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FACTORS INFLUENCING SEDIMENTATION IN THE SHALLOW NERITIC ENVIRONMENT

Sedimentation in the shallow neritic environment is influenced by the interplay of numerous factors. Both type and thickness of the sediment differ depending upon the relative significance of these factors. The chief factors to be considered are *tectonics*, *physiography*, *climate*, *biological activity*, and *associated energy relationships*.

The tectonic intensity of the source area and depositional site of the sediments, although primary factors, may be surpassed in significance by the factors of climate and biological activity. Variation of intensity of uplift and deformation of the source area provide primary control on the composition of the source area and the sediment derived therefrom. Sediments range from mature to immature, and from fine to coarse terrigenous clastics. The same variation of tectonic activity provides variations in physiography of the source area and accompanying energy relationships. Physiographic variations may produce both local and regional climatic variations as a third order factor.

Climate and its influence on and control of vegetation will control weathering, resulting soils, and erosion. Thus climate may be the primary factor in the type and amount of sediment derived from the source area.

Tectonic intensity of the depositional site controls the thickness of the sedimentary sequence, with climate and biological activity providing the influence modifying the type and character of the sediment deposited. Wave and current energy related to storms modify the sediment type and distribution.

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TECTONIC CHRONOLOGY OF PENNSYLVANIAN BORDERLANDS

Pennsylvanian sedimentary rocks that are exposed in the eastern United States were deposited as a broad undulating blanket from highly deformed borderlands—Appalachia on the east and Ouachita on the south. These rocks were universally involved in borderland folding. Two separate sedimentological investigations of essentially undeformed rocks closely adjoining the borderland indicate that regionally distinct segments affected depositional patterns at various times during the Pennsylvanian, and that other segments were not active until latest Pennsylvanian or Permian time.

The first study indicates that the Ouachita deformed belt, now buried beneath Gulf Coastal Plain sediments, was one of the earliest Pennsylvanian tectonic welts and provided the major source of sediments for the Black Warrior basin of northern Alabama and Mississippi. Contrasts in mineral composition of these sediments as compared with correlative sediments in northern Arkansas indicate that this tectonic welt probably plunged northwestward, with the deepest portions of the structure thus being exposed at the southeastern terminus. Exposed Appalachian structures in the southeast are definitely post-early Pennsylvanian and did not affect Pennsylvanian sedimentation in this area.

A second study of paleogeographic patterns in Allegheny and late Pottsville sediments of Pennsylvania, Ohio, West Virginia, and Kentucky shows that major source areas lay to the south, probably related to a tectonic highland paralleling the present Pine Mountain fault. Major structural deformation in the classical fold area of Pennsylvania and northern West Virginia is clearly post-Pennsylvanian and Permian.

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GENETIC TYPES OF SOME SANDSTONES IN THE ALLEGHENY FORMATION OF OHIO

Sandstones between the Middle Kittanning and Lower Freeport coal beds in the Allegheny Formation of southeastern Ohio are divisible into three genetic categories based on gross external morphology of the sand body, proportion of major mineral components, grain size, and homogeneity of cross-bed orientation. The following types are continuously arrayed in east-west trending bands along a northeast-southwest outcrop:

1) Thin, lenticular, discontinuous sand bodies with quartz content about 58 per cent. Among all other constituents, feldspar averages 15 per cent, muscovite 25 per cent, chlorite-biotite 60 per cent. Sands are predominantly fine to medium grained and cross-bedding is randomly oriented.
2) Thick, less widespread, partly continuous, elongate sand bodies in which quartz averages 54 per cent. Among all other constituents, feldspar averages 25 per cent, muscovite 30 per cent, chlorite-biotite 45 per cent. Sand is medium grained and cross-bedding is weakly oriented.
3) Thick, widespread apron or sheet sands in which quartz averages 62 per cent. Among all other constituents, feldspar averages 35 per cent, muscovite 30 per cent, chlorite-biotite 35 per cent. Sands are predominantly medium to coarse grained and cross-bedding is oriented in a northwest-southeast direction.

Type 1, found in the southern part of the area, is believed to represent a meandering, relatively nearshore portion of a fluvial system. In contrast, Type 3, found in the northern part of the area, probably represents sand distribution beyond the area of well-developed channels, perhaps near distributary mouths. Type 2, found between areas of Types 1 and 3, presumably reflects an intermediate situation.

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LANDSLIDE FACIES AND THE PALEOSLOPE IN THE CATSKILL DELTA

Non-red arenaceous strata of the Middle and Upper Devonian Fort Littleton Formation constitute the marine portion of the northern flank of the Catskill delta in Pennsylvania and New York. Lithostratigraphic units within the Fort Littleton thicken and become coarser toward the source in the south-southeast; laterally equivalent lower redbeds of the Catskill Formation occupy successively lower stratigraphic positions in the same direction. Submarine landslide deposits in the upper several hundred feet of the Fort Littleton below the redbeds consist of transported load-structures and angular blocks up to twelve feet long. The base of the landslide facies roughly marks the position of the foot of the paleoslope, that is, the juncture of rocks deposited on unstable slopes with undisturbed strata of the floor environment. Like the base of the Catskill facies, the landslide facies occurs at progressively lower positions toward the south-southeast and, in turn, is laterally equivalent to the distal floor facies, which is