1. INTRODUCTION

OBJECTIVES

The general objective for deep drilling sites in the equatorial and South Atlantic on Leg 3, as on other legs of the Deep-Sea Drilling Project, was to increase understanding of the history of this part of the ocean basins. The approach to this objective by the JOIDES Atlantic Advisory Panel was determined in part by the known physical boundaries and geologic history of the parts of the African and South American continents which border the Atlantic Ocean, but mostly by geological and geophysical observations carried out on this part of the sea floor.

The recent development of tectonic concepts such as the spreading sea floor and movements of large crustal plates (e. g., Hess, 1962; Vine, 1966; Isacks, *et al.*, 1968) implies that the history of the Atlantic Basin, as preserved in the sedimentary record, should be most complete near the continental margins. Such representative sites were selected on the Sierra Leone Rise in the eastern equatorial Atlantic, and on the Rio Grande Rise in the western South Atlantic. These are discussed below in greater detail.

A major part of the planning for drilling in the South Atlantic focused on the Mid-Atlantic Ridge in view of its primary role in the sea-floor spreading hypothesis. A profile of sites across one flank of the ridge was planned primarily on the basis of the relatively well-defined magnetic anomalies across this part of the Ridge (Dickson, *et al.*, 1968). This emphasis contrasted with the more widely-spaced sites on Leg 2 across the northern Mid-Atlantic Ridge, where the magnetic anomaly pattern appears less well-defined.

Whereas the *general* location for each site on Leg 3 was selected from data gathered from reconnaissance surveys of oceanographic ships, the *detailed* location for each site was determined from a pre-drilling survey, performed either by the *R/V Vema* or the *Glomar Challenger* herself. These latter surveys assured the appropriate sea-floor structure and sediment thickness at each site based on the regional surveys, thus permitting the drilling to proceed more efficiently.

Sierra Leone Rise (Site 13)

One of the objectives of drilling at this site in the eastern Atlantic was to provide a stratigraphic link with the western Atlantic. The acoustic reflection profiles showed a fairly smooth and strong reflector similar to Horizon A of the North America Basin, roughly half of the depth to the basement reflector. It was also hoped that this link with the western North Atlantic might provide a correlation between temperate and tropical fauna and flora of the Cretaceous and Tertiary ages.

Also, it was expected that the possibility of finding Eocene radiolarian oozes at this site would provide indirect evidence of a strong equatorial current system of this age, perhaps implying a past link of the Atlantic and Pacific Oceans.

Rio Grande Rise (Sites 21 and 22)

Two sites were planned on this rise, one to sample a relatively complete section of Tertiary sediments (Site 22), and the other to sample the oldest possible sediments where the Tertiary section was absent (Site 21). The Tertiary section was expected to provide important data on the stratigraphic and regional geographic distribution of Tertiary planktonic microfossils.

The other site on the Rio Grande Rise was expected to provide the same data for the Cretaceous. Sediments as old as Maestrichtian had been sampled on the rise (Le Pichon, *et al.*, 1966), and it was hoped that the drilling could penetrate an even older sequence above the basement. The nature of the sediments could be expected to provide important data on the disposition of this large elevation in the sea floor and the ocean environment since the time of its formation.

Mid-Atlantic Ridge (Sites 14 Through 20)

The five sites on the Mid-Atlantic Ridge were placed on the western flank over the recognizable Magnetic Anomalies Nos. 5, 6, 13, 21 and 30 (Heirtzler, *et al.*, 1968). This set of sites, on the basis of the sea-floor spreading hypothesis, would be expected to result in ages of the oldest sediments (or of basement rock) at successive sites away from the Ridge axis increasing from 9 to 72 m.y. These sites were aligned nearly perpendicular to the trend of the Ridge axis at 30°S latitude.

Because the drilling of the ridge sites proceeded rapidly, two additional sites on the eastern flank of the Ridge were drilled to test symmetry. The identification of the magnetic anomaly pattern for these sites was not well known.

Another closely-related objective of the Ridge sites was to investigate the nature and causes of the relatively constant thickness of sediment across the ridge at 30°S (Ewing *et al.*, 1966). This observation appeared to be in contradiction to the expected distribution, based on the sea-floor spreading hypothesis.

OPERATIONAL RESULTS

At 0800 hours on 1 December, 1968, the *Glomar Challenger* departed Dakar, Senegal, to commence Leg 3 of the Deep Sea Drilling Program. On Leg 3, fifty-five days were spent at sea, during which time the *Glomar Challenger* travelled 11,000 kilometers to Rio de Janeiro, Brazil. Thirty-five of these days were spent on site engaged in drilling operations; seventeen separate holes were drilled at ten different sites. The location of these sites (Sites 13 through 22) along with the track of the *Glomar Challenger* is shown in Figure 1. One hundred and three cores were recovered out of 105 attempts which yielded 765 meters (2509 feet) of core, representing a recovery/attempt rate of 92 per cent. A summary of some statistics and the other relevant information at the coring sites is presented in Table 1.

REFERENCES

See consolidated list at the end of Chapter 13.

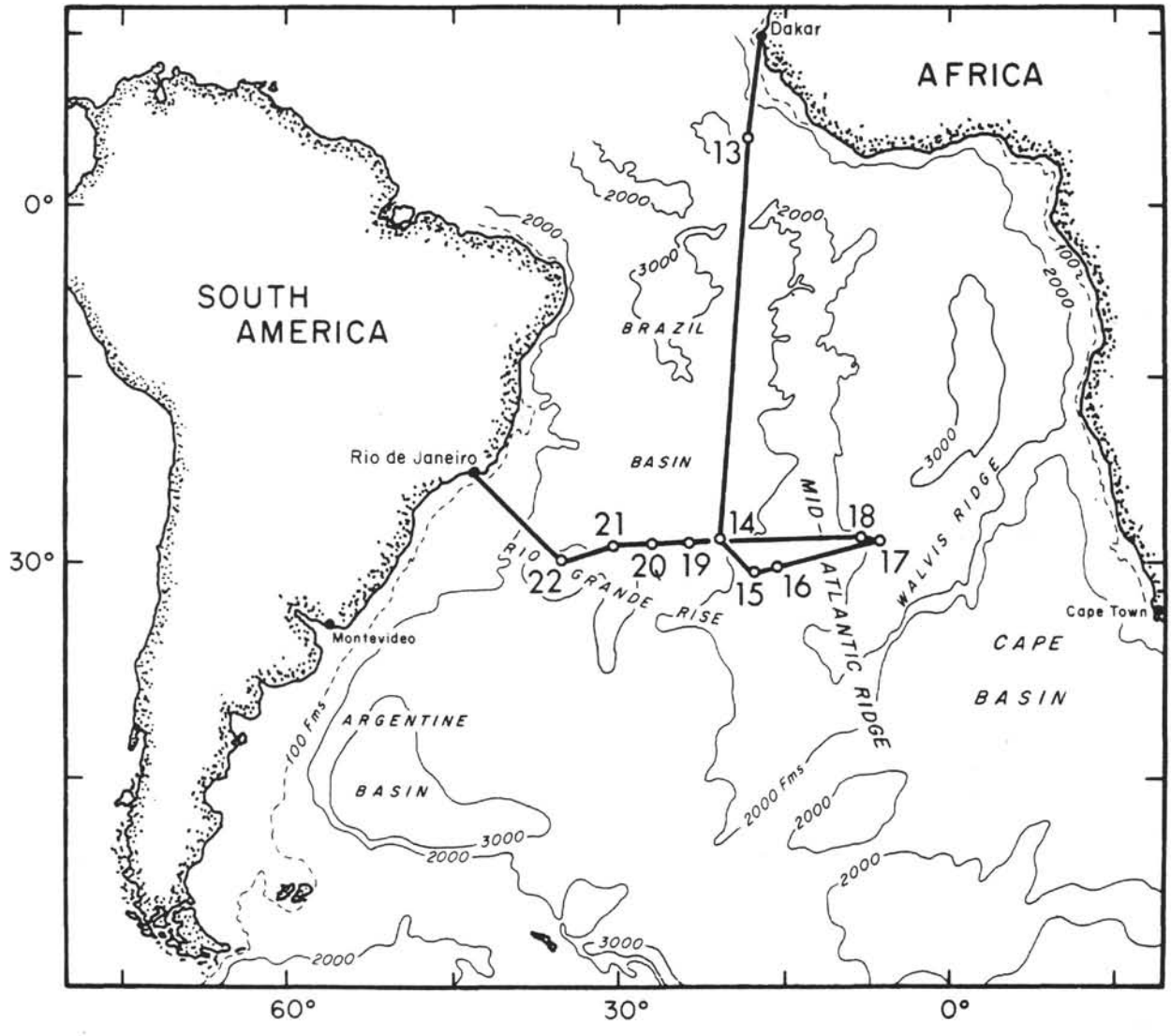

Figure 1. *Location of Sites drilled during Leg 3.*

TABLE 1
Summary of Holes Drilled on Leg 3

Hole	Latitude	Longitude	Dates of Drilling	Water Depth (m)	Number of Cores	Penetration (subbottom) (m)	Amount of Core Recovered (m)
13	06° 02.40′N	18° 13.71′W	Dec. 4-5, 1968	4585	3	145.0	26.5
13A	06° 02.40′N	18° 13.71′W	Dec. 6-10, 1968	4585	7	463.0	11.3
14	28° 19.89′S	20° 56.46′W	Dec. 21-22, 1968	4343	10	107.0	79.4
15	30° 53.38′S	17° 58.99′W	Dec. 24-25, 1968	3927	11	142.0	80.2
16	30° 20.15′S	15° 42.79′W	Dec. 27-28, 1968	3527	12	176.0	99.0
17	28° 02.74′S	06° 36.15′W	Dec. 31, 1968	4265	5	93.0	36.0
17A	28° 02.74′S	06° 36.15′W	Jan. 1, 1969	4265	4	102.5	34.9
17B	28° 02.74′S	06° 36.15′W	Jan. 1, 1969	4360	5	127.4	35.5
18	27° 58.72′S	08° 00.70′W	Jan. 3, 1969	4018	7	178.0	52.4
19	28° 32.08′S	23° 40.63′W	Jan. 7-8, 1969	4677	12	145.2	97.5
20	28° 31.57′S	26° 50.58′W	Jan. 11, 1969	4500	1	6.4	6.1
20A	28° 31.47′S	26° 50.73′W	Jan. 12, 1969	4518	4	64.6	10.8
20B	28° 31.47′S	26° 50.73′W	Jan. 12, 1969	4518	2	15.5	9.0
20C	28° 31.47′S	26° 50.73′W	Jan. 13-14, 1969	4506	6	72.2	48.0
21	28° 35.10′S	30° 35.85′W	Jan. 16, 1969	2113	9	131.0	72.5
21A	28° 35.10′S	30° 35.85′W	Jan. 17, 1969	2113	3	79.3	26.8
22	30° 00.31′S	35° 15.00′W	Jan. 19-20, 1969	2134	5	242.0	38.4