CRUISE REPORT

Ship Name: R/V VEMA

Cruise No: V3002

Dates: 8 December 1972
30 December 1972

Area of Operation: Continental margin off the eastern U.S.

Days at Sea: 22

Days Foreign Port: 4 (San Juan)

Program Description: Survey the continental margin off the east coast of the United States in order to define the area of initial rifting in the Atlantic Ocean.

Participants: (All L-DGO unless otherwise specified)

NAME	POSITION
Eldholm, Olav	Chief Scientist
Roach, D.	T. Grad
Winslow, K.	Camera
Mossman, B.	Air Gun
Kilfoy, J.	Coring Bosun
Peddle, R.	Coring A.B.
Simkins, R.	Core Describer
Stevens, C.	E.T.
Labout, A.	E.T.
Cribier, D.	Sat. Nav.
House, L.	Gravity

No. of Days Charged to:

	Facilities	Research
26 NSF:	GD 31705	GA 27281 GA 35463 GX 28671 GA 14177
____ ONR:		
____ Other:		

CRUISE REPORT

VEMA 3002 NEW YORK - SAN JUAN

INTRODUCTION

The main objective of leg V3002 was to study the continental margin off the east coast of the United States in the area between 25°N and 37°W in order to define the area of initial rifting in this portion of the Atlantic Ocean. Selected lines of sonobuoys across the margin were designed to provide information about the configuration of the deeper sedimentary layers and the basement surface. Figure 1 shows an outline of the track and the location of the stations. The PDR's, the magnetometer and the gravity meter worked well with only minor repairs being necessary. A new PDP-11 computer was installed but the main portion of the "software" was not ready when departing and the available programs needed an excessive amount of computer time. Satellite fixes were received but not processed and the shipboard navigation was therefore based on Loran A and celestial fixes (a minimum of one fix every hour). The pit log was not working properly and a defect in the pitlog sword was believed to cause the malfunction. However, a running navigation (fix pit) calculation was made based on the above-mentioned fixes.

Two new seismic profilers were put on board in New York and they are a great improvement both technically and opera-

tionally. There were some minor bugs in the system that generally were repaired underway. The quality of the profiler records was poor whereas the sonobuoy records were quite good. This was especially detectable at water depths of more than 2000 fm. It is believed that the two eels on board are both poor and should be replaced or rebuilt.

STATION WORK

A new hydro winch and hydraulic control system were installed and we spent some station time to get accustomed to the controls. During these tests a weight similar to the camera sled was used. It turned out that the hydro wire was put on the drum under considerably less strain than is normal when recovering the camera and this caused an irregular winding of the wire on the drum. The entire length of wire was therefore ~~sheared~~ streamed. The Liebus winch works well and near the end of the leg the hydro work was fully operational. The hydro wire appears to have a tendency to curl easily when it is not under strain and the portion that lies on deck between stations has to be inspected at frequent intervals.

The coring operation runs smoothly but some minor modifications have to be made to ease the recovery of bent three-pipers.

SEISMIC REFRACTION WITH AIRGUN AND EXPLOSIVES

Valuable experience was gained by using TNT charges (mostly double charges, e.g. 1 lb.) as energy source when the airgun signal weakened. It appears that it is possible to extend a refractor for a significant distance by switching to explosives. In many instances, this procedure also enabled us to pick a new arrival with higher velocity that was only a weak second arrival in the airgun record. Where no refracted wave is seen in the airgun record, our experience is that it is very unlikely to pick up a refracted arrival with the charge size we now are using.

SCIENTIFIC RESULTS

The computer facilities made it difficult to obtain a satisfactory shipboard data analysis. However, our data clearly define the major geophysical provinces on the margin. This is especially well defined in the magnetic data where we made additional mapping of the quiet zone boundary, the Blake-Spur anomaly and, in some of the crossings, the shelf anomaly. All these linear magnetic anomaly patterns have been suggested to demarcate the line of initial rifting off the east coast of the U.S. In addition, P. Rabinowitz has mapped a linear anomaly about 50 km west of the Blake-Spur

lineament which he associates with the continental edge. Our observations indicate that this anomaly is present but is of smaller amplitude and less well defined than the Blake-Spur anomaly. The Blake-Spur anomaly can now be continued farther northward than shown by Vogt (1971) to about 36°N.

In order to determine whether any of these magnetic anomalies were associated with any structural boundary in the basement and/or the sediments, we made three lines of sonobuoys across the margin. Two of the lines are north of the Blake plateau (lines A, B; Fig. 1), and one line crosses the Blake escarpment (line C; Fig. 1). All sonobuoys exhibit a number of reflection hyperbolas, and in most profiles we also obtained high-velocity refracted arrivals. The reflection hyperbolas appear to correlate between profiles. Although the sedimentary sequence is generally very thick in this area, we believe that the sonobuoys together with earlier data should give an almost continuous seismic structure section across the margin that would be expected to reveal major structural boundaries.

The gravity data appeared to a great extent to relate to topography but further examination must be made, particularly to look for anomalies of relatively long wavelength and low amplitude.

We will also point out that the 3.5 kHz PDR records often show indications of geological activity (unconformities, erosion, etc.) and may prove valuable in a study of sedimentary processes. Several of the cores taken from below the compensation depth are of interest because they contained layers of highly calcareous material although it is most likely these layers represent turbidites.

Olav Eldholm