10. SITE 561[1]

Shipboard Scientific Party[2]

HOLE 561

Date occupied: 18 October 1981

Date departed: 20 October 1981

Time on hole: 35.7 hr.

Position (latitude; longitude): 34°47.10′N; 39°01.70′W

Water depth (sea level; corrected m, echo-sounding): 3459

Water depth (rig floor; corrected m, echo-sounding): 3469

Bottom felt (m, drill pipe): 3470

Penetration (m): 426.5

Number of cores: 3

Total length of cored section (m): 15

Total core recovered (m): 5.96

Core recovery (%): 40

Oldest sediment cored:
Depth sub-bottom (m): 411.5
Nature: Nannofossil ooze
Age: earliest middle Miocene

Basement:
Depth sub-bottom (m): 411.5
Nature: Basalt

Principal results: Hole 561 was drilled on Anomaly 5E on the west flank of the Mid-Atlantic Ridge midway between the Oceanographer and Hayes fracture zones (Fig. 1). It is located 10 miles northwest of Site 560 (it had not been possible to recover basalts at Site 560). Sediments were washed down to the basement at a depth of 411.5 m sub-bottom. The total penetration in the basement was only 15 m when the bit failed.

The recovered basement material consists of aphyric pillow basalts. At least three different groups are identified on the basis of geochemistry. Both depleted (Nb = 3 ppm, Zr = 75 ppm, $[Nb/Zr]_{Ch} \sim 0.4$) and enriched (Nb = 22 ppm, Zr = 98 ppm, $[Nb/Zr]_{Ch} \sim 2.2$) basalts are represented by these groups. Hole 561 is the second hole drilled on this leg from which both enriched and depleted basalts were recovered. Considered together with previous occurrences at Holes 413 (Luyendyk, Cann, et al., 1979) and 504B (Cann, Langseth, Honnorez, Von Herzen, White, et al., 1983), this wide range of abundance ratios (such as Nb/Zr) at a single spot of the ocean crust appears to be a more common feature than previously thought. The combination of isotopic data and trace element studies will help us to understand the relative contribution of mantle sources and melting processes.

Even though only 15 m of basalts were cored before bit failure, a wide variation in Nb/Zr ratio had already been found. It was, therefore, decided that additional recovery was not necessary, and the remaining time could be spent drilling on the same isochrons south of the Hayes Fracture Zone.

At Site 561, no downhole measurements were taken. No sediment accumulation rate could be calculated, and no samples were analyzed for pore-water chemistry.

OPERATIONS

Approach to Site

After we failed to recover basalt at Site 560, we decided to drill a second site in the same general area. The course of the *Challenger* was set in a north-northwest direction along a track that would cross approximately 3 miles north of a basement high observed at 2130Z 16 October on the approach to Site 560. Upon crossing this feature between 1530Z and 1600Z on 18 October, a good basement reflector was noted on the flank of a small peak (Fig. 2). After profiling 4 miles beyond this point, we reversed course. The beacon was dropped when the *Challenger* crossed the site for a second time at 1722Z (see Fig. 2, site chapter Site 560, this volume). Site 561 is located on Anomaly 5E and is roughly 10 miles northwest of Site 560.

On-Site Operations

The hole was spudded at 0100Z 19 October and sediments were washed to basement, which was reached at a depth of 411.5 m sub-bottom at 0400Z (Table 1). After the recovery of Core 2 at 1220Z, we found that a piece of rock had become lodged in the drill pipe and we pumped the center bit down to dislodge the rock. When drilling was resumed, the drill bit did not function properly, perhaps because of the impact of the center bit. After several more hours of attempted drilling, the bit failed completely, and we abandoned the hole. The drill string was pulled and the *Challenger* was under way to Site 562 at 0312Z 20 October.

SEDIMENT LITHOLOGY

The sedimentary section drilled at Site 561 consists of 411.5 m of calcareous pelagic deposits. One wash core (Core H1) recovered 8.5 m of siliceous foraminiferal nan-

[1] Bougault, H., Cande, S. C., et al., *Init. Repts. DSDP*, 82: Washington (U.S. Govt. Printing Office).

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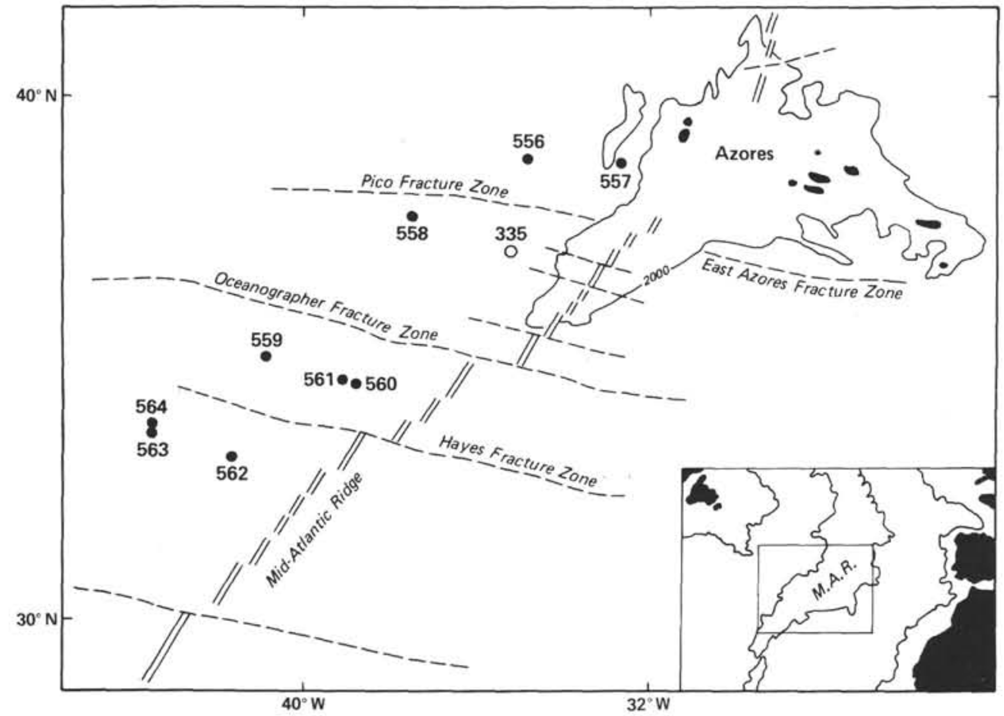


Figure 1. Site location map, Leg 82.

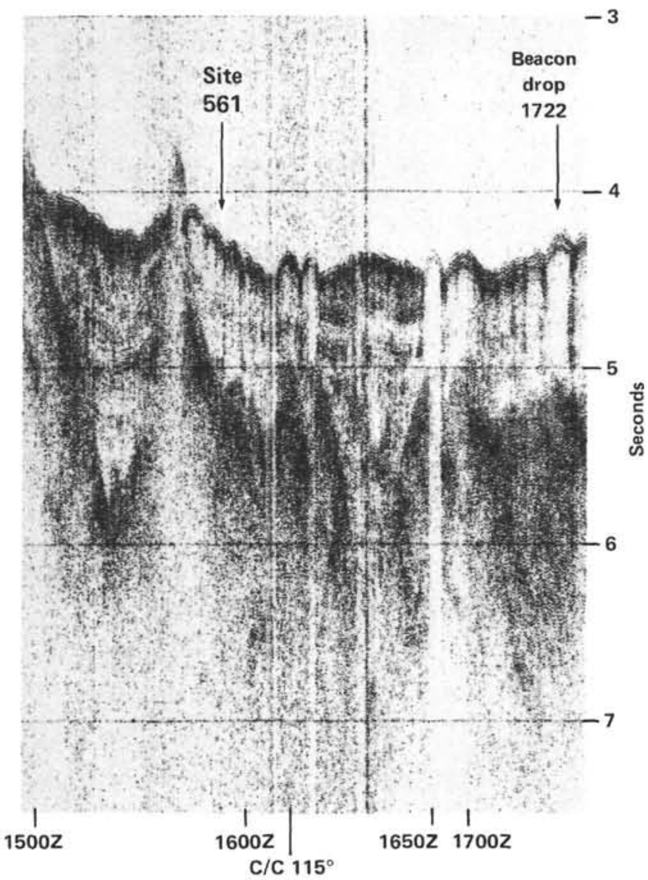


Figure 2. *Glomar Challenger* seismic profile over Site 561. For location of profile see Figure 2, site chapter, Site 560. C/C = course change.

Table 1. Coring summary, Hole 561.

Core	Date (Oct. 1981)	Time (Z)	Depth from drill floor (m)	Depth below seafloor (m)	Length cored (m)	Length recovered (m)	Percent recovered
H1	19	0618	3470.0-3881.5	0.0-411.5	0.0	0.0	0
1	19	0833	3881.5-3884.5	411.5-414.5	3.0	1.46	49
2	19	1220	3884.5-3893.5	414.5-423.5	9.0	2.99	33
3	19	2002	3893.5-3996.5	423.5-426.5	3.0	1.51	50
					15.0	5.96	40

nofossil ooze and nannofossil ooze/chalk. The age range included in the recovered material is Pleistocene to earliest middle Miocene (14–16 or 15–17 Ma). The age of the oldest sediments agrees with the expected basement age at this site.

The siliceous foraminiferal-nannofossil ooze is pale brown (10YR 6/3) with occasional moderate mottling. Indistinct color contact (with 10YR 5/3) may represent massive parallel bedding. A contact with white nannofossil ooze below is disturbed but distinct. Smear-slide estimates of major components include 30% nannofossils, 29% siliceous fossils, 20% foraminifers, and 20% clay.

Most of the material recovered in Sections 561-H1-3 through 561-H1-6 is a mixture of nannofossil chalk and ooze, various shades of white in color (2.5Y 7/2 to 7.5 YRN 8). We observed no evidence of bioturbation. Faint parallel bedding is present in the chalk. Smear-slide estimates of major components include 66–72% nannofossils, 8–9% foraminifers, 10–15% unspecified carbonate, and 10% clay.

The recovered sediments are similar to the section in the same age range at Site 558.

BIOSTRATIGRAPHY

Sediments recovered from Section 561-H1-1 and from 561-H1,CC at Site 561 are from the late Pleistocene to middle Miocene time. These dates are based on the calcareous nannofossils, which are abundant and preserved well to moderately well.

The core-catcher sample examined for foraminifers contains an abundant and well-preserved suite of Neogene (middle Miocene–Pleistocene) markers. The oldest forms identified are middle Miocene with a possible range in age of 14–16 Ma.

Calcareous Nannofossils

One washed sediment core was retrieved from Hole 561 before basement was reached. Sample 561-H1-1, 10 cm is upper Pleistocene on the basis of an assemblage characterized by *Ceratolithus telesmus, Gephyrocapsa oceanica, G. caribbeanica*, and possibly *Emiliania huxyleyi*. This sample is placed in either the *E. huxyleyi* Zone (CN15 or NN21) or the *G. oceanica* Zone (CN14 or NN19–NN20) because of the questionable identification of *E. huxyleyi*. The core catcher of Core H1 occurs just above basement and is middle Miocene. This sample contains *Sphenolithus heteromorphus* and is assigned to either the *S. heteromorphus* Zone (CN4 or NN5) or the *Helicosphaera ampliaperta* Zone (CN3 or NN3–NN4).

IGNEOUS PETROLOGY AND GEOCHEMISTRY

At Site 561, basement was encountered below a 411.5-m-thick sequence of sediments. Three lithologic units and two chemical groups were identified.

Lithologic Units (Fig. 3)

Unit 1 (411.5–412.1 m) Aphyric Basalt

The fresh to moderately altered aphyric basalt of Unit 1 shows some minor, barely visible, plagioclase laths and a few olivine phenocrysts that are altered to brown clay. Round vesicles ≤1 mm in diameter and filled with green clay are randomly scattered and compose 2–5 vol.% of the unit. The basalt is weakly fractured; some narrow veins are filled with calcite.

This unit is only about 70 cm thick, and cooling margins are absent. It may be part of a pillow or single flow.

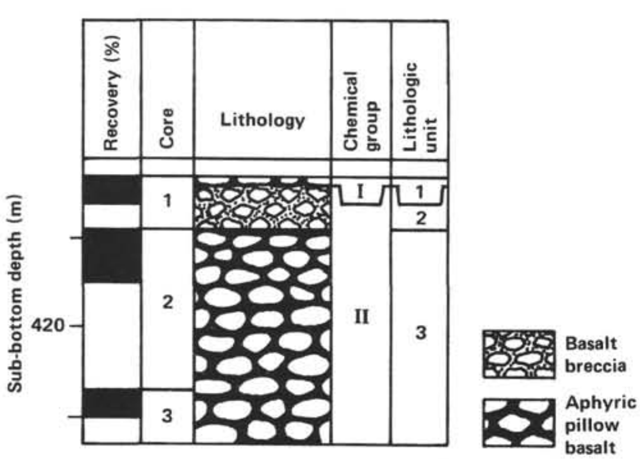


Figure 3. Basement lithology column, Hole 561.

Unit 2 (412.1–414.5 m) Basalt Breccia

This unit is composed of basalt breccia, with large (>5 cm) angular clasts of fairly fresh, fine-grained aphyric basalt and occasional small (<1 cm) palagonitized brown glass fragments within a pale brown limestone matrix. Similar to the basalts of Unit 1, the clasts of Unit 2 contain minor visible lath-shaped plagioclase and minor altered olivine phenocrysts. Round vesicles up to 2 mm in diameter are sometimes filled with clay. Some boundaries between basalt and limestone are very irregular, with numerous small lobes of limestones projecting into the basalt clasts. These may have developed from zones of very strong vesiculation within pillows.

Unit 3 (414.5–426.5 m) Aphyric Pillow Basalt

A sequence of aphyric basalt pillows makes up Unit 3. We drilled through about 10 pillows, ranging in thickness from a few tens of centimeters to 1 m; they are all separated by glass rinds.

The fairly fresh, fine-grained basalts of this unit are almost identical to those of Units 1 and 2. In places, local concentrations of larger plagioclase laths (less than 3 mm) form glomerophyric clusters. A few rounded, possibly partially resorbed, plagioclase phenocrysts (2–3 mm) occur. Olivine phenocrysts (<3 mm) are rare and always altered to green or brown clay. Small round vesicles (mean diameter ~0.5 mm) filled with green clay are common throughout the section. Glass pillow margins are only a few millimeters thick. The glass appears fresh, although it is sometimes highly fractured. A variolitic transition to pillow interiors is common.

Limestone-filled fractures occur throughout the section and often display irregular lobe-shaped boundaries as in Unit 2.

Petrography

Site 561 basalts are characterized by the presence of plagioclase-olivine glomerocrysts (1–3 mm in diameter), which are surrounded by a halo of devitrified glass. The basalts are sparsely phyric, with 2–3% plagioclase phenocrysts (0.5–2 mm in length) occurring either singly or in glomerophyric aggregates with olivine. Most have an optically determined composition of about An_{65}, but two isolated determinations of An_{75} and An_{85} suggest a more complex assemblage. Most of the phenocrysts are either unzoned or display only a single zone boundary, although oscillatory zoning is also reasonably common. In no case, however, was the range of compositions in one zoned crystal observed to be more than about 5% anorthite.[3] Olivine phenocrysts and microphenocrysts (about 5%) are prismatic or diamond shaped and range

[3] Preliminary shore-based microprobe studies suggest that plagioclase phenocryst compositions are close to An_{75} with little zoning, whereas the groundmass has a composition of An_{65}.

from about 0.1 to 0.5 mm in size, but occasional grains are as large as 1 mm, especially in association with plagioclase. Fresh olivine is rare; most grains are completely altered to light brown clay.

The groundmass of the basalts consists of about 35% randomly oriented, elongate plagioclase laths with abundant (45%) interstitial clinopyroxene. Most clinopyroxene occurs as aggregates of very fine (<0.2 mm) granules. Occasionally 5–10% large prismatic grains to about 0.1 mm, 5% granular magnetite, and 10–15% interstitial devitrified glass complete the assemblages.

Vesicles (1–2%) are well rounded and may be unfilled, partially filled by devitrified glass, or filled by emerald green clay or calcite.

Geochemistry

Eight basalt samples were analyzed from Site 561; the analyses are given in Table 2 and plotted versus depth in Figure 4.

The two samples from the wash Core H1 and the upper part of Section 561-1-1 compose Chemical Group I (Table 2, Fig. 4), which is identified with Lithologic Unit 1. Both samples have a very similar chemistry (Table 2) with quite high Mg′-numbers (65 and 67). However, the sample from Core 1 is notably enriched in Sr compared to the wash core sample. The high $(Nb/Zr)_{ch}$ ratio (~2.2) of these samples reflects the quite strongly enriched character that shows up on a modified Coryell-Masuda diagram (Fig. 5).

The six analyzed basalts forming Chemical Group II encompass samples from both Lithologic Units 2 and 3, and are somewhat heterogeneous in major elements if not in trace elements (Table 2). The four basalts in this group from Sample 561-1-1, 128–130 cm to Section 561-2-2 have a rather consistent major element chemistry (Table 2). In comparison to these samples, the sample from Section 561-2-3 has high Fe_2O_3 and low MgO, CaO, and Al_2O_3 abundances (Table 2; Fig. 4), whereas the sample from Section 561-3-1 has a somewhat high CaO content. These minor differences in major element chemistry are, however, not sufficient to warrant the designation of separate chemical groups for these samples. In marked contrast to Chemical Group I samples, Group II basalts display a quite strongly depleted pattern—$(Nb/Zr)_{ch}$ ~0.4—when plotted on a modified Coryell-Masuda diagram (Fig. 5).

Hole 561 is the second location of this leg (Hole 558 is the first) in which enriched and depleted basalts are

Table 2. Analyses of major elements (in wt.%) and trace elements (in ppm) for Hole 561 basalts.[a]

Core-Section (interval in cm) (piece number)	Sub-bottom depth (m)	Chemical group	SiO_2	TiO_2	Al_2O_3	Fe_2O_3[b]	MnO	MgO	CaO	K_2O	P_2O_5	Total	Mg′[c]	Ti	V	Sr	Y	Zr	Nb
H1-CC, 10–14		I	50.54	1.21	15.03	9.84	0.15	8.83	12.33	0.24	0.23	98.40	67	7260	263	225	31.0	100	22.4
1-1, 28–31 (C)	411.8		49.56	1.19	14.89	10.24	0.15	8.46	12.19	0.27	0.20	97.15	65	7140	267	457	29.8	96	21.8
1-1, 128–131 (9B)	412.8	II	50.43	1.34	14.85	11.10	0.17	7.43	12.50	0.18	0.13	98.13	60	8040	356	98	38.4	80	4.3
1-2, 17–20 (2A)	413.2		50.34	1.38	15.14	10.87	0.18	7.56	12.00	0.12	0.12	97.71	61	8280	359	97	39.3	76	2.5
2-1, 52–55 (4A)	415.0		50.18	1.35	14.59	11.48	0.18	7.65	11.90	0.12	0.13	97.58	60	8100	347	90	38.4	72	2.6
2-2, 122–126 (4C)	417.3		50.48	1.33	14.88	11.31	0.18	7.66	11.90	0.18	0.11	98.03	60	7980	349	92	39.2	76	3.3
2-3, 71–73 (6A)	418.2		50.46	1.35	14.27	13.33	0.19	6.75	11.40	0.49	0.12	98.36	53	8100	359	86	42.5	75	1.5
3-1, 114–118 (9F)	424.7		49.89	1.31	14.61	11.40	0.17	7.19	12.74	0.27	0.12	97.70	59	7860	345	90	37.2	73	3.3

[a] Measurements were made on board from ignited samples. Onshore analyses have shown the loss upon ignition to be less than 1%. The concentrations presented in the compilation tables at the end of this volume (Appendix) include volatile contents.
[b] Total Fe as Fe_2O_3.
[c] Mg′ is the atomic ratio of 100 × (Mg/[Mg + Fe^{2+}]); calculated using an assumed Fe_2O_3/FeO ratio of 0.15.

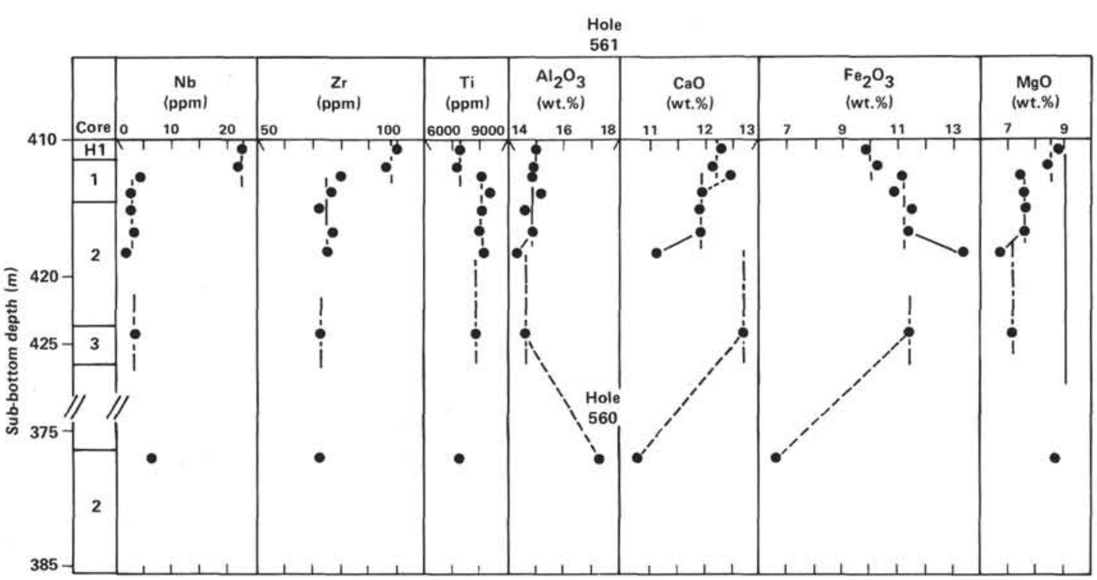


Figure 4. Downhole variations in chemical abundances, including samples from both Holes 561 (top) and 560 (bottom).

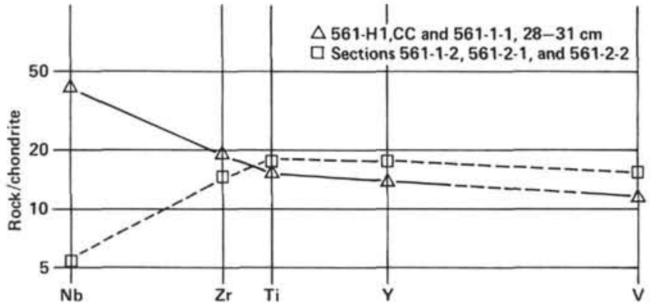


Figure 5. Extended Coryell-Masuda diagram of Chemical Groups I and II, Hole 561.

found. Together with the previous results obtained at Site 413 (Luyendyk, Cann, et al., 1979) and Hole 504B (Cann, Langseth, Honnorez, Von Herzen, White, et al., 1983), these findings tend to show that the occurrence of depleted and enriched material in the same place may be more common than previously thought.

The comments made for Site 558 apply for Site 561; additional data (isotopes, other trace elements, La/Ta) are needed for further interpretation in terms of mantle source and geodynamics.

MAGNETICS

Basalt Paleomagnetism

Three basalt samples were collected for paleomagnetic studies. Because of the few samples available, only natural remanent magnetization (NRM) and susceptibility were measured. Demagnetization was not done in order to allow further studies in shore-based labs. The range of NRM intensities of these basalt samples is 1.5–4.9 $\times 10^{-3}$ emu/cm^3. The susceptibility range is 45–95 $\times 10^{-6}$ emu/cm^3 Oe.

The NRM inclination is variable and ranges from −26.7 to −60.8°. We could not determine whether any of the samples is representative of a dominant inclination value.

The NRM intensity directions and susceptibilities are given in Table 3.

PHYSICAL PROPERTIES

The hole was washed down to basement with the recovery of one wash core. The sediment recovered was too deformed to allow useful measurements. A program of routine measurements of seismic velocity and density was begun. The premature failure of the bit caused abandonment of the hole with only three cores recovered, so that the physical properties measurements were not completed.

SUMMARY AND CONCLUSIONS

Because only three weathered pieces of basalt were recovered at Site 560, we decided to drill a second hole in the area to get a reasonable sampling at each chosen site on Anomalies 6 and 13.

Hole 561 was drilled on Anomaly 5E about 10 miles northwest of Site 560 (midway between the Oceanographer and Hayes fracture zones). Sediments were washed down to the basement felt at 411.5 m sub-bottom.

The total penetration in the basement was only 15 m when the bit failed, but at least three chemically distinct basalt groups were found within the aphyric pillow basalts that were recovered. Both depleted (Nb = 3 ppm, Zr = 75 ppm, $[Nb/Zr]_{ch}$ ~0.4) and enriched (Nb = 22 ppm, Zr = 98 ppm, $[Nb/Zr_{ch}$ ~2.2] basalts are present in these groups. Of all the DSDP sites drilled before Leg 82 where basement was penetrated and detailed trace element data were available, only two (Site 413 and Hole 504B) recovered both enriched and depleted basalts. Sites 558 and 561 of Leg 82 represent the third and fourth occurrences of such a mixture. These samples will have to be studied in detail for other trace elements and for isotopic ratios. Fundamental petrogenetic processes, and fundamental and comparative geochemistry will have to be discussed before any interpretation of the mantle sources and geodynamics can be proposed.

REFERENCES

Cann, J. R., Langseth, M. G., Honnorez, J., Von Herzen, R. P., White, S. M., et al., 1983. *Init. Repts. DSDP*, 69: Washington (U.S. Govt. Printing Office).

Luyendyk, B. P., Cann J. R., et al., 1979. *Init. Repts. DSDP*, 49: Washington (U.S. Govt. Printing Office).

Table 3. Paleomagnetic properties of basalts from Hole 561.

Core-Section (interval in cm)	J_{NRM} ($\times 10^{-3}$ emu/cm^3)	NRM dec. (°)	NRM inc. (°)	χ ($\times 10^{-6}$ emu/cm^3 Oe)
2-1, 35–37	2.34	252.2	−60.8	45
2-1, 64	4.89	140.9	−44.3	65
2-3, 5–7	1.52	80.5	−26.7	95

Note: J_{NRM} = intensity of natural remanent magnetization (NRM); dec. = declination; inc. = inclination; χ = susceptibility.

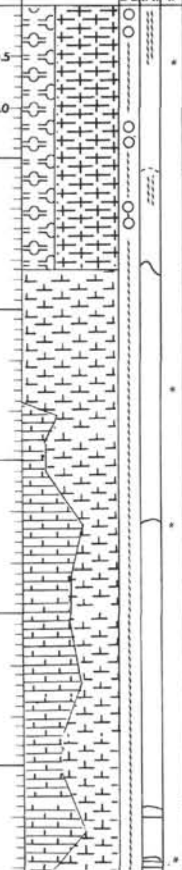
SITE 561 HOLE CORE H1 CORED INTERVAL 0.0–411.5 m

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	SECTION
Pleistocene	CN15 or CN14	1, 2
lower/middle Miocene	middle Miocene (14–16 m.a.) (F) CN3 or CN4 (14–15 or 15–17 m.y.) (N)	3, 4, 5, 6, CC

FOSSIL CHARACTER: FORAMINIFERS, NANNOFOSSILS, RADIOLARIANS, DIATOMS

METERS: 0.5, 1.0

GRAPHIC LITHOLOGY



Basalt

DRILLING DISTURBANCE, SEDIMENTARY STRUCTURES, SAMPLES

– caved
10YR 6/3
10YR 5/3
10YR 6/3
– contact disturbed
7.5YR N8
5Y 8/1
2.5Y N8
7.5YR N8
5Y 7/1
2.5Y N8
2.5Y N8
2.5Y 7/2

LITHOLOGIC DESCRIPTION

DOMINANT LITHOLOGY SILICEOUS FORAMINIFER-NANNOFOSSIL OOZE

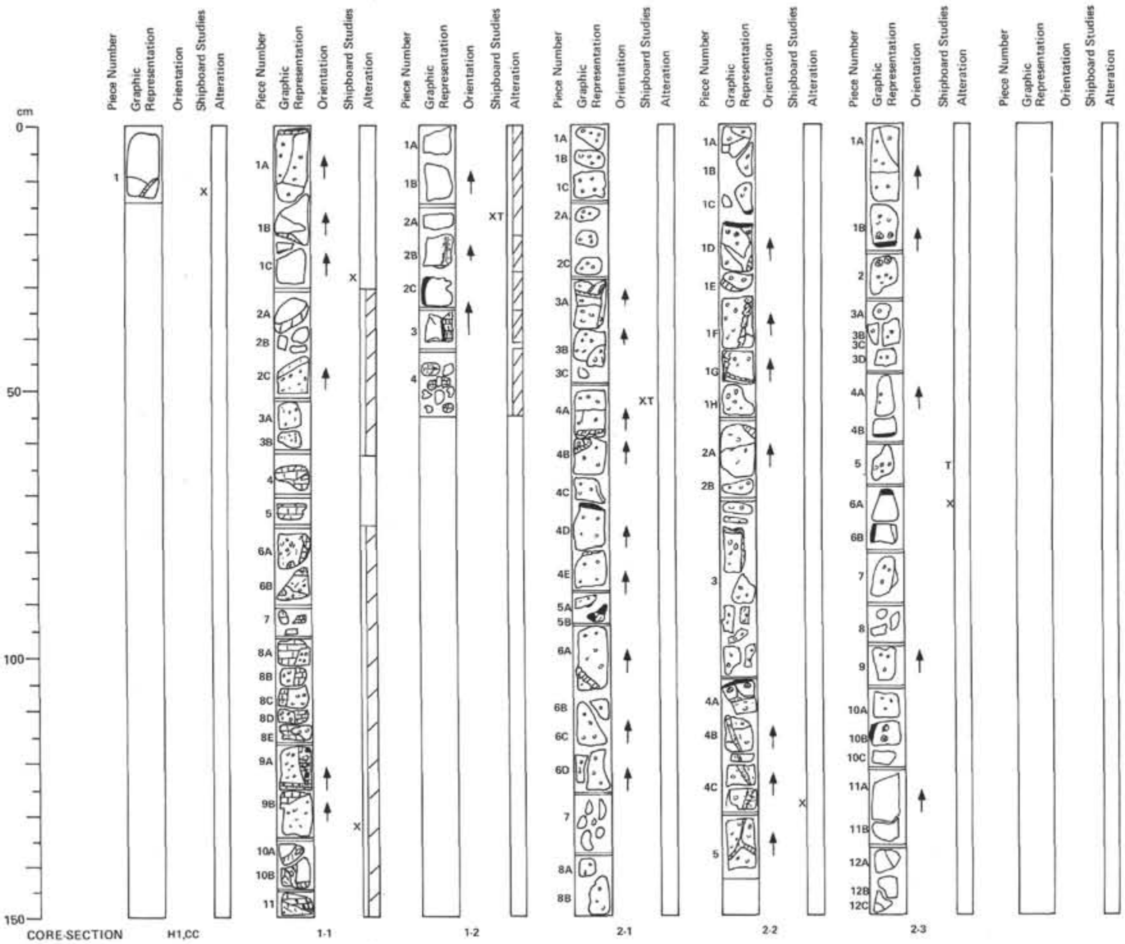
Pale brown
Soft ooze
Occasional moderate mottling

NANNFOSSIL OOZE/CHALK

Various shades white
Faint bedding in pieces of chalk
Mixture of chalk and ooze from Section 3, 90 cm to bottom of core
Occasional black streaks

SMEAR SLIDE SUMMARY (%):

Composition:	1-58	3-80	4-60	6-96
Feldspar	Tr	Tr	Tr	Tr
Clay	20	10	10	10
Volcanic glass	Tr	–	–	–
Palagonite	Tr	–	–	–
Micronodules	–	Tr	–	–
Carbonate unspec.	1	15	10	10
Foraminifers	20	9	8	8
Calc. nannofossils	30	66	72	72
Diatoms	12	–	–	–
Radiolarians	4	–	–	–
Sponge spicules	10	–	–	–
Silicoflagellates	3	–	–	–



SITE 561, CORE H1 — Depth 0.0–411.5 m

CORE-CATCHER

APHYRIC BASALT

Aphyric basalt, gray (7.5YR N5/1) fine grained. Slightly altered grayish brown (10YR 5/2) along fractures. Vesicles scattered, clay-filled (<1 mm). Calcite veined as shown.

SITE 561, CORE 1 — Depth 411.5–414.5 m

SECTION 1

APHYRIC BASALT AND BASALT BRECCIA

0–64 cm: Aphyric basalt gray (7.5YR N6) fine grained with barely visible plagioclase laths and 2–3% round dark brown altered(?) olivine. Only slightly altered grayish brown–brown (10YR 5/2–10YR 5/3) adjacent to fractures. Sparsely to moderately vesicular (2–5%). Vesicles generally round, <1 mm filled by dark green clay (approx. grayish green – 10G 4/2). Minor calcite veining and fractures lined with dark green (~10G 4/2) clay.

64–150 cm: Basalt breccia, limestone matrix. Large (>5 cm) angular clasts of fine grained basalt (as above) in matrix of light gray (10YR 7/2) limestone. Some limestone-basalt contacts are highly irregular – appear corrosive. Others are sharp.

118–123 cm: Occasional, small (<1 cm) palagonitized glass fragments.

SECTION 2

APHYRIC FINE GRAINED BASALT

0–55 cm: Fine grained basalt aphyric with plagioclase crystals just visible. Color is gray (7.5YR N6/0). Vesicles are scattered, fairly round <1–2 mm in diameter; some are clay filled. Clays also present in fractures.

34–55 cm: Fine grained aphyric gray (7.5YR N6/0) basalt. Limestone is present as a rim to one-half of rock. Limestone is massive, very pale brown (10YR 8/4), cracks with dark clays and oxides are present. Vesicles and fractures as in above description. Rim grades in color from basalt gray (7.5YR N6/0) to very dark gray (10YR 3/1) devitrified glass to limestone 10YR 8/4.

28–34 cm: Glassy rim only slightly altered to clay.

34–41 cm: Devitrified(?) glass rim adjacent to limestone matrix.

SITE 561, CORE 2 — Depth 414.5–423.5 m

SECTION 1

APHYRIC BASALT

0–150 cm: Aphyric basalt, gray (7.5YR N5) fine grained. Visible plagioclase laths, some to 3 mm. Plagioclase also as (~ 1%) scattered equant microphenocrysts 1–3 mm. Scattered dark green pseudomorphs(?) after olivine (<1 mm). Alteration minor along fractures only. Vesicles uniformly scattered, round, most <1 mm, some to 3 mm filled by dark green clay. Minor irregular vesicles to 3 mm. Veinlets filled with limestone(?) (calcite + clay?) (pinkish gray (7.5YR 7/2) to light yellowish brown (2.5Y 6/4)).

72–73 cm: Narrow glass rim. Transition to fine grained basalt over less than 2 cm.

90–91 cm: Angular glass fragments in limestone.

54–58 cm: Drusy calcite and green clay(?) vein.

SECTION 2

APHYRIC BASALT (LARGE PILLOWS?)

0–150 cm: Aphyric basalt as in Section 1 with occasional olivine (altered to green clay) up to 3 mm, but approximately 1–2% dark green clay in irregular vesicle-like patches may be pseudomorph olivine. Limestone(?) veins as in Section 1 where shown. Vein boundaries very irregularly shaped. Small (1–3 mm) patches of limestone occur within basalt.

16–19 and 104–107 cm: Pillow margins. Thin veneer of glass to 2 cm variolitic zone to normal fine grained basalt.

63–95 cm: Highly fractured. Fractures coated with light olive brown (2.5Y 5/4) calcite (+ clay?).

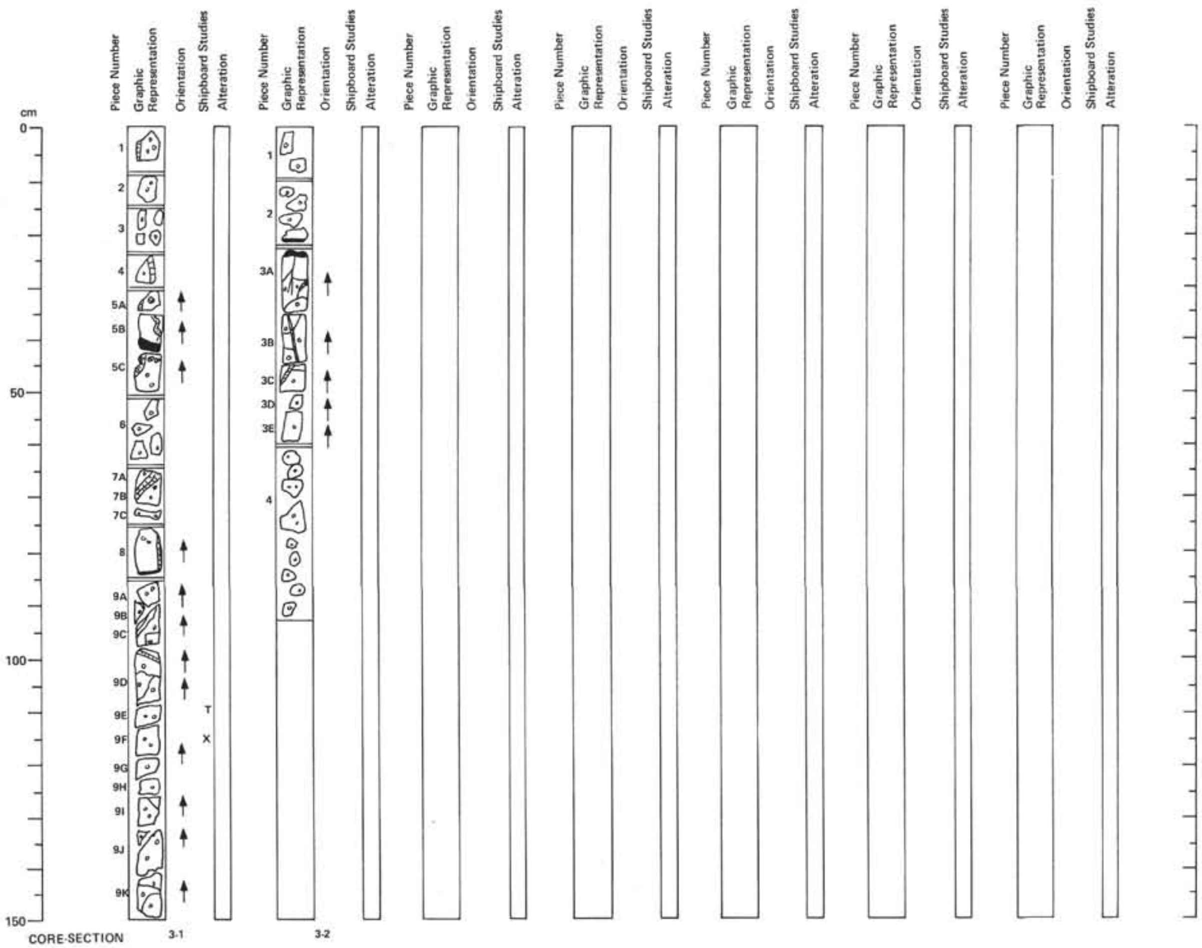
SECTION 3

APHYRIC BASALT (PILLOWS)

0–150 cm: Aphyric, fine grained fairly fresh basalt; color gray (2.5YR N5/0). Olivine(?) pseudomorphs up to 3 mm filled with green clay; some olivine is fresh(?). Vesicles are common; shape: round, size: <1 mm. Few plagioclase phenocrysts occur; size: <3 mm.

18–24 and 112–117 cm: Pillow margin with fine grained basalt through variolitic zone to chilled glass rind.

58–60, 69–71, and 76–79 cm: Fresh glass rinds. Some smaller veinlets are filled with calcite.



SITE 561, CORE 3 — Depth 423.5–426.5 m

SECTION 1

APHYRIC PILLOW BASALT

0–150 cm: Same rock as above. Fine grained aphyric basalt; color gray (2.5YR N5/0). Some olivine(?) (≤3 mm) occurs but is mostly replaced by green clay. Few plagioclase phenocrysts (≤3 mm) are scattered: rounded to resorbed(?). Vesicles are common (≤1 mm) and mostly filled with green clay. Fractures are filled with pinkish gray (2.5YR 7/2) limestone and contain also angular, brecciated basalt fragments (size ≤ 1 cm). (Fractures signed [symbol].)

40–42, 43–44, and 83–84 cm: Chilled pillow margins (fresh glass), accompanied by variolitic transition to fine grained basalt.

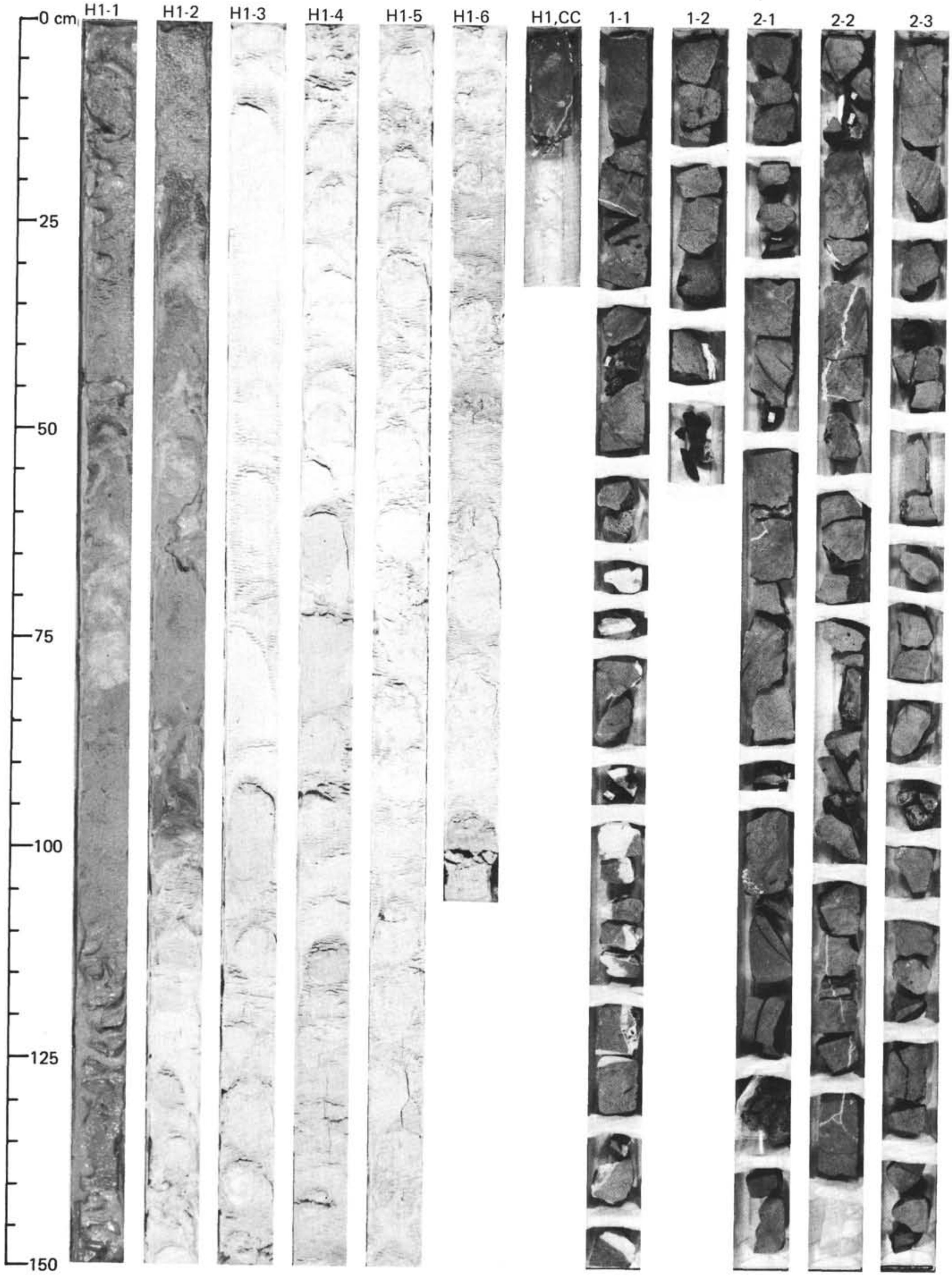
SECTION 2

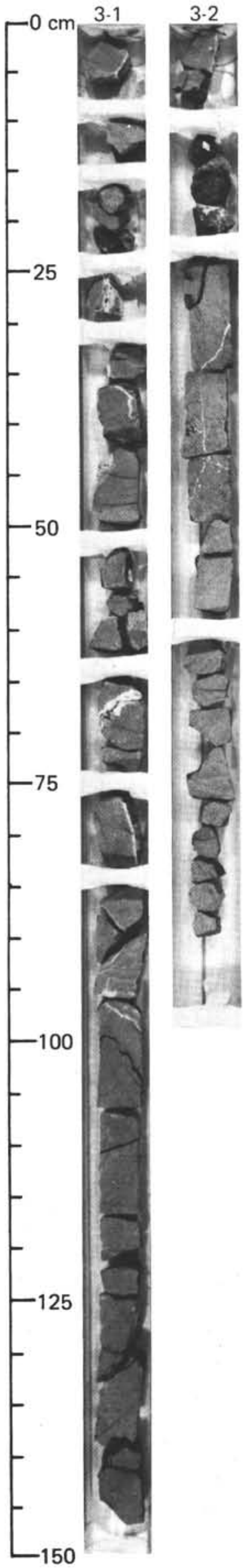
APHYRIC PILLOW BASALT FRAGMENTS

0–98 cm: Fine grained aphyric basalt, fairly fresh. Description see Section 1.

21–22 and 23–25 cm: Fresh glass.

40–48 cm: Very irregular bounded limestone-filled vein (thickness: 1–3 mm).


0 cm
25
50
75
100
125
150
H1-1
H1-2
H1-3
H1-4
H1-5
H1-6
H1,CC
1-1
1-2
2-1
2-2
2-3


3-1
3-2
0 cm
25
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75
100
125
150