sequences. By activating and deactivating elements at various stages in the computation process, the sequential deposition and erosion during evolution of a sedimentary basin can be modeled. Simulated results indicate that excess fluid pressure occurs when a basin is progressively loaded by overlying sediments. An excess pressure gradient will cause pore fluid to flow vertically and horizontally, depending upon the regional stratigraphy and structure, toward the sediment surface. In sandstone-shale sequences, pore fluid in shales tends to flow toward adjacent sandstones, increasing the effectiveness of petroleum accumulation. The downward flow from overlying shales to sandstones, plays an important role in providing resistence to the upward migration of petroleum. The concentrated fluid flux in sandstones tends to flow parallel to the bedding plane toward highest positions of permeable strata, such as crests of anticlines, pinch-outs, or outcrops. Although the orogenic deformation further compresses sediments initially, the subsequent erosion rapidly reduces excess pressure and causes the invasion of meteoric water.

This study suggests that numerical modeling is an effective technique in evaluating histories of subsurface flow, sediment compaction, and petroleum accumulation.

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Analysis of Amplitude Versus Offset to Detect Gas/Oil Contacts in Arabian Gulf

The theoretical behavior of P-wave reflection amplitude as a function of incidence angle (offset) indicates that diagnostic changes should be spatially observable when crossing boundaries between different formation fluids. In particular, when free gas is present in porous sand, Poisson's ratios are known to be abnormally low (usually <0.1-0.2), whereas for oil and water the ratios are usually much greater than 0.3. If the overlying layer has an impedance and Poisson's ratio greater than the target layer, the reflection amplitudes will increase with offset, thereby producing bright spots in stacks.

The problems in analyzing seismic amplitudes are well known. The distortions produced in the recorded amplitudes owing to the effects of sources and receivers, instrumentation, processing, attenuation and absorption, layer tuning, multiple interference, and noise can render the measurements meaningless unless corrected for, which would be difficult. However, by using relative instead of absolute amplitudes and by applying suitable analysis techniques, most of these effects can be virtually eliminated. The resulting amplitude behavior can then be properly interpreted in terms of changes in formation properties.

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Bore-Hole Seismic Profiles in Ekofisk Field

In October 1983, a major bore-hole seismic survey was carried out in the Ekofisk oil field in the Norwegian sector of the North Sea on behalf of the Phillips Petroleum License 018 group of companies. A conventional deviated well VSP and 3 multilevel walkaway seismic profiles were acquired in an area showing poor surface seismic returns owing to gas charging in the overlying sediments.

Processing the data through to a series of conventional common-midpoint sections permitted detailed interpretation of the top of the Ekofisk formation and the top of the Tor formation away from well control. Both formations are producers separated by a tight zone. The Tor formation is the primary zone to waterflood, and information about its lateral continuity is important in the location of proposed water-flow injector wells.

A probably fault-controlled lineation subparallel to the bore hole was detected by the surveys. Reflections from below the reservoir formations are evident, and a by-product from the survey is strong evidence for the existence of apparent anisotropy in velocity or lateral velocity gradients.

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Siliciclastic Incursion in Southern Florida and Development of Florida Reefs During Late Cenozoic

Only one major interruption has occurred in the long history of shallow-water carbonate deposition that has prevailed in southern Florida since the Jurassic. This break resulted from a substantial incursion of the finer siliciclastic sands interbedded or mixed with surprisingly coarse quartz sands during the late Cenozoic. Along the southeastern margin, this influx was succeeded by the development of reefs during the Quaternary.

The siliciclastics occur in the subsurface beneath a section of Pliocene to Holocene shallow-water carbonates. Recent study of well samples shows that these sediments are thickest (120-200 m) along a north-south trend that extends from the central part of southern Florida to the upper Florida Keys. These sediments are largely composed of quartzose grains ranging in size from very fine sand to granule (0.06-4 mm), with minor proportions of calcareous clays, phosphatic grains, and marine faunal fragments. The medium sand to granule-sized sediments are composed of well-rounded quartzose grains and occur either interbedded or mixed with finer fractions.

The sudden influx of siliciclastics in southern Florida beginning in the Miocene is quite unexpected considering the remoteness of the Appalachians, the postulated source. This southward transport may have been accomplished by rivers and/or longshore currents. The siliciclastic section extends southward slightly beyond the curving arc of Quaternary reef deposits. The coincidence of the southeastern edge of siliciclastics with the arc of Quaternary reefs suggests that reef development may have been localized on the siliciclastic margin.

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Alaska—an Explorationist's Jambalaya

Seaward growth of Alaska since Jurassic time has resulted from terrane accretion and deposition of thick clastic sequences in successor basins. Post-accretionary strike-slip faulting and rifting have fragmented both newly accreted terranes and older continental rocks. Accretion and dispersion have resulted in a jambalaya of geologic units that may be viewed in the context of terrane analysis. This offers a spectrum of opportunities and problems for exploration.

Large continental fragments (e.g., North Slope, Nixon Fork, and Tatonduk terranes) consist predominately of Paleozoic rocks with relatively continuous stratigraphy and the greatest potential for regional source and reservoir trends. Other exploration targets may include continental rocks beneath oceanic terranes (e.g., Kagvik, Angayucham, Innoko, and Tozitna terranes), which occur as extensive, relatively thin thrust sheets. An island-arc terrane, the Peninsular terrane, has acted as a source both of hydrocarbons from its organic-rich oceanic sediments, and of reservoir-quality deposits shed into the Cook Inlet successor basin. Post-accretionary rifting and strike-slip dispersion of the growing continental framework of Alaska have resulted in formation of a series of basins filled with clastic sediments, including the Bering Sea and Interior basins, which are current targets for hydrocarbon exploration.

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Thickness Trends and Structure of Berea Sandstone (Mississippian) in Washington County, Ohio

The Berea Sandstone has been a drilling target for hydrocarbon production in Ohio for over 100 yr. Although extensively produced, the Berea still rewards the driller with new commercial production. Due to its shallow depth and low cost of completion, the Berea has undergone a renaissance in interest in recent years. This paper presents the results of a study of more than 3,500 geophysical and driller's logs in Washington County in southeastern Ohio. Structure contours show major trends, such as the Burning Springs anticline and the Cambridge arch, trending almost north-south. In the western third of the county, structural trends change, however, to a more complex, less continuous pattern with a predominant northeast-southwest trend. Isopach trends delineate a system of channel sands trending roughly east-west with sandstone thicknesses ranging from 0 to greater than 25 ft (8 m). Both structures and thalwegs are relatively narrow and thickness changes rapidly, both parallel to and normal to the thalweg. Although no new interpretations of Berea struc-