NZ IPY-CAML Voyage 2008

21-24 FEB Rocky Bottoms

After losing 24 hours research time to rough weather, the last four days have been spent completing core station transects from the edge of the Ross Ice Shelf, and down the continental slope. These are the stations where all our sampling equipment is deployed.

The DTIS (Deep Towed Imaging System) video and still images have shown us that much of this area of seabed west of Iselin Bank, adjacent to Cape Adare, is very rocky compared to the southern shelf areas sampled earlier in the voyage. The seabed is covered with rocks ranging in size from a couple of centimetres up to a metre or more across. Unlike most of the world's seabed, the rocks we are seeing were not formed *in situ* but have been ice rafted from the Antarctic mainland.

The numerous massive glaciers on shore pick up rocks on their slow flow to the coast from inland Antarctica. The rocks are carried on the surface or buried deep within the glacier. These rocks (known as glacial erratics) often show evidence of this movement, with smoothed faces and scratches worn deeply in their surfaces. When the glacier fronts reach the coast they break off, forming icebergs that carry their rock load with them until the bergs melt, dropping

Fig.1. Seabed image showing a range of drop stones from large rocks to small pebbles
Fig.2. Beam trawl on deck with large erratic jammed in the cod end.
Fig.3. Erratic in the cod end of the beam trawl
Fig.4. The midday to midnight watch gathered proudly around their erratic.
(Photo 1: DTIS, Photos 2-4: John Mitchell)

the rocks to the seafloor. Also contributing to this rock transport is the collapse of the steep cliffs onto the surrounding sea ice. The sea ice breaks up and moves offshore during the summer thaw, melts and the ‘drop stones’ fall to the seabed further offshore. Evidence of this process is seen as far north as the Chatham Rise, east of New Zealand.

The presence of these rocks has made it very hard to successfully collect quality biological samples and the gear regularly comes back on board in need of repair.

SCIENCE REPORT

Cephalopods

Cephalopods (squid, octopus, and their relatives) are highly specialised molluscs and the most advanced invertebrates (animals without a backbone). The Ross Sea region is famous for the colossal squid which feeds on sperm-whales and toothfish. As a group, however, the cephalopods are of far more importance than just their spectacular diversity. Their role in the dynamic ecosystem is likely to be important and we are collecting samples to address questions about both their diversity and their trophic interactions. During the survey, we have seen a wide range of cephalopods. Some of the most appealing cephalopods are octopus, particularly the Dumbo octopus.

Dumbo octopus are known from all oceans and are generally found in water deeper than 300m, although in cooler waters, such as Antarctica, they can be found at shallower depths.

Dumbo octopus come in a variety of forms but all species have a semi-gelatinous body, a pair of fleshy ‘fins’ on the mantle (head-like body), strong webbing between the arms, and a row of cirri (minute fleshy finger-like projections) along each side of the sucker row on each arm. Most species are an orange/red/purple colour and all species lack chromatophores (pigment filled sacs under individual nervous control), so they are incapable of changing colour, unlike most other cephalopod groups.

The behaviour and ecology of these largely deep-sea species is poorly known. Most species live close to or on the seafloor. Dumbos generally feed on small prey with low swimming speeds, such as small crustaceans (including amphipods - like the sand-hoppers found at the beach, and shrimps), and worms. Unlike inshore and oceanic cephalopods, which often move rapidly using jet propulsion, dumbos generally move at a more sedate, energy-efficient pace; crawling along the bottom, drifting with the current, swimming using their large fins, or by pumping their webbed arms.

Fig.5. Large specimen of *Cirroctopus*; a large robust dumbo with massive paddle-like fins. Collected from the southern Ross Sea at 750 m. (Photo: Peter Marriott)

Fig.6. *Cirroctopus sp*. in its natural habitat in the Ross Sea at 1600 m. (Photo: DTIS, NIWA)

Mesopelagic trawl catches

The change in catches from the mesopelagic trawl going from the inner Ross Sea shelf to the Ross Sea slope has been quite dramatic. Fish catches on the shelf were almost exclusively Antarctic silverfish with occasional juvenile and adult crocodile icefish. In contrast, fish catches over the slope have been much more diverse and numerically dominated by several species of lanternfish (e.g., *Electrona sp.* and *Gymnoscopelus spp.*), deepsea smelt (*Bathylagus sp.*), and barracudina (*Notolepis spp.*). The invertebrate catches have also differed markedly with shelf catches dominated by crystal krill, and slope catches dominated in weight by large jellyfish. Individuals have weighed up to 15 kg, with tentacles up to 4 m long.

Fig.7. Typical catch from the shelf of predominantly Antarctic silverfish, along with a few crocodile icefish.
(Photo: NIWA).

Fig.8. Typical slope catch of predominantly jellyfish (Photos: NIWA (left), Peter Marriott (below))