2. MID-ATLANTIC RIDGE SITE 395 REVISITED: OPERATIONS AND EXPLANATORY NOTES[1]

Shipboard Scientific Parties[2]

HOLE 395A

Date reoccupied: 19 March 1981 (1100)

Date departed: 31 March 1981 (1600)

Time on hole: 12 days, 5 hr.

Position: 22°45.35′N; 46°04.90′W

Water depth (sea level; corrected m, echo sounding): 4483

Water depth (rig floor; corrected m, echo sounding): 4493

Bottom of casing (rig floor; m, drill pipe): 4605

Bottom of open hole (rig floor; m, drill pipe): 5102

Tools run	Sub-bottom interval (m)	Data quality
Temperature probe; water sampler	29–105; 105	None; good
Temperature probe; water sampler	105–219; 219	Poor; none
Temperature probe; water sampler	2–248; 248	None; good
Temperature probe; water sampler	371–400; 400	Good; good
Temperature probe; water sampler	514–543; 543	Fair; good
Temperature log	0–609	Good
Temperature log (repeat)	72–609	Good
Density; caliper; natural gamma log	112–609	Fair; good; good
Velocity; caliper; natural gamma log	112–609	Fair; none; none
Laterolog; porosity; natural gamma log	112–609	None; poor; poor
Laterolog; porosity; natural gamma log	112–609	Good; poor; poor
Soviet magnetometer: field intensity log	112–609	Good
Soviet magnetometer: susceptibility log	112–609	Good
Borehole televiewer log	112–609	Fair
Packer: pulse test; water sampler; hydrofracture	582	Good; fair; none
Packer: shut-in test; pulse test	179	Good; none
Packer: pulse test	182	None
DARPA seismometer: seismic; temperature	609	Good; good

[1] Hyndman, R. D., Salisbury, M. H., et al., *Init. Repts. DSDP*, 78B: Washington (U.S. Govt. Printing Service).

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Lynch: Randy Jacobson (Chief Scientist), Naval Ocean Research and Development Activity, NSTL Station, Mississippi; Anne Boyd, Naval Ocean Research and Development Activity, NSTL Station, Mississippi; Douglas McGowan, Marine Science Institute, University of Texas at Austin, Galveston, Texas.

Principal results: Hole 395A was reentered five years after drilling was initially done at this site for the purpose of conducting logging and downhole experiments in the upper oceanic crust and to conduct a deployment test for the emplacement of a long-term recording seismometer in the Pacific in 1982. Although the bottom 55 m of the hole was blocked, a 497-m interval from the bottom of the casing to the top of the cavings (112–609 m sub-bottom) was still open and in good condition.

Although the hole was enlarged, the deep investigation (laterolog) and borehole wall tools (density, caliper) worked fairly well throughout the hole, and the velocity tool worked where the hole was to gauge. Using these logs and the magnetometer and televiewer results, it was possible to confirm and refine the basement stratigraphy described by the Leg 45 scientific party. The logged interval contains one massive basalt unit, extending from 89 to 99 m sub-basement, with an apparent bulk density of 2.8 g/cm^3 and a compressional wave velocity of 5 to 6 km/s. This interval is bracketed above and below (79–89 m and 99–114 m sub-basement) by thin units displaying a high magnetic susceptibility and containing serpentinized peridotite. The remainder of the section consists of pillow and flow basalts with a variable formation density of 2.5 to 2.8 g/cm^3 (corrected), a velocity of up to 5.5 km/s, and resistivities of 20 to 1000 ohm-m that increase dramatically near the base of the hole. Downhole logging with the Soviet magnetometer showed distinct magnetic field reversals at 170 m and 475 m sub-basement, with the middle unit being reversely polarized and the upper and lower units being normally polarized.

Temperature measurements conducted shortly after reentry indicate that the hole was isothermal at 2.5°C to about 250 m sub-bottom. Below this depth, the temperature increased slowly, but at an accelerating rate with depth, to 18°C at a depth of about 605 m. Between 605 m and the top of the cavings, the temperature rose abruptly to 22°C, apparently in a short section of drilling mud left in the hole by Leg 45. With the exception of one sample collected near the base of the hole (543 m), which shows Mg depletion, water samples from all levels of the hole are indistinguishable from local bottom water. This observation and the temperature data suggest drawdown to a depth of at least 250 m, diffuse flow into the formation between 250 m and a maximum depth of 543 m, and stagnation at greater depths. These results are consistent with packer tests that show that the permeability near the base of the hole is extremely low (3–9 μDarcies below 582 m) but that the upper part of the section must be highly permeable.

The DARPA seismometer was successfully deployed in the bottom of the hole and then recovered, demonstrating the feasibility of emplacing large, delicate observatories in the seafloor. In addition to obtaining excellent records during a two-ship refraction experiment with the *Lynch*, the seismometer recorded microseisms and several earthquakes.

HOLE 395B

Date occupied: 26 March 1981 (0745)

Date departed: 26 March 1981 (1230)

Time on hole: 5 hours

Position: 22°45.35′N; 46°04.90′W

Water depth (sea level; corrected m, echo-sounding): 4483

Water depth (rig floor; corrected m, echo-sounding): 4493

Bottom felt (rig floor; m, drill pipe): 4493

Penetration (m): 70

Number of cores: 0

Total of length of cored section (m): 0

Principal results: Hole 395B was washed to a sub-bottom depth of 70 m about 100 m northwest of Hole 395A in order to measure the temperature and collect a pore water sample in the sediments near the basement. The results were ambiguous because of possible seawater contamination.

OPERATIONS

The *Glomar Challenger* departed San Juan, Puerto Rico at 1130 on March 14, 1981. After checking the operation of the positioning system and thrusters outside the harbor, a course was set for Site 395 midway between the tracks taken by the *Challenger* to and from the Site on Leg 45 (Fig. 1). Because of excellent weather, the ship was able to make 10 knots until slowing to 6 knots at 0920 hr. on March 19 for the initial approach. Using a combination of satellite navigation, dead reckoning, and bottom and sub-bottom profiles, the ship was navigated over the site (Figs. 2 and 3) and a 16-kHz long-life beacon dropped at 1138 hr. The course was confirmed for another 15 min., then the underway geophysical gear was pulled in and the ship was returned to the site and positioned over the beacon.

After the ship was stabilized over the beacon, the bottom hole assembly was made up and the pipe lowering was started at 1215 hr., the pipe reaching the bottom 7 hr. later at 1920 hr. Satellite fixes received during the pipe lowering indicated that the beacon had been dropped within a ship's length of the reentry cone. The precision depth recorder water depth was 4483 m, 2 m less than the reading on Leg 45.

The reentry of Hole 395A was delayed until 1034 hr. on March 20 because of several tool failures. One of the transducers on the first tool was damaged either on deck or when it seated, and the second tool failed while going down the pipe. The third tool performed flawlessly, however, allowing reentry after only an hour and a half of scanning along an expanding square search pattern. After the tool was brought to the surface, reentry was confirmed by lowering a full stand of pipe into the hole. One stand was then withdrawn so that the temperature structure in the water below the maximum penetration of the stand (45 m) would not be disturbed by pumping down the heat-flow tool.

The downhole experiment program began at 1305 on March 20, when a heat-flow probe-pore-water sampler with a shortened probe was started down the pipe at a pumping rate of 5 strokes per min. (spm). The tool latched in at about 1345 hr., after which temperatures were measured for 3 min. at each of seven intervals at a 10-m spacing in the casing. The pipe was lowered a joint at a time at a rate of 1 joint/min. without pumping. After the last temperature measurement, a preset timer opened the water sampler for 7 min. at a level 7 m above the casing shoe at a depth of 4598 m below the rig floor (105 m sub-bottom). The bit was then raised 10 m and the tool returned to the surface on the sand line after a 5-min. stop at the mud line for thermistor calibration. When

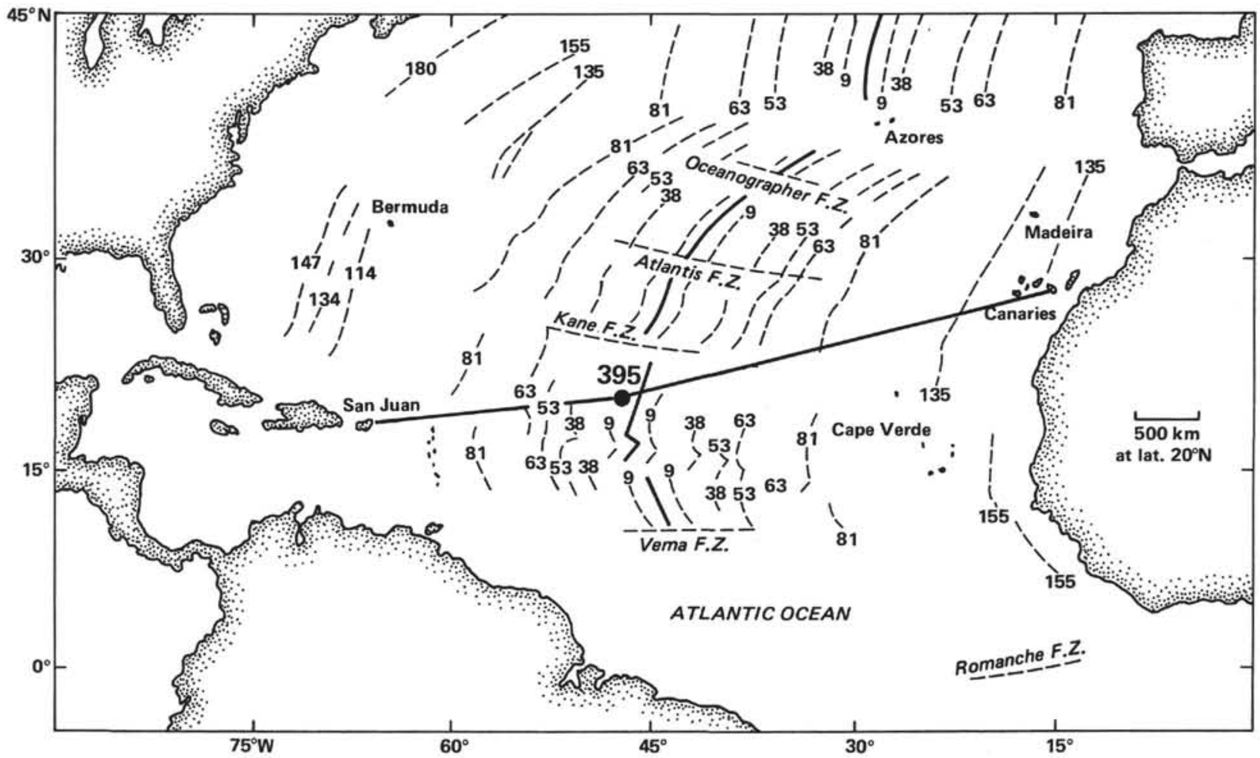

Figure 1. Map showing location of Site 395 and Leg 78B ship's track. (Dashed lines show age of crust in millions of years deduced from magnetic anomalies.)

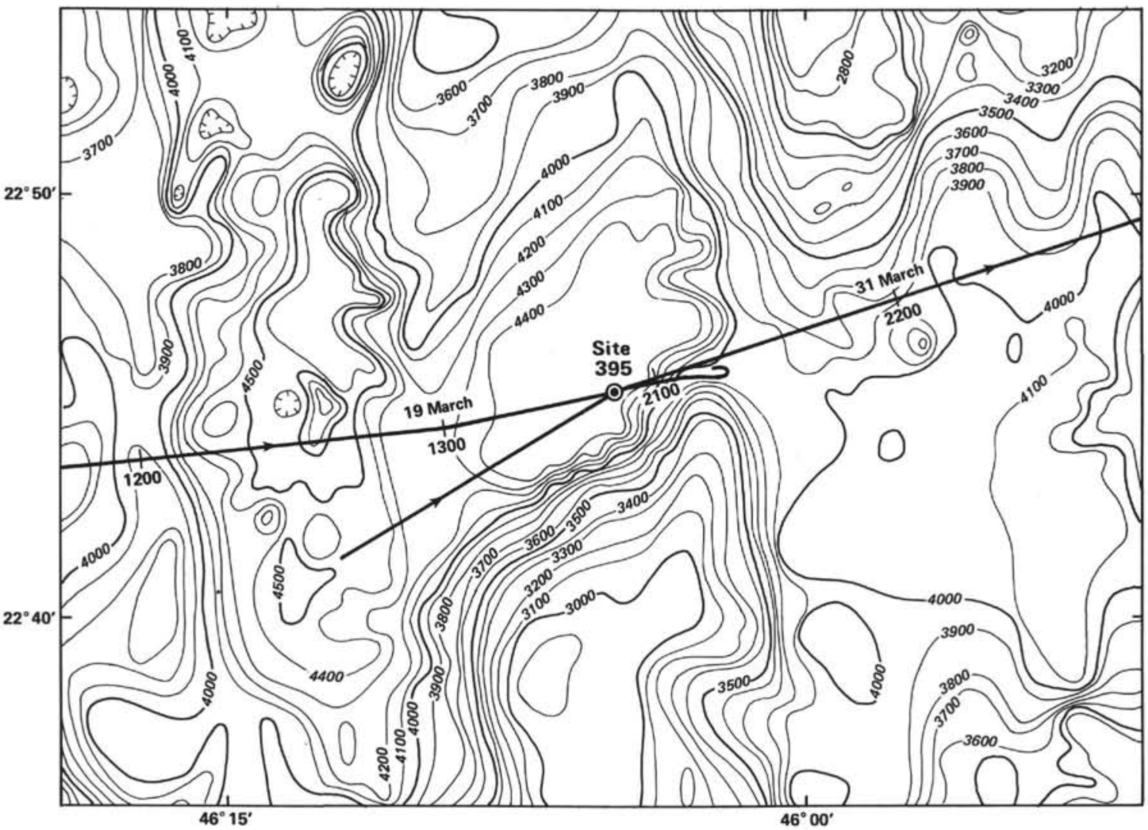

Figure 2. Ship track of *Glomar Challenger* approaching and departing Site 395 on Leg 78B. (Depths are shown in meters.)

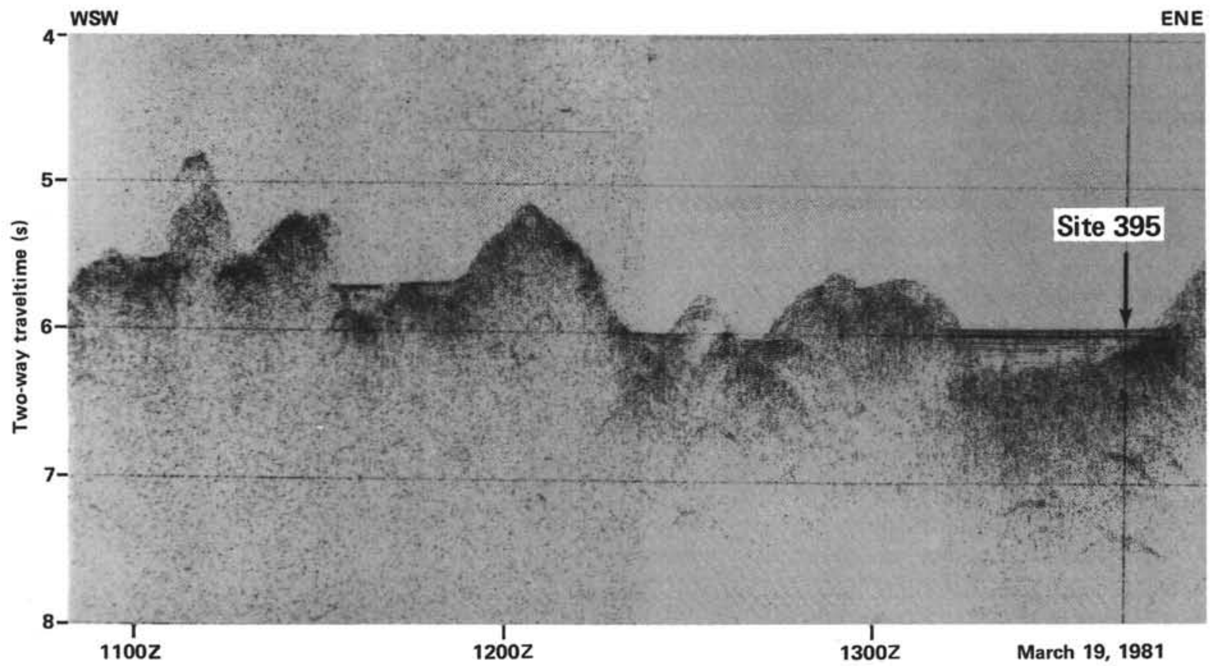

Figure 3. *Glomar Challenger* air-gun record approaching Site 395 on Leg 78B.

the tool was recovered at 1515 hr., it was found that the water sampler had operated properly but that the heat-flow unit had malfunctioned.

A second heat flow–pore water run was made between 1600 and 1715 hr. while lowering the pipe a further 100 m with similar recording and sampling stations. As on the previous run, the tool was pumped down at 5 spm. On this run, an electrical short resulted in invalid temperature readings, and a valve failure caused the water sample to be lost.

Because we thought that the electronics failures associated with the first two runs might have been caused by impact, the third run was made by lowering the tool on the sand line without pumping. After the tool latched in, temperatures were recorded at eight depths while the pipe was lowered in 10-m increments, and a water sample was taken at the deepest station (4741 m below the rig floor). While the tool was being reçovered, the sand line parted 1200 m above the tool and the tool and sand line had to be fished from the pipe. When the tool was finally received on deck at 0620 on March 21, it was found that the water sampler had functioned properly but that the heat-flow tool had again malfunctioned.

On the fourth run, conducted between 0718 and 0916 hr. on March 21, the tool was again lowered on the sand line with 5 spm pumping. Four temperature measurements, each of 3-min. duration, were made at stations located 4864, 4874, 4883 and 4893 m below the rig floor. As before, a water sample was taken at the deepest station. The temperature measurements and the water sampling were both successful.

The fifth and last run was conducted between 1032 and 1244 hr. on March 21. The tool was lowered on the sand line without pumping. Four stations, located 5007, 5017, 5026 and 5036 m below the rig floor, were occupied, and a water sample was taken at the deepest station. After it was verified that this run had been successful, the bit was lowered until a solid blockage was encountered at 5102.4 m. Considering the history of hole problems below this depth during drilling, it was decided that no attempt would be made to clean the hole to its original total depth of 5157 m. The bit was released and the end of the drill pipe pulled up to 4587 m within the casing in preparation for logging.

After rigging the logging sheaves, at 1600 hr. on March 21 we started down a combined Gearhart-Owen gamma-gamma density-2-arm caliper-natural gamma-high resolution temperature log while pumping at 15 spm. The pump was shut off and the temperature log recording begun at a depth of 4440 m below the rig floor, continuing downhole from 1823 to 1944 hr. to the blockage at about 5100 m. The bottom 20 m of the hole were relogged to determine the thermal stability of a high temperature layer found at the base of the hole. Because Hole 395A was filled with mud on Leg 45, it was thought that the temperature in this layer might represent the equilibrium temperature preserved in undisturbed mud in the bottom of the hole.

After the temperature log was completed, the density-caliper-natural gamma tools were checked by logging up to 5025 m. The hole was then logged up from the bottom of the hole to the casing from 2036 to 2134 hr. and arrived on deck at about midnight. Although the density and caliper logs were satisfactory, the natural gamma log appeared to have malfunctioned. It was later decided to be good, however.

A sonic velocity-2-arm caliper-natural gamma tool was started down the pipe shortly after midnight on March 22 while the rate of pumping was maintained at 15 spm. After the tool reached the bottom, a short test section was again run up the hole to 5020 m. The tool was then lowered again and the hole logged up to a depth of 4605 m (the casing shoe) between 0346 and 0428 hr. The tool was then brought to the surface, reaching the rig floor at 0700 on March 22. The sonic log had operated well, but the data was poor except near the bottom of the hole because of extensive hole enlargement, and the natural gamma log appeared to be dead. The caliper functioned mechanically (i.e., it centralized the tool) but it did not record.

The third logging run was made with a combined laterolog-neutron porosity-natural gamma tool. It was pumped down slowly at a rate of 15 spm starting at 0700 hr. on March 22 and arriving at the bottom at 0920 hr. A short test section was run up the hole to 5015 m, the hole was then logged up to the casing between 0937 and 0958 hr., and then the tool returned to the surface at about 1130. The neutron porosity tool had malfunctioned, the gamma log was poor, and the laterolog had failed because of a short in the connecting bridle.

The bridle was repaired, and the combined laterolog-neutron porosity-natural gamma tool was started down the pipe again at about noon at a pumping rate of 15 spm. After a short test section was run up to 5000 m, the tool was relowered and the hole logged up to the casing between 1358 and 1415 hr., the tool reaching the deck at 1530. None of the tools functioned well except the laterolog.

After the logging program was completed (for a summary, see Fig. 4 and Table 1), the Soviet downhole magnetometer was started down the pipe at 1600 hr. at a pumping rate of 15 spm. From the bottom of the casing, the tool descent was slowed to 7 m/min. and the vertical component of the magnetic field, H_z, was successfully logged to the bottom of the hole. The log was repeated up the hole to the casing. An attempt was then made to measure the horizontal component of the field, H_x, but the alignment of the tool depends on the inclination of the hole and the hole was so nearly vertical that the tool turned continuously. The attempt was thus abandoned and the tool was returned to the surface by about midnight.

The magnetic susceptibility tool was then attached and lowered with the magnetometer. When it reached the casing shoe, lowering was again slowed to 7 m/min. and logging was done almost to the base of the hole. The bottom was not touched in order to avoid damaging the ceramic pressure case of the tool. The horizontal field component recording was attempted again to see if the tool would work in this section of the hole but without success. The tool was then brought to the surface, reaching the deck by 0530 on March 23.

Because the quality of the temperature measurements made in the hole with the self-contained temperature probe was questionable and the first temperature log had been conducted after the water column had been somewhat disturbed by pumping, it was decided to repeat the temperature log so that the trend toward thermal equilibrium could be established before the hole was cleaned for the televiewer and packer experiments. The temperature tool was first calibrated in an ice bath and then started down the pipe at 0530 hr. The hole was success-

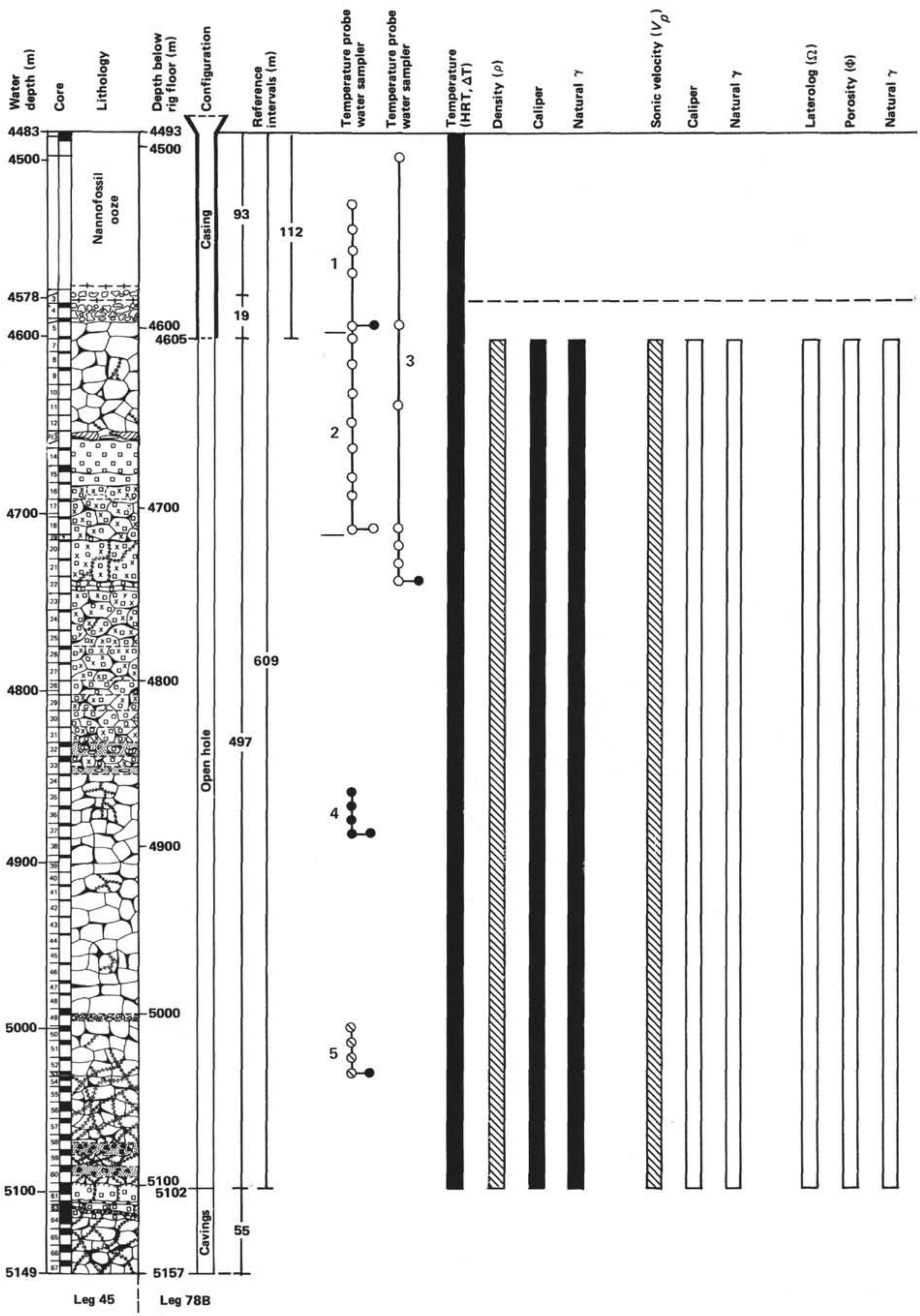

Figure 4. Hole 395A operations summary showing instrument deployment levels and data quality. The numbers 1 to 5 on the temperature probe water sampler plots refer to the downhole runs. (Lithologic column from Natland [1979].)

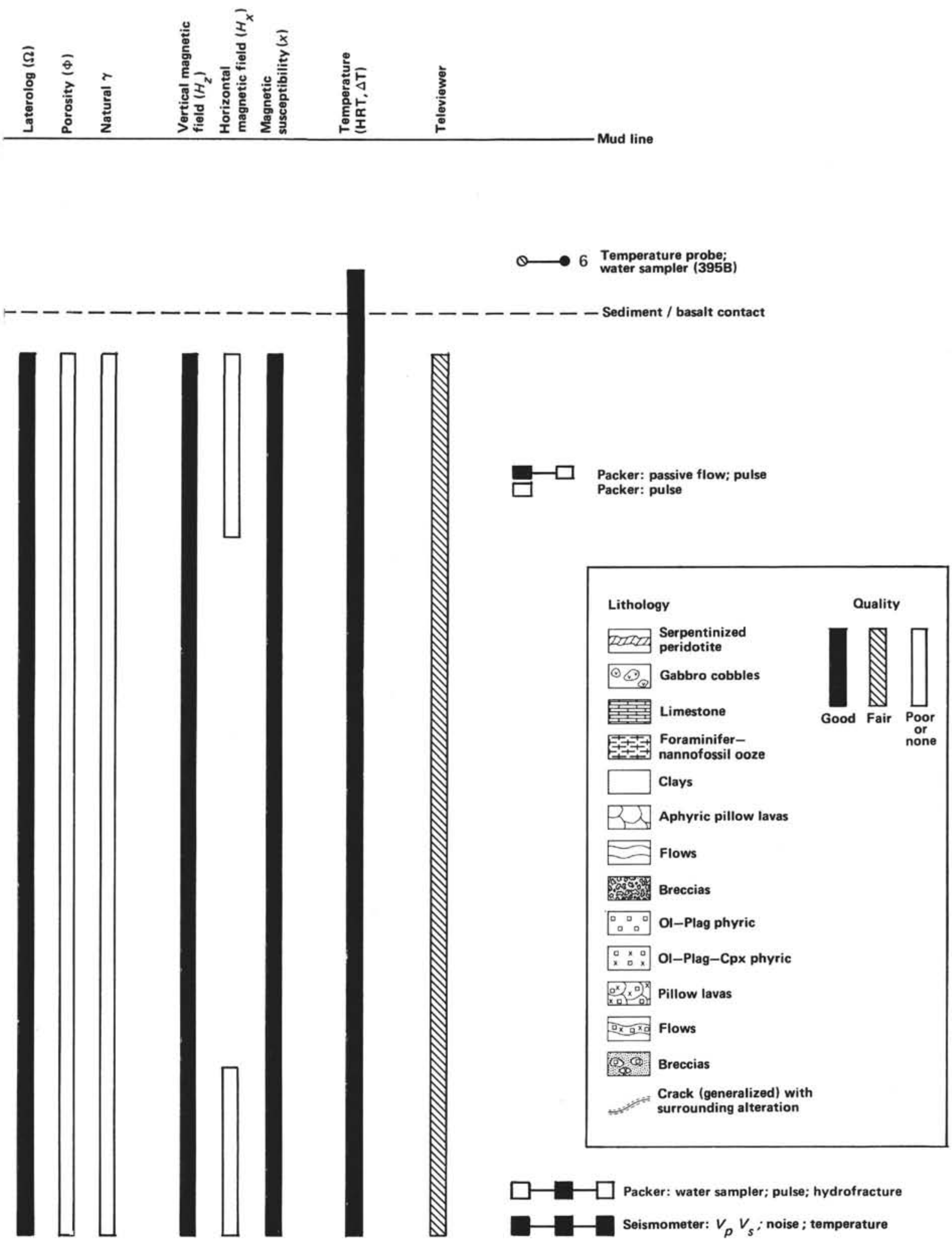

Figure 4. (Continued.)

Table 1. Leg 78B downhole operations summary, Site 395.

Run	Date	Time	Depth below rig floor (m)	Sub-bottom depth (m)	Logging direction	Tool/test	Data quality	Remarks
Temperature probe–water sampler								
1	3/20/81	1300–1512	4522–4598	29–105	Down	Temperature probe	—	Recorder malfunctioned.
						Water sampler	Good	Sampled at 4598 m.
2	3/20/81	1557–1715	4598–4712	105–219	Down	Temperature probe	Poor	Thermistor cable shorted.
						Water sampler	—	Sampler valve malfunctioned.
3	3/20/81	1957–2400	4495–4741	2–248	Down	Temperature probe	—	Recorder malfunctioned.
	3/21/81	0000–0620				Water sampler	Good	Sampled at 4741 m.
4	3/21/81	0718–0916	4864–4893	371–400	Down	Temperature probe	Good	
						Water sampler	Good	Sampled at 4893 m.
5	3/21/81	1032–1244	5007–5036	514–543	Down	Temperature probe	Fair	Recorder unstable.
						Water sampler	Good	Sampled at 5036 m.
Downhole logging								
1	3/21/81	1600–2400	4400–TD	0–609	Down	HRT, ΔT	Good	
	3/21/81	2018–2400	Casing–TD	112–609	Up	ρ	Fair	
						Caliper	Good	
						γ	Good	
2	3/22/81	0000–0700	Casing–TD	112–609	Up	V_p	Fair	Good near base of hole.
						Caliper	—	Centralized tool but no data recorded.
						γ	—	Tool malfunctioned.
3	3/22/81	0700–1130	Casing–TD	112–609	Up	Laterolog	—	Short in bridle.
						ϕ	Poor	Hole oversized.
						γ	Poor	
4	3/22/81	1200–1530	Casing–TD	112–609	Up	Laterolog	Good	
						ϕ	Poor	Hole oversized.
						γ	Poor	
Soviet magnetometer								
1	3/22/81	1530–2400	Casing–TD	112–609	Down, up	H_z	Good	
2	3/23/81	0000–0030	Casing–4700	112–207	Down, up	H_x	—	Hole too vertical to stabilize tool.
3	3/23/81	0030–0500	Casing–TD	112–609	Down	x	Good	
4	3/23/81	0500–0530	TD–5000	507–609	Up	H_x	—	Hole too vertical to stabilize tool.
Downhole logging								
5	3/23/81	0530–1130	4565–TD	72–609	Down	HRT, ΔT	Good	Calibrated in ice bath.
Borehole televiewer								
1	3/23/81	1400–2400	Casing–TD	112–609	Up	Televiewer	Fair	Heavy swell; incomplete motor sweep.
Packer								
1	3/24/81	1100–2400	5075	582	Stationary	Water sampler	Fair	Partially contaminated with surface water.
						Pulse test	Good	
						Hydrofracture	—	No fracture at 2200 psi.
2	3/25/81	1700–2400	4672	179	Stationary	Passive flow	Good	
	3/26/81	0000–0800	4672	179	Stationary	Pulse test	—	Packer failed.
Temperature probe–water sampler (Hole 395B)								
6	3/26/81	0853–1230	4563	70	Stationary	Temperature probe	Fair	
						Water sampler	Good	
DARPA seismometer								
1	3/27/81	0000–2400	TD	609	Stationary	V_p, V_s	Good	Shooting conducted by *Lynch*.
						Noise	Good	
	3/28/81	0000–2400				Temperature	Good	
	3/29/81	0000–2400						
	3/30/81	0000–0445						
Packer								
3	3/30/81	0445–2400	4675	182	Stationary	Pulse test	—	Packer failed.
	3/31/81	0000–0545						

Note: HRT = high resolution temperature; ΔT = differential temperature; ρ = gamma-gamma density; γ = natural gamma ray; V_p = compressional wave velocity; V_s = shear wave velocity; ϕ = neutron porosity; H_z = magnetic field strength, vertical component; H_x = magnetic field strength, horizontal component; x = magnetic susceptibility. TD = total depth.

fully logged from 4565 m to the bottom of the hole between 0811 and 0915 hr., after which the tool was returned to the surface by 1130 hr.

After the temperature logging tool was recovered, the pipe was lowered to the bottom and seawater was circulated for an hour to flush out the mud left in the hole on Leg 45 (traces were detected in the water samples). The pipe was then raised back into the casing.

Starting at 1400 hr., the televiewer was run to the bottom of the casing. Although the tool had functioned well on deck, in the hole the scanning motor only ran at one-third the correct speed, which amplified the already serious problem of ship heave. Because the performance would still allow evaluation of the walls of the hole for packer seating and geologic reconstruction, the hole was logged with the tool as it was. The tool arrived back on deck at 0300 hr. on March 24. The data were only fair, because of the motor problem and because the data were scrambled by heave-induced stretching and overprinting during the run and individual features such as pillows and cracks could only rarely be discerned. However, massive basalt sections suitable for setting the packer could be clearly distinguished from pillow basalts on the basis of reflectivity differences.

After the televiewer was recovered and the logging sheaves removed, the pipe was brought to the surface to install a Lynes packer in order to conduct permeability and flow tests. At 1100 hr. the pipe was run back down, reaching the seafloor by 1830 hr. When the EDO reentry scanning tool reached the bottom of the pipe, it was found that two stands had inadvertently been left out of the pipe string. It was thus necessary to recover the reentry tool, add two stands of pipe, and lower the tool again. When the tool was back on bottom at 0133 hr. on March 25, scanning was resumed and the hole reentered by 0334 hr.

Once reentry was confirmed, the packer was lowered to 5075 m in order to take a large-volume water sample and to run the first pressure test. The sampler go-devil was sent down at 0700 hr. and reached the packer at about 0800 hr., after which the packer was inflated, the hole sealed, the water sample taken from the lowermost portion of the hole, and the go-devil retrieved, the latter arriving on deck with the water sample at 1030 hr. When the water sampler was opened downhole, the formation below the packer was subjected to a large, negative pressure pulse from the water filling the sample chamber. The record obtained by the Kuster Ltd. pressure recorder in the go-devil showed very slow pressure equilibration, indicating that the permeability of the formation near the bottom of the hole was extremely low. This fact was confirmed between 1030 and 1700 hr. when the safety go-devil was sent down, the packer reinflated, and a conventional pressure pulse test run using the ship's pumps. Because the packer seal was excellent and the formation was very impermeable, a hydrofracture test to 2200 psi was conducted at the same level in order to determine the *in situ* stress. Because no fracture was produced at this pressure and higher pressures might have damaged the packer, the go-devil was retrieved and the packer raised to 4672 m, the intention being to return to the base of the hole at the end of the packer experiments to complete the test at higher pressures.

With the packer at 4672 m, two attempts with the safety go-devil were required before the tool was finally inflated at 2140 hr. On the first attempt the overpressure shear plug had sheared prematurely. With the packer inflated, the hole below the packer was isolated and the aquifer pressure was passively recorded until midnight in order to monitor the formation pressure. After this test, a second series of pulse tests was attempted, but the packer could not be kept inflated. When it was found that the packer could not be reinflated even after resetting and refurbishing the go-devil a third time, it was concluded that the packer had ruptured, and the packer experiment was terminated at 0600 hr. on March 26.

Because there was insufficient time to run the pipe to the surface, refurbish the packer, lower the tool, and repeat the experiment before the scheduled start of the DARPA/NORDA downhole seismometer experiment and because the large-scale resistivity experiment was postponed until after the seismometer test to ensure that the logging cable was not damaged and could be used for reentry, it was decided to pull out of the hole, conduct heat flow measurements in the sediments next to the hole, and return the pipe to the surface.

Before the pipe was pulled completely out of the hole, instrumentation designed to measure pipe stress was inserted into the drill string and tested between 0700 and 0745 hr. to calibrate the equipment and monitor the stress under moderate loads. Although the equipment worked on deck, it apparently failed after it was lowered into position.

After the instrumented pipe was removed from the string, the pipe was pulled above the mudline, offset 101 m to the northwest (58 m south and 67 m west of the beacon) and a new hole (Hole 395B) started for heat-flow measurements. The bit was washed in to a depth of 4563 m below the rig floor, after which the heat-flow–pore-water sampler was lowered on the sand line at 0853 and recovered at 1230 hr. Although the tool functional properly, the data may have been degraded by seawater contamination.

Once the tool was on deck, we started pulling the pipe immediately. The last stages of the pipe recovery went slowly because of the need to magnaflux the bottom-hole assembly, and the pipe was on deck by 2315 hr. on March 26. With the arrival of the *Lynch* earlier that afternoon (at 1500 hr.) to set out current meters, deploy ocean bottom seismographs, and conduct shooting, the stage was set for the DARPA/NORDA downhole seismometer experiment.

After the power sub and swivel were magnafluxed, the DARPA instrument package and deployment equipment were set up under nearly ideal sea state conditions between 0130 and 1045 hr. on March 27. The deployment went smoothly, with the instrument recording a maximum acceleration of only 4.2 *g* during handling. As soon as the instrument package was assembled and the electromechanical (EM) cable connected, the pipe and cable were lowered together, the instrument reaching the seafloor at about 1900 hr. The EDO tool was then lowered and reentry achieved at 2357 hr. after 51 min. of scanning. The maximum acceleration experienced by the instrument package during reentry was 6 *g*.

After the reentry tool was retrieved, the borehole instrument package was released from its carriage and lowered to the bottom of the hole by 0715 hr. on March 28. Once it was confirmed that the instrument was in the bottom of the hole, the EM cable was released and the pipe was raised to the surface, reaching the rig floor by 2145 hr. There was no indication of entanglement between the drill string and the cable. The ship was then moved 915 m WSW while cable was payed out, both to reduce ship's noise in the vicinity of the seismometer and to provide an unobstructed shooting line over the hole for the *Lynch*. During the move, the ship's propulsion system was shut down for 15 min. to establish the background noise level in the borehole.

Although the *Lynch* had arrived two days earlier and had begun setting out current meters almost immediately, the OBSs could not be deployed until the last minute because they could only be set to record for 24 hr. Three OBSs were accordingly set 1.1 km north, 1.8 km west, and 1.8 km southwest of the cone between 2300 hr. on March 28 and 0300 hr. on March 29. The *Lynch* then steamed to a position 44.4 km northeast of the *Challenger*, exploding a series of successively larger charges between 0625 and 0700 hr. while enroute in order to calibrate the instrument. After the noise level and sensitivity had been established, the *Lynch* shot a split refraction line over the cone along a heading of 049° relative to the *Challenger* to a position 74.1 km to the southwest (Fig. 5). The vessel then steamed ESE for about 36 km, turned north and shot until it reached the southwest line, at which point it turned northeast and reshot the original line back to the hole. After reaching the hole, the *Lynch* changed to a course of 280° and shot along a line extending 29.6 km to the west. The shooting was terminated at 1100 hr., after which the *Lynch* returned to the vicinity of the *Challenger* and picked up her OBSs. The shooting completed, the *Challenger* returned to its former position over the hole and pulled up the tool by 0400 hr. on March 30.

Preliminary examination of the data during the course of the shooting experiment indicated that the noise level in the hole was very low and that the refraction data were of excellent quality. Temperature measurements recorded at the same time from a thermistor near the surface of the instrument package were in agreement with the highest temperatures observed near the base of the hole during logging.

After the DARPA seismometer package was secured, the packer and the bottom-hole assembly were made up and the pipe was lowered to the seafloor for the last time. The pipe reached the bottom at 1645 hr., after which the reentry tool was lowered and the hole reentered by 1944 hr. After the EDO tool was retrieved, the packer was lowered to a depth of 4675 m. When the safety go-devil was dropped and the tool was inflated, it held weight and pressure briefly but then lost pressure and would not reinflate. When the tool still would not inflate after the go-devil was redressed and rerun, it was concluded that the packer had ruptured under abuse from the hammering of the bumper subs in rising seas, and the experiment was terminated. Because the large-scale resistivity experiment could not be run (the cables were found to be corroded) and deteriorating weather precluded further heat-flow runs, it was decided to abandon the hole at 0545 on March 31. After a brief pause until 0815 to test the downhole bit motion indicator (DBMI), the pipe was brought to the surface and the vessel secured for steaming by 1600.

While pulling the pipe, the ship had been allowed to drift off station to facilitate pipe handling (Fig. 2). After the *Challenger* got underway, she crossed over the beacon at 1749 hr. local time and set a course for Las Palmas, leaving the *Lynch* behind to pick up the ocean bottom seismographs and return to Fort Lauderdale. By the time the *Challenger* made port in Las Palmas in the early morning on April 8, 1981, it was clear that through good luck (the weather was exceptional), good seamanship (the beacon was dropped within 120 m of the cone) and the expertise of the ships' officers and staff, nearly all of the objectives of the leg had been accomplished.

Explanatory Notes

Because Site 395 was reoccupied on Leg 78B for the purpose of conducting downhole geophysical experiments, no coring was conducted during the leg. The core descriptions and petrology referred to throughout the course of the ensuing chapters are from Melson, Rabinowitz, et al. (1979).

While reoccupying the site and reentering Hole 395A, we noted a series of depth discrepancies between the Leg 45 and Leg 78B results. Both sets of depths are shown in Fig. 4. To facilitate direct comparison of the logging and geophysical results obtained on Leg 78B with the petrologic column determined on Leg 45, the depths reported throughout this volume (except this Operations chapter) have been converted to Leg 45 sub-bottom or sub-basement depths.

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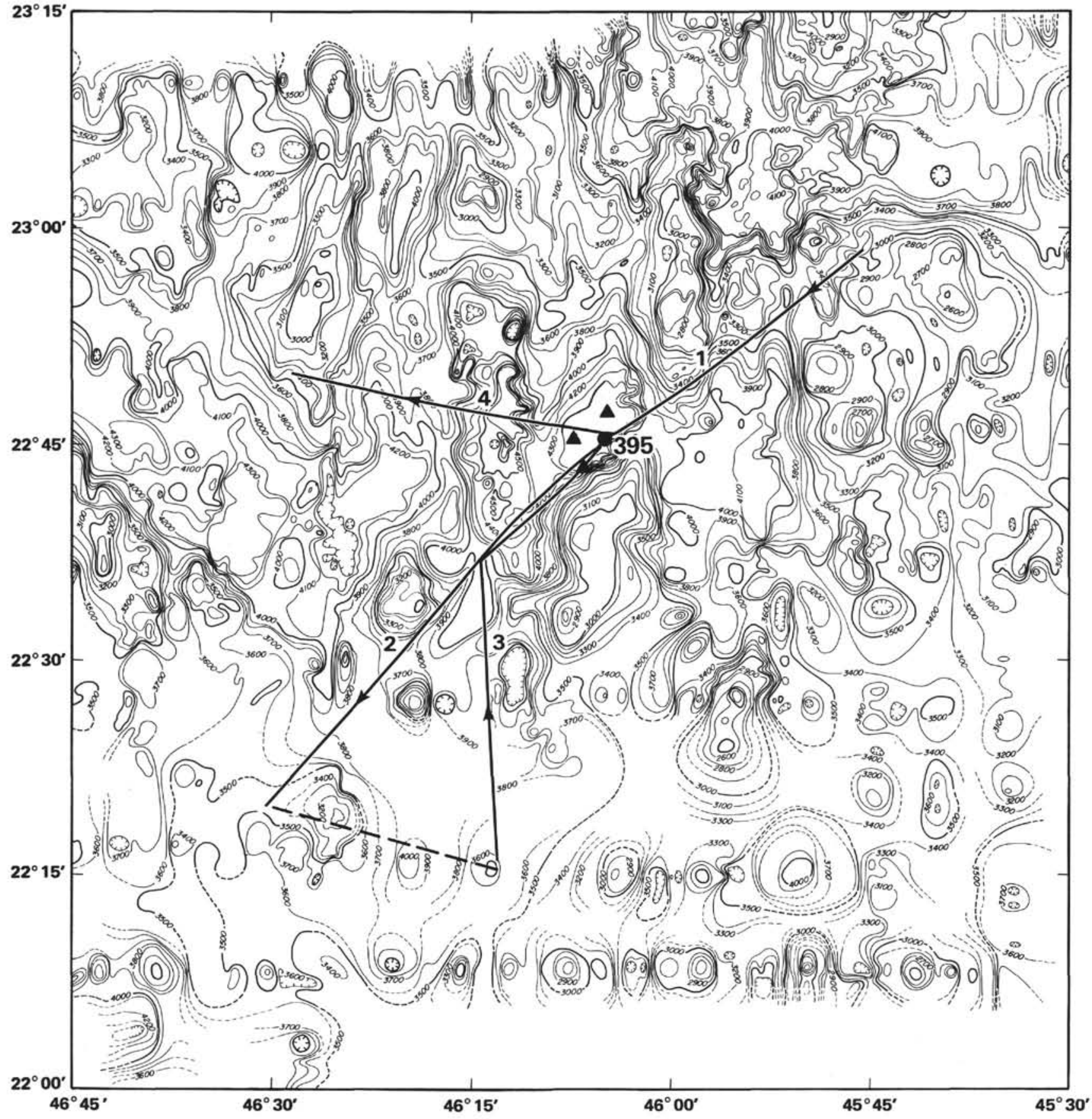

Figure 5. *Lynch* shot lines in the vicinity of Hole 395A. (Triangles indicate OBS locations. Map from Hussong et al. [1979]. Depths are in corrected meters.)