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CRUISE REPORT

Ship Name: R/V CONRAD Cruise No: 21-10

Departure: 3 June 1978 (Date) from Roosevelt Roads, Puerto Rico (Port)

Arrival: 17 June 1978 (Date) at St. Georges, Bermuda (Port)

Days at Sea: 14 Days Foreign Port: _____ (No. of days in arrival port)

Area of Operation: Greater Antilles Outer Ridge and southwestern Bermuda Rise

Program Description:

Deploy bottom-ocean-monitor (BOM) tripod system. Pre-deep-tow survey on SW Bermuda Rise including seismic profiler and 3.5 kHz surveys, near-bottom 3.5 kHz profiling, bottom photography, and gravity coring.

Participants: (All L-DGO unless otherwise specified)

Brian Tucholke	Chief Scientist
Peter Hoose	Co-Chief Scientist
Peter Bruchhausen	BOM Technician
Michael Holland	Camera Technician
Wayne Robertson	E.T.
Ross Rottier	Technician
Martin Iltzsche	Airgun Technician

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

CRUISE REPORT

General

CONRAD 21, Leg 10 began in Roosevelt Roads, Puerto Rico on 3 June 1978 and ended in St. Georges, Bermuda on 17 June 1978. Scientific personnel, ship's supplies and scientific equipment were onloaded in Roosevelt Roads and 6 tons of explosives for RC21, Leg 11 were onloaded about 1½ hours later at Vieques Island. The first station was located on the north flank of the northwestern Greater Antilles Outer Ridge (23°38.2'N, 68°25.9'W), where the BOM tripod system was deployed. The BOM contains an Aanderra current meter, time-lapse nephelometer, time-lapse camera, two AMF acoustic releases and a flotation package with 8-17" glass spheres. It was set in this area because earlier bottom photography showed well developed ripples and current lineations in the clayey sediments, and 6-month current-meter records indicated a nearly unidirectional flow to the southeast at up to 20 cm/sec. BOM deployment went smoothly using the ship's crane. After launch the BOM sank at about 15 fm/minute, slowed by a parachute on a 12-hour magnesium-link release. We stayed in the area for about 6 hours to check that the releases were functioning properly and that the system was upright after landing. All checks indicated that the BOM was correctly deployed on the seafloor. At the same time, we tested the hydrowinch by taking a gravity core in the same location. The BOM system is scheduled to be retrieved by CONRAD in November.

Later in the leg we also deployed a mooring containing a single current meter (15 m off bottom) on the western Bermuda Rise (30°48.9'N, 68°42.3'W). We plan to pick up this mooring on the MELVILLE deep-tow cruise in September. If time limitations on the deep-tow cruise do not allow recovery then, the mooring will be retrieved by CONRAD in November.

The remainder of CONRAD cruise 21-10 was devoted to station work and 3.5 kHz and seismic profiler surveys of the western Bermuda Rise, in the vicinity of the V2609 survey around DSDP Sites 6 and 7, and west to the edge of the Hatteras Abyssal Plain. Of particular interest are large regions of hyperbolic echoes, most of which arise from elongated seafloor bedforms trending NE-SW. Conventional and large-area bottom photographs taken in these areas do not depict large enough areas of seafloor to show the nature of the bedforms, but they do show a general subtle current-smoothing of the sediments. It is unlikely that the bedforms are furrows, such as those creating hyperbolic echoes on the Bahama Outer Ridge, because they are oriented at 45° to the presumed flow of bottom water (to the north) rather than parallel to it. The 3.5 kHz near-bottom pinger and hydrophone was towed slowly across these areas in an attempt to better define the bottom morphology. The records showed seafloor swales, lensing of near surface sediments, and very small-scale hyperbolic echoes and troughs, none of which could be resolved by conventional surface-ship echosounding.

However, the exact nature of the bedforms generating the hyperbolic echoes is still unclear, and, as anticipated, it will be resolved only by Troika or deep-tow surveying.

Equipment

Seismic profiling system - Initial difficulty was experienced with noisy eels. When the eels were dismantled, each was found to have intermittent shorts and broken wiring. After these were repaired, the eels performed reasonably well. Two shark bites later required repair of the pre-amp section and removal of about 2 feet of eel rubber on the leading inactive section of one eel, and cable repair on another eel. Both these eels will be thoroughly checked by Van Santford et al. on CONRAD 21-11.

PDR - The 12 kHz PDR intermittently failed to record. After a thorough checkout, the problem was traced to poor electrical contact along the stylus traverse bar.

Gravimeter - No problems encountered. The system was run to provide data for post-cruise navigation reduction.

Magnetometer - Not used during cruise. However, both bottles were checked out. One had a saltwater leak and was repaired.

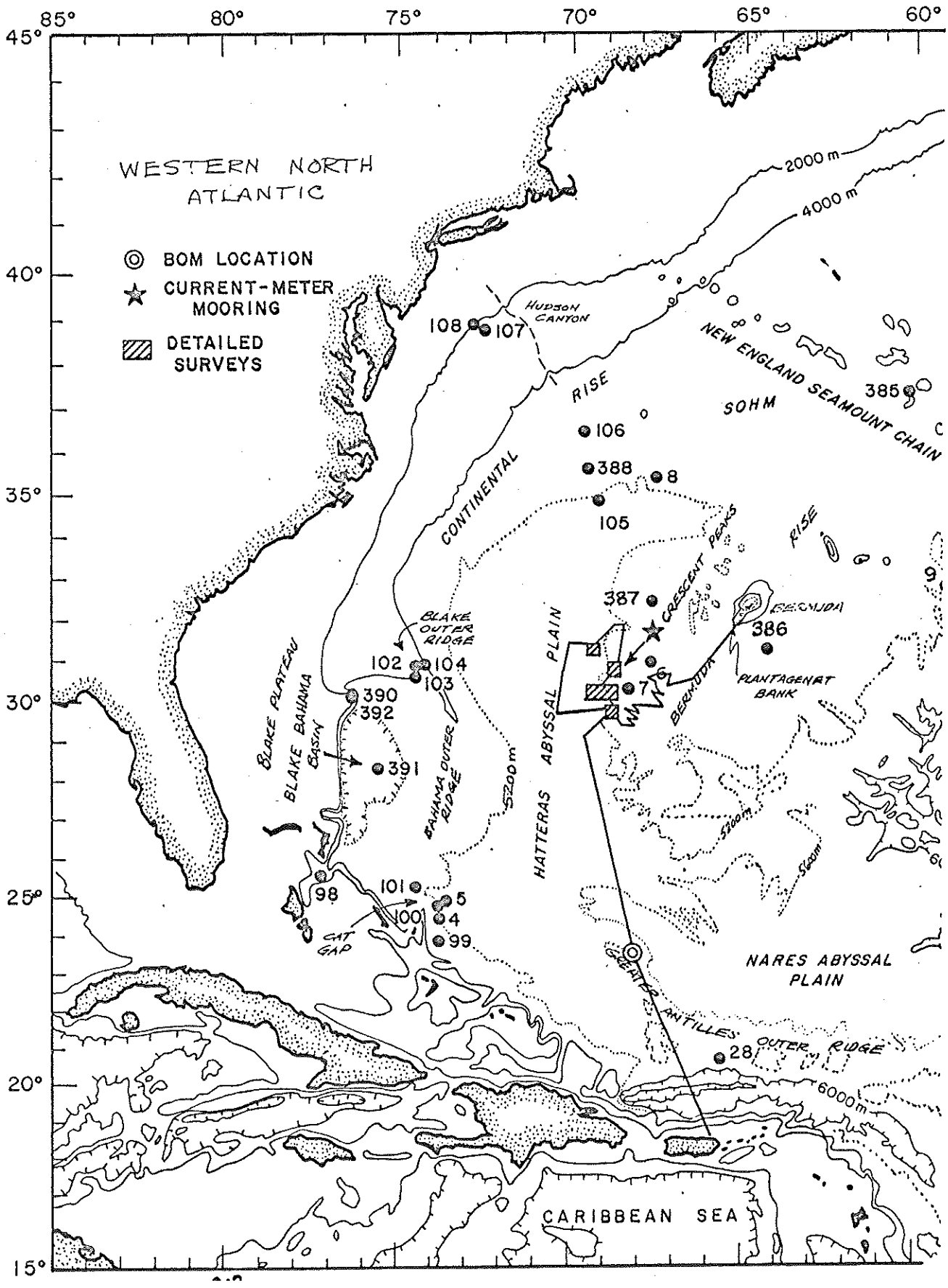
Winches - The hydrowinch worked well, despite not having been used since Leg 5. The STD winch was inoperable at the beginning of the cruise, and the ship's engineers initially thought the winch motor was burned out. However, the problem

later was traced to wiring and once the wiring was repaired, the winch performed well. It is recommended that both the hydro and STD winches be tested on a monthly basis to assure that they remain in good working condition. Also, both winches are long overdue for a thorough overhaul.

Camera Gear - The standard camera performed very well. The two large-frame camera stations, however, had an inordinately large number (> 80%) of cloudy frames. It was not possible to determine from the negatives whether this was from mud stirred up from the bottom or from an intense nepheloid layer; the nephelometer film on the first large-frame camera station failed to advance.

Hydrophone-Pinger - The 3.5 kHz pinger and hydrophone were used for near-bottom profiling over areas of hyperbolic echoes. The hydrophone, connected thru the STD wire to a Raytheon recorder, was mounted about 15 feet above the pinger after the first station. At the first station, the hydrophone was attached near the pinger-transducer and the direct pulse to the hydrophone overwhelmed the reflected pulse. Kiting of the near-bottom array was reduced considerably by weighting the end of the STD wire with a 150 lb trigger-corer weight. In this configuration, the array was towed near a constant level at drift rates up to about one knot. The Raytheon recorder in the dry lab performed very poorly. The gain, sensitivity, and contrast controls are extremely sensitive, and change erratically without any manual

adjustment. This recorder should be thoroughly overhauled.


WESTERN NORTH ATLANTIC
BOM LOCATION
CURRENT-METER MOORING
DETAILED SURVEYS
85°
80°
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70°
65°
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45°
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30°
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20°
15°
2000 m
4000 m
HUDSON CANYON
NEW ENGLAND SEAMOUNT CHAIN
SOHM
RISE
CONTINENTAL
BLAKE OUTER RIDGE
BLAKE PLATEAU
BLAKE BAHAMA BASIN
BAHAMA OUTER RIDGE
5200m
HATTERAS ABYSSAL PLAIN
CRESCENT PEAKS
BERMUDA
PLANTAGENAT BANK
5200m
5200m
CAT GAP
NARES ABYSSAL PLAIN
LESSER ANTILLES OUTER RIDGE
6000m
CARIBBEAN SEA
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