be grouped in three general classifications. The first involved the design and construction of a stable and safe base for deep-ocean drilling operations to be carried out on a year-round basis. The second involved increasing drilling capability sufficiently to reach the 30,000–35,000-foot mantle depth. (This depth is 20–40 per cent greater than the deepest well ever drilled.) The third concerned the development of measurement and sampling techniques to insure maximum scientific productivity from the effort.

Phase II of Project Mohole is now well under way, and many problems have been solved. The basic design of a stabilized drilling platform with a dynamic positioning system is virtually complete, and some of the prototype models of new drilling tools developed by the project recently were tested in a well drilled in basaltic rock near Uvalde, Texas. Also, new logging and coring equipment has been tested successfully in the same hole.

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ELWOOD FIELD

The Elwood field is located along the coast line, 10 miles west of Santa Barbara, California. Less than 500,000 barrels of heavy oil has been recovered from the Rincon Shale, almost 100 million barrels of 28°–36° A.P.I. oil from the Vaqueros Sandstone (a shallow-water transgressive beach sandstone), and more than 3 million barrels of 33°–38° A.P.I. oil from four zones of the Sespe Formation (non-marine sandstone with siltstone interbeds). Productive area is slightly more than 690 acres. Early offshore wells were drilled from piers and later wells were directionally drilled from the adjacent sea cliffs.

Complex east-west-trending reverse and lateral-type faults parallel the Elwood anticlinal structure on the north and south. One minor cross-fault in the western productive area is not an effective barrier to oil movement. Naples offshore field, located 2 miles west on the Elwood trend, and La Goleta gas field, located 4 miles east on the Elwood trend, are characterized by geologic conditions similar to those in the Elwood field.

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BORON AS PALEOSALINITY INDICATOR NOT AFFECTED BY CARBON IN CLAY FRACTIONS

A recently reported inverse correlation between boron and organic carbon in rocks suggests that development of illite-organic complexes during deposition may inhibit boron absorption. The validity of boron as a paleosalinity indicator consequently has been questioned. Analogous studies of illitic clay fractions from the late Visean Lower Yoredale Formation of England revealed no significant correlation between organic carbon and boron. Thus, the validity of boron as a salinity indicator is not affected by organic matter associated with clay fractions. If the reported correlation between boron and organic carbon in rocks is valid, environments which favor organic accumulation could suppress illite authigenesis or inhibit boron absorption. The already-known association between boron and salinity suggests that the first interpretation is more probable.

Equivalent boron, previously regarded as the best index of paleosalinity, depends on the boron-K_2O ratio and K_2O concentration in pure illite. However, in previous investigations the K_2O concentration in clay fractions was assumed to be the concentration in pure illite. Such a procedure leads to increasing error with increasing organic contamination of clay fractions. Therefore, revised equivalent boron values were calculated for the Lower Yoredale Formation by estimating the organic fraction from carbon analyses and recalculating K_2O concentrations in terms of pure illite. These revised values correlate more closely with other geological information and improve discrimination between salinity environments.

Organic carbon associated with illite also may be a useful environmental indicator because it correlates closely with facies and distance from shore. It follows that studies of boron, carbon, and potassium in illitic clay fractions could aid environmental discrimination in exploration for offshore stratigraphic traps.

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ADVANCED DIVING SYSTEMS

(No abstract submitted.)

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SEDIMENTARY REGIME OF SAN MIGUEL GAP

San Miguel Gap is an offshore basin that intersects the continental margin at the extreme northwestern limit of the southern California borderland. The California current sweeps over the western portion of the gap, open to the deep sea through the Patton escarpment, whereas the eastern part lies close to the Channel Islands. Thus the bathymetry presents an enlargement of the continental slope, under both oceanic and terrestrial influences. A sedimentologic study of the basin and its surroundings was conducted.

Virtually all sediments of the gap region are sands. Foraminiferal tests, glauconite grains, and fine quartz-feldspar sand dominate the sand fraction. Locally, volcanic shards, terrestrial pebbles, tar, palagonite rubble, sponge spicules, and diatom tests are conspicuous. Cores show few obvious turbidity-current sands, but there is evidence of traction sediment movement. The clay fraction is significant only in the deepest part of the basin. Sub-bottom profiles suggest two generations of relatively undisturbed sediments overlying a "basement" of Miocene(?) volcanic and sedimentary rocks; the general characteristics of both sedimentary sequences are similar.

Biologic productivity, authigenesis of glauconite, and eolian introduction of terrestrial material, in that order, are the dominant sedimentary processes in the gap. These factors all can be directly related to climatic influences: productivity, to ocean currents and upwelling; glauconite, possibly to extreme weathering and low sedimentation rates; and the eolian sediments, to the occasional offshore windstorms. Because the ultimate control of sedimentation on the continental slope is climatologic, it is clear that valid paleoclimatic reconstruction in such areas may be based on the ancient sediments as well as on faunal data.

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