stratigraphically the highest coal bed in the section; the uppermost part of the Conemaugh is not present. Structurally, the basin in Maryland is the southern termination of the Youghiogheny syncline, which is asymmetrical and plunges to the northeast.

The coal beds of the basin were traced using new data from surface mines, water well logs, a mine-drainage pollution study, recent aerial photographs (May 1979), and unpublished data from the Maryland Geological Survey. Field checking, where possible, substantiated the available data. Two marine intervals, the Ames and the Brush Creek shale, aided in the correlation of the coal beds. A structure contour map of the top of the Upper Freeport coal bed was used to project the outcrop patterns of coal beds onto a topographic map.

Fourteen coal beds were identified in the Lower Youghiogheny basin. Of these, five are minable or potentially minable, the Upper Freeport and the Lower Kittanning being the more important. On the basis of this study, the Barton and Clarion coal beds are newly recognized in the basin. The Clarion coal bed has been mined in conjunction with the Lower Kittanning coal bed and knowledge of its existence adds a significant tonnage to calculated coal resources of the basin. A revised stratigraphic column for the basin shows the stratigraphic position of the Barton and Clarion coal beds. A map showing the coal beds indicates minable and potentially minable areas in the basin.

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Geologic/Geophysical Study of Fluvial Delta in Offshore Louisiana

The purpose of the paper is to define the geologic features of a delta lobe in offshore Louisiana and relate them to seismic characteristics. The seismic facies found in the delta sequence were also studied and compared to the different subdivisions of the delta lobe and its respective geologic features.

The data consisted of a grid of eleven seismic lines which covered an area of 550 sq mi (1,430 sq km). Four wells with various geophysical logs, and paleontologic determinations of their environments, were also included in the data.

A synthetic seismogram and two models were developed: a depositional model, and a seismic facies model. The synthetic seismogram was made from Well C using a velocity log and a density log to obtain the reflection coefficients. These reflection coefficients were then filtered using a time-variant filter. The depositional model was constructed on the basis of the correlation and interpretation of SP logs, the paleoenvironments, and a dip log. The seismic facies model was developed by correlating the seismic reflection characteristics found in the synthetic seismogram with the seismic lines.

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Structural Variations in Wissahickon Group

Four phases of deformation have been recognized along a 16-km transect perpendicular to strike from Mt. Airy to Sykesville in the Maryland Piedmont. Axial plane foliations, S_1, S_2, S_3, S_4, and associated lineations, L_1, L_2, L_3, L_4, are the result of successive superposition of four deformations, D_1, D_2, D_3, D_4. The three phases, D_1, D_2, D_3, vary systematically in orientation across the region. The D_4 phase occurs only locally.

The oldest deformation, D_1, developed a major foliation across the region. The major foliation is represented by a schistosity in the southeast and a slaty cleavage in the northwest. Primary bedding is isoclinally folded, with the major foliation parallel to the limbs of these folds. The folds were most likely rendered isoclinal owing to flattening during successive phases of deformation. In the southeast, the S_1 surface dips steeply southeast and then flattens northwestward to become part of a recumbent fold system. The associated L_1 lineations plunge gently to the southwest or northeast.

The D_2 deformation developed a near-vertical foliation which remains uniform in orientation across the region. In the southeast, the S_2 surface is a crenulation cleavage while northwestward, it changes into a fracture cleavage, locally obliterating the major foliation, S_1. The preexisting S_1 surface was cylindrically folded coaxial with F_1, about an axis that plunges gently southwest. The F_2 folds are commonly the best developed and vary from open to tight.

The D_3 deformation is characterized by a northwest-dipping crenulation cleavage, S_3, and associated crenulation lineations, L_3. The degree of development of the crenulation cleavage is locally variable, but, in general S_3 becomes better developed to the southeast.

The D_4 deformation is not continuous across the region. This can be attributed either to its overall weak development or to its parallel orientation with the preexisting structures. In the extreme northwest, kink bands grade into broad folds that disappear in the extreme southeast.

Studies of the microfabric across the region allowed fold styles to be characterized for each phase of deformation, as well as the determination of metamorphic grade. Although the metamorphic grade increases to the southeast, the peak of metamorphism at any location was coincident with D_1.

D_1 utilized nearly horizontal flow, while D_2 and D_3 were dominated by near-vertical movements. The D_1, D_2, and D_3 phases were probably generated during the Taconic and Acadian orogenies. The D_4 structure was probably a result of the Appalachian orogeny.

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Structural, Optical, and Chemical Relations in Upper Freeport Coal of West-Central Pennsylvania

A direct relation in trends has been made between the structural deformation of west-central Pennsylvania and two petrographic properties of the Upper Freeport coal. Using samples collected by the U.S. Geological Survey, data for vitrinite reflectance and fixed-carbon percentage were generated and contour maps developed. It was found that the values increased in a near-linear northwest to southeast trend—the same trend as that of increasing regional deformation. Further development and refinement of these kinds of contour maps give the means for coal companies to infer the probable rank of a particular coal in areas where there has not necessarily been extensive analysis. The results and conclusions in this paper point to a possible method of predicting certain optical and chemical parameters of coals on the basis of their structural history and scattered samples collected in the basin.

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Thermal and Subsidence History of Williston Basin

The Williston basin is a large intracratonic basin located in North Dakota, Montana, and Saskatchewan. The sedimentary and tectonic histories of the Williston basin have been resolved