DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
THE U.S. MINERALS MANAGEMENT SERVICE

MISCELLANEOUS FIELD STUDIES
MAP MF—1710
SHEET 1 OF 2

INTRODUCTION

Lydonia Canyon is one of several large submarine canyons that indent the eastern U.S. Continental Shelf along the southern flank of Georges Bank (Index map). This bathymetric map of the upper part of Lydonia Canyon (water depths shallower than about 2,000 m) was prepared as part of a study of the physical oceanography and geology of Lydonia Canyon (Butman and others, 1983; Twichell, 1983). An accurate map of the canyon at a scale of at least 1:50,000 was needed for placement of current-meter moorings, for location of hydrographic and sediment sampling stations, and for interpretation of current-meter and geologic data. The map covers the area from 40°10'N. to 40°40'N. and from 67°28'W. to 67°50'W.

Veatch and Smith (1939) published the first detailed bathymetric map of Lydonia Canyon and the adjacent shelf and slope at a scale of 1:120,000. Other maps include National Ocean Survey bathymetric map NK 19-12 (1978) at a scale of 1:250,000 compiled from data obtained at 1.8- to 8.2-kilometer line spacing (some of the same data used by Veatch and Smith), a map by Thompson and others (1980), and a map by McGregor (1983) of the deeper part of Lydonia Canyon compiled from data obtained at about 2-kilometer line spacing. The most detailed map was published by Carpenter and others (1982) at a scale of 1:125,000 based on observations collected over a 1,600-meter^2 grid. In addition, Seanlon (1982) has mapped major morphologic features of the slope in this region at a scale of 1:500,000 using GLORIA sidescan images; her plate shows the location of the Lydonia Canyon axis and major side gullies.

ACKNOWLEDGMENTS

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METHODS

Data were collected on 12 cruises and during nine submersible dives into the canyon axis (table 1). The sea-floor profile was recorded primarily by means of a 12-kHz wide-beam echo sounder (table 1). The depth to sea floor was digitized from strip charts at 1- or 5-minute intervals (typically every few hundred meters) for all cruises. Local highs, lows, and inflection points were also digitized for the *Lulu* 106 and *Whitefoot* 81-2 cruise data. Digitization of the echo-sounding records in the narrow part of the canyon axis between depths of about 1,000-2,000 m was in some instances difficult because side echoes from the canyon walls obscured the floor. However, the *Alvin* dives provided accurate depths along part of the axis in this region. A constant sound speed of 1,500 m/s (probably correct within 1-2 percent) was used to convert acoustic travel time to water depth. The depth observations were referenced to sea level at the time of observation and were not corrected for tidal height. Maximum tidal range in this region of the shelf is about 1.4 m (Moody and others, in press).

The computed depth measurements were contoured by hand at a scale of 1:25,000 on a Universal Transverse Mercator projection and reduced to 1:50,000 (Sheet 1). The spatial distribution of digitized depths is shown on a separate map to indicate the control for the contoured features (Sheet 2).

Navigation was by Loran-C. Latitude and longitude were computed from the Loran-C time delays using the Northstar[1] 6000 5101 algorithm. We estimate that the Northstar latitude/longitude grid is offset from true latitude/longitude by about 0.92 km toward 294.5° (Collins, 1980; McCullough and others, 1982). The Loran-C time delays for 9960 chain stations W and Y are shown around the border of the chart. A Loran-C grid for the chart can be made by drawing straight lines between the border markings.

[1]Use of trade names is for descriptive purposes only and does not constitute endorsement by the U.S. Geological Survey or the U.S. Minerals Management Service.

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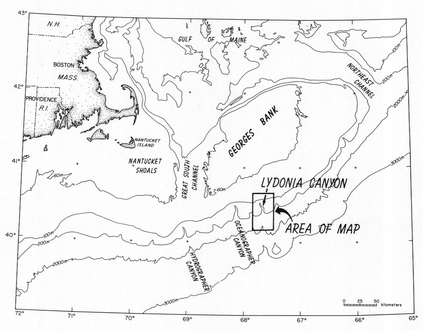

Index map showing the location of Lydonia Canyon on the southern flank of Georges Bank (bathymetry simplified from Uchupi, 1968).

Table 1—*Cruises on which bathymetric data were obtained and system used to measure depth*

Cruise	Instrument	Dates
State Arrow	Minisparker	Aug. 1978
Iselin 78-2	3.5 kHz	Sept. 1978
Gilliss 79-3	3.5 kHz	June 1979
Oceanus 81	12 kHz	May 1980
Gyre 80-7	3.5 kHz	Aug. 1980
Lulu	12 kHz	Aug.-Sept. 1980
Alvin dives	Pressure sensor	Aug.-Sept. 1980
Oceanus 88	12 kHz	Oct. 1980
Oceanus 90	12 kHz	Nov.-Dec. 1980
Oceanus 95	12 kHz	Apr. 1981
Whitefoot 81-2	Uniboom	July 1981
Oceanus 122	12 kHz	July 1982
Oceanus 130	12 kHz	Nov. 1982

BATHYMETRIC MAP OF LYDONIA CANYON, U. S. ATLANTIC OUTER CONTINENTAL SHELF

By
Bradford Butman and John A. Moody

1984

Universal Transverse Mercator Projection
Scale 1:50,000

0 5 kilometers

0 3 nautical miles

Bathymetric contours: 10 meter interval to 200 meters depth, 50 meter interval to 2300 meters depth.

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