WILLIAM J. LUDWIG

Lamont-Doherty Geological Observatory | *Palisades, N.Y. 10964*
of Columbia University

Cable: LAMONT, Palisades, New York State

Telephone: Code 914, Elmwood 9-2900
Twx: 710-576-2653

CRUISE REPORT

Ship Name: R/V CONRAD Cruise No: 1907

Departure: February 27, 1976 (Date) from San Juan, Puerto Rico (Port)

Arrival: March, 27, 1976 (Date) at New York (Port)

Days at Sea: 29 Days Foreign Port: _____ (No. of days in arrival port)

Area of Operation: Barracuda abyssal plain, eastern Nares abyssal plain, Nares fracture zone near 24°North, Bermuda Rise, Continental slope near Baltimore canyon.

Program Description:

Acoustics and near-bottom processes.

Participants: (All L-DGO unless otherwise specified)

1.	Truchan, Marek	Co-Chief Scientist
2.	Embley, Robert	Co-Chief Scientist
3.	Chochov, Spartak	Sedimentologist
4.	Church, Arthur	Owner's Rep. (Eastern Inst.)
5.	Crowell, Bruce	E.T.
6.	Grob, Daniel	E.T.
7.	Holland, Michael	Camera
8.	Iltzsche, Martin	Airgun Tech.
9.	Kelley, Wayne	Gravity E.T.
10.	Kostecki, John	Core Describer
11.	Matson, John	Core Bosun
12.	Selwyn, Steve	Core Observer

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

CRUISE REPORT

R/V Conrad 1907

February 27 to March 27, 1976

Introduction

The purpose of this cruise was to continue with the acoustics/near-bottom-processes program initiated during the previous leg, both funded by the ONR for work in the western North Atlantic. The objective of both of these legs was to establish correlations between sediment-lithology/physical properties and 3.5 kHz echograms in several well defined acoustic-type provinces (see track chart). These areas were: 1) The Barracuda A. P. 2) Eastern Nares A. P. 3) Nares and adjacent fracture zones (region mapped in detail by T. Shipley) 4) extension of Bermuds F. Z. 5) Southwestern Bermuda Rise and 6) a region of large sediment slide on the continental rise off Maryland. The stations in these areas generally included (1) piston coring (2) pinger-hydrophone drops and (3) camera lowerings.

Preliminary Results:

Sediment Velocimeter and Bulk Property Samples:

Velocimeter measurements and bulk density samples were taken at 20 cm intervals in nineteen cores from eight separate acoustic zones (track chart). The general character (amplitude, etc.) of the velocity logs in cores from the various 3.5 kHz acoustic zones were noticeably different. Cores taken in acoustically transparent red clay areas have relatively smooth velocity curves with a slight gradient. The cores taken in the Eastern Nares Abyssal Plain and in the Nares Fracture zone, where the subbottom reflectors are sharp and separated by transparent intervals, contain alternating brown and gray clays. Although the velocity changes were relatively small (20 m/sec), they appear to correlate with prominent subbottom reflectors. Two cores taken in the 24°N fracture valley, where the subbottom reflectors are closely spaced, contain numerous silt layers whose velocity averages about 1540 m/sec.

Five cores taken in the southwestern Bermuda Rise sampled three very distinct acoustic zones whose regional boundaries (mapped on a V26 site survey)

are very sharp. These zones are (1) strong bottom reflector with weak or absent subbottoms (2) "fuzzy" sequence 20-50 m thick where the subbottom reflectors are not clearly defined on surface 3.5 kHz records and (3) multiple clearly defined subbottoms of about 20 m's thickness. Cores in type (1) consisted of red clay. Cores in type (2) consisted of alternating gray and brown clays and a few chalky layers, and a core in type (3) consisted of brown clays with a series of interbedded chalk and marl layers. The velocity logs of these cores showed the smallest variation in type 1 (less than 8 m/sec) and the greatest in type 3 (up to 50 m/sec). In the type 3 core there appeared to be a one to one correspondence between high velocity values and high carbonate layers. The preliminary interpretation of this data is that type 1 acoustic zone represents the background "red clay" pelagic sedimentation and types 2 and 3 represent an influx of sediment by bottom currents.

Survey and Coring in sediment slide on continental rise off Maryland:

Three piston cores and a box core were taken and a short survey was conducted on an area of the continental rise of Maryland south of the Baltimore Canyon (see map). Previous 3.5 kHz profiles collected on VEMA 30 and CONRAD 19 in this area delineated the outline of a large submarine sediment slide and associated debris flow deposits. Our primary purpose in returning to this area was to confirm the acoustic identification of subaqueous debris flows resulting from the slide by sampling. The piston cores and box cores taken in the supposed debris flow showed primary structures (mud and rock clasts, angular contacts) very similar to those discovered on the Northwest African margin the previous year on VEMA 32.

Diapir Survey in E. Nares Abyssal Plain:

Undoubtedly, one of the most interesting and exciting events of the cruise was an attempt to core a "diapir" on the eastern Nares abyssal plain where we conducted a detailed survey to define the types and the density of their distribution per unit area. A significant finding of this effort was evidence from the 12 kHz corehead pinger that these features appear to be genuine, very sharp

lateral disturbances in the flat-lying sediments and not an acoustic artifact. By drifting over a diapir, holding the corehead 12 kHz pinger close to the bottom, we recorded a record similar to the surface transducer record.

EQUIPMENT

Geophysical

Two problems were encountered with the geophysical gear during this cruise. The eels were both unsatisfactory in that they were quite noisy and were continually cutting off because of broken wires. The other problem was the breakdown of the gravity gyros which resulted in about nine days loss of data. No spares were available.

We have demonstrated that the 120 in^3 Bolt air-gun can be towed at speeds of over nine knots through the water, without damaging its " harness". This is an important finding for saving of the ship's time. Previously, seven knots was the top speed recommended.

Coring - The coring program was successful due to the efforts of A. Ludas, A. Hagan and J. Sint in Puerto Rico in fixing the core winch and to the obtaining and splicing of a new section of core wire by S. Gerard and J. Cotter, core bosum of the KNORR.

Piston Coring

Twenty-three piston cores were obtained on this leg. Although one of the tucks is the long splice partially unwrapped halfway through the program, the splice held until the last part of the cruise, when shallower water was reached and the new wire (1500 fathoms) was removed. A new type of break-away piston was successfully tried on a half dozen of the cores. However it is still unclear whether the breakaway piston offers any substantial advantages over the standard type piston.

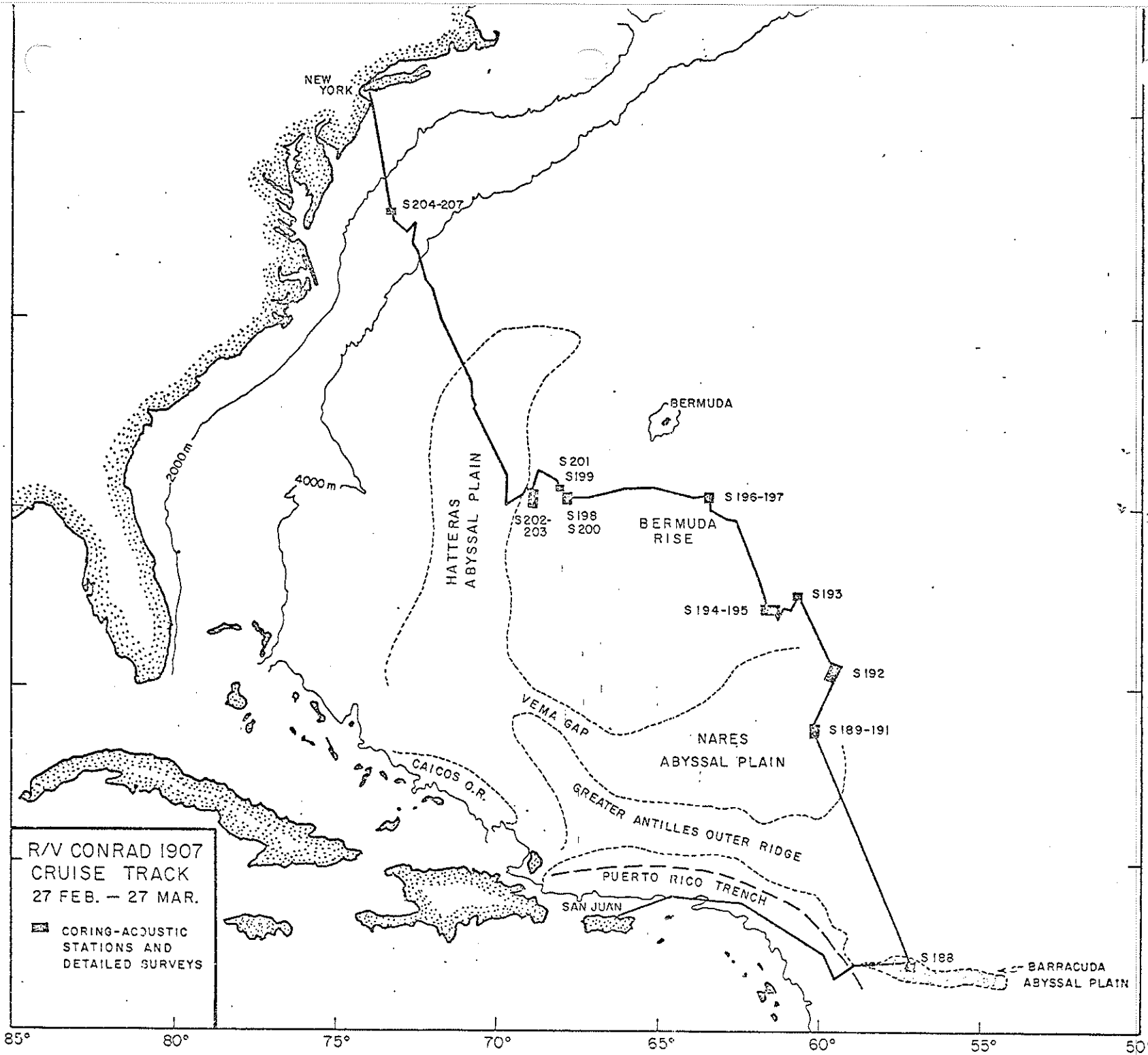
Box Corer

A new, simplified type of box corer designed by S. Selwyn was success-

fully tested on two occasions on this leg. The box corer is designed to fit directly onto the standard core head and its handling, although more complicated than a piston corer, went relatively smoothly. In the future, the presence of the new crane on board CONRAD should make its handling easier. In both instances the box corer was used in a free-fall mode and samples of 125 X 45 X 45 cm (Box Core 39) and 100 X 45 X 45 cm (Box Core 49) were obtained. The biggest remaining problem with the box corer is the retrieval of the mud. In the case of Box Core 39, the mud was carefully sliced away and the structure photographed as the layers were peeled away. Subsamples were also taken and returned to Lamont. Box Core 49 was brought back intact and will be carefully studied at Lamont. A more efficient shipboard sampling system is currently beein devised.

Robert Embley

Marek Truchan


NEW YORK
S204-207
BERMUDA
S201
S199
S202-203
S198
S200
S196-197
BERMUDA RISE
HATTERAS ABYSSAL PLAIN
2000m
4000m
S194-195
S193
S192
S189-191
VEMA GAP
NARES ABYSSAL PLAIN
CAICOS O.R.
GREATER ANTILLES OUTER RIDGE
PUERTO RICO TRENCH
SAN JUAN
S188
BARRACUDA ABYSSAL PLAIN
R/V CONRAD 1907
CRUISE TRACK
27 FEB. — 27 MAR.
CORING-ACOUSTIC STATIONS AND DETAILED SURVEYS
40°
35°
30°
25°
20°
15°
85°
80°
75°
70°
65°
60°
55°
50°