1. The rate of sediment deposition was high. The Plio-Pleistocene embraced only 5 m.y., whereas the Miocene lasted 17 m.y., and the Oligocene and Eocene 32 m.y., yet the volume of sediment deposited during each epoch is comparable.

2. The center of deposition moved northeastward, from South Texas in the Eocene to southeastern Louisiana in the late Miocene-early Pliocene, and then shifted westward again in the Pleistocene. This shifting in depocenters was accompanied by a progradation of the continental shelf edge to its present position near the 600 ft isobath. Hydrocarbon productive trends follow these shifting depocenters.

3. Most of the Plio-Pleistocene sediment was deposited upon substrata which included several thousand feet of mobile salt plus a comparable thickness of mobile, deep water prodeltaic clay. The weight of the accumulating sediments has caused movement of the underlying mobile material so that today the structural condition of the strata in the Plio-Pleistocene depocenters is complicated by numerous large piercement salt domes and ridges, by domes and ridges of diapiric shale, and by many normal faults with displacements up to thousands of feet with omnidirectional strike and dip.

WORSLEY, THOMAS R., Dept. Oceanog., Univ. Washington, Seattle, WA 98105

CRETACEOUS-TERTIARY BOUNDARY EVENT

All pelagic JOIDES cores penetrating the Cretaceous-Tertiary boundary exhibit a major unconformity between the Cretaceous and Tertiary. The gaps in these cores are greater than most marine shelf sections, although all are paleontologically unconformable. Furthermore, calcareous nannofossil biostratigraphy indicates that the Cretaceous-Tertiary hiatus is nearly identical in magnitude for these shelf sections. In a nearly continuous Cretaceous-Tertiary sequence in Alabama, almost all Cretaceous species disappear within 3 m of the boundary, or in about 10^6 years, assuming a pelagic sedimentation rate of 20 m/m.y. Observed nondeposition and/or dissolution at the top of the Cretaceous could have resulted from low carbonate production when widespread tectonic quiescence would yield low phytoplankton nutrient supplies. Low carbonate production began to raise compensation depth because O_2 production curtailment in the oceans caused by phytoplankton depletion led to CO_2 buildup in atmosphere and ocean.

Quantitative nannofossil biostratigraphy shows cyclic fluctuations within a continuous uppermost Maestrichtian section in Alabama. With the 20 m/m.y. sedimentation rate, these are similar in duration to climatic variations predicted by astronomical insolation variations or "Milankovitch curves."

It is postulated that an astronomical cycle of low insolation coinciding with widespread nutrient and carbonate depletion led to carbonate undersaturation in the photic zone, producing mass extinctions of nannoplankton and dependent groups at the close of the Cretaceous. The observed magnitude of the Cretaceous-Tertiary unconformity, as indicated by calcareous fossils, is a function of paleobathymetry, with pelagic sections having been below compensation depth longer than shelf sections and consequently exhibiting greater hiatuses.