

GRADUATE SCHOOL OF OCEANOGRAPHY
UNIVERSITY OF RHODE ISLAND

CRUISE REPORT
R/V GYRE CRUISE G 76-5

MAJOR PROGRAM: Nutrient Geochemistry and Interstitial Analysis (NGIA)

SCHEDULE:

			<u>Julian Day</u>
Depart Abidjan, Ivory Coast	1400 GMT	9 May 1976	130
Arrive Abidjan, Ivory Coast	1600 GMT	13 May 1976	134
Depart Abidjan, Ivory Coast	0800 GMT	15 May 1976	136
Arrive Abidjan, Ivory Coast	1700 GMT	1 June 1976	153

Days at Sea = 23

The cruise was interrupted in the middle to return to Abidjan to discharge chief engineer. Approximately 1-1/2 days were lost in port and an additional 2 days of utilizable seetime were lost in steaming to and from Abidjan and the work area.

FUNDING:

NSF Grant No. DES 760-2310 (Bender and Heath) 16 days at sea
NSF Grant No. DES 740-1537 (Sieburth)

ANCILLIARY WORK:

Dr. William Heronemus: Temperature Profile of axis of Trou Sans Fond
Centre de Recherches Oceanographiques (ORSTOM, Abidjan, Ivory Coast):
Gravity Core from Axis of Trou Sans Fond.

Dr. Dave Schink (TAMU) and Dr. Kent Fanning (USF): Pore Water Silicates

Dr. Douglas Hammond (USC): Pore Water Gases

Dr. Vaughan Bowen (WHOI): Transuranic species in near-surface marine sediments

SCIENTIFIC PARTY:

Philip Froelich	Chief Scientist	GSO/URI
Dr. Michael Bender	Co-investigator	GSO/URI
Dr. G. Ross Heath	Co-investigator	GSO/URI
Kenneth Hinga	Co-investigator	GSO/URI
Paul Dauphin	Research Specialist	GSO/URI
Gary Klinkhammer	Graduate Student	GSO/URI
Nile Luedtke	Research Associate	GSO/URI

SCIENTIFIC PARTY (cont'd)

Doug Cullen	Graduate Student	GSO/URI
Thomas Pazis	Electronics Specialist	GSO/URI
Val Maynard	Technician	DMS/USF
Dr. Douglas Hammond	Assistant Professor	GD/USC
Blaine Hartman	Graduate Student	GD/USC
Theo Duis	Marine Technician	TAMU
Ed Vos	Marine Technician	TAMU
R.V. Pittman	Electronics Specialist	TAMU
Cathy Livingstone	Marine Technician	TAMU
Lynne Bergbreiter	Computer Specialist	TAMU

GSO/URI: Graduate School of Oceanography
University of Rhode Island

DMS/USF: Department of Marine Sciences
University of South Florida

GD/USC: Geology Department
University of Southern California

TAMU: Texas A & M University

OBJECTIVES:

1. To recover gravity cores and piston cores from the west African continental margin and from the crest and eastern flank of the mid-Atlantic Ridge - completed successfully.

2. To recover boomerang cores from a depth interval covering the impingement of the oxygen-minimum on the continental margin - boomerang cores were inoperable: replaced with gravity cores - completely successfully.

3. To analyze for phosphorus, nitrate, silicate, ammonia, sulfide, total CO₂ and pH in pore waters from many of these cores on board ship - successfully completed.

4. To return refrigerated core samples to the laboratory for analysis of organic carbon, phosphorus and nitrogen and mineral sulfide - program underway.

5. To return pore water samples to the laboratory for analysis of sulfate, iron, manganese, zinc, cadmium and copper - program underway.

6. To collect STD-O₂ profiles along transect perpendicular to continental margin in area of oxygen minimum - completed successfully.

7. To deploy and recover three deep-sea buoy moorings with benthic respirometer/fluxometer, sediment traps, and in situ sequential exposure devices for microbial degradation studies. One deployed on Ivory Coast shelf, one at oxygen minimum depth, and one on the equator at 4000m depth - completed successfully.

ACKNOWLEDGEMENTS

We are indebted to the capabilities and experience of Captain Don Armand and the entire crew of R/V GYRE for a successful cruise. We acknowledge particularly the efforts of technicians Theo Duis and Ed Vos, and computer specialist, Lynne Bergbreiter in achieving our goals.

TABLE 1
PISTON CORES RECOVERED DURING
R/V GYRE CRUISE G76-5

STATION NO.	LATITUDE	LONGITUDE	WATER DEPTH, m	PISTON CORE LENGTH, cm	TRIGGER WEIGHT CORE LENGTH cm	PORE WATER ANALYSIS (species)
1	4°58.6'N	5°05.8'W	55	cc only	75 cm	
4	3°51.5'N	5°54.6'W	3612	395	89	All (PC only)
6	1°54.9'N	7°30.3'W	3870	1181	91	All (PC only)
7	5°00.0'N	5°09.5'W	55	220	68	
8	2°55.1'N	6°41.4'W	4535	762	63	All
11	0°01.8'N	9°03.9'W	4980	cc only	89cm	All (TW only)
14	0°00.1'S	12°19.3'W	4170	892		All except Si (PC only)
16	0°01.8'S	16°06.7'W	3274	314		All except H ₂ S (PC only)
17	0°04.0'S	14°58.4'W	3690	496	86	
18	0°00.0'N	13°54.18'W	3900	790		
20	0°02.4'N	10°35.9'W	3870	861	101	All except H ₂ S (PC ONLY)
21	0°02.4'N	9°06.7'W	5029	1177	106	All (PC only)
23	1°06.3'N	8°14.6'W	4901	934		All except H ₂ S (PC only)
26	4°25.6'N	5°27.1'W	2580	1012	76	
27	4°59.5'N	5°07.8'W	55	886	68	All except NO ₃ (PC only)
28	4°55.5'N	4°48.0'W	275	814	66	All except NO ₃ (PC only)
				<u>10,734</u>	<u>978</u>	

NOTE: All = Total CO₂, P, Si, NO₃ + NO₂, NH₃, H₂S, S‰ + pH

Summary: 14 Piston Cores Recovered

10 Piston Cores analyzed for pore water

1 Trigger Weight core analyzed for pore water

TABLE II
GRAVITY CORES RECOVERED DURING
R/V GYRE CRUISE G76-5

STATION NO.	LATITUDE	LONGITUDE	DEPTH	LENGTH	PORE WATER ANALYSES
1	5°00.0'N	5°08.2'W	55	50	(Test)
1	4°59.9'N	5°07.8'W	55	50	(Test)
2	4°51.5'N	5°08.4'W	988	87	
3	4°23.5'N	5°31.0'W	2604	82	
4	3°51.5'N	5°54.6'W	3612	93	All
5	2°51.8'N	6°42.7'W	4563	65	All
7	4°59.5'N	5°09.2'W	55	60	All except S%
9	1°54.0'N	7°29.5'W	4133	85	
10	1°05.1'N	8°11.6'W	4956	65	All
12	0°01.3'N	10°36.2'W	4390	63	
12	0°04.1'N	10°33.8'W	3880	90	All except H ₂ S
14	0°00.1'S	12°19.3'W	4170	63	All except H ₂ S + Si
15	0°02.1'S	14°58.4'W	3685	52	
16	0°02.5'S	16°07.1'W	3310	48	All except H ₂ S
16	0°04.0'S	16°09.0'W	3420	63	
18	0°00.0'N	13°54.2'W	3900	35	
19	0°00.0'N	12°19.0'W	4206	65	
23	1°06.0'N	8°12.5'W	4901	55	All except H ₂ S
27	4°59.1'N	5°06.0'W	80m	64	All
28	4°55.9'N	5°05.4'W	229	43	All
29	4°58.2'N	5°01.2'W	90	65	
30	4°56.7'N	5°01.5'W	185	76	
31	4°56.2'N	5°01.5'W	284	42	
32	4°55.8'N	5°01.2'W	357	58	
33	4°55.3'N	5°01.2'W	472	16	
33	4°55.1'N	4°59.3'W	465	39	
34	4°54.8'N	4°59.4'W	565	52	
35	4°54.6'N	4°59.4'W	649	68	
36	4°54.2'N	5°00.0'W	768	69	
37	4°53.7'N	5°01.7'W	927	74	

TABLE II (continued)

STATION NO.	LATITUDE	LONGITUDE	DEPTH	LENGTH	PORE WATER ANALYSES
38	4°51.0'N	4°59.0'W	1110	67	
39		5°01.0'W	1271	76	
40		5°01.4'W	1482	73	
41		5°01.0'W	250	83	
42		5°01.0'W	141	57	
52	5°11.8'N	3°57.8'W	393	108	Core taken for Centre de Recherche Oceanographique, ORSTOM, in Abidjan, Ivory Coast

Total: 2579cm

Summary: 36 gravity cores recovered

10 gravity cores analyzed for pore waters

TABLE III
SPHINCTER CORES RECOVERED DURING
R/V GYRE CRUISE G76-5

STATION NO.	LATITUDE	LONGITUDE	DEPTH	LENGTH	COMMENTS
1	4°59.6'N	5°08.2'W	55	30	
1	5°00.0'N	5°08.2'W	55	20	
2	4°50.5'N	5°09.0'W	896	22	
11	0°01.8'N	9°04.2'W	4980	25	
24	2°50.9'N	6°41.0'W	4572	27	Replicate Pore Water Analyses
			Total	124cm	

Summary: 5 Sphincter Cores Recovered
1 Sphincter Core Analyzed for Pore Waters

Grand Total Core Lengths = 14,415 cm

TABLE IV
BUOY DEPLOYMENTS DURING
R/V GYRE CRUISE G76-5

STATION #	LATITUDE	LONGITUDE	DEPTH	TIME DOWN	COMMENTS
1	4°59.6'N	5°08.2'W	55m	12 hrs.	Fluxometer/Respirometer & sequential exposure devices (unsuccessful)
12	0°03.5'N	10°34.5'W	4000	6.1 days	Fluxometer/Respirometer & sequential exposure devices
28	4°55.7'N	5°07.2'W	278m	4.6 hrs.	Fluxometer/Respirometer & sequential exposure devices

Summary: 2 successful buoy deployments

TABLE V
HYDROCASTS TAKEN DURING
R/V GYRE CRUISE G76-5

STATION #	LATITUDE	LONGITUDE	WATER DEPTH	ANALYSES
1	4°58.6'N	5°05.8'W	55m	S‰, T, O ₂ , ATP, CHO, P, Si, NO ₃ , POC, DOC
12	0°04.1'N	10°33.8'W	3900	S‰, T, O ₂ , ATP, CHO, P, Si, NO ₃ , POC, DOC

Summary: 2 hydrocasts

TABLE VI
CAMERA STATIONS OCCUPIED DURING
R/V GYRE CRUISE G76-5

STATION #	LATITUDE	LONGITUDE	WATER DEPTH, m	TIME ON BOTTOM
12	0°06.0'N	10°37.0'W	3900-4200	60 minutes (DID NOT FUNCTION)
22	0°03.7'N	10°34.5'W	~ 4160	60 minutes
28	4°55.7'N	5°06.5'W	230-290	60 minutes

Summary: 2 successful camera stations

TABLE VII
 XBT STATIONS OCCUPIED DURING
 R/V GYRE CRUISE G76-5

STATION #	LATITUDE	LONGITUDE	DEPTH	COMMENTS
1	5°00.0'N	5°08.1'W	55m	(Test)
51(a-1)	5°04.0'- 5°14.8'N	4°00.5'- 3°57.7'W	50-1000m	Profile along axis of Trou Sans Fond taken for Dr. Wm. Heronemus at University of Massa- chusetts

Summary: 13 XBT stations

TABLE VIII
 STD-0₂ STATIONS OCCUPIED DURING
 R/V GYRE CRUISE G76-5

STATION NO.	LATITUDE	LONGITUDE	WATER DEPTH	COMMENTS
16	0°02.6'N	16°07.0'W	3300	Test: without Rosette sampler
16	0°02.6'N	16°07.0'W	3300	Test: without Rosette sampler
22	0°03.2'N	10°34.9'W	4298	9 bottles: S‰, T, O ₂ , Si, P, NO ₃
22	0°03.2'N	10°34.9'W	4200	Test: without Rosette sampler
23	1°06.4'N	8°16.0'W	4900	Without Rosette Sampler
24	2°50.4'N	6°40.0'W	4572	9 bottles: S‰, T, O ₂ , Si, P, NO ₃
25	3°51.2'N	5°45.4'W	3603	11 bottles: S‰, T, O ₂ , Si, P, NO ₃
26	4°25.5'N	5°27.2'W	2540	11 bottles: S‰, T, O ₂ , Si, P, NO ₃
27	4°59.5'N	5°07.8'W	60m	Test
28	4°55.9'N	5°05.4'W	310m	Test
28	4°55.7'N	4°59.8'W	380m	11 bottles: S‰, T, O ₂ , Si, P, NO ₃
43	4°57.8'N	5°00.3'W	100m	11 bottles: S‰, T, O ₂ , ATP, DOC, POC, CHO
44			193m	Test: without Rosette samp.
45	4°56.2'N	4°58.7'W	530	11 bottles: S‰, T, O ₂ , ATP, DOC, POC, CHO
46	4°54.2'N	4°58.2'W	988	Test
46	4°53.7'N	5°00.3'W	924	Without Rosette sampler
47	4°50.4'N	5°00.3'W	1360	11 bottles: S‰, T, O ₂ , ATP, DOC, POC, CHO
48	4°45.1'N	4°59.7'W	1812	11 bottles: S‰, T, O ₂ , ATP, DOC, POC, CHO
50	5°03.8'N	4°04.0'W	805m	Without Rosette: station occupied in Trou Sans Fond for Dr. Wm. Heronemus at Univ. of Massachusetts

Summary: 12 successful STD-0₂ stations

CRUISE TRACK
R/V GYRE CRUISE G76-5
NUTRIENT GEOCHEMISTRY AND
INTERSTITIAL ANALYSIS (NGIA)

9 MAY - 1 JUNE 1976

