



# United States Department of the Interior

## GEOLOGICAL SURVEY

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### RESEARCH CRUISE REPORT

Ship: KANA KEOKI                      Operating Institute: University of Hawaii

Cruise No.: BLM Leg Alpha      Dates: 10/27/74 - 11/8/74

Area of Operation: South Texas Continental Shelf

Project: Marine geological survey of the South Texas OCS as part of the BLM baseline environmental assessment program.

Senior Scientist: Charles Holmes

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Description of Program: The program is designed to establish chemical, biological, and geological baseline on the South Texas Continental Shelf. The focus for the geological program is to establish the nature and amount of the suspended sediment in the water column, of the Holocene sediments on the shelf, and to identify and locate regions of geologic conditions which may be hazardous to OCS operations. To accomplish these goals, three cruises have been planned. This report constitutes results of the first cruise. The first two cruises are designated as sampling cruises in which grab samples, box cores, and pipe cores will be taken at sites previously designated. The third cruise will consist of obtaining continuous seismic reflection data. The results of these cruises, associated with the subsequent laboratory analysis, will enable a detailed baseline to be established in this area and provide significant geologic and biologic data for environmental assessment.

Summary of Sea State Conditions and Weather: During the entire cruise the sea ranged from five to ten feet. This was caused by a series of stalled fronts. Only once, however, for a period of four hours were we forced to cease operation. Ship breakdown caused us about five hours of down time during this cruise. These were mostly minor delays, e.g., wire off a winch, and did not seriously hamper operations. The most significant delays were due to navigation delays due to power losses on shore stations and skywave problems. In all, the down time was nearly 47% of the total time spent at sea.

Station Occupied: A total of 157 stations were occupied and the following sampling accomplished:

Smith-MacIntyre grabs	-	151	(6 subsamples made at each station)
Piston cores	-	49	(length range 3 to 10 ft.)
Box cores	-	5	
XBT casts	-	67	
Bottom photographs	-	37	
Suspended sediments	-	24	(3 at each of 8 stations)
Benthic infauna	-	156	

(In addition drift bottle casts were made at 43 stations)

Deviations from Cruise Plan Caused by Physical Conditions:

1. Box coring--continuous high seas throughout the cruise prohibited safe box coring operations except for one brief period. The box cores will be taken on a following cruise leg.
2. Bottom photography--presumably because of the rough sea state, bottom water over the entire area surveyed was extremely turbid. Consequently no photographs of the bottom could be obtained. Attempts were made at 37 stations spaced at different locales across the shelf but all yielded only documentation of high turbidity. The turbidity was confirmed by high concentrations of suspended material in all bottom water samples. Although the failure to obtain bottom photographs was a disappointment, the documentation of high bottom turbidity across the entire shelf is significant: either the bottom sediments over the shelf to its outer edge are being stirred in situ by sea state conditions of 4 to 5; or the turbid water represents high stirring in the shallower inner shelf and transport of the sediment seaward across the shelf by bottom currents.

Preliminary Scientific Results:

1. The 3.5 kHz seismic reflection profiles suggest numerous gas seeps associated with down-to-the basin faulting along the outer edge of the shelf in an area bounded by 96° - 96° 20' W. and 27° 30' - 27° 35' N. (outer edge of Matagorda addition).

Preliminary Scientific Results (continued)

2. Numerous manganese nodules of pebble size were obtained from a topographic high near the outer edge of the shelf in an area of a known high rate of sediment deposition. This is the first report of manganese nodules in the western Gulf.
3. The XBT data showed a mass of warm water over the middle and outer shelf that seems to have become detached from the coast; over the northern part of the survey area, the warm water mass was present at the surface but southward the warm water layer was overlain to progressively greater depths by colder surface water. This is an anomalous and unexpected circumstance that probably reflects a complex water movement pattern on this shelf that is related to an interaction of shelf circulation and wind surface stress.

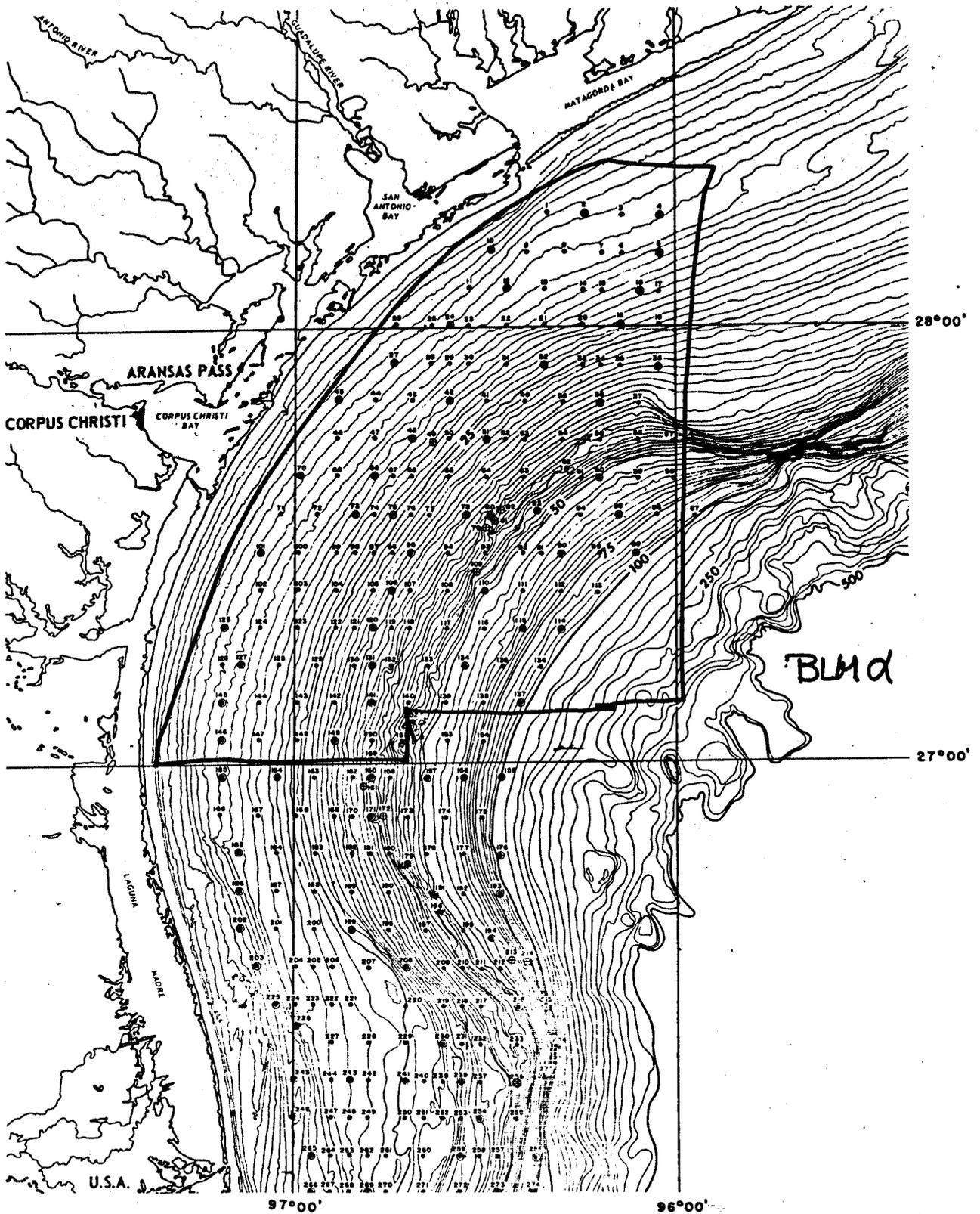


Figure 1--Location of benthic sample stations for geologic studies. • indicates bottom grab; ● indicates both pipe core and box core in addition to bottom grab.