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CRUISE REPORT

Ship Name: Robt. D. Conrad

Cruise No: C22-08
Cruise Name: RACACA

Departure: 11 June 1979 (Date) from St. Georges, Bermuda (Port)

Arrival: 2 July 1979 (Date) at St. Georges, Bermuda (Port)

Days at Sea: 21
(Count day of departure but not day of arrival in port)

Days Foreign Port: 2.3
(number of days in arrival port before next leg)

Area of Operation: Continental shelf, slope and upper rise from Hudson Canyon south to just beyond Hatteras.

Program Description: Seven transects of stations were run approximately perpendicular to the slope consisting of generally 8-10 stations per transect. Work at stations consisted of bottom sediment sampling (box core, kasten core, shipek grab), near-bottom water sampling for radon and suspended particulate matter, water column sampling by CTD and calibration bottles, and marine biological sampling of both phyto- and zooplankton.

Program supported by what contract: DOE 2185 C

Participants: (All L-DGO unless otherwise specified)*

Name	Title
Pierre Biscaye	Chief Scientist
Jean-Claude Brun-Cottan *	Visiting Sci. (U. Pierre & Marie Curie, Paris)
Yuan Hui Li	Scientist(Radioisotopes)
Guy Mathieu	Radon Tech.
Steve Carson	" " (Grad Student)
Joy Bell	" "
Adele Hanley	Particulates Tech.
Bruce Deck	Nutrients, O_2 Tech. (Grad Student)
Kathy Kowtaluk	Radioisotope Tech.
Mike Holland	Camera/Neph. Tech
Jan Szelag	CTD Tech.
Frank Aikman	" " (Grad Student)
Dave Woodruffe	" "
Francis Mitard	" "
Jeanne Stepien	Scientist (zooplankton)
Elizabeth Cosper	Phytoplankton Tech (Grad Student)
Joe Cutillo	Electronics Tech.
Malaki Tumba	Core Bos'n

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

CRUISE REPORT

Robert D. Conrad
C22-08 (RACACA)

GENERAL

All scientific gear for the Geochemical, Physical and Biological Oceanographic programs was either on board (having been stowed in Halifax) or waiting in Bermuda. Stowage and setting up of gear in the laboratories took from the evening of 7 June when the ship arrived in St. Georges through 10 June when we were supposed to sail at 1800 hrs. Sailing was delayed until early morning 11 June because the Chief Engineer was drunk and incoherent, was paid off and put ashore. Shortly after departing St. Georges 11 June, we returned to put the Bos'n (John Santini) ashore as he had a badly abscessed tooth which was worsening rapidly.

We steamed two days toward the study area just south of Hudson Canyon, stopping twice to pressure test equipment that was going to be deployed on a mooring on the first transect. Station work began on 13 June in water about 3,000 m at the deep end of the first transect (see cruise track). After making stations all the way across the shelf on the first transect, we returned to a point on the transect at about 1,000 m water depth to deploy the mooring. From anchor up to the top, the mooring was 250 m long and, besides acoustic release and glass flotation consisted of a 100 m thermistor chain and four 12-in. diameter sediment traps. Deployment went smoothly and the AMF acoustic release talked back to the deck unit after deployment.

We proceeded southward to the second transect (see track chart). The second and subsequent transects (except #6 which also extended shoreward across the shelf) extended generally between 2800 and 80 m of water (upper rise to just shoreward of the shelf break).

Station work consisted of the following casts, most, but not necessarily all, of which were done at each station:

Water Column

CTD - Using the conducting cable, the Neil Brown CTD was lowered through the water column to within several meters of the bottom during which continuous measurements of temperature, conductivity, pressure and dissolved oxygen were read-out and recorded on deck. On the upward trace, small Niskin bottles, some fitted with reversing thermometers, were tripped on a rosette tripping device.

Radon/Particulate Matter - On almost every CTD cast, from eight to twelve 30 liter Niskin bottles were hung on the wire from several meters to a couple hundred meters above the CTD for the collection of a near-bottom profile

of water samples for analysis of dissolved radon-222, radium-226 and suspended particulate matters (SPM). SPM was sampled by in-line filtration of the same water analyzed for radon for gravimetric analysis and also sampled seapartely and analyzed on board on a 200 channel Coulter Counter for size frequency distribution by Dr. Jean-Claude Brun-Cottan of the University de Pierre et Marie Curie, Paris.

Radium-228 - Several casts were made using the hydro winch in which up to twelve 30 l Niskin bottles were spaced throughout the water column and radium extracted on deck from the water. Many surface water samples were also taken for radium extraction using the ship's sea-water circulating system.

In-Situ Pump- An in situ pump fitted with about 50 m of power cable and hose was used to sample in detail the uppermost water column for primary productivity by continuous fluorometric measurement of chlorophyll-a.

Nephelometer - Vertical profiles of light scattering by SPM were made using the LDGO-Thorndike nephelometer. In most cases this measurement was made in conjunction with a bottom-camera cast, but in several instances the nephelometer was hung on the CTD cable above the CTD and below the lowermost Niskin bottle.

Bottom Sampling

Photography - Simultaneously with nephelometer casts, between 15 and 25 photographs of the bottom were taken by bouncing the camera along the bottom during a nephelometer cast.

Box Coring - a newly-built two-shovel box core, modeled after one designed by Andy Soutar of Scripps was tried for the first time. It was used first without a frame and simply hung on the end of the wire with a pinger on the wire above it so that rate of approach to the bottom and penetration could be monitored on deck. Two cores were obtained in this mode from numerous attempts, most of which were not successful for varying reasons. When it became clear that, in deep water, the corer was often falling over, a frame was designed and ship's personnel built it from scrap steel. Unfortunately by the time the frame was completed, however, we were operating in the Gulf Stream off Cape Hatteras and, with attendant surface (and contrary subsurface?) drifts of several knots, the corer was not able to be used successfully.

Shipek Grab - samples of the surface sediment were obtained using the small and very reliable Shipek Grab sampler. This, however, is not a good sampler in water deeper than about 150 m because of sediment wash-out on recovery.

Kasten Core - In water too deep for use of the Shipek, a small (1 m long, approx. 10 cm square) Kasten core was used on the Hydro wire to obtain surface samples of bottom sediment.

Biological Sampling

Chlorophyll-a - Besides detailed vertical profiles of the upper 50-or-so meters of water using the in-situ pump, surface water chlorophyll was continuously monitored using the same on-deck fluorometer. Discrete water samples from the CTD rosette bottles were also analyzed for chlorophyll-a.

Productivity - productivity measurements using tagged C-14 in an on-deck incubator were made from samples taken from the bottled or pumping apparatus.

Zooplankton - Oblique and discrete-depth tows using nylon nets were made for zooplankton analysis. Besides sampling for analysis of zooplankton populations, large-volume tows were made in an attempt to obtain sufficient numbers of zooplankters to grow them in large tanks and extract their fecal material for radioisotope analysis. In general, it appeared to be difficult to net sufficient quantities of animals to obtain sufficient fecal material for the experiment.

All of the transects except one were made across the rise/slope at locations tending to avoid submarine canyons. Transect #3, however, was made up at the axis of the Baltimore Canyon. Several days of ship time were added to this leg under ONR support in order to do sampling in the Baltimore Canyon for Bill Ryan's ONR project. It was determined that, within the context of this summer's cruise schedule, the most efficient use of the small number of days available would be to add them to our leg and for the Geochemists, Physical and Biological Oceanographers to make measurements in one canyon which are different from those normally made by Ryan's group but which would provide complementary data on canyon processes. Besides the transect up the axis of the Baltimore Canyon onto the shelf, two short transverse transects were made across the upper reaches of the canyon. On behalf of Ryan's group about half a day was spent grappling along the southwest wall of Baltimore Canyon for an acoustic release and part of a mooring which they had deployed and been unable to recover on a previous cruise. Besides the grappling device constructed by Ryan's group, several days were spent by ship's personnel constructing additional grapples. Several tows up the side of the canyon across the supposed location of the mooring, however, failed to recover the device or any indication that we had encountered it.

After termination of the last cast on transect #7 south of Cape Hatteras, we steamed back to Bermuda and, because of heavy seas and bad weather, arrived at 1030 hrs 2 July, several hours later than our ETA.

SHIPS EQUIPMENT

For a project consisting entirely of station work, the most important equipment are the winches.

CTD winch - this operated satisfactorily within the implicit design limitations that require a second operator to effect proper level winding of the wire by hand. As on all three winches, the wire metering block is difficult to read at best, is calibrated in fathoms and has no rate-of-descent/ascent capability. A simple block yielding fathoms of wire out may have been adequate for work several decades ago, but not today when instrument packages costing tens of thousands of dollars ride at the end of the wire and who's rate of descent/ascent (in meters, not fathoms, per minute) matter.

Hydro Winch - Before leaving Bermuda a manufacturer's representative was able to repair the winch and put it in reasonable working order. The controls, however, are still very touchy and, along with the metering block need replacement.

Core Winch - The core winch operated well. The only recommendation I would make for it is that the high torque wire rope on it be replaced by a variety that does not kink up the minute tension is released from it. As on the other winches, the metering block should be replaced by a digital block that provides rate of ascent/descent as well as meters wire out and a tensiometer read out.

Gallows Frame - The present configuration of core winch on the main deck leading to a block on the deck directly under the gallows frame, renders null the advantage of having an open-rail, articulating-frame set up. To be of practical use, the plan to mount the winch on an extension of the O-1 with the wire leading directly to the frame-block must be implemented. There should probably be a second (or larger) hydraulic ram to move the gallows frame in and out since the present one is incapable of pulling the frame inboard when there is a corer and even a little bit of wire over the side.

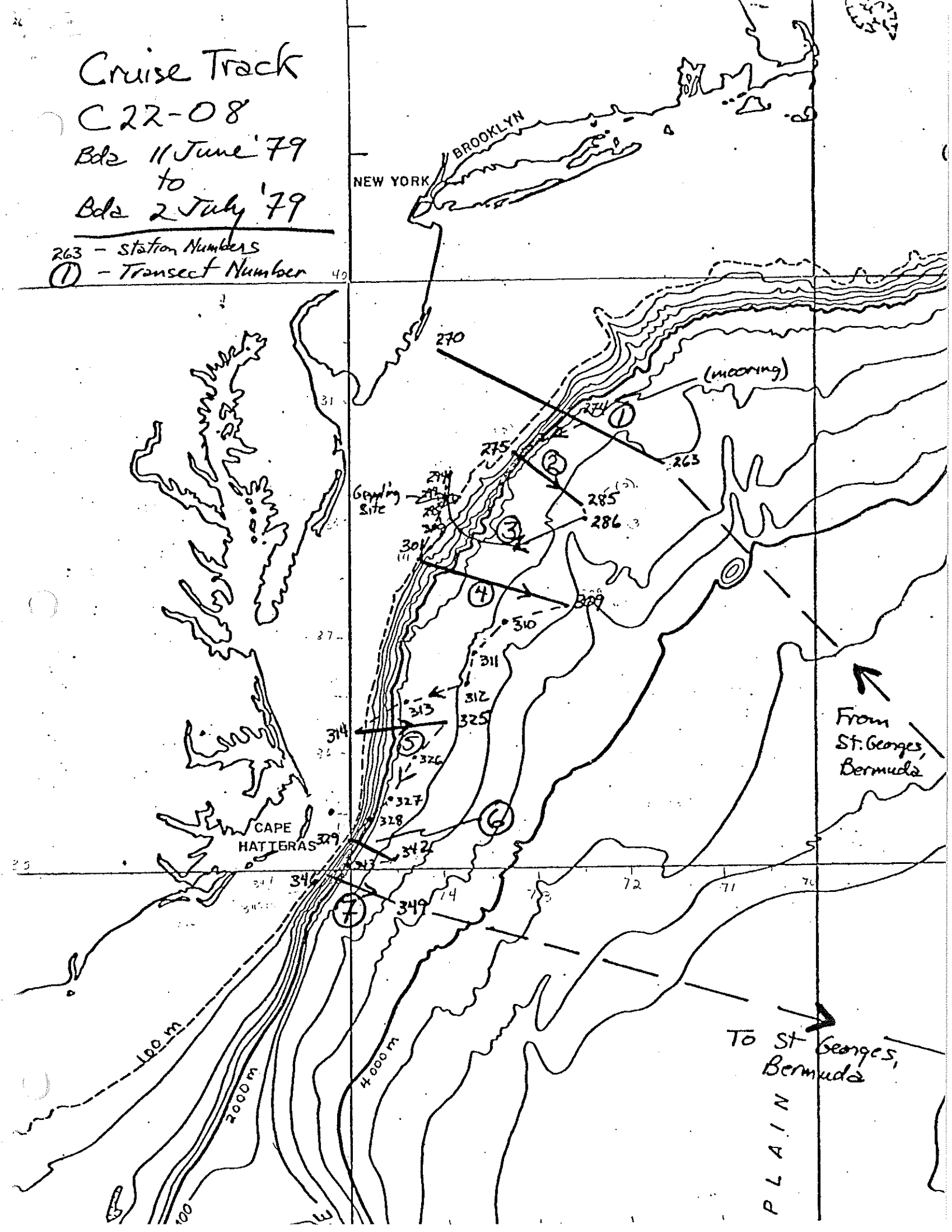
Crane - The service crane on the O-1 deck leaks oil very badly when there is even a moderate load on the boom and therefore cannot be used in any kind of seas without oil going all over the deck. Besides not being able to use the crane at times when it would be helpful, the oil problem is a significant personnel hazard.

CREW

With the exception of the ET, who was largely useless in our non-standard-geophysical operating mode, the entire scientific crew worked very hard and performed their various tasks well.

The entire complement of ships officers and crew are to be commended for the excellent condition of the ship and their helpful and professional assistance in implementing the scientific program.

Pierre E. Biscaye
Chief Scientist, C22-08


Cruise Track
C22-08
Bda 11 June '79
to
Bda 2 July '79
263 - Station Numbers
(1) - Transect Number
NEW YORK
BROOKLYN
CAPE HATTERAS
Gambling Site
(mooring)
270
263
274
275
285
286
301
309
310
311
312
313
314
325
326
327
328
329
342
346
349
From St. Georges, Bermuda
To St. Georges, Bermuda
100 m
2000 m
4000 m
PLAIN