stones and marsh deposits also occur lateral to the littoral sandstones.

The presence of thin, littoral marine sandstones with widespread marsh sediments suggests a depositional environment similar to the modern chenier plain of South Louisiana. The entire Muddy sequence is transgressive toward the east and southeast over a low-relief topography developed on the underlying Skull Creek Shale.

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CRETACEOUS AND TERTIARY DEEP-SEA SEDIMENTS FROM ATLANTIC OCEAN

The sediments drilled during Leg 14 of the Deep Sea Drilling Project off northwestern Africa and northeastern South America comprise a wide range of Cretaceous and Tertiary deep-sea facies. The major processes controlling the distribution of these facies are the changing patterns of supply and preservation of biogenous matter, terrigenous influx, and erosion and redeposition on the ocean floor. The sequence of mid-Tertiary to Quaternary sediments can be described as an evolution from a "north Pacific" to a typical "Atlantic" facies, contingent upon a change in deep-sea circulation from ascending (estuarine) to descending (lagoonal), and a decreasing orogenic influence. For older sediments, recent counterparts are not available in many cases, and the reconstruction of the ancient environments involves unfamiliar sets of geochemical, climatological, and geographic variables, in addition to diagenesis.

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THREE-DIMENSIONAL STYLOLITES AND MIGRATORY ROUTES OF OIL AND GAS

Stylolite seams are mutually interpenetrating sutures, illustrated in the literature as cross sections resembling a stylus. Typical two-dimensional views are those of sutures shown on polished marble and limestone. Three-dimensional views of stylolites are provided by many limestones in the Virgin Member, Moenkopi Formation (Lower Triassic), of southern Nevada. They are well developed in outcrops at Blue Diamond Hill and southwest of Las Vegas. Essentially all seams display a columnar stylus fluted with striations resembling slickensides. In cross section, stylolites range in size from a few millimeters to as much as 15 cm. In plan view, they are polygonal, ranging from pentagonal to octagonal, to some with more sides. Many Virgin Limestone stylolites parallel the stratification, but others are oriented at various angles. Seams bifurcate, braid, regroup, and display diverse patterns of solution channels. Some stylolites parallel cross-stratification.

As interpreted, stylolites are solution-compaction phenomena, and the amplitude of sutures or length of fluted columns is a measurement of the amount of compaction resulting from removal of carbonate sediment. If interlocking columns are 15 cm high, this represents the thickness of bedding unit removed during solution-compaction. Stylolites, being postdepositional, early compaction features are avenues along which oil and gas migrate. Hydrocarbons migrate early during depositional history in depocenters. Stylolites studied in carbonates of the Virgin Member show migratory routes of hydrocarbons, including some which carried oil to fill bioherms.

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STRATIGRAPHY AND DEPOSITIONAL ENVIRONMENTS OF MOENKOPI FORMATION IN SOUTHEASTERN UTAH

In southeastern Utah the Triassic Moenkopi Formation is composed mainly of red and yellowish-gray siltstone, sandstone, mudstone, and limestone. Continuity of individual units in this formation provides a basis for regional correlation. Five members are recognized here: Hoskinnini Member, "lower slope-forming member," Sinbad Limestone Member, "ledge-forming member," and "upper slope-forming member."

The Moenkopi Formation was deposited on a fairly uniform and gentle west slope that was bordered and at times covered by an epicontinental sea. Prominently stratified mudstone and fine siltstone were deposited when the rate of subsidence slightly exceeded the rate of deposition. Mudstone or massive sandy siltstone was deposited from a suspension load or by gravity flow. Ripple-marked and platy siltstone was deposited when subsidence and deposition were nearly equal and currents distributed thin layers of sediment over tidal flats, floodplains, and sea bottom. Horizontally stratified or low-angle cross-stratified sandstone is indicative of beach, bar, or shallow-marine environment. Prominently cross-stratified sandstone was deposited by restrictive currents such as those found in fluvial and tidal channels and some offshore bars. Fossiliferous carbonate was deposited in shallow marine waters.

Using these data, the following conclusions can be drawn. The Hoskinnini Member was deposited in a quiet body of water but was disturbed after deposition. The "lower slope-forming member" was deposited on a large tidal flat and in shallow marine waters; the sea transgressed farther east and deposited the Sinbad Limestone Member. As the sea retreated, a large delta spread across much of the basin of deposition and the complex "ledge-forming member" was deposited. Lithology of the "upper slope-forming member" indicates a widespread low-energy tidal, sabkha, and shallow marine environment.

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CONTINENTAL SEDIMENTATION IN TECTONICALLY ACTIVE GEOSYNCLINAL BASIN, GLACIAL OUTWASH PLAIN OF NORTHEASTERN GULF OF ALASKA

Active stream systems on the glacial outwash plain of southeastern Alaska are building individual fans that exhibit a systematic variation in gradient, morphology, and suites of sedimentary structures from glacier terminus to ocean. The upper fan is characterized by a single, incised stream channel. The central fan, delta-shaped in plan view and occupied by braided streams, is the locus of most active deposition. It is subdivided into a gravel-depositional (upper) area and a sand-depositional (lower) area. A marsh or swamp area, with both braided and meandering streams, may be present at the fan terminus.

Bar morphology changes downstream from sheet bars to longitudinal bars to a complex of longitudinal and linguoid bars. Side and point bars are found in meandering streams. Mega-ripples are common in channels on the lower fan and the sand-depositional central fan, but are rare elsewhere.

A downstream succession of sedimentary structures is (1) well-imbricated, poorly sorted, coarse gravel