

#89008 Soderberg  
Rec'd MAY 10 1989  
IN ADCSM

**CRUISE REPORT DEB-89-1**

1. Ship Name: Deborah B. (Operated by the Marine Environmental Sciences Consortium, Dauphin Island Sea Lab, Dauphin Island, AL)
2. Cruise Number: DEB-89-1
3. Parent Project: Common Services 9470-88800
4. Funding Agency: U.S.G.S., SIR
5. Funding Amount: Actual Expenses
6. Contract Number: NA
7. Contract Start and End Date: NA
8. Area of Operations: Mobile Bay and Mississippi Sound
9. Dates and Ports: The cruise began on May 2 (Tuesday) and continued through May 4 (Thursday). The R/V Deborah B. was operated on a daily basis out of the Dauphin Island Sea Lab facility.
- 10: Chief Scientist: Harley Knebel
- 11: Scientific Party: Ronald Circe, U.S.G.S., Scientist and Cruise Curator  
Ken Parolski, U.S.G.S., Electronics Technician  
Richard Hummell, Geological Survey of Alabama, Scientist  
Steven Parker, Geological Survey of Alabama, Scientist  
Rodney Collier, Dauphin Island Sea Lab, Ships Captain
- 12: Purpose of Cruise:  

As part of the proposed regional Coastal Dynamics Program to be conducted jointly with the State Geological Surveys of Alabama and Mississippi, the U.S.G.S. conducted a pilot survey in Mobile Bay and Mississippi Sound. During this test cruise we wanted to determine if we could obtain useable acoustic profiles and records in these two shallow water environments. Both the bay and and sound have very shallow water depths and extensive areas of fine-grained sediments, which contain interstitial gas.
13. Navigation: The survey was run using the Megapulse Accufix 500 Loran-C system. Appropriate ASF corrections were inserted into the program.

14. Scientific Equipment: The following seismic systems were tested during the first day of the cruise: (1) ORE Geopulse System; (2) Data Sonics Bubble Pulser System; (3) ORE 3.5 kHz System; and (4) Klein Sidescan-Sonar System. However, only the ORE Geopulse and 3.5 kHz Systems were used subsequently along the survey lines. Sediment samples of the bottom were collected by Richard Hummell and Steven Parker using a bucket dredge. These samples were collected at opportune times when the ship was not underway.

15. Tabulated Information:

Days at sea: 3

Length of survey lines: 59 km (see attached page-size maps)

Sediment samples: 27 (collected by Geological Survey of Alabama personnel; see attached table).

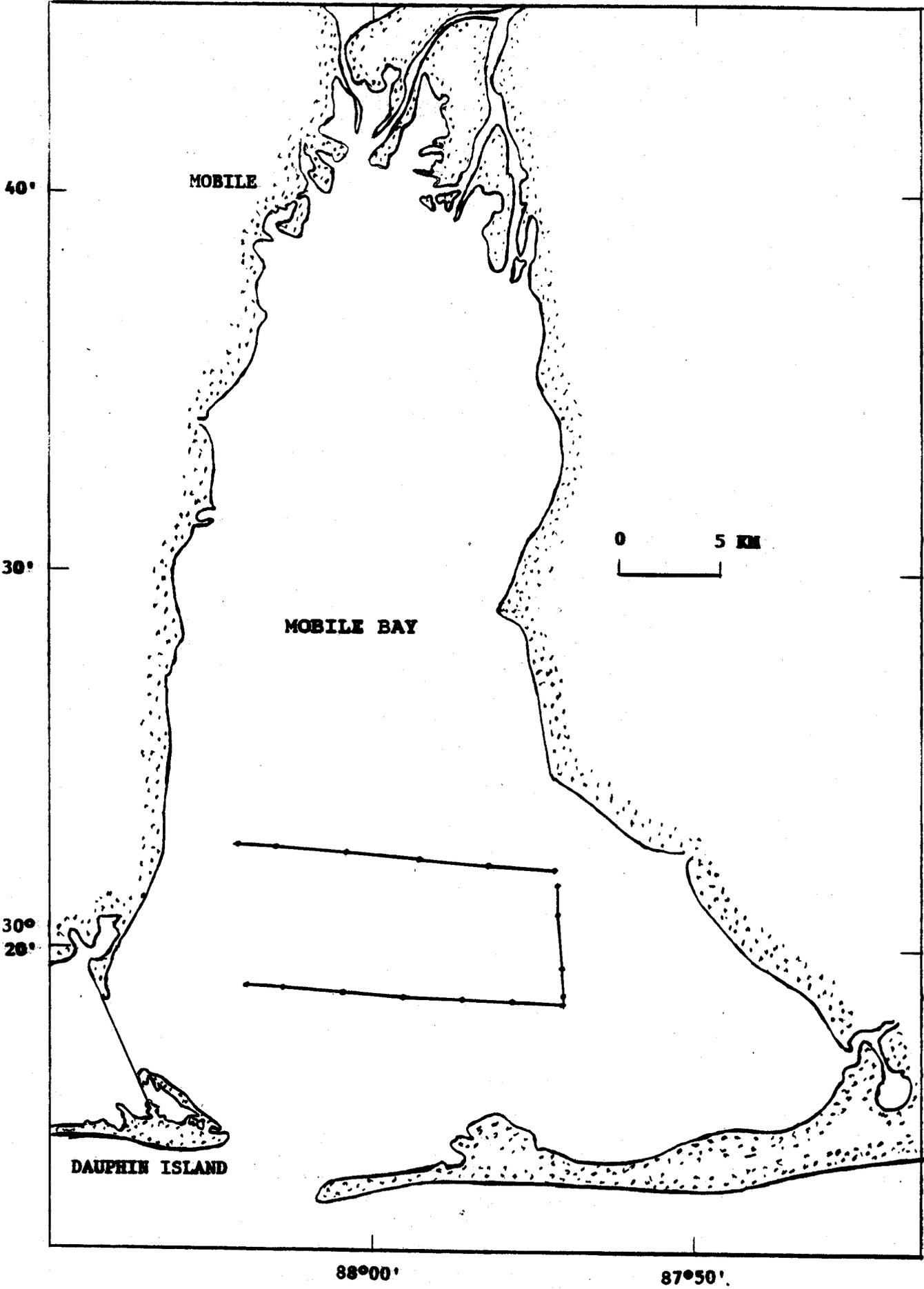
16: Narrative:

The cruise period originally was scheduled for 4 days. However, poor weather caused it to be shortened to 3 days.

May 2 (Tuesday): The first day of the cruise was spent field testing the various seismic systems. During the tests, the systems were deployed in an area along the western margin of Mobile Bay where a previous acoustic survey had shown that subbottom penetration was possible. Tests of the subbottom systems included changes in such variables as power setting, band pass, pulse length, firing rate, sweep rate, hydrophone streamers, and source-to-receiver configurations. A comparison of the Geopulse versus the Bubble Pulser system showed that the Geopulse system generally produced better records in terms of penetration and resolution. In addition, the Bubble Pulser sound source (which rides on a surfboard), tended to dive below the sea surface even during low wave conditions. The Geopulse system, therefore, became the system of choice for running subsequent survey lines. The sidescan sonar system was operated at 500 kHz and was tested during flat calm conditions. Nine samples of the bottom were collected.

May 3 (Wednesday): On this day, survey lines were run across Mobile Bay using the Geopulse and 3.5 kHz subbottom systems (see attached map). Previous acoustic work had shown that nearly three-quarters of the bay floor is underlain by sediments containing interstitial gas, which severely limits acoustic penetration. In order to determine the acoustic penetration possible with our systems, two lines were run across the southern to middle part of this gassy zone. These lines showed the same presence of gas and the same limited penetration as described previously. The top of the gassy sediments was found either at the sea floor or up to a few meters below the bottom. The gassy sediments were ubiquitous beneath the bay, producing a strong, continuous reflector. No reflectors were observed below the top of the gassy sediments. The sidescan sonar system was briefly deployed along the northernmost line across the bay. However, wave conditions during this time produced acoustic artifacts on the record that tended to obscure any natural features. Use of the sidescan system, therefore, was discontinued. Six samples of the bottom were collected.

May 4 (Thursday): The final day of the cruise was spent running a line westward along the axis of Mississippi Sound (see attached map). Geopulse records obtained along this line revealed reasonable acoustic penetration (up to 30-40 m) beneath the bottom. Only a few areas of gassy sediments were found. Wave conditions during this time precluded use of the sidescan sonar system. The line was terminated at midday because of rough sea states. Twelve samples of the bottom were collected.



40°

MOBILE

30°

0 5 KM

MOBILE BAY

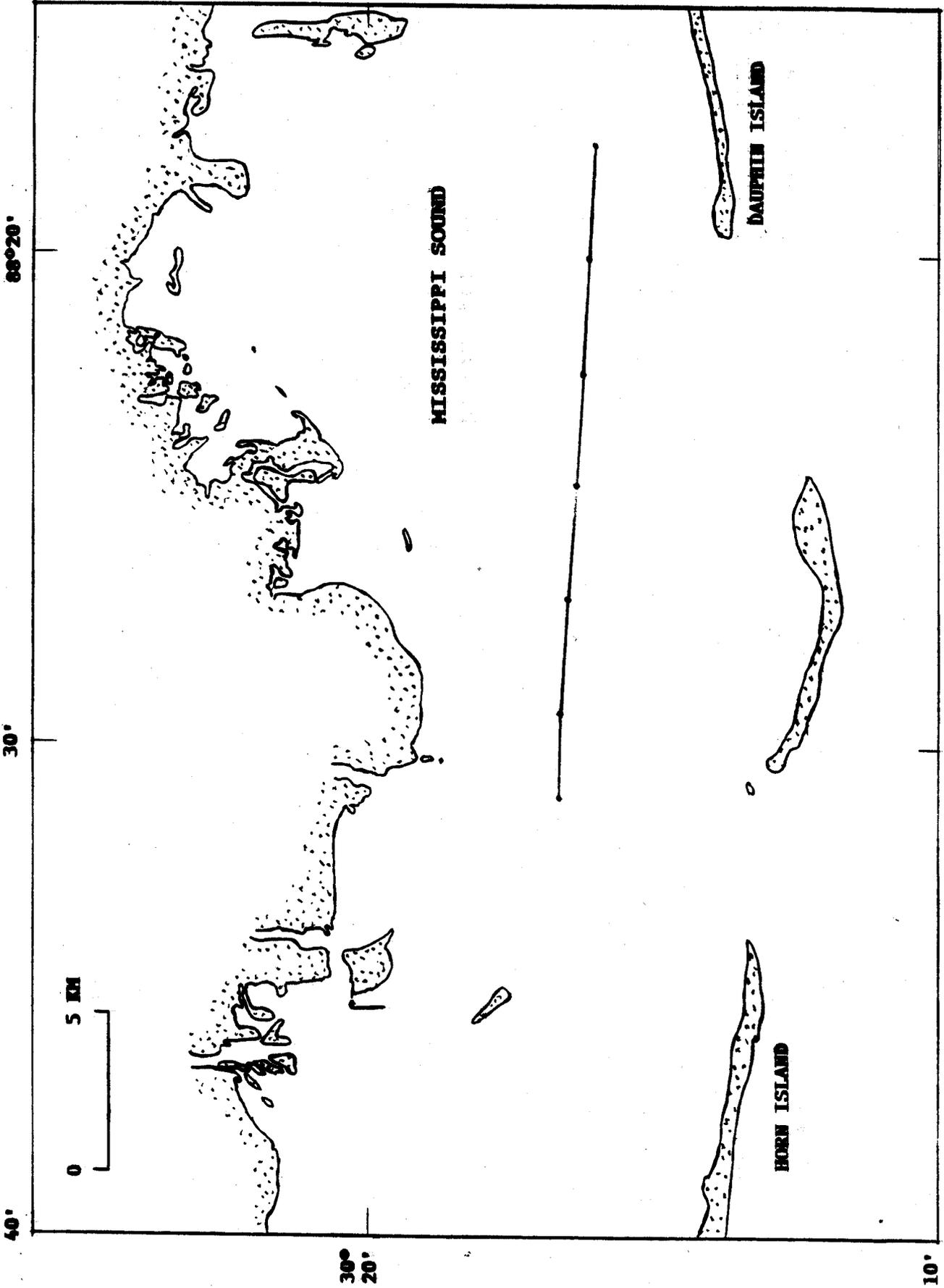
30°

20°

DAUPHIN ISLAND

88°00'

87°50'



USGS-GSA-MBG PROJECT  
 PILOT SEISMIC CRUISE  
 DEB-89-1  
 SEDIMENT SAMPLES

STATION NUMBER	DATE OF OCCUPATION	LORAN - C	WATER DEPTH IN FEET	SAMPLING DEVICE	NUMBER OF SAMPLES	TYPE OF SAMPLES	REMARKS
DEB-89-1-L1	5/2/89	12749.7	47104.6	BD	1	BG	
DEB-89-1-L2	5/2/89	12750.2	47129.8	BD	1	BG	
DEB-89-1-L3	5/2/89	12745.6	47125.3	BD	1	BG	
DEB-89-1-L4	5/2/89	12747.0	47120.2	BD	1	BG	
DEB-89-1-L5	5/2/89	12747.0	47115.1	BD	1	BG	
DEB-89-1-L6	5/2/89	12746.6	47110.0	BD	1	BG	
DEB-89-1-L7	5/2/89	12744.8	47101.5	BD	1	BG	
DEB-89-1-L8	5/2/89	12743.4	47095.2	BD	1	BG	
DEB-89-1-L9	5/2/89	12742.1	47090.6	BD	1	BG	
DEB-89-1-L10	5/3/89	12745.3	47105.1	BD	1	BG	
DEB-89-1-L11	5/3/89	12813.2	47105.0	BD	1	BG	
DEB-89-1-L12	5/3/89	12826.3	47105.0	BD	1	BG	
DEB-89-1-L13	5/3/89	12830.0	47105.0	BD	1	BG	
DEB-89-1-L14	5/3/89	12850.4	47119.6	BD	1	BG	
DEB-89-1-L15	5/3/89	12740.2	47119.7	BD	1	BG	
DEB-89-1-L16	5/4/89	12633.2	47090.1	BD	1	BG	
DEB-89-1-L17	5/4/89	12626.8	47089.9	BD	1	BG	
DEB-89-1-L18	5/4/89	12460.2	47089.9	BD	1	BG	
DEB-89-1-L19	5/4/89	12481.0	47084.0	BD	1	BG	
DEB-89-1-L20	5/4/89	12500.1	47083.6	BD	1	BG	
DEB-89-1-L21	5/4/89	12520.4	47084.0	BD	1	BG	
DEB-89-1-L22	5/4/89	12540.1	47084.6	BD	1	BG	
DEB-89-1-L23	5/4/89	12560.2	47084.3	BD	1	BG	
DEB-89-1-L24	5/4/89	12580.4	47083.5	BD	1	BG	
DEB-89-1-L25	5/4/89	12600.1	47085.0	BD	1	BG	
DEB-89-1-L26	5/4/89	12619.1	47086.4	BD	1	BG	
DEB-89-1-L27	5/4/89	12640.1	47088.8	BD	1	BG	

BD= Bucket Dredge  
 BG= Bottom Grab