

KNIGHT, MICHAEL T., JOHN G. MCPHERSON, and DONALD F. REASER, Univ. Texas at Arlington, Arlington, TX

Deltaic Sedimentation in Nacatoch Formation (Late Cretaceous), Northeast Texas

The terrigenous clastics of the Nacatoch Formation are a record of short-lived progradational phases within the major Late Cretaceous transgression in the East Texas embayment. Progradation was achieved by deltaic out-building from three fluvial feeder systems along the north and northwest margins of the basin. It is probable that additional sediment was derived from a major "sediment dispersal system" east of the Nacatoch deltas.

The deltaic package of the Nacatoch (131 m, 430 ft) is composed of roughly equal proportions of sandstones and mudstones, with the sandstones ranging from very fine-grained, poorly sorted, and mud-rich, to fine-grained and well-sorted. The sandstones have a feldspathic litharenite and subfeldspathic litharenite composition with increasing compositional maturity in the well-sorted examples. Some of the muddy sandstones are highly bioturbated and carbonaceous.

Vertical and lateral lithofacies changes in the Nacatoch deltas were determined by means of electric-log (resistivity) interpretation and well core data, with support from limited outcrop studies. Dip- and strike-oriented cross sections delineated three major coarsening-upward sandstone units which could be correlated in a shore-parallel direction for 42 km (25 mi). Each sandstone shows evidence of reworking by wave-induced processes and redistribution by longshore currents. The lower two sandstones are separated by a thick mudstone interval interpreted as a minor transgressive event. The highly bioturbated, carbonaceous, mud-rich intervals between the other sandstone units are interdistributary bay fills.

The Nacatoch deltas are lobate and developed in response to moderate sediment input, moderate to low wave-energy flux, and significant longshore current action.

Southwest longshore sediment transport from the Nacatoch deltas gave rise to extensive shelf sands in the western margin of the East Texas basin. These well-sorted sandstones are petroleum reservoirs at shallow depths. The similar well-sorted sandstones of the Nacatoch deltas have the same potential as petroleum reservoirs, given the same structural influence.

KOCHEL, R. CRAIG, and JACOB H. KAHN, Univ. Virginia, Charlottesville, VA

Washover Fan and Terrace Dynamics—A Stormy Year on Assateague Island, Virginia and Maryland

Five surveys of painted sand plugs were made between 1982 and 1983 at 7 washover sites on Assateague Island to observe sedimentologic and geomorphologic changes during overwash. The stormy 1982-83 period included a large extratropical storm in October 1982 that produced waves exceeded only by the March 1982 Ash Wednesday storm, 7 northeasters of moderate intensity, and a significant tropical storm.

Our surveys suggest that eolian and washover processes are equally important in net sediment dynamics and morphology of washover fans. Strong storm winds caused erosion of fan surfaces and adjacent dunes. Eolian activity sealed the throats of 2 fans early in the October storm, preventing subsequent washover. Erosion dominated the early phases of washover events and was followed by accretion. For all storms studied, the net effect was accretion.

The occurrence of storms of various magnitudes and frequency permits a comparison of their relative effectiveness in transporting sediment and causing geomorphologic change. The October storm deposited between 20 and 40 cm (8 and 16 in.) of horizontally bedded coarse sand and shell fragments on fans located along northeasterly trending shorelines. Fans along easterly trending shorelines were shielded from direct wave attack and experienced little change. The net effect of 7 subsequent northeasters of moderate intensity also resulted in net accretion, but their total sediment movement averaged less than the amount deposited by the October storm. Surfaces of recently overwashed fans exhibited upper flow regime bedforms and lacked relief. Eolian processes altered fan surfaces between washover events and established partially vegetated dunes on their surfaces in less than 6 months.

KOLLA, V., Superior Oil Co., Houston, TX, F. COUMES, Elf Aquitaine, Pau, France, and A. LOWRIE, U.S. Naval Oceanographic Office, NSTL Station, MS

Morphology, Internal Structure, and Sedimentation in Indus Fan as Revealed by Seismic Investigations and Piston Core Studies

The sea floor of the upper Indus fan is characterized by gradients less than 1/500, channels with levees approximately 100 m (330 ft) high, distinct echos with several continuous subbottom reflectors on 3.5-kHz records, and generally fine-grained sediments (Tc-e sequences) except in channels where coarse-grained sediments (Ta-e) are present. On multi-channel and sparker seismic lines, the levee complexes are characterized by overlapping wedge-shaped reflection packages, and channel axes by high amplitude discontinuous reflections. Since the Oligocene and Miocene, several major episodes of extensive migration of the channels on the upper fan (with sediments more than 3 km, or 10,000 ft, thick) and of the feeder canyons on the Pakistan-India shelf are recognized. During the latest episode (Plio-Pleistocene), 3 distinct regions, each with numerous channel-levee complexes fed by the sediments of both the Indus and the now-extinct Hakra-Nara rivers on the Pakistan-India shelf, are identified.

The middle fan has gradients of 1/500 to 1/1,000, numerous channels with levees approximately 20 m (66-ft) high, and convex morphology due to extensive channel-levee buildup. Gradients less than 1/1,000, channels with levees 8–20 m (26–66 ft) high, prolonged echos with few or no subbottom reflectors on 3.5-kHz records, smooth continuous reflections on seismic records, and the highest sand content in the sediments (Ta-e) of any fan region characterize the lower fan. Although unchannelized sheet-flow turbidite deposition was the dominant mode, channelized and overbank deposition also played a significant role in the sedimentation of the lower fan. On a gross scale, 2 extensive Quaternary sand-rich deposits (lobes), primarily laid down by sheet flows, are mapped on the lower fan.

KOSTER, EMLYN H., Alberta Geol. Survey, Edmonton, Alberta, Canada

Sedimentology of Paleochannels on Foreland Coastal Plain, Judith River Formation (Upper Cretaceous), Southeast Alberta

The upper 90 m (295 ft) of the sub-Bearpaw Judith River Formation, continuously exposed in the badlands along the Red Deer River 185 km (115 mi) east of Calgary, is famous for the unrivaled assemblage of dinosaur fossils. Dinosaur Provincial Park presents a rare opportunity to view the architecture of a foreland coastal-plain sequence as well as to clarify the origin and distribution of subbituminous coal zones and gas reservoirs associated with this formation across southeast Alberta.

The distal reaches of paleodrainage from the developing Cordillera to the Western Interior seaway are being examined by north-south traverses across the badlands. Sharp-based paleochannel units, enclosed by rooted, olive-gray mudstone sequences that are commonly 4–6 m (13–20 ft) thick, vary between 2 end members. The first contains laterally accreted sand-mud couplets with abundant macrofloral debris, and represents cyclical, low-energy growth of point bars, possibly with an estuarine influence. The second, mainly comprising cosets of large trough cross-beds with mudstone intraclasts, was formed by episodic aggradation of high-energy systems. An intermediate composite type displays evidence for an energy increase as channel sinuosity decreased. This variation in paleochannel type is attributed to alternating alluviation/rejuvenation associated with an unstable base level. Coal zones and potential reservoirs appear to be associated with the transgressive and regressive phases, respectively, of the Bearpaw coast. Amalgamation of paleochannels—marked by laterally extensive horizons of bone fragments, lithic and intraclastic gravel—is more common seaward over the axial region of the Sweetgrass arch.

KOSTERS, ELISABETH C., Louisiana Geol. Survey, Baton Rouge, LA, and ALAN BAILEY, Univ. Southwestern Louisiana, Lafayette, LA

Mississippi Delta Peats—Their Relationship to Deltaic Lignites and Coals

Deltaic peats accumulate on abandoned deltaic platforms, in interdistributary basins, in abandoned channels, and as detrital bay deposits.