

PALMER STATION MONTHLY SCIENCE REPORT
October 2005



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NEWS FROM THE LAB

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The ice comes in, the ice goes out. This seems to be the theme for October. Heavy brash mixed with sea ice has surrounded Station for most of the month. The first week of October cleared enough to complete Boating II for most on-site personnel, but quickly closed in again until the 31st.

The *Laurence M. Gould* arrived in Punta Arenas at the end of September, and after cargo operations, headed north to Talcahuano, Chile for drydock to repair the port side shaft seal on October 3rd. Cruise LMG05-12, originally due to leave Punta Arenas that day, was postponed until October 22nd and all personnel and cargo were rescheduled.

After an extended 'pre-season', the *Gould* arrived at Palmer on October 27th with nineteen scientists from nine different research groups, raising the station's population to 43. On the 31st, the ice again cleared enough to allow Boating II for most of the incoming science personnel and B-013-P had a chance to survey bird populations on some of the local islands.

The new IMS building, granted Conditional Occupancy just as the *Gould* arrived, is now bustling with science activity. The Research Associates are moving projects previously housed in T5 into the new facility and a team representing the Comprehensive Test Ban Treaty Organization (CTBTO) is busy setting up the new Radionuclide Aerosol Sampler and Analyzer (RASA) unit.

The average temperature this month was -1.4C, a little over a degree warmer than the -2.7C seen in the 15-year historical average. Precipitation and snowfall were a bit below average, with 43.2

mm (65.7 mm average) precipitation and 34 cm (44 cm average) snowfall, but nothing like the extremes seen in September. And snowstake values, at 86cm, are still well above the average 72cm typically seen at the end of October. Winds were mostly calm, averaging 11 knots, with a few storms – one gusting up to 66 knots on the 7th.

The following projects conducted research at Palmer Station during October:

B-003-P

Response of Terrestrial Ecosystems Along the Antarctic Peninsula to a Changing Climate

Thomas A. Day, Principal Investigator, Arizona State University, Tempe, AZ.

Personnel on station: Sarah Strauss, Matt Krna and Caroline DeVan

Our main objective this month was to unpack and arrange our laboratory and equipment for this season's climate manipulation experiments on tundra cores behind Palmer Station. We arrived on station on October 27 after an extremely smooth crossing. The first three days on station were spent unpacking.

Presently, snow pack remains over most of our tundra core plots. We plan to place the IR heaters and dummy heater controls over these plots in early November, as plots begin to melt out.

In the lab, we have set up and calibrated our instruments that we will use to measure photosynthesis and respiration during the experiment. We also have made mesh bags for plant litter decomposition studies and have acid washed sample bottles for lechate samples that will be collected from the tundra cores once our treatments begin.

Thanks to all station personnel who helped us move in and set up. Special thanks to Ken Navarro and Heidi Scherthanner for their logistics support, Barb Watson for assistance in setting up regulators on our compressed gas cylinders, and Cara Sucher for helping insure that our equipment arrived safely on station.

B-013-P

Palmer, Antarctica Long-Term Ecological Research Project: Long-Term Ecological Research on the Antarctic Marine Ecosystem: Climate Migration, Ecosystem Response and Teleconnections in an Ice-Dominated Environment: Seabird Component

and

B-198-P

Monitoring the Effects of Tourism and Environmental Variability on Adelie Penguins at Palmer Station

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

Personnel on station: Jennifer Blum, Fen Montaigne, Peter Horne

After a calm crossing through the Drake Passage, and a smooth off-load at COPA field station, we arrived at Palmer Station in the evening of October 27. The combination of ice and strong

winds precluded field excursions through the weekend. The time on station allowed us to unpack and set up our lab, take Boating I class, and organize databases and field notebooks. Both wind and ice were favorable on Oct 31 allowing us to complete Boating II and make our first field visits. We were able to get a count of Adelies on Torgersen, Humble and Litchfield, and measure snow transects on Torgersen and Humble. We also made daily observations on marine mammals in the area.

RPSC support has been a great help with our set up this year. Special thanks to Toby Koffman for boating support, and Curt Smith and Sarah Kaye for their help with computers and software.

B-016/032-P

Palmer, Antarctica Long-Term Ecological Research Project: Long-Term Ecological Research on the Antarctic Marine Ecosystem: Climate Migration, Ecosystem Response and Teleconnections in an Ice-Dominated Environment: Phytoplankton Ecology and Bio-Optics, Remote Sensing, Sea-Ice Components

Maria Vernet, Scripps Institution of Oceanography (Principal Investigator, B-016-P)

Raymond Smith, University of California, Santa Barbara (Principal Investigator, B-032-P)

Personnel on station: Karie Sines (016), Maria Vernet (016), Austen Thomas (032) and Boreth Eam (032) (Scripps Institution of Oceanography)

Personnel arrived on station on October 27 after a smooth and pleasant crossing. Ice remained in the harbor through the end of the month, with the exception of one day allowing for completion of boating one and boating two. During this time the group was busy with unpacking, laboratory setup and some instrument testing.

The phytoplankton component collects core samples in phytoplankton for estimation of biomass and carbon uptake rates, as designated by the Palmer Long Term Ecological Research scientists. The sampling includes filtration for particulate carbon and nitrogen, pigment analysis using high performance liquid chromatography, measurement of dissolved inorganic nutrients, and estimation of primary production by measurement of ^{14}C uptake using an on-deck incubator to simulate in situ conditions. Continuous, daily data is collected on photosynthetically available and ultra violet radiation.

The bio-optical component of the LTER collects CTD (conductivity, temperature and density, outfitted with a transmissometer and fluorometer) and PRR (Profiling Reflectance Radiometer) data at all water column sampling times as well as samples for discrete chlorophyll a levels.

We would like to thank everyone at the station for preparations carried out for our arrival, in particular the Palmer Lab Staff and the IT department for their efficient help in lab move-in and the boating coordinator and carpenters for their assistance in platform setup and maintenance.

B-028-P

Palmer, Antarctica Long-Term Ecological Research Project: Long-Term Ecological Research on the Antarctic Marine Ecosystem: Climate Migration, Ecosystem Response and Teleconnections in an Ice-Dominated Environment: Prey Component

Robin Ross and Langdon Quetin, Principal Investigators, Marine Science Institute, University of California at Santa Barbara

Personnel on station: Langdon Quetin (team leader/PI), David Huang (Marine Science Institute, University of California at Santa Barbara).

Activity from 22 October to 31 October, 2003

Our field team arrived at Palmer Station on the evening of 27 October after helping POC John Evans with season-opening logistics at Copa. Upon arrival we found extensive but loose pack ice in the Palmer region. Pack ice in the area has restricted boating since our arrival. Weather has been mostly calm with light winds from the south and west, and until we get strong winds from the north, pack ice will remain in the area.

Moving into the station, setting up the lab and assembling the zodiac are going well. Unfortunately our dive gear was left at Punta Arenas (but will arrive on the next ship in mid-November), so we have yet to sample larval krill (last year's crop) from beneath the pack ice.

There is another great RPSC crew at Palmer Station, and we look forward to a successful season.

B-045-P

Palmer, Antarctica Long-Term Ecological Research Project: Long-Term Ecological Research on the Antarctic Marine Ecosystem: Climate Migration, Ecosystem Response and Teleconnections in an Ice-Dominated Environment: Microbial/Biogeochemistry Component

Hugh Ducklow, Principal Investigator, School of Marine Science, The College of William and Mary

Personnel on station: Hugh Ducklow and Nicole Middaugh

Our component of the Palmer LTER is concerned with specifying and understanding the annual cycle of bacteria in the nearshore zone at Palmer Station, as a means to achieve greater understanding of microbial dynamics and carbon cycling in the marine ecosystem of the West Antarctic Peninsula.

We measure routinely at Stations B and E, twice each week (when weather and ice allow): bacterial abundance, production (thymidine and leucine incorporation rates), dissolved organic carbon, particulate lipid biomarkers. We arrived at Palmer Station on 27 October and spent the next few days to the end of the month unpacking and setting up our lab. Most all critical materials and supplies arrived in good order, and we thank RPSC science and logistics personnel for their support. The month ended and sea ice prevented any sampling to report in this installment. Stay tuned for further details.

B-048-P

Complex Molecular to Global Interactions and Feedbacks in the Marine DMS cycle

Patricia A. Matrai, Principal Investigator, Bigelow Laboratory for Ocean Sciences

Co-PIs: J Dacey (Woods Hole Oceanogr, MA), G DiTullio (U. Charleston, SC), D Erickson (Oak Ridge Nat. Lab., TN), A Gabric (U. Griffith, Brisbane, Australia), W Gregg (NASA Goddard, MD), R Kiene (U South Alabama, AL), D Kieber (SUNY Syracuse, NY), R Najjar (Penn State), R Simó (Institut de Ciències del Mar, Barcelona, Spain),

Personnel on station: Patricia Matrai, Kerry McElroy, George Westby

Large amounts of ice in the Palmer Station vicinity prevented sampling of inshore stations E & B during the month of October, after our arrival on October 28. So did the extensive time necessary to set up the 3 gas chromatographs and the laboratory supplies for the 4-month deployment. The ice allowed squeezing in Boating I and II On October 31. We are already indebted to the Palmer Station Science, Facilities and Boating Staff for their assistance in the laboratory and everybody else for welcoming us on station for the first time. Thanks to the LMG officers, crew and RPSC team for getting us here safely via a spectacular sail through the Gerlache.

RESEARCH ASSOCIATE MONTHLY REPORT

A turnover of duties for the station Research Associate started in late October and is continuing into November.

G-052-P

GPS Continuously Operating Reference Station

Jerry Mullins, Principal Investigator, U.S. Geological Survey

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/CDDIS in Greenbelt, MD.

Preparations for transitioning the GPS/CORS to the IMS building have begun.

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 130 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.

In late October a visit was paid to the seismic vault. The vacuum seal on each of the three instrument bell jars was inspected, and the vertical instrument pumped-down to attain a higher vacuum. UPS batteries were tested, and the mass positions electronically centered.

O-202-P

Antarctic Meteorological Research Center (AMRC) Satellite Data Ingestor

Charles Stearns, 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.

O-204-P

A Study of Atmospheric Oxygen Variability in Relation to Annual to Decadal Variations in Terrestrial and Marine Ecosystems

Ralph Keeling, Principal Investigator, Scripps Institution of Oceanography

Air samples are collected on a semiweekly basis by the station physician.

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. Samples taken from the station are sent to Scripps where the analysis of O₂ and CO₂ content takes place.

O-264-P

Collection of Atmospheric Air for the NOAA/CMDL Worldwide Flask Sampling Network

David Hofmann, Principal Investigator, Climate Monitoring and Diagnostics Laboratory, National Oceanic and Atmospheric Administration

The National Oceanic and Atmospheric Administration (NOAA) Climate Monitoring and Diagnostics Laboratory continues its long-term measurements of carbon dioxide and other climate relevant atmospheric gases. The Palmer Station air samples are returned to the NOAA laboratory for analysis as part of NOAA's effort to determine and assess the long-term buildup of global pollutants in the atmosphere. Data from this experiment will be used in modeling studies to determine how the rate of change of these parameters affects climate. Air samples are collected on a weekly basis by the station physician.

O-275-P

DHS-EML Remote Atmospheric Measurements Program (RAMP)

Colin Sanderson, Principal Investigator, Department of Homeland Security, Environmental Measurements Laboratory

The RAMP system is part of a global network seeking to characterize the quantity and distribution of radionuclide particles occurring both naturally and artificially in the atmosphere. One sample filter was exposed for the duration of each week, and a weekly schedule of calibration, background, and sample counts was maintained. The Research Associate operates and maintains on-site equipment for the project.

This event concluded operations in October.

O-283-P

Antarctic Automatic Weather Stations (AWS)

Charles Stearns, Principal Investigator, University of Wisconsin

The Research Associate monitors data transmissions for the project. AWS transmissions from Bonaparte Point, Hugo Island, and Racer Rock were monitored using the TeraScan system, with only Bonaparte Point currently operational. AWS data received was also forwarded to UCSB for B-032-P (Smith).

A-306-P

Global Thunderstorm Activity and Its Effects on the Radiation Belts and the Lower Ionosphere

Umran Inan, Principal Investigator, Stanford University

The Research Associate operates and maintains on-site equipment for the project. The Stanford equipment receives and records Very Low Frequency (VLF) radio waves in order to study natural ionospheric and magnetospheric phenomena, as well as to study the distribution of the lightning strikes that are a principle source of natural VLF signals. Broadband synoptic data was recorded on a schedule of three out of every 15 minutes each day, and broadband continuous data was recorded for at least nine hours per day. Narrowband continuous data was collected for 12 hours each day.

Additional data recordings were collected this month in support Terrestrial Gamma-ray Flash (TGF) events.

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, NOAA, and ORBVIEW-2 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).

Multiple ice concentration images were provided to the R/V LAURENCE M. GOULD in support of ship operations and grantee group B-050-L for cruise planning.

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.

B-390-P

Thermo-Salinograph

Vernon Asper, Principal Investigator, University of Southern Mississippi

Sea water is pumped continuously through a 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/>.

This system has been transitioned to the IMS building.

T-513-P

Ultraviolet Spectroradiometer Network

Charles Booth, Principal Investigator, Biospherical Instruments, Inc

The Research Associate operates and maintains on-site equipment for the project. 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. Data from the GUV-511 instrument is made available on a daily basis on the project's website at <http://www.biospherical.com/nsf>.

The seasonal testing of the spare electronics was completed successfully. Additionally, scheduled absolute scans and RA turnover training were completed.

T-988-P:

IMS Radionuclide Monitoring

Erik Swanberg, Principal Investigator, General Dynamics

Personnel on station: Erik Swanberg and Bouvard Hosticka

The International Monitoring System (IMS) radionuclide sampler is part of the Comprehensive Test Ban Treaty (CTBT) verification regime. The automated sampler 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.

Initial installation of the IMS Radionuclide Aerosol Sampler and Analyzer (RASA) unit commenced in late October. Two grantees were on station. As the month drew to a close the installation was still in progress but proceeding rapidly.

Tide Gage

The Research Associate operates and maintains on-site equipment for the project. Tide height, seawater temperature, and salinity are monitored on a continual basis by a gage mounted at the Palmer Station pier.

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 six hours by the Palmer Meteorological Observing System (PalMOS) and emailed to the NOAA for entry into the Global Telecommunications System (GTS). Current weather observations for all Antarctic stations, including Palmer, are available on the web at: <http://www.wunderground.com/global/AA.html>.

The PalMOS system was inspected and cleaned twice during October. All items are in working order. The ceilometer, which had been malfunctioning, was examined and temporarily fixed, pending receipt a new connector to replace a broken one.