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# Deep Earth Sampling

In 1961, the United States achieved a notable first by drilling in the deep sea bottom off Guadalupe Island in the Eastern Pacific. This work was preliminary to the Mohole Project, but in principle it demonstrated the feasibility of exploring the deep sea bottom generally. However, the Mohole Project became a center of controversy. For a time it appeared that others, notably the Sheik of Kuwait, might lead in exploiting the new opportunity. However, we were outfumbled, and in 1968 resumed leadership at a great frontier.

Several factors contributed to recovery from the Mohole fiasco. Leading oceanographers suppressed long-standing rivalries to form a Joint Oceanographic Institution's Deep Earth Sampling (JOIDES)* program and outlined objectives for a drilling project. Scripps was selected as the prime contractor, and it prepared a well-conceived proposal calling for drilling at 55 sites, in the Gulf of Mexico, the Atlantic Ocean, and the Pacific Ocean, during an 18-month period. Despite the damage the National Science Foundation had suffered from Mohole, the foundation courageously allocated $12.6 million to the new venture. Scripps then selected the Global Marine Company as drilling contractor. In 8 months this company built a 10,000-ton ship having many advanced design features; the ship can drill and obtain cores from 2,500 feet (750 meters) into sediment beneath 20,000 feet of water. A major success came last August, near the start of the program, in drilling in the Gulf of Mexico. Earlier oceanographic expeditions had discovered under deep water some 170 dome-like structures reminiscent of salt domes of the southern United States and Mexico. Cores from one of these knolls, obtained at a site in 11,746 feet of water, contained materials typically found at the top of many salt domes, including cap rock of $CaSO_4$, free sulfur, and petroleum. Other results from drilling, at seven sites, included discovery of Jurassic sediments (150 million years old), the oldest sedimentary rock yet found in the deep ocean; the finding that much of the deep sea sediments consists of turbidites (produced by a mechanism analogous to mud flows on land); determination that Horizon A, in the areas drilled, consists of a flinty chert; and the observation that, in contrast to sediments now at the ocean interface, many of the cores contained reduced iron.

In the coming months, the drilling program will illuminate a number of major problems. For example, the Atlantic Ocean is thought by some geologists to have been essentially unchanged for much of the earth's history. Many others consider this ocean to be a relatively young feature formed in the wake of migrating continents. Cores from the sediments could support one of these views or an entirely new hypothesis.

The Ocean Sediment Coring Program leans heavily on the accumulated knowledge of previous decades. That knowledge is extensive, for the Lamont Geological Laboratory alone has logged nearly a million miles of deep sea expeditions. Measurements from shipboard have provided much information, while posing puzzles that could be solved only by drilling. Each of the sites chosen was selected because it could provide urgently desired information.

In view of the successes already achieved, with leading oceanographers cooperating well together and with Scripps implementing a well-organized and well-equipped program, prospects for an outstandingly successful project appear excellent.—PHILIP H. ABELSON

* The original JOIDES group consisted of the Institute of Marine Sciences of the University of Miami, Lamont Geological Observatory of Columbia University, Woods Hole Oceanographic Institution, and Scripps Institution of Oceanography of the University of California. In the summer of 1968 the University of Washington was added.