

SEDIMENTATION STYLES AND ACCUMULATION RATES ON THE LOUISIANA SHELF AND SLOPE: STACKED CONDENSED AND EXPANDED SECTIONS

Harry H. Roberts¹ and James M. Coleman¹

ABSTRACT

Data generated from drop cores, soil borings, and high-resolution geophysical profiles taken primarily for geohazard and foundation studies have defined various styles and rates of sedimentation associated with the last rising sea level hemicycle as well as 2-3 previous complete cycles. The data base on which this study is founded consists of approximately 500 borings, over 100 drop cores, and thousands of kilometers of high-resolution seismic. A data synthesis indicates that during times of falling to low sea level channel migration and aggradation caused abundant deposition of coarse clastics on the exposed shelf (expanded sections). During periods of rising to high sea level sedimentation was first focused on filling the deeply cut alluvial valley (averaged accumulation rate above Oxygen Isotope Stage 1-2 boundary ranges from 25-40 cm/100 yr) leaving the shelf and slope to be covered by a thin time-transgressive blanket

of shell hash and foram-rich hemipelagics (condensed sections). Carbon-14 dating indicates that these carbonate-rich deposits accumulate at a slow rate (0.5-3.0 cm/100 yr). Once the valley-filling process nears completion deltas again start building on the inner shelf, switching their loci of deposition on a frequency of $1-2 \times 10^3$ years. Individual delta lobes have sediment accumulation rates that reach magnitudes as high as 11m/100 yr in the coarse distributary mouth facies to over 30m/100 yr in the fine-grained mudflow deposits. Distal shelf and slope sediments accumulate at rates of 4-6 cm/100 yr opposite active inner shelf deltas while rates of 1-2 cm/100 yr are typical of those areas that receive only hemipelagics. Borings indicate that expanded and condensed sections are stacked on the distal shelf and upper slope as a product of high-frequency sea-level fluctuations.

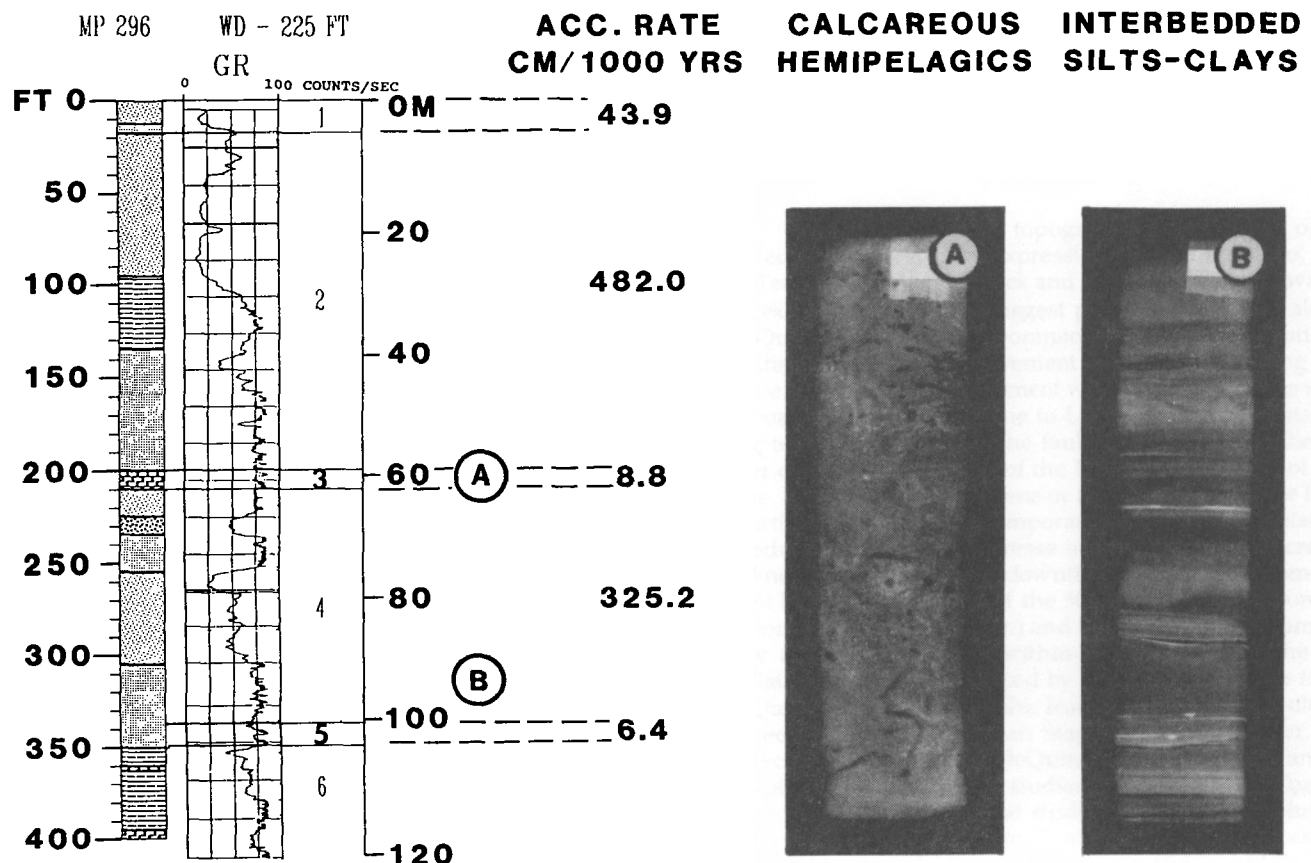


Figure 1. A typical shelf boring (Main Pass Blk. 296) showing condensed and expanded sections deposited during two complete sea level cycles. Accumulation rates and characteristic X-ray radiographs (negatives) from condensed (A) and expanded sections (B) are given.

¹Coastal Studies Institute, School of Geoscience, Louisiana State University, Baton Rouge, LA 70803.