J. Robb

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AII-89-Leg 4

CRUISE REPORT

U.S. GEOLOGICAL SURVEY
OFFICE OF MARINE GEOLOGY
WOODS HOLE, MASSACHUSETTS 02543

BALTIMORE CANYON TROUGH AREA

RV ATLANTIS II
CRUISE-89-LEG 4

JUNE 1-12, 1975

AII-89 Leg 4
Knebel

INTRODUCTION

A cruise aboard the RV ATLANTIS II by the U.S. Geological Survey, Office of Marine Geology, Woods Hole, Massachusetts was conducted within the Baltimore Canyon Trough area from June 1, 1975 to June 12, 1975. The Baltimore Canyon Trough (fig. 1) is a structural depression which underlies the middle and outer continental shelf off the coasts of New Jersey, Delaware, and Maryland; it is considered a likely area for petroleum exploration and possible production in the near future.

This leg of the ATLANTIS II cruise (Leg 4) had three primary objectives. The first objective was to obtain long vibracores in order to deduce the characteristics and ages of the subbottom sediments. These cores were in support of the acoustic survey which was completed in the Baltimore Canyon Trough area in May of 1974. Second, short cores of the subbottom sediments were to be collected. By measuring the relative amounts of Pb_{210} within these short cores, the ages and the accumulation rates of sediments for the past 100 years could be determined. Finally, stability of the sediments at the shelf edge was to be studied. Near surface (and apparently recent) fault displacement had been observed in high-resolution seismic records, suggesting that a mechanism existed for the generation of slumps at the shelf break and on the upper continental slope.

In addition to these primary objectives, several special studies were pursued as well. These studies included: (1) sampling of the surface sediments in order to determine their trace metal and hydrocarbon contents; (2) sampling of the suspended sediments at the water surface; (3) emplacement of pipes into the sea floor (by the vibracore rig) for use as reference points during subsequent submersible dives; (4) outlining the areal extent of the sand-wave field near the head of Wilmington Submarine Canyon; (5) dropping of sea-bed drifters at selected locations; and (6) outlining the path of the ancestral Delaware valley across the continental shelf.

In support of these topical studies, the following systems and equipment were used to collect the basic data and samples:

A. Acoustic Systems

1. 3.5 kHz system

2. Minisparker system

B. Sampling Equipment

1. Vibracore rig (20 ft.)

2. Hydrostatically-damped gravity corer

3. Smith-McIntyre grab sampler

4. Gravity corer

5. Suspended-sediment filtering system

The 3.5 kHz system did not work properly during the bulk of the cruise; only a bottom trace could be obtained on the continental shelf and the signal usually was lost on the continental slope. Thus, it functioned, for the most part, as a fathometer during the cruise period.

In addition, the vibracore operations were hampered by a number of factors. On several days, the weather and sea state were not amenable to the operation. On other occasions, the (sometimes unpredictable) drift of the ship (while anchored) caused delays, both in the amount of time at a station and in retrieval of the vibracore air hose. The air hose was fouled three times around the ship's rudder. A third factor was the water-depth limitation for vibracore operations. The air hoses on the rig collapsed several times during the cruise; the maximum water depth for successful coring was about 80 m. Finally, the deployment and weighing of the anchor took more time than anticipated. The delays associated with anchoring necessarily cut into the total time that could be devoted to vibracoring.

SCIENTIFIC PERSONNEL

The scientific party during the cruise included the following personnel:

Harley J. Knebel	U.S.G.S., Woods Hole	Chief Scientist
Michael H. Bothner	U.S.G.S., Woods Hole	Cruise Leader
Bobb Carson	Lehigh Univ./ U.S.G.S.	Watch Chief
Francis Kohout	U.S.G.S., Woods Hole	Watch Chief
David Twichell	U.S.G.S., Woods Hole	Watch Chief
Frank Jennings	U.S.G.S., Woods Hole	Electronics Tech.
Douglas Fluddy	U.S. Coast Guard Academy	
Patricia Forrestel	U.S.G.S., Woods Hole	
Raymond Hall	U.S.G.S., Woods Hole	
David Huff	Lehigh University	
William Jaworski	U.S.G.S., Woods Hole	
Grant Kimmel	U.S.G.S. (WRD), Mineola, N.Y.	
Edward Lane	U.S. Coast Guard Academy	
David Mazzaferro	U.S.G.S. (WRD), Hartford, Conn.	
Charles Meeder	U.S.G.S., Woods Hole	

The following personnel from Alpine Geophysical Associates, Inc. collected the necessary vibracores and emplaced the reference pipes into the sea floor:

Charles Dill	Supervisor
Charles Gove	
Bernard Katz	

OPERATIONAL STATISTICS

1.	3.5 kHz Records	958 n.miles (1774 km)
2.	Minisparker Records	356 n.miles (659 km)
3.	Sample Stations	42
4.	Bottom Sediment Samples	(78) — 78
	a. Vibracores	19
	b. Hydrostatically-damped Gravity Cores	37
	c. Smith-McIntyre Grab Samples	15
	d. Gravity Cores	7
5.	Suspended Sediment Samples	(50) — 50
6.	Sea-bed Drifters Released	57
7.	Reference Pipes Emplaced in the Sea Floor	3

Figures 2 and 3 show the locations of the sampling stations and the tracklines along which Minisparker records were obtained.

FIGURE 1.

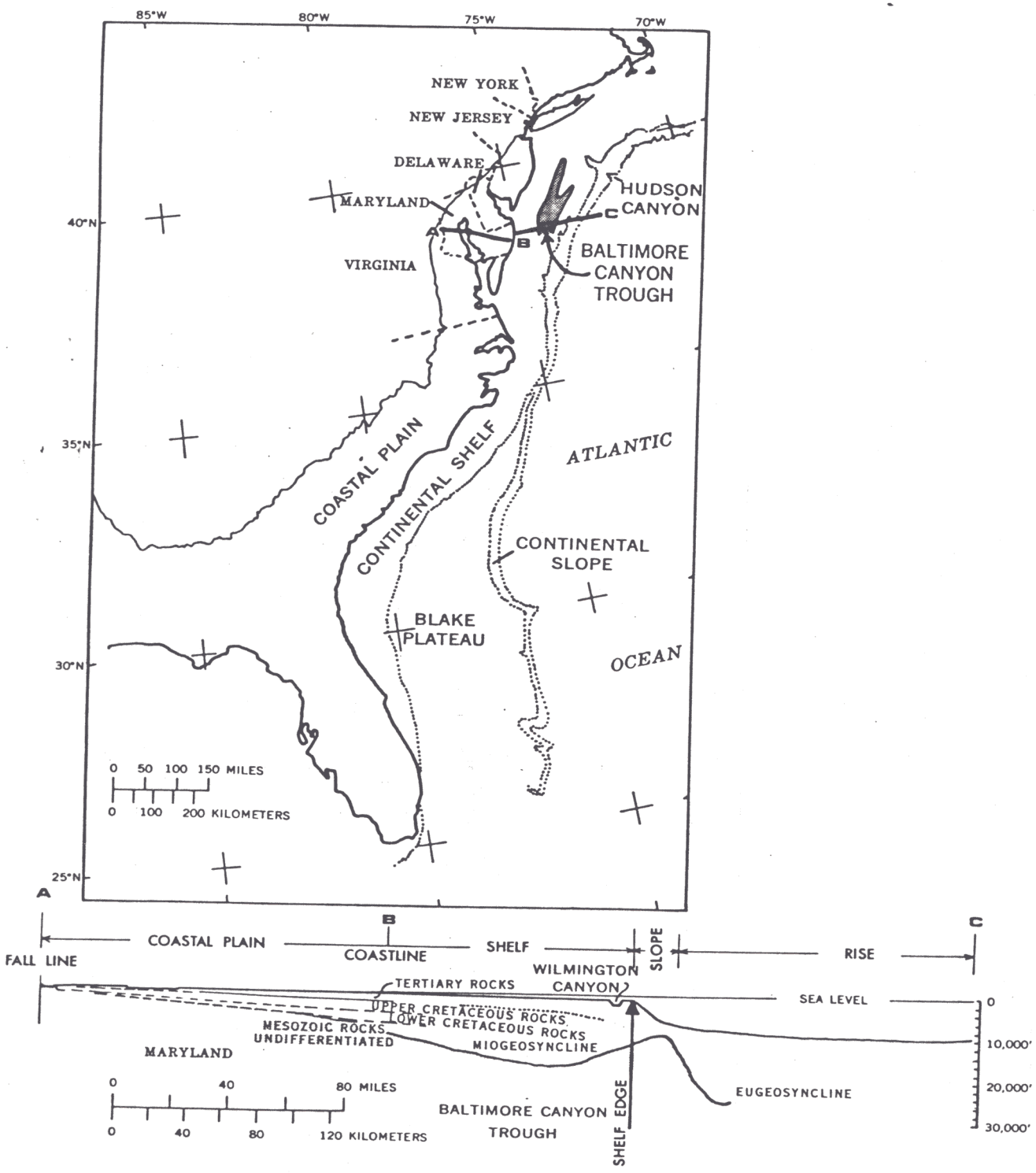

85°W
80°W
75°W
70°W
40°N
35°N
30°N
25°N
NEW YORK
NEW JERSEY
DELAWARE
MARYLAND
VIRGINIA
HUDSON CANYON
BALTIMORE CANYON TROUGH
A
B
C
COASTAL PLAIN
CONTINENTAL SHELF
ATLANTIC OCEAN
CONTINENTAL SLOPE
BLAKE PLATEAU
0 50 100 150 MILES
0 100 200 KILOMETERS
FALL LINE
COASTAL PLAIN
COASTLINE
SHELF
SLOPE
RISE
WILMINGTON CANYON
TERTIARY ROCKS
UPPER CRETACEOUS ROCKS
LOWER CRETACEOUS ROCKS
MESOZOIC ROCKS UNDIFFERENTIATED
MIOGEOSYNCLINE
EUGEOSYNCLINE
SEA LEVEL
0
10,000'
20,000'
30,000'
MARYLAND
0 40 80 MILES
0 40 80 120 KILOMETERS
BALTIMORE CANYON TROUGH
SHELF EDGE

FIGURE 2.

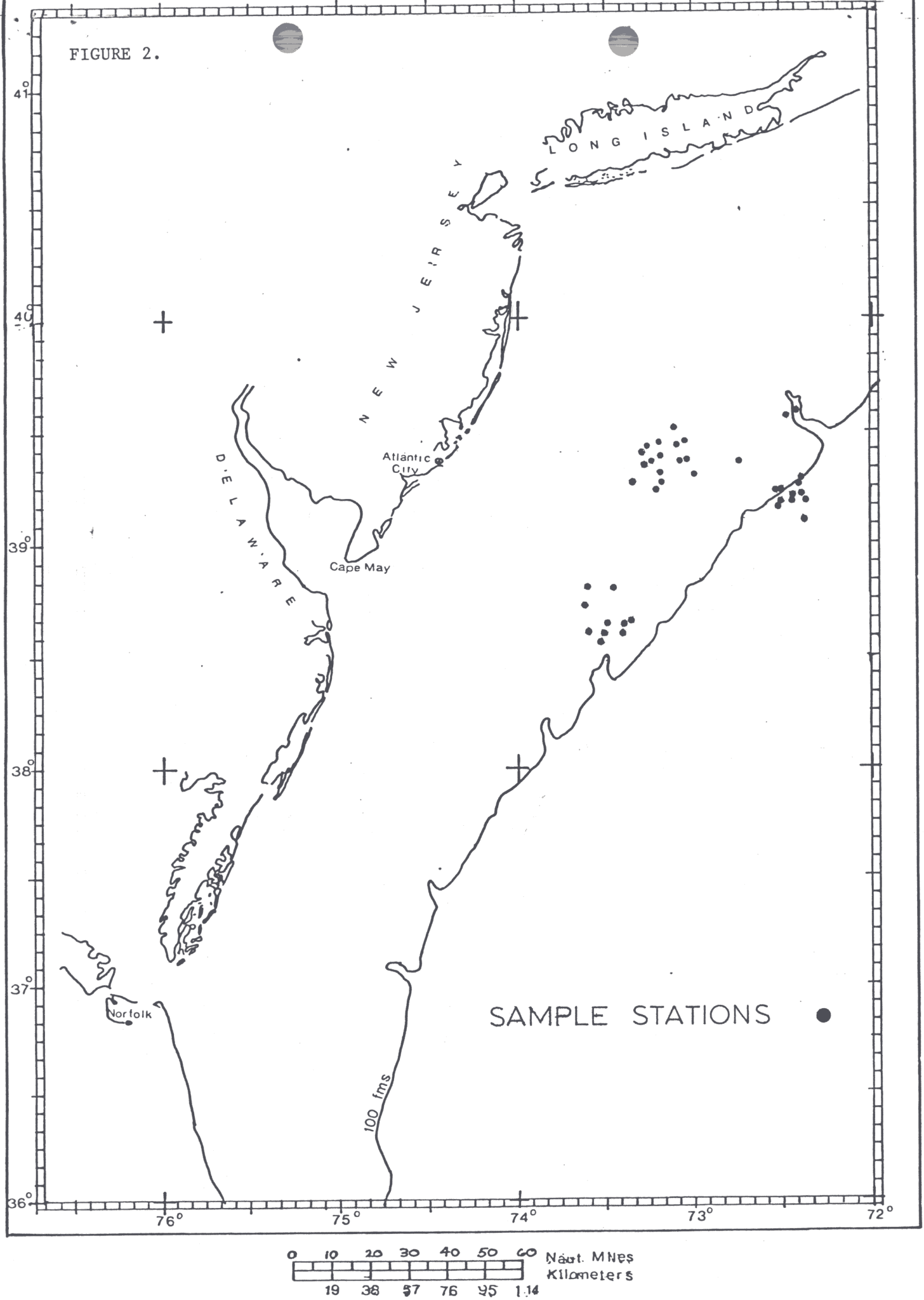
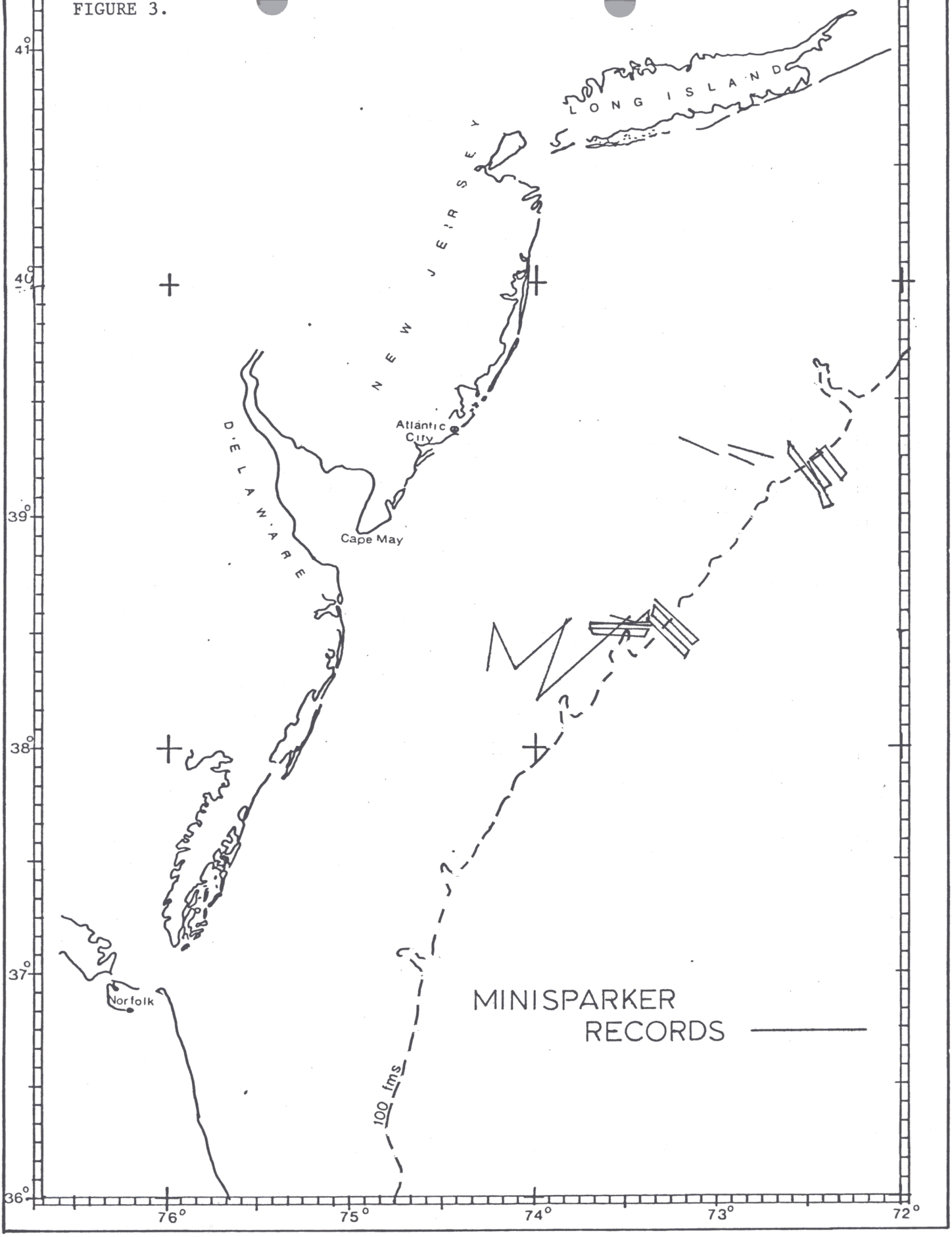
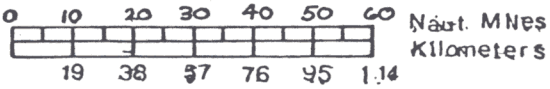

LONG ISLAND
NEW JERSEY
DELAWARE
Atlantic City
Cape May
Norfolk
100 fms
SAMPLE STATIONS
41°
40°
39°
38°
37°
36°
76°
75°
74°
73°
72°
0 10 20 30 40 50 60 Naut. Miles
19 38 57 76 95 114 Kilometers

FIGURE 3.


LONG ISLAND
NEW JERSEY
DELAWARE
Atlantic City
Cape May
Norfolk
MINISPARKER RECORDS
100 fms
41°
40°
39°
38°
37°
36°
76°
75°
74°
73°
72°


0 10 20 30 40 50 60 Naut. Miles
19 38 57 76 95 1.14 Kilometers