

CRUISE REPORT

Cruise TR-034

A two-week cruise aboard R/V TRIDENT began at 1000 on 3 August, 1966 and returned at 0900 on 16 August. The purpose was primarily a geological investigation of the continental shelf south of New England. Barnes Collinson was Master and the scientific personnel consisted of the following:

L. Garrison	Chief Scientist
D. Krause	(Left ship Aug. 7)
R. Radulski	(Came aboard Aug. 7)
A. Buddington	Marine Technician
H. Russell	Biologist
A. Ashraf	Geologist
J. Curtin	Geologist
N. Williams	Geologist

OPERATIONS AND RESULTS

Sub-bottom profiling - More than 1000 nautical miles of seismic profiles were made with the Pneumatic Acoustic Repeater (PAR). The sound source for this instrument was kindly loaned to the project by Bolt Associates of Norwalk, Connecticut, the manufacturer. Figure 1 shows the seismic lines made as well as the locations of sampling stations.

As used on this cruise, this equipment gave more than 800 meters of penetration into the Tertiary sediments which underlie the continental shelf. Although greater penetration is possible, the study depth was limited in order to obtain better definition of the stratigraphic relationships among the upper layers of sediment. Preliminary examination of the field recordings indicate the off-lapping relationship of these beds and the presence of at least three strong unconformities which appear to outcrop or come very near the surface in the western portion of the shelf. A sample taken near one of these apparent outcrops consisted of more than 50% glauconite grains, a characteristic mineral of the Upper Cretaceous-Lower Tertiary coastal plain sediments of New Jersey and subsurface Long Island, thus confirming the outcropping.

GARRISON

TR-034

A buried drainage system some 8 or 9 miles wide with up to 50 m. relief was discovered more than 40 miles south of Gay Head, Martha's Vineyard. The presence of such rugged sub-bottom relief is unusual that far out on the shelf. It is possible that this system represents the main drainage out of the Nantucket Sound area during late Tertiary times.

Various operational difficulties were encountered in the use of the PAR, but all of these were successfully overcome. The most serious trouble was the deterioration of the high pressure air compressor which twice broke down completely. On both occasions Mr. Symonds, The Chief Engineer, was able to make the necessary repairs which allowed the PAR work to continue. Further losses of time resulted from troubles which ranged from normal wear on the equipment to a collision with a large leatherback turtle which snapped air and electrical connections to the sound source.

Coring - Although 13 cores were planned, only six were taken. This was partly due to the nature of the sediment in which coring was attempted and partly due to mechanical problems with the piston corer.

Coring hard-packed sand with a piston or gravity corer has never been very successful, but it was felt that it would be worth the effort to put extra weight on the piston corer and attempt to penetrate the cover of recent sediment in a few places. This was done, but with no success in the sandy areas. However, three of the cores taken were worth while. Two of these were 2 meter and a 3.2 meter penetrations of the anomalous area of silt on the outer shelf at stations 08 and 09. These are the longest cores we have of that material. The third was only a little more than 1 meter in length, but penetrated 35 cm of Recent foraminiferal sand and 70 cm of dense blue clay which is believed to be a lagoonal deposit. This is of interest because it now lies at 150 m on the outermost edge of the shelf at station 13.

Dredging - Dredge samples were taken with the Smith MacIntyre sampler, and about 10 samples were thus recovered. Sample locations were selected which

might yield shell material from a fauna which inhabited the spot during times of lowered sea level. Hence, except for a small sediment sample, the entire haul from each station was screened and the material coarser than 2 mm. saved for examination. Certain parts of the resulting shell collection will be dated by C¹⁴ analysis.

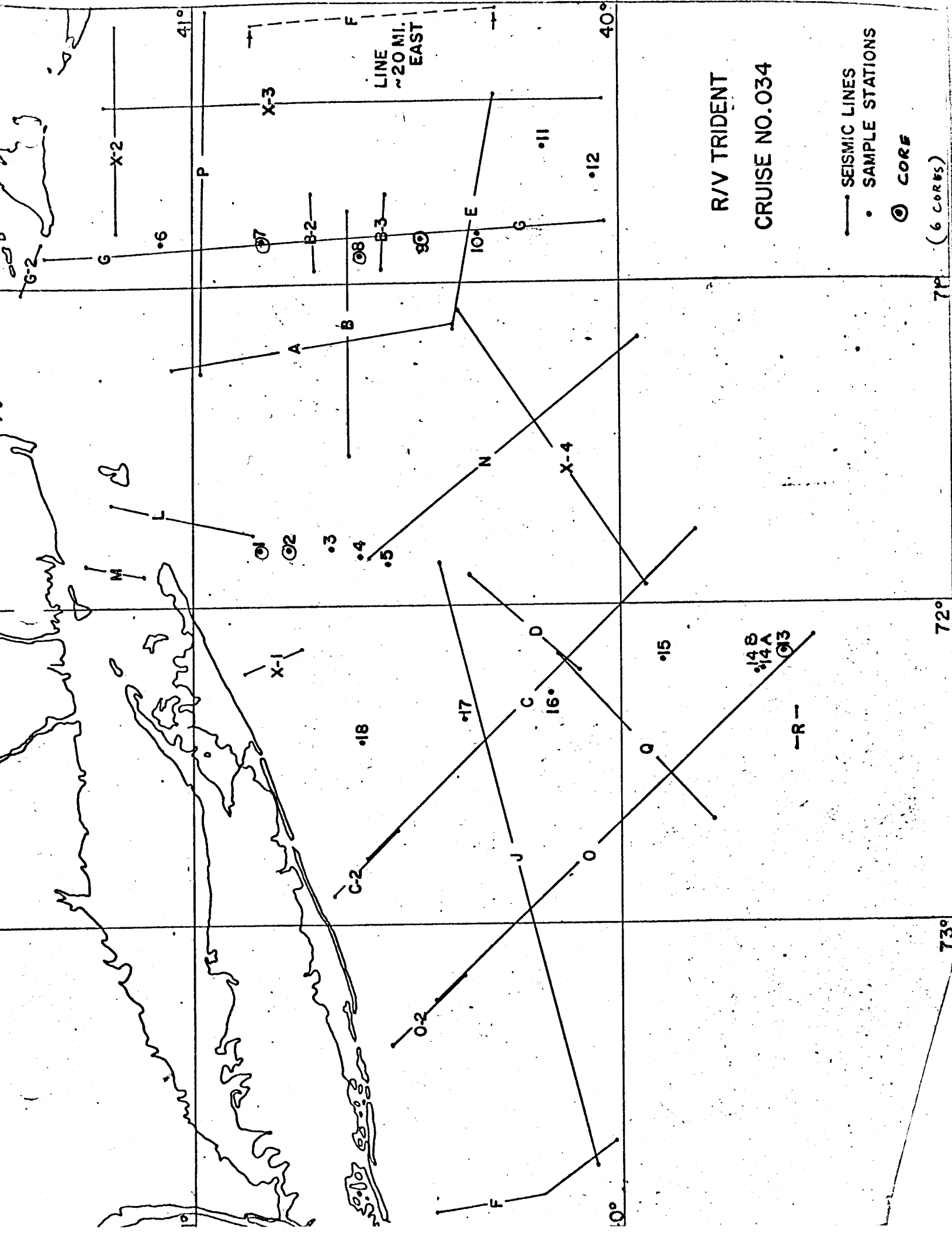
Underwater photography - About 14 stations were laid out for underwater photography with the EG & G deepsea camera, but this phase of the cruise was the only one which was wholly unsuccessful. The camera was operative and photographed the suspended compass on each frame, but no bottom pictures were obtained. Consequently it is inferred that the pinger record was somehow in error and the camera was never within photographing distance of the bottom.

Biological Stations - As part of a continuing study of zooplankton in Narragansett Bay and on the adjacent continental shelf, plankton tows were made at 10 stations (06, 07, 08, 10, 12, 13, 15, 16, 17 and 18) utilizing a Clarke-Bumpus sampler with a 6 mesh net in oblique hauls from near-bottom as dictated by results of a concurrent bathythermograph lowering. That is to say, an attempt was made to collect mid-depth water samples from above and below the thermocline as well as in the thermocline itself.

Several features of the hydrographic data may be of interest. Seaward along both transects the thermocline gradually deepened from about 15 meters down to about 30 meters and then tended to disperse at the slope station. On both transects a lens of cold bottom water was found to extend across most of the continental shelf with coldest temperatures (5° C) encountered along the westernmost leg. It appeared that the inner core of lowest temperatures occurred along the 60 meter contour. Salinities exhibited at least two discontinuities over the outer half of the shelf suggesting turbulent mixing in this area.

Preliminary results from plankton data suggest a very rapid change in characteristics of the population while progressing normal to the coastline during a late summer regime. Thus, while station 06 exhibited a population characteristic of Rhode Island Sound waters, species common to the Gulf Stream and Sargasso Sea, such as Eucalanus, Rhincalanus and Calcocalanus as well as several species of siphonophores and of chaetognaths such as Pterosagitta draco, Sagitta enflata and S. bipunctata, began to make their appearance at station 07. Concurrently, many of the typically inner-coastal forms very quickly disappeared.

As a final point of interest, a plot of surface temperature from bucket thermometer data taken 5-11 August, 1966 as compared with a similar plot from airborne infrared thermometer data collected by personnel of the Sandy Hook Marine Laboratory on 19 August clearly shows that in the interim period the 22° C isotherm remained nearly stationary just south of station 18 while sweeping shoreward along the easternmost transect from a position seaward of station 12 to a new position intermediate between stations 07 and 08. Plankton tows taken 5-11 August show a large swarm of Doliolum nationalis at stations 07 and 08 along the eastern transect with few doliolids at the other 3 stations. Gross examination of samples from the western transect shows large numbers of salps and doliolids at every station. It is postulated that a bolus of warm water which apparently was present south of Long Island for a considerable length of time (21° C water was detected from infrared data on 22 July, 1966) shifted north-easterly during the latter half of August. Thus, endemic productivity of warm water plankton as observed on 5-11 August was enabled to attain a higher level south of Long Island than in the area south of Martha's Vineyard.



R/V TRIDENT
 CRUISE NO. 034

— SEISMIC LINES
 • SAMPLE STATIONS
 ⊙ CORE
 (6 CORES)

LINE
 ~20 MI.
 EAST

14B
 14A
 13

-R-

41°

40°

70°

72°

73°

X-2

X-3

B-2

B-3

10° E

11

12

19

20

21

22

23

24

25

01

02

03

04

05

X-1

18

17

16

15

02

J

C

D

Q

O

N

X-4

L

M

F

10°

P

6

7

8

9

10

11

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