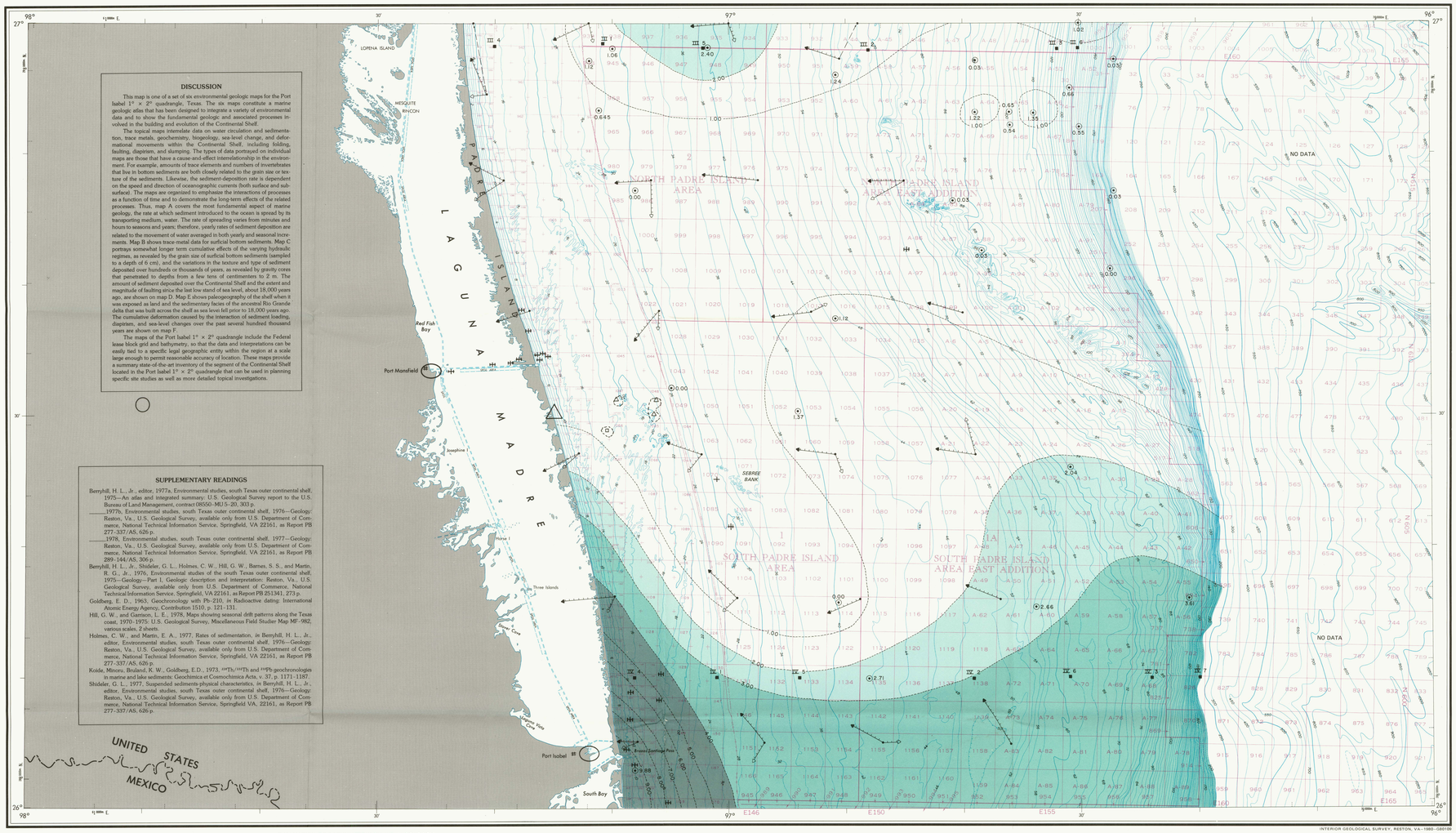
PREPARED ON BEHALF OF THE U.S. BUREAU OF LAND MANAGEMENT



DISCUSSION

This map is one of a set of six environmental geologic maps for the Port Isabel 1° × 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 and the sedimentary facies of the ancestral Rio Grande delta that was built across the shelf as sea level fell prior to 18,000 years ago. 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 Port Isabel 1° × 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 Port Isabel 1° × 2° quadrangle that can be used in planning specific site studies as well as more detailed topical investigations.

SUPPLEMENTARY READINGS

Berryhill, H. L., Jr., editor, 1977a, Environmental studies, south Texas outer continental shelf, 1975—An atlas and integrated summary: U.S. Geological Survey report to the U.S. Bureau of Land Management, contract 08550-MU5-20, 303 p.

_____1977b, 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.

_____1978, Environmental studies, south Texas outer continental shelf, 1977—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 289-144/AS, 306 p.

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.

Goldberg, E. D., 1963, Geochronology with Pb-210, *in* Radioactive dating: International Atomic Energy Agency, Contribution 1510, p. 121–131.

Hill, G. W., and Garrison, L. E., 1978, Maps showing seasonal drift patterns along the Texas coast, 1970–1975: U.S. Geological Survey, Miscellaneous Field Studies Map MF-982, various scales, 2 sheets.

Holmes, C. W., and Martin, E. A., 1977, Rates of sedimentation, *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.

Koide, Minoru, Bruland, K. W., Goldberg, E.D., 1973, ^{226}Th/^{230}Th and ^{210}Pb geochronologies in marine and lake sediments: Geochimica et Cosmochimica Acta, v. 37, p. 1171–1187.

Shideler, G. L., 1977, Suspended sediments-physical characteristics, *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.

Base map information including bathymetry, compiled by the 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 MLW.

Universal Transverse Mercator Grid, Zone 14; 10,000 meter ticks1 are shown on the neatline

Lack of sufficient data on portions of this map requires the use of generalized form lines to infer probable shape for conical or elliptical shaped features that would otherwise appear truncated. The form lines are not at the prescribed contour interval.

EVALUATION OF BATHYMETRIC SURVEY ACCURACY

SURVEY NUMBER	SURVEY DATE	SCALE	SURVEY LINE SPACING (NAUT. MILES)	HORIZONTAL POSITIONING (METERS)
H-6397	1938	1:20,000	.06-.17	20-40
H-6403	1938	1:40,000	.41-1.21	30-100
H-6405	1938	1:80,000	1.0-2.0	45-700
H-6489	1939	1:20,000	.06-.23	20-40
H-6490	1939	1:20,000	.06-.13	20-40
H-6491	1939	1:20,000	.03-.14	20-40
H-6493	1939	1:10,000	.07-.06	15-30
H-6494	1939	1:40,000	.08-1.24	30-100
H-6495	1939	1:40,000	.15-1.30	30-100
H-6496	1939	1:40,000	1.31-2.08	30-100
H-6497	1939	1:80,000	3.5-2.10	45-200
H-6498	1938-39	1:80,000	.36-1.70	45-200
H-6499a	1939	1:240,000	.50-15.30	600-1500

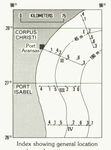
VERTICAL DEPTH ACCURACY (METERS)

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

INTERIOR GEOLOGICAL SURVEY, RESTON, VA—1980—G80109

Compiled by H. L. Berryhill, Jr. and A. R. Trippet in 1978. Scientific contributors include G. W. Hill, L. E. Garrison, C. W. Holmes, E. A. Martin, and G. L. Shideler



MAP SHOWING WATER CIRCULATION AND RATES OF SEDIMENTATION IN THE PORT ISABEL 1° × 2° QUADRANGLE, TEXAS

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

1980

EXPLANATION

DRIFTER RELEASE POINT AND VECTOR—Direction and velocity in km/day for each station are the averages of all drops for all years of study. Drifters used were weighted bottles on the surface and droques on the bottom, dropped at the station from an aircraft. Where the graph could not be centered on the drifter station, it is leadered into the actual station locality. Seasonal averages for all years are shown on figure 1

Surface

Bottom

RATE OF SEDIMENTATION IN MM/YR—Approximately located. Contour interval, 1mm/yr

<2.00 mm/yr

2.00–3.00 mm/yr

3.00–4.00 mm/yr

>4.00 mm/yr

1.24 CORE LOCALITY USED FOR DETERMINING RATE OF SEDIMENTATION—Number indicates average rate of sedimentation in mm/yr during the past 100 to 150 years using the isotope ^{210}Pb as the dating agent

III 3 SAMPLE STATION—Locality of station where South-MacIntyre grab samples were taken for seasonal monitoring of changes in grain size of surficial bottom sediments (fig. 2). Roman numeral is transect designation; arabic number is station designation

PIPELINE LANDFALL

GAS PROCESSING PLANTS

PORTS CAPABLE OF ACCOMMODATING CREWBOATS AND WORKBOATS

GAS FIELDS—Showing location of platforms

Smaller than 2500 sq ft

Larger than 2500 sq ft

SHIPWRECK

ARTIFICIAL FISHING REEF

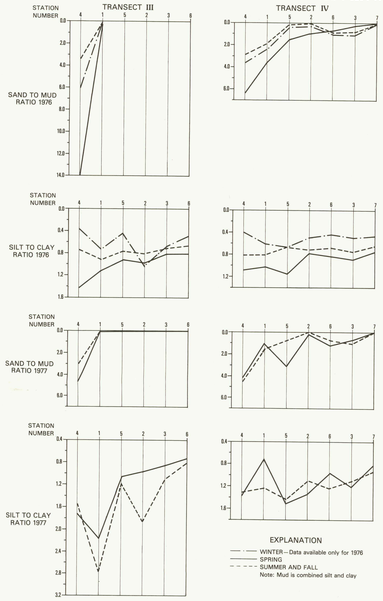


Figure 2.—Seasonal changes in sediment grain size along transects III and IV in the Port Isabel quadrangle, Texas, during 1976-77

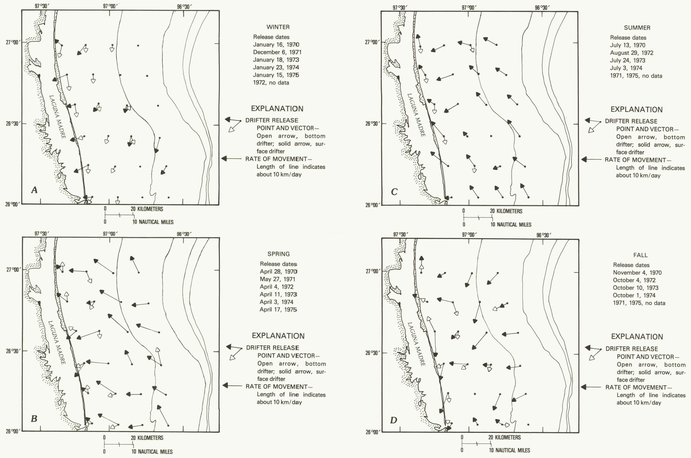


Figure 1.—Seasonal averages for 1970–75 of sea drifter movement in the Port Isabel quadrangle, Texas. *A*, winter; *B*, spring; *C*, summer; and *D*, fall.

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