DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
UNITED STATES NAVAL OCEANOGRAPHIC OFFICE

MISCELLANEOUS FIELD STUDIES
MAP MF–742
Matthews – Geomagnetic Field of Caribbean Sea

ACKNOWLEDGMENTS

The author acknowledges with gratitude the assistance of Paul Grim, National Oceanic and Atmospheric Administration; James Case, U. S. Geological Survey; Gabriel Dengo, Instituto Centroamericano de Investigacion y Technologia Industrial, Guatemala City, Guatemala; Dewey Bracey, U. S. Naval Oceanographic Office; M. Bott, Univeristy of Durham, Durham, England; and Carl Bowin, Woods Hole Oceanographic Institute in locating and obtaining data, in addition to the contributors listed. He also wishes to express gratitude to Roy Beckelhymer, Burmah Oil and gas Co.; Gail Bloomer, Gulf Research and Development Co.; Phillip Lawrence, Mobil Oil Corp.; Arthur Sheldon, Chevron Overseas Production Co.; John Sloat, Union Oil Co. of California; and H. Stephens, Esso Inter-America Inc. for their advice and suggestions for additional sources of data. Peter Topoly and Jose Alonso of the U. S. Naval Oceanographic Office provided valuable assistance in computer programming and data reduction.

COMPILER'S NOTE

This map was constructed from total magnetic intensity data without the removal of the regional magnetic field. It is based upon airborne, shipboard, and land data. Where available, blocks of detailed data are presented without adjustment. Additional portions of the map were from the literature, and the remainder was filled by a composite of random track data adjusted to a 1973.1 epoch as determined by track intersections.

In deciding which data to present in overlapping survey areas, priority was accorded to density of data and quality of navigation. Two U. S. Navy cruises provided a broad coverage of the entire Caribbean Sea. Their data were used for control and as the basis for the adjustment of the random track data. No attempt was made to compile the random track data in the Atlantic and Pacific Oceans, but where detailed surveys were available they were included.

Several portions of the map were available only in anomaly form. Other portions were collected by a flux-gate magnetometer and referenced to an arbitrary datum. To make these portions consistent with the other data, a computer-generated main field was added and then the data was recontoured.

The International Geomagnetic Reference Field (IGRF) was added in all instances for simplicity. The epoch used for the time derivatives in each instance appears in parentheses next to the credit citation for that portion of the map. The magnetic field was too complex in several areas for 100-gamma contour lines to be shown at this scale. Deviations from the 100-gamma contour interval are indicated in parentheses next to the appropriate credit citation.

CONTRIBUTORS

Persons and organizations contributing contoured portions of the map. Numbers in parentheses indicate location on inset map

Colombian Basin (1)
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Durham, England

Old Bahama Channel (3)
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University of Miami
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Nicaraguan Rise (4)(IGRF 1968.0)
BURMAH OIL & GAS CO.
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and
OCCIDENTAL EXPLORATION AND PRODUCTION CO.
Bakersfield, California

Yucatan, Mexico (5) (IGRF 1968.0)
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Blanquilla to Orchilla (8)
(Venezuela Continental Margin)
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Nicaragua (10)
Nicoya Peninsula, Costa Rica (11)
Azüero Peninsula, Panama (12)(500-gamma contour),
Guyana (13)
Trinidad to Tobago (14)
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El Peten, Guatemala (17) (IGRF 1957.0)
UNION OIL COMPANY OF CALIFORNIA
Los Angeles, California

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3. *Presently at KSEPL, Rijswijk, Netherlands.*
4. *Data obtained in the course of governmental surveys assisted by the United Nations Development Programme and executed by the United Nations.*

PUBLISHED MAP SOURCES

Portions taken directly from, or modified from existing published maps

Nevis, Dominica, St. Lucia, St. Vincent, And Grenada (19)
modified from
Andrew, E. M., Masson-Smith, D., and Robson, G. R., 1970, Gravity anomalies in the Lesser Antilles: Institute of Geological Sciences, London, England, Geophysical Paper No. 5.

Unare Bay, Venezuela (20)
Ball, M. M., Harrison, C. G. A., Supko, P. R., Bock, W., and Maloney, N. J., 1971, Marine geophysical measurements on the southern boundary of the Caribbean Sea: Geol. Soc. America Mem. 130, p. 1–33.

Atlantic Ocean East of Northern Lesser Antilles (21) (IGRF 1968.0)
modified from
Bunce, E. T., Phillips, J. D., and Chase, R. L., 1974, Geophysical study of the Antilles outer ridge, Puerto Rico Trench, and northeast margin of the Caribbean Sea: *Am. Assoc. Petroleum Geologists Bull., v. 58, n. 1*, p. 106-123.

Bahamas, North of Cuba (22) (IGRF 1965.0)
modified from
Drake, C. L., Heirtzler, J., and Hirsham, J., 1963, Magnetic anomalies off eastern North America: Jour. Geophys. *Research* v. 68, no. 18, p. 5259-5275.

Netherlands Leeward Antilles (23)
modified from
Lagaay, R. A., 1969, Geophysical investigations of the Netherlands Leeward Antilles: Verhandelingen der Koninklijke Nederlandse Akademie van Wetenschappen, Afd. Natuurkunde, Eetste Reeks, Deel XXV, n. 2, Amsterdam, Netherlands.

Northern Shelf of Honduras (24)
modified from
Pinet, P. R., 1971, Structural configuration of the Northwest Caribbean Plate Boundary: Geol. Soc. America Bull. v. 82, p. 2027–2032.

Virgin Island Bank (25)
Renard, V., 1967, Virgin Bank: Correlation of magnetism and gravity with geology: Rice University, unpublished Ph.D. thesis, Houston, Texas.

Jamaica (26) (IGRF 1955.0)
modified from
Robinson, Edward, 1975, Jamaica and offshore banks, preliminary magnetic anomalies and bathymetry: Mines and Geology Division, Ministry of Mining and Natural Resources, Jamaica.

Cuba (27) (IGRF 1965.0)
modified from
Soloviev, O. N., Skidan, S. A., Pankratov, A. P., and Skidan, I. K., 1964, Comentarios sobre el mapa magnetometrico de Cuba: La Habana, Ministerio de Industrias, Rev. Technologica, v. 2, n. 4, p. 5-23.

North of Surinam (28)
Veldkamp, J. and Vesseur, H. J. A., 1967, Geomagnetic anomalies in the western part of the continental shelf of Surinam: Hydrographic Newsletter Special Publication No. 5, Hydrographer of the Royal Netherlands Navy, The Hague, Netherlands.

CONTRIBUTORS OF RAW DATA

Institutions, agencies, or companies which provided analog data or digital magnetic track data other than given under Published Sources and Additional Sources

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University of North Carolina
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Vening Meinesz Laboratorium
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Woods Hole Oceanographic Institute
Woods Hole, Massachusetts

ADDITIONAL SOURCES

Avery, O. E., Carroll, J. C., and Bracey, D. R., 1966, Shipboard magnetic survey of an area north of the Lesser Antilles: U. S. Naval Oceanog. Office IR H-5-66, Wash., D. C.

Baron, J. G. and Lorentzen, G. R., 1965, An airborne geomagnetic investigation of a reported declination anomaly in eastern Panama: U. S. Naval Oceanog. Office IR H-5-65, Wash., D. C.

Bracey, D. R., 1963, Geologic interpretation of marine magnetic data in an area off the southern Bahama Islands: U. S. Naval Oceanog. Office IMR M-7-63, Wash., D. C.

Bracey, D. R., 1968, Structural implications of magnetic anomalies north of the Bahama-Antilles Islands: Geophysics, v. 33, n. 6, p. 950-961.

Bracey, D. R. and Avery, O. E., 1963, Marine magnetic survey off the southern Bahamas, Project M-15: U. S. Naval Oceanog. Office, Technical Report TR-160, Wash., D. C.

Burton, G. D., 1965, Geomagnetic survey northeast of Hispaniola: unpublished manuscript, U. S. Naval Oceanographic Office IR H-1-65, Wash., D. C.

Courage, F., 1966, Airborne magnetometer-scintillation counter survey of the central part of the Republic of Panama: Lockwood Survey Corp., Ltd., Toronto, Canada, Part I (unpublished).

Fahlquist, D. A., Antoine, J. W., Bryant, W. R., Bouma, A. and Pyle, T., 1972, Seismic reflection profiles in the Yucatan Channel: Memorias, VI Conferencia Geologica del Caribe, Margarita, Venezuela, p. 367-371.

Griscom, A., and Geddes, W. H., 1966, Island-arc structure interpreted from aeromagnetic data near Puerto Rico and the Virgin Islands: Geol. Soc. America Bull., v. 77. p. 153–162

Jagodits, F. L. and Grant, F. S., 1966, Airborne magnetometer survey for Government of Trinidad and Tobago (with U.N.D.P. assistance): by Huntec Ltd. for Lockwood Survey Corp. Ltd., Toronto, Canada (unpublished).

O'Neil, N., 1965, Aeromagnetic survey of the Gulf of Fonseca: Xth Pan American Consultation on Cartography, Pan American Institute of Geography and History, 25 June-10 July, Guatemala City, Guatemala.

Peter, G., 1972, Geology and geophysics of the Venezuelan continental margin between Blanquilla and Orchilla islands: National Oceanic Atmos. Admin. Tech. Rept. ERL 266-AOML 6, U. S. Department of Commerce, Boulder, Colorado.

Van Voorhis, G. R. and Davis, T. M., 1966, Magnetic anomalies north of Puerto Rico: trend removal with orthogonal polynomials: U. S. Naval Oceanog. Office IR H-1-66, Wash., D. C.

SCALE: 1:2,500,000 AT 19°00'N LATITUDE MERCATOR PROJECTION

0 100 200 NAUTICAL MILES

0 100 200 300 KILOMETRES

MAP SHOWING TOTAL INTENSITY GEOMAGNETIC FIELD OF THE CARIBBEAN REGION

by
James E. Matthews
U.S. NAVAL OCEANOGRAPHIC OFFICE 1976

Compiled in 1975

For sale by U. S. Geological Survey, price $.50