2. SITE 571[1]

Shipboard Scientific Party[2]

HOLE 571

Date occupied: 19 March 1982

Date departed: 21 March 1982

Time on hole: 50 hr., 2 min.

Position: 03°59.84′N,114°08.53′W

Water depth (sea level; corrected m, echo-sounding): 3962

Water depth (rig floor; corrected m, echo-sounding): 3972

Bottom felt (m, drill pipe): 3969.5

Penetration (m): 199.5

Number of cores: 1

Total length of cored section (m): 7.11

Total core recovered (m): 7.11

Core recovery (%): 100

Oldest sediment cored:
Depth sub-bottom (m): 7.11
Nature: Light yellow brown foraminifer nannofossil ooze
Age: Pleistocene
Measured velocity (km/s): 1.55

Basement: Not reached

Principal results: Technical difficulties (see Operations) made it impossible to achieve the primary objectives of Site 571, which were to make downhole heat-flow measurements and to sample pore water to maximum hydraulic piston corer (HPC) penetration depth. A first interpretation of the heat-flow measurements suggests that the heat-flow/pore-water probe sampled and measured seawater instead of sub-bottom sediments. This idea is corroborated by initial chemical analyses of the water collected by the probe.

Technical difficulties also delayed operations to the point where only one HPC core, the mudline core, was recovered. Core 1 is 7.11 m long, and it is entirely composed of calcareous to siliceous-calcareous oozes of Quaternary age. It contains (in broad order of abundance) calcareous nannofossils, planktonic foraminifers, radiolarians, diatoms, benthic foraminifers, and silicoflagellates, all of which are generally well preserved. In addition, minor nonbiogenous components occur, and evidence of bioturbation is widespread. Calcium carbonate analyses indicate cyclic variations between about 60 and 90% and allow initial correlation with known Pleistocene carbonate events. Gamma-ray attenuation porosity evaluator (GRAPE) density fluctuations, as well as nannofossil abundance cycles, appear to match the carbonate results. The relationship of these variations to color alternations (dark brown and light brown) in the sediments is, at present, unclear. The sediments are estimated to have accumulated at an average rate of 16 m/m.y. (or 1.0 gm/cm^2/1000 yr.). By extrapolation, the age of the core-catcher sediment is about 0.46 Ma. Paleomagnetic results indicate stable remanent magnetization, of normal direction, acquired at a site-compatible paleolatitude. The physical properties fall within the range of published results for similar pelagic sediments.

BACKGROUND AND OBJECTIVES

Recent studies (Crowe, 1981; Von Herzen et al., 1979) have shown that parts of the equatorial Pacific seafloor are characterized by unusually low heat flow and nonlinear temperature gradients (down to 10 m depth). Low heat flow and nonlinear gradients have been interpreted as being indicative of the loss of heat by hydrothermal circulation. This circulation may be occurring through basement outcrops and/or the sediments. Drilling at Site 571 was proposed by the Hydrogeology Working Group with support from the JOIDES Ocean Crust and Inorganic Geochemistry Panels. The site was intended to serve as the locus of detailed heat-flow and geochemical measurements aimed at examining the advection of pore waters through the sediment in this region. Such measurements would permit the testing of convection models and have important implications for the physics of Layer 2, geochemical mass balances, and seabed waste disposal.

Because of the extremely tight schedule for Leg 85, the JOIDES Planning Committee approved only a curtailed program for Site 571. The directive from the Planning Committee called for a total of 48 hr. (including surveys and pipe run-in and trip) on site. Our first priority was to collect six or seven temperature measurements downsection. If time permitted we also planned to spot core (with the HPC) the intervals at which the temperature measurements were made.

The site selection was based on a detailed seismic and geothermal survey conducted by the R/V *Knorr* (KN-73-4) and a Seabeam survey conducted by the German vessel *Sonne*. The *Knorr* survey (Crowe, 1981) revealed that in addition to exhibiting nonlinear heat-flow gradients, the heat-flow values in the region around Site 571 changed by a factor of two, from a high in the east to a low in the west (Fig. 1). Crowe (1981) correlated this east–west heat-flow transition with a change from rough to smooth basement topography. Site 571, just west of this transition (the low-heat-flow side), is at a spot that showed a high inferred surficial temperature gradient (Fig. 2). Seismic profiles revealed a gently undulating

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[1] Mayer, L., Theyer, F., et al., *Init. Repts. DSDP*, 85: Washington (U.S. Govt. Printing Office).

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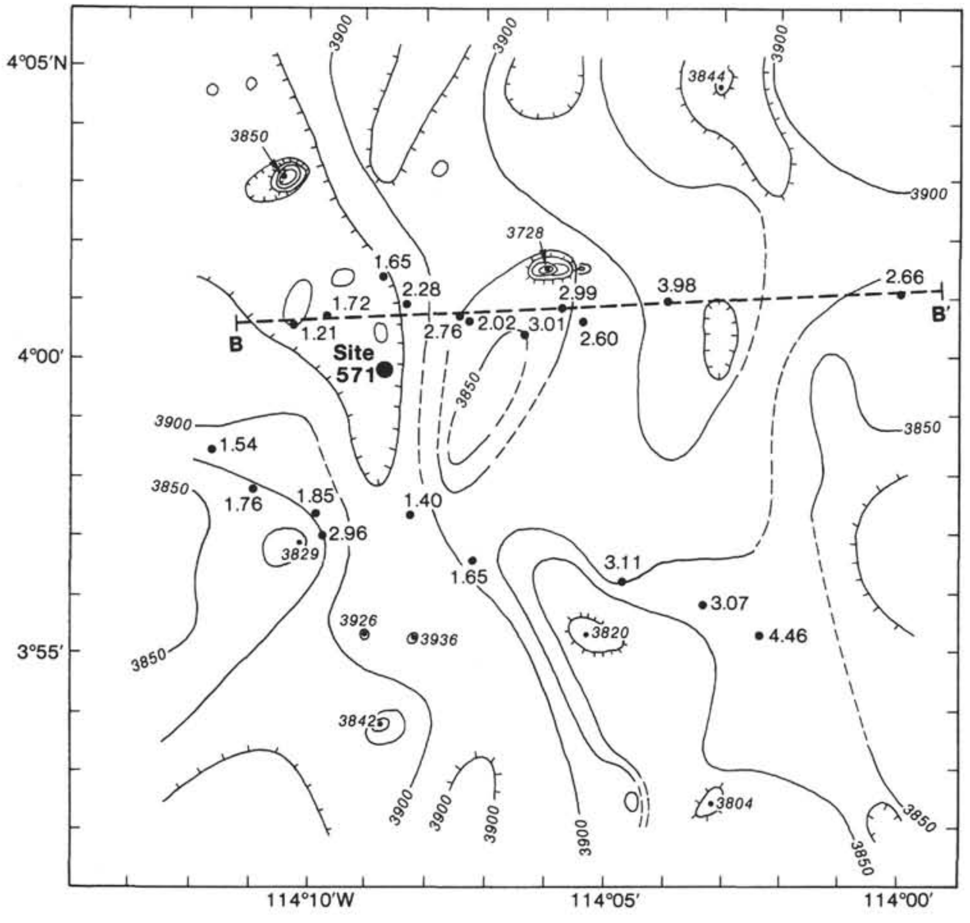


Figure 1. Bathymetry and heat-flow stations near Site 571. Heat-flow values in heat-flow units (HFU), bathymetry in m (after Crowe, 1981).

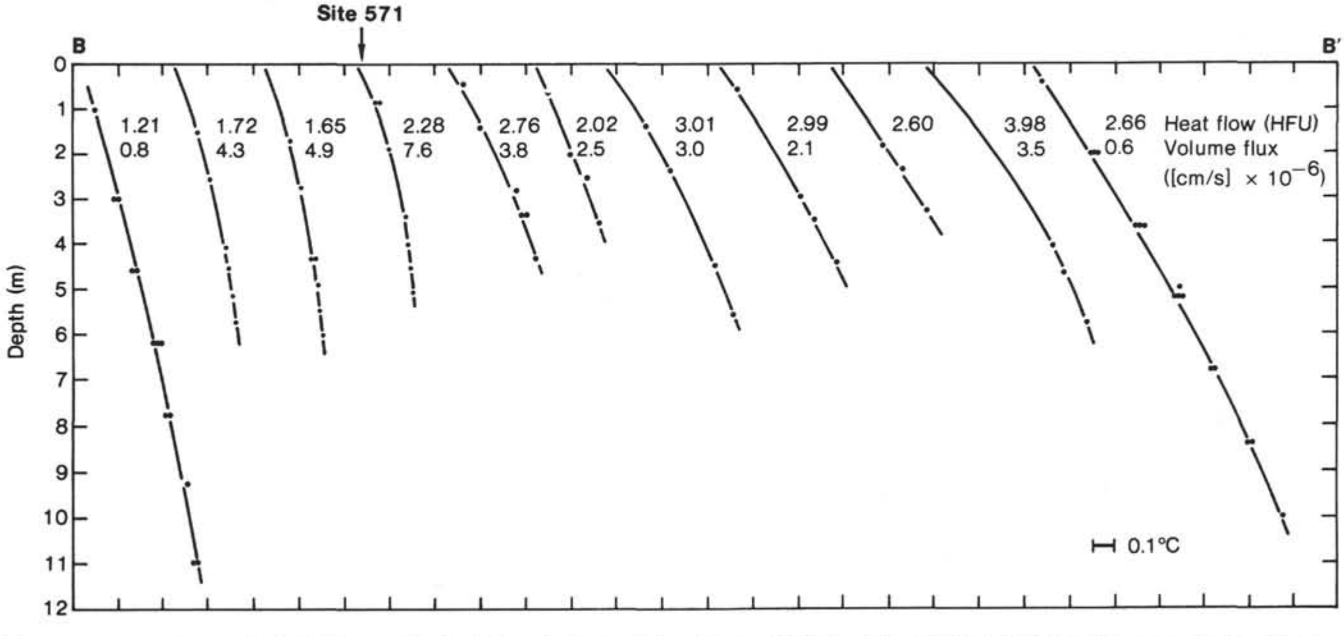


Figure 2. Temperature gradients (°C) along Profile B–B′ of Figure 1 (after Crowe, 1981). Error bars for the temperature data are shown. The temperature profiles are staggered to prevent overlap.

acoustic basement with an occasional basement peak. We were careful to select a site away from basement highs; the D/V *Challenger's* seismic profiler showed 0.34 s of sediment conformably overlying basement at the drill site (Fig. 3). Interpolation of isochron patterns (Herron, 1972; Sclater et al., 1980) indicated the crust at Site 571 to be approximately 15 m.y. old.

The bathymetry generated by the *Sonne* Seabeam system proved to be accurate and extremely useful in determining the ship's position relative to the desired drill site. The regional bathymetry is characterized by lineated troughs and highs with relief of approximately 100 m. This lineation runs northwest–southeast, roughly parallel to the trend of the ridge crest. The drill site (selected for its high inferred surficial temperature gradient) lies near the base of an elongated trough (Fig. 1).

OPERATIONS

The D/V *Glomar Challenger* was scheduled to depart San Pedro, Calif. on 8 March 1982. Difficulty in loading approximately 6000 m of new drill string, however, delayed our departure until 0200Z on 11 March. We arrived in the vicinity of Site 571 at 0600Z on 19 March. While we were under way, continuous seismic profiles (air gun and 3.5 kHz), bathymetric, and magnetic data were collected.

When we were able to locate the ship's position relative to the Seabeam bathymetry collected by the *Sonne* (at approximately 0630Z), we began our presite survey. We first traveled on course 212°, aiming for a spot 2 n. mi. west of the proposed drill site. We then turned east and surveyed a line going directly over the proposed drill site and continuing 2 n. mi. beyond. At the end of this line we proceeded to a point approximately 1 mi. south of the proposed site and turned north, dropping the beacon at 0838Z on 19 March 1982. We continued surveying for 2 n. mi. north of the site and then pulled the geophysical gear and returned to the site. A strong easterly current was present during the survey. We launched the beacon at a position chosen on the basis of bathymetry and dead reckoning that proved to be a few hundred meters south of the preselected site location. The final location for the drill site is 03°59.84′N, 114°08.53′W, slightly south and west of the planned position, but certainly well within the zone of low heat flow and strong nonlinear gradients.

We began to run in the drill pipe at 1025Z in sea state 4 and with a substantial swell. Because of the difficulty of making up new pipe and the sea state, over 16 hr. elapsed between the initial run-in and the first HPC. We took this first core (7.11 m of upper Pleistocene material) to establish mudline depth. The drill string length and precision depth recorder (PDR) depth agreed within 2.5 m.

The rest of the program at Site 571 called for making a series of temperature measurements and, if time permitted, spot piston coring. This was the first time the temperature probe had been used with the HPC, and operation in this mode was far from routine. The first station where heat-flow measurements were to be made (and interstitial water was to be sampled) was 47.5 m sub-bottom (see Table 1). The sediment at this depth was a little too soft to bear enough of the weight of the drill string for the bumper subassembly to function properly, so the drill string was lowered 5 m as the temperature measurement was being made to put more of the drill string's weight on the sediment. (If the sediment does not bear some of the weight of the drill string, the bumper subs remain fully extended, and the end of the drill string is subject to the full force of the ship's mo-

Table 1. Heat-flow measurement, Site 571.

Station	Date (Mar. 1982)	Local time (hr.)	Depth from drill floor (m)	Sub-bottom depth (m)	Measured quantity
1	19	2010	3976.6–4017.0	47.5–52.5	Pore-water sample, temperature
2a	19	2330	4017.0–4036.0	66.5	Temperature
2b	19	2340	4036.0–4055.0	85.5	Temperature
3	20	0230	4055.0–4074.0	104.5–107.5	Pore-water sample, temperature
4	20	1000	4074.0–4121.5	152.0	Temperature
5	20	1300	4121.5–4131.0	161.5	Pore-water sample, temperature
6	20	1600	4131.0–4169.0	199.5	Temperature

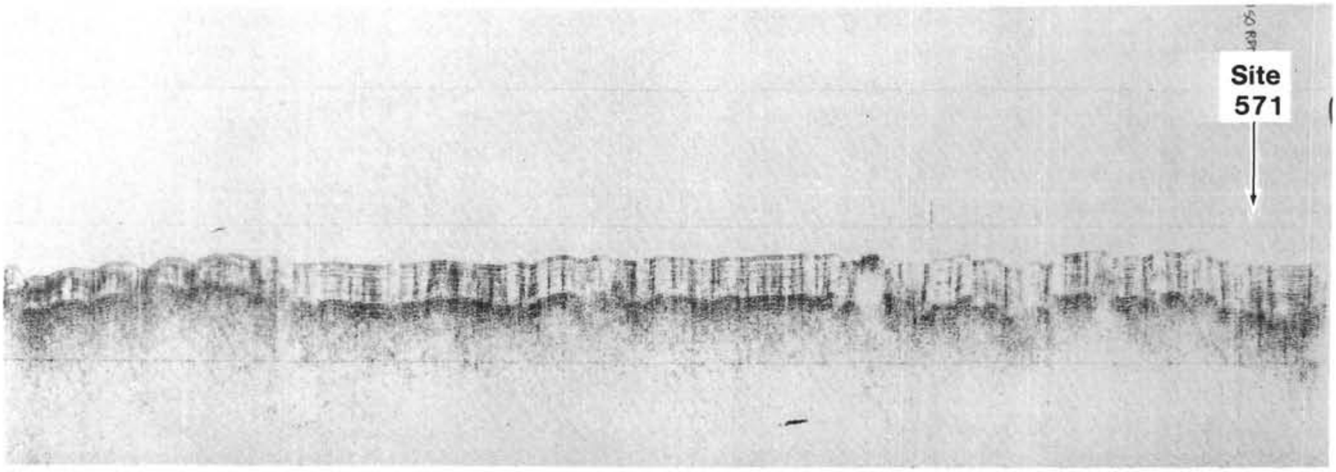


Figure 3. Seismic reflection profile during approach to Site 571. Profile is from *Challenger* air gun records.

tion [substantial at Site 571]. This motion is acceptable for the operation of the HPC, which samples almost instantaneously, but it places tools like the temperature and interstitial water probes in great jeopardy, because these tools must remain extended for 30 to 40 min.)

Data from heat-flow (HF) Station 1 were processed as HF Stations 2a and b were being occupied (at 66.5 and 85.5 m). The results were ambiguous; we attributed the ambiguity to the excessive motion of the tool in the soft sediment. We washed down to HF Station 3, and as we attempted to retrieve the tool the bottom plug on the pressure case for the Kuster orientation tool backed off, causing the tool to separate from the sandline. We fished for the tool and recovered it undamaged 4 hr. later. During this time, analysis of the temperature and pore-water data led us to suspect that both measurements were contaminated by seawater. This meant a leak in the seals that were used to keep hydraulic pressure on the temperature and pore-water tool.

When the temperature tool is used in conjunction with a rotary drill bit, it is mechanically latched into position at the end of the drill string. With the HPC, there is no mechanical latching mechanism; instead, O-ring seals at the top of the tool and hydraulic pressure in the drill string are used to keep the tool extended beyond the bit. If the O-ring seals fail, the drill string cannot maintain pressure, the tool is not held firmly in place, and, most important, the seawater used to pressurize the drill string can run by the temperature and pore-water probes.

During operation at HF Station 4 the blow-out preventor (BOP) was closed so that the pressure in the drill string could be closely monitored. As suspected, the drill string could not maintain pressure, confirming that there was a leak in the system. After the tool was returned, the seals were changed, the top sub was tightened, and the tool was sent down for HF Station 5. To the frustration of all, the drill string could still not retain pressure. Close inspection of the tool revealed that a landing sub on the bottom of the tool was too wide to pass through the seal sleeves that the O-rings at the top of the tool were supposed to seat on. Thus, the bottom of the tool was stuck 20 m up from the end of the drill string, and pumped seawater was free to circulate around the probes. The guilty landing sub is used only in the rotary drilling mode, and so it was turned down to allow clearance past the sealing sleeve.

With great excitement we washed down to 199.5 m and sent the temperature probe down for HF Station 6. The drill string held pressure beautifully and the penetration of the probe was proven by the significant pull-out tension measured when the tool was first retrieved. Unfortunately, an electronic problem with the temperature probe prevented data from being collected. We were all greatly disappointed, but we were already 2 hr. over our allotted time, and any additional work would have required an offset (due to the induration of the sediments deeper than 200 m). Naturally we collected no more cores. We departed Site 571 at 1022Z on 21 March en route to Site 572.

LITHOSTRATIGRAPHY

Lithostratigraphic Subdivision

The sediment in the single core taken at Site 571 belongs to one lithologic unit, a cyclic unit of Quaternary siliceous calcareous ooze. The unit contains cycles of dark brown (10YR 3/3) to yellowish brown (10YR 5/4) siliceous foraminifer nannofossil ooze and yellowish brown (10YR 5/8) to dark yellowish brown (10YR 4/4) diatom nannofossil ooze, alternating with very pale brown (10YR 8/3) foraminifer nannofossil ooze. The contacts between the cyclic bands are usually gradational, and many show evidence of bioturbation.

The sediments are uniform in composition, with common (5 to 25%) to abundant (25 to 75%) sand-sized particles, common silt, and abundant clay. Calcareous nannofossils are abundant to dominant (greater than 75%), foraminifers are common to abundant, and diatoms and radiolarians are rare (1 to 5%) to common. The relative proportion of siliceous microfossils does not appear to influence the color of the sediment directly. Silicoflagellates, terrigenous clay, and volcanic glass occur sporadically in rare amounts. Color variations appear to be due to differential amounts (1 to 5%) of iron oxides.

Bioturbation

Bioturbation is common throughout the section. Burrow mottling consists of subhorizontal burrows with 1-cm oval to elliptical cross sections (Planolites). The mottling is most obvious at cycle boundaries, where sediment of contrasting color has been burrowed down below the contacts. Occasional 1-cm burrows with light-colored "reaction rims" (rind burrows) are visible in the darker units. Two open burrows occur in Section 4 at 7 and 112 cm.

Sedimentary Cycles

The dominant feature of this core is the cyclic change in color from darker brown siliceous calcareous oozes containing iron oxides to lighter-colored calcareous oozes. These color changes may be related to glacial–interglacial cycles of the last 400,000 to 500,000 yr.; however, the carbonate record (Fig. 4) shows that there is no clear correlation between carbonate fluctuations and cyclic color changes.

Carbonate Stratigraphy

Detailed shipboard carbonate bomb analyses at 20-cm intervals of the single 7.1-m core taken at this site show pronounced cyclic variations in carbonate percentages, with high-carbonate intervals exceeding about 90% and low-carbonate intervals lying between 60 and 80% (Fig. 4). These percentages are typical of sediment cores from the eastern equatorial Pacific, and we were able to correlate Site 571 with the standard Pleistocene carbonate event stratigraphy of Hays et al. (1969). Site 571 contains carbonate events B3 through B12 (Fig. 4), indicating that the uppermost 33,000 yr. of the record may

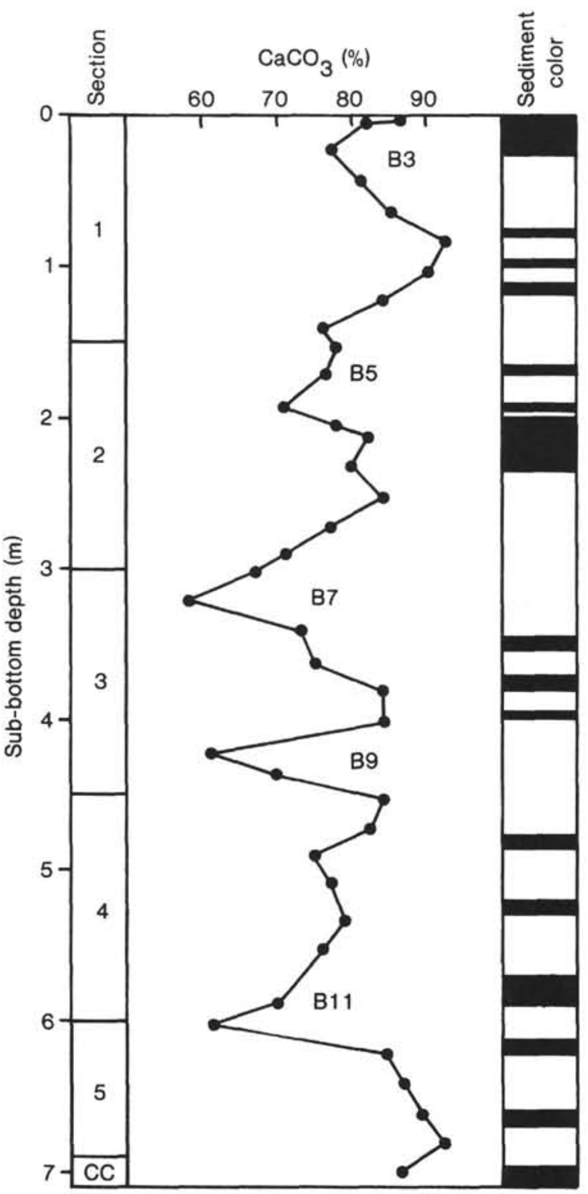


Figure 4. Shipboard carbonate bomb determinations for Site 571. Section numbers for Core 1 are in the left column. Shaded areas in the right column indicate darker brown layers (10YR 3/3). Carbonate minima (Hays et al., 1969) are labeled.

have been lost in the coring process. This inference is in agreement with the sediment accumulation rate calculations for Site 571.

BIOSTRATIGRAPHY

Summary

Planktonic foraminifers, calcareous nannofossils, diatoms, and radiolarians are all represented and well preserved in the sediments recovered at Site 571, although dissolution is marked at some levels. For details on preservation see the sections on the individual fossil groups. The benthic foraminifers are rare but well preserved.

The single core recovered is Quaternary in age, correlates with planktonic foraminiferal Zone N23 and the *Pseudoeunotica doliolus* diatom Zone, and spans three nannofossil and radiolarian zones. The age of the core-catcher radiolarian and nannofossil assemblages (respectively, the top of the "*Stylatractus universus*" and the *Pseudoemiliania lacunosa* zones) lies between 0.44 and 0.60 Ma. The other fossil assemblages do not contradict this age assignment.

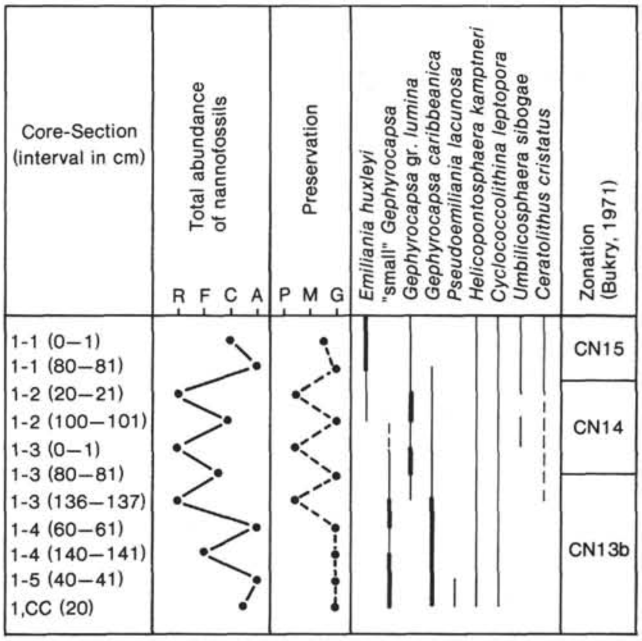
Planktonic Foraminifers

The planktonic foraminifers are generally abundant and well preserved, although abundance and state of preservation vary somewhat in different parts of the cored sequence. Of the nine layers examined, faunas affected by marked dissolution occur in Sections 1 (140–144 cm) and 3 (41–43 cm). These faunas contain fewer species and lack many solution-susceptible species, such as *Globigerina rubescens* and *Globigerinoides ruber*.

On the basis of two extinction datum levels, *Globoquadrina pseudofoliata* and *Globorotalia tosaensis* (Thompson and Saito, 1974; Saito, 1977), the core is assigned to the Brunhes Chron of the geomagnetic time scale and the foraminiferal Zone N23 of Blow (1969). Since no noticeable change in faunal composition occurs, the sequence appears to be continuous. The extinction horizon of *G. pseudofoliata*, which is known to have an age of 0.22 Ma, lies between 119–120 cm and 131–132 cm of Section 2. *G. tosaensis* is conspicuously absent from recovered assemblages, so this datum was apparently not reached by this core; as a result, the base of the core is believed to be younger than 0.6 Ma.

Calcareous Nannofossils

Calcareous nannofossils were observed in 39 samples (some of which are shown in Fig. 5). Coccoliths are al-



Note: R = rare, F = few, C = common, A = abundant; P = poor, M = moderate, G = good.

Figure 5. Occurrence of nannofossil species at Site 571.

ways present, and, in general, they are very abundant and well preserved. They are rare in some samples (Section 1, 40–41 cm; Section 3, 0–1 and 20–21 cm; Section 3, 120–121 and 137–138 cm) where there is evidence of dissolution.

From the top of the core to Section 2 (0–1 cm), the assemblage is dominated by very small coccoliths that can only tentatively be identified as *Emiliania huxleyi* (Zone CN15 of Bukry, 1971). They are associated with *Gephyrocapsa lumina, Helicopontosphaera kamptneri*, and *Cyclococcolithina leptopora*.

Between Section 2, 20–21 cm and Section 3, 120–121 cm, the small species are very rare. The nannoflora is mainly composed of large *Gephyrocapsa (G. lumina* and *G. caribbeanica)* and *C. leptopora. Ceratolithus cristatus* is always present. This assemblage is characteristic of the *C. cristatus* Subzone (CN14b) of the *G. oceanica* Zone. The base of this subzone has been dated by Bukry (1971) at 0.3 Ma.

From Section 3, 136–137 cm to Section 5, 0–1 cm, nannofossils are very abundant and are dominated by *G. caribbeanica* and *G. aperta*. The former species is represented by rather small coccoliths that differ slightly from the original description; the difference may be due to something special about the environment. This part of the core is correlated with the *G. caribbeanica* Subzone (CN13b).

The nannoflora of the core catcher is not very different from the younger assemblage. In addition, there are rare specimens of *Pseudoemiliania lacunosa*, the extinction of which is usually dated 0.42 to 0.45 Ma.

Very few specimens are reworked. In two samples (Section 3, 40–41 and 120–121 cm) there is a partially dissolved specimen of *Discoaster kugleri* (middle Miocene).

Radiolarians

The core contains common, well preserved and diverse Quaternary radiolarians. Samples from Sections 1 (136–137 cm) and 2 (136–137 cm) are in the *Buccinosphaera invaginata* Zone of Nigrini (1971), which is defined by the presence of *B. invaginata* and *Collosphaera tuberosa*. The absence of *B. invaginata* and the presence of *C. tuberosa* in Section 3 (143–145 cm) places that sample in the *Collosphaera tuberosa* Zone. The absence of *C. tuberosa* from Sections 4 (135–137 cm) and 5 (79–81 cm) places the remainder of the core in the *Amphirhopalum ypsilon* Zone. "*Stylatractus universus*", the top of which has been dated at 0.425 Ma, was found in the core-catcher sample but not in the Section 5 sample examined. Since Section 5 is 91 cm long and the core catcher is 20 cm long, an age of 0.425 Ma can be assigned to the sediment interval between 679 and 711 cm below the mudline.

The preservation of radiolarians is good throughout the core, although the fauna found in Section 4 is less robust than that found in other sections of the core. Samples from Sections 1 and 2 show particularly good preservation, with many delicate and elaborate forms present, as well as fragments of the diatom *Ethmodiscus rex*. Orosphaerid fragments are present in Section 5 (79–81 cm).

Diatoms

One sample was examined from the core catcher (9–10 cm). Common diatoms with good preservation were observed after processing in hydrochloric acid. The presence of *Pseudoeunotia doliolus* and the absence of *Nitzschia reinholdii* are indicative of the *Pseudoeunotia doliolus* Zone (0–0.65 Ma). The absence of multinodule forms of *Coscinodiscus nodulifer* supports that age assignment.

Benthic Foraminifers

One sample was examined from the core catcher (15–16 cm). Benthic foraminifers are rare: the sample contained 106 specimens, which were assigned to 32 taxa. Preservation is excellent. The fauna is diverse; *Epistominella, Gyroidinoides*, and *Nuttallides* are the most common genera (33 specimens in all). Only 13 specimens belong to rectilinear species (e.g., *Bolivina, Fursenkoina*). Agglutinants are extremely rare.

SEDIMENT ACCUMULATION RATES

Plotted in Figure 6 are the age range estimates for all the fossil groups in the core-catcher sample. The extinction of *G. pseudofoliata* occurs between 2.6 and 2.8 m. These data suggest an average sedimentation rate of 16 m/m.y. for the upper Pleistocene sediments of Site 571 (Fig. 6).

Mass accumulation rates for the total sediment and for the carbonate and noncarbonate fractions were estimated to be 1.0, 0.79, and 0.21 g/cm^2/1000 yr., respectively.

PHYSICAL PROPERTIES

The physical properties measured for this site included wet-bulk density, sonic velocity, formation factor, and thermal conductivity. Measurements were made at regular intervals within the HPC core except where the sediment was disturbed. A discussion of the data collection techniques, procedures, and pertinent references is presented in the Introduction (this vol.). The data for the single sediment core at this site are tabulated in Table 2. The values are in generally good agreement with the range of values published for deep-sea sediments. Scatter in the values may reflect variability that is expected in the uppermost sediments, which are only beginning to be affected by compaction.

PALEOMAGNETISM

Because of the Brunhes age of Core 1, only a few measurements were carried out. The measurements were made mainly to test the Kuster core orientation system and to obtain a general idea of the magnetic response of the sediments.

The natural remanent magnetization (NRM) intensity of the 14 samples measured varies from 2.4×10^{-6} to 7.4×10^{-6} G, with a mean value of 4.7×10^{-6} G. The directions are stable, with only a small amount of scatter. The mean value of the inclination is 9.8°, which corresponds to a dipole paleolatitude of 4.9°, which is in good agreement with the latitude of the site.

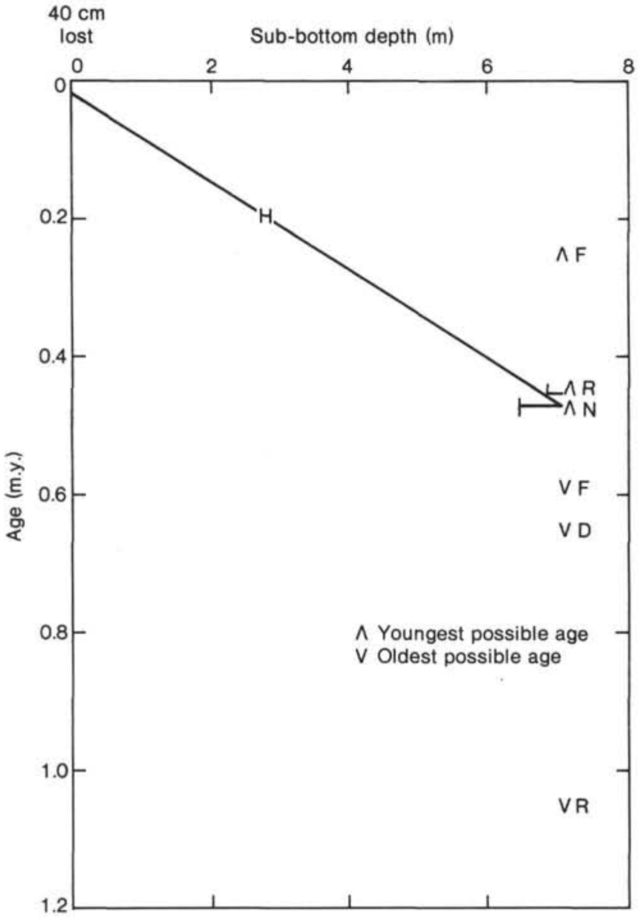


Figure 6. Sedimentation rate at Site 571 (16.0 m/m.y.). Age ranges are shown for foraminifers (F), radiolarians (R), calcareous nannofossils (N), and diatoms (D).

INTERSTITIAL-WATER CHEMISTRY

Very slight changes in concentration occur in the pore waters from these sediments with increasing depth (Fig. 7). The ranges of values for each constituent generally fall within experimental error. Alkalinity shows its largest increase in the uppermost meter of sediment. Since we apparently did not recover the top 40 cm of sediments, we cannot investigate potentially significant changes immediately below the sediment/water interface.

The *in situ* samples verified that the sampling device was malfunctioning. Salinity, pH, and alkalinity data indicate contamination by surface seawater.

SUMMARY AND CONCLUSIONS

As a result of technical difficulties, the activity at Site 571 failed to accomplish its primary goals, namely, to recover downhole heat-flow data, *in situ* pore-water samples, and correlative sediments from an area of unusually low heat flow in the central equatorial Pacific.

The 711 cm–long mudline core recovered yielded no scientific surprises: it contained predominantly calcareous Quaternary oozes with a 16 m/m.y. sedimentation rate and a mass accumulation rate of about 1.0 g/cm^2/1000 yr. The core is heavily bioturbated and characterized by distinct cyclic color changes (from dark to light brown), which is typical for this depositional depth in the high productivity equatorial belt of the Pacific. As expected, all major microfossil groups are abundantly represented, and, with some exceptions, they are well preserved. Calcareous nannofossils and planktonic foraminifers generally dominate, although radiolarians and diatoms never make up less than 1% of the fossil assemblage and usually more. The calcium carbonate content of the sediments varies cyclically, generally between 70 and 85%. These carbonate fluctuations are matched by variations in the abundance of the nannofossil flora and are also expressed in (GRAPE) downcore density cycles, low density corresponding to low carbonate content. The coherence of these data allows the identification of Pleistocene carbonate events B12 to B3 (Hays et al., 1969). The identification of these events is corroborated by the extrapolated age of the bottom of Core 1 (about 0.46 Ma) and the absence of the topmost 40 cm of sediment, which were lost during coring. The sediment's physical properties and geochemistry (as indicated by shipboard analysis) are also compatible with results published earlier for similar biogenous oozes. The magnetization of the sediments is stable, of normal direction, and of typical intensity; it was acquired at Site 571 latitude.

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Table 2. Site 571 physical properties summary. All data are for Core 1.

Section	Level (cm)	Wet-bulk density (g/cm³)	Porosity (%)	Sonic velocity (km/s)	Thermal conductivity (mcal/cm·s·°C)	Formation factor	
						Vertical	Horizontal
1	116	1.38	75	1.55	2.53	1.63	1.57
2	59	1.30	75	1.54	2.43	1.33	1.29
3	52			1.47	2.53	1.22	1.19
4	41			1.55	2.76	1.67	1.62
5	36	1.52	71	1.54	2.77	1.58	1.57

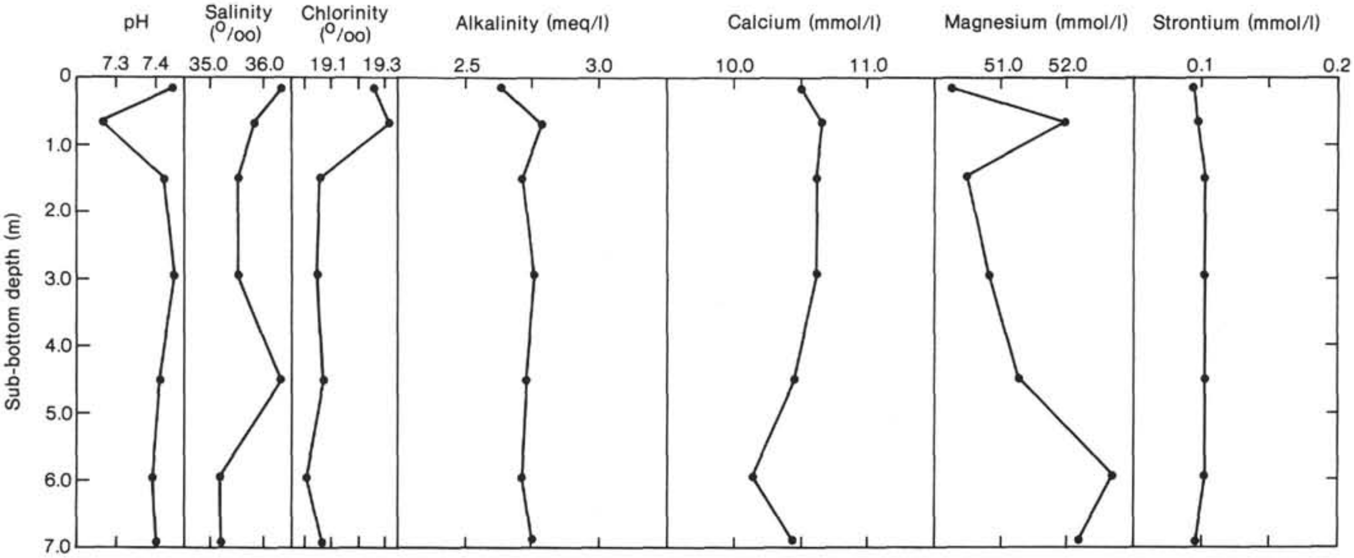
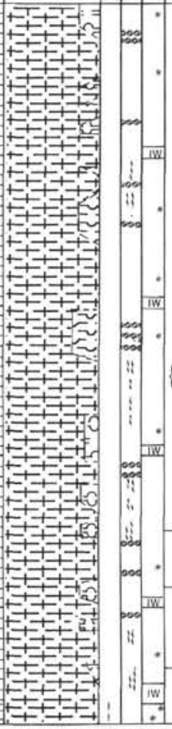


Figure 7. Interstitial-water geochemistry at Site 571.

SITE 571 HOLE CORE 1 CORED INTERVAL 0.0–7.1 m

TIME – ROCK UNIT	BIOSTRATIGRAPHIC ZONE	FOSSIL CHARACTER: FORAMINIFERS	FOSSIL CHARACTER: NANNOFOSSILS	FOSSIL CHARACTER: RADIOLARIANS	FOSSIL CHARACTER: DIATOMS	SECTION	METERS
Quaternary		N23	*E. huxleyi* zone CN15	*B. invaginata*	*Pseudoeunotia doliolus*	1	0.5 1.0
			G. oceanica zone CN14	*C. tuberosa*		2	
			G. caribbeanica zone CN13b			3	
			P. lacunosa zone	*A. ypsilon*		4	
						5	
						CC	



10YR 3/3
10YR 8/3
10YR 5/4
10YR 8/3
10YR 5/4
10YR 8/3
10YR 3/4
10YR 5/4
2.5Y 7/4
10YR 4/4
5YR 4/6
10YR 4/4
7.5YR 5/4
10YR 8/3
10YR 5/8
10YR 5/6 and 7.5YR 6/8
10YR 6/4
10YR 7/3
7.5YR 4/4
10YR 4/4
7.5YR 8/4
10YR 5/4 and 7.5YR 8/4
10YR 7/3
7.5YR 4/4 and 10YR 7/4
7.5YR 8/4
10YR 8/2
7.5YR 8/2 and 7.5YR 5/4
7.5YR 5/4
10YR 8/3
10YR 6/4

LITHOLOGIC DESCRIPTION

CYCLIC SILICEOUS–CALCAREOUS OOZE (UNIT I): Cyclic variations between siliceous foram nanno ooze, dark brown (10YR 3/3) to yellowish brown (10YR 5/4), foram nanno ooze, very pale brown (10YR 8/3) and foram diatom nanno ooze, yellowish brown (10YR 5/8) to dark yellowish brown (10YR 4/4).

Burrowing and mottling are common in Section 2 40–45 cm, Section 3, 41–109 cm, Section 4, 30–54 and 70–79 cm, and in Section 5, 21–36 cm.

Gradations in color are common.

Most contacts are gradational.

SMEAR SLIDE SUMMARY (%):

	1, 12	1, 70	2, 57	2, 125	3, 32
Texture:					
Sand	38	37	7	35	30
Silt	22	23	23	20	20
Clay	40	40	70	45	50
Composition:					
Clay	–	–	–	Tr	Tr
Volcanic glass	–	–	–	Tr	Tr
Carbonate unspec.	10	17	9	5	5
Foraminifers	35	35	15	35	12
Calc. nannofossils	35	40	55	50	50
Diatoms	9	6	15	8	25
Radiolarians	9	2	3	2	8
Silicoflagellates	<1	<1	–	–	<1
Iron oxides	2	–	3	–	–

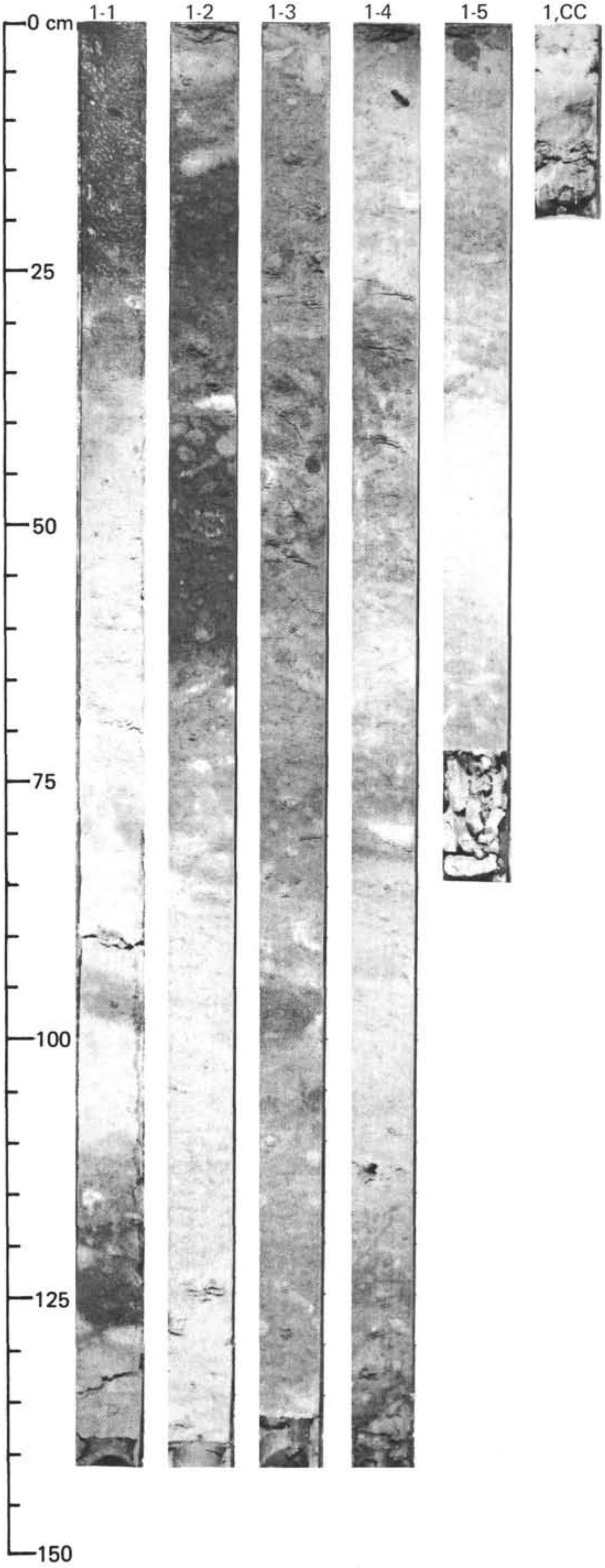
	3, 128	4, 113	5, 46	3, CC	14, CC
Texture:					
Sand	25	25	10	25	15
Silt	25	15	20	15	5
Clay	50	60	70	60	80
Composition:					
Clay	–	Tr	–	–	–
Carbonate unspec.	15	2	6	10	20
Foraminifers	8	20	9	20	10
Calc. nannofossils	60	65	80	60	60
Diatoms	9	8	2	5	5
Radiolarians	8	5	2	5	5
Silicoflagellates	Tr	–	<1	<1	–

IW = lower 11–20 cm of section depleted by Physical Properties and Interstitial Water samples.

NOTE: Graphic lithologies represent average compositions derived from smear slides and do not always reflect the detailed alternation of sediment types. Major lithologic boundaries are shown but gradational contacts, small scale cyclicity and ooze-chalk alternations are represented schematically. Color changes approximate to lithologic changes.

Site 571, Core 1
CARBONATE BOMB:
1, 2 cm = 86%
1, 21 cm = 77%
1, 41 cm = 81%
1, 61 cm = 85%
1, 81 cm = 92%
1, 101 cm = 90%
1, 121 cm = 84%
1, 139 cm = 76%
2, 3 cm = 78%
2, 21 cm = 76%
2, 42 cm = 71%
2, 61 cm = 82%
2, 82 cm = 80%
2, 102 cm = 84%
2, 122 cm = 77%
2, 138 cm = 71%
3, 2 cm = 67%
3, 22 cm = 58%
3, 42 cm = 73%
3, 62 cm = 75%
3, 82 cm = 84%
3, 102 cm = 84%
3, 122 cm = 61%
3, 135 cm = 70%
4, 2 cm = 84%
4, 23 cm = 82%
4, 38 cm = 75%
4, 58 cm = 77%
4, 82 cm = 79%
4, 102 cm = 76%
4, 138 cm = 70%
5, 2 cm = 61%
5, 22 cm = 84%
5, 41 cm = 87%

Information on core description sheets, for ALL sites, represents field notes taken aboard ship under time pressure. Some of this information has been refined in accord with post-cruise findings, but production schedules prohibit definitive correlation of these sheets with subsequent findings. Thus the reader should be alerted to the occasional ambiguity or discrepancy.


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