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Impact of Holocene Transgression on Depositional Environment of Northern Gulf of Mexico Continental Margin

Sample analysis and geophysical profiles across the continental slope and shelf of the northern Gulf of Mexico indicate that, as a result of a comparatively rapid rise in sea level, the Holocene transgressive facies is not as well developed as that of the Pleistocene. This rise in sea level, combined with the decrease in the rate of precipitation in the Pleistocene and Holocene, caused a diminution of sediment supply to the western margin. The Mississippi River system maintained an adequate sediment flux and a prograding delta to the edge of the shelf. As a result, the mass wasting potential was lessened on the western slope but maintained in the central region. The present sedimentation rates measured by ^{210}Pb-dating vary from 1 cm/year on the upper slope near the delta to 1 mm/year on the western slope off the Rio Grande.

The mineral composition of the fine sediment varied very little if at all during the transgression. The sand-size fraction, however, changed from a dominantly detrital to a biogenic-organic composition. Organic material in the sediment increased and is dominantly of marine origin. The level of the oxygen minimum was elevated to near the shelf and slope break.

Although thinner, the Holocene transgressive unit is similar stratigraphically to units lower in the section and to units that envelope hydrocarbon-producing horizons in the Gulf Coast. In addition, the fine, organic-rich sediment rapidly deposited in an area of low oxygen may become petroleum source beds. The abundance of marine organic materials in this unit favors generation of petroleum over gas.

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Cretaceous-Tertiary Versus Carboniferous Depositional Settings—Factors Affecting Coal Parameters

Recent studies in the coal measures of the Carboniferous, Cretaceous, and Tertiary have shown that one of the most critical determinants of seam parameters is the depositional environment of the coal and enclosing strata. Although some of the differences between the Cretaceous-Tertiary and Carboniferous coals can be explained by their different ages and depth of burial (Btu, moisture content), many of the coal parameters (thickness and continuity, sulfur and trace-element content, ash content, roof and floor conditions) can be attributed to their depositional setting and the effect of energy conditions in the depositional basin on the environments of peat accumulation.

Because of the wave energy in the western Cretaceous seaway, many of the deltas have sandstones that were reworked into interchannel areas from contemporaneous distributary mouth bars. These delta-front sheet sandstones formed platforms upon which widespread coals developed. In contrast, the most laterally continuous Carboniferous coals of the Appalachians accumulated in the upper reaches of the lower delta plain. Because of the low wave energies at the delta front, the only sites for coals to amass were on the levee and splay deposits adjacent to distributary channels which were separated by large interdistributary bay sequences.

Previous studies have related the sulfur content of coals to the occurrence of marine and brackish roof rock. Western coals are considered to be lower in sulfur than eastern coals. Since a significant part of the western reserves are in fluvially related Tertiary coals while most of the low-sulfur fluvial coals of the Appalachian Carboniferous have already been mined, this statement is true in generalities. However, the Cretaceous-Tertiary coals of the west that developed in marginal marine environments are as high in sulfur as the Appalachian Carboniferous coals that accumulated in similar environments.

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Oil Exploration in Southeast Turkey Thrust Belt

The southeast Turkey thrust belt forms the foothills zone of the Late Cretaceous to late Tertiary Alpine orogenic belt, which frames the Arabian craton in southern Turkey and Iran. The thrust belt is characterized by imbricate structures and disharmonic folding. It comprises a northern inner belt in which Late Cretaceous and Tertiary tectonic phases are superimposed, and a southern outer belt in which Late Cretaceous thrusts underlie gently deformed Tertiary sediments. To the south lies the folded foreland.

In southeast Turkey, oil has been found in middle Cretaceous carbonate rocks in the frontal overthrusts of the outer thrust belt and in middle and Upper Cretaceous limestones in faulted anticlines of the foreland. Over 300 exploration wells in this area have resulted in the discovery of about 40 oil fields of which 26 lie in the outer thrust belt. Two oil types can be distinguished: (1) low-sulfur, light crude, mainly confined to the thrust belt and thought to have been derived from Silurian source rocks, and (2) heavy, high-sulfur crude, produced from the foreland fields, probably derived from Lower Mesozoic source rocks.

Oil prospects in the thrust belt are limited by reservoir deterioration toward the highly deformed inner thrust belt and by the distribution of Silurian source rocks. Exploration tools applied to locate the oil traps in the overthrusts include field gravity, bore-hole gravity, seismic reflection and refraction shooting, and structural trend studies based on subsurface data and theoretical models.

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Anticipating Coal Mining Problems in Hartshorne Formation, East-Central Oklahoma, Using Sedimentary Facies Analysis

A study of sedimentary facies associated with the Hartshorne coal beds of east-central Oklahoma provides an opportunity for preventive planning to minimize mining problems.

Sedimentary facies within the Hartshorne formation