NZ IPY-CAML Voyage 2008

14-17 FEB Far south in the Ross Sea

Over the past few days we have been working our way south into the lower Ross Sea and then eastwards towards 180°, paralleling the Ross Ice Shelf. During this period *Tangaroa* got to its southern most point ever at 76°52.164'S 179°55.856'W.

As expected, the main controller of all our activities has been the weather. Heavy snow showers earlier in this period gave everything a white coating, but once the snow cleared and the clouds broke, we had good (but distant) views of Ross Island, with the mountains of the Asgaard and Olympic Ranges as a backdrop.

This was followed by high winds and freezing salt spray that gave the sampling gear and parts of the ship a thick coating of ice. This meant chipping nets, CTD, sleds etc out of solid blocks of ice before they could be deployed on the next station. And that wasn't the end of it.

Then we transited east into a patch of water where the sea temperature dropped below -1.8°C (freezing point of sea water). Grease ice started forming and once the wind dropped, extensive areas of pancake ice developed. We finished the work in that area and have now moved back west where the water temperature is warmer at -1.3°C.

While all these weather and ice issues have been going on, the sampling has continued successfully with many hauls of fish and benthic organisms that excite the biologists on board.

Fig.1. Brenke Sled in the snow.
Fig. 2. Snow cover on trawl deck.
Fig.3. Deck crew working in a blizzard.
Fig. 4. Ice cover over wave gate and deck.
Fig. 5. Pancake ice waves.
Fig. 6. Grease ice with water ripples.

Photos 1&3 Glen Walker, 2, 4-6 John Mitchell

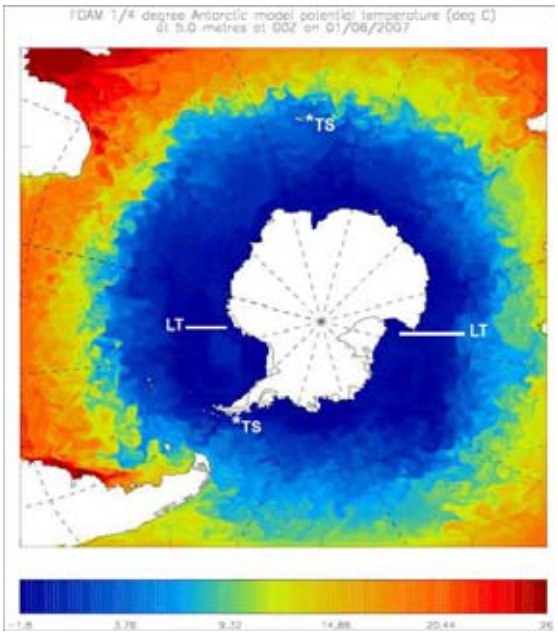
SCIENCE REPORT

One of the objectives for the voyage involves sampling micro-organisms (such as bacteria, referred to as 'bacterioplankton') in the water column. Bacterioplankton are a critical component at the base of the food-web and can use a substantial portion of the primary productivity from phytoplankton. Understanding this portion of the food-web will be important for the Ross Sea Ecosystem model which is being developed to build a picture of how energy is transferred through the system. The biodiversity of bacterioplankton in the Southern Ocean remains underexplored, though from the few studies that have been conducted, Southern Ocean bacterioplankton communities appear to resemble communities from lower latitudes in terms of common bacterial groups identified.

A research project funded through the International Census of Marine Microbes (ICoMM) aims to use sequencing technology to reveal the diversity of bacterioplankton around Antarctica. The methods used will give the total diversity and relative abundances of each sequence type in each sample.

The project is addressing questions such as: how does the biodiversity of Antarctic bacterioplankton compare with lower latitude communities; is bacterioplankton community composition more similar between the Arctic and Antarctic Oceans than between other ocean ecosystems; how does bacterioplankton community structure change in the Weddell and Ross Seas on a southerly gradient through the Antarctic circle 65-75°S?

Four sampling areas have been selected to provide a wide coverage of the Antarctic for IPY (Fig. 7). These include: sampling at different points in time ('time series') at Kerguelen Island (Jean-Francois Ghiglione, France); time series at Anvers Island (Alison Murray, USA); sampling at different locations along a line ('transect') across the Eastern Weddell Sea (Ramon Massana, Spain); and a transect into the Ross Sea during the NZ IPY-CAML voyage onboard *RV* Tangaroa. Time series provide an indication of temporal trends; transects provide an indication of spatial variation within a snapshot.



To date we have collected samples at 55°, 60° 65° and 75° In transit to and in the Ross Sea region. We have one at 70°S still to collect. These samples will be sent to the USA for sequencing.

At each sampling site we are also collecting data for environmental and biological parameters such as temperature and salinity, chlorophyll and nutrient concentrations, bacterial abundance, and bacterial activity to provide a full data set for comparison with the other sites.

Fig. 7. Locations of time series (TS) and latitudinal transect (LT) samples proposed for marine bacteria community for DNA sequencing. Colours represent sea surface temperature for the Southern Ocean for June, 2007.

Another objective for the voyage targets animals associated with the seabed (i.e. the benthos). Sampling gear used to collect benthic organisms includes rough-bottom trawl, beam trawl, brenke sled and multicorer. The first tow in the Ross Sea used the rough-bottom trawl which is designed to sample fish. Attached to the trawl net were two small cone nets (termed little BIT) attached to the ground-rope to sample small invertebrates not retained by the larger mesh trawl net.

Amongst the sediment and rubble of dead broken shells was about 25 kg of invertebrate samples, comprising over 1100 individual animals. Echinoderms (seastars, brittle stars, urchins) and sponges were the most abundant and diverse groups of organisms in the catch. Pycnogonids (sea spiders) were also common – this strange group of animals is plentiful in Antarctic waters, and the animals can reach a large size. The catch included a species of *Pycnogonum*, which may be a new species, or at least a species that has not been found in the Ross Sea before (Fig. 8). A copepod parasite was attached to the body of the specimen, which is unusual, and will be of great interest to taxonomists back at NIWA.

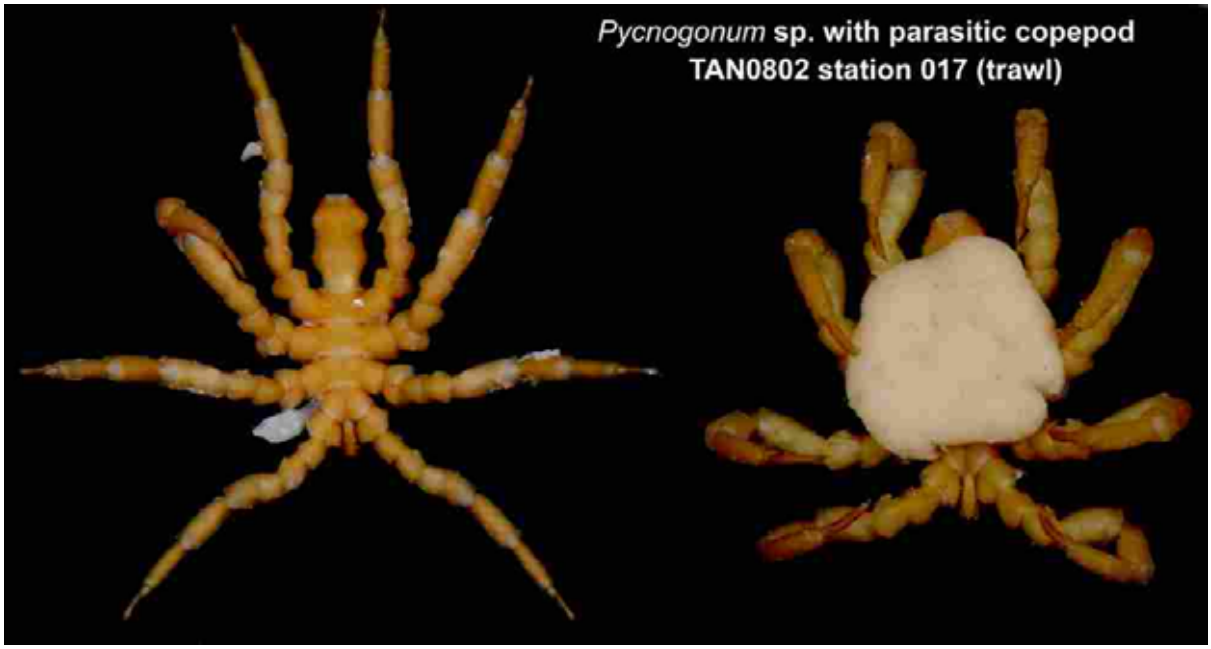


Fig. 8. Pycnogonid (sea spider). Left normal, Right with parasite attached.