



**Sit. Rep. #02**  
**21 January 2008**  
**US AMLR Vessel Survey (*R/V Yuzhmorgeologiya*)**  
**South Shetlands, Antarctica**

After successfully completing the fur seal survey, the field-camp crew was dropped off at Cape Shirreff. At approximately midnight January 18, the US AMLR Program began the acoustic biomass survey of the West Area (north of the South Shetland Islands). This Area is sampled along seven transects. We were able to complete the first 6 transects with only minor weather delays. That is, until the morning of the 21st, when a major storm caused 7-8 meter seas. Thus for the last 24+ hours we have been stalled, waiting out the storm. We are currently holding position at 60° 29' South and 58° 28' West. The sky is beginning to clear, the winds have dropped below 30 knots, and the seas are slowly beginning to die down. We expect to be moving north and completing this final transect by late tonight the 22nd of January.

### **Acoustics**

Acoustic data for the use in generating biomass estimates of krill will be completed for the next update. We await the completion of the final 7th transect of the West Area. All acoustic instruments have worked flawlessly, at condition up to 5 meter seas, and 30 knot winds. We have been able to make 10-12 knots most of the survey with high quality data recorded.

### **Zooplankton**

Post-larval krill were widely distributed across the region north of the South Shetland Islands, present in 18 of 19 samples collected in the West Area. Greatest concentrations (222-642 individuals, 92-214 per 1000 m<sup>3</sup>) were at one station over the inner shelf near Cape Shirreff (Livingston Island) and at two stations over the slope northwest of Livingston and King George Islands. The overall mean and median abundance values (36 and 8 per 1000 m<sup>3</sup>, respectively) are about average for this area during January surveys.

The krill length-frequency distribution was strongly bimodal with peaks centered on 28 mm juvenile and 50 mm adult lengths. Juveniles comprised 36%, immature stages 14% and mature individuals 50% of the total catch. These results suggest fairly strong recruitment success from last years (2006/07) reproductive effort. This would be the third year in a row with good krill recruitment.

Virtually all of the mature krill were in the early reproductive stages, with female stage 3A and 3B making up 30% of the total krill catch. These results, plus the fact that most of the spermatophore packets attached to 3B females appeared to be fresh, suggest that

sampling occurred during a massive synchronous mating event. The infrequent occurrence (42% of samples) and low concentrations (mean 2 per 1000 m<sup>3</sup>) of early calytopis stage krill larvae support the idea that this is the first major reproductive event of the season.

The remaining zooplankton assemblage was numerically dominated by copepods (primarily *Calanoides acutus*, *Metridia gerlachei*, *Pareuchaeta* sp. and other unidentified species), post-larval *Thysanoessa macrura* and chaetognaths. *Salpa thompsoni* was present in 14 of the 19 samples with mean and median abundance values of 16 and 10 per 1000 m<sup>3</sup>, respectively. Largest concentrations of this salp species were over shelf and slope areas northwest of Livingston and King George Islands. *Salpa* ranked sixth in overall mean abundance following post-larval krill and the amphipod *Primno macropa*. The high latitude salp *Ihlea racovitzai* was present in low numbers at only one of the West Area stations, suggesting minimal influence of Weddell Sea water here.

## **Oceanography**

A slowly falling barometer, and winds from the west, saw calm seas, mild overcast weather during the Drake crossing. The convergence's northern edge was well defined and crossed at latitude 58° S, on the southbound transit. Two periods of strong winds, mainly from the west, peaking to forty knots were experienced on Tuesday and Sunday. This was associated with a sharp drop in barometric pressure. The average wind speed for the above mentioned period was around fifteen knots. An extra transmissometer (blue) and a second 2PI PAR sensor were installed and interfaced to the CTD system and 24 casts were successfully completed, during the acoustic calibrations and the stations of the South Area, including four additional stations that very completed during the initial seal survey. A further four drifters were deployed north of Livingston Island within the high chl-a, slope waters. Additionally, a number (~15) of XBTS were launched to "fill-in" the data between CTD casts.

## **Phytoplankton**

Only 50% of the West Area samples have been processed at this time. For the area north of Livingston Island and westward, chlorophyll-a averaged  $0.5 \pm 0.5$  mg m<sup>-3</sup>, ranging between 0.9 - 1.7 mg m<sup>-3</sup> along the shelf to less than 0.2 mg m<sup>-3</sup> beyond the shelf break. True Drake Passage Antarctic Surface Water was not encountered in any of the pelagic stations, with off shore stations having chlorophyll-a concentrations that increased with depth from ~0.12 mg m<sup>-3</sup> at 5 meters to 0.28 mg m<sup>-3</sup> at 100 m (representing the deep chlorophyll-a maximum). This contrasts with high chl-a areas where chl-a was uniformly distributed in the upper 20 m, and decreased to background concentrations from 30 m down to ~100 m.

Scripps Institution of Oceanography collaborators have deployed bio-optical instruments daily, and have collected water samples for analysis from the mid-day CTD cast. To date, the Integrated Optics Package (IOP) and the Profiling Reflectance

Radiometer system (PRR) have been deployed at 3 mid day CTD stations. Water samples have been collected from various mid day CTD depths for photosynthesis vs. irradiance (PvsE) experiments, analyses of particulate absorption (ap/ad) and dissolved material absorption (as), HPLC pigments, particulate CHN, and measurement of particle number and size distribution (Coulter Counter). HPLC pigments samples have been collected at surface and subsurface chlorophyll max have been collected at 20 stations. Additionally the surface PRR 810 has continuously recoded surface irradiance at 19 spectral channels since beginning the Drake Passage crossing. Mati Kahru has provided temporally composite satellite images of chl-a and sea surface temperature.

### **Birds and Marine Mammal Observations**

Data on the distribution, abundance and behavior of seabirds and mammals were collected during underway ship operations in the West stratum. Twenty transects were collected totaling approximately 540 nautical miles of survey effort. The seabird community consisted primarily of Cape Petrels, Black-browed Albatrosses, Gray-headed Albatrosses, Giant Petrels, Blue Petrels, Antarctic Prions, Wilson's Storm Petrels, Black-bellied Storm Petrels, White-chinned Petrels, and Chinstrap Penguins. On 20 January, we observed a Sooty Albatross. This species is generally not known to occur in the South Shetlands. As in previous surveys, feeding aggregations of Cape Petrels were observed on eastern transects of the West stratum, north of King George Island. A total of 33 Humpback Whales were observed. Two Gray's Beaked Whales were observed near the shelf break north of Livingston Island. We observed 6 aggregations of Antarctic fur seals on transit along the west canyon north of Livingston Island.

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Report submitted by AMLR researchers aboard the *R/V Yuzhmorgeologiya*, conducting surveys of the pelagic ecosystem in the peninsula region of the Antarctic. These reports are posted at <http://swfsc.noaa.gov/aerd-field.aspx>.