

**LTER LMG-1001; Final Sit-Rep (21-30 January, 2010)**

Operations during the final phase of this year's LTER cruise were highlighted by successful studies of penguin colonies and their oceanographic context on Avian island and Charcot Island, as well as the annual visit to the BAS Rothera Base on 23 January. At Charcot Island we achieved two successful landings to study the Adelie Penguin colony we rediscovered last year, and mapped a new canyon that we hypothesize supports enhanced food availability in this region. Process Study-3 at this site encompassed a wide range of activities in open water, the ice edge, in the sea ice and in the Charcot Polynya and Canyon area near the island.

On our entire cruise we benefitted from excellent logistical support from RPSC and ECO: on the RPSC side MPC Jamee Johnson oversaw a complex and demanding cruise with patience and confident assurance. MTs Chance Miller and Justin Smith provided skilled support on deck and in Zodiacs. ETs Mike Coons and Tony D'Aoust cheerfully handled complicated (and sometimes very frustrating) mooring recoveries as well as our computer and communications needs. Captain Joe Abshire and Chief Engineer Fernando xxx and their mates, engineers and crew handled the ship with their usual professionalism and are good friends and shipmates besides. Mates Rick Taylor, Rob XXX, and Jerry Hoff drove the vessel relentlessly onward, especially at Charcot Island in occasionally heavy sea ice. Bosun Elfren XXX and his seamen drove the winches day and night. Chef Ramses XXX provided crowd-pleasing meals throughout our cruise. Thanks everybody! We're looking forward to next year already.



LM GOULD and Emperor Penguin at Charcot Island, January 27, 2010. Photo by Alex Kahl ©.

Individual reports follow.

**B-013. Seabird Component (W.R. Fraser, PI). Field Team Members: Shawn Farry and Kristen Gorman.**

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Our work during the third week of LTER 10-01 was performed at Avian Island, where we occupied a field camp for 6 days, January 17-22, 2010. At Avian Island we primarily work on the breeding and foraging ecology of Adélie penguins. Thus, we deployed PTT satellite tags, surveyed breeding colonies, weighed and measured chicks, and diet sampled adult Adélie penguins. In addition, we surveyed the entire island for marine mammals, giant petrels, and cormorants. This year's field camp was very successful in large part due to the support received by RPSC marine in deploying and retrieving the field team and supplies to Avian Island, also for installing a heavy duty tarp on the roof of the survival hut to ensure the hut remain dry during inclement weather. We thank Marine Technicians Justin Smith and Chance Miller for their assistance, in addition to ET Mike Coons for communications support.

Our final week of work during LTER 10-01, January 23-28, consisted of additional at-sea observations of seabirds near the Charcot Island area, in addition to an off-ship excursion to a colony of Adélie penguins nesting at Charcot Island. Our fieldwork at Charcot Island replicated many of our tasks at Avian Island including deployment of PTT satellite tags, surveying, weighing and measuring chicks, and diet sampling adult Adélie penguins. The sea-ice conditions around Charcot were amenable to zodiac operations and accessing the Adélie colony. We especially thank Captain Joe Abshire and other ECO personnel for navigating the ship skillfully through areas of thick sea-ice and RPSC MPC Jamee Johnson, MT/MSTs Justin Smith and Lindsey Loughry for zodiac support.

**B-019 Phytoplankton & AUVs (O. Schofield, PI). Field Team Members: Megan Cimino, Kaycee Coleman, Michael Garzio, Tina Haskins, L. Alex Kahl, Rob Sherrell.**

As the 2010 LTER cruise has progressed, so too has the scientific success of B-019. The latest portion of the cruise witnessed our continued success with filtering at each station for chlorophyll and accessory pigments, measuring variable fluorescence and the upper water column Inherent Optical Properties, and conducting simulated in situ primary production experiments. We have also continued to collect trace metal profiles at a number of stations and underway trace metal samples in the southern portion of the extended LTER sampling grid. Following the excellent party at Rothera we also recovered our autonomous underwater glider, RU06. RU06's flight path was guided by the foraging patterns of the Adélie penguins of Avian Island. Upon arrival at Charcot polynya, B-019 supported B-013's work with penguins onshore at Charcot Island as well as deploying RU06 for the first ever autonomous underwater glider flight in a polynya. RU06's historic glider flight was a success as she was recovered after spending 6 hours transecting the major axis of the polynya. RU06's transect helped define the present water masses, chlorophyll, CDOM, and bio-optical characteristics of the upper 100 meters of the water column within the newly discovered polynya hypothesized to be sitting at the upper edge of a submarine canyon. Within the sea ice extent, B-019 is also collaborating with B-045 to conduct

trace metal clean biological production experiments mixing deeper and surface waters. Additionally, B-019 is helping B-020 process chlorophyll samples from their zooplankton grazing experiments. Following a second successful day of supporting B-013 on Charcot Island, B-019 also deployed RU06 at the northern edge of the sea ice. RU06 is currently flying northbound through the heart of the LTER sampling grid measuring the gradient in chlorophyll and bio-optical characteristics away from the sea ice edge and into ice free Antarctic Summer Water. Upon completing LTER's survey of Charcot Canyon, we expect to recover RU06 in two or three days during the northward transit to Palmer Station. All of the above-described success would not have been possible without the support of RPSC and ECO personnel on board the LMG. In particular, the MTs help with zodiac and deck operations has been excellent.

**B-020. Zooplankton Component (D. Steinberg, PI). Field Team Members: Joe Cope, Kim Bernard, Kate Ruck, Lori Price, Beth Simmons, Sarah Glitz.**

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**Outreach Component (B. Simmons, PAL Outreach Coordinator, and B-020 team member)**

Benefitting from the help and participation of the LTER researchers, the crew and RPSC support staff on the ship, the Education and Outreach (E/O) component of the Palmer LTER has gathered essential video footage and photographic documentation of the LTER LMG-1001 cruise. The opportunity to formally participate in researching the macrozooplankton and mesozooplankton species alongside the Zooplankton Field B-020 team is providing unparalleled exposure to field personnel, data, research techniques and oceanographic sampling equipment to allow the further development of educational materials and products. Numerous individuals have given their time and insight in the form of interviews and detailed tours of Palmer Station, Torgersen Island, Humble Island, and Avian Island as well as vessel operations. Photographs and video clips collected thus far are available for immediate access via the Field Blog found at <http://pal.lternet.edu/outreach/blogs/cruise201001/>.

This blog affords families, friends, school children and other formal and informal communities the opportunity to witness our research and participate alongside us. A live webcast was conducted at Palmer Station with Rancho Bernardo High School in San Diego, California, granting several high school marine science classes an opportunity to be here with us, ask questions and experience the polar environment for the very first time. An Art Contest on the blog invited young children to share with us what inspires them most about this marine ecosystem. Materials posted on the blog and website allow classroom educators to refine their lessons about Antarctica with a keen eye toward recognizing zooplankton abundance and distribution and the importance of time series studies. Armed with this real-time information provide by Palmer E/O, educators are able incorporate our research concepts into their existing programs. This opportunity provides students with tangible, relevant science in a fashion not possible outside of the Palmer cruise setting.

**B-045. Microbial Component (H Ducklow, PI). Field Team Members: Hugh Ducklow, Matthew Erickson, Mirko Lunau, Maggie Waldron, Dan Whiteley.**

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B-045 continued to collect ocean microbial and carbon system properties along the transect lines and at the Process Study-2 station (5 morning and evening CTDs over 3 days). Bacterial productivity over the upper 50 meters averaged 24 mgC/m<sup>2</sup>/d at the grid stations, about the same as the over all average for the past 7 years (2010 range 10-43; 2003-10 range 2-131). We also completed the second nitrogen cycle experiment at Process Station 2, and numerous vertical profiles of microbial cell properties using the flow cytometer.

This week we highlight MST Lindsey Loughry for special thanks, for outstanding support of our labwork and safety and waste-handling needs.

**B-021. Physical Oceanography Component (D Martinson, PI)**

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The overall objective of our component in Palmer LTER is to provide fundamental ocean property distributions in support of the overall PAL LTER hypothesis that the ecosystem is responding to the physical environment. Also, given that the rapid atmospheric winter warming is not due to the sun, determine the role of the warm ocean waters in contributing to the excessive winter atmospheric warming and excessive glacial melt.

Operations in the second week included routine CTD's at 8 grid stations and 7 more at Process Station 2. We also successfully recovered our mooring at Avian Island.

**O-288. WAP Flux - New Tools to Study the Fate of Phytoplankton Production in the West Antarctic Peninsula. (K Buesseler, PI). Field Team Members: Steve Pike, Stephanie Owens, Jim Valdes**

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During this period of the cruise, our team continued VPR deployments and <sup>234</sup>Th sampling at each CTD station. We completed the bulk of our underway sampling to investigate the spatial variability of POC flux and biological pump properties contributing to the flux.

The second process station was very successful in that we recovered all of the instruments we deployed, including the first ever neutrally buoyant sediment trap (NBST) to be deployed off the West Antarctic Peninsula. In addition to the NBST, we also deployed and recovered a drifting array containing sediment traps at three depths including polyacrylamide gel traps and respiration chamber traps. The flux at this process station was notably different with a shift from small particles and fecal pellets at process station 1 to a large component of the flux being made up large krill fecal filaments.

We would like to recognize and thank all ECO and RPSC personnel for their continued help with all aspects of science and deck operations. We also thank the Captain and crew of the ARSV L.M. Gould.

