DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED ON BEHALF OF THE U.S. BUREAU OF LAND MANAGEMENT
STATE TERRITORIAL WATER DATA COLLECTED IN COOPERATION WITH THE BUREAU OF ECONOMIC GEOLOGY, UNIVERSITY OF TEXAS AT AUSTIN

MISCELLANEOUS INVESTIGATIONS SERIES
MARINE GEOLOGY ATLAS
CORPUS CHRISTI QUADRANGLE, TEXAS
MAP I-1287-B

DISCUSSION

This map is one of a set of six environmental geologic maps for the Corpus Christi 1° x 2° quadrangle, Texas. The six maps constitute a marine geologic atlas that has been designed to integrate a variety of environmental data and to show the fundamental geologic and associated processes involved in the building and evolution of the Continental Shelf.

The topical maps interrelate data on water circulation and sedimentation, trace metals, geochemistry, biogeology, sea-level change, and deformational movements within the Continental Shelf, including folding, faulting, diapirism, and slumping. The types of data portrayed on individual maps are those that have a cause-and-effect interrelationship in the environment. For example, amounts of trace elements and numbers of invertebrates that live in bottom sediments are both closely related to the grain size or texture of the sediments. Likewise, the sediment-deposition rate is dependent on the speed and direction of oceanographic currents (both surface and subsurface). The maps are organized to emphasize the interactions of processes as a function of time and to demonstrate the long-term effects of the related processes. Thus, map A covers the most fundamental aspect of marine geology, the rate at which sediment introduced to the ocean is spread by its transporting medium, water. The rate of spreading varies from minutes and hours to seasons and years; therefore, yearly rates of sediment deposition are related to the movement of water averaged in both yearly and seasonal increments. Map B shows trace-metal data for surficial bottom sediments. Map C portrays somewhat longer term cumulative effects of the varying hydraulic regimes, as revealed by the grain size of surficial bottom sediments (sampled to a depth of 6 cm), and the variations in the texture and type of sediment deposited over hundreds or thousands of years, as revealed by gravity cores that penetrated to depths from a few tens of centimeters to 2 m. The amount of sediment deposited over the Continental Shelf and the extent and magnitude of faulting since the last low stand of sea level, about 18,000 years ago, are shown on map D. Map E shows paleogeography of the shelf when it was exposed as land. The cumulative deformation caused by the interaction of sediment loading, diapirism, and sea-level changes over the past several hundred thousand years are shown on map F.

The maps of the Corpus Christi 1° x 2° quadrangle include the Federal lease block grid and bathymetry, so that the data and interpretations can be easily tied to a specific legal geographic entity within the region at a scale large enough to permit reasonable accuracy of location. These maps provide a summary state-of-the-art inventory of the segment of the Continental Shelf located in the Corpus Christi 1° x 2° quadrangle that can be used in planning specific site studies as well as more detailed topical investigations.

SUPPLEMENTARY READINGS

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Berryhill, H. L., Jr., Shideler, G. L., Holmes, C. W., Hill, G. W., Barnes, S. S., and Martin, R. G., Jr., 1976, Environmental studies of the south Texas outer continental shelf, 1975—Geology—Part I. Geologic description and interpretation: Reston, Va., U.S. Geological Survey, available only from U.S. Department of Commerce, National Technical Information Service, Springfield, VA 22161, as Report PB 251341, 273 p.

Feely, R. A., 1975, Major-element composition of the particulate matter in the near-bottom nepheloid layer of the Gulf of Mexico: Marine Chemistry, v. 3, no. 2, p. 121–156.

Holmes, C. W., 1973, Distribution of selected elements in surficial marine sediments of the northern Gulf of Mexico continental shelf and slope: U.S. Geological Survey Professional Paper 814, 7 p.

_____1977, Clay mineralogy, in Berryhill, H. L., Jr., editor, Environmental studies, south Texas outer continental shelf, 1976—Geology: Reston, Va., U.S. Geological Survey, available only from U.S. Department of Commerce, National Technical Information Service, Springfield, VA 22161, as Report PB 277-337/AS, 626 p.

Pinsak, A. P., and Murray, H. H., 1960, Regional clay mineral patterns in the Gulf of Mexico, in Swineford, A., editor, Clays and clay minerals: National Conference Clays and Clay Minerals, 7th, Washington, D. C., October 1958, Proceedings, p. 162–177.

EXPLANATION

STATION LOCALITY AND GRAPHS SHOWING TRACE-METAL CONTENT OF BOTTOM SEDIMENTS—Amounts indicated by bars are in parts per million. Numbers along base of graph represent the following six trace metals: 1, Ba; 2, Zn; 3, Cr; 4, Pb; 5, Cu; and 6, Ni. Number above sample locality (dot) is amount of Cd in ppm; number below is amount of organic carbon in percent. The sample locality dot is leadered to the actual sample locality when it could not be centered. To be analyzed for trace metals the sediment samples were ashed at 450°C for six hours, leached with 15.7N HNO_3, and analyzed with Perkin Elmer 303 and 360° atomic absorption spectrophotometers. The precision of analyses in percent are as follows: Ba, 9; Cd, 8.3; Cr, 7.4; Cu, 4.4; Ni, 5.9; Pb, 7.4; and Zn, 4.2. Summary maps showing the general distribution of trace metals in the region during winter 1974 are included (fig. 1)

PERCENTAGE OF SAND IN BOTTOM SEDIMENTS—Approximately located. Based on composite analysis of upper 6 cm of sediments. Areas with more than 50 percent sand content shown in yellow. Minimum sand grain size, 0.063 mm

SAMPLE STATION—Locality of station where Smith-MacIntyre grab samples were taken for seasonal monitoring of changes in trace-metal content of surficial bottom sediments (fig. 2). Roman numeral is transect designation; arabic number is station designation

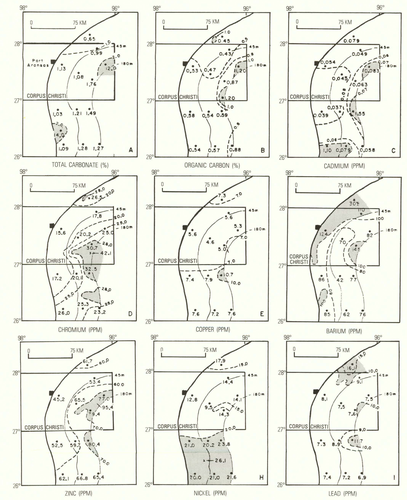


Figure 1.—Regional summary maps showing general distribution of trace metals in surficial sediments on the south Texas outer Continental Shelf during winter 1974. Water depths (solid lines) and isopleths (dashed lines) approximately located.

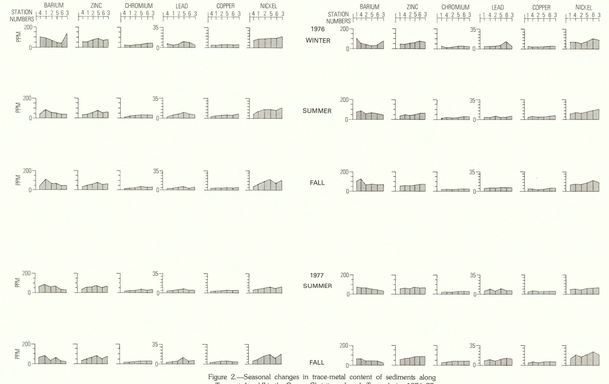


Figure 2.—Seasonal changes in trace-metal content of sediments along Transects I and II in the Corpus Christi quadrangle, Texas during 1976–77. Transect I, stations 1 and 4 are shown on the Beeville quadrangle to the north (I-1288-B).

Base from U.S. National Ocean Survey,
Base map information including bathymetry, compiled by the U.S. National Ocean Survey from NOS hydrographic surveys supplemented by hydrographic information from other sources. Bathymetric contour intervals: 10 meters to the 200-meter depth, supplemented by 2-meter intervals, thence 50 meters to maximum depth. Datum M.S.W.
Universal Transverse Mercator Grid, Zone 14; 10,000-meter ticks (—) are shown on the neatline

EVALUATION OF BATHYMETRIC SURVEY ACCURACY

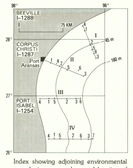
SURVEY NUMBER	SURVEY DATE	SCALE	SURVEY LINE SPACING (NAUT. MILES)	HORIZONTAL POSITION (METERS)
H-5612	1939	1:10,000	.02– .12	15–30
H-5613	1934	1:10,000	.02– .10	15–30
H-5693	1934–35	1:20,000	.03– .12	20–40
H-5694	1934–35	1:20,000	.02– .15	20–40
H-6394	1938	1:20,000	.07– .15	20–40
H-6395	1938	1:20,000	.04– .10	20–40
H-6396	1938	1:20,000	.05– .15	20–40
H-6397	1938	1:20,000	.06– .17	20–40
H-6401	1938	1:40,000	.22– .80	30–100
H-6402	1938	1:40,000	.12– 1.28	30–100
H-6403	1938	1:40,000	.41– 1.21	30–100
H-6404	1938	1:80,000	.55– 2.10	40–200
H-6405	1938	1:80,000	.10– 2.00	40–200
H-6494	1939	1:40,000	.08– 1.24	30–100
H-6498	1938–39	1:80,000	.36– 1.70	40–200
H-6498a	1939	1:240,000	.50–15.3	600–1500
H-9002	1968	1:20,000	.16– .22	20–40
H-9005	1968	1:20,000	.16– .43	20–40

VERTICAL DEPTH ACCURACY (METERS)

Depth		
	0–20	0.3
	20–50	0.5
	50–200	1.0
	Over 200	1% of depth

TRANSVERSE MERCATOR PROJECTION
Scale 1:250,000

5 0 5 10 15 20 Statute Miles
5 0 5 10 20 25 30 Kilometers
5 0 5 10 15 Nautical Miles



Index showing adjoining environmental geologic maps and general location of sample-station transects used in this series

INTERIOR—GEOLOGICAL SURVEY, RESTON, VA.—1981—GB3315

Compiled by H. L. Berryhill, Jr. and A. R. Trippet in 1978. Scientific contributors include S. A. Marlin, C. W. Holmes, C. A. Rice, G. L. Shideler, and C. E. Stelting

MAP SHOWING TRACE-METAL CONTENT AND TEXTURE OF SURFICIAL BOTTOM SEDIMENTS IN THE CORPUS CHRISTI 1° x 2° QUADRANGLE, TEXAS

Compiled by
Henry L. Berryhill, Jr. and Anita R. Trippet

1981

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