U.S. DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

DESCRIPTION OF MID-RANGE SIDESCAN-SONAR DATA FROM THE CONTINENTAL SLOPE OFFSHORE NEW JERSEY, COLLECTED BY R.V. GYRE, CRUISE 80-G-8A

by

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As part of its responsibilities under Federal programs to lease areas of the Outer Continental Shelf for petroleum development, the U.S. Geological Survey (USGS), in cooperation with the U.S. Bureau of Land Management, has been studying the surficial geology of the Continental Slope between Lindenkohl and South Toms Canyon offshore of New Jersey (fig. 1). The area, chosen as a representative segment of the Continental Slope in the Baltimore Canyon Trough region, has been bathymetrically and geologically mapped (Robb and others, 1981a,b) by using closely spaced high-resolution seismic-reflection data (Robb, 1980a, b), observations from submersible (Slater and others, 1981), and piston cores (Booth and others, 1981; Olsen and others, 1981). Studies of the area have continued, using sidescan-sonar images to show the shapes and locations of small-scale geomorphic features. This report accompanies the public release of copies of those sidescan-sonar data, which are described below.

The sidescan-sonar data were acquired in cooperation with the Lamont-Doherty Geological Observatory of Columbia University during cruise 80-G-8A of the R.V. GYRE from 4 to 10 September 1980. The data were collected by a Sea-Marc I sidescan-sonar system constructed by International Submarine Technology, Inc., Redmond, WA. The sonar vehicle was towed 300 m above the bottom. Data were corrected for slant range in real time, and the records show a 5-km swath (2.5 km to each side). Tracklines of the R.V. GYRE (fig. 2) were laid out so that parallel images, centered 5 km apart, were acquired in two sets. Thus, most places in the area surveyed were viewed by the sonar system at two viewing angles which differ by about 40 degrees of azimuth. Because the acoustic response of a given feature varies with viewing angle, these two views provide comparative information regarding the real configuration of

the bottom topography.

Echosounding data were acquired during sidescan operations by means of a 3.5-kHz echosounding system using a hull-mounted transducer and a 4.5-kHz echosounder mounted on the sidescan vehicle at depth. These data provide water depth, vehicle altitude, and a small degree of acoustic penetration in the subbottom.

Track locations of R.V. GYRE were established by using Loran-C and satellite fixes. The horizontal distance from the ship to the sidescan-sonar vehicle was calculated from vehicle depth (pressure sensor) and slant range (acoustic). Lateral position of the vehicle (to either side of the ship track) was estimated by post-cruise comparison of data from parallel or crossing tracks.

All data and navigational records from this cruise are keyed to GMT (Greenwich mean time). Note that the sidescan fish was towed as much as 45 minutes of travel time behind the ship's position: hence, although points on the hull-mounted-echosounder records and sidescan-sonar records may be annotated with the same time, the positions they represent and bottom features they show are not the same because the sensors were on different vehicles. Ship speed was most commonly about 2 knots (3.7 km/hr) and ranged from 1.7 knots (3.1 km/hr) to 2.9 knots (5.4 km/hr). Sidescan-sonar-vehicle altitude was monitored, and tow-cable length was continuously varied to maintain the vehicle altitude of about 300 meters off the bottom.

Sidescan-sonar data were collected in several forms:

1. Continuous strip-chart images showing slant-range corrected, dual-channel, port and starboard, 5-km swath. Along-track scale was corrected by occasional manual adjustment of the paper-feed rate of a 19" recorder. This record set is recorded

dual channel (port and starboard) and is labelled "A" or "orthorectified."

2. Continuous strip-chart images showing slant-range corrected, dual-channel, 5-km swath, recorded at constant recorder-paper rate, but with each incoming data sweep repeated four times, to expand the along-track scale. These dual-channel records are labelled "B" or "slant-range corrected."
3. Continuous strip chart of raw sidescan records, dual channel, showing data from the 4-second sweep (6-km swath) having no processing for slant-range correction or ship speeds. Records are labelled "Raw, P + S."
4. Continuous strip-chart records labelled "raw port" and "raw starboard" are single-channel recordings of port- or starboard-side, 4-second sweep analog data (3-km range) having no corrections applied.

Echosounding data were collected in two forms:

1. "Ship's 3.5-kHz" records represent data acquired by means of a hull-mounted transducer on the R.V. GYRE.
2. Records labelled "Fish-flyer record" are a dual-channel presentation of the "ship's 3.5 kHz" and the "Fish 4.5 kHz", or the sonar-vehicle-mounted 4.5-kHz transducer. Note that the "Fish 4.5 kHz" records show the sea bottom relative to fish altitude, not as depth below a constant datum.

Original records may be viewed at the USGS office in Woods Hole, Massachusetts. Microfilms of data from this cruise, including the sidescan-sonar and echosounder records as discussed above and charts (scale 1:50,000) showing the tracks of the R.V. GYRE and of the sidescan-sonar vehicle, can be purchased only from the National

Geophysical and Solar-Terrestrial Data Center, NOAA/EDIS/NGSDC, Code D621, 325 Broadway, Boulder, Colorado, 80303 (303-497-6338).

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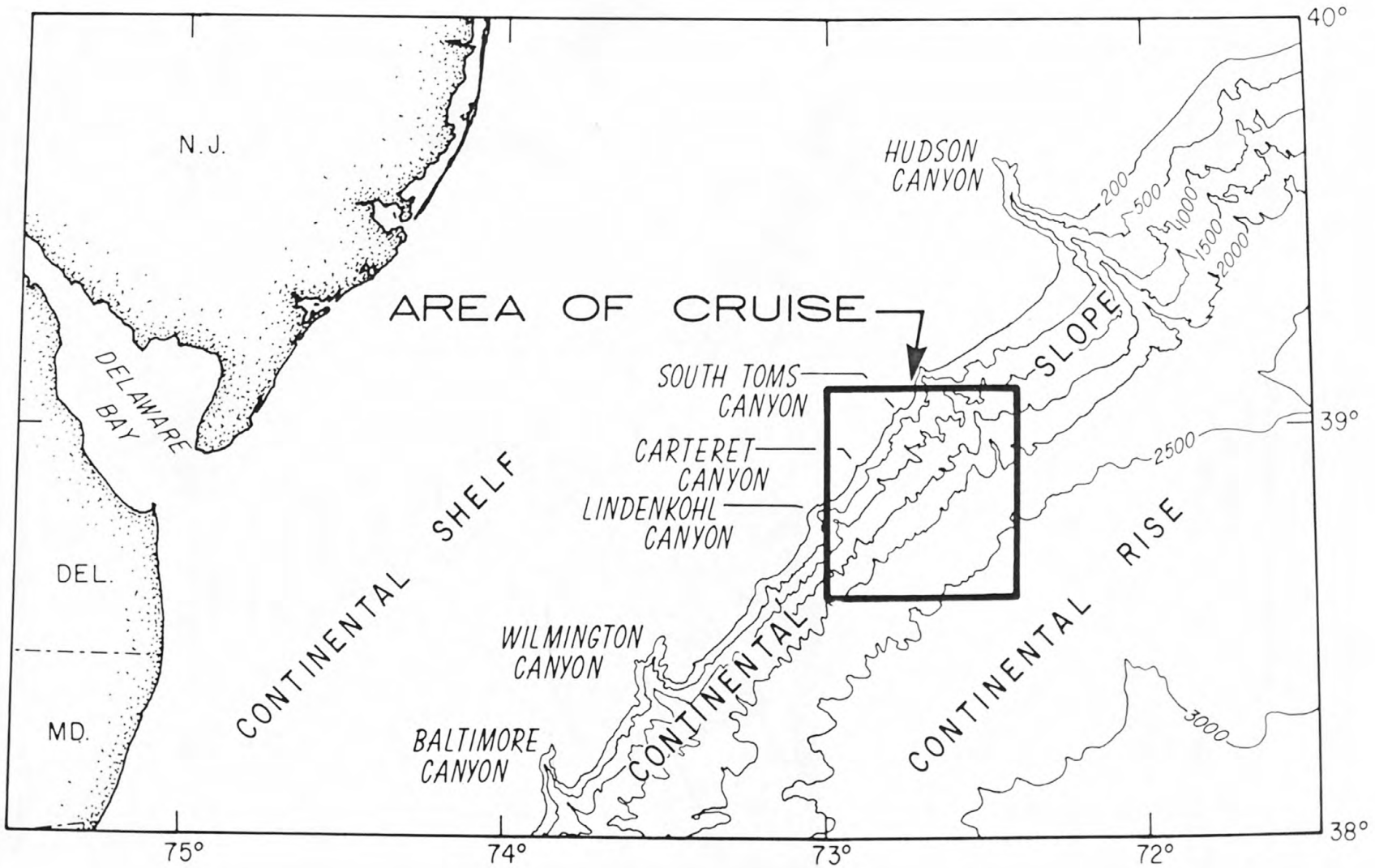

Figure 1. Map showing location of study area of GYRE cruise 80-G-8A. Bathymetry in meters.

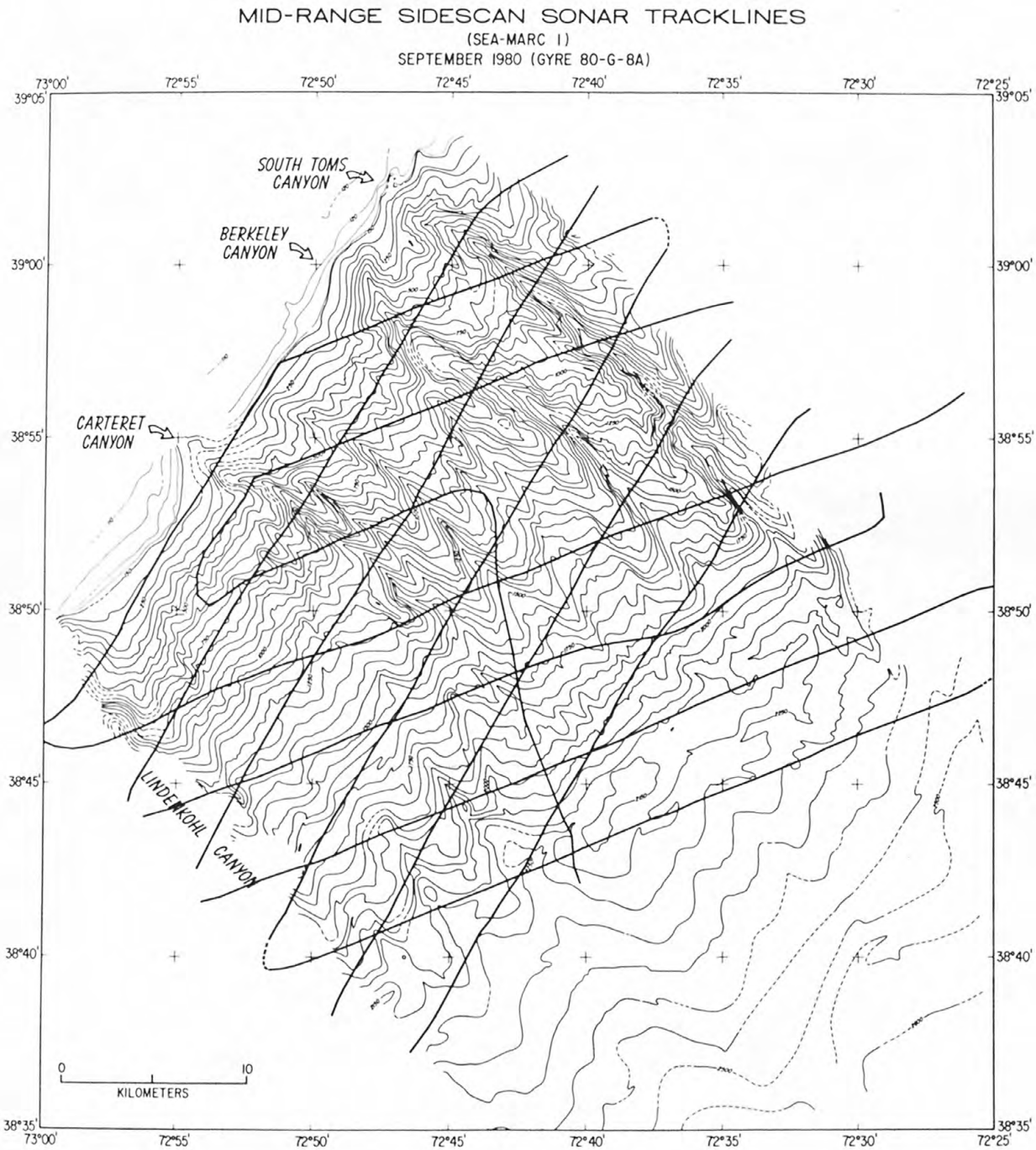

Figure 2. Map showing location of mid-range sidescan-sonar tracklines, GYRE 80-G-8A. Bathymetry in meters (base from Robb and others, 1981b).