

# PALMER STATION MONTHLY SCIENCE REPORT

MAY 2020



An area where seals have been congregating on Christine Island, where the outline remains of an elephant seal. *Image Credit: Randy Jones*

## NEWS FROM THE LAB

Randy Jones, Summer Laboratory Supervisor

Throughout the month, we lost approximately three hours of daylight over the 31 days of May as we approach mid-winter. Our remaining science field objectives – Research Associate support of Terra Lab science and air sampling, servicing the G-094-L (Yu/Beilman) microclimate station on Amsler Island, and the C-013-P (Fraser) giant petrel fledgling monitoring – were confined to a short window of daylight, or else required a re-familiarization with headlamp operation.

Over the course of the C-013-P (Fraser) giant petrel fledgling study on Humble Island (late March through mid-May 2020), ASC staff volunteers (Network Engineer Jeff Mossen and Medical Doctor Pete McLaughlin, and several other ASC volunteers) monitored 23 fledgling weights and presence/absence at the nest sites. Monitoring occurred every three to four days, depending on weather conditions, and was supported by the Marine Technicians. Mortality is difficult to confirm based on these observations, but all 23 of the fledglings appeared to fully fledge and flew off-island by mid-May. See below for a compilation photo of the fledgling class.

Snowy, winter weather continued throughout the month. Snow accumulated during snow events on 1-2 May, 5-6 May, 17 May, 20 May, and 27 May. Warmer periods of rain punctuated the month, melting snow and compacting the remaining snow cover.



**The 22 giant petrel fledglings nesting on Humble Island. One fledgling not shown. Note the downy white feathers, which are lost during the fledgling period as flight feathers develop.** *Image Credits: Marissa Goerke; Collage Credit: Jeff Mossen*



**The moon rising over the Peninsula mountains, taken from the top of the glacier.** *Image Credit: Randy Jones*

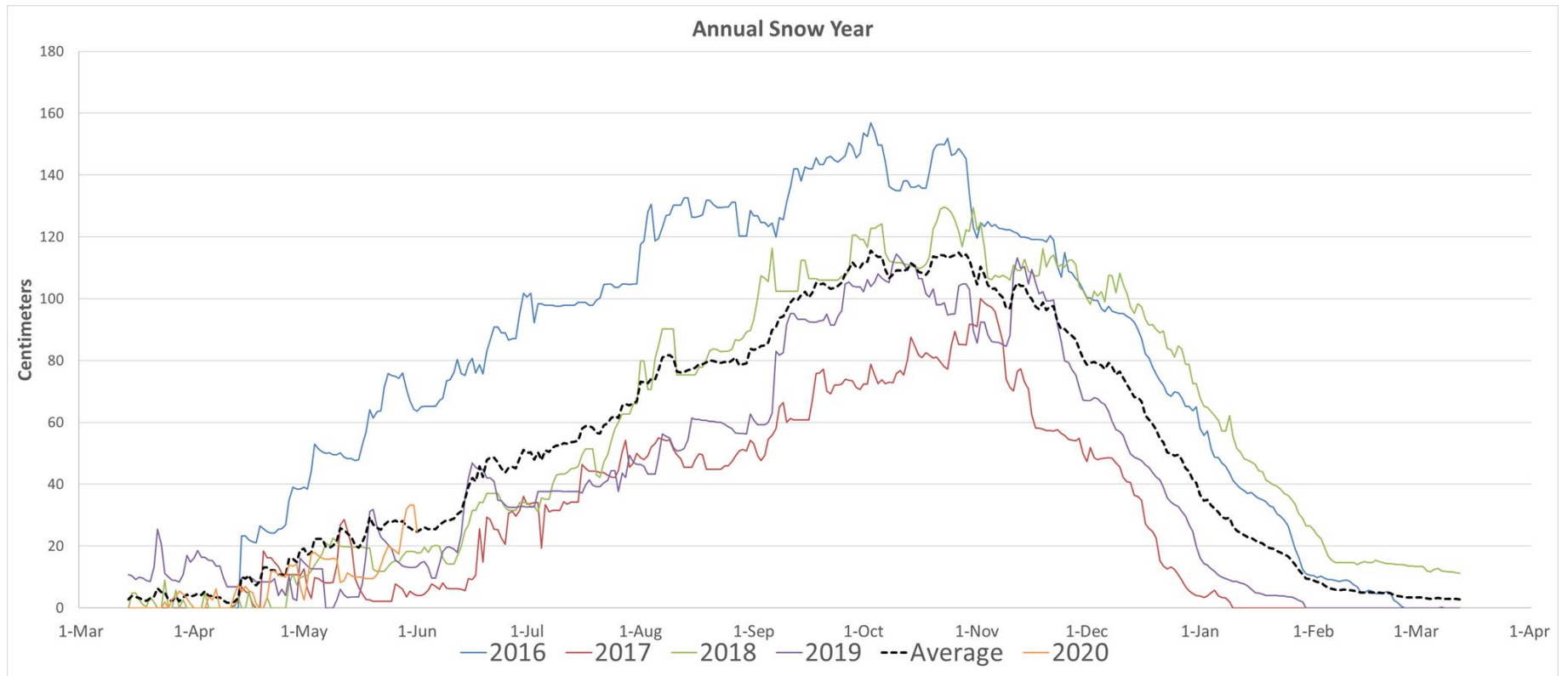
## MAY 2020 WEATHER

Marissa Goerke, Research Associate

|   |
|---|
| <b>Temperature</b>  |
| <b>Average:</b> -2.0 °C / 28.4 °F   |
| <b>Maximum:</b> 5.9 °C / 42.6 °F on 31 May 06:58  |
| <b>Minimum:</b> -8.3 °C / 17.1 °F on 14 May 04:44   |
| <b>Air Pressure</b>   |
| <b>Average:</b> 993.4 mb  |
| <b>Maximum:</b> 1008.4 mb on 25 May 09:08   |
| <b>Minimum:</b> 971.1 mb on 27 May 11:48  |
| <b>Wind</b>   |
| <b>Average:</b> 8.6 knots / 9.9 mph   |
| <b>Peak (5 Sec Gust):</b> 48.0 knots / 55.0 mph on 31 May 08:32 from NE (47 deg)                  |
| <b>Prevailing Direction for Month:</b> NNW  |
| <b>Surface</b>  |
| <b>Total Rainfall:</b> 27.2 mm / 1.1 in   |
| <b>Total Snowfall:</b> 44.0 cm / 17.2 in  |
| <b>Greatest Depth at Snow Stake:</b> 33.2 cm / 12.9 in  |
| <b>WMO Sea Ice Observation:</b> 6-10 Bergs, bergy bits, growlers, brash, grease ice, and ice rind |
| <b>Average Sea Surface Temperature:</b> -0.63 °C / 30.9 °F  |

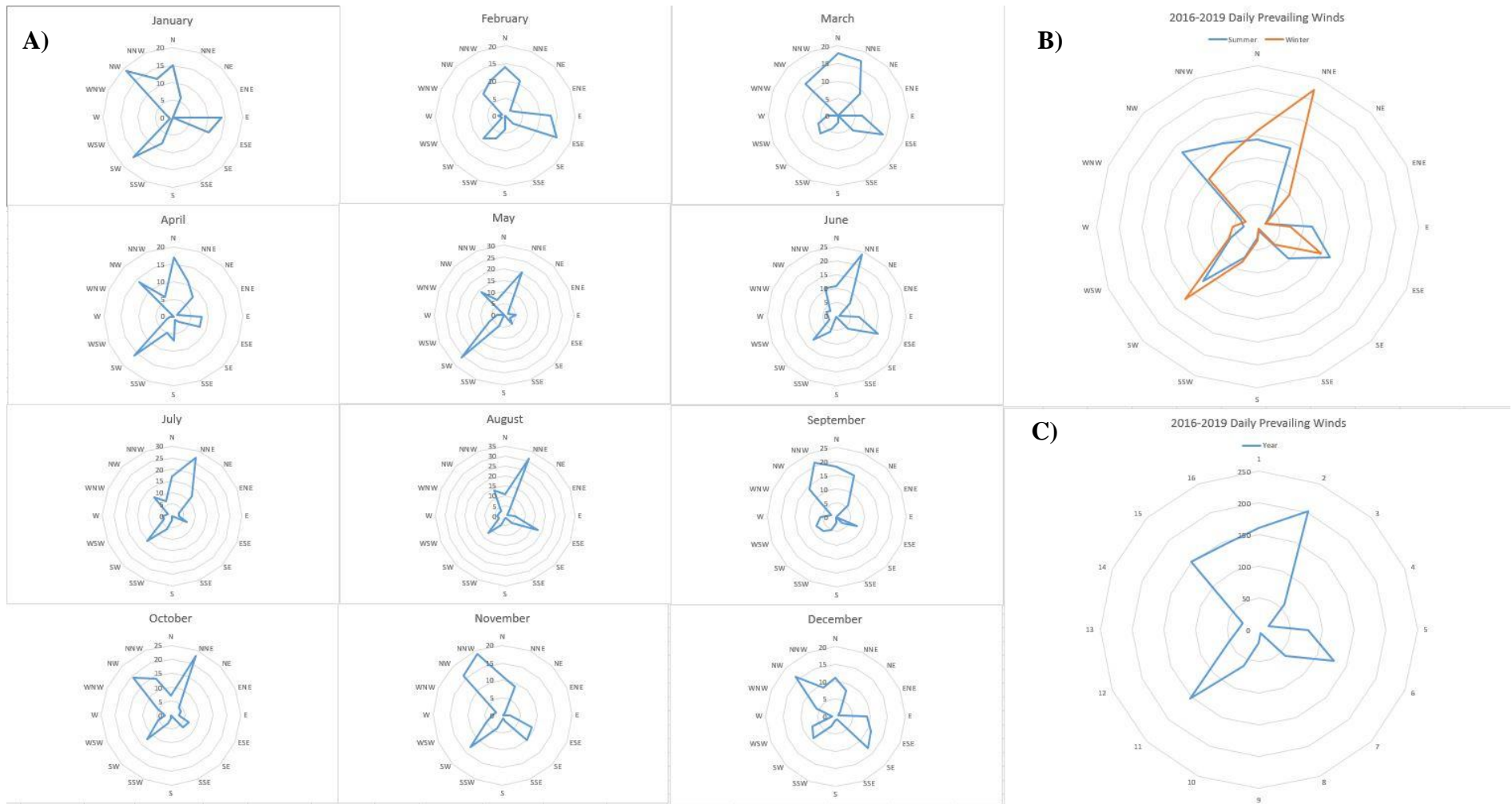
The high temperature in May was 42.6 °F and averaged 28.4 °F. Several shoulder season storms passed through the area bringing high winds, heavy precipitation, and colder temperatures. Sea ice was observed in various states of formation on several occasions. Seventeen inches of snow fell, but was interspersed with warmer rain events and freezing fog resulting in rime ice on several occasions (Fig. 1)

For the Palmer Backyard Automated Weather Station (AWS), monthly “prevailing” winds have been summarized for 2016-2019 in frequency distribution charts of the wind speed and direction (Fig. 2).



**Fig. 1** – A summary of Palmer Backyard snow stake snowfall data (cm). Data are shown as an annual snow year (1 March thru 31 March the following year).





**Fig. 2** – A summary of the Palmer Backyard Automated Weather Station (AWS) winds. Frequency distributions of wind speed and direction from 2016-2019 for A) the months of the year, B) for summer (October thru March, blue line) and for winter (April thru September, orange line), and C) the entire year period. The scale refers to the number of days in the 4 year span that the prevailing wind from each daily period came from that direction.

## **PALMER STATION RESEARCH ASSOCIATE MONTHLY REPORT**

**May 2020**

Marissa Goerke

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

Dr. 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.

Both the ELF/VLF operated normally throughout the month.

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

Mr. 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 2020-21 visit by the grantee was deferred.

### **O-264-P: A STUDY OF ATMOSPHERIC OXYGEN VARIABILITY IN RELATION TO ANNUAL DECADAL VARIATIONS IN TERRESTRIAL AND MARINE ECOSYSTEMS**

Dr. 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 successfully taken twice this month.

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

Mr. Don Neff and Dr. Steve Montzka, Principal Investigators, National Oceanic and Atmospheric Administration / Global Monitoring Division

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 successfully taken within one week of their target sampling dates due to boating operations and high winds.

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

Dr. James Butler, Principal Investigator, National Oceanic and Atmospheric Administration / Global Monitoring Division

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 this month. Bi-weekly absolute scans were completed as scheduled without complications.

**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 remained in its 75% operational configuration while Sea Space continues to engineer a solution to the problem. Several requests for technical support were fulfilled to aid in the search for a solution.

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

Mr. 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 operated normally throughout the month. Processed filters and sent logs as needed.

**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.

**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) operated normally throughout the month. Clear days have allowed the remote weather stations to wake up occasionally. The PAWS system was migrated to an upgraded server resulting in a several hour outage.

Observations are archived on the AMRC website: <ftp://amrc.ssec.wisc.edu/pub/palmer/>.