EN032 - 21 PISTON CORES, 1 KASTEN CORE, 2 BOXCORES, 4 GRAVITY CORES
OBJECTIVE: Climatic history of the northern Gulf of Mexico recorded in Late Quaternary marine sediments.

SCHEDULE: Depart Morehead City, N. C. 1700 EST 27 Jan. 1979
Arrive West Palm Beach, Fla. 0930 EST 16 Feb. 1979

FUNDING: NSF Grant No. OCE76-21262 (Kennett); 20 days at sea
NSF Grant No. OCE78-21170
OHR Contract No. NOO914-75-C-0537

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GSO/URI* H.U. +

+Lesleyan University

Tex. A & M

PURPOSE: Cruise EN32 included one principal project and two ancillary programs.

1) Piston cores were taken in the Orca Basin, the northwestern slope of the Gulf of Mexico, the Desoto Canyon and the northeasternmost Campeche Escarpment. a) A dense, anaerobic brine is contained within the isolated Orca Basin. Cores were taken across the narrow transition zone at 2260 meters which marks the top of the brine. Cores taken beneath anaerobic waters are expected to be undisturbed by bioturbation and will provide high resolution records of latest Quaternary climatic events. The bentonic fauna in cores taken near the transition zone will be compared with that in cores taken at similar depths from an adjacent aerobic basin. b) Cores from the northwest slope were selected using data from the Lamont core collection. Sites were chosen in regions of both high and low sedimentation rates for studies of Late Quaternary climate and paleoceanography. c) Cores from the Desoto Canyon were taken to study in greater detail the history of the Laurentide meltwater event at the end of the last glaciation. d) Cores from the Campeche Escarpment were selected using data collected on cruise TR149 and GS7603. Pliocene and Quaternary sections were cored to study the initiation and development of the modern Florida Current.
2) Hydrocasts were taken in the Orca Basin to sample waters above, below and within the transition zone at the top of the anaerobic brine. The water samples, taken in 1.2 liter Hansen bottles with 24 ml piggybacks, were analyzed for dissolved gases, temperature, salinity and nutrients in order to understand better the biological production of gases in anaerobic conditions and their biological consumption within the transition zone.

3) Gravity cores and box cores were taken in the Orca Basin, an adjacent basin and on the abyssal plain. Concentrations of isotopes produced since the beginning of the nuclear age will be analyzed in surface sediments to measure the depth of bioturbation in these differing benthic habitats.

RESULTS:

1) A total of 21 piston cores (Table 1) with trigger cores plus one kasten core (Table 2) were successfully recovered. The average piston core length was 32 feet; the total length of sediment recovered was 703 feet. A gross biostratigraphy determined from samples taken at five foot intervals in all piston cores indicates that most cores contain latest Quaternary sediments. However, those cores from the northeastern Canpeche Escarpment contain Pliocene. Cores over 2000 nautical miles of high resolution sub-bottom profiles were recorded outlining the nature of sedimentary regions between core sites (Fig. 1).

2) A total of 25 samples were taken in 1.2 l Hansen bottles with 25 24 ml piggyback samplers. In addition one 5 l and one 30 l samples were taken in Hiskin bottles in order to measure volatile hydrocarbons (Table 3). Bottle depths ranged from 2400 m to 2600 m and some sampled the transition zone at 2260 meters at the top of the brine. Table 4 indicates which gases and nutrients were measured in each hydrocast.

3) Two box cores (Table 6) and four gravity cores (Table 5) totaling 31 feet of sediment were successfully recovered. Undisturbed top sediments appear to have been recovered in AC2, 4 and 5 and in both box cores.

The top four centimeters of the box cores will be analyzed for Pu-239, Pu-240, and Th-234. The gravity cores with undisturbed tops will be sliced into one centimeter thick sections and analyzed for Pb-210, Ra-226, Th-230, U-234, U-238, Th-232 and for Pu-231 in selected cores. Porosity and CaCO3 content will be analyzed as well.

ACKNOWLEDGEMENTS:

Essential to the success of this cruise were the cooperation and performance of Captain H. Bennett and the crew of R/V ENDEAVOR and the expertise of Mr. Rodman Davies and Mr. Roger Rousseau, marine technicians from the University of Rhode Island.
<table>
<thead>
<tr>
<th>Piston Core Number</th>
<th>Piston Core Length (Feet)</th>
<th>Trigger Core Length (Inches)</th>
<th>Water Depth (m)</th>
<th>Lat. (°)</th>
<th>Lon. (°)</th>
<th>Region</th>
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<td>1820</td>
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**Total** | **642.6** | **609**

**Average** | **32.0** | **38**

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**TABLE 2. KASTEN CORE SITE**

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TABLE 4. EH-32 HYDROCAST SAMPLES

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<th>HC 3</th>
<th>HC 3A</th>
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*deepest bottle only
### TABLE 5. GRAVITY CORE SITES

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<th>Core Length (ft.)</th>
<th>Water Depth (m)</th>
<th>Lat. (II)</th>
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### TABLE 6. BOX CORE SITES

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<th>Long. (II)</th>
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