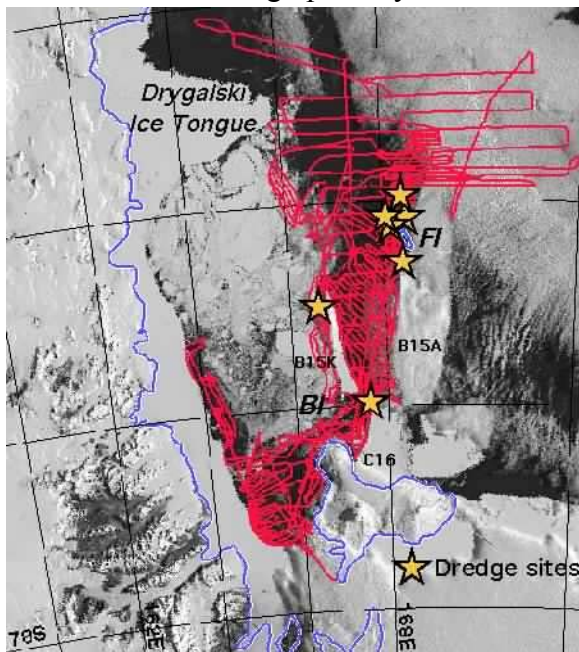


## NBP04\_01 Cruise Report #4: Week of 9 February – 15 February, 2004

The storm and sea swell we had been experiencing abated the beginning of the week. Overcast conditions continued until near the end of the week. TeraScan satellite images useful for evaluating ice conditions were obtained only on one day at the end of the week. We attempted to order an additional RADARSAT image to aid in planning the final days of the cruise, but were told it was not possible to acquire an image over the study area until 15 February (U.S.) and to receive it until early on the 17<sup>th</sup> (here). Since this would not have helped our planning, we did not proceed with an order. Sea conditions at the beginning of the week degraded both multibeam and seismic data, however the noise can be largely removed from the seismic data by processing. Late in the week we encountered substantial areas where thin, continuous ‘nylas’ sea ice had formed. Where the nylas was present, the multibeam could not obtain any good data. Increasing wind is now breaking up the nylas and data is improving.



Early in the week we acquired 483 km of multichannel seismic data along 4 east-west profiles to the north and east of Drygalski Ice Tongue, and a north-south line, 150 km in length, that ties across the whole series of east-west lines in this seismic grid. For most of this survey we were recording with 4 guns, but were down to 3 guns at the end of the tie line. For 2 of the east-west lines, shot later to improve correlation of faults in the grid, we had 6 guns blazing and a balanced streamer. Some minor damage to the birds, incurred while running through ice north of Drygalski Ice tongue, was repaired during a complete overhaul of guns and birds. Ten sonobuoys were deployed. All of the MCS data has been processed and the lines imaging structures along the eastern margin of the Terror Rift look stunning.

Dredging was completed at three sites during the week. The first dredge target was a large seamount-like feature beneath the northern tip of the large tabular berg B15K, about 50 km north of Beaufort Island (BI) and 50 km west-southwest of Franklin Island (FI). The initial dredge attempt resulted in the loss of the dredge. A second attempt at this locality using a different dredge was successful and yielded a large haul of basalt samples. Two additional targets were dredged in the volcanic field immediately north of Franklin Island. One target consisted of a seamount sited along a linear ridge and the second was a seamount sited on the northward submarine extension of Franklin Island. Both dredges were successful, yielding abundant basalt samples. A total of 7 successful dredges have now been completed on the cruise.

A bathymetric high, believed to be a volcanic feature due to the associated magnetic anomaly, has remained an elusive target for mapping due to constant sea ice cover. We did succeed in mapping the northern extent of the feature, consisting of a cluster of seamount-like edifices. While working through the ice toward this feature, the swath mapping revealed a region characterized by a group of round to ovoid, low-relief (up to c. 80 m) hills that are most likely of glacial origin, as they have virtually no magnetic signature.

We were able to complete some additional swath mapping around Beaufort Island, but were largely prevented from mapping to the west and northwest of it by the pack ice. In addition, the calm waters in the lee of the island were rapidly becoming covered with newly formed 'nylas'-type sea ice, preventing acquisition of multibeam data. Consequently, we changed from our plan to concentrate on mapping in that area and commenced single-channel seismic data acquisition. We attempted to obtain radial lines extending outward from Ross Island to examine the geometry and sedimentary fill of the 'flexural moat' surrounding the island. We were able to complete one of these lines, but only portions of the other two lines due to the presence of pack ice and a field of rapidly moving large tabular bergs north of Mt Bird. A single-channel seismic line, traversing westward across McMurdo Sound, was then completed. Additional lines were collected parallel to the coastline offshore of the Cape Roberts/Granite Harbour region. We will use the grid of lines across the Mackay Sea Valley to map stratigraphy drilled by the Cape Roberts Project eastward into the Victoria Land Basin and Terror Rift. Unfortunately, however, the planned east-west lines in this region can not be collected due to the current ice configuration. We have acquired approximately 250 km of single-channel seismic data while traveling at 6 knots.

In the final days of the cruise we plan to complete swath mapping of as much of the remaining area of southern McMurdo Sound as possible, and to complete two additional MCS lines in the southeastern Sound in an area that was previously inaccessible due to sea ice.

The total distance covered during the week is 1927 km. Continuous measurements of BATHY-2000 sub-bottom profiler, SIMRAD swath bathymetry, and gravity have been made. Magnetic data have been collected along most of the track, totaling approximately 1565 km.