BRUNNER GS-7603

GRADUATE SCHOOL OF OCEANOGRAPHY
UNIVERSITY OF RHODE ISLAND
KINGSTON, R. I. 02881

CRUISE REPORT
R/V GILLISS CRUISE GS7603

OBJECTIVE: A study of current activity in the southern Florida Straits recorded in Late Pleistocene sediments and a study of in situ benthic respirometry.

SCHEDULE: Depart Miami, Florida 1730 GMT 18 March 1976
Arrive Miami, Florida 1500 GMT 31 March 1976
14 days at sea.

FUNDING: NSF Grant No. DES72-01667 (Kennett); 9 days at sea.
NSF Grant No. DES74-01537 (Sieburth); 5 days at sea.

SCIENTIFIC PARTY:

Charlotte A. Brunner	Chief Scientist	GSO/URI*
Kenneth Hinga	Co-investigator	GSO/URI
Paul Davis	Co-investigator	GSO/URI
Max Flandorfer	Coring Technician	RSMAS/UM○
Jake Lathrop	Coring Technician	RSMAS/UM
Thomas Pazis	Marine Technician	GSO/URI
John Carrott	Marine Technician	GSO/URI
Stephen Imms	Marine Technician	GSO/URI
John Keany	Graduate Student	GSO/URI
Solmaz Akturk	Graduate Student	GSO/URI
Stephen Yokubaitis	Graduate Student	GSO/URI
Jane Elrod	Graduate Student	GSO/URI
Steven Hurlbut	Graduate Student	OE/URI □
Roger Roussell	Student	NR/URI +
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PURPOSE: Three programs were involved in cruise GS7603. 1) A set of piston cores (Table 1) in the southern Florida Straits was taken at critical locations selected using data from R/V TRIDENT cruise TR149. The cores sample the various major sedimentary regions and transitional zones which are further defined by over 2000 nautical miles of high resolution 3.5KHz sub-bottom profiles. The piston cores range from the present to 200,000 years in age and will be used for biostratigraphic, climatic and paleocirculation studies of this dynamic ocean region. The area marks the beginning of the Gulf Stream Current and the inflow-outflow for the isolated Gulf of Mexico. The research continues the studies of C. Brunner in the Gulf of Mexico with the guidance and support of Professor James Kennett. 2) A deep sea bouy was launched in the southeastern Gulf of Mexico in 3450 meters of water. Attached were an in situ benthic respirometer at its anchor and two sequential exposure devices; one 25m above the soft Mississippi cone sediments and the other 225m

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below the ocean surface at the base of the photic zone. The sequential exposure devices culture bacteria existent in the oceanic water column. The in situ benthic respiration measurements are among the first to provide hard data concerning energy budgets in the abyss. The isolated basinal conditions of the Gulf will make an interesting comparison with samples and measurements planned this May in the equatorial Atlantic. The program continues the research interests of Ken Hinga with the guidance and support of Professor John Sieburth. 3) During station time used for coring and during the bouy launch and recovery, water samples were collected and filtered using a reverse flow concentrator in order to provide inoculum for culture of naked oceanic amoebas. Little is known of the taxonomy, distribution or abundance of these protozoans which are difficult to concentrate by conventional methods. Water samples were taken from deep (3400m) and shallow (300m) hydrocasts, from the air-water interface, from sargassum weed and from sediment core tops. A number of chemical and physical analyses were conducted to define the nature of the water column forming the amoeban environment. The research was conducted by Paul Davis, a student of Professor John Sieburth's.

RESULTS:

1) A total of 16 piston cores (Table 1) with trigger cores and 1 gravity core were successfully recovered. The average piston core length was 7.6m; the total length of sediment cored was 130m (Table 1). A gross biostratigraphy completed onboard at a sample interval of 150cm indicates that several cores contain sediments over 200,000 years old and most piston cores penetrate to the last interglacial stage. Over 2000 nautical miles of high resolution sub-bottom profiles were taken which in conjunction with the cores well define the various sedimentary regions of the straits. Each sedimentary region is deposited in response to known dynamic oceanographic conditions in operation during Recent sedimentation. By mapping the migration of regional facies through the last glacial and interglacial stages, changes in the nature of oceanographic conditions can be inferred. The cruise track and stations are illustrated in Figure 1.

2) On the deep sea bouy (Table 4) there were 2 types of instruments. A sequential exposure device openly exposed various substrates to ambient sea water for varying lengths of time. The substrates were preserved for later examination by light and scanning-electron microscopy to determine the rate of bacterial colonization. A benthic respirometer was placed on the sediment-water interface at 3450m, and after 7 days, it sampled water inside and external to its 4 chambers. Analyses quantified oxygen depletion within the chambers and silica flux across the sediment water interface. To define the environment in which the bouy was stationed, bottom photography and 2 deep and shallow hydrocasts were completed prior to launch and 7 days later at recovery (Table 2). All water samples were prepared onboard ship for laboratory analyses for dissolved oxygen (measured onboard), salinity, dissolved organic carbon, particulate organic carbon, monomeric and polymeric carbohydrates, and adenosine tri-phosphate biomass.

3) Inoculum for amoeban cultures was collected from 2 deep (3500m) hydrocasts, 9 shallow (300m) hydrocasts, from 5 samplings of the air-water interface (Table 2), from 2 trigger core tops, and from several collections of sargassum weed. In order to define the environment from which the protazoans were sampled, a number of analyses were performed. From each hydrocast, water samples were prepared for laboratory analyses of dissolved oxygen, salinity, dissolved organic carbon, particulate organic carbon, monomeric and polymeric carbohydrates and adenosine tri-phosphate biomass. From each air-water interface sample, enough water was collected for ATP biomass measurement. At all but the second hydrocast station, XBT's were taken. At three stations, quantum sensor measurements were made (Table 3).

TABLE 2. SAMPLES AND PROCEDURES USED TO CHARACTERIZE THE MICROBIAL OCEANIC ENVIRONMENT

Hydrocast No.	XBT No.	Air-Water Interface Sample No.	Camera Station No.	Latitude (N)	Longitude (W)	Date
1*	1	--	1	23°59.1	84°56.3	3/20/76
2	--	1	--	23°58.7	84°55.8	3/20/76
3	--	--	--	23°36.4	85°33.1	3/21/76
4	2	2	--	23°02.3	85°05.0	3/23/76
5	3	3	--	24°08.8	80°48.7	3/25/76
6	4	4	--	23°43.5	82°42.7	3/26/76
7	5	5	--	23°06.6	84°14.0	3/27/76
8*	--	--	--	23°59.2	85°11.5	3/30/76
9	6	--	2	24°00.0	85°11.1	3/30/76

* Deep hydrocast to 3500m, all others to 300m

TABLE 3. QUANTUM SENSOR MEASUREMENTS

Sample No.	Latitude (N)	Longitude (W)	Depth (m)	Local Time	Date
1	23°23.5	86°21.5	20	10:00	3/22/76
2	23°02.0	85°03.9	27	10:00	3/23/76
3	24°10.5	80°33.6	38	12:30	3/25/76

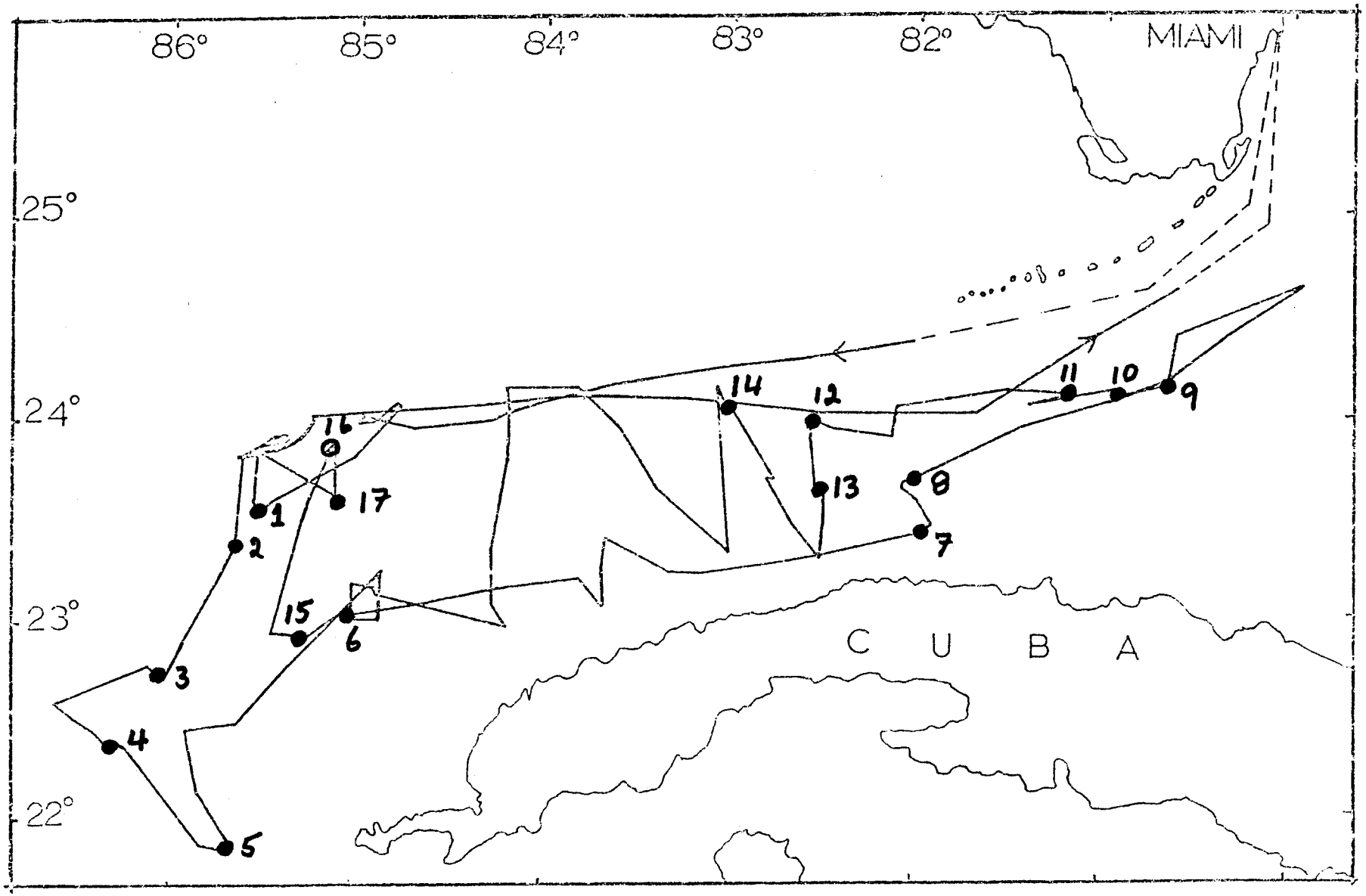
TABLE 4. LOCATION OF DEEP SEA BOUY

Latitude (N)	Longitude (W)	Depth (m)
85°36.1	23°49.0	3450

ACKNOWLEDGEMENTS: The performance of Captain R. Hagan and his crew and the expertise of Max Flandorfer and Jake Lathrop, RSMAS coring technicians, are acknowledged.

TABLE 1. CORES TAKEN ONBOARD R/V GILLISS DURING CRUISE GS7603

Core Number	Latitude (N)	Longitude (W)	Water Depth (m)	Piston Core Length (m)	Trigger Core Length (m)
1	23°33.5	85°32.0	1172	7.75	0
2	23°21.6	85°40.0	1107	13.05	0.96 29.3
3	22°32.2	86°03.5	1101	13.24	0
4	22°23.5	86°21.5	1340	3.48	0.30 - 9.1
5	21°53.6	85°42.8	1990	2.46	0.30 - 9.1
6	23°02.0	85°03.9	2000	14.21	1.49 - 45.4
7	23°27.1	81°56.6	1620	7.08	0.21 - 6.4
8	23°45.0	81°52.6	1550	4.36	1.68 - 51.2
9	24°10.5	80°33.6	1040	1.96	0
10	24°07.2	80°50.5	890	6.70	0.13 - 4.0
11	24°07.5	81°08.1	905	6.26	0
12	23°59.1	82°26.0	845	3.42	0.01 - 0.3
13	23°40.3	82°27.6	1600	6.36	0
14	24°03.3	82°57.4	920	6.23	0.40 - 12.2
15	22°55.6	85°15.8	2085	16.33	0.45 - 13.7
16	23°50.4	85°07.4	3100	Gravity	0.17 - 5.2
17	23°35.6	85°04.0	3450	8.49	1.27 - 38.7
			Total	121.38	7.37 - 224.6
			Average	7.60	0.43



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