

subsequent variation in degree and type of diagenesis have yielded a remarkable range of ultimate lithologies. The Chalk of Northern Ireland is extremely hard (porosities of 1-10%), has oxygen isotopic values averaging -5.60‰ , has low Sr concentrations and shows equant, blocky calcite micrite. Samples from Yorkshire have porosities of 18%, oxygen isotopes of about -4.00‰ , and moderately extensive blocky calcite. Chalks from southern England (Dover, Thanet, Brighton) are very soft (porosities of about 43%), yield oxygen isotope values around -2.88‰ , and show relatively slight recrystallization to blocky calcite. The Ekofisk chalk has an average porosity of 30% with oxygen isotope values averaging -0.42‰ , high Sr concentration, traces of dolomitization, and common rounded crystal shapes.

These diagenetic variations appear related to the extent of freshwater diagenesis. Areas of continuing subsidence (North Sea basin) were not exposed to fresh water; cementation there was a function of burial depth and associated pressure solution-precipitation of calcite in marine or brine waters. In areas of increasing uplift (generally greatest near basin margins), progressively greater freshwater input brought about increasing diagenetic alteration of lithologic and petrophysical characteristics. These diagenetic facies are petrographically, as well as geochemically, recognizable.

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COMPARISON OF SLOPE AND BASINAL SEDIMENTS OF MARGINAL CRATONIC BASIN AND GEOSYNCLINE

The transition from slope to basinal facies generally is not so well exposed or understood as it is in the Pennsylvanian of New Mexico's Pedregosa basin and in the Liassic of Switzerland's Piemontais geosyncline.

The shape of the Pedregosa basin is controlled by basement faulting; its trend is oblique to the Ouachita-Marathon geosyncline. During periods of stable sea-level stand, carbonate sedimentation prevailed in shelf areas, and bioherms built up at the shelf edge. Bioclastic foresets and huge slumps of brecciated material from these bioherms extended from the shelf edge into the basin, where deep-water carbonates were deposited. During periods of low sea-level stand, rivers cut through the shelf deposits and shelf-edge bioherms and eroded deep valleys on the slope. As sea level rose, the basin was filled mainly with shales, and valleys on the slope were filled with sand. The geometry of these sand bodies at the base of the slope is probably fan- or cone-shaped.

Normal faults in the Liassic slope sediments of the Piemontais geosyncline reflect the structural tension that persisted during early geosynclinal stages. Thick beds of structureless breccias accumulated on the downthrown side of these faults. In the downslope direction, the breccias grade into turbidite facies; farther downslope, thick wedges of turbidite thin at their distal edges. No evidence was found of channels or canyons that would serve as point sources for sediment dispersion down the slope. The turbidites grade upward into radiolarian chert.

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GEOLOGY AND DEVELOPMENT OF ATTKA OIL FIELD, INDONESIA

Of particular significance in the Indonesia oil search was the discovery of the Attaka oil field, offshore East Kalimantan (Borneo), in late 1970. After confirmation drilling from September 1970 to February 1971, field development and facility installation began in early 1971. First production was achieved in November 1972.

This major field is in the Tertiary Balikpapan basin. Production occurs mainly from sublittoral to deltaic sands of the

"Attaka Series," of Pliocene and Miocene ages. The age of the deepest bed penetrated in the field area is middle Miocene. Well logs and paleontologic data indicate a predominately regressive sequence of deposition. Highly permeable pay sands, 34 in number, occur at intervals from 2,000 to 7,800 ft measured depth.

The structure is a faulted anticline. Faults and stratigraphic variations in part control accumulation and affect fluid properties. The oil is very low in sulfur content, and has a range of gravity from 35 to 52°API. Both saturated and undersaturated reservoirs are present.

Development drilling was accomplished from 6 platforms with nearly all wells completed using dual tubing strings. After fluid processing at a production platform, further treating occurs at the onshore Santan terminal, where oil storage capacity is 2,000,000 bbl. Tankers are loaded at an SBM (buoy) anchored offshore. The maximum size of tanker that can be loaded is 125,000 DWT. With the completion of wells and facilities, it is anticipated that field production will exceed 100,000 BOPD during 1973.

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SEISMIC INTERPRETATION I AND II—RECENT ADVANCES IN SEISMIC EXPLORATION

This capsule review is a condensation of an SEG Continuing Education short course that is designed to present recent advances in seismic exploration from viewpoints based upon (1) a linear filter model and (2) a geometric model, with statistical communication theory unifying these two viewpoints.

Convolution of the source pulse with the earth reflectivity gives the seismic signal in the linear filter model. Absorption introduces the time variance. Horizontally traveling noise and random noise are additive processes that complete the filter model. Analysis of signal and noise in f-k (frequency-wavenumber) space leads to methods of noise suppression based upon spacial filters in the field and velocity filters in processing. Distortion of the source pulse by ghosts and reverberations is overcome by deconvolution, where the unknown and spacial varying source pulse is replaced by one that has constant and more desirable properties, such as zero phase.

The geometric model overcomes the one-dimensional shortcoming of the filter model, and allows for refractions and diffractions. Horizontal stacking to suppress multiples and increase signal-to-noise ratio requires accurate knowledge of the stacking velocity which is derived by analysis of normal movement.

Utilization of optimal acquisition and processing to preserve the amplitude and frequency characteristics of the underlying reflectivity, along with velocity estimates from strictly surface measurements, significantly improves interpretation in terms of lithology, stratigraphy, and fluid content, and demonstrates that the seismic method is more than a structural mapping tool.

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MULTISENSOR SYSTEMS REVEAL GAS SEEPS AND GAS-CHARGED SEDIMENTS

No abstract available.

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FACIES DISTRIBUTION OF TRACE FOSSILS IN JURASSIC-CRETACEOUS TRANSGRESSIVE SEQUENCE, NORTH-CENTRAL NEW MEXICO

In the southeastern part of the San Juan basin (north-central New Mexico), the upper Morrison, Dakota, and lower Mancos stratigraphic interval represents a transgressive nonmarine to marine, sedimentary sequence. Trace fossils, although quite