gravity meter is a high-precision, large-volume, bulk-density tool. It is unique in that bulk densities can be measured directly, *i.e.*, with no calibration and in place. The large rock volume measured ensures that the measurements are relatively unaffected by mud cake, infiltrated zones, washouts, or casing. The use of large-volume density measurements has added a new dimension (depth) to some formation evaluation problems.

Bulk densities measured with the borehole gravity log in wells in the Gulf Coast area show considerable deviation from densities measured with the gamma-gamma log. Moreover, they do not show a density change in the over-pressured shale zone. These results suggest that although the physical parameters measured by small volume tools may be quite accurate, they may not be representative of true formation characteristics.

With only one exception, densities from a borehole gravity log in a carbonate-shale sequence agree closely with densities measured by the gamma-gamma log. This difference in densities of 0.18 g/cc is attributed to either porosity lateral to the borehole, a lateral change in lithology, or a fault.

The high precision and large rock volume measurement capabilities of the borehole gravity meter make it especially useful in measuring low porosities as, for example, that of a fractured quartzite in Libya, and in measuring fluid density behind casing, for example, gas in Texas.

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APPRAISAL OF COMPUTER MAPPING TECHNIQUES AS APPLIED TO MIOCENE FORMATIONS OF BAYOU CARLIN AND LAKE SAND FIELDS, SOUTHWESTERN LOUISIANA

A computer-aided subsurface mapping program of the middle Miocene section (-9,500 to -15,000 ft) was attempted for a 160-sq mi tract in the structurally "low" part of the famous "Five Islands" trend of Louisiana.

Seven resistivity features were picked from most of 136 electric logs and were correlated and used to make one isopach map, and conventional (manually contoured) structural maps of 4 zones. The same data were then employed to generate computer maps by 2 different approaches: weighted-moving-average (contour maps) and least-square-fits of polynomial surfaces up to the fifth order (trend maps). Numerous computer maps were generated on the high-speed printer and plotter, including structural maps, isopach maps, trend maps, and various residual maps. However, all of them do not appear to convey geologic sense, and some, particularly high-order trend maps, may be of little use.

The degree of similarity the computer maps bear with the manual maps varies widely with the map type and technique used. The contour-type maps may best serve as "quick-look" maps, bringing out the major structural elements and guiding the choice of horizons for hand contouring. Others, such as the isopach maps, yield the growth-fault effect and can guide later interpretations. The polynomial surface maps depict regional trends which can be used to make predictions away from known areas, to suggest "highs" and "lows" of significance, and to display meaningful thickness variations. The residual maps show promise of distinguishing structural traps, the locale of growth faulting, and typical tectonic and sedimentational patterns.

Computer maps do not supplant manually contoured maps. Some of them, if used early in a mapping program, could aid in picking horizons for hand contouring and could be used as a guide for contouring. Others should be used to suggest corrections in the structure, and still others as guides to the final interpretation.

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STRATIGRAPHIC UTILITY OF SOME MIOCENE AND YOUNGER ARENACEOUS FORAMINIFERA

Miocene and younger sediments of the Gulf Coast locally contain numerous arenaceous Foraminifera. Certain genera and species are particularly useful in subsurface stratigraphy. Arenaceous forms present especially difficult problems in identification. These problems are compounded by the fragmentary condition of specimens present in the washed residues usually available to industrial paleontologists. Special care in washing is required if arenaceous forms are to reach the paleontologist in identifiable condition.

Bigenerina, Clavulina, and *Martinotiella* commonly can be identified when only uniserial fragments are available. These three genera are valuable guides in the recognition of depositional energy regimes. *Bigenerina* is typically found in high-energy lithotopes. Specimens are commonly present in beach and offshore-bar deposits. *Clavulina* requires a lower energy regime. It can be found in protected bays, or seaward from the surf zone on the open marine shelf. *Martinotiella* is restricted to low-energy environments. It is a minor component of middle Miocene and younger outer neritic faunas. Whereas all three genera are locally useful as stratigraphic markers, they have a broader utility in suggesting probable sand conditions. Under most conditions, the higher the energy level of the depositional environment, the more abundant and coarser the sand.

Several species of arenaceous Foraminifera used by oil industry paleontologists for subsurface correlations on the Gulf Coast are found in the same relative stratigraphic positions at least as far as the Caribbean basin. *Textularia crassisepta,* which marks the Pliocene-Pleistocene contact (*Valvulina* "H" datum) in offshore Louisiana, seems to have a similar level in Jamaica. *Textularia subplana* is typical of middle Pliocene (*Buliminella* "1") deposits in Louisiana. Specimens from samples of the same(?) age were found in northern Colombia and in Jamaica. *Bigenerina humblei,* a middle Miocene index species in Texas and Louisiana, may be a junior synonym for *Textularia falconensis* Cushman and Renz, a Venezuelan stratigraphic marker. Renz believed the latter to be useful throughout the Caribbean region.

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SIGNIFICANCE OF CHANGES IN SHORELINE FEATURES ALONG TEXAS GULF COAST

The open Texas coast is characterized by 3 distinct types of shoreline: (1) barrier islands consisting of sand beaches, fore-island dunes, and a vegetated or barren back-island area; (2) peninsulas where beaches are dominated by shell (shell ramps with or without incipient dunes form the crest of the peninsula), and storm channels and washover deposits dominate the back-island area; and (3) strand plain a few to several hundred feet across, where shell material and rock fragments are dominant over terrigenous sand. Physiographic features of strand plains are a steep forebeach and a wide shell ramp that terminates as a steep avalanche face. Only the barrier islands and peninsulas are associated with bays and lagoons.

When viewed separately, these shoreline features appear to have a random distribution. However, when their occurrence is considered in the context of Pleistocene and Holocene depositional history of the Texas coastal zone, there is order in their distribution. Barrier islands develop in the same areas as do sand-rich Pleistocene deltas with broad strand plains. Peninsulas are positioned along Pleistocene interdeltaic areas. Strand plains are situated along the distal parts of mud-rich Pleistocene and Holocene deltas.

Distribution of these 3 shoreline types along the Texas coast cannot be explained adequately by a sand source from modern rivers being transported by longshore drift. Occurrence of the 3 shoreline types can be explained best by local Pleistocene and early Holocene sediment sources. Broad, sand-rich barrier islands are presently moving toward an equilibrium state where sediment input is about equaled by intensity of physical pro-