

LM GOULD 04-01 (01 January – 07 February, 2004): Situation Report 1

(Palmer, Antarctica Summer Cruise, 2004 -- Hugh Ducklow. Chief Scientist and P.I.)

LMG 04-01 departed Palmer Station (64S, 64W) on 07 January to commence operations on the 2004 summer cruise of the Palmer, Antarctica LTER Project (PAL). This is the 12th summer cruise in PAL. The science party includes 22 PAL scientists, technicians and students plus 6 support personnel from Raytheon Polar Services (RPSC). Our immediate cruise objectives include occupying about 50 standard hydrographic stations on the LTER grid for sample collection (see individual reports below), performing a high-density foraging survey in Arthur Harbor, visiting British Antarctic Survey (BAS) colleagues at Rothera Station, Adelaide Island (67S, 67W), and a host of other, individual objectives. The long-term goals of the PAL summer cruise program include: specifying the spatial distributions and interannual variability of physical, chemical and biological properties along the West Antarctica Peninsula (WAP), documenting climate change in the WAP region and establishing a mechanistic understanding of the responses of the Antarctic marine ecosystem to climate change. We also seek to describe and the ecological processes that structure local “hotspots” – foci of penguin breeding and plankton activity in the study region (near Anvers, Renaud and Adelaide Islands) through a series of special process stations (more to follow in subsequent reports). The overall goal of PAL is to understand the structure and dynamics of the Antarctic marine ecosystem in the context of interannual variations in sea ice cover and decade-scale changes in the regional climate (anthropogenic warming).

During the first week of cruise operations we successfully occupied grid stations on the 600 and 500 lines and Stations B,E in Arthur Harbor as well as two “inside” or nearshore stations in the Lemaire and Grandidier Channels near Renaud Island. At this point, we wish to thank in particular USAP logistics coordinators Milenko Buljjan (AGUNSA, Punta Arenas, Chile), Rebecca Shoop and Ken (Cheech) Navarro (RPSC), and their respective staffs, who all helped us get underway with quick port calls in Punta Arenas and Palmer Station over the New Year’s holiday. As always, we owe thanks for the tremendous efforts of all of those involved in this project - especially the crew and support staff aboard the LM Gould.

Individual Science Team Reports:

B-013-L: Seabird Ecology (Bill Fraser, PI).

Team members: Heidi Geisz, Brett Pickering

Calm seas have facilitated bird observation transects and stationary censuses from the bridge along the 500 and 600 lines of the grid. We have noted very few penguins and whales in our observations thus far. As per usual, we recorded a higher density of birds and bird species near the shelf break. We will continue to monitor bird presence in an attempt ascertain foraging areas and patterns.

Additionally, we were able to prepare our gear for an upcoming day trip near Trundle Island and a camping trip on Avian Island scheduled for later this month. Our objectives include investigating Adélie colony densities, foraging areas and diet contents. We successfully tested our satellite transmitters slated for deployment on Avian Island.

Special thanks to Doug Fink and John Evans for helping us prepare our field gear.

B-016-L: Phytoplankton Ecology (Maria Vernet, PI)

B-032-L: Optics and Remote Sensing (Ray Smith, PI)

Team members: Wendy Kozlowski (field team leader), Karie Sines, Joe Grzymiski, Peter Horne, Erin Bostrum, Brian White, and Eli Loomis,

The specific goals of this composite group are to map the optical parameters of the Palmer LTER grid and make spatial (latitude, longitude and depth) measurements of primary productivity, active phytoplankton fluorescence, discrete chlorophyll, nutrients and particulate organic matter. Daily CTD casts along the LTER grid are combined with measurements of downwelling irradiance, upwelling radiance, surface PAR, surface ultraviolet radiation and simulated *in situ* measurements of primary production. Our first week aboard the Laurence M. Gould was extremely busy as the entire laboratory had to be moved from Palmer Station to the ship in less than 24 hours. This was accomplished with the incredibly organized cargo groups at both Palmer and aboard the ship. As well, added computer resources had to be mobilized to deal with the volume of data collected each day, a problem which was resolved with much thanks to Jim Waters, Palmer IT. A potentially serious instrument-mounting problem was also handled at the last minute by Palmer Station boating coordinator Doug Fink. The Palmer FEMC is also acknowledged for help with last minute construction. The result of these efforts was a very successful first week of sampling the 600 and 500 lines. We sampled 28 stations in 8 days. Looking forward we plan on maintaining a busy schedule due to the shortened cruise and will also be adding 24-hour “process” stations and a high density sampling grid near Palmer Station.

BP-028-L: Zooplankton and Micronekton - Langdon Quetin and Robin Ross (PIs).

Team members: Robin Ross, Brian Cheng, Amy Kaiser, Jason Watts, Robin Cadiz, Shannon Talley.

During the the January 2004 LTER summer cruise, we will continue to document the distribution and abundance of the macrozooplankton and micronekton across the study region. These data allow us to determine whether there are cycles or trends in the temporal/spatial distributions of the different species. Four species are of particular interest. Antarctic krill and the salp, *Salpa thompsoni*, are the dominant grazers in the pelagic ecosystem. The ice krill, *Euphausia crystallorophias*, and larval Antarctic silverfish, are indicator species for waters thought to be associated with summer pack ice. The documented regional warming in the LTER study region may result in climate migration, and potentially changes in the distribution of these indicator species. During the high density grid within the foraging range of the Adélie penguins nesting near Palmer Station, we will use a scientific echosounder to assess the prey distribution in the water column at the same time that members of the BP-013 field team assess the distribution, abundance and behavior of the foraging penguins. In addition, we plan a suite of instantaneous growth rate and spawning frequency experiments with Antarctic krill, and will use these data to estimate spatial variation in secondary production and reproductive output of Antarctic krill. During the process stations focused on food web dynamics, we plan to assess the grazing impact of both the dominant macrozooplankton grazers, in conjunction with assessments of their physiological status.

BP-028 would particularly like to thank Andy Nunn and his crew for their assistance with initial set up of the net depth sensor.

B-045-L: Microbial Biogeochemistry (Hugh Ducklow, PI).

Team members: Mary Turnipseed (field team leader), Nicole Middaugh, Anne Mills, Shana Rapoport and Jennifer Salerno.

Specific cruise objectives include specifying the spatial distribution and interannual variability inorganic and organic biogeochemical properties (dissolved inorganic and organic carbon, oxygen), heterotrophic microbial biomass and heterotrophic bacterial production rates, plus the seasonal to annual scale vertical fluxes of particulate organic matter through the water column, as monitored by a moored sediment trap near station 600.120. We will also be collecting large-volume particulate samples for analysis of organic biomarkers at the hotspots, or process study sites. During the first week, B-045 activities centered on training a new field team and sampling along the 600 and 500 lines on the PAL Grid. Our group is also participating in educational outreach coordinated through The College of William and Mary and the Williamsburg-James City County, VA Schools (<http://web.wm.edu/news/frontpage/index.php>).

B-045 wants to thank Cara Sucher, Barb Watson and Lauren Rogers (Palmer Station) for invaluable assistance in staging and setting up our cruise operations.