.



**Moon over Torgersen Island, Amsler Island, and Arthur Harbor** *Image Credit: Randy Jones*

## **R-938-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 operated normally throughout the month with an occasional reboot of the system. Two TeraScan associates visited the site and the system received a tune up and all equipment was inspected.

#### **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-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 has operated normally throughout the month. Filters were prepared and are ready for shipment. The yearly filter swap and install was performed without incident.

#### **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 has operated normally 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 AWS is online and the Wauwermans AWS came up for a few days and dropped out again, battery failure is suspected. Observations are archived on the AMRC website: <ftp://amrc.ssec.wisc.edu/pub/palmer/>.