

PALMER STATION MONTHLY SCIENCE REPORT
December 2009



Palmer Station Zodiac parking lot blocked by Ice Bergs
Image Credit: Ken Kloppenborg

NEWS FROM THE LAB

Tracey Baldwin, Supervisor of Laboratory Operations

Phil Spindler, Assistant Supervisor of Laboratory Operations

December was a month of movements- people moved to and from station, research and cruise ships visited, and icebergs moved in and out of convenience. The weather continued to improve with more sunny days and less snow on the ground. The fauna in the area continues to increase in numbers with many more feathered faces on the islands. Holiday celebrations continued throughout the month, culminating in a much appreciated holiday break.

At the very end of the month, the M/S VEENDAM brought Rick Lee and Dave Denlinger's polar entomologist group (B-256-P) to station. They hit the ground running by collecting the most adults in one field season for them. A more detailed report will come in January's Science Report. Included with that passenger transfer were Rebecca Shoop (station manager) and Phil Spindler (Assistant Supervisor of Laboratory Operations). Tracey and Bob Farrell redeployed station on this same vessel.

WEATHER SUMMARY

December 2009

December only saw two days of snow, for a total of 6 cm, not terribly below the average of 10 cm. But yearly snowfall for 2009 was quite low at 198 cm (compared to the average 362 cm).

Rising temperatures mid-month eliminated most of the snow remaining on the ground from the winter. Wind speeds were also high during the two weeks leading up to the holiday, averaging 12 to 22 knots during that time. Peak gusts were 57 knots on the 16th, and average wind speed for the month was 10 knots.

The mean temperature was 1.5 °C, slightly below the average of 2.0 °C. Maximum and minimum temperatures were also near the average for December, at 6.9 °C and -2.5 °C, respectively.

The tabular berg visible on the horizon in October and November finally blew off in early December. The high number of visible bergs dropped significantly mid-month with the northerly winds. Still, several small bergs remain grounded to the sea floor in the immediate vicinity. Sea surface temperatures trended upward from 0.0°C to 1.0 °C during December.

THE FOLLOWING PROJECTS CONDUCTED RESEARCH AT PALMER STATION:

B-013-P: Palmer Long Term Ecological Research (LTER): Looking back in time through marine ecosystem space, apex predator component.

Dr. William R. Fraser, Principal Investigator, Polar Oceans Research Group, Sheridan, MT

Personnel on station: Jennifer Blum, Kristen Gorman, Rick Smaniotto

Winds proved to be our adversary for part of this month, as a number of field days were missed due to high winds. Precipitation early in December hampered some field activities. Despite these missed days, we were still able to continue most of the breeding chronology monitoring and sampling of our selected Adelie penguin nests locally and on Dream and Biscoe Islands, as well as the Chinstrap and Gentoo penguin nests on Dream and Biscoe, respectively. Hatch dates and measurements began this month and will continue into January for all 3 penguin species. A peak egg census was completed at the beginning of the month for both the Chinstrap and Gentoo penguins on Dream and Biscoe; all 3 penguin species were censused in the Joubin Islands soon after. We continue to monitor the number of depredated eggs from all 3 penguin species on all islands and continue to make collections for further analysis and collaborations. Preparations for the Humble Island Adelie penguin radio transmitter monitoring continued with instrument, equipment and software checks/testing.

Our third field team member, Rick Smaniotto, arrived in the middle of December.

Skua work continued this month, as we began checking for hatches of Brown Skuas on local islands as well as on Dream and Biscoe Islands. Our South Polar Skua study on Shortcut intensified with recording nest initiation/lay dates for the entire island and collecting scat samples. Blue-eyed Shags hatched in early December and the censusing continued on Cormorant Island. An all-island Kelp Gull survey was completed near the beginning of the

month. Giant Petrel satellite transmitter work continued on Kristie Cove and Shortcut Island. Our all-island census of Giant Petrels began in mid-December; new breeders were banded and the census will continue into January. The Giant Petrel nest monitoring study on Humble Island began in mid-December.

Our monitoring of marine mammals continued this month and was highlighted by sightings of humpback and minke whales in the Palmer area. Lab work has continued with the processing of new samples. LTER cruise preparations were also initiated this month.

Thanks to RPSC for their continued great support this month. Special thanks to John Fonseca for his great attitude and continued efforts to keep our boats in the best shape possible. This month he again made some repairs on a schedule that worked best for our project objectives and spent time after hours/on RPSC days off to accomplish this. Also thanks to Jeff Otten for his assistance with troubleshooting the cruise palms.

B-019-P: Palmer Long Term Ecological Research (LTER): Looking back in time through marine ecosystem space, phytoplankton component.

Oscar Schofield, Principal Investigator, Institute of Marine and Coastal Sciences, Rutgers University

Personnel on station: Brian Gaas, Tina Haskins, and L. Alex Kahl, Institute of Marine and Coastal Sciences, Rutgers University

Yet again, favorable weather allowed for extensive CTD, bio-optics, and phytoplankton sampling in the Palmer area. Working with B-045 we collected full water column pigment samples and bio-optical profiles on eight days (03, 07, 10, 14, 17, 21, 24, & 28 December). Simulated in situ experiments carbon uptake experiments were also conducted on 5 of those sampling days. In addition to the joint sampling ventures, B-019 also independently collected CTD and bio-optical profiles (both Inherent and Apparent Optical Properties) at station E & B on 12 other occasions bringing our total to 20 sampling days during the month of December. Furthermore, two of those additional 12 days consisted of non-traditional sampling locations including stations G, H, I, J, adjacent to Dream Island, near Halfway Island, and around the Outcast Islands.

At the end of November, our deep-glider was adrift near Hugo Island. Thankfully, through extensive efforts by the Palmer Station Manager, the Nathaniel B. Palmer was convinced of the necessity of rescuing the glider. Upon being rescued the glider was transported on the N.B. Palmer back to Punta Arenas where it was transferred to the L.M. Gould and was in transit to Palmer Station at the end of December. Subsequent to the recovery of our deep-glider we also continued with Autonomous Underwater Vehicle surveys of the Palmer Basin or cross-shelf canyon. We deployed another AUV, or *glider*, from station E for a five day survey of the nearby submarine canyon. During the five days variable fluorescence (an indicator of phytoplankton physiological condition) and CTD data were continuously collected by the glider and will be analyzed alongside B-013's penguin foraging data from the same time period. In addition to collaborating on studying the Palmer Adelle foraging area, we also provided zodiac support for B-013's survey of the Joubin Islands. At the end of the month we had to both prepare for the annual LTER cruise and move from lab 10 into lab 2.

B-019 would like to thank the Station Manager for his efforts to have the NBP retrieve our glider. We are also grateful for the support provided by FEMC, Waste, and the Chefs (especially ginger cookies with white chocolate chips!). Foremost though, we would like to thank the Boating Coordinator for his unwavering dedication to supporting our research. On more than one occasion, the Boating Coordinator assisted B-019 with glider deployment/recovery activities up until the end of boating hours at 10 pm. The Boating Coordinator also made many small adjustments to assorted boating equipment and scientific instruments on the zodiac. His efforts, well beyond the call of duty, were instrumental in ensuring the success of our science for the month and the season.

B-045-P: Palmer Long Term Ecological Research (LTER): Looking back in time through marine ecosystem space, microbial ecology component.

Dr. Hugh Ducklow, Principal Investigator, The Ecosystems Center, Marine Biological Laboratory, Woods Hole, MA

Personnel on station: Margaret Waldron and Daniel Whiteley

During the month of December B-045 has continued to sample twice weekly at stations B and E with B-019 for bacterial abundance, productivity, particulate organic carbon and nitrogen, dissolved organic carbon and nutrients. Our data show that the second seasonal peak of bacterial productivity at stations B and E is currently underway. We have also completed ten of our bacterial population dynamics experiments, which we are conducting in one of the environmental rooms at Palmer Station. The goal of the experiments is to assess the growth rates of different components of the microbial assemblage.

In addition to our regular research, we have been busy preparing for the annual LTER cruise aboard the *Laurence M. Gould*, which departs January 5 from Palmer Station. Two new additions to the B-045 team, Amanda Keledjian and Alice Alpert, will arrive at Palmer in early January in time for thorough orientation so that they can continue our work while Maggie and Dan join the LTER cruise for the month of January.

Again, we wish to thank B-019 for their collaborative efforts and to the RPSC support personnel for their continued assistance with our research. In particular, we appreciate the dedicated efforts of Tracey Baldwin, Phil Spindler and Lily Glass in assisting with our preparations for the 2010 LTER cruise.

Y-609-P IPY: Improving the Public's Understanding of Polar Research Through Hands-On Fellowships for Science Journalists in the Arctic and Antarctic

Christopher Neill, Principal Investigator, The Ecosystems Center, Marine Biological Laboratory, Woods Hole, MA

Personnel on Station: Christopher Neill, Angela Posada-Swofford, Scott Canon, and Jason Orfanon

The group finished their three-week field season. Scott, Jason and Angela took advantage of every opportunity to join the routines of the other science groups, helping with everything from bird census to water filtering. Before they redeployed, the group presented a science talk

explaining their success and experience for the field season. They had many successful outreach opportunities and video teleconferences (VTC). One VTC was accomplished with the help of Jeff Otten. It was a bilingual video chat with five separate groups across South America, primarily museums and classrooms.

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Brian Nelson**

**G-295-P GPS CONTINUOUSLY OPERATING REFERENCE STATION.
Bjorn Johns, Principal Investigator, UNAVCO**

The Research Associate operates and maintains on-site equipment for the project. Throughout the month, 15-second epoch interval GPS data files were collected continually at station PALM, compressed, and transmitted to the NASA-JPL in Pasadena, CA.

The GPS operated normally for the duration of the month.

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

The Research Associate operates and maintains on-site equipment for the project. Station PMSA is one of more than 143 sites in the GSN monitoring seismic waves produced by events worldwide. Data files are recorded to tape and also sent real-time to the U.S. Geological Survey (USGS).

A new router was installed to alleviate a network security issue. The installation went smoothly and the system continues to operate normally. Archive tapes were shipped to IRIS.

**O-202-P ANTARCTIC METEOROLOGICAL RESEARCH CENTER (AMRC)
SATELLITE DATA INGESTOR.
Mathew Lazzara, Principal Investigator, University of Wisconsin**

The Research Associate operates and maintains on-site equipment for the project. The AMRC SDI 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 ingestor operated normally for the duration of the month.

O-204-P A STUDY OF ATMOSPHERIC OXYGEN VARIABILITY IN RELATION TO ANNUAL TO DECADEAL 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 aid in determining rates of marine biological productivity and ocean mixing. The results are also used to help determine the 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. Palmer Station is especially well situated for resolving signals of carbon cycling in the Southern Ocean.

The Research Associate collects samples fortnightly from both TerraLab and the VLF Building. A goal is that all sampling will eventually be moved to TerraLab. Samples taken from the station are sent to Scripps where the analysis of O₂ and CO₂ content takes place.

Sampling equipment and operations were per plan throughout the month. Air samples were shipped to Scripps.

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

James Butler (Principle Investigator), 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.

Palmer Station is one of many sites around the world providing data to support these projects. The Research Associate collects weekly air samples for Carbon Cycle Greenhouse Gases Group and fortnightly samples for Halocarbons & other Atmospheric Trace Species Group.

Sampling occurred normally during the month. Air samples were shipped to NOAA.

O-283-P ANTARCTIC AUTOMATIC WEATHER STATIONS (AWS).

Mathew Lazzara, Principal Investigator, University of Wisconsin

The Research Associate monitors data transmissions for the project and performs quarterly maintenance on the station at Bonaparte Point. AWS transmissions from Bonaparte Point are monitored using the TeraScan system and the Data Ingestor system. Data collected from this station is freely available from the University of Wisconsin's AMRC website.

The system collected data normally throughout the month.

A-306-P GLOBAL THUNDERSTORM ACTIVITY AND ITS EFFECTS ON THE RADIATION BELTS AND THE LOWER IONOSPHERE.

Umran Inan, Principal Investigator, Stanford University

Stanford University has been operating a Very Low Frequency (VLF) receiver antenna at Palmer Station since the 1970's. By receiving naturally and manmade signals between 1 and 40 kHz, the Stanford VLF group is able to study a wide variety of electromagnetic phenomenon in the ionosphere (uppermost layer of the atmosphere ionized by solar radiation) and magnetosphere (the area surrounding the earth dominated by the Earth's magnetic field and particles trapped by it. Many of these studies relate to the energetic releases associated with lightning. For example, Palmer Station's unique location enables it to pick up small bits of radiation from lightning strikes as far away as Africa, the USA, or the Pacific Ocean.

The system collected data normally during the month. Specially requested data was transferred to Stanford. Archived data was shipped to Stanford.

T-312-P TERASCAN SATELLITE IMAGING SYSTEM.

Dan Lubin, Principal Investigator, Scripps Institution of Oceanography

The Research Associate operates and maintains on-site equipment for the project. Throughout the month, the TeraScan system collected, archived, and processed DMSP and NOAA satellite telemetry, capturing approximately 25-30 passes per day. A weekly 85GHz SSM/I ice concentration image was produced and transferred to UCSB for B-032-P (Smith).

The system collected data normally during the month. An automated data transfer from Palmer to McMurdo stopped working unexpectedly and is being investigated.

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 through 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. 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. The station Research Associate maintains the on-site system.

The system operated normally during the month.

B-390-P: THERMO-SALINOGRAPH

Vernon Asper, Principal Investigator, University of Southern Mississippi

Sea water is pumped continuously through a thermosalinograph (TSG) sampling system, recording the temperature, conductivity, salinity, and fluorescence. The real-time data, including graphs and web camera images of the ocean in the vicinity of Palmer Station, are compiled by a local server into web page format and relayed to a mirror site at Woods Hole Oceanographic Institute, which is a collaborator in the project. The URL for the WHOI mirror site is <http://4dgeo.whoi.edu/tsg/>.

The webcam and thermosalinograph operated normally during the month.

T-513-P: ULTRAVIOLET (UV) SPECTRAL IRRADIANCE MONITORING NETWORK (UVSIMN)

Charles Booth, Principal Investigator, Biospherical Instruments, Inc

A 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, while the sun is above the horizon. A BSI GUV-511 filter radiometer, which has four channels in the UV and one channel in the visible for measuring Photosynthetically Active Radiation (PAR), is located next to the SUV-100.

The UV monitor collected data normally during the month.

T-998-P: IMS RADIONUCLIDE MONITORING

Michael Pickering, Principal Investigator, General Dynamics

The International Monitoring System (IMS) radionuclide sampler is part of the Comprehensive Test Ban Treaty (CTBT) verification regime. The automated Radionuclide Aerosol Sampler and Analyzer (RASA) unit pumps air continuously through a filter for 24 hour periods, collecting particulates in the .2-10 micron range. The filter is then tested for particulates with radioisotope signatures indicative of a nuclear weapons test. The station Research Associate operates and maintains the instrument.

The system operated normally throughout the month. New filter media were installed.

TIDE GAGE

The Research Associate operates and maintains on-site equipment for the project. Tide height and seawater temperature are monitored on a continual basis by a gauge mounted at the Palmer Station pier. Although salinity (conductivity) is also recorded by the tide gauge, the measurements are incorrect and should not be used. Correct salinity data can be found on the TSG system.

The tide gauge operated normally during the month.

METEOROLOGY

The Research Associate acts as chief weather observer, and compiles and distributes meteorological data. At the end of the month a summary report is prepared and sent to interested parties. Weather data collected using the automated electronic system is archived locally and forwarded twice each 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 (PalMOS) and emailed to the NOAA for entry into the Global Telecommunications System (GTS).

A new rain gauge was installed and is operating properly.

Scheduled inspections were carried out at the Gamage Point tower. Weather updates and satellite imagery were forwarded to the R/V LAURENCE M. GOULD and the R/V NATHANIEL B. PALMER.