GRAVIMETRIC EXPLORATION FOR REEFS AND FRACTURE ZONES IN THE MICHIGAN BASIN

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The variable mantle of glacial drift which covers the Michigan Basin prohibits the use of seismograph or magnetometer except in small local areas. The gravity meter, although influenced by the erratic drift, reveals maximum values over the Niagaran Reefs and has accounted for most of the reefs found to date. Gravity and structure maps of the Peters Reef in St. Clair County are presented to show the typical circular gravity maximum nearly coincident with the Salina A-1 structure.

A gravity profile across the Scipio Field suggests that the productive Trenton fracture zone is coincident with a basement fault. Similar fault patterns are associated with the Trenton production at Northville and Deerfield. Gravity surveys can map such faults and thereby indicate additional areas where similar Trenton fractures could be expected.

BAHAMIAN FACIES

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The Bahama Banks have long been considered a classical area for the study of limestone genesis. The Great Bahama Bank, in particular has been the subject of a number of studies of carbonate deposition. Few of these studies, however, have considered the abundance and regional distribution of the various kinds of calcium carbonate grains which mantle the bank. The present study was initiated to delineate quantitatively calcium carbonate facies on the northwestern part of the Great Bahama Bank and to determine what biological and physical factors contribute to the origin and distribution of the various grain types.

Representative subsamples of 218 sediment samples were impregnated in a polyester resin and then thin-sectioned. A point count analysis of each thin section was made to determine the constituent composition of the fraction larger than ⅛ mm. The weight percentage of the fraction smaller than ⅛ mm was used as a measure of grain size. Statistical analysis of the accumulated data with a high speed digital computer resulted in the delineation of the following five facies: (1) coralgal facies — characterized by a relative abundance of corals and coralline algae; (2) oolitic facies — characterized by an abundance of oolitically coated grains; (3) grapestone facies — typified by an abundance of grapestone and cryptocrystalline grains; (4) pellet mud facies — characterized by an abundance of faecal pellets and particles smaller than ⅛ mm; and (5) skeletal mud facies — typified by a relative abundance of skeletal debris and particles smaller than ⅛ mm.

Differences between the last four facies are considered to be primarily the product of differential current strength, with current action decreasing progressively in intensity from the oolitic to the skeletal mud facies. In contrast, the coralgal facies appears to owe its distinctiveness to the relatively great depth and large areas of rock bottom which characterize this depositional environment.

Ideally, one might expect the Bahamian facies pattern to consist of a series of five concentric bands parallel to the bank's margin. This expected ideal pattern, however, is strongly modified by local environmental conditions created by the submerged karst surface of the Pleistocene basement rock.