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Depositional History of Smackover Carbonates in Manila Embayment of South Alabama

Upper Jurassic Smackover carbonate deposition in south Alabama was significantly influenced by a number of paleotopographic highs which divided the region into several subbasins or embayments. The Manila embayment in Monroe, Conecuh, and Clarke Counties was bounded to the south by the Conecuh ridge and the Wiggins arch and to the west by diapiric salt ridges. These paleotopographic highs protected the interior of the embayment from wave and current energy and significantly influenced Smackover deposition.

Initial carbonate deposition, represented by intertidal oncolitic and peloidal packstones and algally laminated mudstones, occurred in the deeper portions of the embayment, and was accompanied by the continuation of subaerial clastic deposition on the still-emergent highs. With sea level rise, these intertidal deposits graded upward into subtidal peloidal packstones containing sparse faunal assemblages indicative of the restricted circulation within the embayment. By middle Oxfordian time, sea level rise had inundated the paleohighs, eliminating restrictive conditions in the embayment. Deposition in the embayment is represented by peloidal, oolitic, and oncolitic packstones and grainstones containing open marine faunal assemblages, while the paleohighs became the site of oolitic shoals with local patch-reef development.

A decrease in the rate of sea level rise during late Oxfordian time allowed the carbonate deposits to build toward sea level. The oolitic shoal deposits on the paleohighs pass upward into evaporitic sabkha deposits, whereas the deposits of the embayment grade into oolitic shoal and intertidal flat deposits and finally into sabkha and evaporitic lagoon deposits.

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Shelf Morphodynamics of Drowned Barriers on Louisiana Shelf

Since the 1950s, Mississippi-delta researchers have hypothesized that Ship and Trinity Shoals, on the Louisiana continental shelf, were formed during the transgressive phase of the delta cycle following the abandonment of the Maringouin delta lobe during the Holocene. Historic, stratigraphic, and sedimentologic data strongly support this theory and suggest that the shoals originated through the drowning of delta-flank barrier islands. Maps published prior to 1840 show islands in the approximate location of the present shoals.

Following submergence, the barrier/shoal system was subject to extensive modification by shelf currents. A comparison of U.S. Coast and Geodetic hydrographic surveys (1853, 1889-90, 1936) and a 1983 survey conducted by the authors illustrate that the shoals have migrated landward up to 2 km (1.2 mi) and been reduced in subaqueous elevation up to 3 m (10 ft). The overall trend is of erosion at the shoal crest and deposition seaward below 10-m (33-ft) water depth. Large scale ridge and swale features are also present in water depths below 6 m (20 ft).

The shoals are composed of clean, well-sorted, fine-grained sands essentially devoid of bedforms detectable by side-scan sonar. Three days after Hurricane Alicia's passage within 160 km (100 mi) south of Ship Shoal, there were still no noticeable bedforms. This suggests that hurricanes may be of too short a duration to initiate shelf-wide flow of a magnitude great enough to significantly affect shelf-shoal sediment dispersal, at least in the shoals' present state.

Ship and Trinity Shoals are still being modified today, and as long as they remain highs on the sea floor they will continue to be modified by shelf currents. It is believed that the original barrier morphology played an important part in the development of the present morphology. It is inferred that the presence of the original barrier chain, its composition, and its orientation relative to dominant wave and current conditions controlled the development of the present morphologic features. The only hope of preserving the present shoals would be if they were covered by prodelta deposits of another progradational cycle. Otherwise Ship and Trinity Shoals will continue to be modified until they reach a stable configuration for the Louisiana continental shelf.

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Possible Mantle Convection-Current Sink Under United States Cordillera

The concept of plate tectonic subduction has helped explain the compressive deformation of the U. S. Cordillera, but continued convergent plate movements have not explained as satisfactorily the end of compression from Alaska to southern Mexico about 40 m.y.B.P., nor the extensional faulting from Canada through Mexico since about 20 m.y.B.P. Accordingly, it may be appropriate to reconsider Hess' original concept of a two-sided mantle convection sink.

The axis of a deep Bouguer gravity anomaly (below 125 km or 78 mi) extending from Mexico through western Colorado into Canada may represent the axis of a mantle convection sink. The low-density rocks along the axis of the anomaly may originate from sinking mantle convection currents and/or magmatic differentiation of upper mantle rocks which were carried into the deeper, hotter mantle.

If mantle convection currents that transported the Pacific subduction plate eastward and those that transported the North American plate westward both met and sank in the Cordilleran mantle sink, then the two limbs of the sink would be defined. However, a "shadow zone" between the top of the subduction plate and base of the lithosphere offers the possibility that westward-directed mantle convection currents may have exerted enough stress on the subduction plate to end compression and start extension of the lithosphere, despite continued convergent plate movements and subduction.

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Habitat of Hydrocarbons in Hackberry (Oligocene, Middle Frio), Texas and Louisiana

This paper reinterprets the stratigraphic position, depositional environments, and depositional systems in the middle Frio (Oligocene) Hackberry, and their relation to hydrocarbon accumulations. This stratigraphic unit is present in the subsurface of southeastern Texas and southwestern Louisiana, in an area known as the Hackberry embayment. The unit consists of a lower Hackberry sandstone-shale sequence, overlain by middle and upper Hackberry marine shale (the Hackberry shale "wedge").

The lower Hackberry sandstone-shale sequence overlies a truncated lower Frio section, but in some interdomal areas and in downdip locations lower Hackberry sediments rest conformably on lower Frio *Nonion struma* beds. Planktonic foraminifers indicate that the erosional surface between lower and middle Frio coincides with a worldwide relative sea level fall approximately 30 Ma, in planktonic foraminiferal zone P21. Dip-oriented submarine channel and fan systems related to this erosional surface contain lower Hackberry reservoir sands in downdip positions.

The marine shale wedge that overlies the lower Hackberry sandstones was deposited during a relative sea level rise, when rates of subsidence exceeded rates of deposition. Some strike-oriented discontinuous marine sand reservoirs are present within the shale wedge.

Production is found in the lower Hackberry in structural traps in reservoirs related to nearshore and fluvio-deltaic deposition (traction-transport systems), and, in downdip locations, in stratigraphic-structural traps in submarine channel-fan systems (gravity-transport systems). Unexplored objectives related to submarine channel-fan systems may be present below thick, growth-faulted younger Frio sections.

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Palynology, Oil Shale Genesis, and Depositional Environments of Fossil Butte Member, Green River Formation

(No abstract available)