

GRADUATE SCHOOL OF OCEANOGRAPHY  
Narragansett Marine Laboratory  
University of Rhode Island  
Kingston, Rhode Island

Report of the Sunrise I Expedition (Cruise 9)  
with R/V TRIDENT

September 11, 1963

R/V TRIDENT put to sea on 16 August 1963 for a geological investigation of a section of the southern New England continental shelf from Hudson Canyon (30°30'N, 72°30'W) east to Veatch Canyon (40°N, 69°30'W). She returned on 30 August 1963.

LIST OF SCIENTIFIC PERSONNEL:

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Malcolm McConnell (Yale Univ.)  
Dr. Robert I. Krasner (Prov. College)  
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LIST OF SHIP PERSONNEL:

James B. Milliken, Master  
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R. S. Bardwell  
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The objective of this cruise was to study present and past geological conditions of the middle and outer parts of the continental shelf off southern New England as determined from sounding profiles,

sub-bottom reflection profiles, surface sediment grab samples, sediment cores, bottom photographs, and hydrography. As a service several biological tows were made where conditions permitted.

The first phase of the cruise was devoted to sounding and sub-bottom reflection studies along the outer edge of the shelf. The sounding profiles amplified previous evidence of apparent coastal type topographic features on at least four crossings of the outer shelf at depths of 110-160 m over a distance of some 130 miles (Hudson Canyon to Veatch Canyon). These features which resemble a sand bar and trough configuration, were quite striking on several of these traverses. Ten continuous seismic profiles were also made during this time at the shelf edge. On all these runs at least one sub-bottom reflector was recorded. Near Hudson Canyon the best sub-bottom record was obtained. Here a relatively deep reflector which was picked up on the upper continental slope, intersected the bottom surface near the 160 m curve. This was followed by a distinct wedge-like reflector which appeared at 150 m and pinched out at 127 m.

When sub-bottom profiling operations were underway, eight surface zooplankton samples were obtained by use of an unmodified Gulf III sampler for George Grant, a graduate student in biological oceanography. These samples were taken as part of a preliminary study of Middle Atlantic shelf waters. Initial examination revealed an abundance of pelagic tunicates and a change (since late June) in the chaetognath fauna, with Sagitta serratodentata replacing S. elegans as the dominant species in waters south of New England.

During the second phase of the work grab samples were collected along twelve traverses across the middle and outer shelf and this sampling has defined the general sediment distribution pattern on this section of the shelf. Silt-clay covers a large part of the study area, pinching out toward Nantucket Shoals on the east, Martha's Vineyard on the north, the vicinity of Hudson Canyon on the west, and the shelf edge on the south. Sand or sandy type sediments occur along the outer limit of the shelf. The Smith-McIntyre and Van Veen Samples were used and both functioned satisfactorily.

The final phase of the work was devoted to coring and bottom photography. Although the results of coring must await laboratory study, one core, some 150 cm in length, apparently penetrated the silt-clay cover at one location. This finding could mark the interface between materials of essentially glacial origin from those of post glacial processes. On the whole, however, the coring equipment's performance did not meet expectations even though sea conditions were ideal generally. Gravity, piston, and vibro corers were used. The gravity corer failed to retrieve cores of sufficient length to be considered adequate even though soft materials were encountered. The piston corer produced the longest core but was not consistent even though penetration on many occasions was maximum. The vibro corer (equipment developed by J. Sanders of Yale) was not tested thoroughly because of unfavorable weather and insufficient time but here, too, problems are evident. As a top-heavy piece of gear it was difficult to keep the ship's "A" frame directly over the corer under normal sea conditions and thus keep the ship from pulling the corer over on its side. On one attempt a mechanical failure prevented the retention of a core even though penetration was satisfactory. The last effort produced a core of almost one meter so that coring in 400-600 feet of water is feasible with this type of gear. However, some redesigning is necessary and more testing under marine conditions is needed before this vibro corer can be relied upon at sea.

Bottom photographs were attempted at eight stations, seven of which were along the shelf edge. As far as is known the camera and pinger assembly performed satisfactorily.

Hydrocasts of 3-5 bottles were made at seven stations within the study area.





