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Study of Continental Shelf and Slope
on the Coasts of Long Island, N.Y., and New Jersey*

GERALD M. FRIEDMAN

Rensselaer Polytechnic Institute, Troy, N.Y.,
and

Visiting Scientist, Summer 1965, Hudson Laboratories of
Columbia University, Dobbs Ferry, N.Y.

In conjunction with the research program at HUDSON LABORATORIES OF COLUMBIA UNIVERSITY into the relationships between acoustic properties and ocean-bottom geology, the writer began an investigation in 1965 into the grain-size, environment of deposition, and chemical properties of associated waters of bottom sediments on two profiles across the continental shelf and upper slope south of Long Island and southeast from New Jersey.

Two weeks were spent at sea in July, 1965, aboard the USS Allegheny (a modified sea-going rescue tug of the ATA class), equipped with Decca navigation system and Westrex Mark Xa Precision Depth Recorder. Decca positions were plotted on special Decca Charts with a scale of 2 in. = 1 mile made at Hudson Laboratories for this project. In addition to the continuous topographic traverses, 83 bottom samples were collected from 83 stations made at 2-mile intervals, using a bucket dredge; and 30 cores were collected from 22 stations using either compressed-air vibro-corer or gravity-drop corer: 10 vibro-cores ranging in length from 5.1 to 31.8 cm came from 9 stations on the Long Island profile, and one from the New Jersey profile; and 19 gravity-drop cores from 11 stations on the Long Island profile, and from one station on the New Jersey profile. Cores were collected in plastic liners, which also brought up a sample of the bottom water. Cores were handled and stored in the vertical position, or as nearly vertical as was possible.

At each coring station the Eh and pH of samples of ocean-surface water, ocean-bottom water, and sediment interstitial water were measured aboard ship. Electrodes were inserted through holes drilled in the sealed plastic liner tubes in order to measure the properties of the bottom water and interstitial water. Smaller water samples were bottled for later measurements at Hudson Laboratories of salinity (by induction salinometer) and sodium (electrode) and magnesium ions (by optical

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spectrograph). The results of this work are summarized in McKINNEY and FRIEDMAN (1966), to be read by title at the Northeastern Section, Geological Society of America, Annual Meeting in February, 1966.

Grain-size and mineralogical analyses and studies of the microfauna from the bottom samples are being carried out in the Department of Geology, RENSSELAER POLYTECHNIC INSTITUTE, Troy, N.Y., by TOM McKINNEY and JOEL GERVIRTZ respectively, working under the supervision of the writer.

The purpose of this investigation is to determine if the physical properties of the sediments are related systematically to their initial mineralogy and/or texture, to any subsequent diagenetic changes of these or other parameters, or to environment of deposition. The sediments of this area of the continental shelf were deposited in part in subaerial environments during Pleistocene (or older) low stands of sea level, in part during the various Pleistocene transgressions, and in part at present sea level. One of the goals of the project is to determine the geological history of the area.

The future program will include more extensive coring and shallow-penetration sub-bottom profiling to establish the three-dimensional distribution of the sediment types; additional shipboard and laboratory chemical measurements of the properties of the various waters; shipboard gamma-ray scans of the cores to determine their bulk density; side-looking sonar scans of the bottom to map topography in three-dimensions; and underwater television scans to observe the bottom.

The U.S. GEOLOGICAL SURVEY group at WOODS HOLE OCEANOGRAPHIC INSTITUTION under the direction of K.O. EMERY, the NARRAGANSETT MARINE LABORATORY of the UNIVERSITY OF RHODE ISLAND (R.L. McMASTER), U.S. ARMY ENGINEERS COASTAL RESEARCH GROUP (and their sub-contractor, ALPINE GEOPHYSICAL ASSOCIATES), and the BELL TELEPHONE COMPANY (ROBERT S. ALLEN, working on his doctorate at RUTGERS UNIVERSITY) are known to be carrying out geological programs on the shelf south of Long Island and/or east of New Jersey, using some of the same methods that have been employed in this project. It is believed, however, that the combination of measurements of chemical and physical properties of the sediments and three-dimensional topographic approach provided by side-looking sonar of this Hudson Laboratories project are not being included by other research groups.

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