SEDIMENTOLOGY AND BIOSTRATIGRAPHY OF CORES IN MIOCENE DEPOSITS, OFFSHORE LOUISIANA, GULF OF MEXICO

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ABSTRACT

As oil exploration in the Gulf of Mexico advances further basinwards, key late Tertiary and Quaternary reservoir targets are increasingly sought in deepwater systems tracts dominated by turbidite and other gravity flow deposits. Depositional and stratigraphic models in deepwater settings are diverse and commonly complex. This is especially so in the Gulf of Mexico, where the interaction of sediment and shallow buried salt adds to an already complex picture.

Acquisition of conventional cores increases our understanding of deepwater deposition, particularly in paleo-slope settings. Nearly 120m (400′) of near continuous core recovered from Miocene slope deposits, offshore Louisiana has been described and analyzed for sedimentological and biostratigraphic information. Provisional results show that in this case study sandy slope deposition comprises a wide variety of gravity flow processes in broadly a middle bathyal setting. However, two distinct slope associations are clearly recognized from biostratigraphic and sedimentological signatures.

Association A is characterized by relatively organized and undisturbed sandy turbidites that display vertical thickening and thinning trends, but which yield little or no flora and fauna. Individual sand beds range from less than one mm to a few metres in thickness, are very fine to fine grained and typically exhibit cross- and planar lamination structures.

Association B is irregularly bedded, has coarser sands and yields a rich assemblage of reworked and indigenous flora and fauna that identify local and regional source areas for the slope sediments. The sand beds in this association are up to 6m in thickness, contain numerous mudstone clasts and shell fragments and are interbedded with disturbed claystone and siltstone lithofacies.

Interpretation of these two contrasting slope associations is assisted by local seismic mapping. These analyses provide a structural and stratigraphic context that is similar for both associations. Therefore the principal control on major changes in slope deposition in this case study appears to be external variations in the nature of sediment supply. Association A may reflect a period of relatively well structured turbidite deposition, comprising numerous individual sandy and barren flows, during which background hemipelagic deposition was either diluted of excluded at the site of deposition. Association B, in contrast, may reflect rather catastrophic slope processes, during which the initiation of large and sandy turbidites, together with rafted and slumped mudstones resulted in a diverse array of shallow water facies being redeposited in a much deeper water environment.

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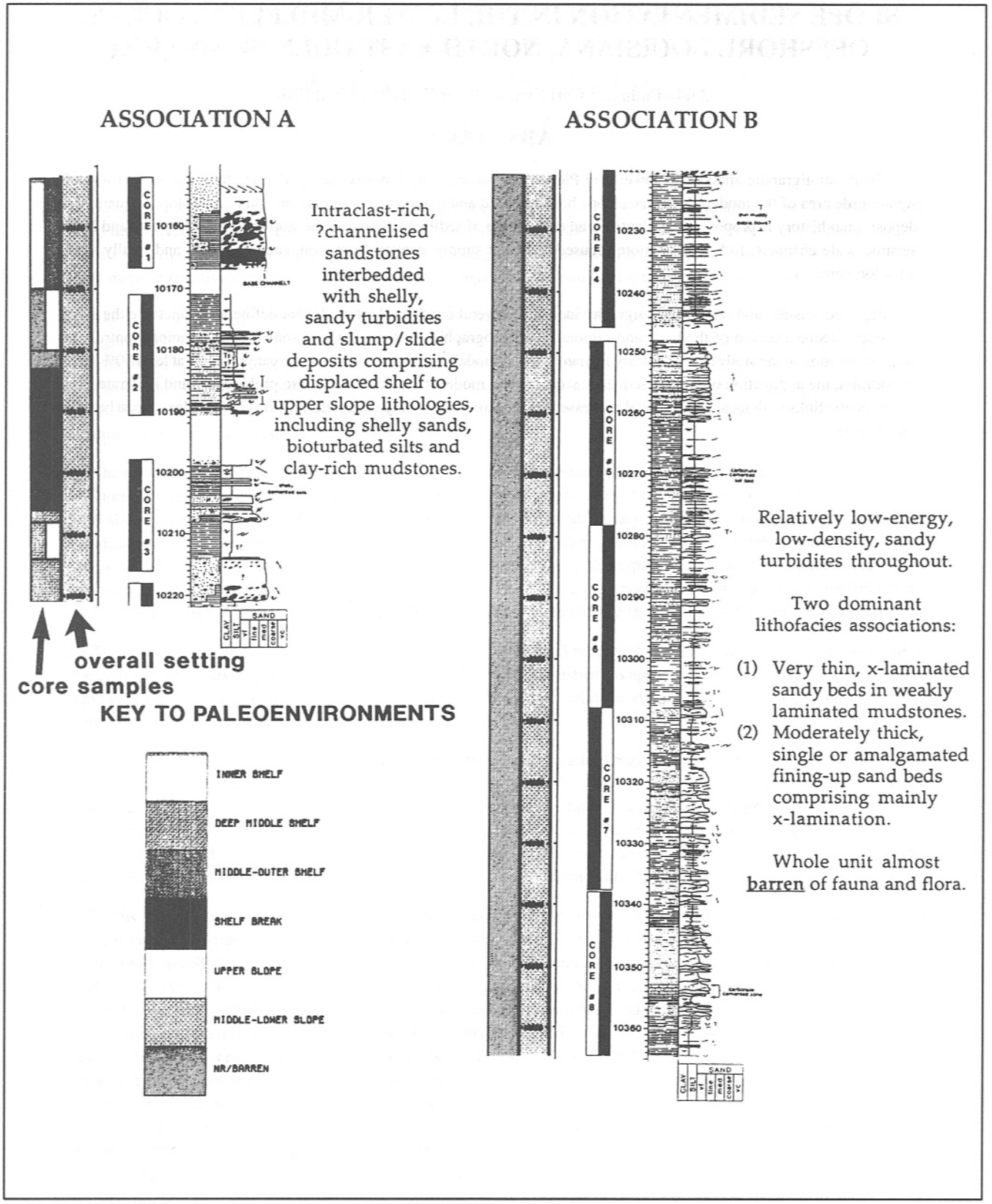

Figure 1. The sedimentological and stratigraphic significance of these major changes in slope processes is difficult to address from a single case study. However, it is possible to make some links with the overall seismic stratigraphy of the Mio-Pliocene shelf margin updip from the core location. These analyses suggest periodic break–up of shelf margin deltas and/or the initiation of canyon features may well be linked to the slope associations identified in the core.