salts from the crystal lattice, causes upward ejection (relative to the subsiding solids) of dissolved salts. This is supported by positive ^{18}O-isotopes ($\delta_{18}O_{smow}$ up to +1.96 at bottom of hole 497), which make freshening of the pore waters by influx of meteoric water unlikely. If our hypothesis is correct, lowered chlorinities in sections of subtropical continental margins (high organic matter content!) might thus serve as an indicator for the occurrence of clathrates. Organic matter oxidation is associated with strong sulfate depletion (within one or a few meters from the sea floor), a pronounced increase in alkalinity (maximum between 50 and 250 m subbottom) and ammonia as well as phosphate (maxima between 100 and 200 m). Calcium and strontium remain uniformly low throughout the holes, Mg decreases markedly with decreasing chlorinity. The fact that chlorinity does not drop to zero in the clathrate zone suggests that only a portion of the pore water is tied up in clathrate formation.

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Facies Characteristics of Modern Size-Graded Shelf Deposits, Northwestern Gulf of Mexico

General decrease in grain size of modern surficial sediments with increasing water depth across the continental shelf off south-central Texas suggests that the sediments are in equilibrium with the hydraulic regime during fair weather conditions. The stratigraphic record, however, indicates storm-dominated shelf sedimentation resulting in zonation of sedimentary structures, bed types, and bed sequences. Three facies are defined.

Lower shoreface (water depth: 10 to 30 m): sediment has a significant fine sand component and occasional thin shell beds. Bioturbation is generally high with a diverse trace assemblage. Sand beds exhibit parallel to subparallel lamination with erosional basal contacts. Bedding relations define two major seqeunces: (1) thin, clean, laminated sand → thick, sandless, nonbioturbated mud → heavily bioturbated muddy sand with mottled tecture, and (2) thick, clean, laminated sand → interlaminated mud and sand → muddy sand with mottled texture. Both sequences are cyclic and result from variation in hydraulic energy related to storm events.

Midshelf (30 to 120 m): clayey silt sediment containing little sand and no shell beds. Sediments are moderately bioturbated; trace diversity is intermediate. The only physical structures are occasional parallel-laminated sand beds. Bed-type diversity is intermediate. Moderately thick mud beds are separated by thinly laminated or bioturbated, storm-related sand beds.

Outer shelf (120 to 200 m): clayey silt sediment (clay content greater than on the midshelf). Bioturbation and trace diversity are low. Bed-type diversity is low, and bedding relations simple. Thick, very thinly but faintly laminated, slightly bioturbated mud beds are separated by thin, heavily bioturbated, relatively clean sand beds (distal storm layers).

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Erosion of Old Slump-Scar on Nova Scotian Slope and Possible Mid-Slope Depositional Lobe

High-resolution seismic profiles and a long-range sidescan sonar (*Gloria* II) records have been used together to interpret a complex erosional pattern on the Nova Scotian continental slope. A steep uppermost-slope (200 to 500 m depth) is dissected by numerous small gullies which converge to form a single flat-bottomed, erosional channel below 700 m depth. The sidescan record shows these features to be confined to a lobate area, approximately 8 km wide. Seismic profiles outside this area show a smoother topography with greater continuity of parallel subbottom reflectors. The eroded area is interpreted as an old slump-scar which has been secondarily eroded by a gulley-channel system. Cores from the area are compatible with this interpretation.

At about 1,000 m depth, the incised channel cannot be recognized on either the seismic profile or the sidescan record. However, a profile in the predicted path of the channel shows a broad mound, approximately 5 km wide, with a relief of about 20 m. This has a rather similar profile to a suprafan of a submarine fan, with a small channel on the surface, possible buried channels and erosional surfaces in the subbottom. It is suggested that sediment from the channel system has been deposited in this deeper area to form a depositional lobe.

The mid-slope position of this possible depositional system has major implications for interpretation of ancient basin-margin sequences and the later erosion of a slump scar is important in terms of a potential hazard for placing bottom structures.

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Geology-Petrophysics of Levelland 12-Acre Tertiary Pilot, West Texas

The Levelland 12-acre (4.8 ha.) pilot was drilled during the latter part of 1972 on a double five-spot pattern, and underwent waterflooding from March 1973 until August 1979. On August 3, 1979, carbon dioxide flooding was initiated.

The purpose of this study was to define a stratigraphic zonation for the San Andres Formation (Permian) in and around the pilot, to obtain an accurate, quantitative, reservoir description to aid engineers achieve a historical match of the waterflood, and to evaluate the tertiary recovery efficiency of carbon dioxide flooding.

Excellent core control demonstrated that sedimentary deposition had occurred in an arid coastal carbonate-evaporite province similar to that which exists today on the Trucial Coast, Persian Gulf. Stratigraphic zonation was made using core data in conjunction with log data. A quantitative reservoir description was achieved by the following steps: (1) porosity calibration of the gamma ray–neutron logs; (2) permeability calculation from the calibrated porosity using available core data; (3) determination of the permeability cutoff for net pay; (4) determination of connate-water saturation from applicable native state cores; (5) determination of the reservoir zonation, and (6) computer generation of ϕH, KH, and H maps for individual reservoir zones and combinations of reservoir zones.

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Modern Carbonate Shelf-Slope Boundaries

The shelf-slope boundary along modern carbonate buildups on a worldwide basis demonstrates a high variability in morphology, structure, biogenic barriers, sediments, depth of occurrence, dominant processes, and general geologic history. This boundary is defined as the zone of maximum gradient change between the nearly horizontal shallow-water shelf