"zero energy" coast of northwest Florida and the other on a high-energy coast near Oxnard-Ventura, California.

A principal difference in the two coastal areas is wave energy. Of interest in comparing the two sequences is the determination of where the break occurs between the influence of physical and biogenic processes as reflected by the dominant sedimentary structures. In California this break occurs between 9 and 15 m, and in Florida the break is essentially nonexistent.

Our previous study of the Georgia coast considered a low-energy shoreline but one with considerably more wave energy than that of the "zero energy" sequence of Florida. The Gulf of Gaeta is a medium to high-energy shoreline, as is the barrier-island coast on the North Sea. Wave heights and average depths of the physical/biogenic break in the three latter areas are intermediate between those of northwest Florida and the Oxnard-Ventura area of California.

These preliminary results offer the beginning of a framework in which modern coastal process can be compared to preservable facies characteristics of an ancient beach-to-offshore sequence.

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Geology and Potential Uses of Geopressure Resources of Gulf Coast

The United States Energy Research and Development Administration has supported efforts to evaluate the potential contribution to the national energy supply of geopressured geothermal resources in the Gulf Coast. Efforts include a program of resource assessment and programs to examine utilization of the resource for the production of electricity and as a source of industrial-process heat.

Work on resource assessment has suggested the presence of perhaps as much as 6,000 MW-centuries of recoverable electric energy and of 220 Tcf of methane. This program has emphasized finding significantly large sand bodies within the geopressured stratigraphic section in addition to defining the distribution of abnormal fluid pressures and formation temperatures. Regional sand facies analyses conducted thus far indicate five locations in the Frio formation of Central and South Texas where adequately large geopressured geothermal resources may be present.

Engineering studies of energy-conversion systems based on total-flow, flashed-steam, and binary-cycle concepts show that development of electric power from the Gulf Coast geopressure resource is technically feasible. However, such recovery is only marginally economic in view of the relatively low temperatures involved (less than 300°F or 149°C), and especially if dissolved methane is not present at saturation levels. Under favorable circumstances, investment in exploitation of the complete geothermal resource can produce rates of return of 15 to 30 percent. Rates of return as large as 10 percent appear unlikely under present and near-term future circumstances if only electric energy is recovered from the resource.

Study of use of the resource as process heat in pulp and paper mills and new sugar refineries has shown that these uses also are technically sound. The thermal content of a barrel of geothermal brine can cost as little as 9 mills when credited for recoverable hydraulic energy and methane. The value of heat approaches 50 mills per bbl for certain applications. Again, under favorable circumstances, the use of geopressure resources for these nonelectric applications is economically attractive.

All programs have pointed out clearly the need for better specific understanding of the resource, especially its dissolved methane content and its ability to produce for tens of years.

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Reef Morphology and Sediment Transport, Lucaya, Grand Bahama Island

Between August 1974 and April 1975 three saturation dives were made in the Perry Hydrolab off Lucaya, Grand Bahama Island. During the 16 days spent on the bottom, studies of reef zonation and sediment transport to a depth of 80 m were conducted. The physiographic zones of the area, although highly variable, are similar to those found by Goreau and Land in the Jamaican reefs. Eight zones were identified in the Lucaya reef area: (1) shoreface sands, (2) shallow-rock terrace, (3) inner-rock ridge, (4) shallow reef (reef crest), (5) inner sand flat, (6) fore reef (terrace and escarpment), (7) fore-reef slope, (8) deep fore reef and wall.

Textural analysis and tracer studies indicate that the sand which is produced primarily in the fore reef is moving seaward across the fore-reef slope and over the top of the wall. Transport over the wall is through chutes that cut through the deep fore reef onto the outer fore-reef slope. Sediment traps placed in these chutes at a depth of 60 m indicate that approximately 200 g of sediment per day is transported over a 1-meter section of the wall. Lower rates were measured during calm periods when gravity creep was the sole method of observed transport. Higher rates were associated with more severe wave conditions that created a strong return flow from water trapped along the beach.

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Timing of Carbonate and Clay Diagenesis in Cambrian-Ordovician Cow Head Breccia, Newfoundland

The Cow Head Breccia accumulated from the Middle Cambrian through Middle Ordovician on the western slope of the proto-Atlantic. The 310-m sequence consists of carbonate megabreccia, green shale, lime mudstone, calcarenite, and radiolarian chert. As the "Taconic" klippe is oriented, the paleoslope dipped northeast, interrupted by a narrow carbonate platform that trended northwest-southeast. Gravity-mass flows from the platform deposited the breccia.

The original carbonate mud of the slope lime mudstone, and matrix of the breccia, is now entirely calcite microspar and pseudospar. Growth was very early because dense layers of pseudospar are deformed in erosionally truncated slump folds and soft-sediment folds