

PALMER STATION MONTHLY SCIENCE REPORT

September 2005



NEWS FROM THE LAB

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Special contributions from James Slaughter, Winter Station Manager; Cara Sucher, Supervisor Laboratory Operations; and Glenn Grant, Research Associate

September was a month of preparation, anticipation and transition at Palmer Station. Some of the winterover crew began packing their bags, while others prepared for turnover activities before the September 20 arrival of the *Laurence M. Gould*. The winterover crew warmly greeted the summer arrivals with signs, cheers and hugs.

Once the summer crew arrived, the work pace accelerated. Following meetings and orientations, staff promptly began turnover activities, logistics operations, FEMC projects, safety trainings, boating classes and lab preparations. In the labs, computers and equipment were set up, circuits were added to accommodate new instruments, and safety switches were installed in the Aquarium Room. Science support staff began receiving materials, tracking orders, and issuing equipment. Materials for the Copa field camp (B-040-E, Trivelpiece) were gathered, packed and loaded on the *Gould* in order to be available for the camp opening on the next southbound trip.

The *Gould* departed on September 23. The next day, unfortunate news arrived that the main shaft seal on the port side blew out. The *Gould* limped back to Punta Arenas at about 6 knots to drop off passengers and then headed north to Talcahuano for dry dock repairs. Fortunately, only two cruises are impacted, and after LMG05-12/13, there should be no residual schedule changes necessary.

Ring-a-ding ding goes the IMS building. The fire detection system was tested and approved by the RPSC Fire Protection Manager. The furniture was built, door hardware installed, and final clean up completed. After the arrival of LMG05-11 brought additional materials, carpenters began the installation of the metal soffit material, the bottom siding of the building. In addition the fiber optic cable plant was installed and all data ports made available. Shiny new equipment

awaits final uncrating and installation. RPSC Conditional Occupancy is now complete and awaits final approval by the NSF and PACDIV. Once approved, the science transition will begin.

As expected for a spring month, September's weather was blustery. The average wind speed was only 7 knots, but gusts exceeded 40 knots on several days and peaked at 53 knots mid-month. Thankfully, the weather around the ship's port call was calm and fair. Temperature extremes for the month swung from a low of -14.2C to a high of +4.2C in little more than a day. The average temp was -2.7C, considerably warmer than the 15-year historical average of -5.7C. Precipitation was light, with most days seeing little or none. Total melted precipitation was 20.1mm, far less than the normal monthly average of 54.8mm -- a new record low amount for September. Likewise, the total snowfall was only 14cm, also a record low, as compared with the normal monthly average of 45cm. At the end of the month the total snow-stake accumulation stood at 75cm, still deeper than the median value of 60cm.

Sea ice concentrations near the station were typically 8/10ths at the beginning of the month, with patches of open water visible in the distance. By the end of the month, however, concentrations had diminished to 3/10ths or less. Fast ice in Arthur Harbor and the back of Hero Inlet, however, remained solid.

Wildlife sightings increased significantly during September. The birth of two Weddell seal pups on the ice in Hero Inlet brought some excitement to station, with many trekking over to Bonaparte Point to observe and photograph the pups' first movements. The Antarctic sheathbills made their presence known with loud squawking and head-bobbing activities early in the month. Also observed this month were leopard seals, crabeater seals, elephant seals, giant petrels, kelp gulls, blue-eyed shags, snow petrels, pintado petrels and Antarctic terns.

The following projects conducted research at Palmer Station during September:

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.

Portable generator power was provided to the GPS reference station during a planned station power outage. Data collection continued uninterrupted for the duration of the outage.

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.

Twice during September printouts and data from major earthquakes, occurring elsewhere on the planet but received strongly at Palmer, were provided to the Palmer community for general interest.

**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.

A new detector was received and installed in the Palmer's RAMP system. After a series of calibrations, the spectra using the new detector was found to be significantly improved as compared to the old detector. The replacement was considered a success, and the system is once again providing high resolution data.

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).

The anemometer on the Bonaparte Point AWS is broken. An inspection (via binoculars) revealed that the propeller was missing. Spare parts have been provided by the R/V LAURENCE M. GOULD and we are awaiting a calm day, with acceptable boating conditions, to perform a maintenance visit.

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 of the High frequency Active Auroral Research Program (HAARP) campaign and also 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).

Ice concentration images were provided to the R/V LAURENCE M. GOULD in support of the station opening cruise. Additional images were provided to grantee group B-050-L for planning and support of upcoming cruises.

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/>.

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 triple absolute scan, using all available calibration lamps, was completed.

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>.

Repairs and calibrations to various PalMOS instruments are ongoing.