

J-G

CRUISE REPORT  
R/V ENDEAVOR  
EN-061

**Core Laboratory**  
Graduate School of Oceanography  
University of Rhode Island

SCHEDULE

Leg 1.	Depart	February 11, 1981	Abidjan, Ivory Coast
	Arrive	February 19, 1981	Ascension Island
Leg 2.	Depart	February 21, 1981	Ascension Island
	Arrive	March 10, 1981	Rio de Janeiro, Brazil

J-G

REGION OF INVESTIGATION AND PURPOSE

1. Rock dredging of the Mid-Atlantic Ridge (1° - 20°S) and sampling of Ascension Island for the purpose of laboratory petrological and geochemical studies.
2. Water sampling along the MAR rift bottom for helium isotopic and related analyses.

Both types of sampling were aimed at charting probable geochemical provinces and mantle source heterogeneities as well as studying relationships between the composition of the South Atlantic seafloor and volcanic rocks exposed on islands in the region.

This cruise is part of a long-term cooperative project between WHOI (Drs. G. Thompson, W.B. Bryan, S. Humphries and W. Jenkins) and URI (J-G Schilling).

SCIENTIFIC PARTY

Jean-Guy Schilling	Chief Scientist	URI
Richard Kingsley	Co-chief Scientist	URI
Marion Rideout	Graduate Student	URI
Christine Olsen	Graduate Student	URI
Bryan McCulley	Geologist	URI
Roger Roussell	Marine Specialist	URI
Stephen Imms	Marine Specialist	URI
George Beaulieu	Marine Assistant	URI
Richard Beaudreau	Marine Specialist	WHOI
Roxanne Marino	Research Assistant	WHOI
Jocelyn Gamble	Research Assistant	WHOI

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SHIP COMPANY

John S. Tate	Master
Adrian K. Lane	1st Mate
John P. Ciastkewicz	2nd Mate
Henry B. Bickford	Boat Swain
Charles E. Parks	Able-Seaman
Jack E. Buss	Able-Seaman
Samuel T. Wiley	Able-Seaman
John P. Symonds	Chief Engineer
John F. Rutledge, Jr.	Junior Engineer
Douglas G. Lindner	Oiler
William E. Benders	Stew/Cook
James F. Rogers	Cook/Messman

OPERATIONS AND RESULTS

Breakdown of operations were the following:

	<u>Hours</u>	<u>Nautical Miles</u>
Survey Lines* (8-10 knts.)	64	576
Transit* (12 knts.)	385	4,536
Dredge stations	128	
Hydrocast stations	22.5	
Sampling-Ascension Island	60	
Total	659.5	5,112

Results obtained during the cruise are:

1. The cruise tracks are shown in Fig. 1. Continuous bathymetric and seismic reflection (3.5 and 12KHz) profiling and total magnetic field recording (1 min. intervals) were obtained during both transit and survey lines; except within 200 miles of the coasts of Africa and Brazil and a 5-mile zone off the coast of Ascension Island.
2. Twenty-five magnetic and bathymetric survey lines were run across the Mid-Atlantic Ridge for the purpose of locating more precisely the rift, or ridge axis, which remains poorly charted in the South Atlantic, and to locate the dredge and hydrocast stations.

An unnamed fracture zone at the latitude of 17°50'S was identified. The active transform part of this fracture zone, where the ridge axis is displaced, is approximately 60n.m. long. The corresponding spreading flow line passes approximately through St. Helena Island. We propose to name this fracture zone the "Bonaparte Fracture Zone".

\* Survey lines and transit include continuous 12.5 and 3.5KHz seismic reflection and bathymetric profiling and total magnetic field recording.

OPERATIONS AND RESULTS - - cont'd.

3. Twenty-five dredge stations were occupied. Their locations are shown in Fig. 2. Exact coordinates are given in Table 1. Volcanic rocks of variable freshness were successfully recovered at 24 of these stations. Three dredge hauls returned empty, and one dredge was lost. Glass of variable freshness was obtained at 22 of the 24 successful stations.
4. Eight hydrocast stations composed of 8 10-liter Niskins bottles placed at various intervals up to 500m from the seafloor were successfully occupied for the purpose of He isotopic and related analyses (W. Jenkins, WHOI). Sixty-four oxygen and salinity measurements were obtained on board, as well as insitu temperatures. Results of these measurements can be obtained from Dr. W. Jenkins (WHOI). Table 2 lists the exact coordinates and depths of these water samples.
5. Three days were spent on Ascension Island for the purpose of rock sampling and direct familiarization with the geology of this island. Classic localities described by Charles Darwin during the voyage of HMS BEAGLE (1896) and R.A. Daly's geological study (1925) were revisited as well as others. Eighteen volcanic localities were sampled. The samples range from basaltic to trachytic, and include ultramafic, gabbroic and granitic inclusions from two localities. Figure 3 shows the locations of these samples.

ACKNOWLEDGMENTS

The assistance and cooperation of Captain John S. Tate and his ship company is greatly appreciated. We thank the British Government for permitting us to land and conduct geological observations on Ascension Island. Our visit to Ascension could not have been successful without the invaluable logistic assistance of our host, His Honor, the Administrator Bernard Paucefort and his wife, Patricia; C. Chrisman, Chief of Police; Lt. Col. Richard G. Donovan, Commander Ascension AAF; Gene Zink, NASA Station Director; N. Abell, BBC Director; and the directors of Cable and Wireless Ltd. and South African-South Atlantic Cable Co., and many other islanders who so kindly provided their time, transportation and shared their knowledge of the island with us. Their warm welcome will remain a unique life-experience to all of us. This work was supported by the National Science Foundation under Grant OCE78-24690.

TABLE 1. DREDGE STATIONS - CRUISE EN061

STATION ID	LOCATION	DEPTH (m)	SURVEY LINE	FEATURE	RECOVERY	GLASS AVAILABILITY	WEIGHT (kg)
1D	1° 24.4'S 13° 10.5'W	2400-2800	1	Near MAR crest (elevated!)	Massive aphyric pillow basalt with some glassy crust.	good	155
2D	2° 14.3'S 12° 23.8'W	3810-3960	2	West side MAR rift	Aphyric pillow basalt. Apparently two types: 1) fresh glassy; 2) older looking. Some mud and red consolidated clay.	good	210
3D	3° 26'S 12° 13.5'W	2990-3100	3	West side MAR rift	One large slightly altered pillow basalt, highly feldsparphyric, coated with 2-3mm Mn. - some glass preserved.	poor	75
4D	4° 16.3'S 12° 11.9'W	2500-2700 1800-2200	4	Flank of seamount near MAR axis	Hyaloclastite and small aphyric pillow fragments. Indurated ooze and green mud. Hydrothermal stains.	fair	215
5D	5° 11.1'S 11° 31'W	3000-3600	5	East side MAR rift	Pillow basalt fragments: 1) glassy; 2) older aphyric with Mn stain; 3) older plagiophyric mixed with glass layers. Glass agglomerates (fresh).	abundant & fresh	235
6D	6° 18.6'S 11° 19.3'W	3550 & 2670-3100	6	West side of MAR rift	Pillow basalt fragments: 1) fresh aphyric with glassy crust; 2) plagiophyric with very fresh thick glass; 3) older plagiophyric with Mn stain.	abundant & fresh	310

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STATION ID	LOCATION	DEPTH (m)	SURVEY LINE	FEATURE	RECOVERY	GLASS AVAILABILITY	WEIGHT (kg)
7D	7° 30.4'S 13° 27.4'W	3950-4100	7	MAR rift bottom	Pillow basalts with some fresh glass, aphyric.	minor but fresh	20
8D	8° 00.5'S 13° 23.9'W	3300-3480	8	East side of MAR rift	Pillow basalts: 1) very fresh, glassy and aphyric; 2) plagiophyric with thick glass; 3) older type with Mn stain and some glass.	good	250
9D	8° 36.9'S 13° 16.1'W	2180-2230	9	Inner Mountains of MAR, no rift apparent	Highly altered pillow basalts with 2-5mm Mn crust, horn type solitary coral, oyster shell and indurated ooze.	none	140
10D	9° 06.4'S 13° 19.5'W	2575-2750	10	Bottom of a valley near MAR axis - no rift apparent	Highly to mildly altered pillow basalts: 1) aphyric; 2) olivine phenocryst bearing.	none	105
11D	9° 37'S 13° 13.8'W	1610-1750	11	Top of seamount near MAR axis - no rift apparent	Slightly altered pillow basalts with Mn stain and some glass preserved.	poor	208
12D	9° 55.8'S 13° 07.5'W	2150-2260	12	Top of seamount near MAR axis - no rift apparent.	One large pillow basalt, highly plagiophyric with Mn stain and some glass.	poor	125
13D	10° 33.2'S 13° 00.4'W	3255-3320	13	MAR rift bottom	Pillow basalt, highly feldspar-phyric, with thin glass.	poor	260
14D	11° 03'S 13° 02.2'W	3375-3500	14	West side of MAR rift	Very fresh pillow basalts with glassy crust (bread-crust texture): 1) plagiophyric; 2) Olivine-plagioclase phenocrysts type.	good	260

TABLE 1. DREDGE STATIONS - CRUISE EN061

STATION ID	LOCATION	DEPTH (m)	SURVEY LINE	FEATURE	RECOVERY	GLASS AVAILABILITY	WEIGHT (kg)
15D	12° 01.9'S 14° 24.6'W	3235-3270	15	MAR rift bottom	Partly altered, highly feldsparphyric crust fragments with some glass and Mn stain.	poor	1/2 kg
16D	12° 40.9'S 14° 39.7'W	3510-3640	16	MAR rift bottom	Very fresh and glassy pillow basalts and crusts, plagiophyric.	good	170
17D	14° 39.6'S 13° 29.6'W	2800-2925	17	MAR rift bottom	Pillow basalt & crust: 1) fresh glassy crust with roapy structures, aphyric; 2) glassy pillow slightly palagonitized.	good	155
18D	15° 27.8'S 13° 15.7'W	2770-2950	18	MAR rift bottom	Large and small pillow basalts: 1) fresh with glassy rims; 2) with glassy rims partly palagonitized.	fair	115
19D	16° 49.5'S 14° 19.5'W	3715-3960	19	MAR rift bottom	1) Fresh glassy pillow basalts; 2) basaltic pavement, with abundant tiny vesicles and Mn stain (2 pieces).	very good	280
20D	17° 20.1'S 14° 10.9'W	3430-3500	20B	Volcano in MAR rift bottom	1) Very fresh glassy pillow basalts and crust, plagiophyric; 2) possibly older type.	abundant & very fresh	90

TABLE 1. DREDGE STATIONS - CRUISE EN061

STATION ID	LOCATION	DEPTH (m)	SURVEY LINE	FEATURE	RECOVERY	GLASS AVAILABILITY	WEIGHT (kg)
21D	17° 52.6'S 12° 56.3'W	3775-3860	21	MAR rift bottom	1) Very fresh, highly glassy & feldsparphyric basaltic crust; 2) Slightly older glassy and feldsparphyric pillow basalts with Mn stains.	good	25
22D	18° 22.8'S 12° 50.4'W	3650-3700	22	MAR rift bottom	1) Very fresh and glassy pillow basalts with magnificent flow textures, lightly feldsparphyric; 2) small pillow basalts, glassy and feldsparphyric; 3) slightly older type pillow basalts with some glass.	abundant	195
23D	18° 58.8'S 12° 17.9'W	3495-3580	23	MAR rift bottom	Slightly altered pillow basalts with some glass preserved: 1) freshest, slightly porphyritic with some glass; 2) older, plagiophyric; 3) large diabase block.	poor	160
24D	19° 25.3'S 12° 13.6'W	2850-3100	24	MAR rift bottom - east side	None	none	--
25D	20° 18.9'S 11° 42.7'W	3240-3300	25B	MAR rift bottom	1) Fresh and glassy pillow basalts with some Mn stains; 2) possibly older type as well.	abundant	200

TABLE 2.      HYDROCASTS - CRUISE EN061

STATION	DATE	LATITUDE	LONGITUDE	SONIC DEPTH	TIME SPENT
2H Line 2	Feb. 14, 1981	2-15.45S	12-24.26W	3930m	3 hrs. 10 min.
5H Line 5	Feb. 17, 1981	5-09.46S	11-32.17W	3790m	3 hrs. 20 min.
8H Line 8	Feb. 22, 1981	8-01.48S	13-25.15W	3400m	3 hrs.
11H Line 11	Feb. 23, 1981	9-35.0S	13-13.9W	1710m	1 hr. 45 min.
14H Line 14	Feb. 25, 1981	11-03.9S	13-02.2W	3400m	3 hrs.
15H Line 15	Feb. 26, 1981	12-00.9S	14-26.4W	3125m	2 hrs. 30 min.
18H Line 18	Feb. 28, 1981	15-27.61S	13-15.60W	2905m	3 hrs.
19H Line 19	March 1, 1981	16-50.0S	14-20.20W	3820	2 hrs. 30 min.

Sampling depths for all stations 5, 10, 15, 30, 45, 95, 195, 495m from bottom.

Total Time: 22-1/2 hours



R/V ENDEAVOR ENOGI - CRUISE TRACKS  
SOUTH-ATLANTIC

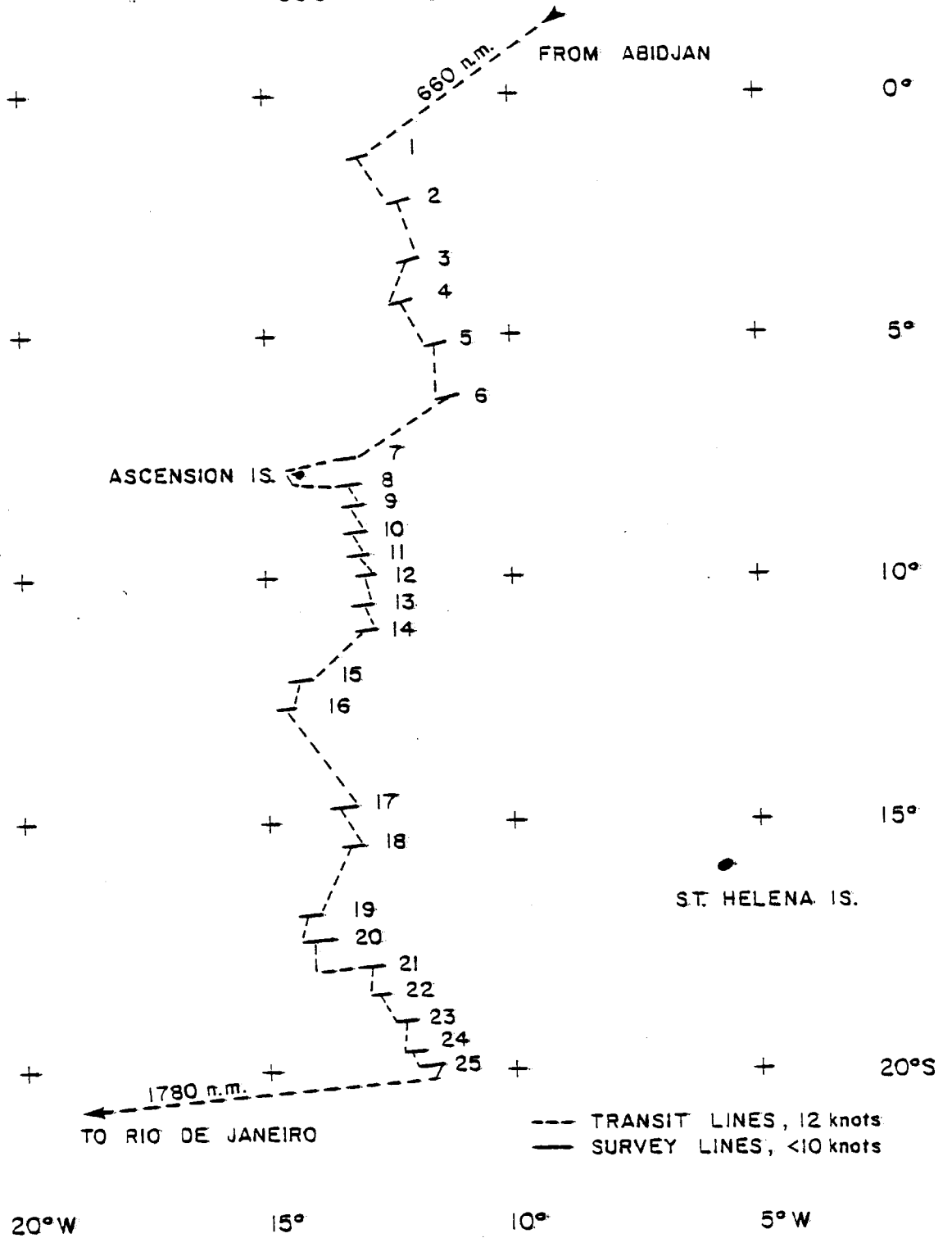


Figure 1.

# R/V ENDEAVOR EN-061 STATION LOCATIONS

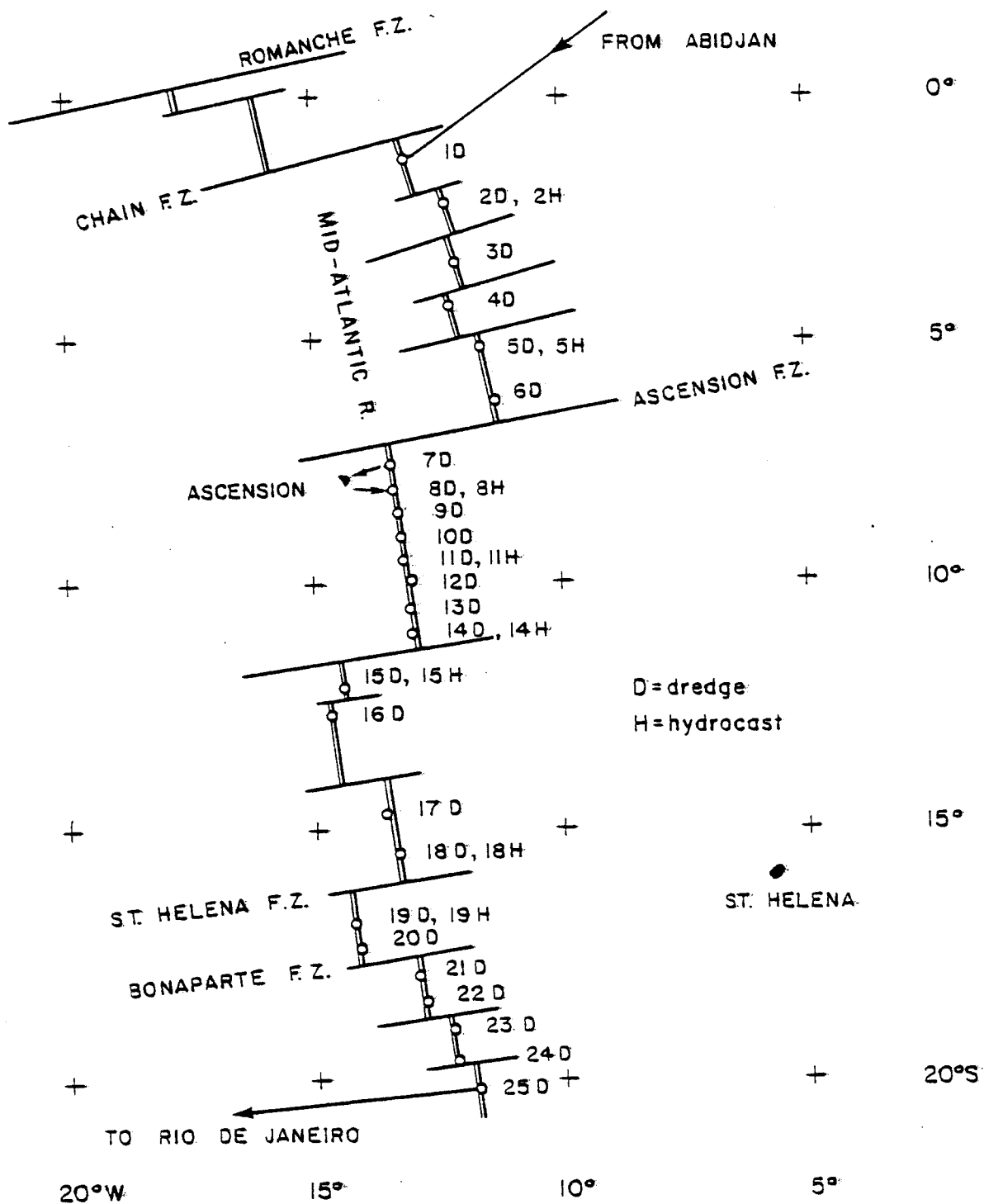


Figure 2.

ASCENSION ISLAND

— TRACHYTE  
..... RECENT FLOWS

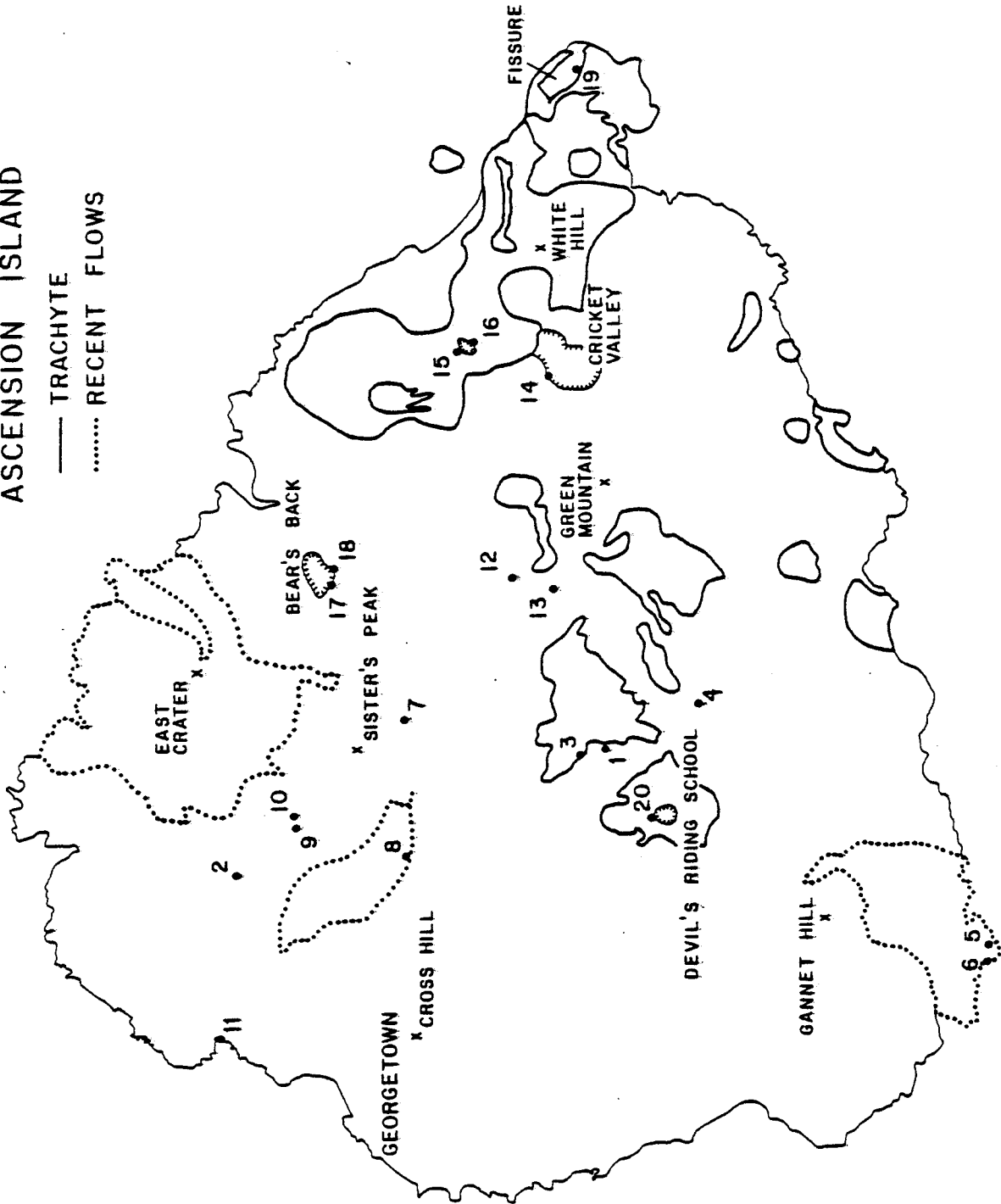


Figure 3.

# CRUISE REPORT

SHIP UTILIZATION DATA

EN-061

UNOLS  
REV. 11/71

SHIP NAME R/V ENDEAVOR		OPERATING INST. URI		PARTICIPATING PERSONNEL			
CRUISE (LEG) NO. EN-061		DATES 2/11/81-3/10/81		CODE	NAME		
AREA OF OPERATIONS: 1° South to 20° South Mid-Atlantic Ridge		PORT CALLS:	DATES	1.	Dr. Jean-Guy Schilling	Ch. Scientist	URI
DAYS AT SEA 26		Abidjan, Ivory Coast	2/11/81	2.	Richard Kingsley	Co-Ch. Scientist	URI
DAYS IN PORT 3		Ascension Island	2/19-2/21/81	3.	Brian McCully	Geologist	URI
		Rio de Janeiro	3/10/81	4.	Richard Boudreau	Marine Specialist	WHOI
				5.	Marion Rideout	Graduate Student	URI

WAS RESEARCH CONDUCTED IN FOREIGN WATERS? NO COUNTRY: \_\_\_\_\_  
 PRIMARY PROJECTS (those which govern the principal operations, area and movements of the ship)

PROJECT TITLE AND PRINCIPAL INVESTIGATOR	SPONSORING ACTIVITY	GRANT OR CONTRACT NUMBER	PARTICIPATING PERSONNEL (AS CODED ABOVE)
Rock dredging of the Mid-Atlantic Ridge (1°S-20°S) and sampling of Ascension Isl. for the purpose of laboratory petrological and geochemical studies. J.G. Schilling, G. Thompson, W.B. Bryan, S. Humphries, W. Jenkins	NSF	OCE78-24690	1 through 12

ANCILLARY PROJECTS (which are accomplished on a not-to-interfere basis and contribute to the overall effectiveness of the cruise)

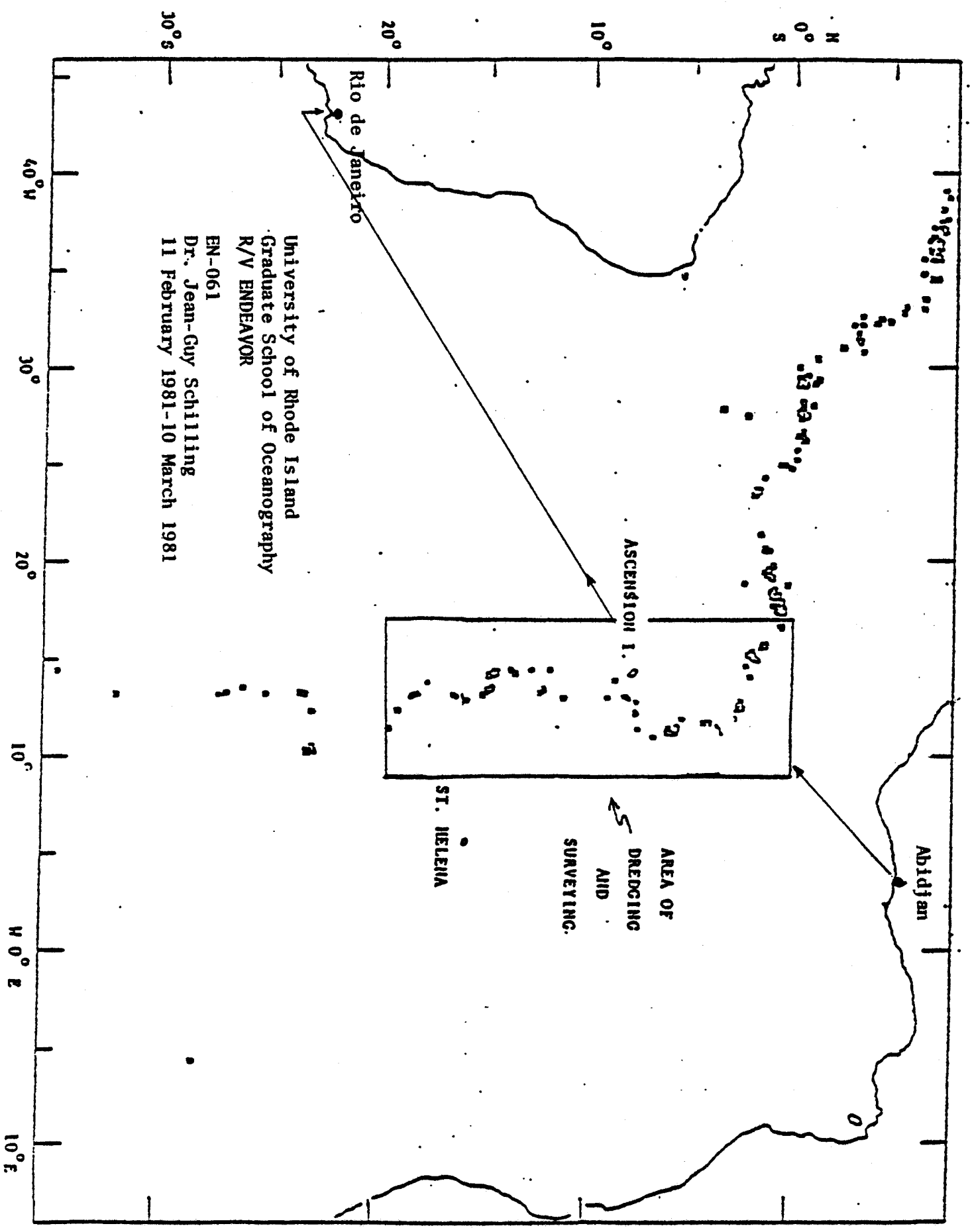
PROJECT TITLE AND PRINCIPAL INVESTIGATOR	SPONSORING ACTIVITY	GRANT OR CONTRACT NUMBER	PARTICIPATING PERSONNEL (AS CODED ABOVE)
Water sampling along the MAR rift bottom for helium isotopic and related analyses. W. Jenkins	NSF	OCE78-24690	4, 7, 9

SIGNATURE [Signature] DATE 7/30/81  
 CHIEF SCIENTIST

COST ALLOCATION DATA			
DAYS CHARGED	AGENCY OR ACTIVITY CHARGED	GRANT OR CONTRACT NO.	
33	NSF	OCE78-24690	

ATTACH PAGE SIZE CRUISE TRACK SIGNATURE [Signature] 7/30/81

(Continue personnel and project listings on reverse if additional space needed)



University of Rhode Island  
 Graduate School of Oceanography  
 R/V ENDEAVOR  
 EN-061  
 Dr. Jean-Guy Schilling  
 11 February 1981-10 March 1981

6.	Christine Olsen	Graduate Student	URI
7.	Roger Roussell	Marine Technician	URI
8.	Stephen Imms	Marine Technician	URI
9.	Roxanne Merino	Research Assistant	WHOI
10.	Jocelyn Gamble	Research Assistant	WHOI
11.	Eric Martin	Geologist	URI
12.	George Beaulieu	Marine Assistant	URI