magnetics in this area can also be considered prospective.

A preliminary geologic cross section is constructed using an integration of surface geology, well control, and seismic and magnetic data. Two-dimensional gravity profiles of the geologic cross section are computed and compared with the observed gravity. The interpreted subsurface geology is then modified to improve the match between the calculated gravity and the observed gravity while retaining the constraints imposed by the seismic and magnetic data.

The results of this study illustrate that potential field data can be a useful tool when integrated with available information. Use of these data provides an improved determination of the structural geology in the Idaho-Wyoming thrust belt, and provides attractive leads which ordinarily would be followed by seismic surveys. However, in this particular modeling study, the gravity data do not directly yield prospects, although they do yield an improved interpretation of the structural geology which is compatible with all other available data.

MURRAY, STEPHEN P., and HARRY H. ROBERTS, Louisiana State Univ. Coastal Studies Inst., Baton Rouge, La.

Dispersal of Fine-Grained Sediment in Strongly Stratified Coastal-Boundary Layer

An investigation of the relation between dynamic oceanography and the dispersal of fine-grained sediment has been conducted on the unusually broad (100 to 250 km) and shallow (20 to 30 m) Mosquito Bank (Cayos Miskitos), off the east coast of Nicaragua. Exceedingly high rainfall (500 cm/year) on the coastal watersheds supplies enormous quantities of fresh water and suspended sediment to the nearshore area. A dynamic balance between the density and water-slope pressure-gradient forces, the Coriolis forces, the forces of internal friction, and the spatial acceleration of the water parcels produces a very distinct, turbid, brackish coastal-boundary layer (CBL). The dynamics are such that this CBL is dominated by a coastal jet 20 to 30 km wide, with a velocity of 50 to 70 cm/sec predominantly alongshore. Owing to the steadiness of the local trade winds, the jet appears to be a persistent feature, thereby minimizing large-scale exchanges with the shelf water beyond the CBL. Data on both suspended and bottom sediment clearly show the overriding influence of CBL dynamics on sediment dispersal. Despite the enormous input of terrigenous material brought to the shelf of about 25×10^6 m^3/year (five times more than is delivered to the entire U.S. Atlantic Coast), fine-grained sediments are distinctly confined to the vicinity of the CBL.

The vast expanse of this shallow bank outside the CBL, essentially free of terrigenous sedimentation, has developed into a suite of carbonate environments. Environments grade seaward from a relatively flat depositional plane dominated by *Halimeda*-rich aragonitic muds to a mid-shelf and outer-shelf zone of island-flank platforms and topographic highs associated with coral-algal reefs. Likewise, the bank-edge escarpment displays rough bottom conditions typical of reef development.

NAIRN, A. E. M., Univ. South Carolina, Columbia, S.C.

Stratigraphic Correlation of Keathley Anomaly, Magnetostratigraphy of Tunisia

A magnetostratigraphic study of upper Mesozoic limestone sections in northeastern Tunisia combined with a study of existing radiometric data leads to a slight modification in the correlation of the marine magnetic anomaly sequence with the biostratigraphic scale. The base of the Keathley sequence (M25) lies in the upper Oxfordian with M22 being within the lower Kimmeridgian. The upper part of the section studied (uppermost Campanian-Maestrichtian) matches with data from previous studies. There is a tentative suggestion that the Cretaceous quiet interval, from 77 to 112 m.y.B.P., may contain a number of reversals of short duration. The nature of our samples prevents verification of this. The geomagnetic pole position for the Upper Jurassic is 62.0S 15.9E A_{95} = 7.9.

The ammonitico rosso sections suggest correlation which implies that although reduced in thickness there are no major lacunae in the sections.

NEAL, DONALD W., and DOUGLAS G. PATCHEN, West Virginia Geol. and Econ. Survey, Morgantown, W. Va.

Subsurface Stratigraphy of Upper Devonian Clastics in Southern West Virginia

Studies of Upper Devonian shales and siltstones in southern West Virginia have resulted in a refinement of the stratigraphic framework used in characterizing the gas-producing "Devonian shales." Gamma-ray log correlation around the periphery of the Appalachian basin has extended the usage of New York stratigraphic nomenclature for the interval between the base of the Dunkirk shale and the top of the Tully Limestone to southern West Virginia. Equivalents of the Dunkirk shale and younger rocks of New York are recognized in southwestern West Virginia and are named according to Ohio usage.

Gas production is primarily from the basal black shale member of the Ohio Shale. Gas shows from older black shale units (Rhinestreet and Marcellus shales) are recorded from wells east of the major producing trend. Provided suitable stimulation techniques can be developed, these older and deeper black shales may prove to be another potential gas resource.

NEASHAM, J. W., Shell Development Co., Houston, Tex.

Characterization of Rock Mineral and Pore Space Properties for Proper Reservoir Description and Formation Evaluation, Gulf Coast

No abstract available.

NEESE, D. G., Univ. Wisconsin, Madison, Wisc.

Carbonate Facies Variation on Guadalupian Shelf Crest (Upper Yates and Lower Tansill Formations), Guadalupe Mountains, New Mexico

The Guadalupian shelf crest provides a unique setting for the study of changing carbonate-shelf environments. Previous works by King, Newell, Dunham, Smith, Pray, and others have provided models and interpretations to define a generalized morphology of the carbonate facies for the Guadalupian shelf, behind the Capitan Limestone. Detailed field studies of about 50 m of carbonate units within the upper Yates and lower Tansill Formations reveal significantly different facies patterns and suggest changing shelf profiles and environments through time.

Alternating carbonate and sandstone units are apparent as the product of cyclic shelf sedimentation. Major carbonate units within the stratigraphic interval studied are informally named (Hairpin dolomite, Triplet dolomite, and basal Tansill dolomite). Recognition of five major carbonate lithofacies within the three identified carbonate units at the shelf crest (the paleotopographic high of Dunham's marginal mound) indicates variance in deposition owing to highly restricted water conditions as well as more "normal" marine water circulation.

The three carbonate units differ in the following respects: the Hairpin dolomite is dominated by fenestral peloid grain-supported, pisolite-rich facies, and is associated with erosion surfaces and abundant tepee structures. Carbonate facies in the Hairpin dolomite repeatedly grew to "fill level," and the shelf crest extended at least 3 km perpendicular to the Capitan Limestone. The Triplet dolomite is composed primarily of peloidal grainstones with abundant admixed siliciclastic grains. Shelf-crest features, that is, pisolites, tepees, and fenestral strata, are uncommon, suggesting an absence of a nearly emergent paleotopographic high and a more continuous basinward sloping shelf. The basal Tansill dolomite contains abundant skeletal grains, that is, dasycladacean algae, ostracods, gastropods, and foraminifers, suggesting a deeper shelfward penetration of more open marine water than for the other two units.

Erosion surfaces common at the upper boundaries of the identified major carbonate units are most common and traceable horizontally 0.5 to 3 km behind the Capitan front, locally 50 m behind the Capitan Limestone. Simple progradation of the shelf-crest facies with the Capitan Limestone through time does not explain the change of facies within the three major carbonate units.

NEGUS DE WYS, J., and R. C. SHUMAKER, West Virginia Univ., Morgantown, W. Va.

Relations of Gas Occurrence to Geologic Parameters in Eastern Kentucky Gas Fields

A study of initial open-flow gas data from 4,750 wells in eastern Kentucky gas fields relates gas occurrence to geologic parameters including structural/stratigraphic sections, lithology, and geochemistry.

Approximately 300 formation density logs are used for stratigraphic correlation, reinforced by data from two cored wells and cuttings from 11 wells in this 3,000-sq-mi (7,800 sq km), 10-county study area known historically as the Big Sandy field. This field has produced for over 50 years.

Trend traces of initial open-flow data are interpreted as zones of more intense fracturing and show four preferential directional trends.

The gentle anticlinal structure in the northern part of the field, which may be an extension of the Paint Creek uplift, broadens to the south and bifurcates. Small faults are identified southwest of the main field and the Rome trough crosses the northern part of the field.

The 100-ft/mi southeast dip of the basement rocks is subdued to 30 to 50 ft/mi in the producing Devonian shale sequence which thickens by an order of magnitude into the basin to the northeast.

NELSON, P. H. H., Shell B-P Petroleum Development Co. of Nigeria, Ltd., Lagos, Nigeria

Discovery and Development of Nembe Creek Oil Field, Nigeria

The discovery well for the Nembe Creek field in the coastal swamp of the Niger delta was drilled in 1973. Average recoverable reserves have risen to over 600 million bbl after the drilling of 30 wells. Nearly one-third of the wells drilled have been proposed on the basis of direct reflection seismic support, principally in the form of seismic structure mapping and cross sections. In addition, lateral predictions on the basis of true amplitude impedance data have been made for two appraisal wells.

The timely acquisition and interpretation of sufficient seismic lines in an area of complex structure, but good reflection quality, have permitted the drilling of long step-out appraisal wells, leading to early delineation of field limit and rapid growth of proved reserves.

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Application of Palynology to Age Determination, Correlation, and Paleoecology of Gas-Bearing, Nonmarine Rocks in Central Rocky Mountains

Potentially economic, low-permeability (tight), gas-bearing sandstone reservoirs in the Uinta, Piceance Creek, and greater Green River basins are found in predominantly nonmarine rocks of Late Cretaceous, Paleocene, and Eocene ages. Accurate subsurface correlations are essential to the estimation of reserves and to the understanding of the nature of reservoirs; but, in the absence of paleontologic data, the nonmarine rocks historically have proven to be difficult to correlate with geophysical logs. Pollen, spores, and other plant microfossils recovered from surface exposures and from boreholes have provided data on the age of the rocks and have facilitated accurate biostratigraphic correlation of surface and subsurface sections.

The rocks generally represent sediments deposited in lacustrine, alluvial-fan, braided- and meandering-stream, delta-plain, lagoonal, and littoral-marine environments. The nature of source, reservoir, and trapping units in these rocks is commonly, in part, a function of the depositional environment of the units. Palynologic data in combination with sedimentological, petrographic, mineralogic, geochemical, and other paleontologic data, all derived from the same samples, have been used to refine interpretations of lithofacies and to determine the paleoclimate, paleoecology, and paleoenvi-