Blake Outer Ridge, (2) between Washington and Norfolk canyons, and (3) southeast of Long Island. Deposits resulting from these events extend across the rise to depths greater than 4,000 m. In the zone north of the Blake Outer Ridge, the deposits extend onto the Hatteras Abyssal Plain to a water depth of 5,400 m.

The distribution of most of the major slide zones appears to relate to the position of canyon systems and may be due to the rapid buildup of sediment overflowing from the canyons during the last glacial stage. Occasional large intraplate earthquakes such as the 1886 Charleston or the 1929 Grand Banks events may be the direct triggering mechanism. The ages of the slides are as young as middle Holocene. In time, the slope and rise probably will reach an equilibrium point (this may already be the situation), and the frequency of large-scale slides will decrease drastically until the next glacial stage.

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Environmental Regulations for In-Situ Uranium Mining, From Exploration to Restoration

In the past several years, laws have been passed and implemented through regulations to protect and improve the quality of our environment. Accordingly, uranium mining operations are closely controlled by many federal, state, and local laws and regulations. Therefore, persons in the industry should be aware of (1) the federal laws and regulations affecting in-situ uranium mining, (2) the source materials license and environmental statement process, including time and costs, (3) the monitoring requirements, including excursion detection and control, and (4) the restoration process.

The laws and regulations of Texas and of Wyoming differ in permit requirements.

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Progressive Cementation from Marine to Deep Subsurface Environments, Upper Smackover Formation

Several generations of carbonate cement are present in high-energy oolitic grainstones of the upper Smackover in seven wells in Arkansas, Texas, Louisiana, and Mississippi. The complete pattern of cementation reflects progressive lithification during burial. However, no single sample displays all cement types. The earliest cement was precipitated in the marine environment shortly after deposition; it consists of fibrous rims of nonferroan calcite "isopachously" surrounding grains. Small blocky crystals of either ferroan or nonferroan calcite formed after the marine cement. These crystals, which occur on the fibrous rims or irregularly encrust grains, are thought to have precipitated in the "shallow" phreatic environment. Subsequent compaction of the sediments with burial was inversely related to the degree of development of these early cements. Postcompactional cements consist of dolomite and coarse ferroan or nonferroan calcite, both of which are interpreted to have formed in the "deep" subsurface. The dolomite not only occurs as a void-filling cement, but also partially replaces grains. In places, dolomite rhombs transect sutured grain boundaries, providing conclusive evidence of their late origin. The coarse calcite comprises the final generation of cement and is the most common cement type. This cement may be poikilotopic; it commonly replaces dolomite rhombs. Porosity reduction is mainly the result of compaction and pore occlusion by this late calcite cement.

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Pore Space in Holocene Carbonate Sediments

Mean porosity and permeability of Holocene carbonate sediments from Florida and Great Bahama Bank, determined for 74 samples by water-flow rates in a falling-head permeameter, are related to depositional texture as follows: grainstone 44.5% (range 40 to 53%), 30, 800 md (range 15,800 to 56,600 md); packstone 54.7% (45 to 67%), 1,840 md (32 to 9,300 md); wackestone 68% (64 to 78%), 228 md (38 to 6,570 md); very fine wackestone 70.5% (76 to 73%), 0.87 md (0.63 to 1.37 md); supratidal wackestone 63.5% (61 to 66%), 5,590 md (617 to 24,100 md).

The muddiest and finest grained sediments have the highest porosities but lowest permeabilities; this negative correlation between porosity and permeability is the reverse of the situation in carbonate rocks, even those as young as Pleistocene. High porosity and low permeability show a strong correlation with percentage of fines ($<64\mu m$). From capillary-pressure curves it is inferred that many of the pore entrances in muddy carbonate sediments are finer than $1\mu m$, at least after drying.

Cementation rates for simple models of upper-phreatic-zone cementation calculated from the measured permeabilities would require excessive time to produce the degree of cementation present in late Pleistocene rocks of Florida and the Bahamas. Climate, especially rainfall and evapotranspiration, emerges as the rate-controlling factor in the most reasonable models of phreatic-zone cementation.

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Miocene Carbonate Gravity Flows in Blake-Bahama Basin

Intraclastic chalk, radiolarian mudstone, and carbonate silt (inferred sediment gravity-flow deposits) comprise the Miocene section in the Blake-Bahama basin at DSDP Site 391. Greenish-gray radiolarian mudstones, comparable to hemipelagic sediments that form the North American continental-rise prism elsewhere in the North Atlantic, occur as numerous clasts and a few thin intervals indicating that they formed the background sedimentation. The intraclastic chalk and carbonate silt generally lack sedimentary structures, but gravity-flow deposition is indicated by reworked fossils (forams, nannofossils, and radiolarians) as old as Cretaceous, mixed planktonic and shallow benthic forams, a few shallow-shelf limestone clasts, and preservation of carbonate materials deposited approximately 1 km below the Miocene calcite compensation depth.

The Great Abaco Member at Site 391 is 500 m thick. Intermittent coring, recovering 21% of the interval, indicates the following sequence, from top to bottom: (1) structureless white calcareous silt (57 m) with reworked fossils, including Eocene ones; (2) intraclastic marly chalk (123 m) with gray mud clasts of variable abundance and size, up to 2 cm long, attributed to debris-flow deposition; (3) dark, structureless radiolarian mudstone (28 m); probably background hemipelagic sediment, but contains a few reworked fossils; (4) intraclastic chalk (171 m) with a few intervals of dark mudstone and of shallow-water limestone lithoclasts showing lamination, scoured surfaces, and vague grading; debris-flow deposits; (5) heterogeneous interval (124 m) of intraclastic chalk and dark mudstone with several graded beds of claystone intraclasts which show partial Bouma sequences, suggesting turbidity-current, as well as debris-flow and contour-current deposition.

The variety in types of clasts and in age and depth of reworked fossils, as well as the sheer volume of the unit, indicate several source areas including the continental rise and slope (hemipelagic clasts), the Blake Plateau (pelagic carbonate material) and the Great Bahama Banks (shallow-water limestones and benthic fossils).

Seismic profiling shows that the Great Abaco Member is about 500 m thick throughout the Blake-Bahama basin, an area of about 50,000 sq km, but pinches out abruptly at the basin margins, probably against hemipelagic muds. Several internal reflectors and a profound regional unconformity at the base (horizon A^u, Late Cretaceous to Miocene hiatus) provide good seismic mappability of the Great Abaco Member and several subunits. The internal acoustic character is a series of smooth, closely spaced reflectors, consistent with intermittent gravity-flow deposition, but local current sculpture is indicated by channels and long-wavelength bedforms.

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Petroleum Potential of Scotian Shelf—Case Study

Application of modern concepts of petroleum genesis, migration, and accumulation permits an evaluation of the petroleum potential for the Scotian Shelf area of the Atlantic outer continental shelf. Conclusions are that shows of gas and oil are to be expected, but commercial scale production is unlikely in the area studied. The paucity of accumulated petroleum derives from two primary factors: (1) unfavorable conditions of deposition resulting in a low conversion of organic matter; and (2) losses, probably to the surface, of a large proportion of the petroleum generated. A third factor of secondary importance is low concentrations of source material in some formations. The results of this study can be used to evaluate other parts of the basin where conditions may be more favorable for the formation of economic accumulations of petroleum.

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Dolomitization Models from Early Precambrian Sequence in South Africa

A 1,500-m-thick chemical sedimentary unit within the approximately 2,300-m.y.-old Transvaal Supergroup contains more than 75% dolomite. A paleogeographic reconstruction for this stratigraphic interval has delineated a passive southeastern basin margin which was a low-relief, stromatolitic tidal flat; this is distinguished from an active northwestern basin margin along which banded iron formations precipitated in lagoons behind clastic-textured carbonate barriers. Large stromatolitic mounds occupied the intervening shallow, subtidal environment.

Two generations of dolomitization are recognizable in the tidal-flat facies; these are considered to reflect schizohaline conditions. Palisade pseudomorphs, probably after gypsum, indicate hypersalinity which is considered to have resulted in the penecontemporaneous development of micritic dolomites. Later, coarse-grained, limpid dolomites with associated secondary cherts are interpreted as a response to a freshwater, low-pH meteoric overprint. The barrier facies comprises limestones and replacement dolomites which contain up to 10% FeO and 4% MnO in the carbonate lattice. The degree of dolomitization decreases away from the banded iron formations, suggesting the lagoon as a potential source of a refluxing magnesium-iron-manganese brine. The widespread occurrence of both iron and manganese in their divalent states lends support to previous contentions of a reducing atmosphere during the early Precambrian. The stromatolitic mounds, which have an average stratigraphic thickness of 200 m and a basinal extent of hundreds of kilometers, consist of uniformly pure and fine-grained dolomites which are characteristically devoid of chert. These dolomites may be primary or, conversely, could have formed through reaction with the ambient waters of an intracratonic epeiric sea which had high concentrations of magnesium and sodium.

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Malossa Field, Deep Discovery in Po Valley, Italy

The discovery of the Malossa gas and condensate field 15 mi (24 km) east of Milan is one of the more recent results of the exploration activities carried out by AGIP in the Po Valley since the 1950s.

The structure was recognized by a seismic reflection survey. Since 1967-68, with the introduction of digital techniques in geophysical prospecting, the reflection seismic method has allowed better information at a greater depth with a vast improvement in quality of the reflecting horizons. The Malossa field structure is a faulted, southward-overthrust block. The top of the hydrocarbon-bearing formation is at about 5,400 m. Hydrocarbons are present in the Dolomia Principale Formation of Noric (Mesozoic) age. Even though the formation has low porosity values it is the main reservoir.

The caprocks are a marly limestone of Cretaceous