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CRUISE REPORT

Ship Name: R/D. CONRAD Cruise No: 21-15

Departure: Oct. 12, 1978 (Date) from Bergen (Port)

Arrival: Nov. 10, 1978 (Date) at Bermuda (Port)

Days at Sea: 28
(Count day of departure but not day of arrival in port)

Days Foreign Port: _____
(number of days in arrival port before next leg)

Area of Operation: Mid-Atlantic Ridge and Flanks

Program Description: Upper Crustal Structure as a Function of Plate Age, Central North Atlantic.

Program supported by what contract: TO-0210, Scope V

Participants: (All L-DGO unless otherwise specified)

Name	Title
R. Houtz	Sen. Research Assoc. Chief Scientist
M. Sundvik	Scientist
R. Suozzo	Computer Tech.
C. Salcedo	E.T.
K. Jacobs	E.T.
A. Stein	E.T.

All inquiries regarding cruise should be made to the chief scientist.

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Objectives

The track was designed to provide a sample of crustal structure from the Mid-Atlantic ridge out to 40 m.y. old crust. This was to be accomplished with sonobuoys and large airguns, which, it was hoped, would provide refraction data from layer 3 as well as the upper crustal layers. Earlier work with small airguns had failed to penetrate to layer 3, and the sampling was very poor, being concentrated around Iceland where layer 2A may be unusually thick.

Scientific Results

Penetration was achieved to mantle at 7 stations, and to layer 3 at 16 stations. The uppermost layers provided refraction data at almost every station, but basement topography was frequently too rough to allow accurate solutions to be computed. The large airguns provided numerous stations where the velocity of layer 2A could be measured. Preliminary results obtained aboard ship show that layer 2A in the central North Atlantic is about 700m thick, or about half as thick as that measured by Houtz and Ewing. It remains to be seen if this is the result of regional variations or comes about because of differences in airgun performance. Preliminary results show that refraction velocities of 4.5 to 5.0 are more commonly measured with the large guns, as well as the 5.0 to 5.5' layer 2B - type' velocities. Hence the remaining thickness attributed to layer 2A is thinner. Typically, the small guns record only the 5.0 to 5.5 refraction because it is strongest, and the remaining uppermost section was designated 'layer 2A'.

Shipboard Procedures

When large airguns are to be used with sonobuoys on an opportunity basis, it is preferable to have two airgun mechanics aboard. This would allow the deployment of sonobuoys at anytime. As it stands, with only one mechanic, the guns must be on board while he sleeps. Our procedure was to shut down at 2200 if a sonobuoy had not already been launched. The guns were put back in at 0600 or 0700.

Profiling started 4 days out of Bergen, due to three days on the North Sea shelf and one day of bad weather west of Scotland.

Exceptionally good weather put us ahead of schedule with 20 (out of 30 sonobuoys deployed) providing useful information down to 29°S. At this latitude, no data could be gathered due to extreme topography. The NAVOCEANO charts were entirely mis-leading in this part of the Atlantic. After losing 5 days and wasting 9 sonobuoys, we steamed north and found smoother topography. About 2/3 of the 50 or so sonobuoys launched are useful.

Notes on Personnel and Equipment

The CONRAD is well-run and in excellent shape - no complaints. Scientific personnel are cheerful and willing. High marks are due Sundvik and Salcedo. Watch-standers, except for Sundvik, are a bit casual about rectifying 'galloping guns' and making gain changes. The latter came up frequently because of changes in airgun source (Bolt to L-DGO and back about 4 times/day), which came about because we shut down the large guns when predictably rough terrain had to be traversed.

The maggie was noisy on the short towing cable, so Salcedo rigged a second maggie on a spliced cable to give full length. It was noisier, so we went back to the original. The Raytheon is inoperative and needs a replacement for board A9. The 32-piece shipment that arrived in Bergen was clearly labelled, so that it was immediately apparent which pkgs. were scientific - keep up the good work.

The airguns and compressors, according to Martin were in extremely poor condition. He spent 8 solid days frantically getting things back in working order before our sonobuoy work began at latitude 49°N.

Severe electrical problems were traced to the panel in the doghouse. This was repaired by the electrician while I stood by. He showed me a couple connections with reversed polarity. The airgun and water-break patch panel door had worked free and had been banging around for 7-8 days, knocking screws out of a unit attached to back of door; it was hanging down and bashing into steel frame. I screwed it back in, but this unit may bear watching.

Bolt airgun trigger in dry lab gave much trouble until Salcedo (without schematics) found that trigger #2, the only one that worked reliably, had both capacitors wired in parallel. In the other 3 the 2nd capacitor had not been soldered in. As a result #2 gave a 20 m/sec square wave and others gave a spike that was too short to activate the solenoids reliably. This was fixed.

Sonobuoy receiver B is O.K., contrary to earlier reports. Sonobuoy inventory at end of cruise: 45 x SSQ 41A's
9 x SSQ 57A's

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