

15. SITE 774¹

Shipboard Engineering and Scientific Parties²

HOLE 774A

Date occupied: 21 January 1989
Date departed: 21 January 1989
Time on hole: 7 hr, 18 min
Position: 20°35.90'N, 121°44.08'E
Bottom felt (rig floor; m, drill-pipe measurement): 1094.5
Distance between rig floor and sea level (m): 10.5
Water depth (drill-pipe measurement from sea level, m): 1084.0
Total depth (rig floor, m): 1132.3
Penetration (m): 37.8
Number of cores: 0
Total length of cored section: 0
Total core recovered: 0

HOLE 774B

Date occupied: 21 January 1989
Date departed: 22 January 1989
Time on hole: 1 day, 9 hr, 0 min
Position: 20°35.90'N, 121°44.08'E
Bottom felt (rig floor; m, drill-pipe measurement): 1089.0
Distance between rig floor and sea level (m): 10.5
Water depth (drill-pipe measurement from sea level, m): 1078.5
Total depth (rig floor, m): 1344.9
Penetration (m): 255.9
Number of cores: 0
Total length of cored section: 0
Total core recovered: 0

Principal results: Site 774 lies southwest of Itbayat Island in Luzon Strait. Although no cores were recovered, a water-gun profile obtained during the site approach indicates that the site is at the edge of a local basin bounded by a bathymetric high. A nearly horizontal reflector appears to lap against basement.

Unfortunately, both holes drilled at this site were lost. Hole 774A was abandoned at a total depth (TD) of 37.8 mbsf because of hole instability. Hole 774B was drilled 500 m to the northeast. It was abandoned when the drill pipe became stuck at a TD of 255.9 mbsf, with the result that the pipe was severed just above the bottom-hole assembly (BHA).

BACKGROUND AND OBJECTIVES

The principal objective for Site 774 was the same as for Site 773: to test the diamond coring system (DCS) as thoroughly as

possible by coring into basement. Unfortunately, neither engineering nor scientific objectives were realized when Holes 774A and 774B were both abandoned because of adverse hole and weather conditions.

OPERATIONS

Introduction

The location chosen for drilling Site 774 lay to the north approximately 43 nmi from Site 773 and off the southwest tip of Itbayat Island in order to avoid the rip currents and the normal inter-island currents that characterize Luzon Strait. Upon arriving in the vicinity of the site, we realized that the currents near the selected site were not much less than those we had already experienced. A site, which appeared to be the best site available, was chosen from the water-gun profiles in the underway-geophysics lab (Fig. 1). A Datasonics releasable beacon, model UAB-354B, was dropped at 0615 hr, 21 January (all times given are Universal Time Coordinated or UTC). The corrected PDR measurement was 1093.4 m, and the drill pipe verified the water depth to be 1094.5 m. As the thrusters and hydrophones were lowered, and positioning on the beacon commenced, the weather became rougher to the point that both the captain and the electrical supervisor for Underseas Drilling, Inc. (UDI) were worried that operations at this site might be interrupted because of positioning alarms.

Hole 774A

The bit was made up, and at 0745 hr, running of the BHA commenced. The currents as indicated on the ship's pit log were so strong that ODP's current meter was rigged up and deployed over the starboard side in order to record current measurements vs. depth. Again, a modified XCB/DCS BHA was made up and all 5.5-in. drill string was run. Bit no. 2, used on the last hole, was rerun, and at 1140 hr Hole 774A was spudded and drilled to a sub-bottom depth of 37.8 m. The hole quickly became unstable, requiring 40,000 lb of overpull at 8 mbsf and 160,000 lb of overpull at 37 mbsf. Three 20-bbl sweeps of high-viscosity mud were pumped, but it soon became clear that we would need to drill a new hole.

Hole 774B

The bit was pulled clear of the seafloor, and the ship was offset 500 m to the northeast on a course of 050°. Hole 774B was spudded at 1445 hr and slowly control-drilled to 255.9 mbsf. The hole was drilled in a total of 289 rotating min with only 10,000 lb of bit weight, so it was evident that basement could be much deeper than we had thought. The last single that was drilled to the 255.9-mbsf level had begun to take more weight, so at 0001 hr on 22 January we decided to pull the center bit and drop an XCB in order to determine the lithology.

With the sand line on the way down, the driller suddenly saw a drastic weight loss and quickly had the sand line withdrawn from the pipe in order to pull a double in the hope of getting above the zone of trouble. The result was that three singles could be laid out, but the pipe still became stuck at 0030 hr.

¹ Harding, B. W., Storms, M. A., et al., 1990. *Proc. ODP, Init. Repts.*, 124E: College Station, TX (Ocean Drilling Program).

² Shipboard engineering and scientific parties are as given in the listing of participants preceding the contents.

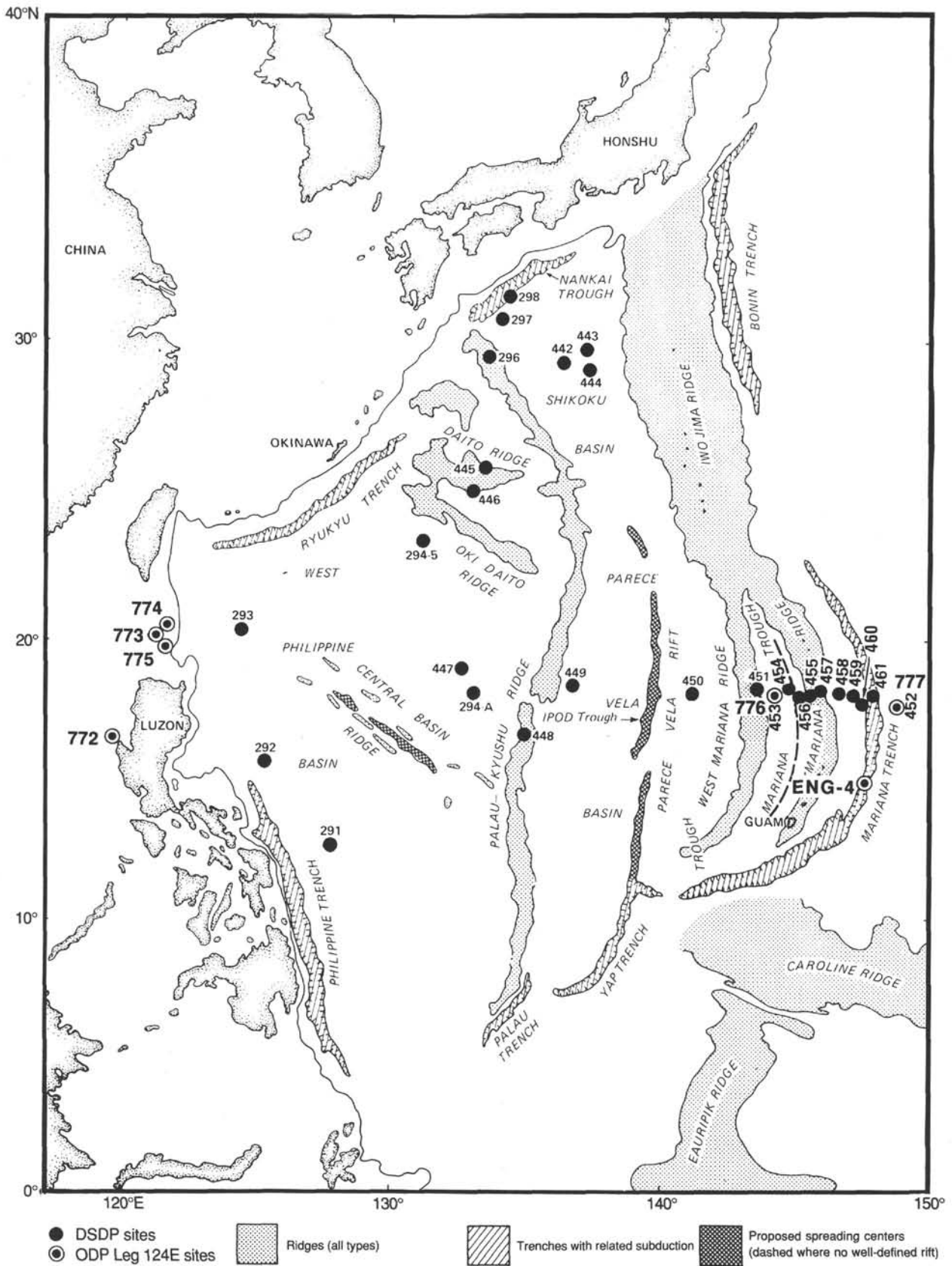


Figure 1. Map of western Pacific region showing DSDP sites and ODP Leg 124E sites. Adapted from Hussong et al. (1982, Fig. 1).

From that time until 0500 hr, the pipe was worked, and between 460,000 and 510,000 lb of overpull was applied to the drill string without any success. Rotation of the pipe was not possible, and circulation was tried without success. At 0500 hr the center bit was retrieved, and at 0615 hr the driller attempted to lower the pipe to the bottom. That also was not successful, and at that time the pipe was stuck between tool joints, making it impossible to set the elevators even to break off the top-drive. Finally, at 1200 hr the pipe had slowly been worked uphole an inch at a time, and the elevators set on the stool. The DCS would have been deployed with the pipe in a stuck position, except that at that time the large bit was two stands off bottom. The drill rod, therefore, would not have had any consolidated formation in which to drill, or maybe would not have had any formation at all if the hole had not reconstituted.

The first severing charge was rigged, deployed, and fired, and, while the firing panel indicated a positive discharge, the pipe did not come free. At 1745 hr, after the second charge had been fired, and while holding 150,000 lb of tension on the pipe, the pipe started to move. The driller quickly pulled five doubles, with the drag staying between 50,000 and 150,000 lb on all. After the top-drive was set back, pipe was pulled in stands, and the seafloor was cleared at 1840 hr. The drill pipe was laid down, and thrusters and hydrophones were pulled and secured at 2230 hr. The commandable beacon was recalled and retrieved prior to getting under way.

SITE GEOPHYSICS

Site 774 lies in about 1100 m of water at the edge of a local basin southwest of Itbayat Island in Luzon Strait. The local basin is bounded on the west by a bathymetric high that may be related to the eastern boundary of the island to the north and is bounded to the north and east by a shallow ridge that lies submerged between Itbayat and Batan islands.

The water-gun record taken along the western margin of this basin is shown in Figure 2. The surface of the basin slopes gently and is underlain by a nearly horizontal reflector at about 0.2 s sub-bottom (estimated 150 mbsf). This reflector appears to lap against basement, where basement was expected between 150 and 200 mbsf. Figure 3 shows the *Resolution's* survey track in the vicinity of Site 774.

SUMMARY AND CONCLUSIONS

Two holes were drilled at Site 774 (ENG-1B) in attempting to find basement and stable hole conditions for testing the diamond coring system (DCS). The water depth of slightly less than 1100 m would have been ideal for DCS testing owing to minimal round-trip times for wireline, drill pipe, and drill rod (tubing).

Hole 774A was drilled with an XCB bit and center bit to a total depth (TD) of 1132.3 m or 37.8 mbsf. The hole was terminated owing to extreme hole instability likely caused by the loose volcanoclastic sand penetrated at the mud line. When an overpull of 160,000 lb was required to free the drill string, the decision was made to terminate the hole.

Hole 774B was also drilled with an XCB bit and cutting shoe to a TD of 1344.9 m or 255.9 mbsf. Basement was not reached, and hole stability continued to deteriorate until eventually the drill pipe became irretrievably stuck. After a maximum overpull of 510,000 lb failed to free the pipe, and after working for 12 hr, a drill-string severing charge was deployed, and the hole was abandoned. It is suspected that the same accumulation of volcanoclastic sand encountered in Hole 774A was responsible for the sticking of the drill pipe in this hole.

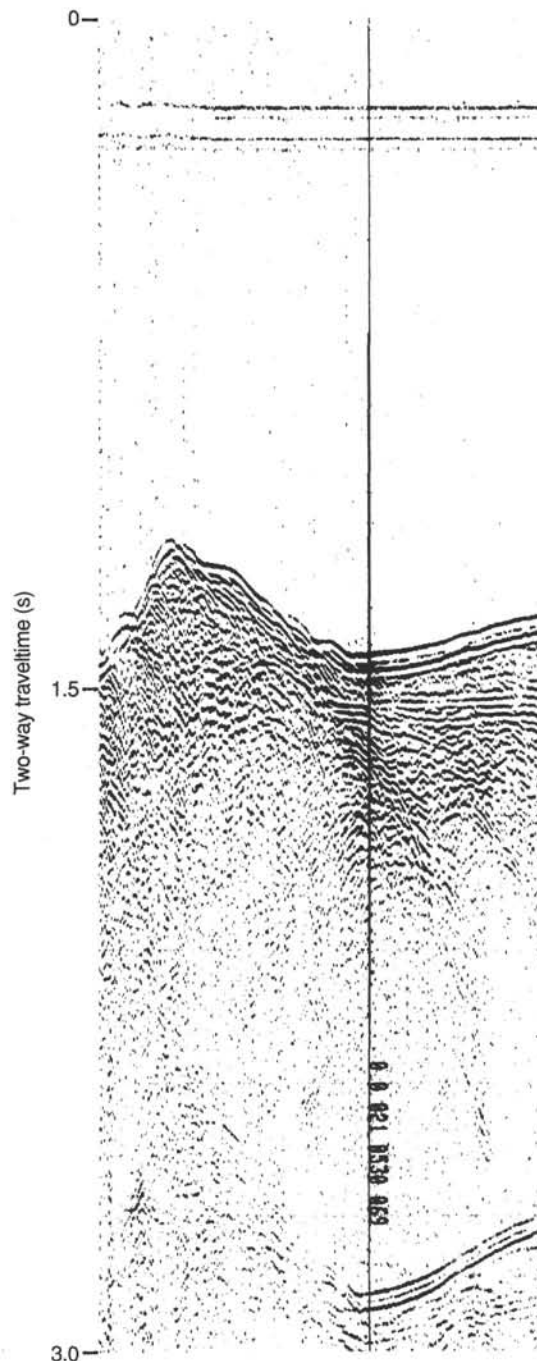


Figure 2. Water-gun record a short distance south of Site 774.

Weather conditions at the site were extremely rough and contributed to the difficulty in maintaining adequate hole stability. No developmental tools were deployed or evaluated at the site.

REFERENCE

- Hussong, D. M., Uyeda, S., Knapp, R., Ellis, H., Kling, S., and Natland, J., 1982. Deep-Sea Drilling Project Leg 60: cruise objectives, principal results, and explanatory notes. In Hussong, D. M., Uyeda, S., et al., *Init. Repts. DSDP, 60*: Washington (U.S. Govt. Printing Office), 3-30.

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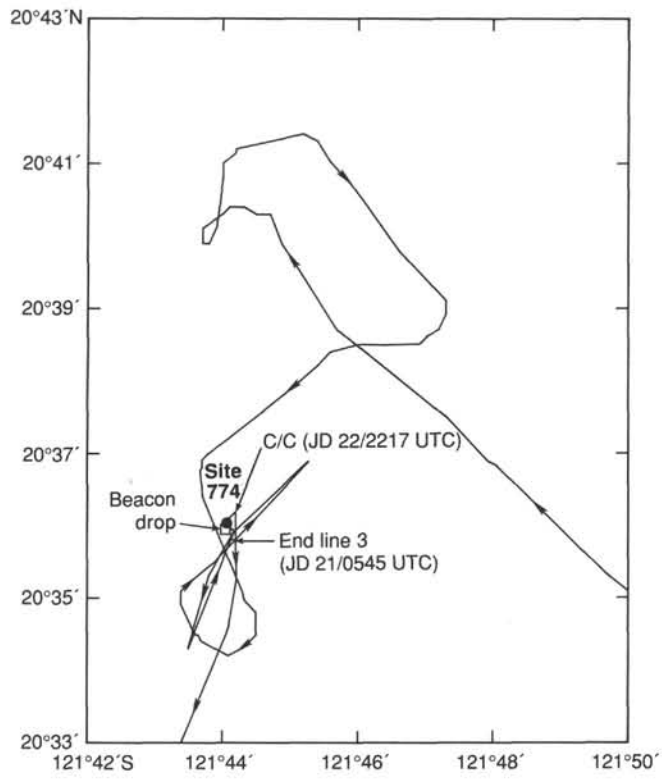


Figure 3. Resolution's survey track in the vicinity of Site 774.