with a slow rise in sea level followed by a rapid fall with periods ranging from 1 to 200 m.y. We have modeled these cycles in a similar way with a linear rise in sea level followed by an instantaneous drop. The resulting synthetic stratigraphy is characterized by extensive onlap in this case.

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Formation Evaluation: Benefits of Downhole Logging While Drilling

The development of new downhole measurement systems, coupled with mud-pulse telemetry techniques, allows real time surface evaluation of downhole parameters while drilling. Currently available systems, such as Exploration Logging's DLWD tool, combine formation resistivity and natural gamma ray sensors with directional survey and other measurements. These parameters aid formation evaluation, pressure evaluation, wellbore positioning, and drilling efficiency.

For real time applications, such as correlation and bed identification, a DLWD log can be treated as a conventional wireline log. For further evaluation, the interpretation of DLWD data requires an understanding of the differences in the design of MWD tools compared to conventional wireline tools, as well as the differences in logging environment. These differences, include physical size, logging speed, borehole effects, invasion, etc.

The benefits of real time subsurface data enhance other geologic and engineering data acquisition systems in formation evaluation, pressure evaluation, and well planning.

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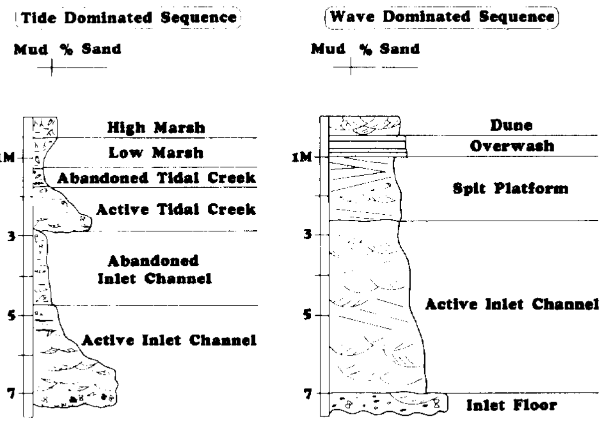
Tidal Inlet: Dominant Facies of Clastic Barrier Shorelines

A synthesis of drill-hole data from wave- and tide-dominated coastal settings suggests that 40% or more of clastic shoreline deposits are tidal-inlet related. Inlet channels rework adjacent barrier islands, replacing "classic" coarsening-upward shoreface sequences with fining-upward tidal-inlet deposits.

An antipathetic relationship between wave height and tidal range along the South Carolina to North Carolina coast results in distinct tide-dominated versus wave-dominated inlet sequences. In addition to hydrographic regime, pre-Holocene topography and sediment supply modify tidal-inlet sequences, geometries, and lithologies. Ephemeral, rapidly migrating wave-dominated inlets, filled by landward and longshore sediment transport, deposit a fining-upward sequence of: (1) inlet floor of coarse shell and pebble lag; (2) channel deposits of planar and trough cross-bedded sand and shell; and (3) a spit platform, composed of planar cross-bedded and horizontally laminated fine-grained sand. Channel migration and abandonment results in preservation of isolated shore-parallel (strike) wedge to lenticular-shaped inlet-fill sand bodies occurring randomly along the shoreline. Measurements of cross-sectional profiles from 12 wave-dominated relict inlet sand bodies reveals a consistent (1:125, 250, 500...) thickness to width ratio.

Lower migration rates and bar-bypassing at tide-dominated inlet mouths concentrate inlet deposits in the updrift portion of a barrier island. Abandoned inlet channels exhibit symmetrical, U-shaped strike geometries and crescentic, concave-upward, dip geometries. The most seaward, tide-dominated inlet sequences become fine upward from basal trough and planar cross-bedded active inlet channel sand and shell to a trough cross-bedded and rippled ebb-tidal delta sand. Coarsening-upward foreshore sand and shell overlie abandoned inlet deposits. Landward, the overlying ebb-tidal delta and foreshore sands interfinger with wavy to lenticular-bedded silts and clays of the abandoned inlet fill and bioturbated salt marsh which form an impermeable updip seal over the inlet channel. Isolation of these wave or tidally influenced inlets by paleotopography confines inlet deposition to a small area, causing vertical stacking of abandoned inlet channels.



Modern tidal inlets compose 5% of North Carolina's wave-dominated coast and 20% of the tide-dominated South Carolina coast; however, Holocene barriers in North Carolina contain 35% inlet-fill whereas South Carolina barriers average 15% inlet fill. Extensive inlet formation, migration, and abandonment account for this 1:7 ratio of modern wave-dominated inlets to relict inlet deposits. Less extensive migration of more stable tide-dominated inlets accounts for an approximate 1:1 ratio of modern inlets to preserved inlet sequences. With a higher preservation potential for inlet deposits over shoreface or foreshore deposits, fining-upward sand and/or mud-rich inlet sequences will dominate ancient clastic shorelines. Porous, fining-upward, quartz-rich inlet sand bodies are the most preservable facies in barrier shoreline sequences and exhibit consistent thickness to width ratios and lateral geometries. These insights will serve as a valuable stratigraphic tool in the exploration of interdeltaic clastic reservoirs.

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Anatomy of Texas Oil

Approximately 153 billion bbl of in-place oil have been discovered in Texas oil reservoirs. Characterization of 500 of the largest of these reservoirs (those that have cumulative oil productions of more than 10 million bbl) on the basis of geologic and engineering parameters, facilitates the grouping of Texas oil reservoirs into families or "plays" of similar reservoir geology and common engineering and production attributes. Basic data for each reservoir were tabulated from information in the hearing files of the Texas Railroad Commission and other public sources. Thirty variables were examined for each reservoir. Oil plays were characterized in terms of: (a) reservoir genesis, (b) petrophysical properties of the reservoir, (c) trapping mechanism, (d) drive mechanism, (e) fluid properties, (f) volume of in-place oil, (g) recoverable reserves, (h) calculated oil recovery efficiency, and (i) reservoir management practices and conventional well spacing. Most of the major Texas oil reservoirs can be grouped into 48 geological plays which account for 71% (32 billion bbl) of all Texas oil production.

Twenty-one of the plays are located in a belt along the Texas Gulf coastal plain and in the East Texas basin. Mesozoic and Cenozoic sandstone reservoirs deposited in fluvial-deltaic and strandplain systems dominate over fluvial sandstones and carbonate reservoirs. The remaining 27 plays extend westward from north-central to west-central Texas. Dolomite is the prevalent reservoir lithology with sandstone and reef-associated limestone being more abundant than chert, conglomerate, and nonreef associated limestone. Reservoir genesis in the north and west Texas plays is diverse and includes a spectrum of clastic depositional environments from fan and fan delta to slope and basin systems. Carbonate reservoirs have been interpreted as open and restricted shelf deposits, platform margin-associated banks and reefs, and deeper water atoll and pinnacle reef systems. Unconformity-related reservoirs in west and east Texas, such as the prolific East Texas field, are grouped into two plays regardless of the depositional history of the reservoir. Recovery efficiencies of the Paleozoic north and west Texas plays are considerably lower than those of the coastal plain and east Texas plays.

The effects of drive mechanism, lithology, permeability, API gravity, and viscosity on reservoir performance are well known. An additional important control on recovery efficiency that has been emphasized by this study is reservoir genesis. Although productivity can be modified by extremes in permeability or hydrocarbon character, it otherwise follows predictable trends based on the known geologic complexity and heterogeneity of the depositional system of the reservoir.

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Ocean Margin Drilling Project Data Synthesis off Eastern North America

An atlas of geological and geophysical maps has been compiled for the east coast of the North American continent, covering an area from well onshore to the ocean crust, and from 39 to 46°N lat., as part of the Ocean Margin Drilling Project.

Included in the atlas are maps of the depth to continental oceanic basement, depth to the top of Lower and Middle Jurassic (reflectors J_M/J_3 and J_S/J_2, to the top of Jurassic (reflectors J/J_1), to the top of Neocomian (reflector Beta), to the top of Cretaceous (reflector A*), to the top of Paleogene (reflector A_u), and to the top of early Miocene (reflector X). Isopach maps between these reflectors and between them and the sea floor are also included. Contours are two-way travel time with a contour interval of 0.25 to 1 sec.

The atlas also contains a tectonic map of basement, a pre-Quaternary geologic map and lithofacies maps for six time slices.

There are geophysical maps of magnetic and gravity anomalies and compressional wave velocities in sediments and basement.

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Peculiarities of Petroleum Formation in Highly Bituminous, Siliceous, Shaly, Carbonaceous Facies, Timan-Pechora Basin, USSR

Over 50 oil and gas fields with total reserves of about 6×10^9 BOE have been discovered in the Timan-Pechora basin, one of the most important Russian frontiers. Almost all the sequence is productive, although major reserves are confined to two stratigraphic intervals beneath regional seals. Principal source rocks are the so-called Domanik facies, 25 to 150 m (82 to 492 ft) thick, represented by rapidly alternating black shales, chert, marls, and siliceous and organic limestones. Exclusively sapropelic organic matter averages 5 to 7% and reaches 20% or more. Soluble bitumen is very abundant (1 to 2 wt. %) and contains all the components characteristic of crudes: from light oils to heavy tars and typical high-molecular asphaltenes. These characteristics exist even on the basin's periphery where Domanik facies are only marginally mature. In other areas, Domanik facies are mature; they are probably overmature in the deepest troughs. Outside the area covered by Domanik facies, pools and even significant shows are absent.

Deposition of this prominent facies began during the end of early Frasnian time in a wide stagnant sea that covered the eastern edge of the Russian platform. Beginning in the late Frasnian, shallow-water carbonate sedimentation resumed along the basin's edges and on uplifted blocks. Condensed Domanik deposits continued to form in the gradually deepening sea on the east side of the basin. Barrier reefs and clastic terraces that prograded basinward formed along the northern and western boundaries. The deep-water trough was finally filled by thick clastics at the end of early Tournaisian time.

The unusual composition of Domanik facies and their exceptional enrichment by sapropelic organic matter result in their peculiarities as petroleum source rocks. Lithology of the rocks, particularly the abundance of huge carbonate concretions fully or partly replaced by silica, suggests a long delay in lithification and the relative importance of the late diagenetic stage of oil generation. This explains the presence of immature oils in underlying Devonian clastics and their absence elsewhere in the sequence. On the other hand, Domanik facies, owing to significant silicification that trapped giant amounts of bitumen in the rocks, became a "natural repository" of oil during geologic history. This oil migrated because of fracturing, especially during stages of tectonic activity. Spatial distribution of oil types and deposits of solid bitumen in traps having different ages of formation, clearly shows predominance of pulse-like vertical migration. Migration of oil from the Domanik continued during late stages of geologic history along with block uplifting, cooling of the sedimentary cover, and absence of sedimentation. Thus, methods of applied geochemistry that invoke models of heating should not be applied to Domanik-type rocks and more geologic data are required to assess their role as oil sources.

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Influence of Accretionary Tectonics on Sedimentation and Diagenesis: Paleogene Yager Formation of Northern California

The Yager formation of Humboldt County, California, comprises well-bedded mudrock, sandstone, and conglomerate of Paleogene age. These strata are much less deformed than coeval broken formations and melange of the Coastal Belt Franciscan. We infer that deposition occurred within slope, slope-channel, and trench-slope-basin environments, in an overall subduction or transpressional tectonic regime.

The following observations suggest that Yager basins were both restricted in size and elongate in shape: (1) feeder-channel