13. FAN MARGIN INTRODUCTION AND SUMMARY[1]

Shipboard Scientific Party[2]

INTRODUCTION

Walker and Massingill (1970) identified and mapped two large areas of slump deposits on the Mississippi Fan using 3.5-kHz sub-bottom profiler records. As little information concerning the lithologic characteristics or internal geometry of these deposits existed, a drill site was selected on the easternmost slump mass (Fig. 1). The site would allow an assessment of this slump mass as well as provide additional information on the lateral margins of the most recent and/or underlying fan lobe.

Seismic data in the vicinity of the proposed drill site were sparse. Sub-bottom records showed little or no penetration with the exception of isolated erratic dipping reflectors. In a few instances, these data appear to show multiple sequences, as though several individual mass-movement events have occurred. On single channel air-gun records, the upper 100 m consists of a transparent zone capping relatively high amplitude semicontinuous reflectors. Deep-tow 3.5-kHz records acquired approximately 20 km west of the proposed site, within the slump mass, show chaotic dipping reflectors.

Site 616 was selected to answer three major questions:

1. Does the transparent zone represent a mass-movement deposit and, if so, what mechanism was responsible for its emplacement?

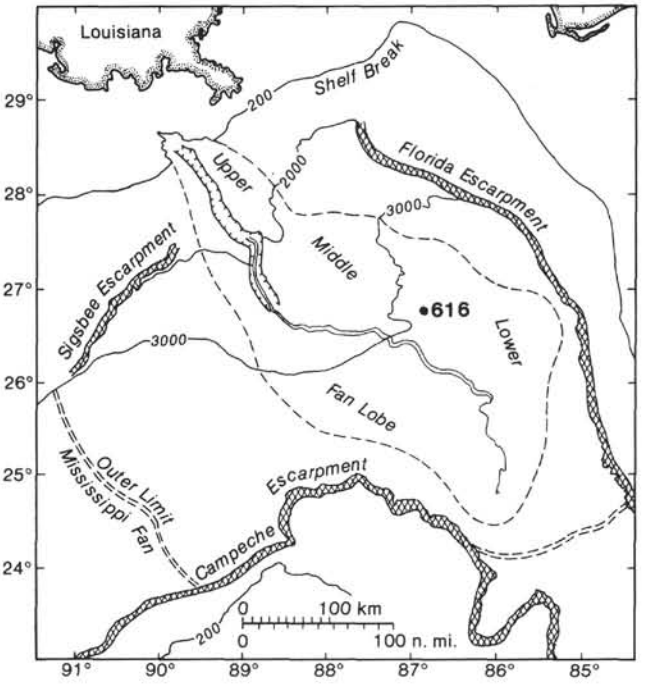

Figure 1. Map of Mississippi Fan with a general outline of the modern fan lobe and the location of Site 616.

2. What are the sedimentologic and geotechnical characteristics of these deposits?

3. Are the semicontinuous reflectors underlying the slump mass the marginal flank deposits associated with the youngest fan lobe or do they represent another fan lobe and, if so, what are their lithologic characteristics?

SUMMARY

Drilling at Site 616 was considered successful and the major scientific objectives were achieved. The principal results are described next.

1. The upper 96 m of cored section consists of an overall coarsening-upward fine-grained mud and silty sequence displaying extremely steep dips (ranging up to 65°). Numerous small zones of disturbance separate sequences displaying variable dips. The sequence obviously represents emplacement by mass-movement processes, but the source of the sediment is unknown as the entire section was virtually devoid of foraminifers. These observations clearly demonstrate that mass movement with considerable rotation can transport coherent blocks over very low gradients and significant distances.

2. In addition to the mass-movement interval, two fan lobes were cored. The youngest fan lobe is approximately 88 m thick with a total of 33.8 m net sand (38.5%) and

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is a fining-upward sequence. The lower fan lobe was only partially cored, but appears to display a coarsening-upward trend with a minimum of 7% sand. The sand sequences in the older lobe tend to show graded base sands while in the upper, younger lobe, the sands display both graded and sharp bases. Reexamination of the seismic and shipboard data reveals that these fan lobes predate seismic Horizon "20" and thus do not represent marginal deposits belonging to the modern fan lobe in which the other sites were drilled.

3. The entire section contains sparse planktonic foraminifers, indicating a rapid sedimentation rate. One interval, from 65 to 150 m sub-bottom, contains a relatively high faunal content, possibly representing slower sedimentation rates. Ericson's Zone Z (Holocene) was less than 1 m thick; most of the cored section was deposited during Ericson's Zone Y (late Wisconsin glacial). Based on seismic correlations of Zone X, the sedimentation rate may be as high as 5.5 m/1000 yr. The site clearly demonstrates that thick series of fine-grained sediments can be deposited rapidly in deep-water settings and that low or nondepositional periods are too short to accumulate planktonic foraminifers.

REFERENCE

Walker, J. R., and Massingill, J. V., 1970. Slump features on the Mississippi Fan, northeastern Gulf of Mexico. *Geol. Soc. Am. Bull.*, 81:3101–3108.