PALMER STATION MONTHLY SCIENCE REPORT

April 2023

Divers jumping off R/V HADAR to sample transect sites in the Joubin Islands, as seen from a support zodiac.
Image credit: Ben Rosen-Filardo

NEWS FROM THE LAB

Angela Klemmedson, Winter Laboratory Supervisor

April was particularly busy at Palmer Station, focused on transitioning between summer and winter science, and supporting many science groups along the way. The R/V LAURENCE M. GOULD arrived March 31st with the Palmer winterover staff, several NSF representatives and ASC contractors, and two Terra Lab grantees. The arriving grantees included one from T-998 (Hosticka) to perform maintenance on the CTBTO Radionuclide Monitoring Station and one from O-264 (Stein) to install a sampling inlet in the roof of Terra Lab to collect NOAA air samples. After a hectic yet successful turnover, the ship departed April 7th with the Palmer summer staff, NSF representatives, and all of the grantees from C-013 (Cimino), B-046 (Teets), T-998 (Hosticka), and O-264 (Stein) aboard.

Several ASC contractors stayed through the next portcall to perform maintenance on towers around Palmer Station, test our drinking water, train the fire brigade, and inspect fire systems. The B-027 (McClintock) group also stayed on station and we continued supporting their science throughout the month of April. They completed many local dives throughout the month, and even made it to the Joubin Islands, after being delayed several times due to weather and conflicting operations.

The Palmer Station "junior birders" have continued the giant petrel chick counts and measurements since the departure of the C-013 (Cimino) grantees. The two selected individuals go to Humble Island every five days (weather dependent) and as of May 5th, 10 of the 24 giant petrel chicks have fledged and left their nests. We expect the remaining 14 chicks to fledge throughout the next few weeks.

Less than two weeks after the R/V LAURENCE M. GOULD left Palmer, it returned again on April 19th. This time, the ship brought grantees from B-036 (O'Brien) to study hypoxia tolerance in Notothenioid fishes. The group started setting up their lab and aquarium spaces and then spent four days fishing before returning to Palmer. We conducted a smooth transfer of their live fish from the ship to our Aquarium, and have had great survival of the fish since then. Read the B-036 (O'Brien) section of this report for more information.

The R/V LAURENCE M. GOULD left Palmer again on April 28th, taking the B-027 (McClintock) grantees and the remaining ASC contractors with it, cutting our station population nearly in half. The LMG23-05 fishing cruise will arrive this week and come and go several times throughout May and June, and then we will be on our own for the remainder of the winter. We are all looking forward to the arrival of our final science group, B-459 (Bernard) and the science-packed winter ahead!

Junior birders weighing a giant petrel chick on Humble Island to continue data collection for C-013 (Cimino).
Image credit: Ben Rosen-Filardo

B-027-P: ASSEMBLAGE-WIDE EFFECTS OF OCEAN ACIDIFICATION AND OCEAN WARMING ON ECOLOGICALLY IMPORTANT MACROALGAL-ASSOCIATED CRUSTACEANS IN ANTARCTICA

James McClintock and Charles Amsler, Principal Investigators, University of Alabama at Birmingham

Personnel on station: Charles Amsler, Margaret Amsler, Jami de Jesus, Hannah Oswalt

Personnel movements this month: Our field team redeployed with LMG23-04 on 28 April

Up through 19 April, the month was again dominated by daily monitoring of seawater chemistry and of amphipod molting and mortality, as described in our March report. These seawater chemistry measurements are standard within the ocean acidification science community to ensure that results are repeatable across studies.

In addition to daily seawater chemistry monitoring, on 19 April we began preparations for ending the main ocean acidification experiment the next day. This involved siphoning the bottom of each of our experimental buckets to remove debris and remaining amphipod molts, and removing the plastic aquarium plants that we had been seeding with diatoms for the amphipods to eat, while carefully ensuring that no amphipods remained on the removed plants. This preparation streamlined our work on 20 April when we ended our experiment, which had run for exactly eight weeks. We were able to use Lab 1, right next to the aquarium building, for this as it had been vacated by previously redeploying groups. Being right next to the aquarium made our processing much more efficient.

Each experimental bucket was emptied of amphipods, which were counted by species, noting the few that had died or molted since the preceding day. Each of the species was divided into vials to be used for analysis of overall body chemistry composition and vials to be used for X-ray diffraction analysis of exoskeleton calcification. They were then frozen at -80 C for transport to UAB where these analyses will be completed.

In April we also performed two experiments to examine the impacts of ocean acidification on the palatability of macroalgae to the amphipods and on amphipod feeding rates overall. One of these experiments focused on defenses of the chemically defended brown macroalga, which is the host we collected the amphipods on initially. Our experiment in 2019-20 used these in the experimental buckets instead of plastic aquarium plants and the algae were frozen and transported to UAB at the end of our (COVID-shortened) 2019-20 season. At UAB their defensive chemical metabolites were extracted and the extracts returned to Palmer for use this season. We found that ocean acidification decreased the palatability of the extracts under future climate change levels. Similarly, a palatable red alga that we used in the experiments because it is eaten by two of the three amphipod species became less palatable after only two weeks at the lowest pH treatment. Amphipods at the end of the eight week experiment, however, did not differ in their consumption of untreated red algae.

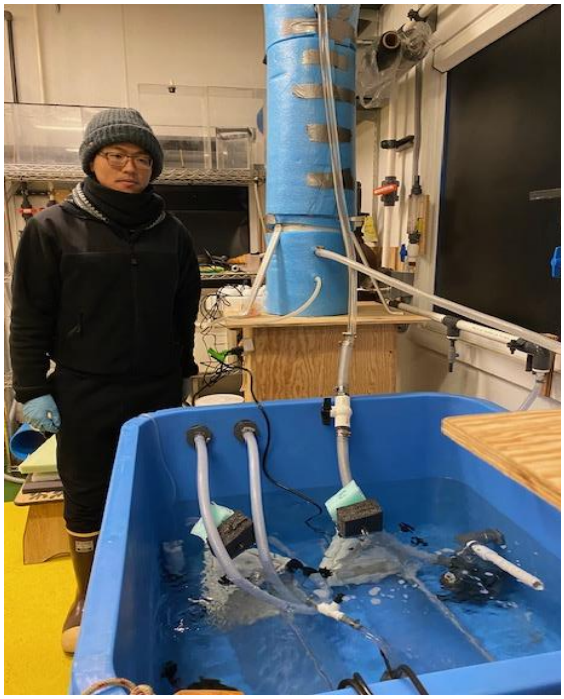
In April we were also able to complete dives begun in March at one of our B-236 transect sites in the local boating area and to partially resample two of three transect sites in the Joubin Islands with a day of RHIB support. Being able to revisit these sites to see how they had and had not changed is very useful to our ongoing analysis of data from that project.

We are grateful for the generous and professional assistance from numerous ASC staff in facilitating our activities. In particular, Angela Klemmedson, Hannah James, Kim Sonderland,

and Lance Roth facilitated our laboratory operations and coordinated our overall station support while Matt Gosselin, Barb Krasinski, and Matt Cabell facilitated our boat diving activities.

B-036-P: ANT LIA: HYPOXIA TOLERANCE IN NOTOTHENIOID FISHES
Dr. Kristin O'Brien, Principal Investigator, Institute of Arctic Biology, University of Alaska Fairbanks; Dr. Yangfan Zhang, Senior Personnel, Harvard University
Personnel on station: Dr. Kristin O'Brien (UAF), Dr. Yangfan Zhang (Harvard University), Augustus Snyder (UAF), Noelle Picard (UAF), Danae Paredes (Universidad Austral de Chile)

Our field team arrived at Palmer Station on April 19 and began setting up our laboratory. Two days later, most of the field team, with the exception of Yangfan Zhang, departed on the R/V LAURENCE M. GOULD for our first fishing trip to Dallmann Bay and offshore of Low Island. Yangfan is leading experiments quantifying the critical oxygen tension (Pcrit) of notothenioid fishes. Results from these experiments will inform the level of hypoxia fishes will be exposed to for long-term acclimation experiments to evaluate the capacity of notothenioid fishes to remodel their physiology and biochemistry in response to hypoxia. Measurements of Pcrit require first measuring standard metabolic rate (SMR) and then lowering the oxygen level to determine the minimum level of oxygen required to maintain SMR. Oxygen levels in the tank are reduced by displacing oxygen with nitrogen gas. The efficiency of deoxygenation is improved with a degassing column filled with porous media to increase the surface area of water as it is pumped through the column along with nitrogen gas (shown below).



Dr. Yangfan Zhang with one of the two tanks used for measuring critical oxygen tension.
Image credit: Kristin O'Brien

While Yangfan prepared the set up for measuring Pcrit, other members of the field team went fishing April 22-26 and were successful in capturing some individuals from each of our target species, including the red-blooded species *Notothenia coriiceps*, and hemoglobinless icefish *Chaenocephalus aceratus.*

Upon returning from our fishing trip, we continued setting up our laboratory and preparing reagents for biochemical measurements. We will begin collecting tissues from normoxic individuals by the first week of May and quantifying hematocrit, hemoglobin levels, the activity of Na+/K+ ATPase in gill tissue, mitochondrial function, as well as harvesting tissues, preserving gills for microscopy and isolating nuclei for further analyses at our home institution. These additional analyses will include quantifying changes in metabolism, gene expression and gill architecture in response to hypoxia.

We greatly appreciate the outstanding support from the staff at Palmer Station with offloading fish from the R/V LAURENCE M. GOULD following our fishing trip and setting up our laboratory.

ASC staff transferring Xactic tanks of *Notothenia coriiceps* and *Chaenocephalus aceratus* to B-036 grantees to net transfer into aquarium tanks. *Image credit: Gabe Nerf*

PALMER STATION
RESEARCH ASSOCIATE MONTHLY REPORT
April 2023
Ben Rosen-Filardo

View from the Terra Lab roof as the sun crests the glacier, April 28, 2023. From left to right are the RASA & Scripps intakes (T-998-P & O-264-P), UV instruments (O-264-P), and GPS transmitter antenna (T-295-P). *Image credit: Ben Rosen-Filardo*

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

Andrew Gerrard, Principal Investigator, New Jersey Institute of Technology

Extremely Low Frequency/Very Low Frequency (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. Lightning source currents are estimated or directly measured by experimental observations of individual natural and rocket−triggered lightning flashes in North America. Together, the North American and Antarctic data sets are used to experimentally

identify and analyze the components of lightning and the effects of lightning, such as lightning-induced electron precipitation (LEP), that are observed in the Antarctic, more than 10,000 km away.

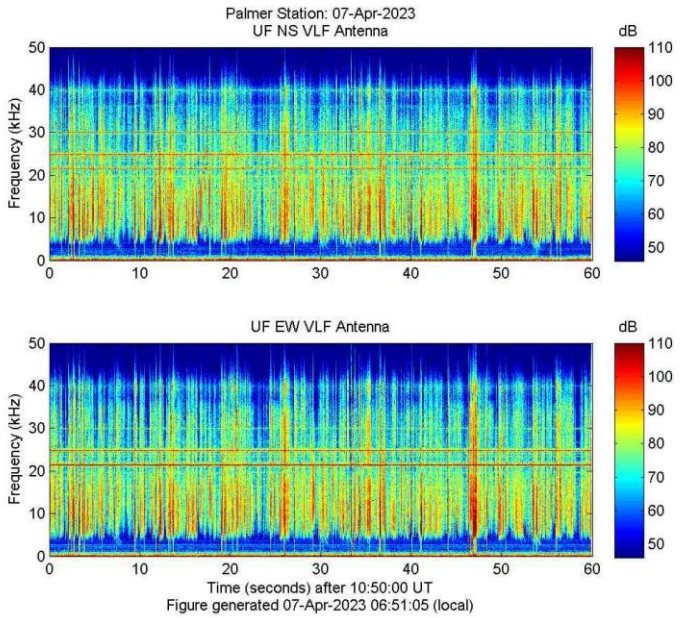


Figure 1. *Real-Time broadband VLF Spectrogram from Palmer Station, Antarctica.*

Both the Extremely Low Frequency and Very Low Frequency systems operated well this month. The spectrograms were reviewed daily and bi-weekly antenna inspections were done as weather allowed. Hard drives were swapped on April 8.

Current VLF/ELF data from Palmer Station can be observed at:
http://halo.ece.ufl.edu/realtime_palmer_bb.php.

A-111-P: SAMBA MAGNETOMETER

Andrew Gerrard, Principal Investigator, New Jersey Institute of Technology

The three-axis fluxgate magnetometer at Palmer is one in a chain of eleven longitudinal, ground-based magnetometers extending down though South America and into Antarctica. The primary scientific goals are the study of Ultra Low Frequency (ULF) waves and the remote sensing of mass density in the inner magnetosphere during geomagnetically active periods. Palmer's magnetometer is also a conjugate to the Canadian Poste de la Baleine Station, allowing the study of conjugate differences in geomagnetic substorms and general auroral activity.

SAMBA stands for South American Meridional B-field Array. The sites are approximately along the 0° geomagnetic longitude and ranging from -5° to -48° geomagnetic latitude. In combination with other magnetometer chains, including the AGO (Automated Geophysical Observatory) systems elsewhere in Antarctica, the stations create an almost complete, cusp-to-cusp-long meridional chain at approximately 0° magnetic meridian.

The magnetometer was originally installed at Palmer in 2005, and a replacement installed in April of 2008. In 2017 the project was taken over by Andrew Gerrard. On March 27th, 2017 the USAP IT blocked all northbound VPN traffic under a larger umbrella of blocking all northbound

encrypted-tunnel traffic. Since that time there has been much discussion, but the magnetometer is still considered a security vulnerability. The Research Associate has been working with the home institution at the University of California, Los Angeles to resolve this issue. As of September 30th, 2020 at 7:45am local time, the magnetometer was removed from the network. The instrumentation and computer are still operational. Data will continue to be collected and stored locally. The project is preparing to ship the new system that will be compatible with the network down this year. More information can be found at: http://magnetometers.bc.edu/index.php/palmer.

G-090-P: GLOBAL SEISMOGRAPH NETWORK (GSN) SITE AT PALMER STATION.
Kent Anderson, Principal Investigator, Incorporated Research Institutions for Seismology (IRIS)

Palmer's seismic station, code named PMSA, is part of the Global Seismic Network (GSN), a collection of 150+ sites worldwide, operating under the aegis of the Incorporated Research Institutions for Seismology (IRIS), and managed by the United States Geological Survey's Albuquerque Seismological Laboratory (ASL). The site was installed in March 1993. As of August 2006, PMSA is also used as an ancillary seismic system for the CTBT/IMS installation; CTBT-specific protocols for the seismic system are covered in the CTBT (T-998-P) section this document.

A standard seismic station consists of three seismometers oriented to detect ground motion along three mutually perpendicular lines. Most of the time the directions chosen are north-south, east-west, and up-down. The seismometers in the Palmer Station installation are “forced balanced” instruments, which means that they work by keeping an inertial mass stationary with respect to the instrument (and the earth). When a seismic wave arrives, the ground moves, carrying along the housing of the seismometer. The inertial mass tends to remain stationary and not move with the instrument, but it is electronically “forced” to travel along with the instrument (and the earth). The amount of “force” necessary to make it move with the rest of the instrument is proportional to the ground acceleration and is recorded as the raw data from the seismometer.

By examining time of arrival, azimuth, magnitude, frequency and wave type of the incoming waves, seismologists can determine the location, depth of focus, magnitude, type of faulting that occurred, ground acceleration in gravitational force and the structure of the medium (the earth) through which the waves traveled to reach the station. The Research Associate operates and maintains on-site equipment for the project.

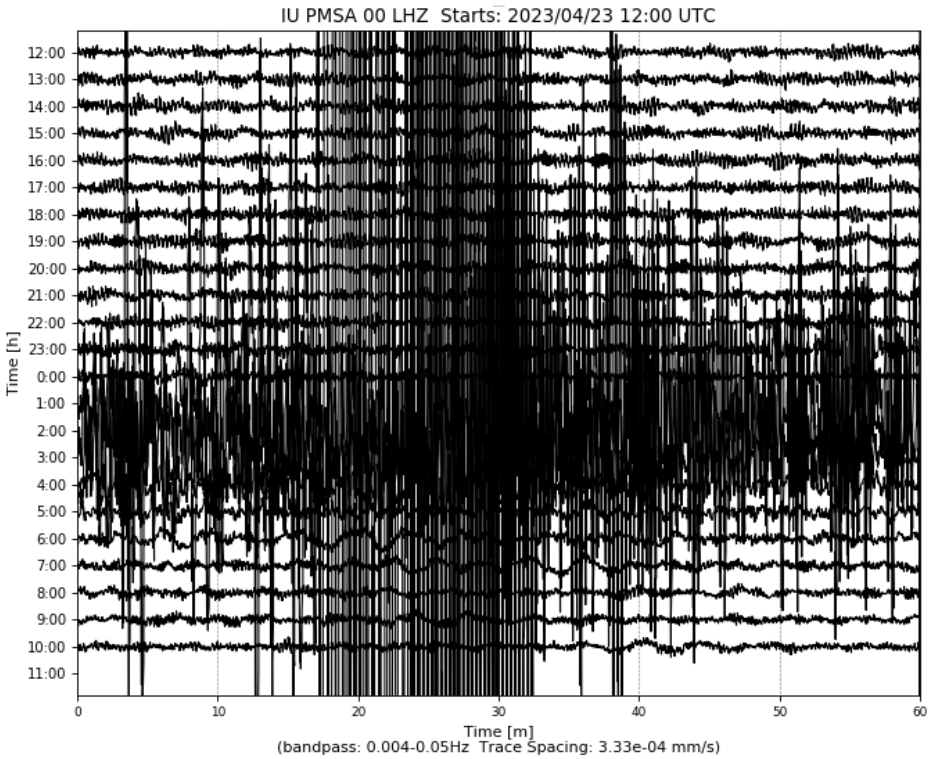


Figure 2. *Two earthquakes on April 24, 2023 in the South Pacific as recorded from the Palmer seismic station.*

The system operated consistently throughout the month. The time stamp and seismic activity found on the Heliplot was checked daily. Current data from Palmer station can be found on the USGS site: https://earthquake.usgs.gov/monitoring/operations/stations/IU/PMSA/#heliplot.

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 inter-annual 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 Scripps Institution of Oceanography flask sampling project analyzes air samples to assess variations in the atmospheric oxygen content caused by exchanges of O_2 between the atmosphere and the Southern Ocean. The oceans tend to be a source of oxygen to the air in the spring and summer, and a sink for oxygen in the fall and winter. The spring emissions are mostly due to photosynthesis in the water, while the winter uptake is due to mixing processes, which bring oxygen depleted waters from depth up to the surface. These exchanges lead to variations in the oxygen content of the air above the water, and these changes are rapidly mixed around the latitude band by zonal winds. Measurements of the seasonal variations in oxygen content at Palmer and other sites may be valuable for documenting changes in the biological productivity of the southern oceans over time.

The percentage changes in oxygen are very small. Relative to the 20.95% background, the summer-winter differences are only about 0.01%. Some special precautions are necessary so that the O_2 content of the samples isn't perturbed at this low level. Among these precautions are maintaining a constant pressure and temperature in the flasks during sampling. This dictates the installation of the sampling station indoors and the use of a pump module with a bypass valve for avoiding pressure buildup. The Research Associate collects samples fortnightly from Terra Lab.

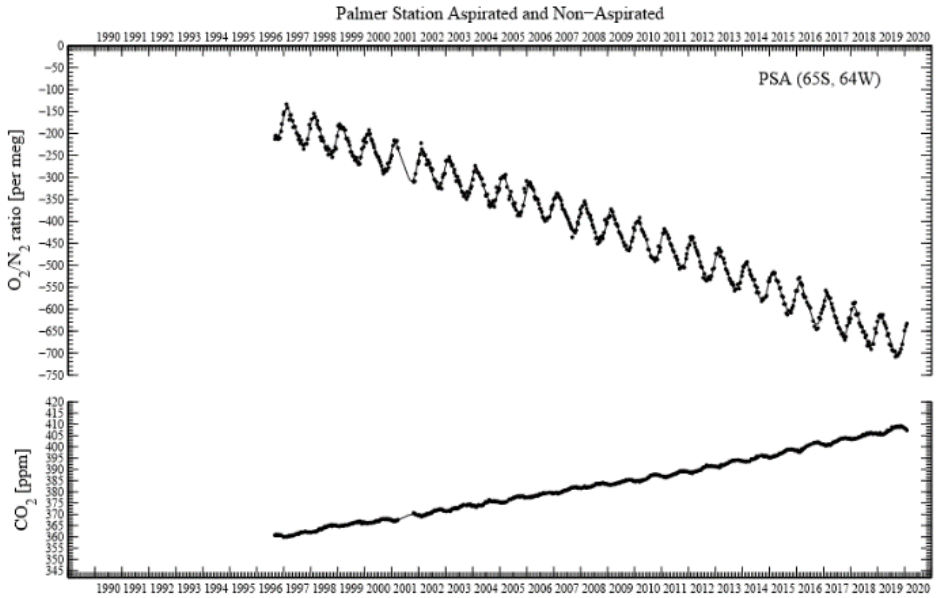


Figure 3. *Historical plot of* $\boldsymbol{O_2/N_2}$ *ratio per meg and* $\boldsymbol{CO_2}$ *ppm updated on July 29, 2020.*

Air samples were collected on April 1, April 14, and April 30. Wind conditions must equal or exceed 5 knots from a direction between 5° to 205° constantly for over an hour with no interference from human traffic on foot or in vessels. These air samples are shipped to the Scripps Institution of Oceanography in California for analysis. More information and data can be found at: https://scrippso2.ucsd.edu/osub2sub-data.html.

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 Laboratory; 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_2O) and halogen containing compounds. The Research Associate collects weekly air samples for the CCGG group and fortnightly samples for the HATS group. Wind must be between 5 and 15 knots and consistently blow from one sector with no people, equipment, or boats upwind of the sampling location.

Christine Smith, NOAA GML Field Operations Manager, visited Palmer Station this month to inspect and maintain the system. With the assistance of the Research Associate and Antenna Riggers, she installed a fixed inlet on the northeast side of Terra Lab to be used for HATS sampling during high winds.

Carbon Cycle Greenhouse Gases (CCGG) samples were collected on April 4, April 9, April 18, and April 25 during favorable wind conditions. More information and data for the Carbon Cycle group can be found at: https://gml.noaa.gov/ccgg/.

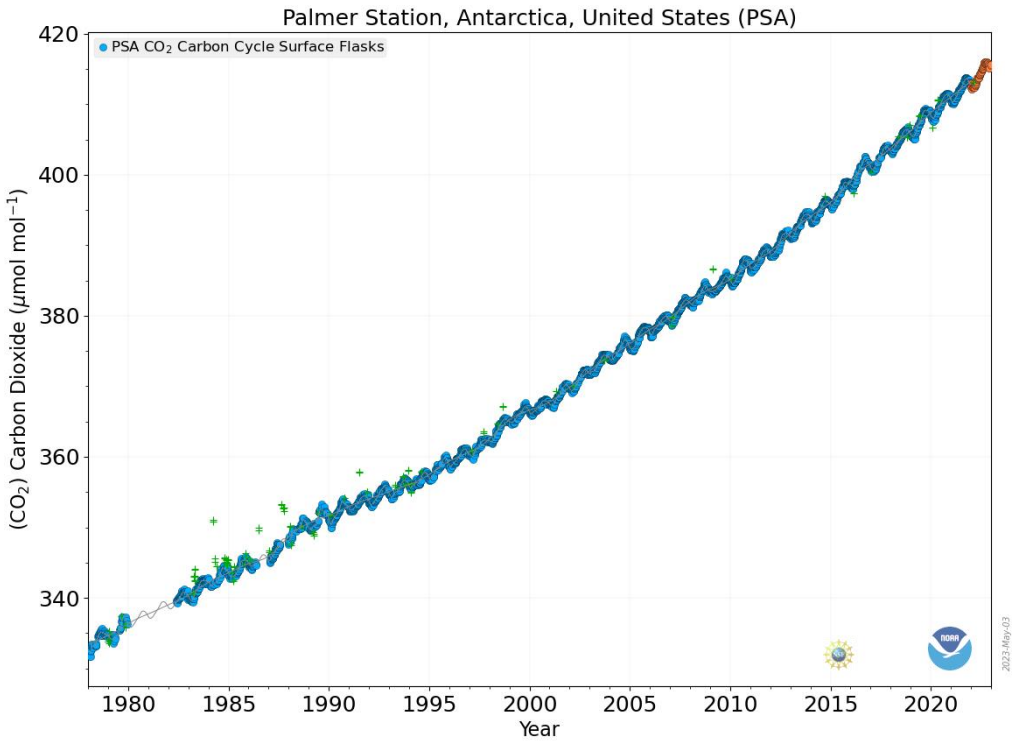


Figure 4. *Carbon Dioxide (CO_2) levels at Palmer Station dating back to 1978. Orange dots are preliminary data.*

Halocarbons and other Atmospheric Trace Species (HATS) samples were collected on April 9 and April 25 during favorable wind conditions. More information and data for the Halocarbons and other Atmospheric Trace Species group can be found at: https://gml.noaa.gov/hats/

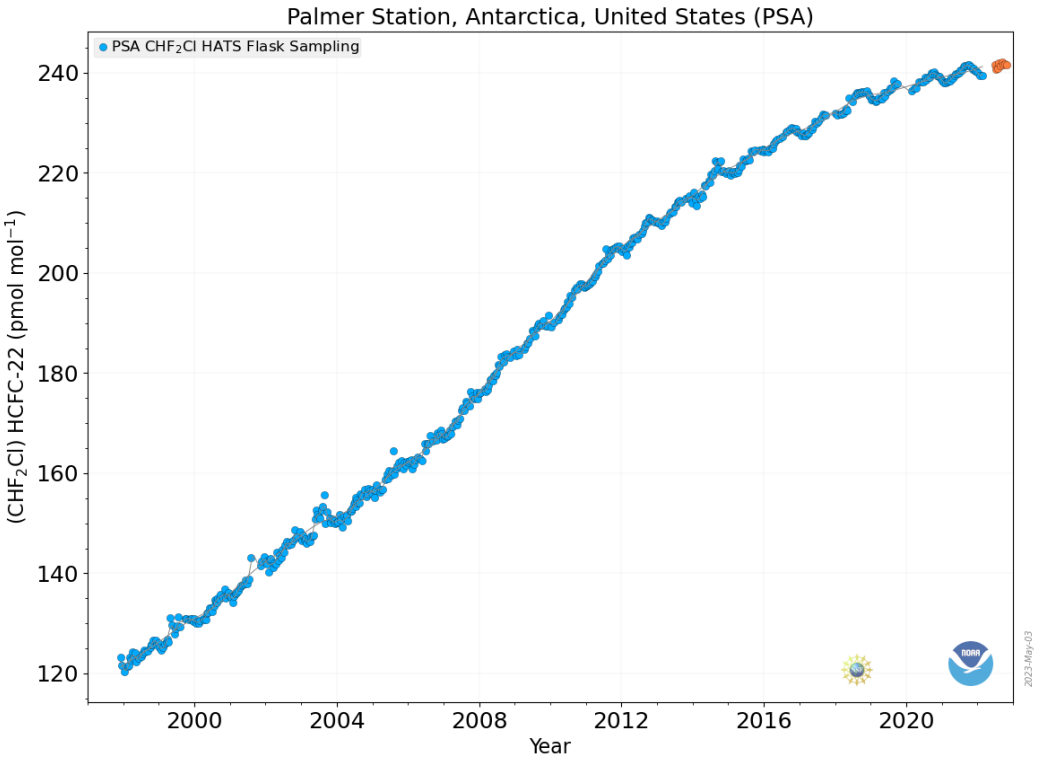


Figure 5. *HCFC-22 (CHF_2Cl) levels at Palmer Station dating back to 1997, one of the Halocarbon and Trace Gases measured at Palmer Station.*

All samples collected on station are sent back to the Earth System Research Laboratories in Boulder, Colorado for analysis.

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

Scott Stierle, Principal Investigator, National Oceanic and Atmospheric Administration / Global Monitoring Laboratory; 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 Ground-based Ultraviolet (GUV-511) filter radiometer, an Eppley Precision Spectral Pyranometer (PSP), and an Eppley Total Ultra Violet Radiometer (TUVR) also continuously measure hemispheric solar flux within various spectral ranges. The Research Associate operates and maintains on-site equipment for the project.

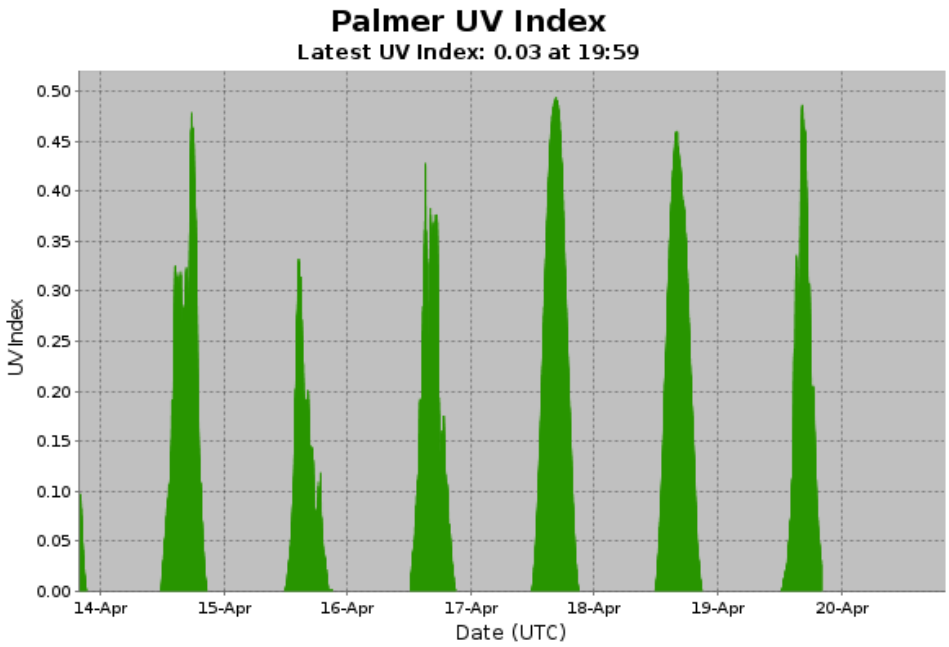


Figure 6. *UV index generated from the GUV-511 radiometer in real time.*

The log was filled out and collectors were cleaned on a daily basis. Once a week level checks were performed to confirm that the instrumentation was within +/- 0.2 degrees. The weekly log was sent out each Monday, and an SUV-100 Absolute Scan was performed on April 25 without issues. Christine Smith, NOAA GML Field Operations Manager, visited Palmer Station this month to inspect and maintain the system. On April 5, she installed a new SUV collector, which was then calibrated on April 11 using all five external lamps. For more information, visit: https://esrl.noaa.gov/gmd/grad/antuv/.

R-938-P: TERASCAN SATELLITE IMAGING SYSTEM

Justin Maughmer, Principal Investigator, System Administrator, United States Antarctic Program

TeraScan is an integrated system of hardware and software designed for automated reception of data from meteorological/environmental satellites and for processing the data into images and data overlays. The system collects, processes, and archives DMSP and NOAA satellite telemetry, capturing approximately 25-30 passes per day. The data files for these images and overlays are of a special format called TeraScan Data Format (TDF). 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.

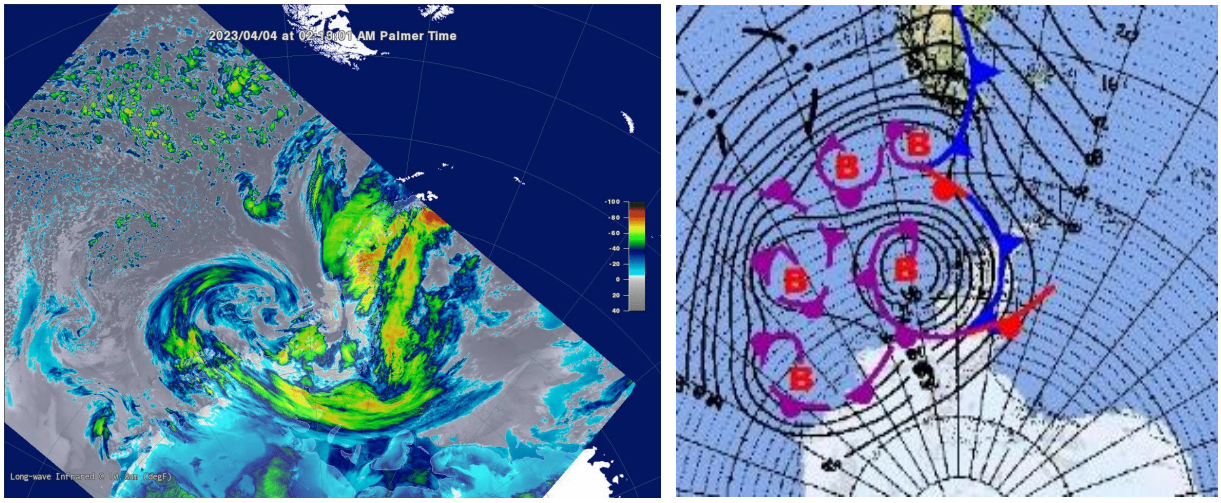


Figure 7. *NOAA-18 April 4 satellite pass (left) explained by the Chilean meteorological chart (right).*

The imagery was checked daily. Both the METOP and NOAA satellite passes were captured normally.

T-295-P: GPS CONTINUOUSLY OPERATING REFERENCE STATION.
Joe Pettit, Principal Investigator, UNAVCO

The National Science Foundation (NSF) tasked and funded the USGS Antarctic Program to establish a GPS (Global Positioning System) Continuous Operation Reference Station (CORS) at Palmer to serve a variety of scientific investigations in Antarctica. A permanent GPS CORS known as PALM (1003) was established during April and early May of 1997. Four reference marks were set and, along with 10 existing survey marks, PALM was tied in by differential GPS methods.

The GPS data collected supports the International GPS Service (IGS). This system is used for global geophysical studies such as crustal motion monitoring and determination of the global frame. PALM also provides Palmer scientists with real-time differential GPS positioning capabilities. Continuous 15-second epoch interval GPS data files are collected at station PALM, compressed, and transmitted to the NASA-JPL in Pasadena, CA.

JPL/NASA is contracted to maintain the system, and they have sub-contracted to UNAVCO. While operation and maintenance of the GPS/CORS base station is the responsibility of the Research Associate, it is available for grantees who wish to use the roving systems and/or differential post-processing using data from the fixed reference station. Users are expected to have proper training prior to deployment to Palmer. The Research Associate may offer support to visiting grantees at their discretion.

The system operated consistently throughout the month. The lights on the Trimble and Septentrio receivers were all illuminated in the correct pattern and showed no signs of interruption.

For more information, visit: https://www.unavco.org/projects/project-support/polar/base_stations_and_survey_systems/palmer/base.html.

T-998-P: INTERNATIONAL MONITORING STATION (IMS) FOR THE COMPREHENSIVE NUCLEAR TEST BAN TREATY ORGANIZATION. (CTBTO)
Managed by General Dynamics

The Comprehensive Nuclear Test Ban Treaty (CTBT) bans all nuclear explosions. Although not ratified, the U.S.A. is following through with the treaty, including the installation monitoring stations around the world. The global verification regime for monitoring compliance is called the International Monitoring System (IMS). The radionuclide air particulate sampling station was installed at Palmer in October of 2005. Palmer's radionuclide sampler/analyzer (RASA) is a primary station in the IMS, known by its treaty code USP73 (and RN73). The pre-existing USGS seismic system is an auxiliary station, treaty code AS106.

Data collected by Palmer's RASA unit is relayed real-time via a virtual private network (VPN) across the Internet back to the CTBT Organization (CTBTO) in Vienna. As of August 2006, both the RASA and seismic systems have been certified by CTBTO. Palmer is now officially part of the IMS. 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 consistently this month. The RASA GUI was checked daily. The amount of filter material was checked as needed and no anomalies were heard coming from the blower. Daily filters were processed as needed and the monthly log was sent on time.

Cristian Ferman, a General Dynamics engineer, visited Palmer Station this month to inspect and maintain the system. With the assistance of the Research Associate, Cristian installed a new meteorological station on the Terra Lab upper deck. Additional details about the treaty and monitoring stations can be found on the CTBTO web site, http://ctbto.org/.

PHYSICAL OCEANOGRAPHY

Palmer Station has a tide and conductivity gauge located on the west side of the pier at -64.774558° -64.055580° at a height of 11.46 meters (WGS-84). It was reinstalled at this deeper depth after the completion of the Palmer Pier.

The Research Associate acts as the station's physical oceanography observer by maintaining and observing the sea state. Observations of sea ice extent and growth stage is recorded along with continuous tidal height, ocean temperature, and ocean conductivity. Observations of sea ice around station were made daily.

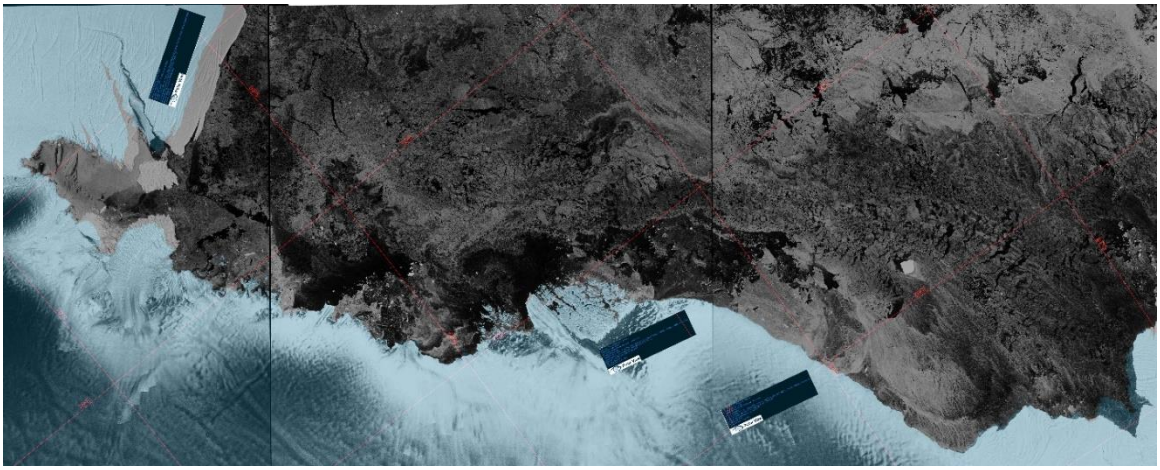


Figure 8. *Prydz Bay sea ice imagery provided to the R/V Nathaniel B. Palmer. Source: Composite of Polar View Sentinel-1 images from April 21, 2023.*

Tide level, sea water conductivity, and sea water temperature data is archived on the AMRC website: http://amrc.ssec.wisc.edu/data/ftp/pub/palmer/.

METEOROLOGY

Mike Carmody, Principal Investigator, United States Antarctic Program

Palmer Station is Station 89061 in the World Meteorological Organization (WMO) Worldwide Network. Automated surface synoptic observations are made 8 times each day and emailed to the National Atmospheric and Oceanographic Administration (NOAA) for entry into the Global Telecommunication System (GTS).

The Palmer Automatic Weather Station (PAWS) is a collection of sensors, computers, and software that records the meteorological data and generates synoptic reports. PAWS began recording data in September of 2015. It was a replacement for the Palmer Meteorological Observing System (PalMOS) that was taken down in November 2017. The PAWS sensors and data acquisition hardware are located on a ridge in the backyard at -64.774130° -64.047440° at an elevation of 38.3 meters above sea level using the World Geodetic System-84. In addition to the synoptic and METAR reporting, PAWS also archives the current conditions at one-minute intervals and displays both raw data and graphs of the sensor data on our local intranet.

The Research Associate acts as Chief Weather Observer on station, measuring, compiling and distributing all meteorological data. Snow accumulation is physically observed by taking an average of five accumulation stakes found near the PAWS system. All weather data is archived locally and forwarded to the University of Wisconsin on the first day of each month for archiving and further distribution.

The local weather station (PAWS) operated well throughout the month. All remote island sites were consistently operational this month until April 27, when the Joubins and Gosslers stations begun to fade in and out with the daylight. As winter sets in, all three remote island sites will lose sufficient solar power and will go dark for the remainder of the season.

One minute weather data is archived on the AMRC website:
http://amrc.ssec.wisc.edu/data/ftp/pub/palmer/.

Palmer Monthly Met summary for April, 2023

Temperature
Average: -.2 °C / 31.7 °F
Maximum: 8.5 °C / 47.3 °F on 3 Apr 15:57
Minimum: -5.9 °C / 21.38 °F on 11 Apr 04:27
Air Pressure
Average: 981 mb
Maximum: 1012.6 mb on 12 Apr 10:46
Minimum: 954.6 mb on 23 Apr 00:50
Wind
Average: 16 knots / 18.4 mph
Peak (5 Sec Gust): 58 knots / 67 mph on 3 Apr 17:04 from NNE (31 deg)
Prevailing Direction for Month: NNE
Surface
Total Rainfall: 160.8 mm / 6.33 in
Total Snowfall: 32 cm / 12.5 in
Greatest Depth at Snow Stake: 19 cm / 7.4 in
WMO Sea Ice Observation: 1-5 bergs, bergy bits, growlers, and brash ice
Average Sea Surface Temperature: .55 °C / 33 °F

This month, the April high temperature record (1989-present) was broken with a high of 8.5 °C on April 3. This surpasses the prior record of 8.2 °C in April 2020.

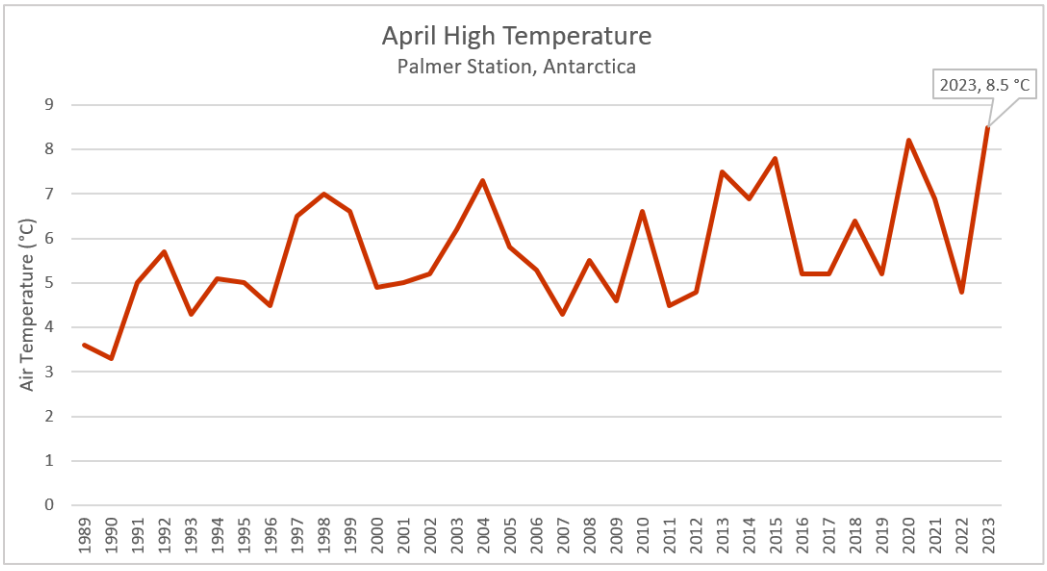


Figure 9. *Palmer Station April high temperature, 1989-present.*

The April average sea surface temperature record (2015-present) was also broken, with an average of 0.55 °C. The previous record was 0.52 °C in April 2019.

This month was the wettest April on record (1990-present), with 160.8 mm of melted precipitation. This narrowly surpasses the prior record of 160.5 mm in 2019. It was also tied for the windiest on record (1989-present), with an average wind speed of 16 knots (first reached in April 1998).