

**Phytoplankton cell (*Actinocyclus*) isolated by Deneb Karentz and the B-466-P team.**

*Image Credit: Deneb Karentz*

#### **NEWS FROM THE LAB**

**By Carolyn Lipke, Assistant Supervisor of Lab Operations**

Field teams continued to dodge heavy brash ice all through November, but science continued on regardless. Spring is finally here; snow is melting rapidly and whale sightings are on the rise. Palmer Station welcomed our first cruise ship visitors of the season this month, and we all ate a ridiculous amount of pie on, and for many days following, Thanksgiving. The B-013-P (Fraser) field team joined us in early November, and at the end of the month we had to say goodbye to the B-466-P (Karentz) group. Their energy and enthusiasm will be greatly missed.

## **NOVEMBER 2011 WEATHER**

**By Brian Nelson, Research Associate**

Ice continues to be a dominant factor along the peninsula, often precluding boating operations and science. A wide band of sea ice beginning at the southern end of Anvers Island extends all the way down to the Bellingshausen Sea. It moves in and out of the Palmer Station area according to the winds and sea currents. Sea surface temperatures rose from  $-1.5^{\circ}\text{C}$  to around  $0^{\circ}\text{C}$  during November, so hopefully the ice will begin to melt and dissipate soon.

Air temperatures have also risen, causing most of the winter snow accumulation to melt and leaving only patches on the southern slopes. Average temperature was  $0.2^{\circ}\text{C}$ , maximum was  $6.6^{\circ}\text{C}$ , and minimum was  $-4.0^{\circ}\text{C}$ .

Precipitation was normal for November, with total melted at 38.6mm and snowfall at 21cm. Year-to-date snowfall is about 100cm lower than average at 250cm. Winds were also typical, averaging 11 knots with a maximum gust of 67 knots.

### **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, Shawn Farry

We arrived at Palmer Station on the evening of November 7; we were able to move onto station upon arrival. Excessive winds followed the next morning, thus minimal cargo was unloaded and hand-carried across from the LMG. The rest of our science cargo was unloaded later in the month when the LMG returned from the November research cruise. A few periods of high winds throughout the month prevented access to some of our more distant research sites. A combination of brash and pack ice had a greater impact on our research efforts as the month progressed, delaying some of our censuses at outlying islands.

Penguin population studies began upon our first trip into the field; regular censuses of Adélie colonies on Torgersen, Humble, Cormorant and Christine Islands and gentoo colonies on Biscoe Island were conducted throughout the month. The annual peak egg census for Adélie penguins was completed on Torgersen, Humble, Cormorant, Christine, Dream and Biscoe Islands; the annual peak egg census for gentoo penguins was completed on Biscoe Island. The chinstrap penguin peak egg census will occur in early December.

Breeding chronology and egg production were monitored on a subset of Adélie nests on Torgersen and Humble Islands. A portion of nests were sampled at the 1-egg stage to obtain adult body condition and egg measurements. All depredated eggs in the area are being surveyed and collections have been initiated for further analysis and collaborations.

Mark-recapture and breeding chronology studies began with brown skuas on Torgersen, Humble, Cormorant, Christine, Litchfield, Dream and Biscoe Islands, and with south polar skuas on Shortcut Island. Population monitoring of the blue-eyed shag colony on Cormorant Island

began, as did our marine mammal censuses. Satellite transmitters were tested and deployed on nesting Kristy Cove and Shortcut Island giant petrels; transmitter rotations will continue into February. An early-season census of giant petrel nests was completed on Shortcut Island.

In between our excursions into the field we unpacked and organized all of our gear and equipment; received and unpacked cargo that arrived with us; set up our work areas; made preparations for our upcoming camping plans; prepped files and field notebooks; updated our data sheets and databases; tested and made modifications to some field instruments and equipment; and initiated testing of our Humble Island data link equipment and software to be set up in early December. We also participated in the National Geographic Explorer and Spirit of Sydney tour ship/yacht visits that occurred near the end of the month.

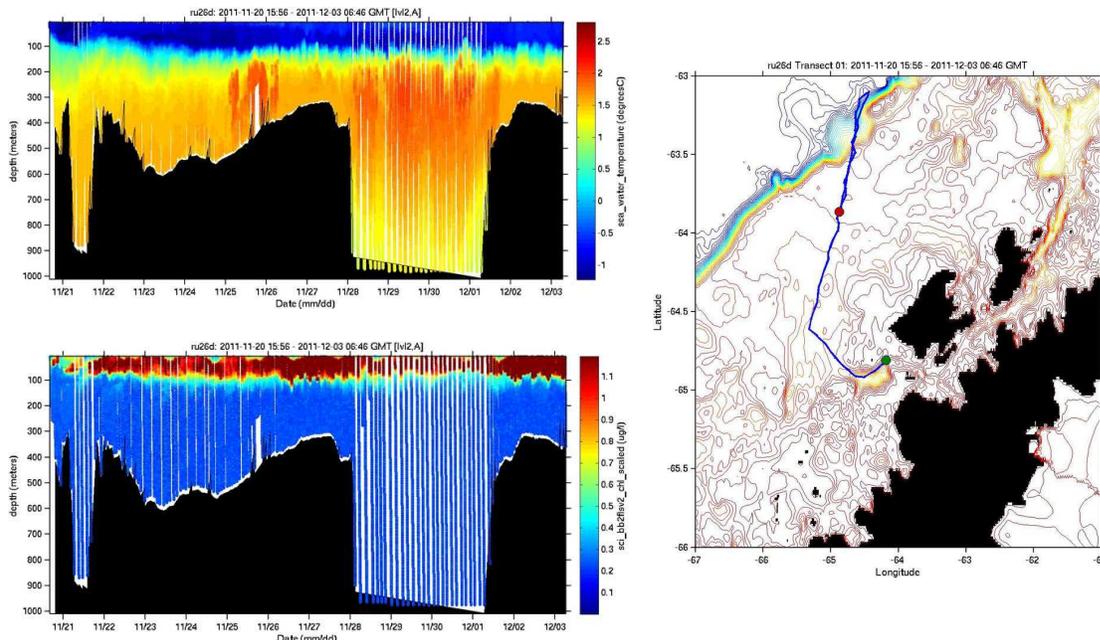
Special thanks to Carolyn Lipke for her noteworthy professionalism and to Graham Colegrove for his extra efforts in getting our boating operations going this month. Thanks to all of RPSC and Edison Chouest for their support this month.

## **B-019-P PALMER LONG TERM ECOLOGICAL RESEARCH (LTER): LOOKING BACK IN TIME THROUGH MARINE ECOSYSTEM SPACE, PHYTOPLANKTON COMPONENT**

Principle Investigator: Oscar Schofield, Rutgers University

Personnel on Station: Kaycee Coleman, Josh Mayer, and Travis Miles

In November we started getting as much of a sampling rhythm as the ice and winds allowed. The first half of the month was characterized by consistently high winds and frequent pack ice pushing into hero inlet. The second half of the month winds slacked off and we had an extended period of calm. This allowed for phytoplankton productivity to take off. The calm period also gave us a weather window where we could prep and deploy our first glider, RU26D. RU26D quickly exited the canyon region to avoid the densely packed ice that has been moving in and out of the region. After exiting the canyon we sent her north on the first leg of her mission to sample the northern section of the LTER grid, which we do not regularly sample on the LMG any more. We then intend to fly her back south to sample shelf-break all the way down to Marguerite Bay. Ice conditions permitting the British Antarctic Survey at Rothera will pick her up prior to the LMG arriving during the heart of the LTER cruise. Other November activities included continued preparation for the LTER Site Review that will occur mid-December.



## **B-020-P: PALMER LONG TERM ECOLOGICAL RESEARCH (LTER): LOOKING BACK IN TIME THROUGH MARINE ECOSYSTEM SPACE, ZOOPLANKTON COMPONENT.**

Dr. Debrah K. Steinberg, Principal Investigator, Virginia Institute of Marine Science, VA  
Personnel on station: Kim Bernard, Domi Paxton

November marked the start of the 5-6 day diurnal tidal phases. Our acoustic sampling is targeting these periods of strong diurnal tides, as well as the following semi-diurnal tides. During the first two weeks of November (before the start of the diurnal tide) we successfully conducted portions of our survey area 5 times. One day prior to the start of the diurnal phase, we sampled the entire survey area (2 grids – see Figure 1). For the first 2 days of the diurnal phase we were able to sample both grids, but during the 3<sup>rd</sup> and 4<sup>th</sup> days there was too much sea ice and brash in the survey area and we were not able to sample. On the 5<sup>th</sup> day we attempted to sample, but again there was too much ice and we could not reach the first way point of our first grid. On the 6<sup>th</sup> day we sampled both grids, but only those transects that were not in the ice. The tidal phase then switched to the semi-diurnal and we have been unable to get out sampling since as there has either been too much ice or winds exceeding 20 knots. In total we have conducted 10 acoustic surveys this month.

On days when we have been unable to go out sampling due to weather and/or ice, we have been preparing for the upcoming Site Review. A number of posters have been produced that will remain on station for future field teams.

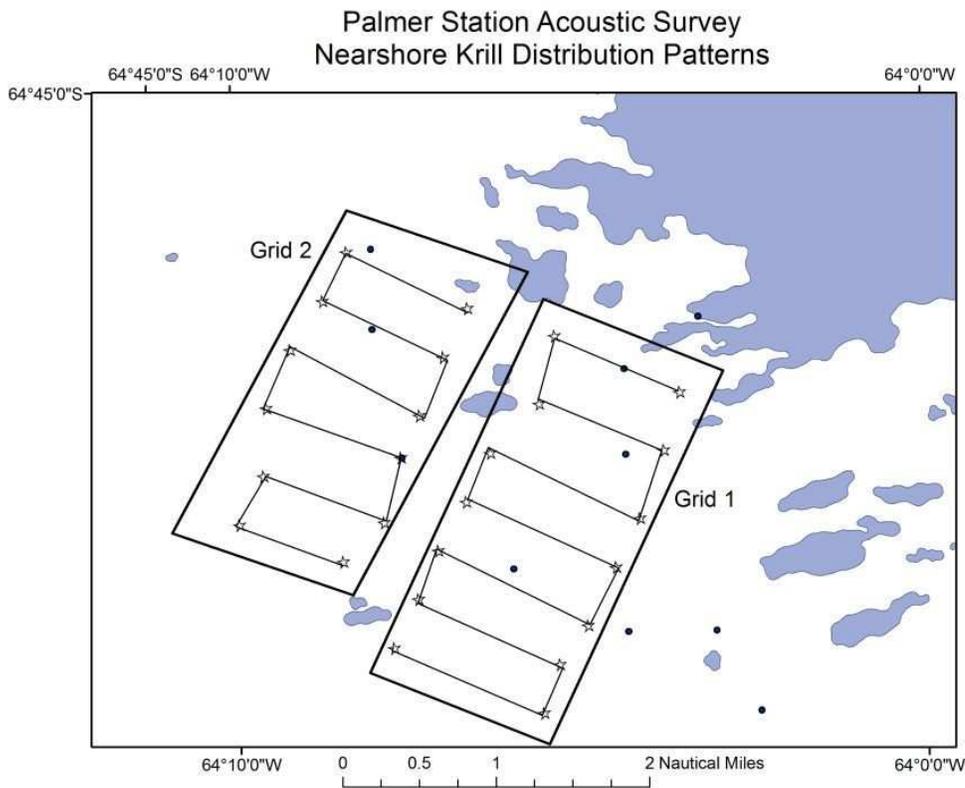


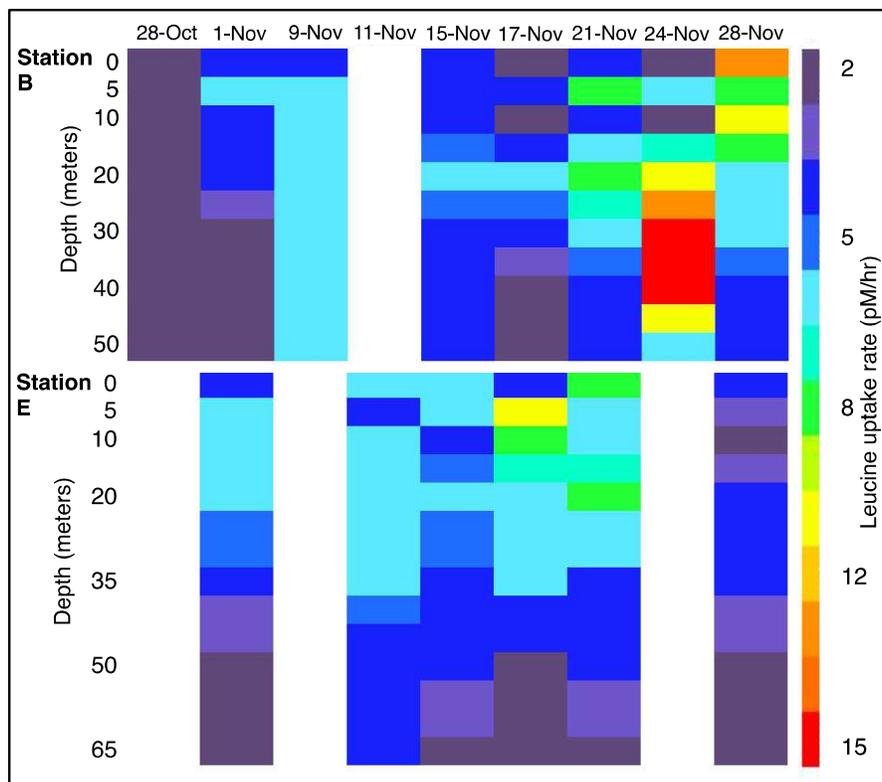
Figure 1. Map showing the acoustic survey area, with Grids 1 & 2.

**B-045-P: PALMER, ANTARCTICA LONG-TERM ECOLOGICAL RESEARCH (LTER): CLIMATE MIGRATION, ECOSYSTEM RESPONSE AND TELECONNECTIONS IN AN ICE-DOMINATED ENVIRONMENT: MICROBIAL / BIOGEOCHEMICAL COMPONENT**

Principal Investigator: Dr. Hugh Ducklow (Ecosystems Center, MBL)  
Personnel on station: Zena Cardman & Luke McKay (UNC Chapel Hill)

November has been kinder to our sampling schedule. This month we saw few days with high winds, and we are visited less and less frequently by the ebb and flow of seasonal sea ice. Since our last report, B-045-P has been able to get out on the water for all but two planned sampling days – a very exciting improvement from October. We continue to work closely with B-019-P, investigating the interplay between bacterial and phytoplankton populations. Using the Bruiser Zodiac platform, equipped with an electric winch, B-045 and B-019 collect water samples at seven depths: up to 50m at Station B, and up to 65m at the deeper, farther-offshore Station E. During November, we were able to reach Station E on six out of 8 sampling days, and Station B on 7 of 8 sampling days.

We incubate our water samples with  $^3\text{H}$ -labeled leucine. With  $^3\text{H}$  as a tracer, we can calculate the rate at which bacteria incorporate leucine into their biomass – a good proxy for bacterial production.



This figure shows Leucine incorporation (in pM/hr) with depth at Station B (top), and Station E (bottom), over the course of the season thus far. (Instances of high bacterial production are represented by red colors, while low Leucine incorporation rates are at the violet end of the spectrum.) We already see striking increases in production, typical for this time of year as the circumpolar current brings warmer, more nutrient-rich water up onto the shelf. We will be correlating these data with B-019's data on primary productivity and chlorophyll-a

concentration, as well as temperature and salinity (obtained through regular CTD casts), dissolved organic carbon content, and plankton abundance (which we measure using flow cytometry).

With a visit from the National Geographic Explorer, November also brought a great opportunity to share our work with tourists. B-045-P is excited for future cruise ship visits, and hopes to continue demonstrating the importance of long-term ecological research to the public.

**B-466-P: COLLABORATIVE RESEARCH: FUNCTIONAL GENOMICS AND PHYSIOLOGICAL ECOLOGY OF SEASONAL SUCCESSION IN ANTARCTIC PHYTOPLANKTON: ADAPTATIONS TO LIGHT AND TEMPERATURE**

Deneb Karentz, Principal Investigator, University of San Francisco

Joe Grzyski, Principal Investigator, Desert Research Institute

Personnel on station: Deneb Karentz, Iva Neveux, Bethany Goodrich, Austin Gajewski

Our scientific focus for the last month of our field season remained on characterizing changes in phytoplankton community composition coincident with changes in local physical/chemical conditions such as day length, in situ light levels, mixed layer depth and nutrients. Species succession and phytoplankton photosynthetic adaptation strategies will be linked to community gene expression patterns measured using massively parallel sequencing.

During November we continued to sample from LTER Station E when ice and wind conditions allowed boating (Nov 1, 9, 11, 14, 17). The suite of measurements and collections included:

- Seacat CTD casts: characterization of temperature and salinity with depth
- Biospherical PUV: light attenuation in UV and visible wavelengths
- Whole water samples from 5, 10, 20, 40 and 60 m for quantification of species cell densities, determination of chlorophyll concentrations, measurement of nutrients
- Plankton net tows at 10, 20 and 40m for cell concentrates that will be used for genomic analyses

We also continued 1) daily sampling of phytoplankton from Arthur Harbor to monitor species succession patterns, 2) weekly sampling of aquarium water for cell identification and chlorophyll analyses, and 3) a weekly seawater fractionation series to quantify size class contributions to chlorophyll. In addition, single cell collections were made and preserved for sequencing. These samples will provide a means to evaluate intra-species variation in genetic complement and gene expression.

Light-adaptation experiments with phytoplankton cultures (donated to us by B-239-P Steward group) were completed as described in the September report. These experiments were conducted under controlled light:dark conditions and will provide data to examine species-specific photosynthetic and genomic responses of phytoplankton to incremented increases in light intensity, a laboratory proxy for the seasonal gradient of light that leads to the spring bloom.

Over 30 cell isolates representing 10 different taxa were cultivated during our field season. These clones were harvested and will be used to further characterize and compare genomic and transcriptomic characteristics on an inter- and intra-species basis.

A Satlantic FIRE (Fluorescence Induction and Relaxation) fast repetition rate fluorometer (FRRF) was installed in line with the aquarium unfiltered seawater system this month for continuous operation. This instrument will measure a variety of photosynthetic characteristics from the natural phytoplankton assemblages of Arthur Harbor over the next three years. The data will be analyzed in conjunction with genomic results from this field season to evaluate patterns of phytoplankton physiological responses to the seasonal changes in the physical environment.

The B-466-P field team departed Palmer Station on November 27.

We would like to express our sincere thanks to all of the Raytheon Polar Services Company personnel who contributed to making our 4-month field season a complete success. Logistical and science support for our project was excellent, and we greatly appreciated the wonderful assistance provided by the Palmer Station staff.

**PALMER STATION**  
**RESEARCH ASSOCIATE MONTHLY REPORT**  
**November 2011**  
Brian Nelson

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

Station PMSA is one of more than 143 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.

Data collection occurred normally during the month.

**A-109-P: ANTARCTIC EXTREMELY LOW FREQUENCY/VERY LOW FREQUENCY (ELF/VLF) OBSERVATIONS OF LIGHTNING AND LIGHTNING-INDUCED ELECTRON PRECIPITATION (LEP).**

Robert Moore, Principal Investigator, University of Florida

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. The Research Associate operates and maintains on-site equipment for the project.

Data collection went as planned for the month.

**A-132-P: FABRY-PEROT INTERFEROMETER (FPI)**

Qian Wu, Principal Investigator, National Center for Atmospheric Research

The Fabry-Perot Interferometer observes mesospheric and thermospheric neutral winds and temperatures at Palmer Station. The Research Associate operates and maintains on-site equipment for the project.

Data collection occurred normally during the month. The instrument was shut down on November 28 because night time light levels are too high for data collection. It will be turned back on in January.

**O-202-P: ANTARCTIC METEOROLOGICAL RESEARCH CENTER (AMRC) SATELLITE DATA INGESTOR.**

Mathew Lazzara, Principal Investigator, University of Wisconsin

The AMRC 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 Research Associate operates and maintains on-site equipment for the project.

A temporary fix has been put in place by the PI, returning the data display to normal, visually. The data ingestor is not receiving information from TeraScan, and so it is contacting a server at the University of Wisconsin for that data.

**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 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 both TerraLab and the VLF Building.

Sampling equipment and operations were per plan throughout the month.

**G-239-E: SOIL PROPERTIES, PERMAFROST, AND ACTIVE-LAYER DYNAMICS**

James Bockheim, Principal Investigator, University of Wisconsin

The overall objectives of this project are to describe, sample, and classify soils at key sites along the Antarctic Peninsula to be used as benchmarks for evaluating the consequences of continued climate warming in the region and for examining latitudinal gradients in soil properties. The Research Associate responds to requests concerning the weather station on Amsler Island.

Data was successfully collected from the weather station on two occasions this month.

**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 (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.

Carbon Cycle and Halocarbon sampling occurred normally during the month.

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

James Butler, Principle Investigator, National Oceanic and Atmospheric Administration / Global Monitoring Division; 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. Also collecting light spectra is a BSI GUV-511 filter radiometer, an Eppley PSP pyranometer, and an Eppley TUVR radiometer. The Research Associate operates and maintains on-site equipment for the project.

The UV monitor collected data normally for the month.

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

Mathew Lazzara, Principal Investigator, University of Wisconsin

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 Research Associate monitors data transmissions for the project and performs quarterly maintenance on the station at Bonaparte Point.

The weather station ran normally during the month.

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

Bjorn Johns, 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 GPS operated normally for the duration of 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 and magnetosphere. The Research Associate operates and maintains on-site equipment for the project.

Data collection was normal throughout the month.

**T-312-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 system operated normally for the month.

**A-357-P: EXTENDING THE SOUTH AMERICAN MERIDIONAL B-FIELD ARRAY (SAMBA) TO AURORAL LATITUDES IN ANTARCTICA**

Efthya 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. The Research Associate maintains the on-site system.

The system collected data 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 data and webcam images are sent to a mirror site (<http://4dgeo.who.edu/tsg/>) at Woods Hole Oceanographic Institute, which is a collaborator on the project.

The thermosalinograph operated normally during the month, but the website isn't being updated, probably due to continued server issues after hurricane Irene.

**T-434-M/P: POLAR GEOSPACIAL CENTER**

Paul Morin, Principal Investigator, University of Minnesota

The Polar Geospatial Center provides geospatial support (in the form of mapping, data delivery, and GIS analysis) to science and logistics communities of the U.S. Arctic and Antarctic programs. The Research Associate has been requested to collect ground control points in the Palmer area throughout the 2011-2012 season.

Ground control points were collected on Gamage Point, Bonaparte Point, Spume Island and Janus Island.

**B-466-P: FLUORESCENCE INDUCTION AND RELAXATION (FIRe) FAST REPETITION RATE FLUOROMETRY (FRRF)**

Deneb Karentz, Joe Grzymiski, Co-Principal Investigators, University of San Francisco

The focus of this project is to identify and evaluate changes that occur in genomic expression and physiology of phytoplankton during the transition from winter to spring, i.e., cellular responses to increasing light and temperature. A Fast Repetition Rate Fluorometer (FRRF) with a FIRe (Fluorescence Induction and Relaxation) sensor was installed in the Palmer Aquarium. The Research Associate downloads data and cleans the instrument on a weekly basis.

The FRRF was installed this month and maintained by B-466-P while they were on station. In December, the Research Associate will begin the duties of data collection and cleaning the instrument.

**T-998-P: INTERNATIONAL MONITORING STATION (IMS) FOR THE COMPREHENSIVE NUCLEAR TEST BAN TREATY ORG. (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 TeraScan system has been operational for the duration of the month.

**TIDE GAGE**

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

The tide gauge operated normally during the month.

**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 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).

The weather station operated normally throughout the month. Scheduled inspections were carried out at the Gamage Point tower. Weather updates and satellite imagery were forwarded to the R/V LAURENCE M. GOULD.