

# Core Laboratory

Graduate School of Oceanography  
University of Rhode Island

CRUISE REPORT  
GS-7605

PROJECT: Tephrochronology and submarine volcanism in the Lesser Antilles arc.

SCHEDULE: Departed 1800 HRS May 11, 1976 from Fort de France, Martinique.  
Arrived 1300 HRS May 28, 1976 at Bridgetown, Barbados.

FUNDING AGENCY: National Science Foundation, Submarine Geology and Geophysics Program. Grant No. OCE 75-21197

## SCIENTIFIC PARTY:

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R/V JAMES M. GILLISS departed from Fort de France in Martinique at 1800 HRS on May 11, 1976, to commence cruise GS-7605. Captain on this cruise was R.R. Hagan. The principal objective of this cruise was to gather data on the distribution of Lesser Antilles-derived volcanic ash layers in adjacent sedimentary basins. Secondary objectives were a detailed survey of the 1974-active submarine volcano Kick'em-Jenny and a search for the alleged 1902-active Hodder's volcano. Weather was good throughout the cruise and seas were moderate. Cruise terminated in Bridgetown, Barbados, at 1300 HRS on May 28, 1976.

## CORING OPERATIONS:

The ship's track during cruise GS-7605 totalled 2210 nautical miles (figure I). A 3.5 kHz seismic profiling system was operated continuously while underway, and on station both the 3.5 kHz and a 12.5 kHz system were used, giving apparent sub-bottom penetration from 10 to 100 meters. The seismic profiling system proved to be an essential tool in locating sea-floor suitable for piston coring. The first part of the cruise (stations #1 to 16) was devoted to piston and gravity coring near Martinique and on the eastern flank of the arc, off Dominica, Martinique and St. Lucia. Coring this region turned out to be difficult due to the highly disturbed nature of the flank and the scarcity of sedimentary basins. Where present, sedimentary basins on this flank contain coarse sand and turbidites.

The Miami piston coring equipment was used throughout the cruise as principal means of bottom sampling, with a 9.2 m pipe-string. While this system proved convenient and rapid in use, the recovery was disappointing in general. This can be attributed in part to poor penetration in the highly disturbed terrain on the eastern flank of the arc north of the Tobago Trough and to the presence of turbidites in the Grenada Trough. Core recovery on the Atlantic abyssal plain was considerably better, although core recovery here rarely corresponded to observed penetration. A modified gravity corer with a 7.6 cm liner was used throughout the cruise with great success. Undisturbed samples of topmost 0.30-0.70 m of sediment were thus obtained, yielding information on distribution of recent and historic ash layers. During latter part of

cruise this gravity corer was rigged as trigger corer for main piston corer, again with highly satisfactory results. Some sixty-six stations were occupied during the cruise, yielding a total of 156 meters of sediment core. (see Table I)

#### HODDER'S VOLCANO SURVEY:

A detailed survey west of St. Lucia showed no trace of structures which might be interpreted as Hodder's volcano. It is concluded that floating pumice rafts from the 1902 eruption of Mt. Pelee gave rise to the accounts of "Hodder's Volcano".

#### KICK'EM-JENNY VOLCANO SURVEY:

The volcanic core was surveyed in detail in order to search for possible changes in topography as a result of the 1974 eruption. Preliminary examination of the data indicate no major changes since the 1972 survey, with the exception that the crater appears wider and breached to the south. Twelve expendable bathythermographs were launched in and around the crater. Two XBT's recorded significant rise in temperature on the crater floor, from 12.9°C to 17.8°C and from 13.4°C to 18.4°C respectively. Seismic profiling records show unusual "noise" or signal scattering adjacent to and immediately above the crater, possibly due to a thermal anomaly or particulate matter in suspension in the body of water above the crater or due to sonic sources within the crater itself. No such thermal or sonic phenomena were observed in the 1972 survey. Three dredges were attempted on Kick'em-Jenny. The first dredge was lost at 600-800 meters depth on the first attempt due to bridle wire failure at 7,500 kg tension. This encounter with solid rock on the southwestern flank of the core was a surprise, as grabs in this region in 1972 had yielded loose lapilli and scoria only. A second dredge on the eastern flank of the Kick'em-Jenny cone at 200 to 300 m depth brought up 150 kg of bread-crust bombs, lapilli, scoria and sand of black amphibole-porphyrific basalt. A third dredge inside the crater yielded numerous lava blocks of amphibole-porphyrific basalt up to 0.4 m in width. Solid outcrops of this sort were not observed in the crater region in 1972. One possible interpretation of the available evidence is that, after initial explosive activity, the crater has brimmed over with lava in the last eruption, leaving a solid collar of lava on the rim. Combination of steep slope of the cone and low effusion rate resulted in fragmentation of the lava at the top of the cone, giving rise to hyaloclastics on the flanks. Breaching of the crater is indicated by the bathymetry and is probably related to issuing of lava flows to the south and southwest, encountered as solid rock at the first dredge station. These observations result in considerable modification of our previous interpretation of the mode of eruption of Kick'em-Jenny: flank deposits of hyaloclastic material are more likely due to fragmentation of a lava front at the crater rim rather than pyroclastic deposits derived from explosive activity. A hydrocast was taken inside the crater, with accompanying surface water samples.

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## TABLE I

## STATION LIST

Station #	Latitude	Longitude	Depth (M)	Type	Recovery
1	14°27.1N	61°38.5W	2856	G.C.	0.48 M (core)
2	14°28.5	61°40.8	2880	P.C.	3.74
3	15°15.0	61°59.0	2684	P.C.	8.05
4	15°42.4	60°14.8	5030	P.C.	1.70
5	15°30.8	60°04.5	5110	P.C.	5.67
6	16°00.7	59°19.3	5095	G.C.	0.70
7	15°20.0	59°26.2	3640	G.C.	0.62
8	15°05.2	59°35.8	3933	P.C.	5.58
9	15°05.4	59°35.3	3877	G.C.	0.65
10	14°42.0	59°39.7	2575	G.C.	0.67
11	14°43.2	59°38.3	2625	P.C.	4.65
12	14°11.4	60°00.3	2120	G.C.	0.90
13	14°11.6	59°59.5	2131	P.C.	4.49
14	13°52.5	60°13.5	1675	G.C.	0.70
15	14°00.3	60°23.1	1760	G.C.	0.60
16	14°01.7	60°20.0	1791	P.C.	0.32
17	14°00.2	61°39.7	2955	G.C.	0.34
18	14°03.0	61°08.2	1810	P.C.	3.56
19	14°03.6	61°07.7	1810	G.C.	0
20	14°03.0	61°08.5	1856	G.C.	0
21	13°55.0	61°51.5	2960	P.C.	2.40
22	<sup>1326</sup> 175M-76 13°56.9	61°57.2		G.C.	0.57- <i>Granada</i>
23	13°23.8	61°51.4	2975	G.C.	0.40
24	13°23.8	61°51.8	2982	P.C.	5.76
25	13°22.3	62°20.2	2980	P.C.	4.00
26	13°23.1	62°20.4	2980	G.C.	0.42
27	12°37.4	62°11.7	2980	P.C.	8.81
28	12°38.4	62°10.5	2975	G.C.	0.61
29	12°18.1	61°42.7	1680	P.C.	5.10
30	12°18.5	61°43.0	1706	G.C.	0
31	12°18.2	61°43.1	1706	G.C.	0.62
32	12°17.8	61°39.2	915	G.C.	0
33	12°17.8	61°39.2	999	G.C.	0
34	12°18.0	61°39.2	934	G.C.	0
35	12°18.2	61°38.8	600	DREDGE	0 Kg
36	12°17.8	61°38.4	220	DREDGE	100 Kg
37	12°18.0	61°38.4	220	DREDGE	150 Kg
38	12°18.0	61°38.4	200	HYDROCAST	5 liters
39	12°25.0	61°43.8	235	G.C.	0.72
40	12°29.0	60°44.2	2348	P.C.	4.30
41	12°45.8	60°31.6	2448	P.C.	4.28
42	12°47.0	60°32.3	2447	G.C.	0.58
43-Not used → 44	13°09.5	60°36.6	2082	G.C.	0
45	13°11.9	60°36.0	2091	G.C.	0
46	13°09.0	60°32.4	2258	P.C.	0.20
47	13°08.0	60°28.0	2380	G.C.	0.50
48	13°01.6	60°21.0	2430	P.C.	1.44
49	13°01.3	60°18.4	2470	G.C.	0.54
50	12°59.0	60°12.1	2470	G.C.	0.40
51	12°55.4	60°07.0	2150	G.C.	0.45
52	12°54.2	59°58.8	1790	G.C.	0.40

G.C. = GRAVITY CORE

P.C. = PISTON CORE

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TABLE I

STATION LIST (Continued).

53	12°32.8	59°22.4	1685	P.C.	4.40
54	12°14.5	58°31.3	1700	P.C.	3.86
55	11°37.9	57°14.7	4300	P.C.	1.05
56	11°15.8	56°08.0	4450	P.C.	7.39
57	10°48.8	54°50.4	4455	P.C.	8.00
58	10°27.4	53°29.7	4700	P.C.	6.23
59	11°45.6	53°02.5	4908	P.C.	3.79
60	13°04.2	52°32.8	5093	P.C.	5.50
61	14°15.3	52°10.3	5100	P.C.	5.30
62	14°08.5	53°39.7	5225	P.C.	5.59
63	14°12.7	55°05.2	5355	P.C.	6.06
64	14°18.5	56°26.0	5140	P.C.	5.56
65	14°26.4	57°39.3	5375	P.C.	5.00
66	14°26.8	58°32.0	3365	P.C.	1.88

(Some Trigger Weight Cores Were Also Recovered)

G.C. = GRAVITY CORE

P.C. = PISTON CORE

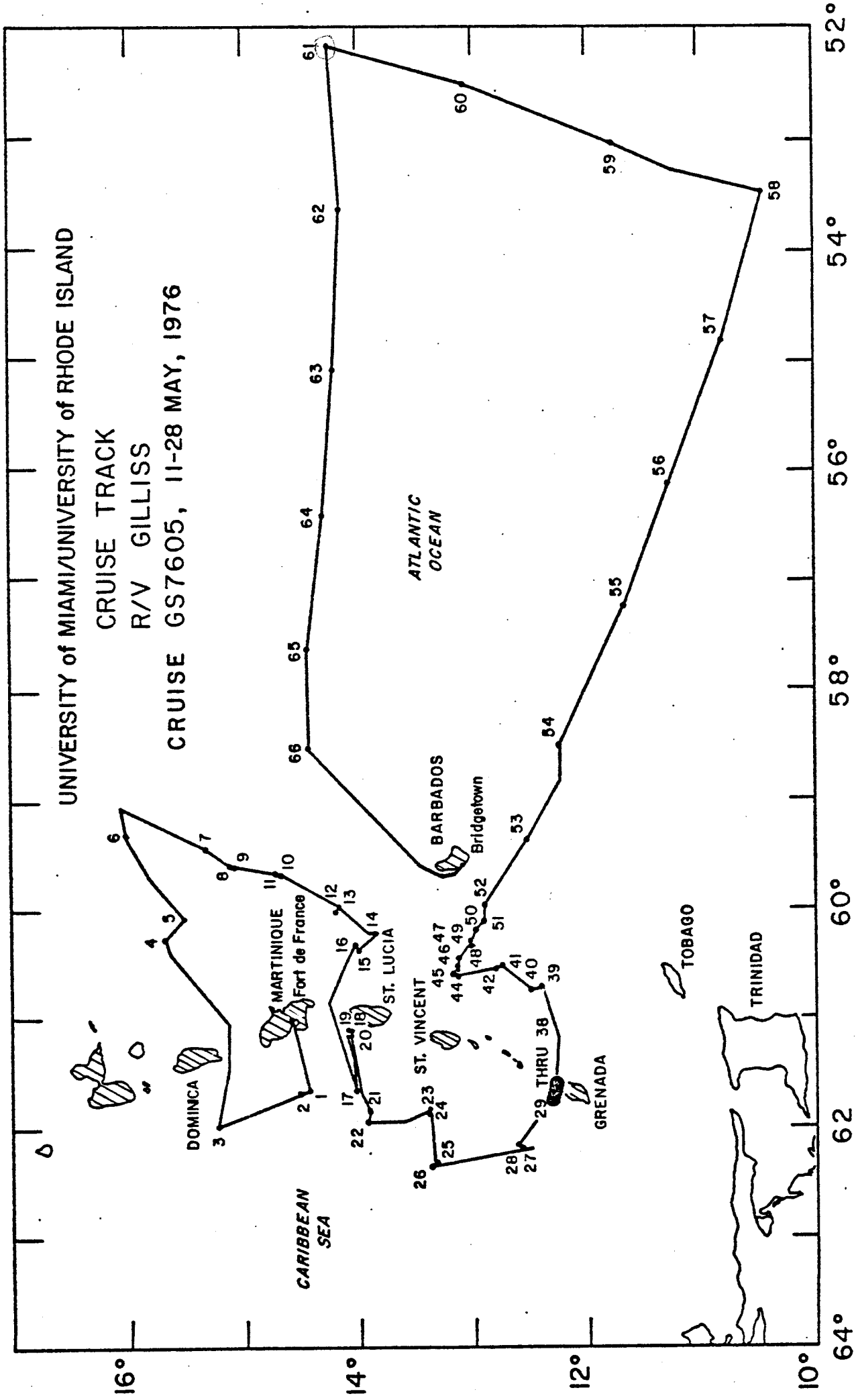


FIGURE I