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Cruise Report
CK05–04 Leg2
(Pre-Expedition #901)

16 November 2005 – 14 December 2005

Shimokita – Yokohama

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1. Introduction

Preparation for non-riser and riser drilling tests of D/V Chikyu, including laboratory setup, has been in progress since her delivery on July 29, 2005. The CK05-04 Leg 2 (Hachinohe – Yokohama) cruise were planned for the purpose of testing synthetically the drilling modules, the Dynamic Positioning System (DPS) and the Blowout Preventor (BOP), namely the System Integration Test (SIT), which has been continuing since CK05-03. For one of items of SIT, piston coring by the Hydraulic Piston Coring System (HPCS) was scheduled in the middle of CK05-04 Leg 2. Purposes of this coring is to confirm performance of the coring system and acquire fundamental engineering data used for evaluating the bearing capability in the 50 m thick formation for conductor pipe at the time of BOP installation during the riser drilling test, which shall be conducted in the next year at the same sites. Cores recovered for the first time by D/V Chikyu was expected to provide us a great opportunity to carry out a practical exercise of core processing for improving the laboratory environment and figuring out various issues related to core flow and measurements. Furthermore the cores can be used for various purposes including science, education, advertisement and onboard experiments, etc., besides for the geotechnical purpose. Prior to the cruise, we defined following main objectives:

1) To provide fundamental geologic data (especially shear strength and density of sediments) for evaluation of geotechnical issue regarding the BOP installation.
2) To collect cores for display, for experiments using onboard instruments, for education and for scientific purposes.
3) To verify the degree of disturbance of the cores collected by the HPCS and to evaluate this system.
4) To test the core flow in the laboratory area with conducting practical measurements onboard.
5) To verify the performance and the data quality of analytical equipments

The target area located on the forearc basin of NE Japan, off-Shimokita, is a region where sedimentation rate is very high due to high biological productivity attributed mainly to diatom reproduction. Hemipelagic sediment with high accumulation rate not only enables to preserve geologic records in high resolution, but also would behave as a large organic carbon reservoir. In addition, it also may create steadily an aerobic subseafloor environment relatively resistant to organic decomposition, if a location is situated near the oxygen minimum zone in water depth. Although this is a test cruise that is not planned based on scientific proposals, we accepted several sample requests from internal researchers of JAMSTEC in order to provide a chance to use the recovered cores for their scientific interests. According to these requests, two researchers besides from CDEX were participated as onboard scientists.

Before the departure for the cruise, we discussed about name of a test cruise with coring operation. From requirement on database and to keep some consistency with IODP style name, we decided to call this cruise “Expedition 901”. This numbering system using a three-digits number for each expedition beginning from 901 was approved officially in CDEX. Accordingly, the next test coring cruise shall be called “Expedition 902”. In addition, a 4-digits number beginning from 9001 following to C, the initial of Chikyu, is decided to be used for a site number.

2. Coring Plan and Actual

Coring sites are located on the northeast Japan forearc basin, off-Shimokita (Fig. 1). A broad submarine canyon originated from southwest Hokkaido extends southeastward with a gentle slope, then goes across the forearc basin eastward at off-Shimokita and terminally falls down to the Japan Trench. For the riser drilling tests scheduled in the next year and after, CDEX has carried out many site surveys on this forearc submarine canyon. Based on the results of site surveys, three different candidate locations for riser drilling tests were set in the east, in the west and in the south of this submarine canyon, where the water depth is about 1200 m, 2200 m and 1600 m, respectively. The south location is situated at the same place of the previous IPOD drilling sites. Each location included two candidate sites, in other words, totally six sites were listed up. In order to evaluate bearing capability of formation for a conductor pipe installation, up to 50 m penetration coring by HPCS is planed for each sites. Preparation for core processing in the laboratory area was also performed based on the original plan and on a request from the Well Planning Department, CDEX. According to the final plan which was confirmed onboard just before the operation, coring shall have been carried out within a week from November 23 to November 30 with estimating situations in following prioritized order:

Loc. 81-B6	41°10’35.90”N, 142°12’01.97”E	West area	1183 mWD
Loc. 7-B	41°11’01.20”N, 142°12’01.97”E	West area	1179 mWD
Loc. 11-X	41°07’33.12”N, 143°38’25.81”E	East area	2196 mWD
Loc. 10-X	41°08’37.85”N, 143°38’25.37”E	East area	2216 mWD
IPOD Site 439	40°37’36.60”N, 143°18’37.80”E	South area	1656 mWD
IPOD Site 438	40°37’47.40”N, 143°14’09.00”E	South area	1552 mWD

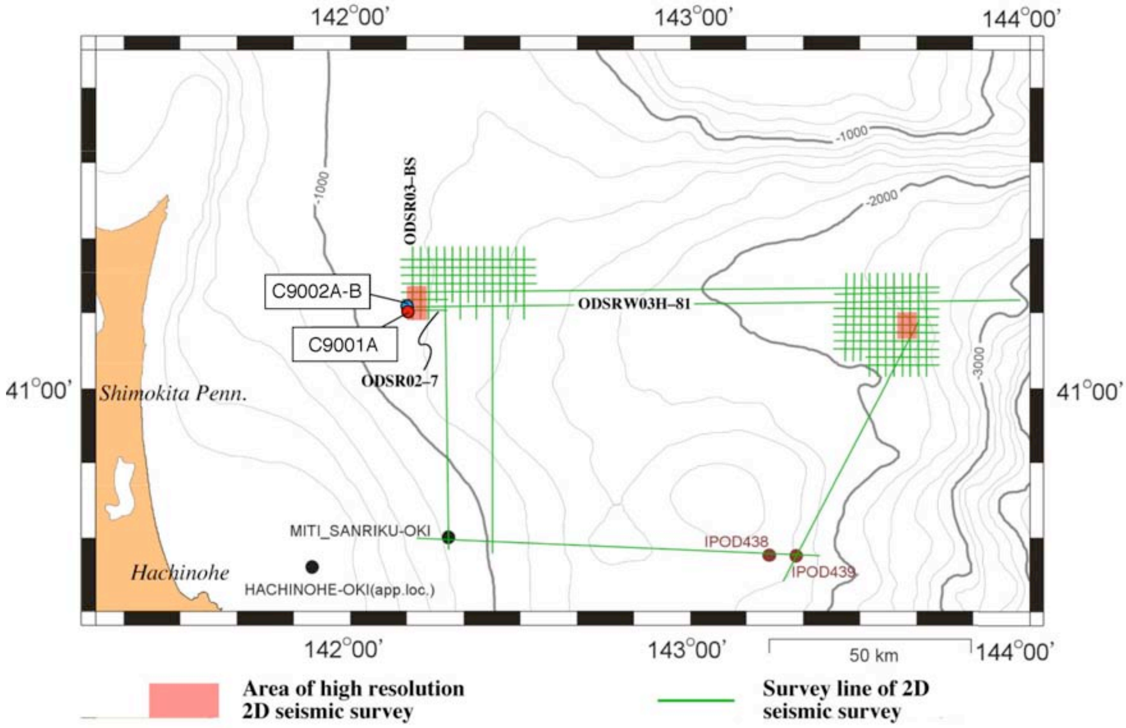


Fig. 1 Bathymetry map showing the drilling sites and survey lines of two-demensional seismic survey

However, the commencement of coring was delayed for three days owing to various unexpected troubles occurred in the drilling modules. It was in the evening of November 26 that the first core came onboard. Conclusively coring were practiced at the two sites, Loc. 81-B6 and Loc. 7-B in the west area where the water depth is about 1180 m (Table 1). According to a decision that it should dig forward at the same site as deep as possible using the remained operation time, an offset coring with two holes was carried out at the second site. Coring for remaining sites abandoned due to the time limit, especially those in the east area, will be conducted in the next fiscal year, 2006. In accordance with the approved numbering system, these sites were newly named as follows:

Old	New
Loc. 81-B6	901-C9001
Loc. 7-B	901-C9002

where 901 is expedition number and a four-digits number following to C is a site number. Five cores from the Site C9001 Hole A and eight cores from the Site C9002 Holes A and B were obtained. Coring results are summarised in Table 2. Core recovery was generally good, yielding constantly over 100% (due to gas expansion) except for C9001A-2H, but having 97% of recovery.

3. Site Survey Summary

Detailed bathymetry mapping for drilling areas was carried out by *R/V Natsushima* in NT–0401 cruise during 13–25 February 2004, using SeaBat 8160 Multibeam Echosounder with a frequency of 50 kHz. Two-dimensional seismic surveys were carried out in a 15 km (N–S) x 30 km (E–W) area covering the drill sites by *R/V Polar Duke* in April 2002, by *R/V Polar Princess* in February to March 2003, and in March 2002. The former two are targeted deep penetration with long streamer cables and high power airguns, whereas the last one is targeted a high-resolution survey of the shallow part. Two drill sites C9001 and C9002 are located on the cross point of lines ODSR03–BS and ODSRW03–H81, and lines ODSR-BS and ODSR02–7, respectively. Figure 2 shows structural interpretation of the seismic survey data (time section). The uppermost 0.2 sec of interval is characterised by a rhythmical layering of horizons parallel to the seafloor. The horizons below are characterised by rhythmic repetition of a set of high amplitude, continuous layers and gradual downward decreasing-amplitude horizons suggesting turbiditic beds. Base of the Pleistocene sediments defined by an unconformity, is located at ca. 2.3 sec at the drill sites. It is gently dipping northwards and consequently, the overlying Pleistocene sediments become thicker towards north. Another major unconformity at ca. 2.9 sec defines the base of Pliocene sediments, which lies sub-parallel to the base of the Pleistocene unit. This unit is characterised by a stack of low-amplitude but continuous horizons. The underlying Oligocene–Miocene unit is characterised by a repetition of very high amplitude layers with about 0.15 sec interval, probably being turbidite. A set of high-angle normal faults truncates this and the underlying Eocene units, which seizes at the base of the overlying Pliocene unit. Although truncated by faults, the amplitude anomalies at the drill sites can be traced horizontally ca. 15 km in N–S cross-Section. These high-amplitude horizons might be coarse-grained conglomerate layers.

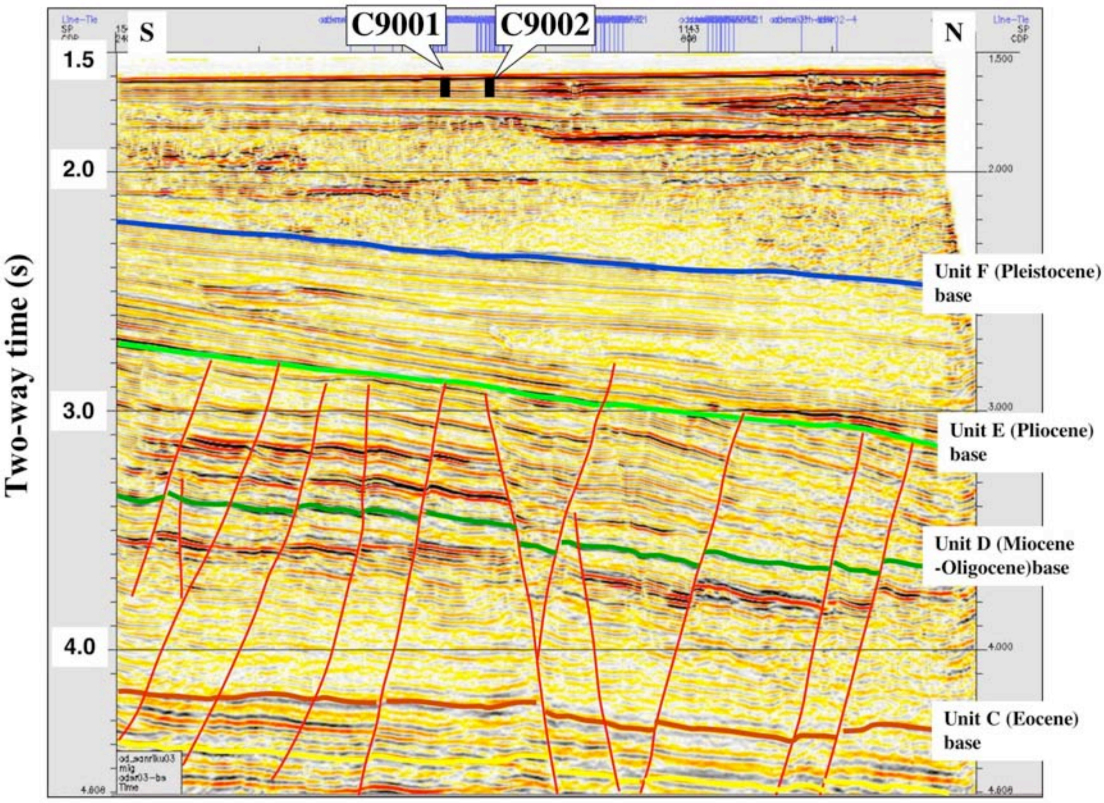


Fig. 2 N–S seismic cross-section along ODSR03–BS (line location is shown in Fig. 1). Drill sites C9001 and C9002 are also shown. Data acquisition was by *R/V Polar Princess* in 2003. Geologic interpretations are done by A. Ibusuki (unpublished data).

4. Description of Cores

All cores were split after whole-round non-destructive measurements and whole-round sampling. Visual descriptions were taken for archive halves of each core in terms of its lithologic and structural features. Colour photo images for each core and raw description of each Section are shown in Appendices 1 and 2, respectively.

Cores from both sites yielded almost identical lithologic and structural features. Lithology is quite monotonous throughout the entire cores as dominated by massive olive-black to olive-greyish silty clay intercalated with several light-greyish and dark-greyish tephra layers. Bioturbation is intense in some intervals, and gas expansion cracks and voids are common in every ten centimetre.

Silty clay

Olive-black to olive-greyish (7.5Y 4/2 ~ 10Y 3/2 in Munsell colour system) silty clay is the most dominant lithology throughout the all cores (roughly over 95%). Foraminifers and diatoms are common although their abundances vary by horizon to horizon. Bioturbation is generally so intense as it gives completely homogeneous texture. However, bioturbation is recognised as a slight difference in colour in some intervals. Burrows are recognised in some horizons. Hyalite foraminifers of 300–500 µm are commonly observed by naked eye. Diatoms are commonly observed by microscopic observation which occupy about 30 modal%. Sponge spicules, nannofossils and radiolarians are also common in microscopic observation (Fig. 3a). Isolated granule and pebble are found in some horizons. Pumice is the most abundant. It occurs as light-greyish angular to sub-rounded grain of a few mm to 1.3 cm in diameter. Scoriaceous granules and pebbles are second dominant next to pumice, occur as sub-rounded grain of a few mm to 1 cm in diameter. Rare chert, sandstone and volcaniclastic rock fragments are also found.

Tephra

Tephra layers are rarely intercalated in massive silty clay horizon. Thickness varies from ~1 mm to 10 cm. Grain size ranges from silt to granule, however the most frequently observed ones are of fine to very-fine sand size. Average occurrence of > 5mm thick tephra layer is about 5–6 per each core. There are two types of tephra observed: light-greyish to white pumiceous, and dark-greyish to black lithic crystal (Fig. 3b). These two types are often interfingered or changed gradually. In many cases, tephra layers have a sharp bottom boundary and a gradual top boundary, and often show an upward fining grading.

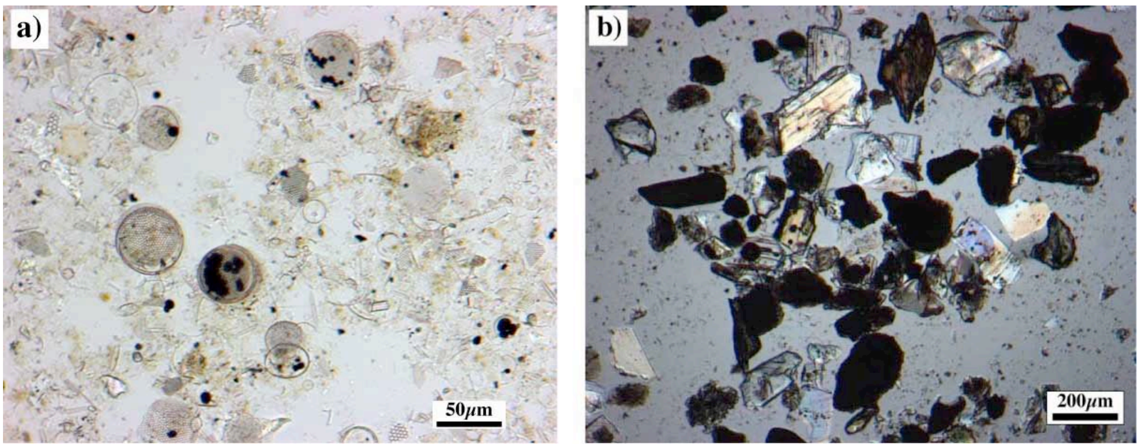


Fig. 3 Representative photo micrographs of a) diatomaceous silty clay (Site C9001A Core 2H Section 6 68 cm) and b) tephra (Site C9002 Core 2H Section 4 30.5 cm). a) Other than diatoms, nannofossils and sponge spicules are commonly observed. Secondary pyrite is recognised inside of some diatoms. PPL. b)

Fine sand size lithic tephra. Main constituents are, lithic grains, vitric grains, quartz and hornblende. PPL.

Detailed description of each core

Site C9001 Hole A

The dominant lithology is olive-black to olive-greyish diatomaceous silty clay with foraminifer. As minor constituents, sandy clay and tephra layers are intercalated with silty clay. Foraminifer is common in silty clay throughout the all cores however, is more concentrated in some horizons: around 142 cm of Core 1H Section 3, and 49.5 cm of Core 5H Section 4. Bioturbation is recognised as a subhorizontally interfingered structure of slightly different coloured silty clays (7.5Y 3/2 ~ 10Y 4/2) in some intervals. This structure is relatively frequently observed in the lower part of the hole, Section 1–4 of Core 4H. Sandy clay is a very rare lithology in this hole, which occurs only at around 31–36 cm of Core 4H Section 2. Both the top and the bottom boundaries to the over- and underlying silty clay are unclear. Tephra layer occurs at eight horizons. Detailed description of each layer is as follows.

Core 3H Section 1 107.8–108.2 cm: Dark-greyish sandy scoria of coarse silt size with minor amounts of vitric grain, feldspars, quartz, some ferromagnesian minerals and siliceous microfossils.

Core 3H Section 2 70.0–78.0 cm: Greyish pumiceous vitric ash is distributed in the interval of 70.0–71.0 cm with sharp top boundary to the overlying silty clay. This layer gradually changes downward into poorly sorted pumiceous sand (71.0–74.5 cm). Greyish scoriaceous fine sand is distributed beneath that in the interval of 75.0–78.0 cm. The bottom boundary to the underlying silty clay is sharp however is warped upward due to gas void.

Core 3H Section 6 17.0–34.0 cm: Greyish pumice to olive-greyish tephra, gradually changed.

Core 4H Section 2 85.5–88.0 cm: Olive-black tephra with a sharp bottom boundary and a gradual top boundary.

Core 5H Section 1 124.0–128.0 cm: Rhyolitic pumice layer. Grain size ranges from 5 mm to 3.0 cm (mode: ca. 2.0 cm) in diameter. The top and bottom boundaries are vague.

Core 5H Section 4 78.0–83.0 cm: Pumiceous lithic crystal tephra of medium sand size, composed dominantly of dacitic to rhyolitic lithic grains and subordinate quartz and hornblende crystals. The bottom boundary is sharp and the top boundary is gradual and upward fining grading is observed.

Core 5H Section 4 92.0–103.0 cm: Granule to pebble size (maximum 2 cm in diameter) angular pumice with upward coarsing grading in the interval of ca. 92.0–100.0 cm. The top of the unit is vaguely defined as increasing pumice pebbles in the overlying silty clay layer. A wedge-shaped dark-greyish medium volcanic sand layer is beneath the pumice granule layer with maximum thickness of 3 cm. The component is quartz, pumice, pyroxenes, lithic grains and opaques in the order of abundance.

<u>*Site C9002 Hole A*</u>

The dominant lithology is olive-black to olive-greyish diatomaceous silty clay with foraminifer. As minor constituents, sandy clay and tephra layers are intercalated with silty clay. Foraminifer is common in silty clay throughout the all cores, and is more concentrated in some horizons or patches. Foraminifer-rich horizons are: 136–147 cm of Core 1H Section 4, 139–140 cm of Core 2H Section 3, 58–68 cm of Core 3H Section 1, 130–133 cm of Core 3H Section 3, 35–65 cm of Core 3H Section 6, 85–145 cm of Core 3H Section 6, and 0–44 cm of Core 3H Section 8. Subhorizontally interfingered bioturbation structure is rarely observed in this hole. Sandy clay occurs usually as a few to 10 cm layer with vague top and bottom boundaries to silty clay above and beneath. Sandy clay layers are relatively abundant in the intervals of upper part of Core 1H Section 1, lower part of Core 2H Section 4, and lower part of Core 3H Section 3, and the whole Section of Core 3H Section 6. Tephra layer occurs at six horizons. Detailed description of each layer is as follows.

Core 2H Section 1 112.0–113.0 cm: Very-fine sand size ash layer is distributed in the interval of 112.5–113.0 cm. And pumice granules are found in the above 0.5 cm intervals of silty clay.

Core 2H Section. 2 14.0–14.7 cm: Very-fine sand size light-greyish (upper) and dark-greyish (lower) ash layers. Both top and the bottom boundaries are sharp although wavy. Also the boundary between the two layers is sharp.

Core 2H Section 2 23.3–24.3 cm: Very-fine sand size dark-greyish scoriaceous ash layer. Top boundary is gradual and bottom boundary is sharp.

Core 2H Section 2 124.5–125.3 cm: Very-fine sand size dark-greyish scoriaceous ash layer. Top boundary is gradual and bottom boundary is sharp.

Core 2H Section 3 137.6–139.0 cm: A set of fine sand size tephras of light-greyish (137.6–138.2 cm) and dark-greyish (138.2–139.0 cm) layers. Boundaries are vague.

Core 2H Section 4 27.0–31.0 cm: An alternation of olive-black and greyish-olive ash layers. Both layers are about 1 cm thick and five layers are recognised. Layer boundaries are wavy but sharp. The bottom boundary of this unit is also wavy probably due to erosion. The olive-black ash layer is composed mainly of fine sand size vitric and crystal grains. The greyish-olive layer is composed mainly of fibrous vitric grains of fine to medium sand size.

<u>Site C9002 Hole B</u>

Lithologic distribution is basically the same as the previous two holes. The dominant lithology is olive-black to olive-greyish diatomaceous silty clay with foraminifer. As minor constituents, sandy clay, sand, silt, clayey silt and tephra layers occasionally occur. Foraminifer is common in silty clay and sandy clay throughout the all cores, however its abundance varies with depth. Foraminifer-rich horizons are: 72–73 cm of Core 2H Section 1, 123–124 cm of Core 3H Section 466–112 cm of Core 3H Section 6, 28–45 cm of Core 4H Section 5, 57–80 cm and 106–127 cm of Core 4H Section 3, 24–34 cm and 138–140 cm of Core 4H Section 6, 6.5 cm of Core 4H Cc, 86 cm of Core 5H Section 1, and 49–62 cm of Core 5H Section 3. Foraminifer is less abundant in deeper part than the middle of Core 5H. Subhorizontally interfingered bioturbation structure described in C9001 Hole A is relatively common in this hole, especially from the top to middle of Core 3H, meddle of Core 4H, and meddle to bottom of Core 5H. Burrow is recognised in some horizons. Sandy clay occurs as a few to 10 cm-thick layer. Average occurrence is several per each Section, and most of them have gradual boundaries to the over- and underlying silty clay layers. In the interval of 53.5–129.0 cm of Core 2 Section 3, three units of ca. 23 cm upward fining graded bedding from sandy clay to silty clay are recognised. Some sandy clay layers occur in association with tephra layers. Silt and clayey silt are rather minor constituents, which are only found at 19.5–29.8 cm of Core 3 Section 2 and 57.6–61.1 cm of Core 4 Section 1, respectively. Tephra layer occurs at 19 horizons. Detailed description of each layer is as follows.

Core 1H Section 5 102.5–107.5 cm: Granule to medium sand size pumice layer showing an upward fining grading. Pumice grains are sub-rounded to angular. Bottom boundary is sharp, and top boundary is gradual. Angular pumice granules up to 3 mm are also found in the overlying silty clay layer in the interval of 98.0–102.5 cm.

Core 1H Section 5 110.5–114.0 cm: Dark-greyish very-fine scoriaceous sand layers interfingered with silty clay layers with centimetre order. Bottom boundary is sharp and the top boundary is gradual.

Core 2H Section 1 103.0–111.0 cm: Olive-black fine sand interfingered with olive-greyish silty clay. The same olive-greyish fine sand also occurs as a patch at 117 cm.

Core 2H Section 2 25.0–29.0 cm: Dark olive-grey to black fine volcanic sand (ash) layers. The ash is composed of quartz-rich lithic-crystal with volcanic glass. A thin olive-greyish silty clay layer is intercalated in the interval 25.5–26.0 cm. Bottom boundary is sharp and top boundary is gradual, and upward fining grading is recognised.

Core 2H Section 4 126.5–130.0 cm: Dark olive-greyish to black very-fine volcanic sand layer. A wedge-shaped crack at the middle of the layer might have changed the original thickness.

Core 3H Section 1 26.0–29.0 cm: Olive grey clay (ash) to olive black sand.

Core 3H Section 3 3.0–8.0 cm: Greyish-olive silty fine-sand (ash) with a sharp bottom and a gradual top boundaries.

Core 3H Section 4 48.0–57.0 cm: Dark-greyish fine to medium scoriaceous sand layer with a sharp bottom and a gradual top boundaries. Upward fining grading is observed.

Core 3H Section 4 60.0–73.0 cm: A combination of white pumice and dark-greyish scoriaceous sand (fine to very-fine). The pumice grains distributed in ~60.0–70.0 cm of intervals are granule to pebble size, angular, and showing an upward coarsing grading. The scoriaceous layer is about 3 cm thick, and is composed of very-fine sand. The bottom of the unit is sharp. The top of the unit is vaguely defined as increasing pumice pebbles in the overlying silty clay layer.

Core 4H Section 1 61.2–62.0 cm: Dark olive-greyish tephra with a sharp bottom and a gradual top boundaries.

Core 4H Section 2 8.0 cm: Olive-black lithic-crystal fine sand layer.

Core 4H Section 2 20.0–26.0 cm: Greyish-olive to greyish fine vitric sand with a sharp bottom and a gradual top boundaries. Major components are vitric bubble wall glass.

Core 4H Section 2 99.0–109.0 cm: Dark olive-greyish fine lithic-crystal sand interfingered with olive-greyish silty clay. Main components of the lithic-crystal sand are lithic grains, quartz, feldspars, hornblende and glauconite.

Core 4H Section 2 127.0–130.0 cm: Dark olive-greyish fine lithic sand composed mainly of lithic grains, quartz, feldspars, hornblende and glauconite.

Core 4H Section 5 8.6–10.5 cm: Well-sorted greyish vitric ash layer.

Core 4H Section 5 10.5–24.0 cm: Interfingered dark-greyish fine sand and light-greyish pumice layers. Interfingered boundary is quite irregular which looks like a flow structure. The bottom boundary of the unit is sharp and oblique, whereas the top of the unit is gradual. An upward fining grading is recognised.

Core 4H Section 5 135.6–139.5 cm: Dark-greyish to greyish ash of very-fine to fine sand size. The top boundary is gradual. The bottom boundary is sharp but convoluted.

Core 5H Section 3 21.0–28.0 cm: A gradual downward changing sediment series from greyish-olive silty medium sand to black fine lithic-crystal sand. The sand is composed mainly of lithic grains, quartz, biotite, hornblende and pyroxenes. The unit bottom is sharp and the top is gradual, and an upward fining grading is recognised.

5. Core Processing Procedures

1) Objectives of Onboard Measurement

There are four main purposes for the onboard measurements in this cruise: 1) to provide fundamental geologic data for geotechnical evaluation on BOP installation, 2) to test the total core flow from core cutting area to core processing deck, including curation works, 3) to obtain data for verifying performance and quality of analytical equipments, and 4) to obtain data for sample requestors. For the sake of achieving these purposes, we carried out fifteen items of non-destructive and two items of destructive measurements for core sections and two items of measurement for discrete sample. The measurement items of minimum requirement for geotechnical data were shear strength, density profiles and visual core description (VCD), and optionally grain size and mineral composition, which shall be analyzed onshore. Regarding the other measurement items, the objective was primarily practical core processing test using real core samples. Analytical equipments used for core processing in this cruise were X-ray CT scanner (XCT), Multi-Sensor Core Loggers (MSCL-W, -S, -I, -C), Cryogenic Magnetometer (SQUID), X-ray Fluorescence Core Logger (XRFCL), Vane Shear, Penetrometer, Pentapycnometer, Balance, Gas Chromatograph with natural gas analyzer (GC-NGA) and CHNS/O Element Analyzer (EA).

2) Core Flow

We practiced each measurement basically according to the following core flow (Fig. 4).

1) Whole round core section

- 1-1) Puncturing on the core liner to release internal expanding gas for safety at appropriate positions prior to partitioning
- 1-2) Void gas sampling at the Core Cutting Area before partitioning a core as appropriate, then forwarding to GC-NGA
- 1-3) Headspace gas sampling from the bottom of the first section at the Core Cutting Area, then forwarding to GC-NGA
- 1-4) XCT scanning
- 1-5) MSCL-W (GRA: gamma-ray attenuation density; PWV: P-wave velocity; NCR: non-contact electric resistivity; MS: magnetic susceptibility; NGR: natural gamma-ray radiation) logging after equilibration with room temperature
- 1-6) Whole-round core sampling from selected intervals
- 1-7) Splitting into archive and working half core sections

2) Archive half core section

- 2-1) MSCL-I (IMG: digital photograph image) scanning after surface mud scraping
- 2-2) VCD
- 2-3) MSCL-C (RSC: reflectance, spectrophotometry and colorimetry; MS) logging after/during VCD

2-4) SQUID logging

2-5) XRFCL logging

3) Working half core section

3-1) MSCL-S (GRA, PWV, NCR, MS) logging with a plastic film wrapping

3-2) Vane Shear and Penetrometer measurements

3-3) Sampling from the same horizon of 3-2), then forwarding to Pentapycnometer and optionally to EA

With respect to the working half core sections of C9002A and B from which microbiology discrete samples were taken by the onboard scientists, the order of 3-1) and 3-2) was interchanged in order to perform sampling as soon as possible after splitting. In addition core sections waiting for the next processing were once put in the cold storages, in case that the waiting time were to be long, however, it was in the latter half of the core processing period of this cruise that this treatment was performed. Before this treatment was performed, all half-split core sections waiting the next processing were kept in the core lab., rapped with plastic film in the room temperature (up to twelve hours). After completion of all processing items, each sections were packed in a plastic bag with vacuuming and were reserved in the cold core storage refrigerated at 2°C.

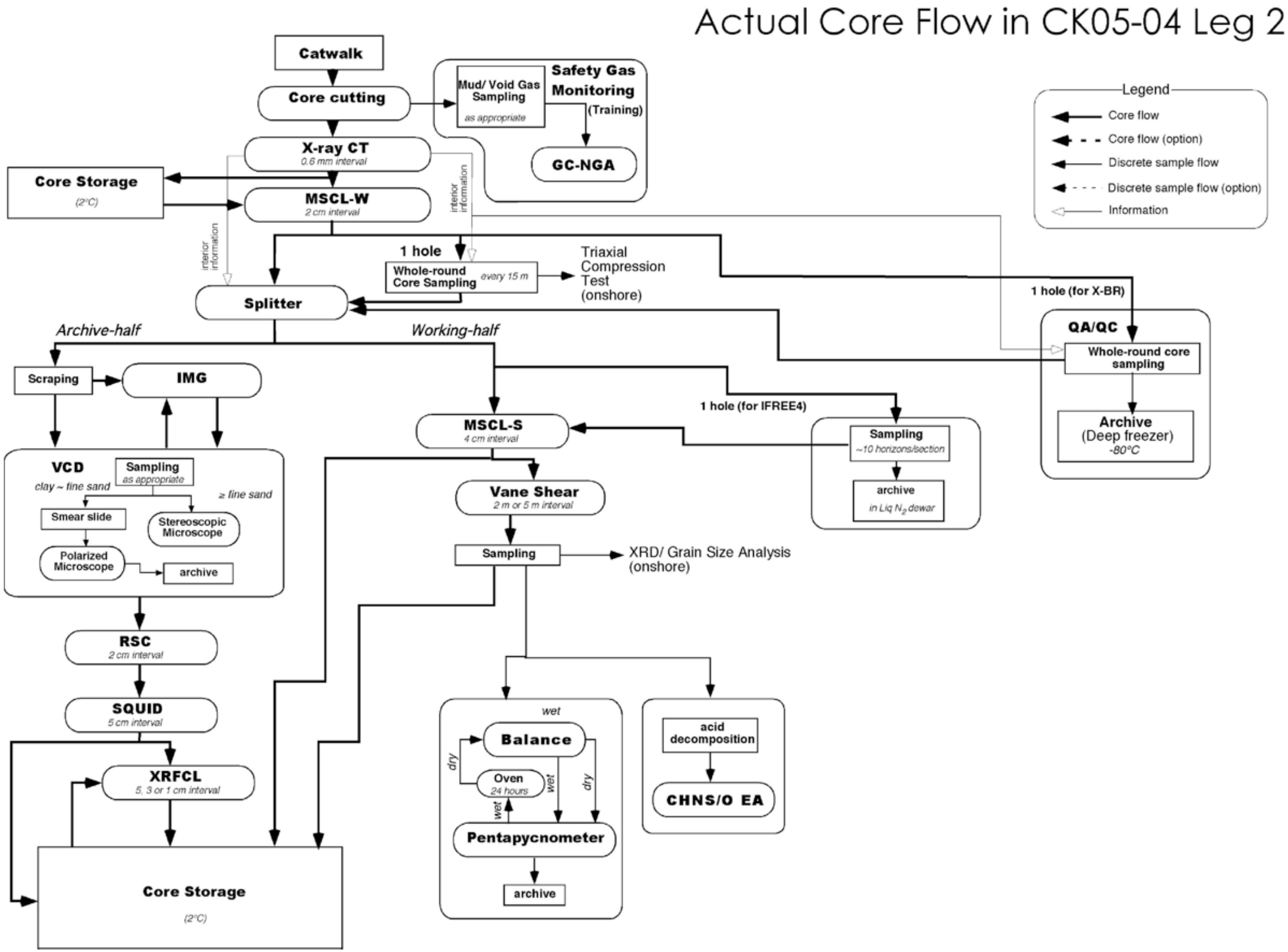


Fig. 4 Measurements and core flow practiced during CK05-04 leg 2

3) Measurement conditions and procedures

X-ray Computed Tomography Scanner

X-ray CT images

X-ray CT images were acquired for whole-round core sections at the first of all measurements, using GE Medical System Light Speed Ultra16. In this system, a X-ray source and arrays of 912 semiconductor detectors rotate at 360° around a sample and attenuated intensity of two-dimensional fan-beams of X-rays transmitting a sample is measured. The helical scan mode adopted in this system enables to perform a measurement of a sample with a high speed. Three-dimensional CT scan data of a whole round core section is mathematically reconstructed from the two-dimensional data of X-ray attenuation distribution. Calibration for giving CT-values was made using a pure water standard piece and air. X-ray tube voltage and current were set to 120 kV and 100 mA, respectively. Measurement interval of the helical scan was set to 0.625 mm under the 16 arrays of detectors mode. In this scan mode, it requires about 3 minutes for each 1.5 m core section. A CT image of a vertical plane with 512 x 512 pixels is digitized from a DICOM-formatted file for each core section scan.

Multi-sensor Core Logger (MSCL)

Continuous measurements of non-destructive physical properties were conducted using the Multi-Sensor Core Logger (MSCL) systems of GEOTEK Ltd., UK. We have four systems of MSCL onboard: MSCL-W (standard type), MSCL-S (standard type), MSCL-I (XYZ type) and MSCL-C (XYZ type). The MSCL-W and –S systems are designed for logging whole-round and split-half core sections put sequentially on a track, respectively, mounting sensors of core thickness, temperature, gamma-ray attenuation (GRA) density, P-wave velocity (PWV), non-contact electric resistivity (NCR), and magnetic susceptibility (MS). In addition, the MSCL-W system mounts a natural gamma-ray radiation (NGR) sensor with four detectors. In these standard-type MSCL systems, multiple core sections, which move by using a core pusher, are logged continuously through the stationary sensor array track. The XYZ-MSCL system, including MSCL-I and –C systems, is designed for measuring split-half core sections, which are plurally loaded. In this system, sensors move above the samples. The MSCL-I mounts a digital image scanner and the MSCL-C mounts a spectrophotometric colorimeter (RSC) and MS sensor.

Core thickness

Core thickness is used in calculations of some properties logged by MSCL-W and -S. Core thickness measurement is made using a pair of displacement transducers (0.01 mm in the resolution) and mechanically coupled to spring loaded P-wave transducers. Core thickness is acquired based on deviation in thickness between a reference piece and each point of a core section and sediment thickness is consequently calculated by subtracting a total liner wall thickness from the core thickness.

Temperature

Core temperature, which exerts some influences upon the data of PWV and NCR, is basically equilibrated with a room temperature before the MSCL measurement in order to keep measurement condition stable as much as possible. Confirmation of the temperature equilibration was conducted by using a thermometer probe inserted into a selected core sections from a punctuated hole, where no influence is expected to be occurred on measurements subsequent. The room temperature, which was regarded as the room temperature, was measured continuously using a standard PRT (platinum resistance thermometer) probe during the logging.

P-wave velocity

PWV measurement was performed for both whole-round and split-half cores, passing through the P-wave transducers mounted on the MSCL-W and –S systems. As the P-wave transducers, a pair of the oil filled Acoustic Rolling Contact (ARC) transducers is adopted for the MSCL-W, while a pair of the piston-type transducer and ARC for the MSCL-S. Calibration for each system is conducted using a standard piece that is the core liner filled with distilled water. As P-wave measurement is sensitive to temperature and calibration was done at the room temperature, the core samples were equilibrated to the room temperature before measurement at least three hours. Measurement intervals are 2 cm and 4 cm for whole-round and split core analyses, respectively.

Natural gamma-ray radiation

Natural gamma rays emission was recorded for all core sections to measure variations in radioactive counts of samples. A sensor shielded by lead is a scintillation counter detector which is optically coupled to a photomultiplier tube and connected to a bias base that supplies the high voltage power and a signal pre-amplifier. NGR measurement was conducted only for whole-round core samples, passing through the NGR sensor housing on MSCL-W. Four sensors are mounted horizontally and vertically in each lead cube housing. Background intensity measured under inserting a blank piece that is the core liner filled with distilled water is about 40 cps. The spatial resolution for each detector is 15 cm. Measurement interval and time are 5 cm and 30 seconds, respectively.

Magnetic Susceptibility

Magnetic susceptibility (MS) is the degree to which material can be magnetized in an external magnetic field. This measurement aids in the detection of fine variations in magnetic intensity associated with magnetic reversals or lithologic changes (alteration or grain size). MS measurement for a whole-round core sample was performed by using the Bartington loop sensor (MS2C) with a 8 cm loop diameter. MS was also measured for split-half core sections using the Bartington point sensors (MS2F) mounted on MSCL-S and MSCL-C. A spatial resolution of the loop sensor is 20-30 mm, while that of the point sensor is 0.5 cm. The data acquisition intervals for MSCL-W, -S and –C were 2 cm, 4 cm and 2 cm, respectively, with an acquisition time of 1 second.

Gamma-rays attenuation bulk density

Bulk density of sample materials was determined by measuring the gamma rays attenuation (GRA) through the cores. This measurement is based on the principle that the density of material is related to attenuation, mainly by Compton scattering, of a collimated beam of gamma rays passing through a known volume of material. GRA density measurement was performed for both whole-round and split-half cores, by using the MSCL-W and –S systems, respectively. The thin gamma ray beam is provided from a ^{137}Cs gamma rays source at the radiation of 370 Bq in a lead shield with 2.5 mm collimator. The gamma ray detector, which comprises a scintillator and integral photo-multiplier tube, measures the intensity of the beam relative to standards providing the GRA density of the core material. Calibration equations for MSCL-W and -S are determined using each standard piece comprising a stepwise machined cylindrical aluminium piece, distilled water and the core liner. Accuracy of GRA data is about 1 % and that of bulk density calculated based on GRA is less than 2 %. The sampling intervals for whole-round and split-half cores were 2 cm and 4 cm, respectively, and the sampling time was 4 seconds.

Non-contact electric resistivity (NCR)

Electric resistivity were measured for whole-round and working-half cores using a non contact inductive coil array mounted on the MSCL-W and –S systems. The non-contact electric resistivity sensor of GEOTEK enables resistivity of sample materials to be measured through plastic liners. Resistivity profiles are very sensitive to changes in pore water salinity or pure water content. Calibration is performed using five salt water standards in the core liners (0, 1.75, 3.5, 17.5, 35 g/l) with known resistivities (range: 0.21-15.48 Ω•m @20°C). Special resolution of the sensor is about 2 cm according to GEOTEK. Sampling interval for whole-round and archive-half cores were 2 cm and 4 cm, respectively.

Digital Color Image

Digital color images of cores were taken by using MSCL-I from archive-half cores. The GEOSCAN color line scan camera mounted on the MSCL-I system is a 3 CCD device using 3 * 1024 pixel CCD arrays. White calibration were performed by using a white tile which causes isotropic scattering of the light (Spectraron, Labsphere Co.) Scanning for a section with 100 pixel/cm requires about 5 minutes.

Reflectance, Spectrophotometry and Colorimetry (RSC)

Color spectra of cores are varied by their chemical or mineralogical compositions. The Konica-Minolta color spectrophotometer mounting on the MSCL-C system acquires automatically reflection spectra from the surface of the core providing a detailed and accurate color description at the time of measurement. RSC data for each sections were obtained from archive-half cores. Measured data are expressed by brightness and chromaticness using indexes of L* (black-white), a* (red-green) and b* (yellow-blue). The accuracy of reflectance data is less than 0.1 % and that of chromaticness is less than 0.04 in a value of ΔE *ab. Calibrations were carried out internally by using a white calibration reference spectrum and a zero calibration reference spectrum. RSC measurement was conducted at a 0.5 cm interval. Measurement interval was 2 cm.

Cryogenic Magnetometer

Remanent magnetization

Measurements of the natural remanent magnetization (NRM) were performed on archive-half sections before and after alternating-field (AF) demagnetization using the pass-through type superconductivity magnetometer, SQUID magnetometer 760 modified (2G Enterprises). This instrument is equipped with a direct-current superconducting quantum interference device (DC-SQUID) and has an inline AF demagnetizer. Sampling interval was 5 cm and five steps of demagnetization, 5, 10, 15, 20 and 25 mT were applied.

X-ray Fluorescence Core Logger (XRFCL)

Bulk chemical compositions

Line-scanned chemical compositions were measured by the JEOL JSX3600–CA1 XRF core logger (TATSCAN-F2) on archive-half core sections with the fundamental parameter quantification (bulk-FP) method. This instrument is an energy dispersive X-ray analyzer that enables to measure the bulk chemistry of split-half cores or slabs continuously and non-destructively under a non-vacuum atmosphere.

A Rh anticathode is used in the X-ray tube. A seimconductor detector with a Be window is equipped and is cooled at -180 to -170°C by a cryogenic cooler. The inside of the housing connecting the tube and the detector, closed off by a 6 μm hypolymer film (Prolene film) from the outside, is kept in an atmosphere of He gas at 150 cc/min in flow rate. The distance between a sample surface and the housing is automatically set to 1 mm, where an air layer is intercalated.

For the measurement of cores during this cruise, the X-ray tube accelerating voltage and current were set to 30 kV and 0.17 mA, respectively. The collimator diameter was 7 mm. Measurement intervals were 5 cm for C9001A, 3 cm for C9002A-1H-3 to -2H-7 and C9002B, and 1 cm for C9002A-1H-1 to -1H-2 and -3H. Measurement time was set to 60 sec in live time, where dead time was approximately 30-40 sec. The wet sample surface was covered by a 4 μm hypolymer film (Ultralene film) to prevent drying. A quantity analysis for wet sediments, however, gives ordinary data of underestimation in light elements and overestimation in heavy elements due to X-ray absorption effects, when the bulk-FP quantification method is applied.

Vane Shear

Shear Strength

Vane test and penetration test were carried out for total 42 horizons covering all intervals. Depth intervals of the both tests are every 2 m for Site C9001 core, and every 5 m for C9002 cores. Detailed analysis intervals were chosen based on the CT scanned images as less disturbed, and homogeneous CT values. And the final selection of the analysis points was by naked eye observation of the split surface. Each test was performed at three levels in each selected interval, and their average was regarded as a representative for the interval.

Vane test was performed using the Wykeham Farrance International WF23500 vane tester with a constant rotation rate (60°/min). Size of the test hole is 12.9 mm in diameter and 12.9 mm in height. Shear strength was estimated by dividing the critical torque for rapture by vane constant. Penetration test was performed using the Geotest Instrument E284 penetrometer, and measured the compressive strength (qu). As the samples were almost sand-free clay, qu/2 was regarded as shear strength.

Discrete sample measurements

Head space and void gases

Head space and void gases were sampled and analysed for a exercise of a safety monitoring in a core flow. The Agilent Technologies Gas Chromatograph 6890N FID/TCD with an auxiliary component for natural gas analyses (Wasson-ECE Instrumentation), namely, GC-NGA was used for the analyses.

Sampling was conducted at the Core Cutting Area before partitioning into sections. Mud samples for head space gas analysis were taken from the bottom of section 1 of each core with 5 cc by using a special syringe sampler. The mud samples were put in glass vial containers and heated at 70 °C for 30 min in an oven. Extracted gas of 5 cc were taken by using a gas-tight syringe to inject to the GC-NGA. Void gas samples were collected from a selected place by using a gas-tight syringe and 5 ml of collected gas sample were analyzed. However, appropriate sample volume for each gas analysis was uncertain. Detailed investigations for such matter will be carried out later.

Moisture and Density (MAD)

Combination of wet and dry masses and volumes of discrete samples were measured to obtain bulk and grain densities and porosity. Sample mass was weighed on the Motion Compensated Shipboard Balance System. For the balance system, 17 sets of calibration curve were prepared every 1g in a range from 8 to 26 g and the precisions were less than 0.04 % in RSD. Sample volume was measured by two sets of the Pentapycnometer PPY-15T and PPYC-KU (Quantachrome Instruments). Sample cells used for the measurements were medium size (50 cc) and the calibration was performed using a medium standard sphere (ca 29 cc). The purge time of He gas was set to 1 min. The measurements for each sample were repeated five times and the average was taken. Measurement time for each sample is approximately 1 hour.

The following procedure of sample processing was applied. About 10 cc samples were taken from working half core sections and wet weight and volume were measured. After this, the samples were dried up in an oven heated at 105 °C oven for 24 hours, and then cooled in a desiccator for one hour. Finally the dry weight and the volume were measured. It is well known that a precision of wet volume measurement is relatively worth than that of dry volume measurement, however, the classic procedures were applied for a investigation on data qualities.

Total organic carbon

Total organic carbon (TOC) content was measured using the CHNS/O Elemental Analyzer Flash–EA1112NC (Thermo Electron Cooperation). Samples were taken from those originally collected for XRD and Grain-size Analysis from C9001A. Calibration curves were obtained using standard of sulfanilamide. As an oxidization catalyst, copper oxide is applied. Sample mass was weighed by the heave compensated electronic balance system.

In the pretreatment, two types of acid treatment were applied to a sample in order to investigate difference of results depending on sample preparation methods. First of all, samples were dried by using a freeze-dry machine for approximately 1 day. For the first acid treatment, approximately a few tens of milligram samples were decarboxylated with 1N HCl in vial containers, and then were desalted using ultrapure water and dried. For the second acid treatment, the same amount of samples were decarboxylated and dried in silver cups settled on a hotplate heated at 80°C with 6 N HCl. In the elemental analyzer, samples were burnt at 900 °C in the burning column at first. After passed trough the reduction column set to 840°C and the moisture absorption column, the extracted gas were analyzed. Quantified CO_2 in this way was regarded as TOC.

6. Core Processing Results

1) X-ray CT

A whole-round X-ray CT image was taken for all sections first of all the measurements. X-ray CT image well reflects the lithologic and structural information of cores. Figure 5 is comparisons of visual images of split cores (photo and sketch) and CT images of whole-round cores. In Fig. 5a, two ash layers at 8.5 cm and 31 cm are clearly shown as bright (= high CT value) bands in the CT image. Further, some sedimentary structures are also visible as differences in CT value. Laminar structures are recognised in some intervals both in visual and CT images, most distinctively at 53–55 cm. And gradual upward fining structure in the interval of 55–70 cm, probably a turbidite flow, also appear as a bright to dark upward gradation with a sharp bottom boundary. X-ray CT imagery also well detects drilling induced disturbances. Figure 5b is an example of heavily disturbed core. There are many subvertical cracks in this core. In a visual image, two continuous cracks are found in the intervals of 0–75 cm and 85–110 cm. On the other hand in a CT image, such cracks are shown as a queue of more discrete segments making a dashed line-like looking. Figure 5c is another example of artificially disturbed structure. There are disturbed spots on the right-hand side in the visual image (left-hand side in the CT image) at about 15 horizons. They are fractures originated from small drill holes on the core liner to escape gas. Another interesting example is site C9001 Hole A Core 3. It first looked sandy in the cutting area, as though the upper part of this core is composed of thick sand layer. However, sandy layer actually was only ca.10 cm thick, and dragged sand on the inner wall of core liner made such a looking. CT value of this ‘sandy-looking’ interval is the same as the normal silty clay layer, suggesting CT value is not effected by thin surface disturbance. It has been proved that X-ray CT imagery can detect the extent of these disturbances without giving any effect on the cores, which is helpful for selection for further analysis and sampling.

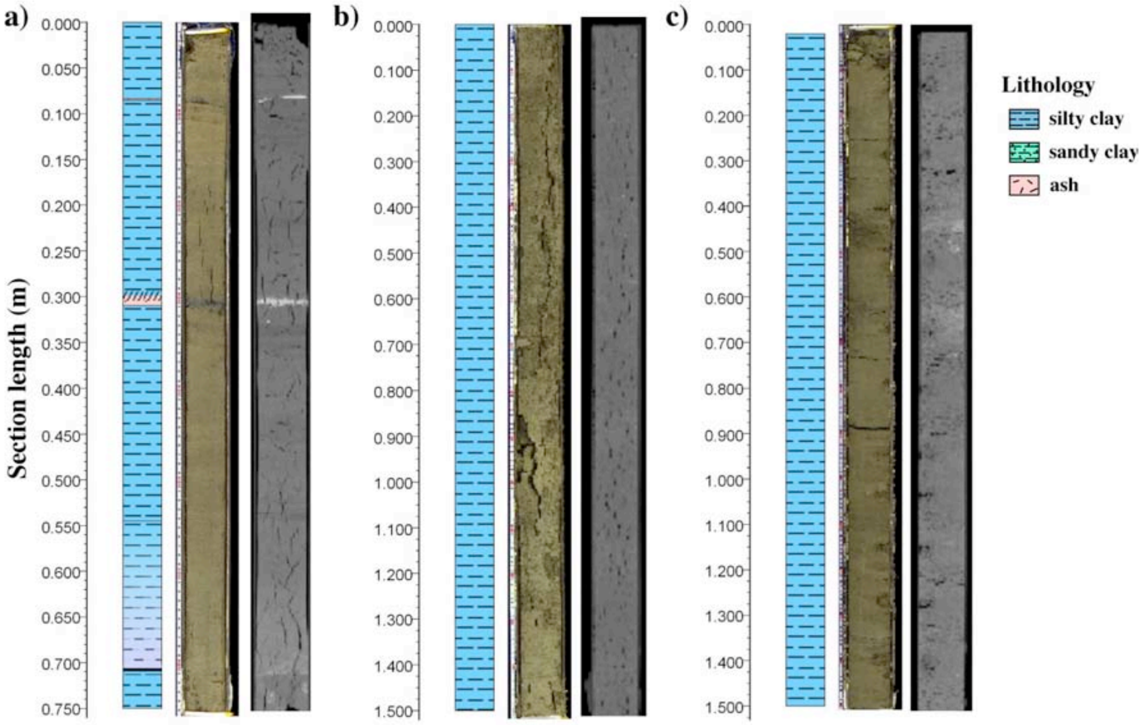


Fig. 5 Comparison of visual and CT images. a) Site C9001 Hole A Core 2 Section 1, b) C9001 Hole A Core 2 Section 3, c) Site C9001 Hole A Core 4 Section 4.

2) Physical Properties

Gamma-ray Attenuation Bulk Density, MAD Bulk Density and MAD Grain Density

Gramma-ray Attenuation (GRA) bulk density profiles show generally congruity between whole-round and working-half cores except partial disagreements (Fig. 6 and Fig. 7). Average GRA bulk density is approximately 1.4 g/cm^3 and shows good agreement with MAD bulk density. MAD grain density is almost constant and averagely about 2.55 g/cm^3. In GRA profiles of whole-round cores, some large scale common trends are recognized: downward increase of upper 5 m in C9001A (from 1.30 to 1.40 g/cm^3) and upper 6 m in C9002A-B (from 1.25 g/cm^3 to 1.45 g/cm^3), downward decrease from 16 to 31 m in C9001A (from 1.42 g/cm^3 to 1.2 g/cm^3) and from 17 to 32 m in C9002A-B (from 1.5 g/cm^3 to 1.3 g/cm^3), and roughly constant below 32 m in C9001A and 36 m in C9002A-B. For the middle scale, conspicuous depletions occur at around 10 m and 43 m in C9001A, and their correlative depletions are also seen at around 11 m and 47.5 m in C9002A-B, respectively. Furthermore, downward increase in a short interval occur both from 31 m to 32 m in C9001A (to 1.4 g/cm^3) and from 32 m to 36 m in C9002A-B (to 1.45 g/cm^3), below the large scale downward decrease trend. This downward increase is also distinctly seen in the profiles of MAD bulk density.

901-C9001A

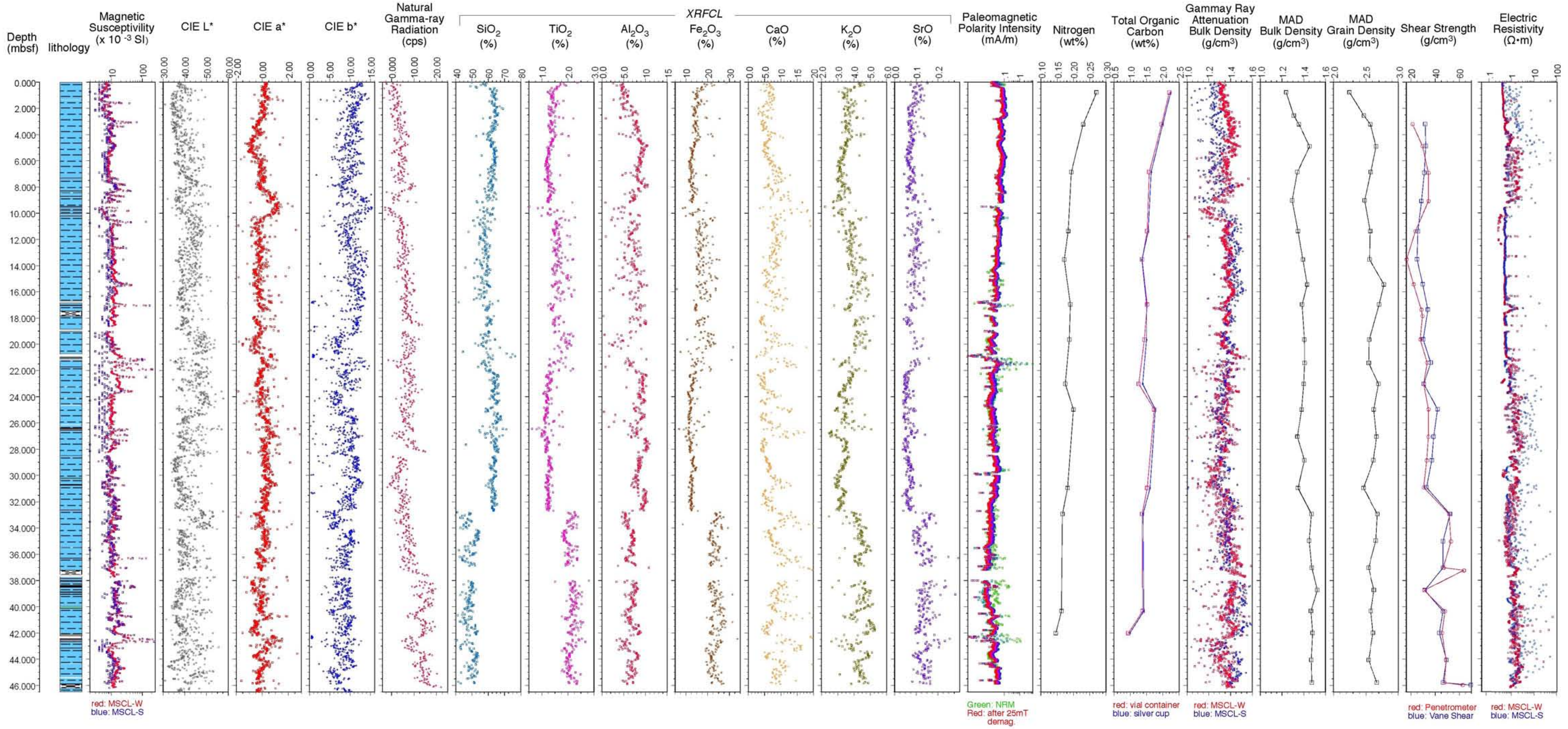


Fig. 6 Synthesized columnar profiles of physical, chemical and magnetic properties and lithology for Site C9001 Hole A. All data for each profile within the plot range are shown without any filtering. Equally spaced spikes like "brush" in some profiles, especially in paleomagnetic intensity and electric resistivity, are corresponding to section boundaries. All graphs are created by using Composite Log Viewer, J-CORES.

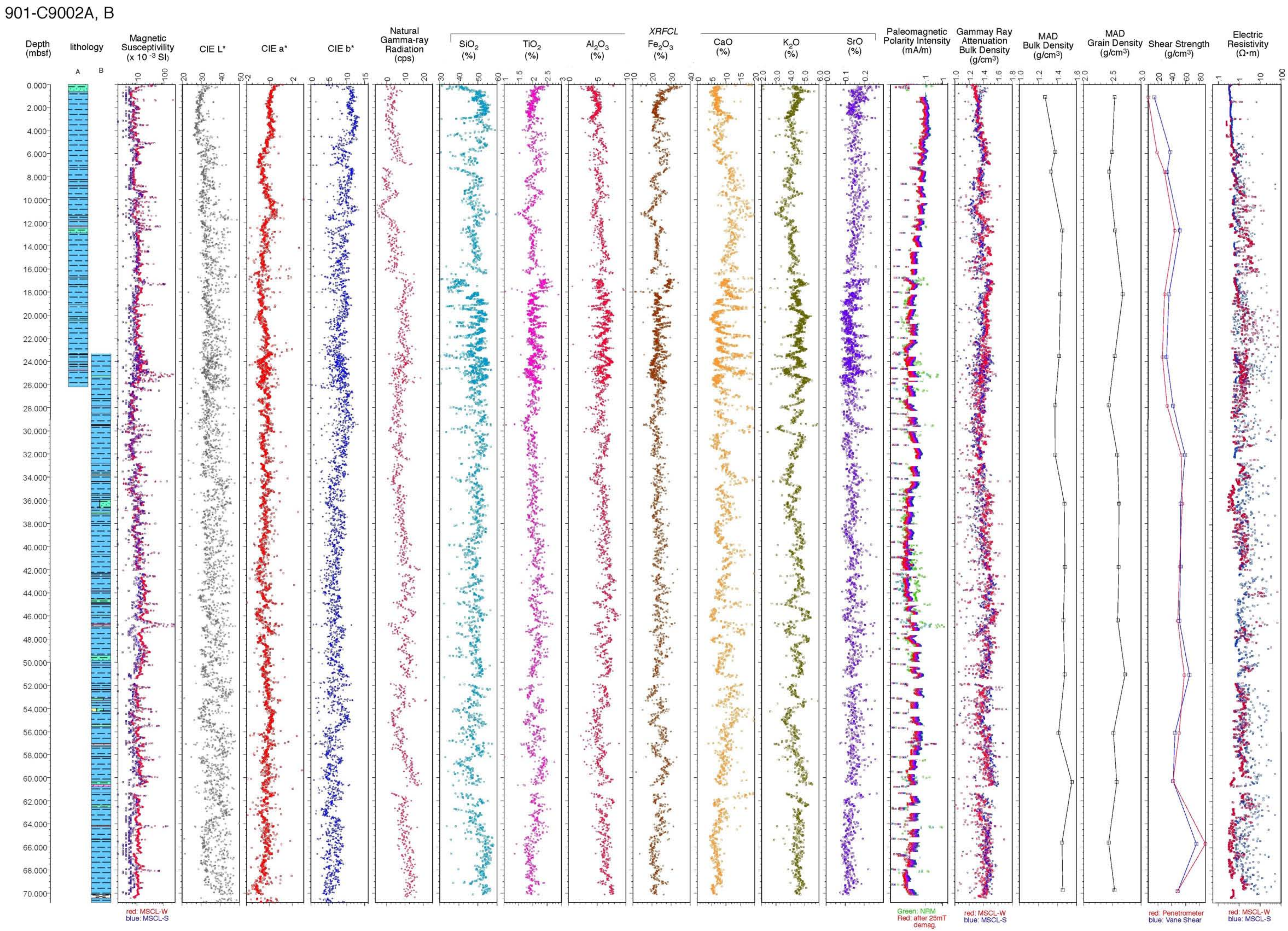


Fig. 7 Synthesized columnar profiles of physical, chemical and magnetic properties and lithology for Site C9002 Hole A and B. All data for each profile within the plot range are shown without any filtering. Equally spaced spikes like "brush" in some profiles, especially in paleomagnetic intensity, are corresponding to section boundaries. All graphs are created by using Composite Log Viewer, J-CORES.

P-wave velocity

P-wave velocity (PWV) data obtained for both whole-round and split-half cores were far from what are expected, that is, lower than PWV of water (Fig. 8). For whole-round cores in upper 4 m of C9001A and 6 m of C9002A-B, PWV is almost equal to that of water, 1.5 km/sec and become lower from these depths. Data in the lower part are basically constant at 1.1 km/sec, but obviously very low. In addition, measurement for split-half cores did not give realistic data in the most part and consistency with data for whole-round cores was observed only in the upper 3 m and some intervals in the upper part of C9001A. The cause for difficulty in PWV data collection would be existence of a thin gap between the sediment and the liner, gas void cracks and internal small gas voids.

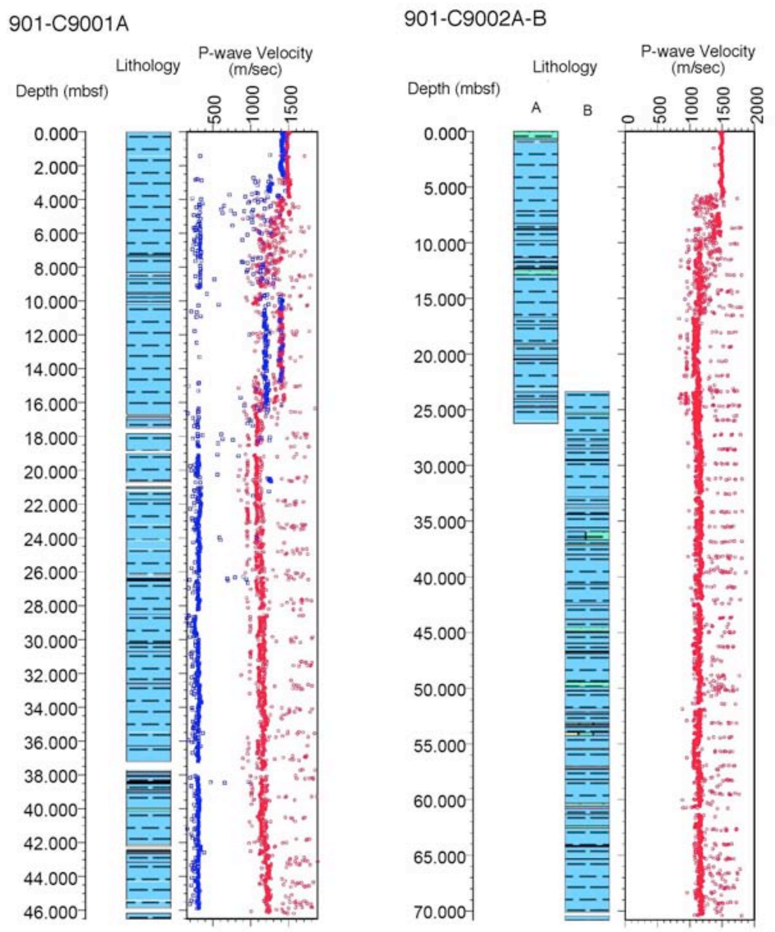


Fig. 8 Columnar profiles for P-wave velocity of Site C9001 Hole A and C9002 Hole A-B. Red open circle: MSCL-W, blue open square: MSCL-S (data of C9002 are not shown). All data for each profile within the plot range are shown without any filtering. Data like "brush" are corresponding to section boundaries.

Electric Resistivity

Electric resistivity profiles were obtained by NCR sensor for whole and split-half cores (Fig. 6 and Fig. 7). Both profiles show general coincidence, but the profiles of split-half core data are much more scattered probably due to interstices yielded between the core liner and the core. Short wavelength variations influenced by gas void cracks are very obvious in whole-round core profiles. The profile of C9001A (Fig. 6) shows a general downward increase from 0.4 to 1.6 Ω·m with relatively higher resistivity intervals from 5 to 9 m and from 14 to 20 m. The profile of C9002A-B (Fig. 7) exhibits also a general downward increase by 63 m from 0.4 to 1.6 Ω·m, however, it decreases again to about 0.4Ω·m.

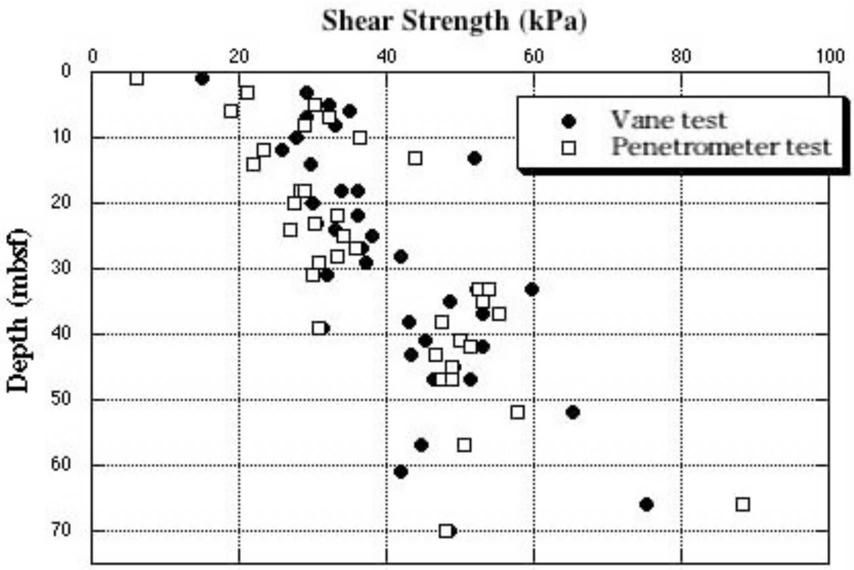


Fig. 9 Plot showing the result of shear strength test

Shear strength

Shear strength was measured by vane test and penetrator test for total 38 intervals: 22 for site C9001 and 16 for site C9002. To evaluate data quality, obtained results are ranked as A (fine) to C (poor) based on the sample conditions after test; A: test induced fractures are radial, suggesting low disturbance, B: test fracture is parallel to the horizon, suggesting high disturbance, and C: rapture was not sharply detected. If more than one rank of data are mixed in for the same horizon, only the best ones are chosen for average. In addition, data were discarded in the following cases: the measured point is very close to the gas escaping drill hole on the liner; one of the measured points has different CT value. The evaluated results are summarised in Tables 3 and 4, and Fig. 9. In either site, by either test method, the estimated shear strength shows a positive correlation with depth. In shallower part (ca. < 30 mbsf), penetration test tends to yield lower shear strength than vane test. However, the both values become closer with increasing depth.

Natural Gamma-ray Radiation

Natural gamma-ray radiation of a sediment sample is chiefly attributed to potassium-bearing minerals such as clay minerals. The NGR profiles in Fig. 6 and Fig. 7 exhibit a general downward increase trend probably due to progressive compaction with some short ranged variations. Those variations are roughly consistent with those showed in K2O profiles measured by XRFCL.

Magnetic susceptibility

Magnetic susceptibility (MS) profiles show generally congruity between whole-round cores for which a loop sensor was applied, and working-half cores for which point sensors were used, except partial disagreements (Fig. 6 and Fig. 7). Each high MS peaks are basically corresponding to tephra, sand or invisible ashy or sandy layers, therefore, MS profiles are very useful for correlation among holes. Regarding this topic, we are discussing in the later section.

4) Bulk Petrochemistry

Continuous bulk petrochemical analysis was conducted by using the XRFCL and major elemental profiles were obtained from C9001A and C9002A-B (Fig. 6 and Fig. 7). Some short ranged variations, generally appeared as negative changes in light elements such as Si and Al, seem to be related to section boundary or cracks, however, medium to long ranged variations are yielded due to lithogical changes including local occurrences of fossils or .gravels (Fig. 10). For the data showed in Fig. 6 and Fig. 7, no filtering to exclude error data is performed, however, overestimation of phosphorus given by the quantification software can be used as an indicator of poorly quantified data (Fig. 11). Data of a horizon where phosphorus content is given lower than 16 % can be neglected. Phosphorus is generally overestimated in the quantification of bulk FP method, because the phosphorus spectrum is located in the slightly higher energy position than silicon and is overlapped by a broad silicon spectrum. When a heavier absorption occurs in silicon due to a bad sample surface condition or higher water content, phosphorus is also unrealistically overestimated.

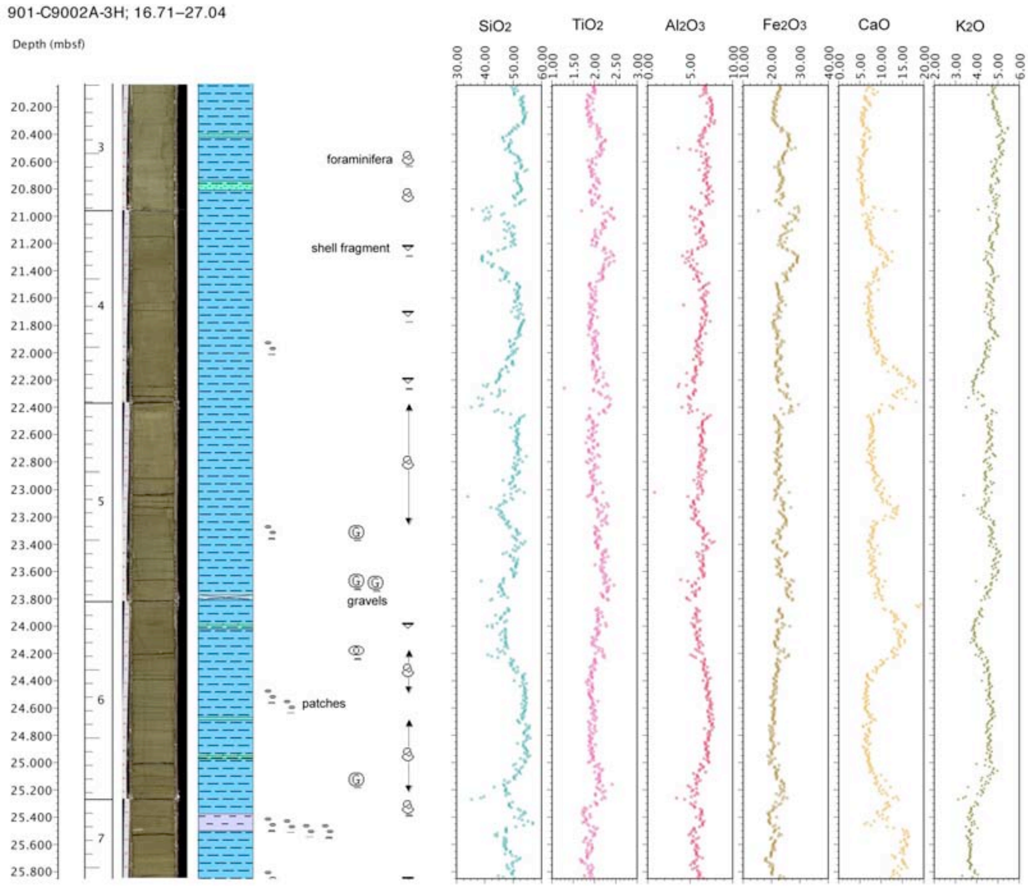


Fig. 10 Comparison between XRFCL results and lithology, an example from C9002A-3H.

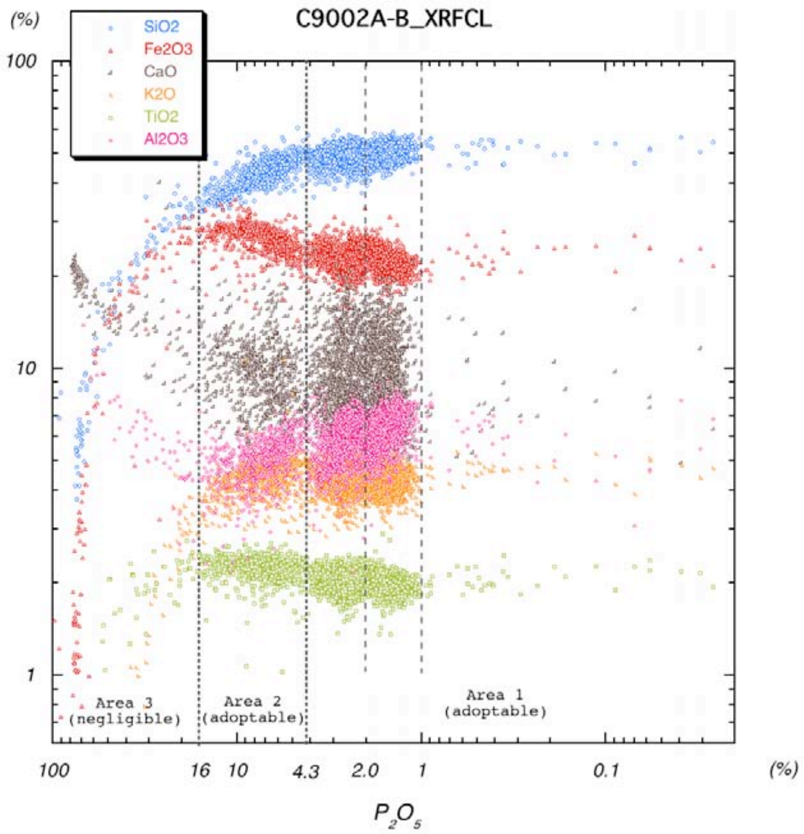


Fig. 11 Variations of SiO_2, TiO_2, Al_2O_3, Fe_2O_3, CaO and K_2O versus P_2O_5. Overestimation in phosphorus can be used as an indicator of poorly quantified data. Data of a horizon where phosphorus content is given lower than 16 % can be neglected.

XRFCL results plots of C9002A-B after data exclusion and normalization are shown in Fig. 12. Concentrations of each element, which are overestimated in heavy elements and underestimated in light elements, were corrected by multiplying some factors so that the values become realistic based on a result of XRF quantification for a sample of mud from a Shimokita piston core of the previous site survey cruise. Variations of each profile become clearer and dispersion is reduced. Relatively constant ratio of iron and titanium means that heavy mineral composition is essentially invariant. In calcium profile, which has a base concentration, the variations are probably generated by calcareous microfossil population changing.

As an interesting result, a strong correlation between SiO_2/Al_2O_3 and bulk density is exhibited in Fig. 13. Because the absorption coefficients of fluorescence X-ray in aluminium and silicon are relatively similar due to their proximity of energy, the ratio of these elements can cancel an effect of X-ray absorption. Silicon and aluminium are thought to represent concentrations of diatom and clay mineral, respectively. Therefore, higher Si/Al would reflect higher diatom population and it is considered that bulk density of the sediments is controlled essentially by diatom concentration.

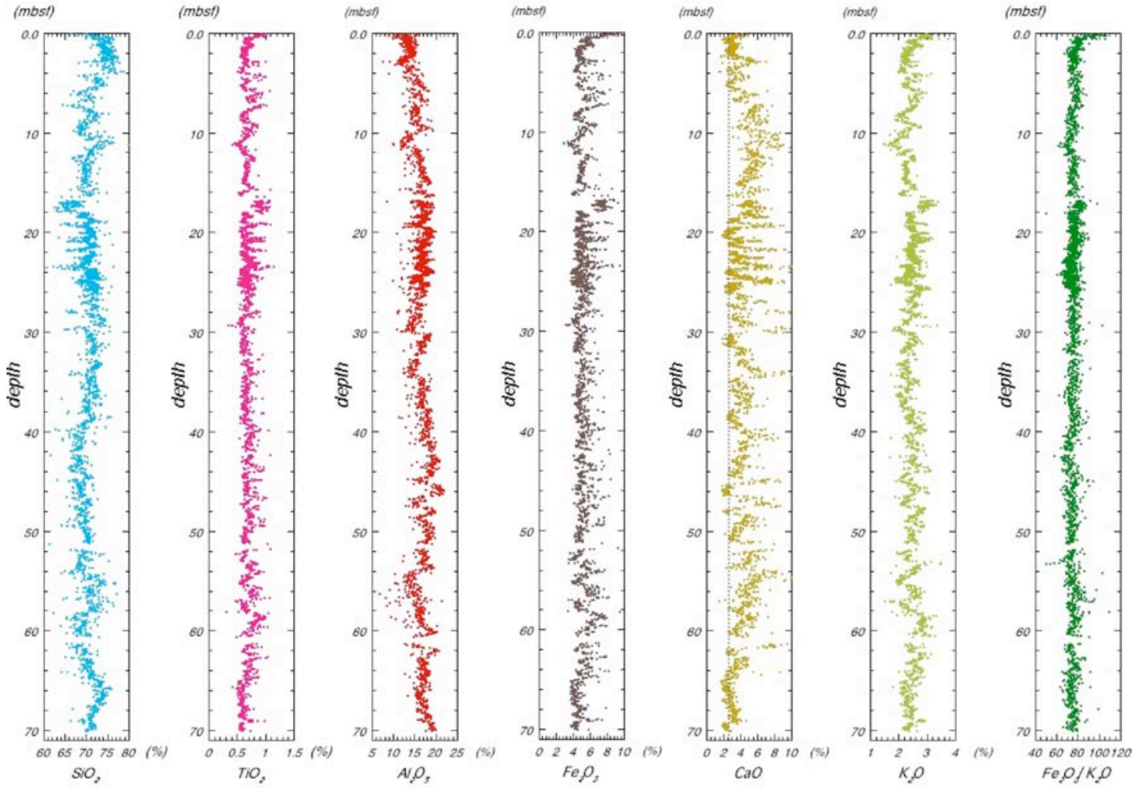


Fig. 12 XRFCL results plots of C9002A-B after data exclusion and normalization. Variations of each profile become clearer and dispersion is reduced. Relatively constant ratio of iron and titanium means that heavy mineral composition is essentially invariant. In calcium profile, which has a base concentration, the variations are probably generated by calcareous microfossil population changing.

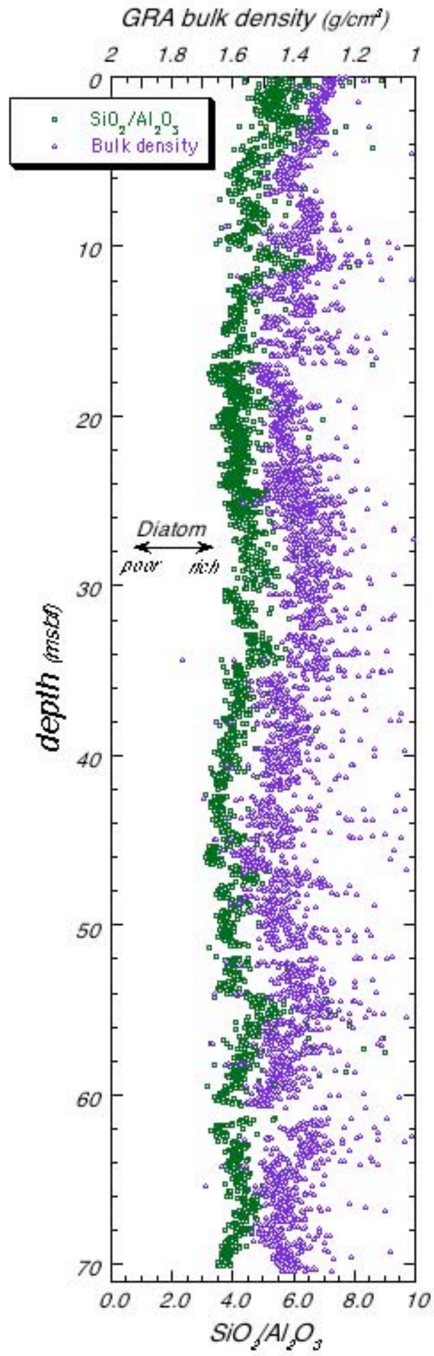


Fig. 13 Comparison of SiO2/Al2O3 and bulk density of C9002A-B. Higher Si/Al reflects higher diatom population and bulk density of the sediments may be controlled essentially by diatom concentration.

6. Inter-hole depth correlation

Inter-hole depth correlation has tried by using some key beds between Holes A and B of Site C9002, and Sites C9001 and C9002. Results are summarised in Fig. 15.

A pair of very characteristic tephra layers are found in the intervals of 78–103 cm of Site C9001 Hole A Core 5H Section 4 (approx. 42.45–42.65 mbsf) and 48–73 cm (approx. 46.65–46.90 mbsf) of Site C9002 Hole B Core 3H Section 4. In both Sections, a combination of upward coarsening pumice layer of about 10 cm thick and the underlying scoriaceous very-fine sand layer of about 3 cm is observed. The upward coarsing tephra is observed only in these two intervals in all observed cores. Magnetic susceptibility curves also have a very good coincidence in terms of intensity and peak shapes (Fig. 14).

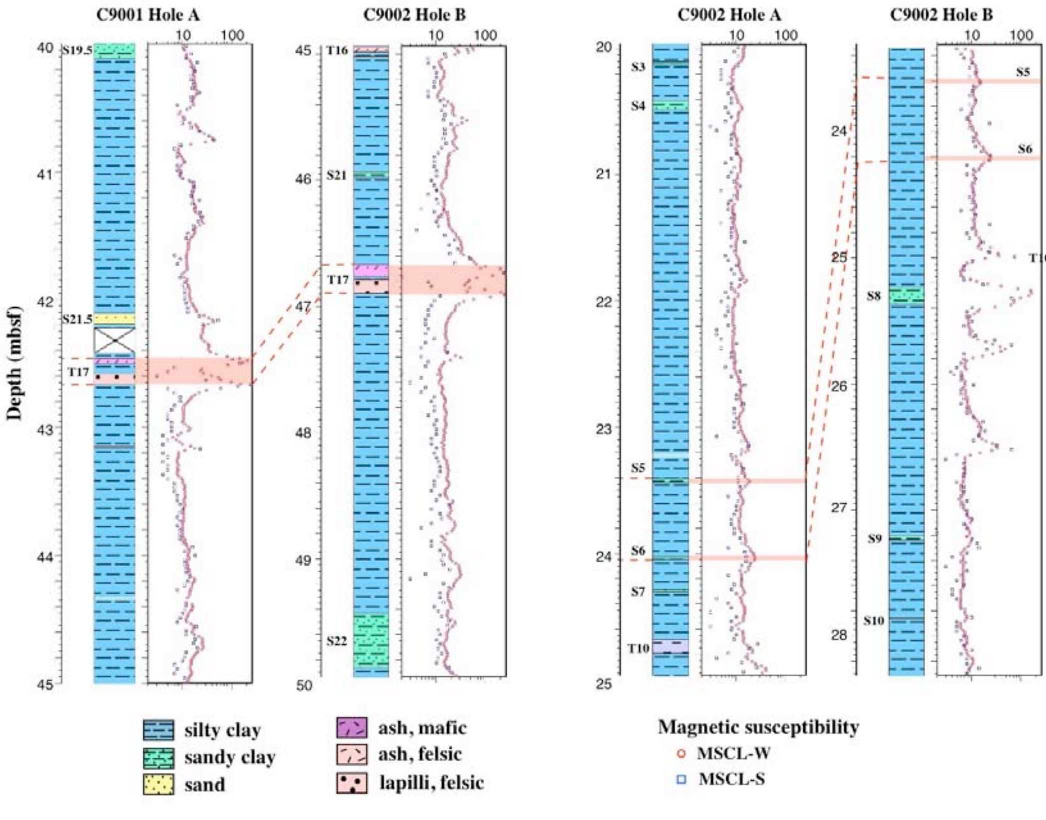


Fig. 14 Inter-hole depth correlation between Site C9001 Hole A and Site C9002 Hole B, and Site C9002 Hole A and Site C9002 Hole B.

Correlation between Holes A and B of Site C9002 is more difficult because of lacking good key bed such as tephra between the lowermost core of Hole A (3H) and the topmost core of Hole B (1H). However, some characteristic peaks can be found in both holes for magnetic susceptibility. A pair of thin sandy clay layers occurs at 23.50 m and 24.05 m in Hole A, which are termed as S5 and S6 in Fig. xxx, respectively. Magnetic susceptibility shows small peaks with values of 2.0–2.5 x 10^{-2} at these horizons. As the baseline of magnetic susceptibility for silty clay in this interval is below 1.0 x 10^{-2} hence these peaks are clearly detectable. A similar pair of magnetic susceptibility peaks appears at 23.63 m and 24.20 m in Hole B with about 2 x 10^{-2}, although no visible lithologic difference is recognised in this interval.

As a result of inter-hole correlation, the three holes are correlated to the drilling depth. Characteristic tephra and sandy layers are numbered as T1, T2... and S1, S2... from top to bottom, respectively (Fig. 15). Minor layers occurring only in a certain hole are numbered like S19.5, which means a minor sandy layer occurring between S19 and S20. Total 30 of major tephra layers and 21 sand / sandy clay layers are recognised. Some of them are lacking in certain holes, or are only detectable as magnetic susceptibility anomaly. Site C9001 Hole A and Site C9002 Hole B are correlated by T17 tephra layer, and Site C9002 Holes A and B are correlated by S5 and S6 sandy clay layers. As a few tens of cm of the topmost of Site C9002 Hole A core contained a certain amount of seawater, the top of this hole was regarded as seafloor, the origin for the depth (0 mbsf). The top of the Site C9001 Hole A is then, about 4 m below the seafloor. Comparison of some tephra and sand / sandy clay layers between two sites indicates that intervals between each two key beds are longer in sire C9002. Depth of T17 is exactly the same in both sites by definition. T13, a tephra layer about 11.5 m above T17 in site C9001 appears12.5 m above T17 in site C9002. Hence the interval between two layers is 1 m longer in the latter hole. The difference becomes larger upward to ca. 2.5 m, i.e. with a distance from the reference layer (T17). This may suggest higher sedimentation rate in sites C9002 than in C9001.

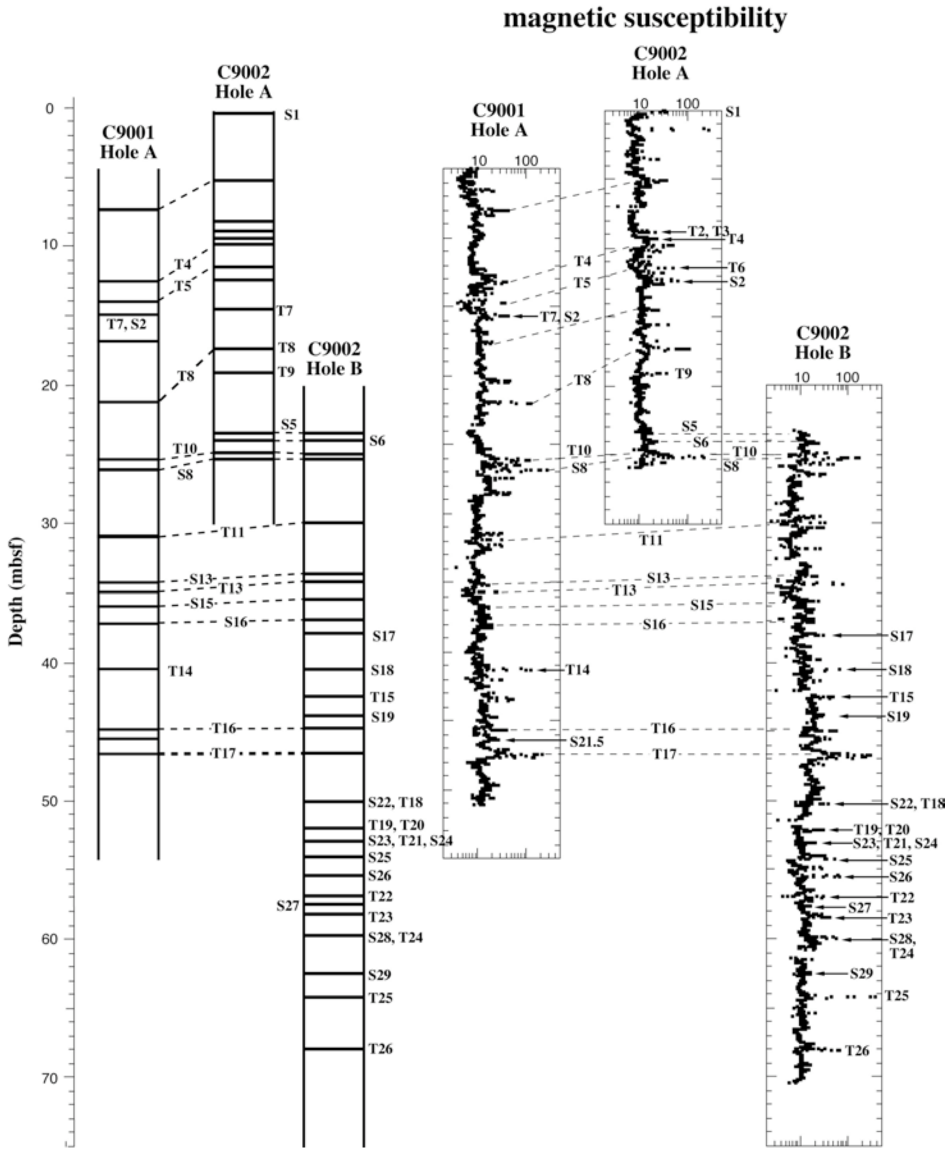


Fig. 15 Inter-hole correlation of lithology and magnetic susceptibility. Solid horizontal lines in the left columns indicate the tephra (numbered as T1, T2, ...) and sand / sandy clay (numbered as S1, S2,...) horizons.

7. Onboard sampling for onshore studies

Some whole-round and discrete samples were taken onboard for onshore studies. This is a summary of onboard sampling. See details about sampling for curation report

Triaxial compression test samples

Whole-round samples of 33 cm-long were taken from three intervals of Site C9001 Hole A cores for triaxial compression test. The samples were taken from homogeneous silty clay horizons avoiding drilling disturbance on the basis of CT scan image analysis. Both ends of samples were sealed by paraffin, and stored under room temperature condition.

Microbiology samples

Four whole-round samples of ca. 15–25 cm-long, and one split sample of 40 cm-long were taken from Site C9001 Hole A cores for microbiological study.

1.0–2.0 cc discrete samples were taken were taken from the working halves of Site C9002 Holes A and B cores. Sampling interval is 50 cm in basically, and total 202 samples were taken for DNA extraction and identification. 56 of them are shared with peleontological study mentioned below. Samples were stored in vial and stored under (stored conditions).

Paleontology samples

1.0 cc discrete samples were taken from 56 horizons of the working halves of Site C9002 Holes A and B cores for paleontological study, which are shared with DNA extraction analysis samples. Samples were taken basically from the middle of each Section.

8. Summary

Total 13 cores were taken from two sites by HPCS with total length of 70.81 m. Coring quality is generally fine. X-ray CT-scanner observation has revealed that no severe drilling disturbance on soft sediments was observed except for some intervals. Cored sediments of offshore Shimokita are dominated by olive-black to olive-greyish massive diatomaceous silty clay commonly containing foraminifers. Total 30 layers of tephra and 28 of sand ~ sandy clay layers are intercalated in silty clay layers in this interval. Thick sand / conglomerate and/or high-pressure layers were not found which are potential geohazard. And shear strength tests has revealed that the sediments of this location have sufficient shear strength for settlement of conductor pipe in riser drilling.

Physical and chemical properties were analysed for whole, split and discrete core samples. natural gamma-ray, GRAPE density, magnetic properties and colour spectrometry yielded good correlation with visual observation. On the contrary, P-wave velocity and electric resistivity could not yield any meaningful result probably due to many gas-induced expansion cracks and voids.

Using some of tephra and sandy clay layers as key beds, three holes were correlated in terms of depth. Magnetic susceptibility was very helpful in this process. The intervals between certain key beds are wider in the site C9002 cores, which may infer different sedimentation rate.

Table 1 Site summary.

Site	Latitude	Longitude	Water depth (m)
C9001	41°10’35.90’’N	142°12'01.97"E	1183
C9002	41°11’01.20’’N	142°12’0197’’E	1179

Table 2 Coring summary.

Hole	core No.	top (mbsf)	bottom (mbsf)	coring length (m)	recovered length (m)	recovery (%)
C9001A	1H	0.0	9.5	9.5	10.00	105
	2H	9.5	19.0	9.5	9.25	97
	3H	19.0	28.5	9.5	9.90	104
	4H	28.5	38.0	9.5	10.15	107
	5H	38.0	46.5	8.5	9.94	117
	Total	0.0	46.5	46.5	49.24	106
C9002A	1H	0.0	7.2	7.2	7.20	100
	2H	7.2	16.7	9.5	10.00	105
	3H	16.7	26.2	9.5	10.11	106
	Total	0.0	26.2	26.2	27.31	104
C9002B	1H	23.3	32.8	9.5	10.21	107
	2H	32.8	42.3	9.5	9.91	104
	3H	42.3	51.8	9.5	10.22	108
	4H	51.8	61.3	9.5	10.42	110
	5H	61.3	70.8	9.5	10.13	107
	Total	23.3	70.8	47.5	50.89	107

Table 3 Results of shear strength test for Site C9001.

Hole	Core No.	Depth (mbsf)	Shear strength (kPa)	
			Vane test	Penetration test
Hole A	1H	3	29.2	21.1
		5	32.1	30.4
		7	29.1	32.3
	2H	10	27.8	36.3
		12	25.8	23.3
		14	29.6	22.0
		18	33.9	28.4
	3H	20	30.0	27.5
		22	36.0	33.3
		23	30.5	30.4
		25	38.0	34.3
		27	36.6	35.8
	4H	29	37.1	30.9
		31	32.0	29.9
		33	52.2	52.5
		35	48.6	53.0
		38	43.2	47.6
	5H	39	31.3	30.9
		41	45.2	50.0
		43	43.4	46.6
		45	49.3	49.0
		47	46.4	47.6

Table 4   Results of shear strength test for Site C9002.

Hole	Core No.	Depth (mbsf)	Shear strength (kPa)	
			Vane test	Penetrator test
Hole A	1H	1	14.9	5.9
		6	34.7	18.6
	2H	8	33.2	29.4
		13	51.7	44.1
	3H	18	35.9	29.4
		24	32.5	26.5
Hole B	1H	28	41.9	33.3
		33	59.6	53.9
	2H	37	53.1	55.4
		42	53.0	51.5
	3H	47	51.3	49.0
		52	65.4	57.9
	4H	57	44.6	50.5
		61	41.9	
	5H	66	75.2	88.3
		70	48.5	48.1

Appendix

Appendix 1

Colour photo images of each core

Appendix 2

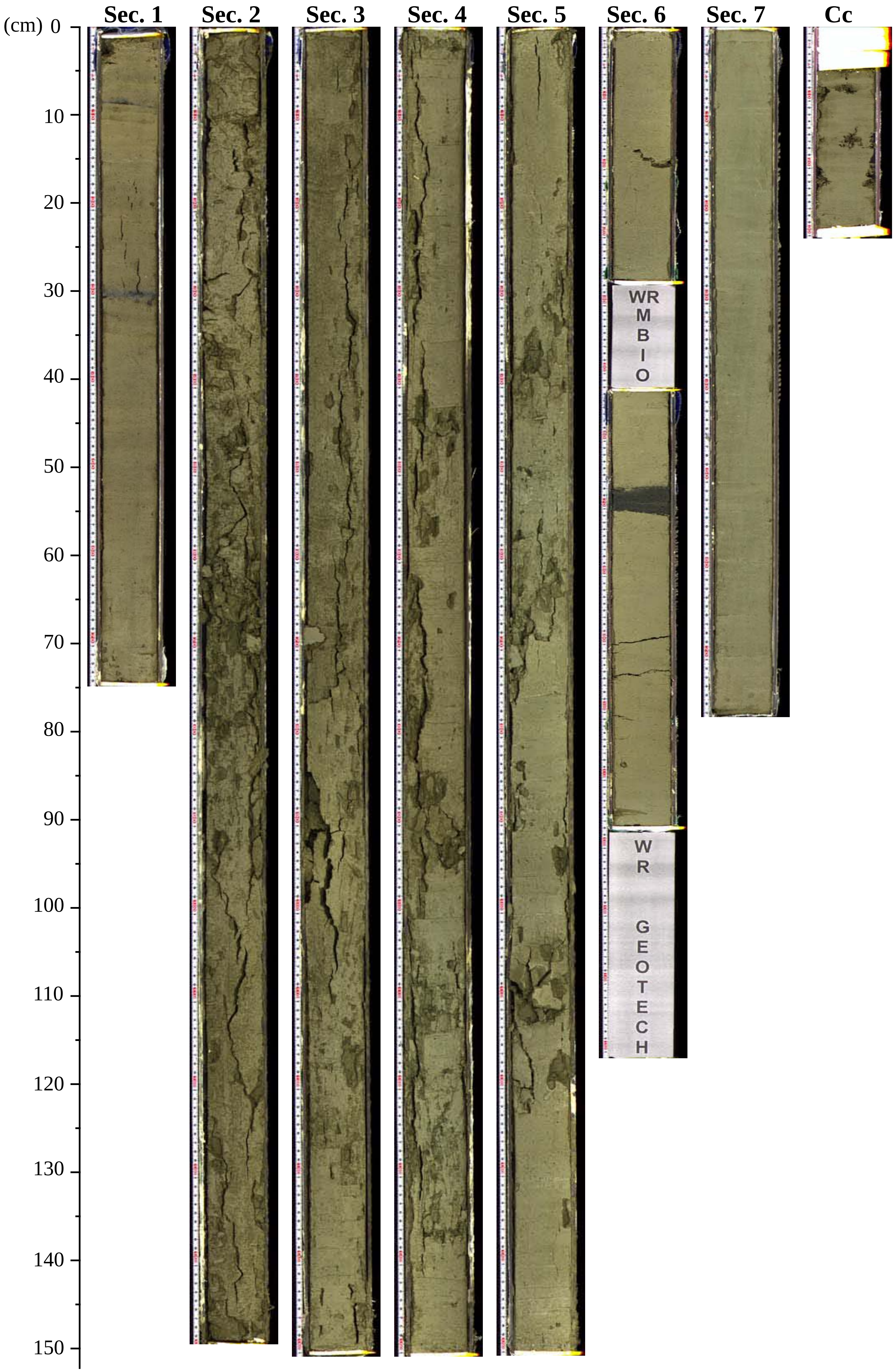
Visual description of each core Section (J-CORES)

Appendix A

Colour photo image of each core Images were taken by GEOTEK xxx (model). Colour calibration was achieved using xxxx.....(calibration method).

Site C9001 Hole A Core 1H

Site C9001 Hole A Core 2H

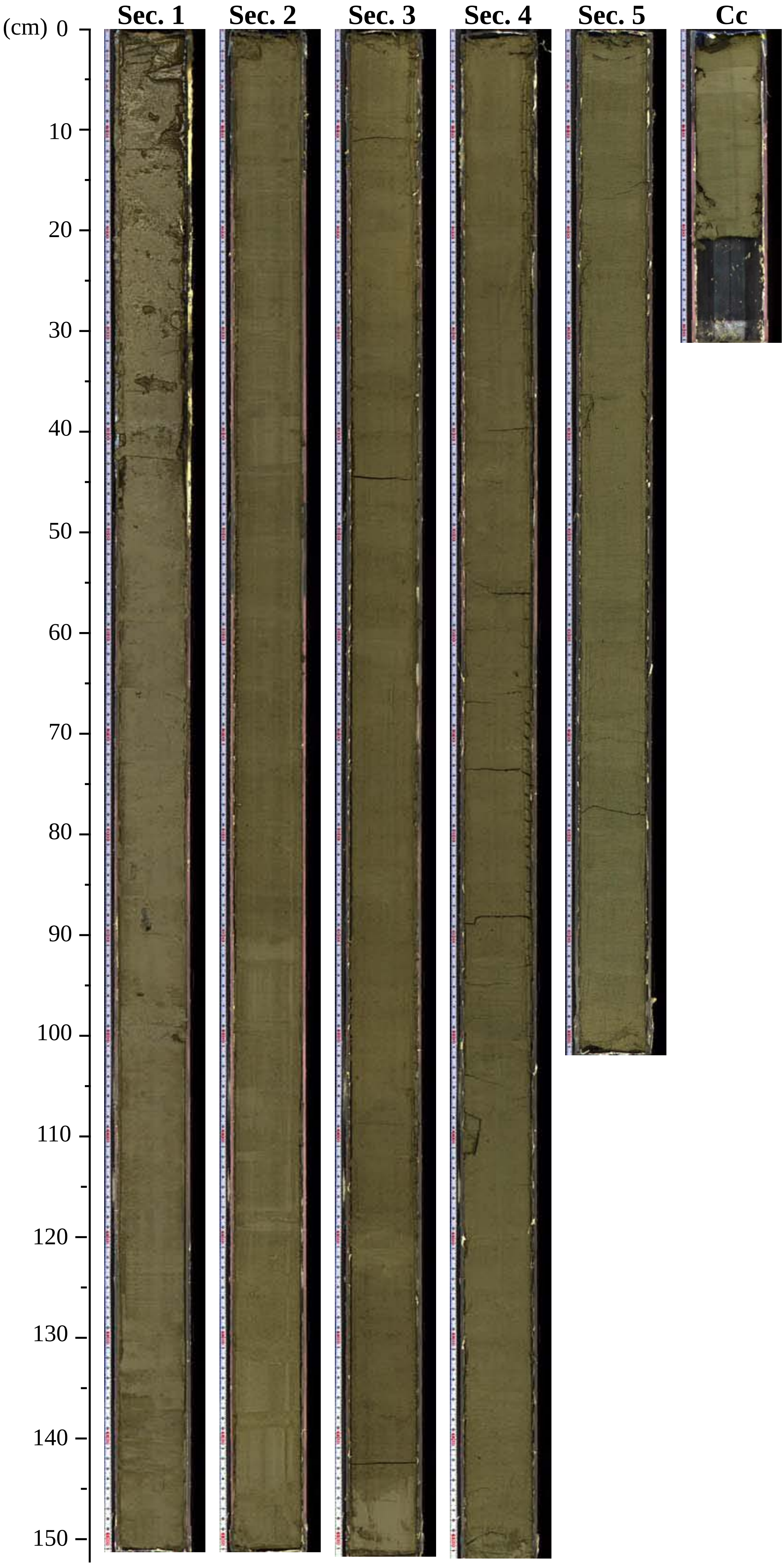


Site C9001 Hole A Core 3H

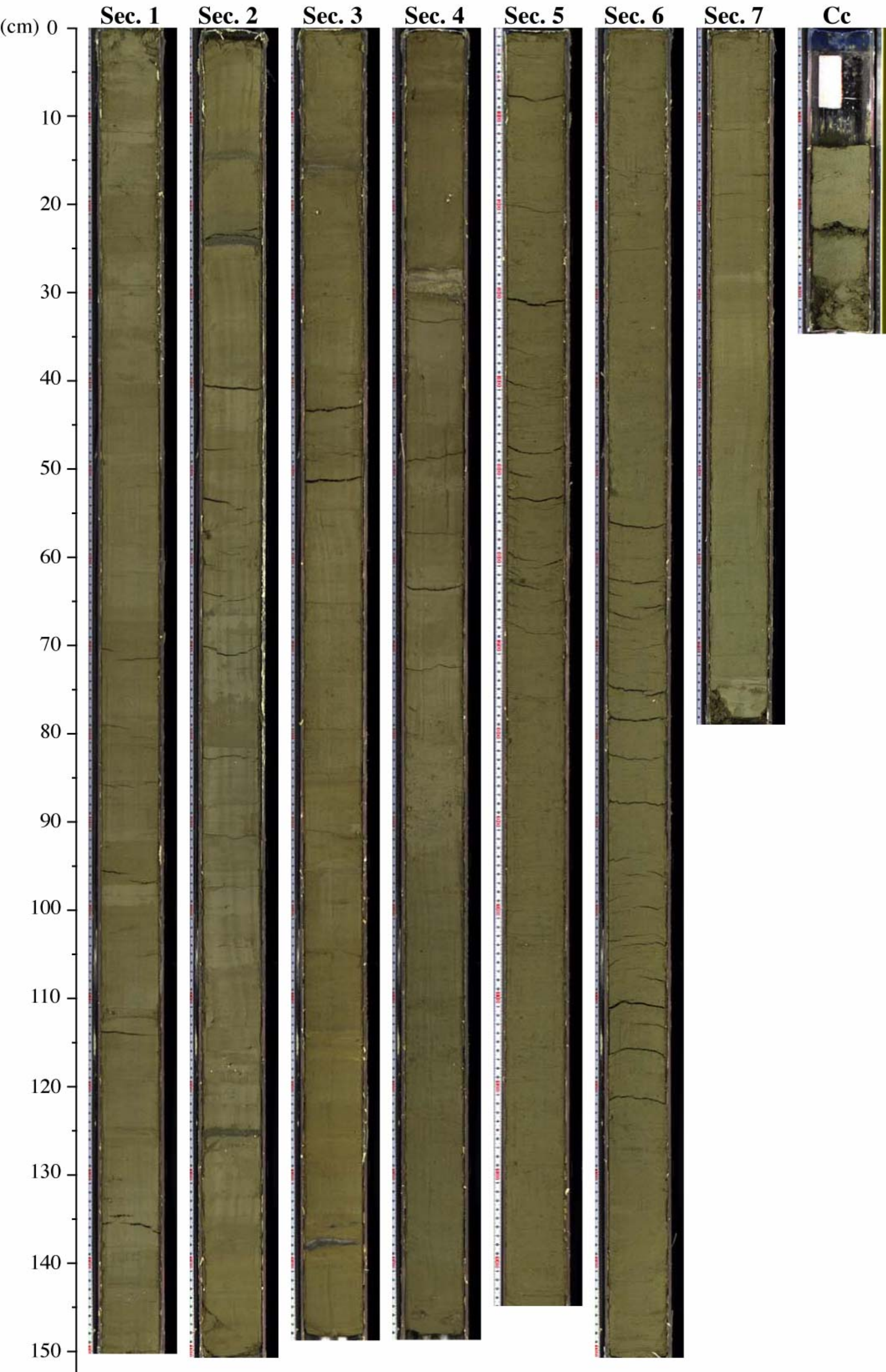
Site C9001 Hole A Core 4H

Site C9001 Hole A Core 5H

Site C9002 Hole A Core 1H



Site C9002 Hole A Core 2H



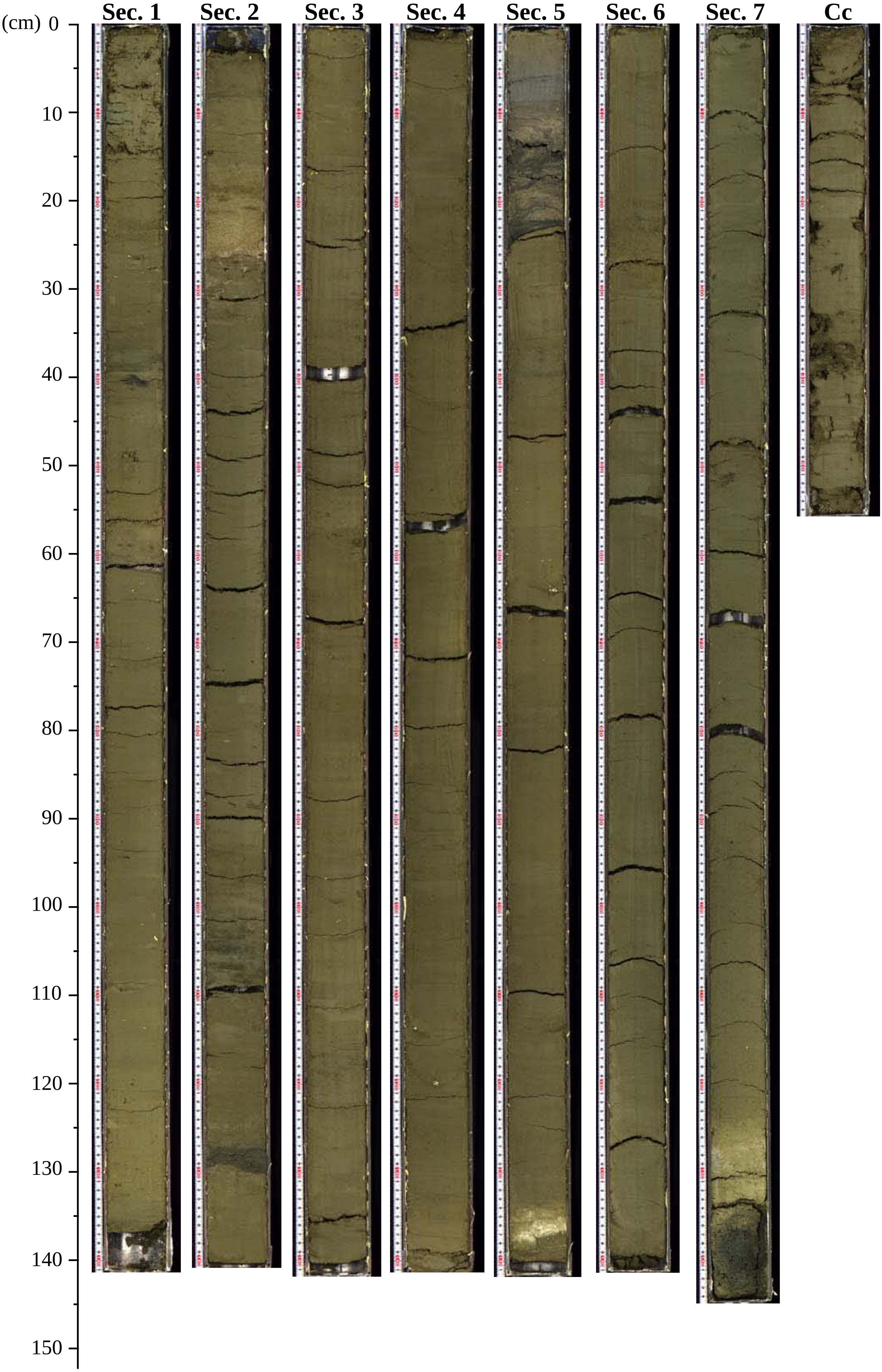
Site C9002 Hole A Core 3H

Site C9002 Hole B Core 1H

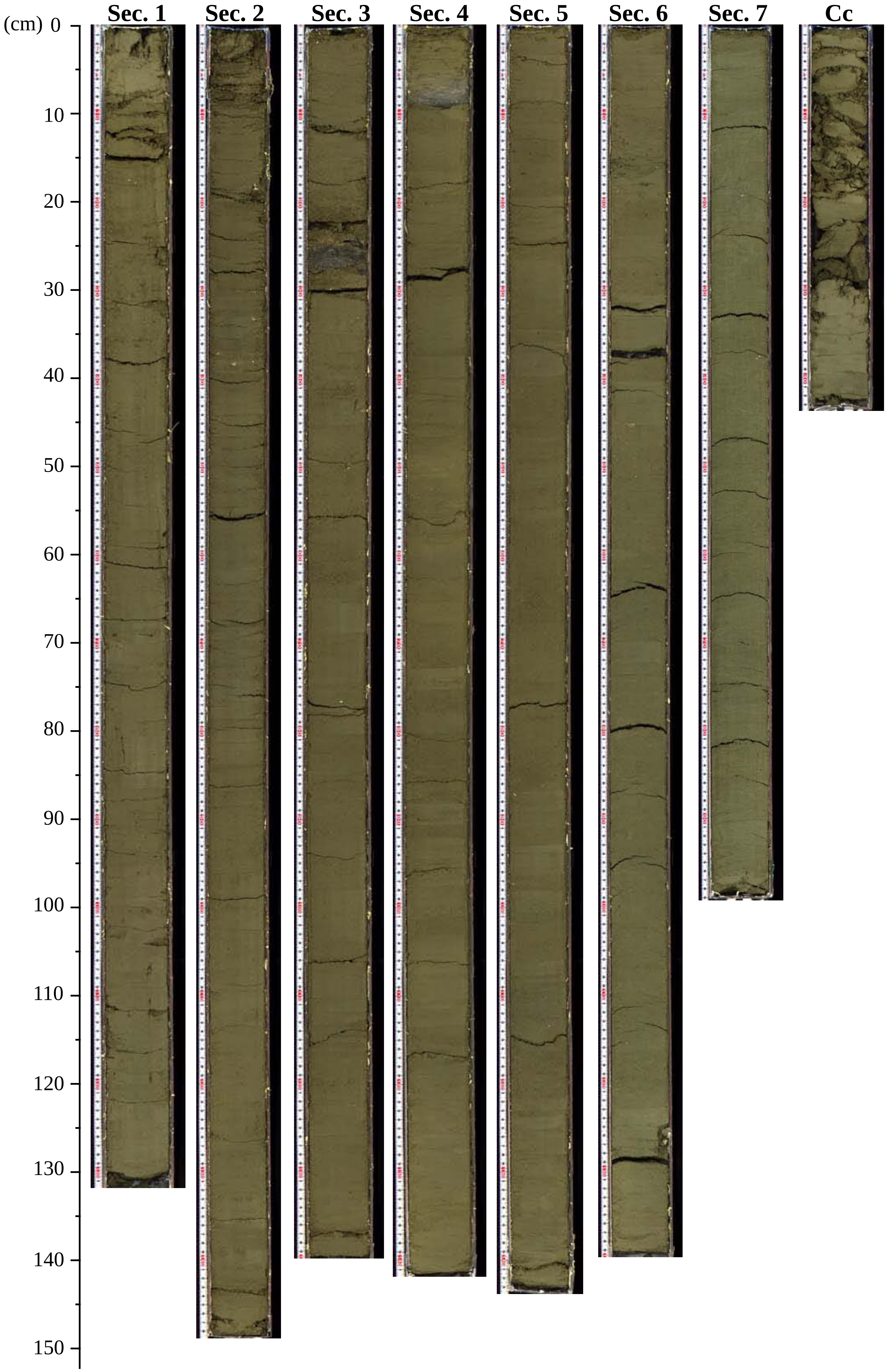
Site C9002 Hole B Core 2H

Site C9002 Site B Core 3H

Site C9002 Hole B Core 4H



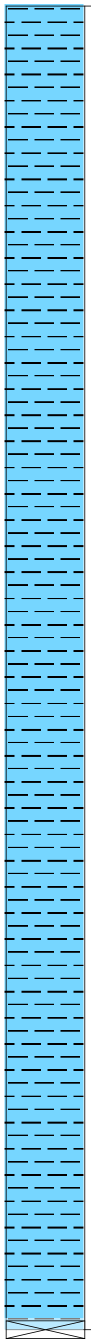
Site C9002 Hole B Core 5H



901-C9001A-1H-1; 0.0–1.53

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Litholog... Fossils	drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450
1.500



1H-1, 2.0 cm.

69.3-73.0 cm. Patch.blackish patch.

Silty Clay. visual description. Olive black, massive, bearing Foraminifer, strong H2S-like smell

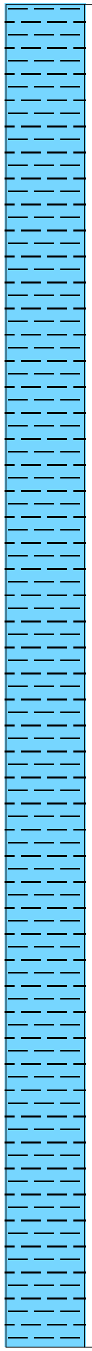
149.0-149.0 cm. Shell fragments.

1H-1, 151.0 cm.

901-C9001A-1H-2; 0.0–1.51

depth Interval (m)	section photo	lithology-distribution		sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450
1.500



1H−2, 0.0 cm.

Silty Clay. the same lithology as 1H−1, 2.0−151.0 cm.

1H−2, 150.0 cm.

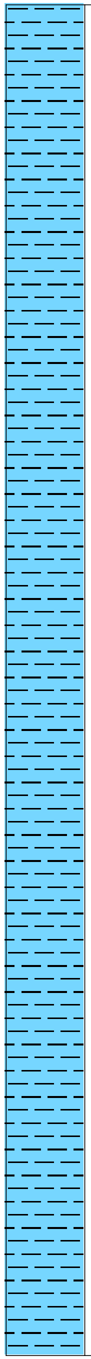
9.0−9.2 cm. Pumice.
Pumice.

37.0−37.2 cm. Pumice.
pumice.

901-C9001A-1H-3; 0.0–1.53

depth Interval (m) | section photo | lithology-distribution | sedimentary structure-distribution Sedimentary structures | Lithologic accesories | Fossils | drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450
1.500



1H-3, 0.0 cm.

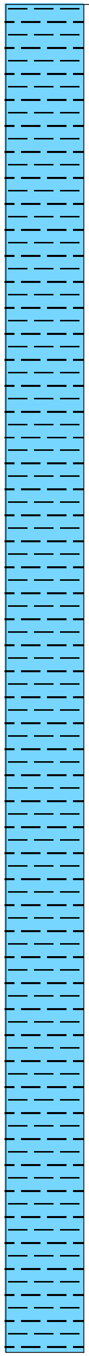
SIlty Clay. visual description. Olive black, massive, bearing Foraminifera, H2S-like smell

1H-3, 152.0 cm.

36.0-36.0 cm. Shell fragments.

142.0-142.5 cm. Foraminifer.Foraminifera and shell fragment rich.

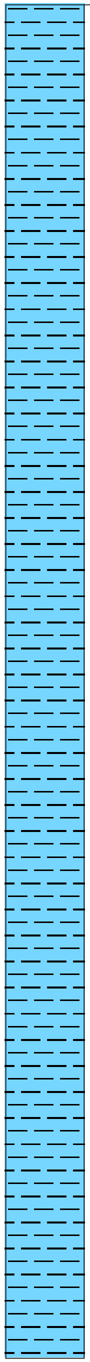
901-C9001A-1H-4; 0.0–1.53

depth Interval (m)	section photo	lithology-distribution		sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance
0.000			1H-4, 0.0 cm.				
0.050						3.5-3.5 cm. Shell fragments.	
0.100							
0.150							
0.200							
0.250							
0.300							
0.350							
0.400							
0.450							
0.500							
0.550							
0.600							
0.650							
0.700							
0.750							
0.800			Silty Clay. visual description. Olive black silty clay with foraminifera, massive, H2S-like smell				
0.850						84.0-84.0 cm. Shell fragments.	
0.900							
0.950							
1.000							
1.050							
1.100							
1.150							
1.200							
1.250							
1.300					131.0-131.5 cm. Pumice. pumice.		
1.350						134.0-134.0 cm. Shell fragments.	
1.400							
1.450							
1.500							

901-C9001A-1H-5; 0.0–1.53

depth Interval (m) | section photo | lithology-distribution | sedimentary structure-distribution Sedimentary structures | Lithologic accesories | Fossils | drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450
1.500



1H-5, 0.0 cm.

Silty clay. visual description. Olive black, diatom sity clay with foraminifer, massive

44.0-45.0 cm. Patch. black patches.

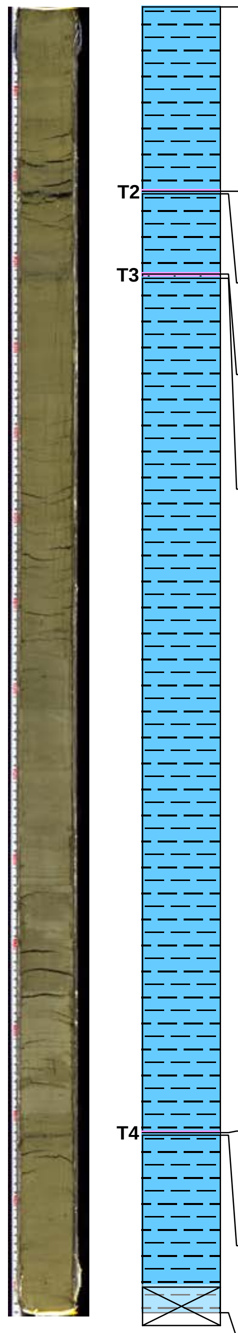
61.5-61.5 cm. Shell fragments.

64.0-64.0 cm. Shell fragments.

901-C9001A-1H-6; 0.0–1.58

depth Interval (m)	section photo	lithology!distribution	sedimentary structure!distribution Sedimentary structures	Lithologic accesories	Fossils	drilling!disturbance Drilling Disturbance

0.000, 0.050, 0.100, 0.150, 0.200, 0.250, 0.300, 0.350, 0.400, 0.450, 0.500, 0.550, 0.600, 0.650, 0.700, 0.750, 0.800, 0.850, 0.900, 0.950, 1.000, 1.050, 1.100, 1.150, 1.200, 1.250, 1.300, 1.350, 1.400, 1.450, 1.500, 1.550



1H-6, 0.0 cm.

Silty Clay. visual description. Olive black, massive, bearing scattered Foraminifer, H2S-like smell

1H-6, 21.6 cm.

Ash. visual description. dark greenish gray ash (very fine volcanic sand) bearing glass fragments

1H-6, 21.9 cm.

Silty Clay. the same lithology as 1H-6, 0.0-21.6 cm.

1H-6, 31.3 cm.

Ash. visual description. dark greenish gray to greenish gray ash (fine volcanic sand) gray in upper and blackish in lower

1H-6, 31.8 cm.

Silty Clay. the same lithology as 1H-6, 0.0-21.6 cm.

78.0-78.0 cm. Shell fragments.

1H-6, 131.9 cm.

132.0-132.5 cm. Shell fragments.

Ash. visual description. dark greenish gray scoriaceous ash (fine volcanic sand) bearing shell fragments

1H-6, 132.2 cm.

Silty Clay. the same lithology as 1H-6, 0.0-21.6 cm.

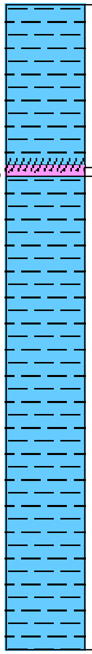
1H-6, 153.0 cm.

901-C9001A-1H-7; 0.0–0.75

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedimentary structures | Lithologic accesories | Fossils | drilling!disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700

T4.5



1H-7, 0.0 cm.

Silty Clay. visual description. Olive black, massive, including Foraminifer

1H-7, 18.5 cm. gradual contact.

Ashy sand. visual description.

1H-7, 19.5 cm.

Silty Clay. the same lithology as 1H-7, 0.0-18.5 cm.

1H-7, 73.3 cm.

Lithologic accesories:

12.5-12.5 cm. Pumice. Pumice.

Fossils:

2.5-2.5 cm. Shell fragments.

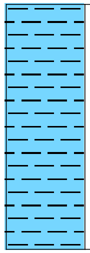
11.0-11.0 cm. Foraminifer.

14.5-14.5 cm. Foraminifer.

24.7-24.7 cm. Shell fragments.

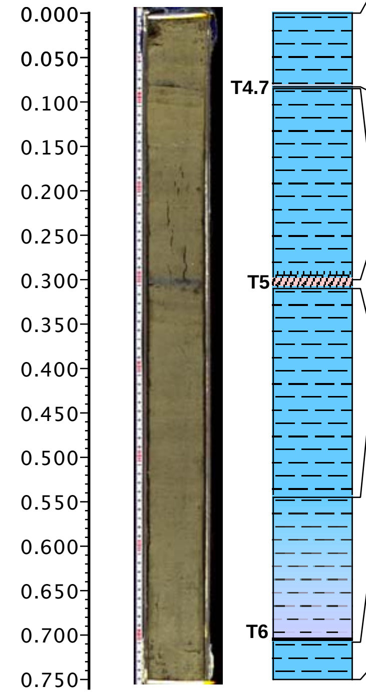
41.0-41.0 cm. Shell fragments.

901-C9001A-1H-CC; 0.0–0.29

depth Interval (m)	section photo	lithology-distribution		sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance
0.000 0.050 0.100 0.150 0.200 0.250			1H-CC, 0.0 cm. Silty Clay. visual description. Olive black, massive, bearing foraminifera 1H-CC, 27.6 cm.				

901-C9001A-2H-1; 0.0–0.76

depth Interval (m)	section photo	lithology!distribution	sedimentary structure!distribution Sedimentary structures	Lithologic accesories	Fossils	drilling!disturbance Drilling Disturbance



2H-1, 0.0 cm.

Silty Clay. visual description. Olive black diatom silty clay with foraminifera

2H-1, 8.3 cm. gradual contact.

Ash. visual description. Dark grey

2H-1, 8.5 cm.

Silty Clay. the same lithology as 2H-1, 0.0-8.3 cm.

2H-1, 30.0 cm. gradual contact.

Ash. visual description. Dark grey

2H-1, 31.0 cm.

T5

Silty Clay. the same lithology as 2H-1, 0.0-8.3 cm.

2H-1, 54.5 cm.

gradation from Diatom Sandy Silt to Silty Clay. Diatom Sandy Silt (bottom end lithology). visual description. Olive black Silty Clay (top end lithology). the same lithology as 2H-1, 0.0-8.3 cm.

2H-1, 70.8 cm. sharp contact.

Silty Clay. the same lithology as 2H-1, 0.0-8.3 cm.

2H-1, 75.0 cm.

2.0-13.5 cm. Planer lamination, faintly.

21.5-30.0 cm. Planer lamination, faintly.

31.0-51.8 cm. Planer lamination, faintly.

51.8-54.5 cm. Planar lamination/mm-scale color banding/Laminae.

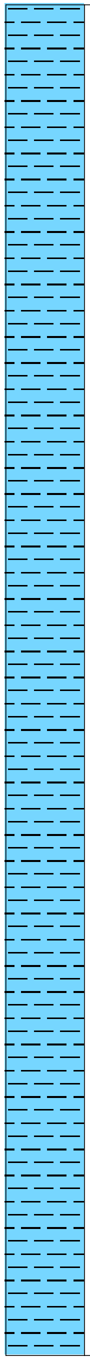
54.5-70.8 cm. Graded Bedding (Normal).

41.0-41.0 cm. Shell fragments.

901-C9001A-2H-2; 0.0–1.51

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution: Sedimentar...	Lithologic a...	Fossils	drilling-disturbance: Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450
1.500



2H-2, 0.0 cm.

Silty Clay. visual description. Olive black, massive

2H-2, 150.0 cm.

41.0-41.0 cm. Shell fragments.Lens.

116.0-116.0 cm. Shell fragments.Assosiated with a layer..

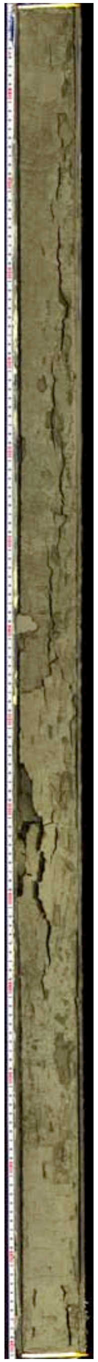
138.5-138.5 cm. Shell fragments.Lens.

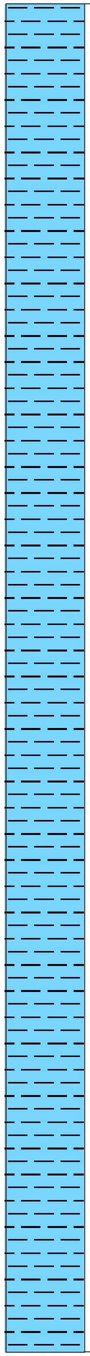
0.0-151.0 cm. Highly Disturbed.vertical cracks.

901-C9001A-2H-3; 0.0–1.52

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance

0.000 0.050 0.100 0.150 0.200 0.250 0.300 0.350 0.400 0.450 0.500 0.550 0.600 0.650 0.700 0.750 0.800 0.850 0.900 0.950 1.000 1.050 1.100 1.150 1.200 1.250 1.300 1.350 1.400 1.450 1.500





2H-3, 0.0 cm.

Slity Clay. visual description. Olive black, massive

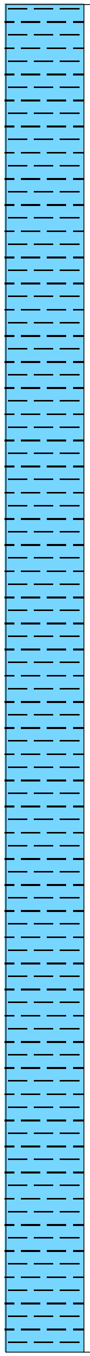
2H-3, 151.0 cm.

0.0-152.0 cm. Highly Disturbed.vartical cracks.

901-C9001A-2H-4; 0.0–1.52

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450
1.500



2H-4, 0.0 cm.

Silty Clay. visual description. Olive black, masive

2H-4, 151.0 cm.

95.0-95.0 cm. Gravel.Granule, 0.25 cm phi.

17.0-17.0 cm. Shell fragments.

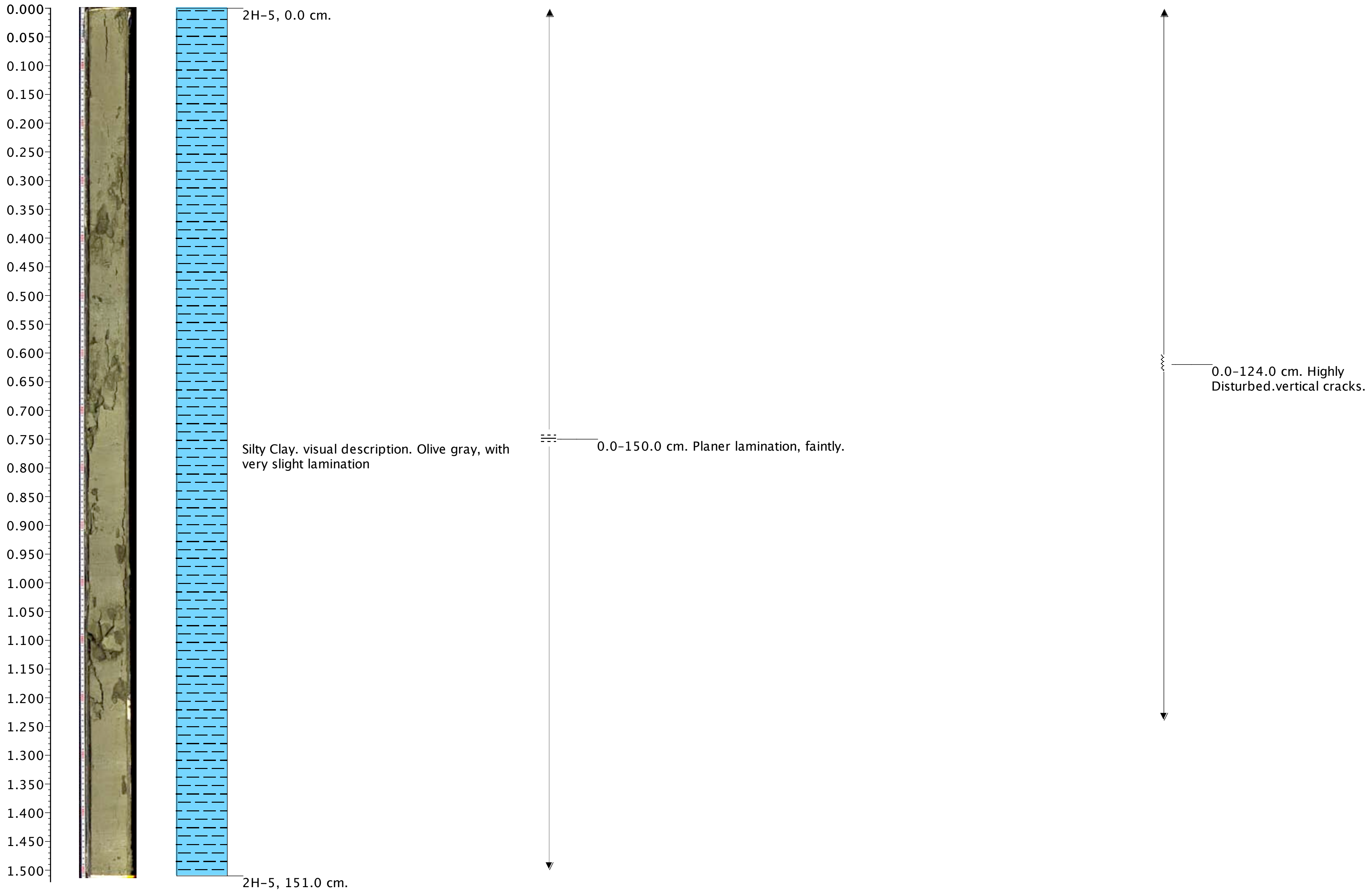
79.0-79.0 cm. Shell fragments.

0.0-152.0 cm. Highly Disturbed.vartical cracks.

0.0-151.0 cm. Highly Disturbed.vertical cracks.

901-C9001A-2H-5; 0.0–1.52

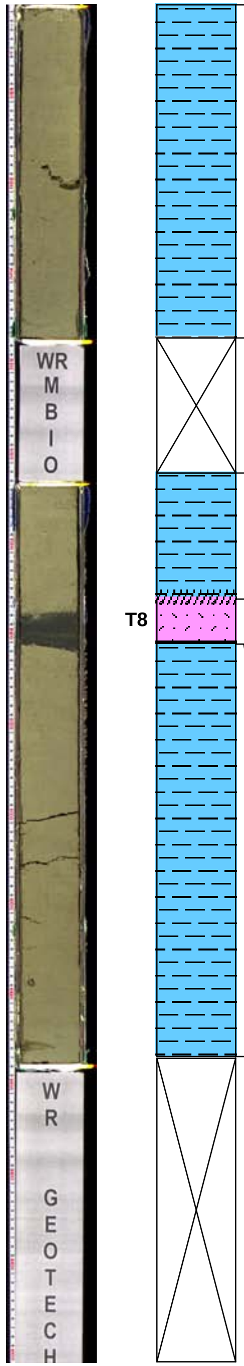
depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithologic ...	Diagenesis	Fossils	drilling-disturbance Drilling Disturbance



901-C9001A-2H-6; 0.0–1.51

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedimentary structures | Lithologic accesories | Fossils | drilling!disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450
1.500



2H-6, 0.0 cm.

Silty Clay. visual description. Olive gray, massive

2H-6, 37.0 cm.

2H-6, 52.0 cm.

Silty Clay. the same lithology as 2H-6, 0.0-37.0 cm.

2H-6, 66.0 cm. gradual contact.

Ash. visual description. bluish black ash (fine volcanic sand)

2H-6, 71.0 cm. sharp contact.

Silty Clay. the same lithology as 2H-6, 0.0-37.0 cm.

2H-6, 116.8 cm.

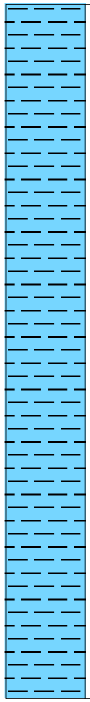
52.0-66.0 cm. Planer lamination, faintly. slight lamination with thin blackish lenses.

71.0-116.0 cm. Planer lamination, faintly.

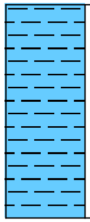
106.0-106.0 cm. Gravel.C-granule.

10.0-10.0 cm. Shell fragments.

901-C9001A-2H-7; 0.0–0.78

depth Interval (m)	section photo	lithology-distribution		sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance
0.000			2H−7, 0.0 cm.				
0.050							
0.100							
0.150							
0.200							
0.250							
0.300							
0.350							
0.400			Silty Clay. visual description. Olive gray, massive, foraminifer bearing, interleaved blackish thin lens through the section				
0.450							
0.500							
0.550							
0.600							
0.650							
0.700							
0.750			2H−7, 77.1 cm.				

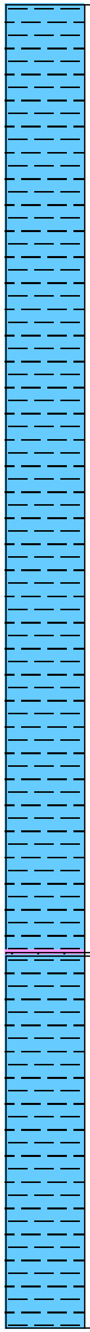
901-C9001A-2H-CC; 0.0–0.3

depth Interval (m)	section photo	lithology!distribution		sedimentary structure!distribution Sedimentary structures	Lithologic accesories	Fossils	drilling!disturbance Drilling Disturbance
0.000			2H-CC, 0.0 cm.				
0.050							
0.100							
0.150			Silty Clay. visual description. Olive gray, massive, foraminifer bearing				
0.200							
0.250			2H-CC, 24.0 cm.				
0.300							

901-C9001A-3H-1; 0.0–1.54

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedimentary structures | Lithologic accesories | Fossils | drilling!disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450
1.500



T9.3

3H-1, 0.0 cm.

Silty Clay. visual description. Olive black, diatom silty clay with foraminifer, massive

3H-1, 107.8 cm. gradual contact.

Ash. visual description. dark gray scoriaceous sand with vague boundary

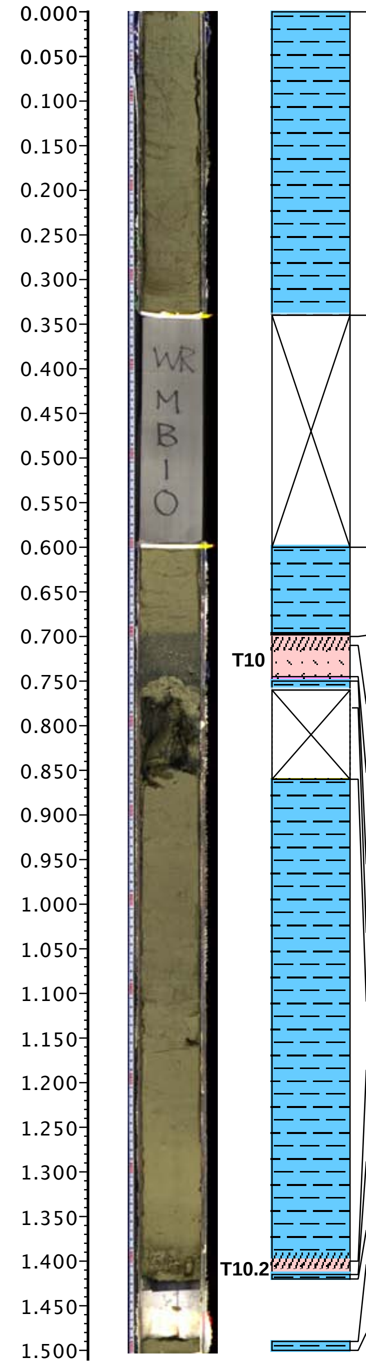
3H-1, 108.2 cm. gradual contact.

Silty Clay. the same lithology as 3H-1, 0.0-107.8 cm.

3H-1, 150.5 cm.

901-C9001A-3H-2; 0.0–1.51

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution | Sedim... | Lithologic accesories | Fossils | drilling!disturbance | Drilling Disturbance



3H-2, 0.0 cm.

Silty clay. visual description. olive black diatom silty clay, massive

3H-2, 34.0 cm.

3H-2, 60.0 cm.

Silty clay. the same lithology as 3H-2, 0.0-34.0 cm.

3H-2, 70.0 cm. sharp contact.

Ash. visual description. gray, pumiceous vitric ash

3H-2, 71.0 cm. gradual contact.

Pumice ash. visual description. Gray, bad sorting

3H-2, 74.5 cm. gradual contact.

Scoriaceous sand. visual description. Gray scoriaceous fine sand, with sharp base

3H-2, 75.0 cm. sharp contact.

Silty clay. the same lithology as 3H-2, 0.0-34.0 cm.

3H-2, 78.0 cm.

Void with silty clay and fine sand. visual description.

3H-2, 86.0 cm.

Silty clay. the same lithology as 3H-2, 0.0-34.0 cm.

3H-2, 140.0 cm. gradual contact.

Pumiceous Silty Clay. visual description. Granule ~ pebble size light gray pumices

3H-2, 141.5 cm. gradual contact.

Silty clay. the same lithology as 3H-2, 0.0-34.0 cm.

3H-2, 142.0 cm.

3H-2, 149.0 cm.

Silty clay. the same lithology as 3H-2, 0.0-34.0 cm.

3H-2, 150.0 cm.

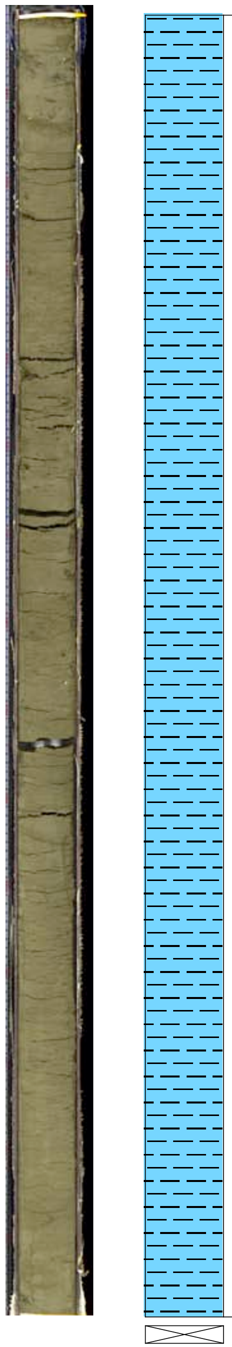
3.1-3.1 cm. Gravel.Sub-rounded granule, 0.2 x 0.3 cm.

108.0-108.0 cm. Gravel. Rounded granule, 0.2 x 0.3 cm.

105.5-105.5 cm. Wood Fragments.

901-C9001A-3H-3; 0.0–1.54

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedim...	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance



0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450
1.500

3H-3, 1.0 cm.

Silty Clay. visual description. Olive gray, massive, with foraminifer

3H-3, 149.0 cm.

7.0-7.0 cm. Pumice.Pumice, 0.3 cm phi.

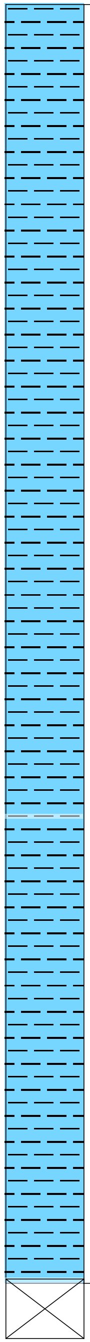
13.0-13.0 cm. Shell fragments.

0.5-150.2 cm. Foraminifer.

901-C9001A-3H-4; 0.0–1.59

depth Interval (m) | section photo | lithology-distribution | sedimentary structure-distribution Sedim... Lithologic accesories | Fossils | drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450
1.500
1.550



3H-4, 0.0 cm.

Silty Clay. the same lithology as 3H-3, 1.0-149.0 cm.

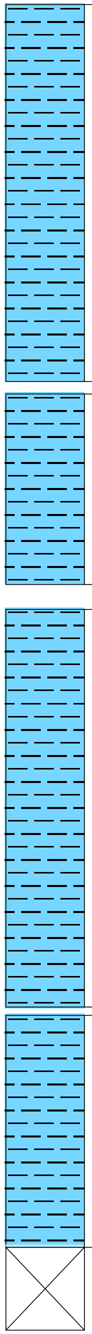
95.7-95.7 cm. Pumice.Rhyolitic tuff pebble w/hydro-alteration, ~1.3cm phi, angular..

3H-4, 150.5 cm.

901-C9001A-3H-5; 0.0–1.63

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450
1.500
1.550
1.600



3H-5, 0.0 cm.

Silty Clay. visual description. Olive gray, massive, with scattered shell fragments and foraminfera

3H-5, 45.5 cm.

3H-5, 47.0 cm.

Silty Clay. the same lithology as 3H-5, 0.0-45.5 cm.

3H-5, 70.0 cm.

3H-5, 73.0 cm.

Silty Clay. the same lithology as 3H-5, 0.0-45.5 cm.

3H-5, 121.0 cm.

3H-5, 122.0 cm.

Silty Clay. the same lithology as 3H-5, 0.0-45.5 cm.

3H-5, 150.0 cm.

69.8-70.0 cm. Patch. olive brown.

131.0-132.0 cm. Patch.bright brown.

96.0-96.0 cm. Gravel.Quartz, 0.1 cm phi, angular.

10.0-10.0 cm. Shell fragments.

23.0-23.0 cm. Shell fragments.

26.0-26.0 cm. Shell fragments.

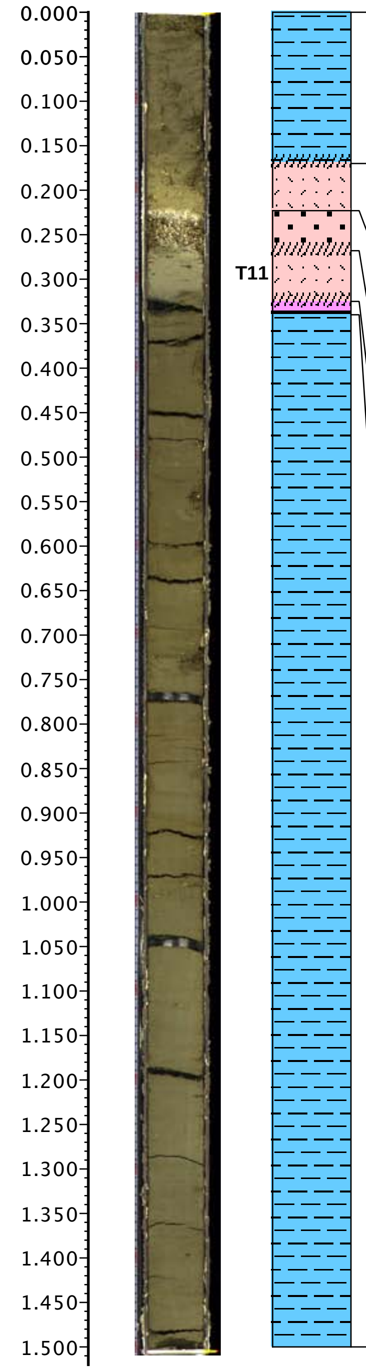
38.0-38.0 cm. Shell fragments.

43.0-43.0 cm. Shell fragments.

87.0-87.0 cm. Shell fragments.

901-C9001A-3H-6; 0.0–1.52

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedimentary structures | Lithologic accesories | Fossils | drilling!disturbance Drilling Disturbance



3H-6, 0.0 cm.

Silty Clay. visual description. Olive black, massive

3H-6, 17.0 cm. gradual contact.

Ashy clay. visual description. grayish olive ashy clay

3H-6, 22.3 cm.

Pumice. visual description. Gray, 0.2 ~ 0.3 cm phi

3H-6, 26.8 cm. gradual contact.

Ash. visual description. Olive gray ash

3H-6, 32.5 cm. gradual contact.

Scoriaceous ash. visual description.

3H-6, 34.0 cm. sharp contact.

71.0-71.0 cm. Pumice.Pumice, maximum length 1.0 cm, dragged?.

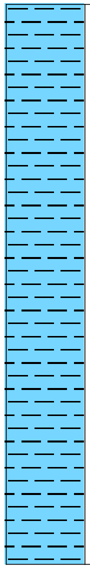
Silty Clay. the same lithology as 3H-6, 0.0-17.0 cm.

99.5-99.5 cm. Shell fragments.

125.5-125.5 cm. Shell fragments.

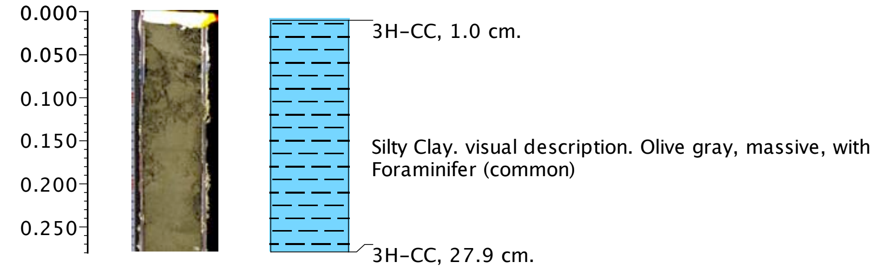
3H-6, 150.0 cm.

901-C9001A-3H-7; 0.0–0.64

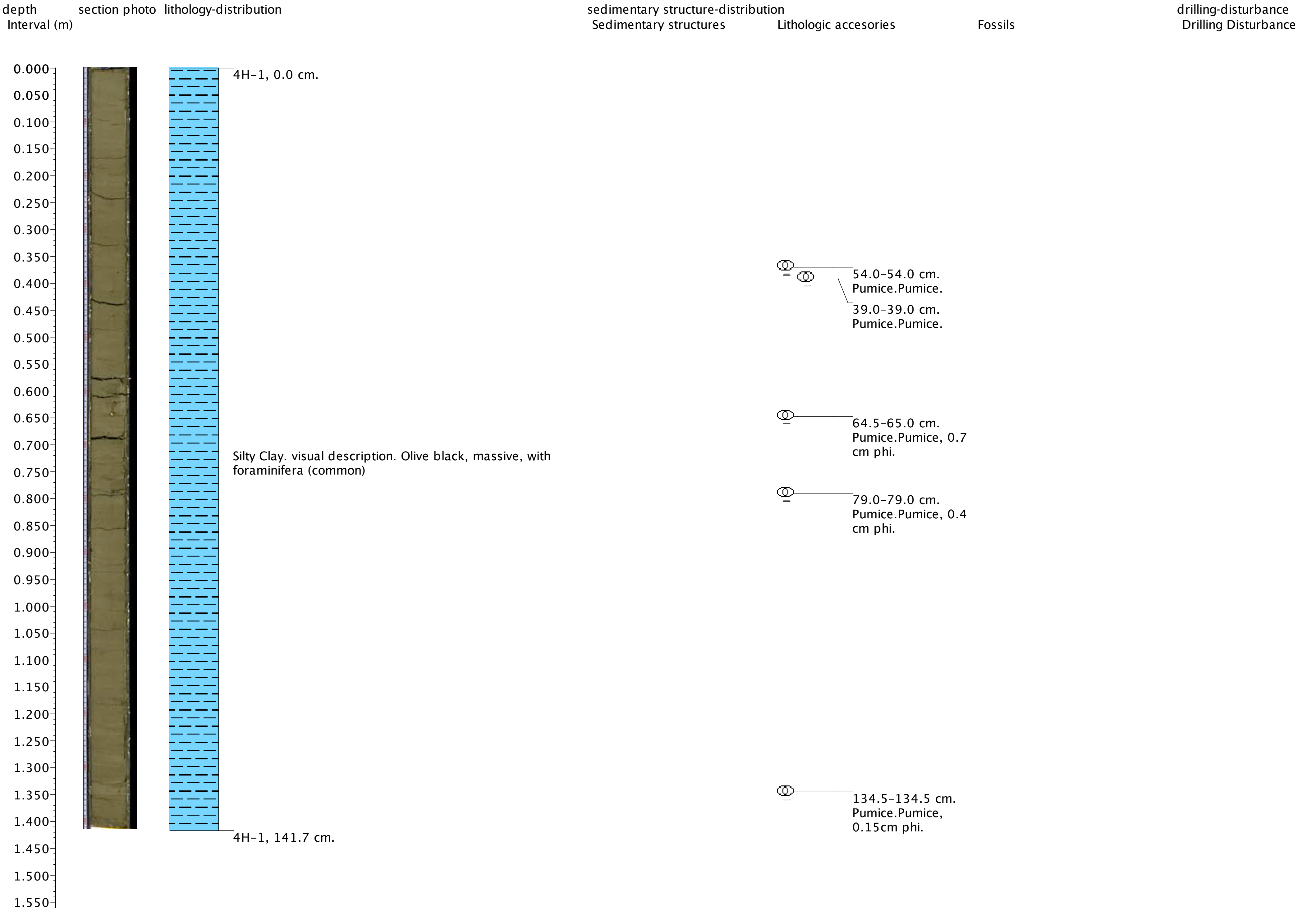
depth Interval (m)	section photo	lithology-distribution		sedimentary structure-distribution Sedimentary...	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance
0.000			3H-7, 0.0 cm.				
0.050							
0.100							
0.150							
0.200							
0.250							
0.300							
0.350			Silty Clay. visual description. Olive black, massive, foraminifer bearing				
0.400							
0.450							
0.500							
0.550					54.0-54.0 cm. Pumice.Pumice.		
0.600			3H-7, 63.0 cm.				

901-C9001A-3H-CC; 0.0–0.28

depth	section photo	lithology-distribution	sedimentary structure-distribution			drilling-disturbance
Interval (m)			Sedimentary structures	Lithologic accesories	Fossils	Drilling Disturbance



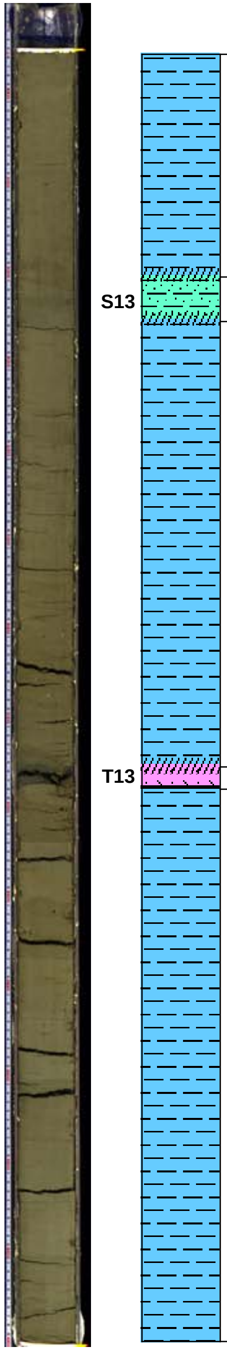
901-C9001A-4H-1; 0.0–1.56



901-C9001A-4H-2; 0.0–1.52

depth Interval (m)	section photo	lithology!distribution	sedimentary structure!distribution Sedimentary structures	Lithologic accesories	Fossils	drilling!disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450
1.500



4H-2, 5.5 cm.

Silty Clay. visual description. Dark olive, bearing foraminifera

4H-2, 30.5 cm. gradual contact.

Sandy Clay. visual description. Olive black, fine sandy clay, with vague boundaries

4H-2, 35.5 cm. gradual contact.

Silty Clay. the same lithology as 4H-2, 5.5-30.5 cm.

4H-2, 85.5 cm. gradual contact.

Ash. visual description. Olive black fine volcanic sand (ash)

4H-2, 88.0 cm. sharp contact.

Silty Clay. the same lithology as 4H-2, 5.5-30.5 cm.

4H-2, 150.0 cm.

Lithologic accesories:

102.0-102.0 cm. Gravel.Sandstone granule, dark bluish gray.

Fossils:

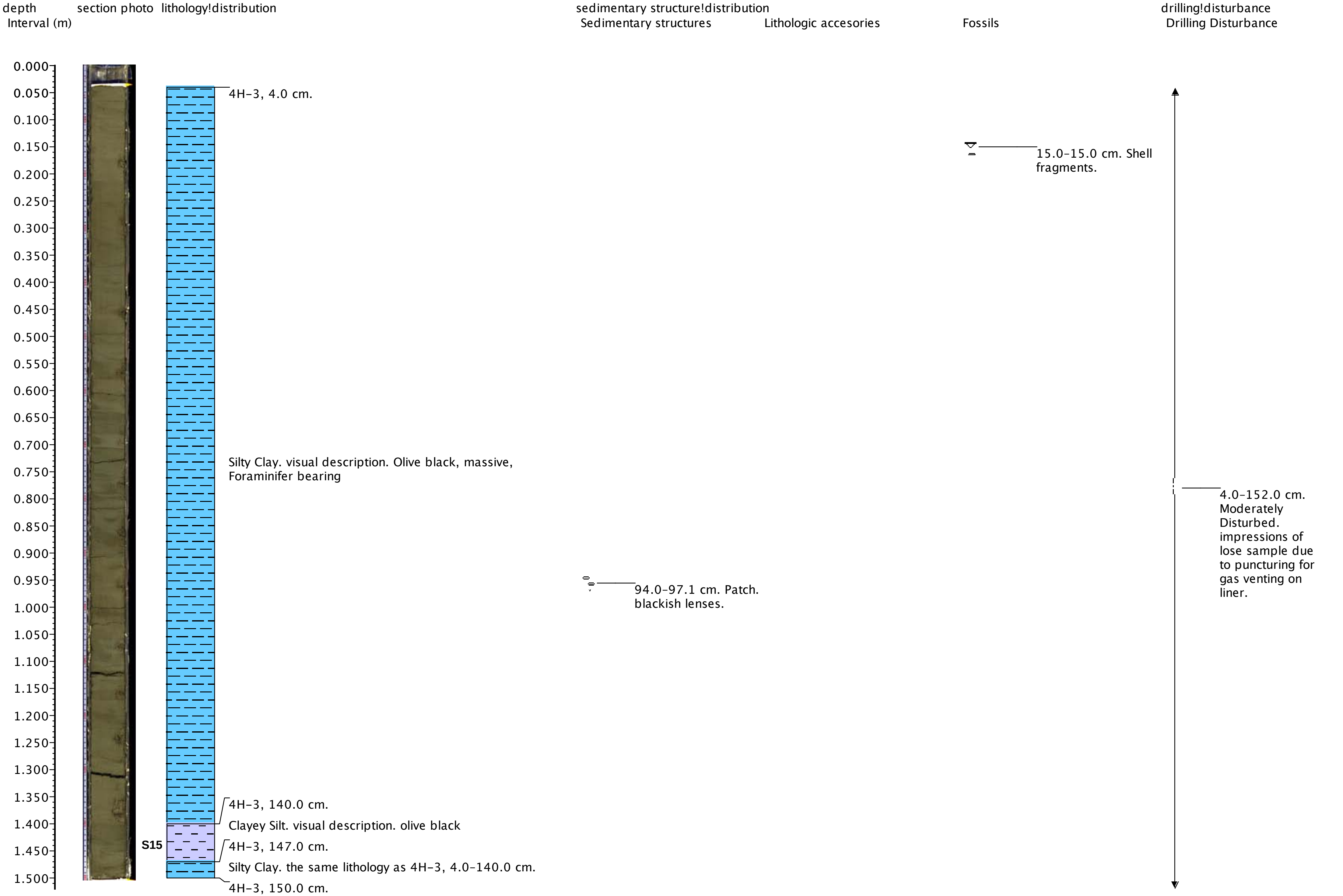
11.7-11.7 cm. Shell fragments.

60.0-60.0 cm. Shell fragments.

70.0-79.0 cm. Shell fragments.Fine sand size shell gragments, scattered.

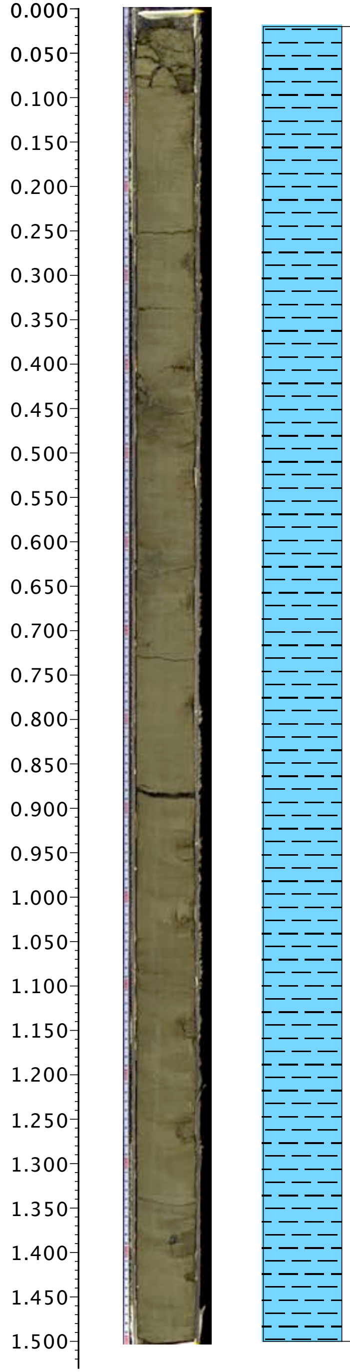
122.0-122.5 cm. Foraminifer.

901-C9001A-4H-3; 0.0–1.52



901-C9001A-4H-4; 0.0–1.53

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance



4H-4, 2.0 cm.

Silty Clay. visual description. Olive black, massive

4H-4, 150.0 cm.

44.0-48.5 cm. Patch. Tephra patches, very fine ~ fine sand size.

53.0-53.0 cm. Patch. Tephra patch.

71.5-72.0 cm. Patch. Tephra patch.

111.0-111.0 cm. Pumice.Pumice granule, ~0.1cm phi.

138.5-140.0 cm. Gravel.Chert pebble, rounded, 0.9cm phi, bluish gray.

120.0-120.0 cm. Shell fragments.

125.0-125.0 cm. Shell fragments.

127.0-127.0 cm. Shell fragments.

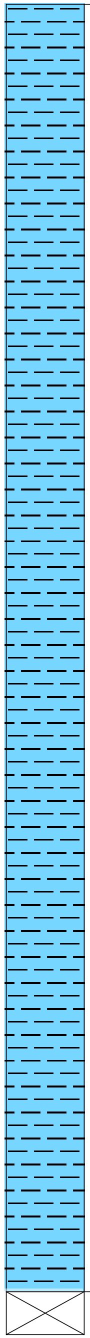
2.0-10.0 cm. Highly Disturbed.

0.0-153.0 cm. Moderately Disturbed.impressions of lose sample due to puncturing for gas venting on liner.

901-C9001A-4H-5; 0.0–1.57

depth Interval (m) | section photo | lithology-distribution | sedimentary structure-distribution Sedimentary structures | Lithologic accesories | Fossils | drilling-disturbance Drilling Disturbance

0.000 0.050 0.100 0.150 0.200 0.250 0.300 0.350 0.400 0.450 0.500 0.550 0.600 0.650 0.700 0.750 0.800 0.850 0.900 0.950 1.000 1.050 1.100 1.150 1.200 1.250 1.300 1.350 1.400 1.450 1.500 1.550



4H-5, 0.0 cm.

Silty Clay. visual description. Olive black, diatom silty clay, massive

4H-5, 150.0 cm.

47.9-48.4 cm. Gravel.Sub-rounded pebble, 0.4 x 0.7 cm, scoria.

77.9-78.3 cm. Gravel.Sub-rounded pebble, dark gray, 0.3 x 0.4 cm.

110.6-111.0 cm. Gravel.Sub-rounded pebble, dark grey, 0.3 x 0.4 cm.

125.7-126.0 cm. Gravel.Angular granule, dark gray, 0.2 x 0.3 cm, planer.

141.3-141.8 cm. Gravel.Angular pebble, dark gray, 0.3 x 0.5 cm.

62.6-62.6 cm. Shell fragments.

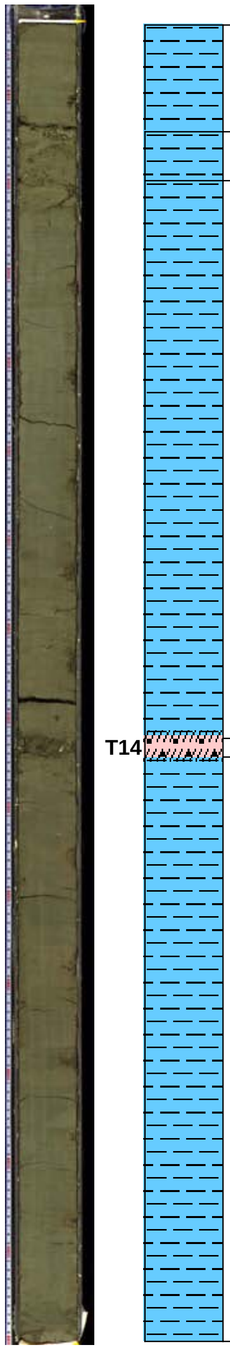
136.0-136.0 cm. Wood Fragments. 0.2cm phi, black.

0.0-150.7 cm. Moderately Disturbed. impressions of lose sample due to puncturing for gas venting on liner.

901-C9001A-4H-6; 0.0–1.52

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedimentary structures | Lithologic accesories | Fossils | drilling!disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450
1.500



4H-6, 2.0 cm.

Silty Clay. visual description. Olive black

4H-6, 14.0 cm.

Sllty Clay w/Pumice. visual description. including pumice, 0.2cm phi

4H-6, 19.5 cm.

Silty Clay. the same lithology as 4H-6, 2.0-14.0 cm.

4H-6, 82.2 cm. gradual contact.

Pumice. visual description. 0.5 cm phi

4H-6, 84.3 cm. gradual contact.

Silty Clay. the same lithology as 4H-6, 2.0-14.0 cm.

4H-6, 150.0 cm.

14.0-14.0 cm. Pumice.Pumice, 1.0 cm phi.

14.3-19.5 cm. Pumice.pumice.

19.5-19.5 cm. Pumice.Pumice, 1.0 cm phi.

15.0-15.0 cm. Shell fragments.

58.5-58.5 cm. Shell fragments.

70.0-70.0 cm. Shell fragments.

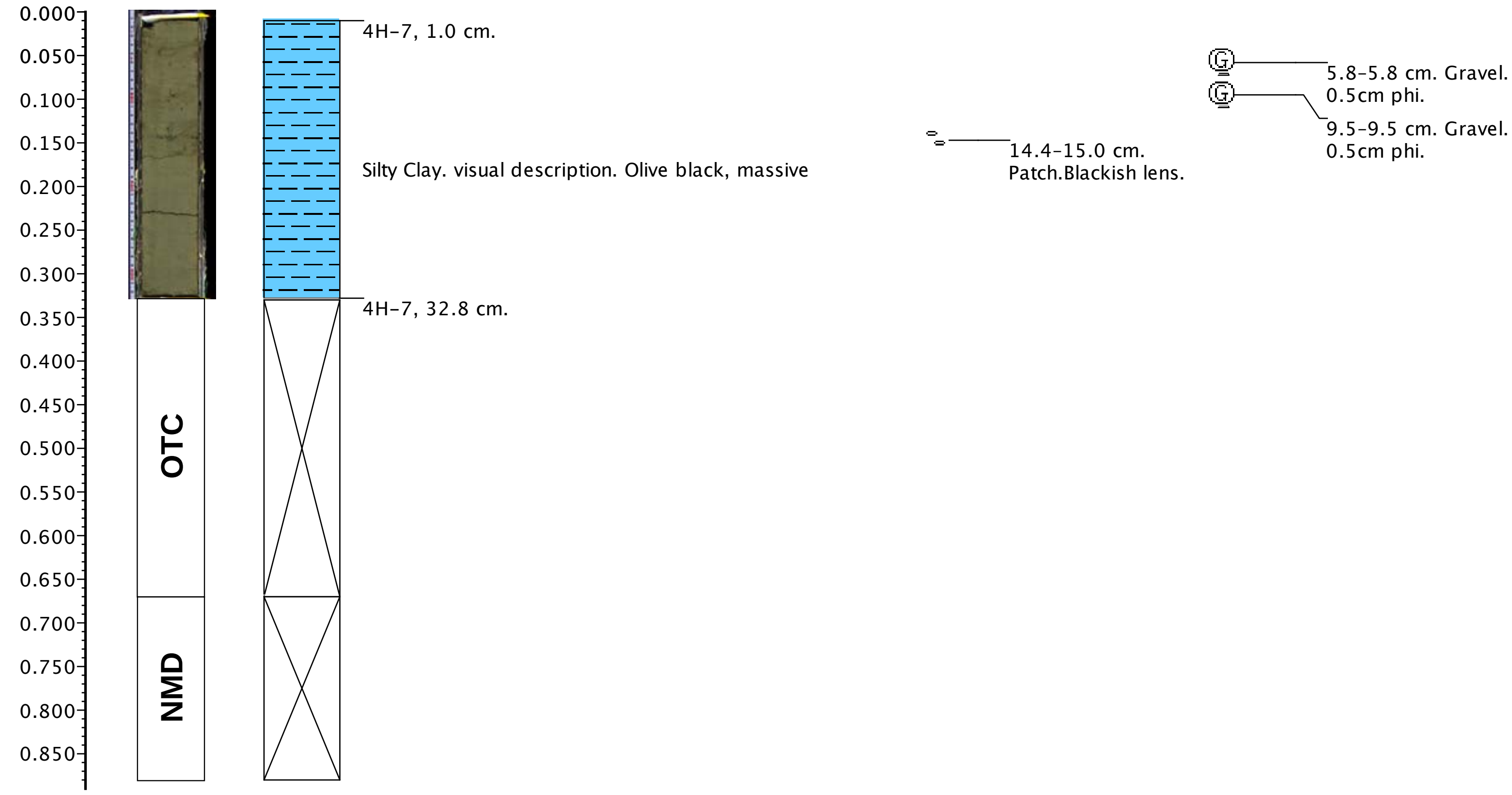
71.5-72.5 cm. Shell fragments.

93.0-93.0 cm. Shell fragments.

0.0-152.0 cm. Moderately Disturbed. impressions of lose sample due to puncturing for gas venting on liner.

901-C9001A-4H-7; 0.0–0.89

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedimentary structures | Lithologic accesories | Fossils | drilling!disturbance Drilling Disturbance



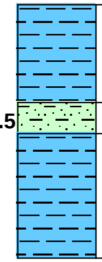
901-C9001A-4H-CC; 0.0–0.3

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution | drilling!disturbance

Sedimentary structures | Lithologic accesories | Fossils | Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300

S18.5



4H-CC, 0.0 cm.

Silty Clay. visual description. Olive black, massive

4H-CC, 11.0 cm.

Sandy Silt. visual description. olive black fine sandy silt

4H-CC, 14.5 cm.

Silty Clay. the same lithology as 4H-CC, 0.0-11.0 cm.

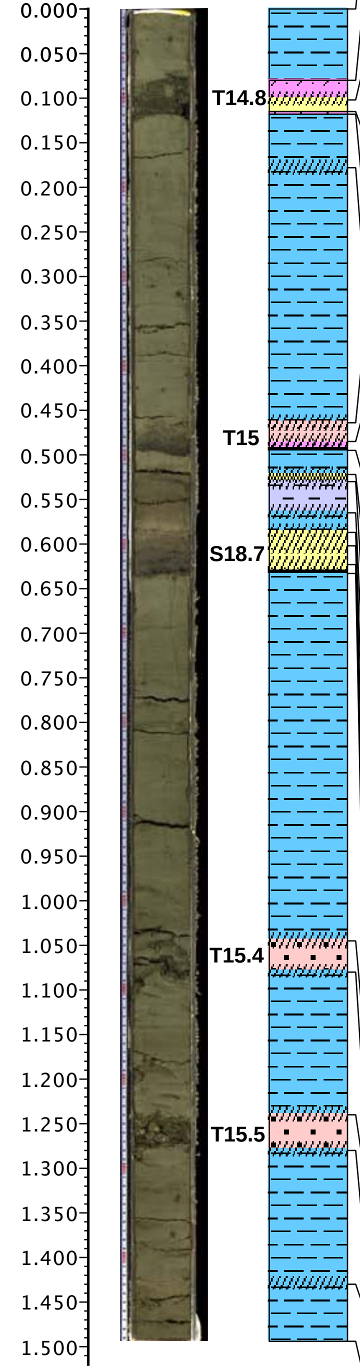
4H-CC, 28.5 cm.

G

23.0-24.0 cm.
Gravel.1.0cm phi.

901-C9001A-5H-1; 0.0–1.52

depth Interval (m) | section photo | lithology!distribution



5H-1, 0.0 cm.
Diatom Silty Clay. visual description. Olive gray, strongly bioturbated
5H-1, 8.0 cm.
Ashy fine sand. visual description. dark olive gray ashy fine sand with benthic foraminifera
5H-1, 10.2 cm. gradual contact.
Sand. visual description. Foraminiferal fine to medium sand, bearing Uvigerina spp.
5H-1, 11.5 cm.
Scoriaceous fine sand. visual description. dark gray
5H-1, 11.8 cm.
Silty Clay. visual description. Olive gray, massive
5H-1, 17.8 cm. gradual contact.
Silty Clay. visual description. Strongly bioturbated, slight color bandings of 7.5Y3/2 and 10Y3/2, some black patches scattered
5H-1, 46.4 cm. gradual contact.
Ash. visual description. olive gray pumiceous ash (very fine sand)
5H-1, 48.5 cm. gradual contact.
Ash. visual description. blueish gray scoriaceous ash bearing pumice (fine to very fine sand)
5H-1, 49.5 cm. sharp contact.
Silty Clay. visual description. grayish olive silty clay lower 1.0cm moderately silty
5H-1, 52.2 cm. gradual contact.
Very fine sand. visual description. blueish gray very fine sand
5H-1, 53.0 cm. gradual contact.
Clayey silt. visual description. olive black clayey silt, with bioturbated base
5H-1, 56.5 cm. gradual contact.
Silty clay. visual description. Gray silty clay
5H-1, 58.7 cm. gradual contact.
Very fine sand. visual description. Gray
5H-1, 60.2 cm. gradual contact.
Very fine sand. visual description. Gray, slightly dark
5H-1, 62.3 cm. gradual contact.
Very fine sand. the same lithology as 5H-1, 52.2-53.0 cm.
5H-1, 63.3 cm. sharp contact.
Silty Clay. the same lithology as 5H-1, 17.8-46.4 cm.
5H-1, 104.5 cm. gradual contact.
Pumice. visual description. 0.4 ~ 3.0 cm phi rhyolitic pumice baried in silty clay
5H-1, 108.0 cm. gradual contact.
Silty Clay. the same lithology as 5H-1, 11.8-17.8 cm.
5H-1, 124.0 cm. gradual contact.
Pumice. visual description. 0.5 ~ 3.0 cm phi rhyolitic pumice
5H-1, 128.0 cm. gradual contact.
Silty Clay. the same lithology as 5H-1, 17.8-46.4 cm.
5H-1, 143.0 cm. gradual contact.
Silty Clay. the same lithology as 5H-1, 11.8-17.8 cm.
5H-1, 149.4 cm.

sedimentary structure!distribution

Sedimentary structures

0.0-8.0 cm. Heavy Bioturbation.

17.8-46.4 cm. Heavy Bioturbation.

17.8-46.4 cm. Patch.Some black patches scattered.

63.3-104.5 cm. Heavy Bioturbation.

Lithologic accesories

3.2-3.2 cm. Gravel.Angular, 0.3cm phi.

29.0-29.0 cm. Gravel.Angular, 0.2 x 0.4 cm.

31.0-31.0 cm. Gravel.Angular, 0.1 x 0.2 cm.

32.0-32.0 cm. Gravel.Angular, 0.3 x 0.5 cm.

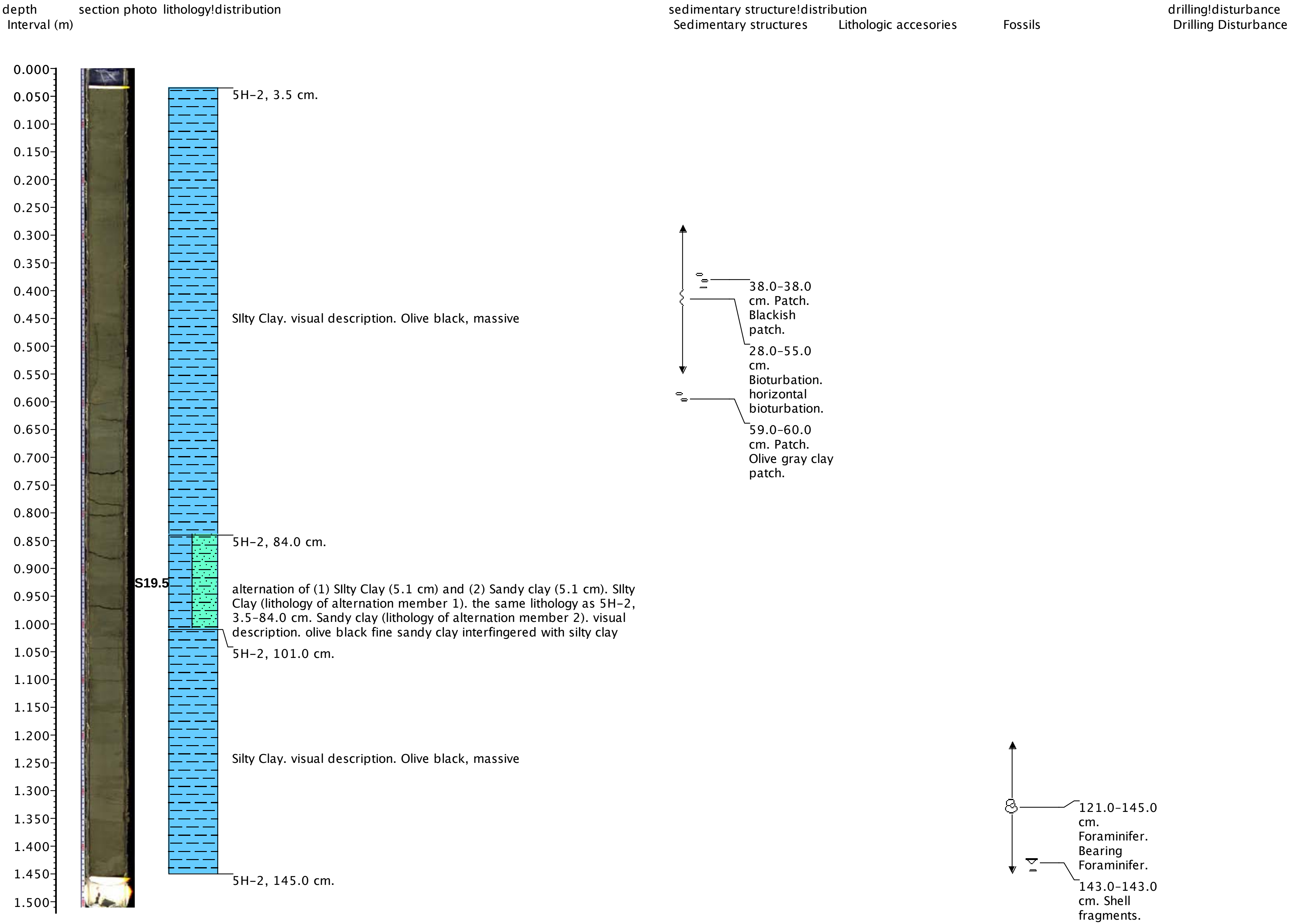
63.5-63.5 cm. Gravel.Aub-angular, 0.2 x 0.3 cm.

119.0-119.0 cm. Pumice.1.2 cm phi pumice, dragged by corerer from upper pumice layer?.

133.3-133.3 cm. Pumice. Pumice, 0.3 x 0.4 cm phi.

137.2-137.2 cm. Pumice. Pumice, 0.3 x 0.4 cm.

901-C9001A-5H-2; 0.0–1.52



901-C9001A-5H-3; 0.0–1.52

depth Interval (m) | section photo | lithology-distribution | sedimentary structure-distribution Sedimentary structures | Lithologic accesories | Fossils | drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450
1.500

5H-3, 0.0 cm.

Silty Clay. visual description. olive gray, massive, with foraminifer

5H-3, 67.0 cm.

Silty Clay. visual description. Olive gray, massive, intercalated with dark olive silty clay layers (~ few mm)

5H-3, 73.0 cm.

Silty Clay. the same lithology as 5H-3, 0.0-67.0 cm.

5H-3, 90.0 cm.

Silty Clay. visual description. Altenation of olive gray and dark olive silty clay in ~1cm interval anastmosing

5H-3, 116.0 cm.

Silty Clay. the same lithology as 5H-3, 0.0-67.0 cm.

5H-3, 136.0 cm.

Silty Clay. the same lithology as 5H-3, 90.0-116.0 cm.

5H-3, 146.0 cm.

12.0-12.0 cm. Patch.Tephra patch, fine scoriatic sand.

14.5-15.0 cm. Patch.Tephra patch, fine scoriatic sand.

64.0-75.0 cm. Bioturbation.

94.0-118.0 cm. Bioturbation.

901-C9001A-5H-4; 0.0–1.52

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedimentary structures | Lithologic accesories | Fossils | drilling!disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
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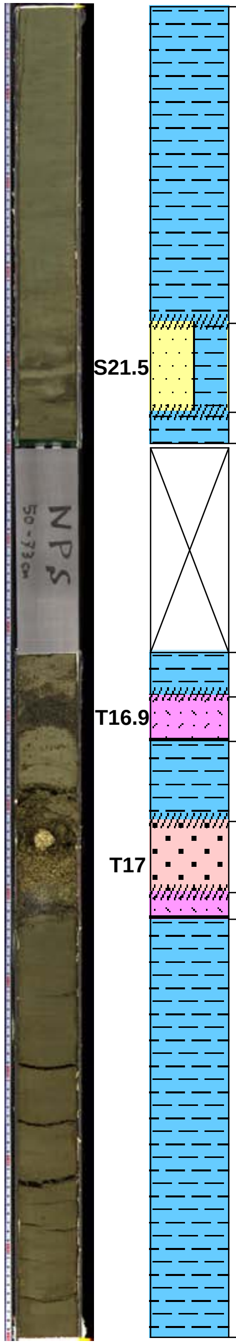
1.300
1.350
1.400
1.450
1.500



5H-4, 0.4 cm.

Silty Clay. visual description. Olive black to olive gray, horizontally bioturbated

5H-4, 36.0 cm. gradual contact.

alternation of (1) Very fine sand (7.1 cm) and (2) Silty Clay (5.1 cm). Very fine sand (lithology of alternation member 1). visual description. olive black, interfingered with silty clay Silty Clay (lithology of alternation member 2). the same lithology as 5H-4, 0.4-36.0 cm.

5H-4, 46.0 cm. gradual contact.

Silty Clay. the same lithology as 5H-4, 0.4-36.0 cm.

5H-4, 49.5 cm.

5H-4, 73.0 cm.

Silty Clay. visual description. Olive gray, massive

5H-4, 78.0 cm. gradual contact.

Ash. visual description. dark gray pumiceous ash (medium sand), lithic-crystal tephra pumice + lithic (rhyolite-dacite) + qtz + hbl

5H-4, 83.0 cm. sharp contact.

Silty Clay. the same lithology as 5H-4, 73.0-78.0 cm.

5H-4, 92.0 cm. gradual contact.

Muddy Pumice. visual description. Grayish olive, granule ~ pebble size pumice

5H-4, 100.0 cm. gradual contact.

Ash. visual description. Dark gray, ash (volcanic medium sand) qtz + pumice + 2px + lithic + opeque +

5H-4, 103.0 cm. sharp contact.

Silty Clay. the same lithology as 5H-4, 73.0-78.0 cm.

5H-4, 150.0 cm.

Sedimentary structures:

0.0-32.0 cm. Bioturbation. horizontal bioturbation.

35.0-35.0 cm. Patch.Organic patch.

78.0-83.0 cm. Graded Bedding (Normal).

92.0-100.0 cm. Graded Bedding (Reversed).

Lithologic accesories:

104.0-104.0 cm. Pumice.Pumice.

Fossils:

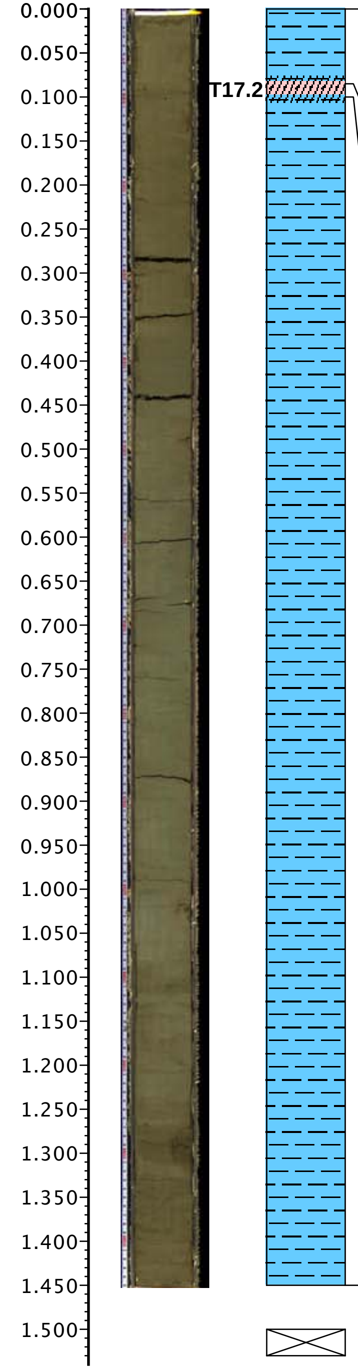
47.0-49.5 cm. Foraminifer. Foraminifer scattered.

131.0-131.0 cm. Shell fragments.

145.0-145.0 cm. Shell fragments.

901-C9001A-5H-5; 0.0–1.54

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedimentary structures | Lithologic accesories | Fossils | drilling!disturbance Drilling Disturbance



5H-5, 0.0 cm.

Silty Clay. visual description. Olive black, massive, foraminifer bearing

5H-5, 8.5 cm. gradual contact.

Ash. visual description. With foraminifer

5H-5, 10.0 cm. gradual contact.

Silty Clay. the same lithology as 5H-5, 0.0-8.5 cm.

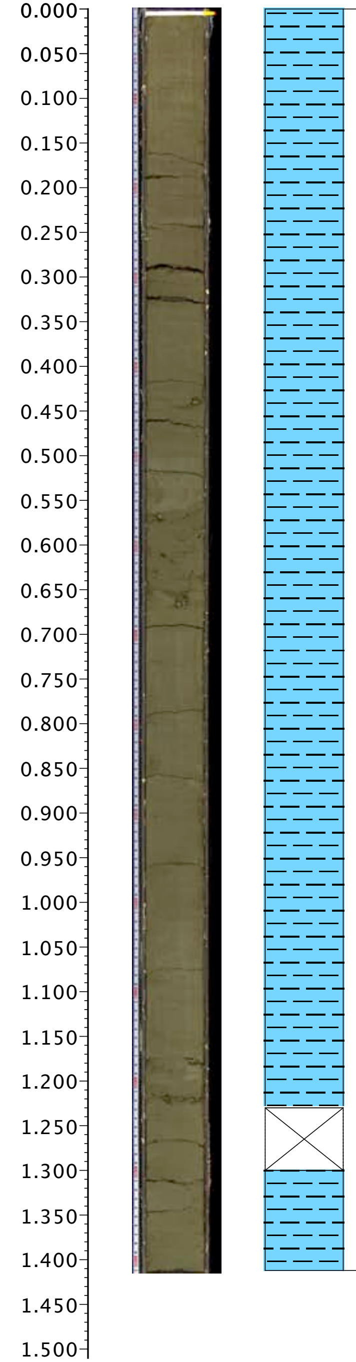
5H-5, 145.0 cm.

10.0-10.0 cm. Shell fragments.

47.1-148.1 cm. Moderately Disturbed.impressions of lose sample due to puncturing for gas venting on liner.

901-C9001A-5H-6; 0.0–1.51

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance



5H-6, 0.0 cm.

Silty Clay. visual description. Olive black, massive, foraminifer bearing

5H-6, 141.2 cm.

Lithologic accesories:

44.0-44.0 cm. Pumice.Pumice, 0.5cm phi.

56.7-56.7 cm. Pumice.Pumice, 0.5cm phi.

66.5-66.5 cm. Pumice.Pumice, 0.5cm phi.

Fossils:

19.0-19.0 cm. Shell fragments.

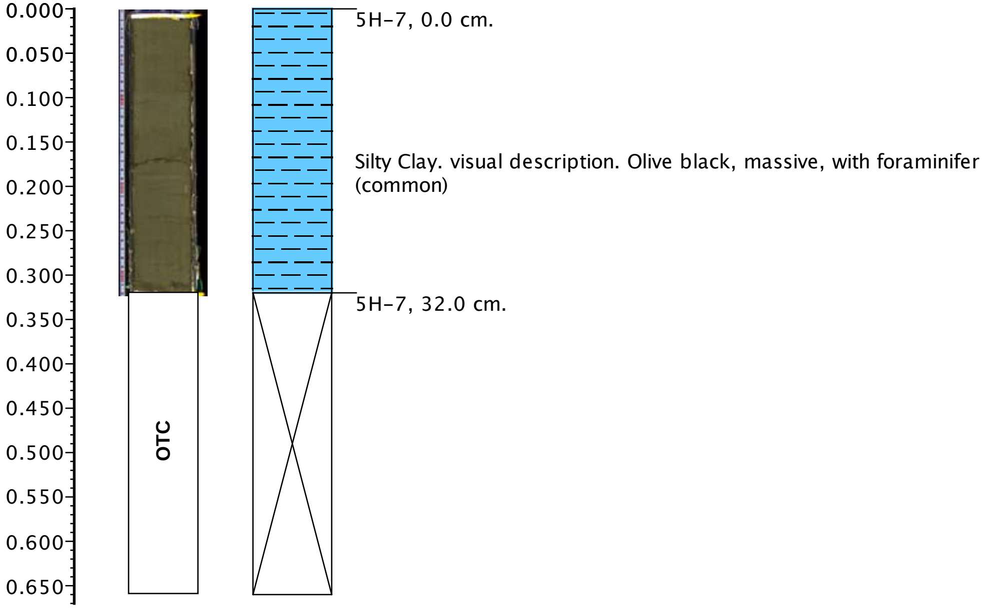
56.5-67.0 cm. Foraminifer. Including pumice (0.2cm phi).

97.5-100.4 cm. Foraminifer.

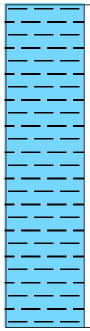
122.0-122.0 cm. Wood Fragments. Length 1.0cm.

901-C9001A-5H-7; 0.0–0.67

depth	section photo	lithology!distribution		sedimentary structure!distribution			drilling!disturbance
Interval (m)				Sedimentary structures	Lithologic accesories	Fossils	Drilling Disturbance

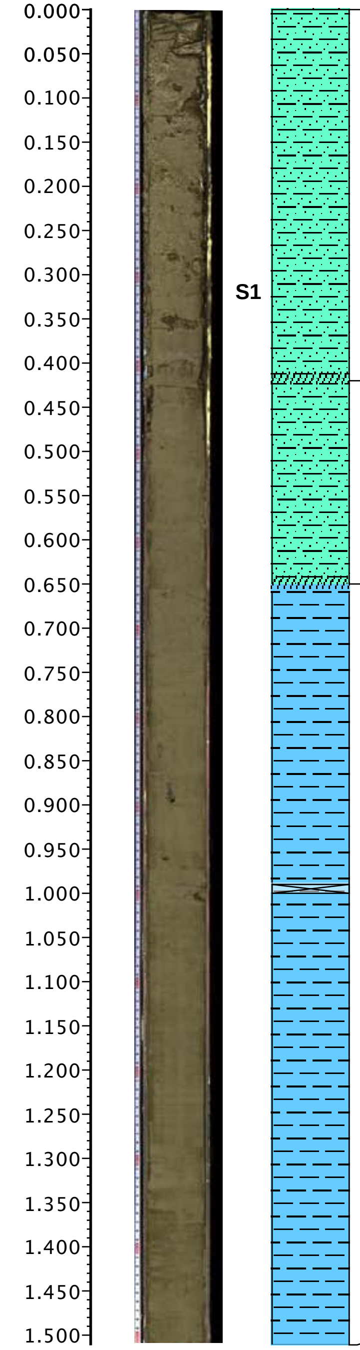


901-C9001A-5H-CC; 0.0–0.38

depth Interval (m)	section photo	lithology-distribution		sedimentary structure-distribution Sedimentary...	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance
0.000 0.050 0.100 0.150 0.200 0.250 0.300 0.350			5H-CC, 1.5 cm. Silty Clay. visual description. Olive black, massive, with foraminifer unconsolidated (soft). (Kan Aoike) 5H-CC, 37.3 cm.		7.0-7.0 cm. Others.Dark spot. 11.5-11.5 cm. Others.Dark spot. 23.2-23.2 cm. Others.Dark spot.		

901-C9002A-1H-1; 0.0–1.51

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedim... | Lithologic accesories | Fossils | drilling!disturbance Drilling Disturbance



1H-1, 0.0 cm.

Sandy clay. visual description. Olive black sandy clay bearing csd-granule sized pumice, high water content

1H-1, 42.0 cm. gradual contact.

Sandy clay. visual description. Olive black sandy clay

1H-1, 65.0 cm. gradual contact.

Silty clay. visual description. Olive balck silty clay bearing foraminfers, slightly developed weak lammination. H2S-like smell.

1H-1, 151.0 cm.

10.0-10.0 cm. Pumice.pumice.

19.0-19.0 cm. Pumice.pumice.

29.0-29.0 cm. Pumice.pumice.

88.9-89.0 cm. organic material. black organic material (tube-like).

96.0-96.1 cm. organic material. black organic material (tube-like).

98.0-100.0 cm. Foraminifer. foraminifer rich, patch.

107.8-108.2 cm. organic material.black organic material (tube-like).

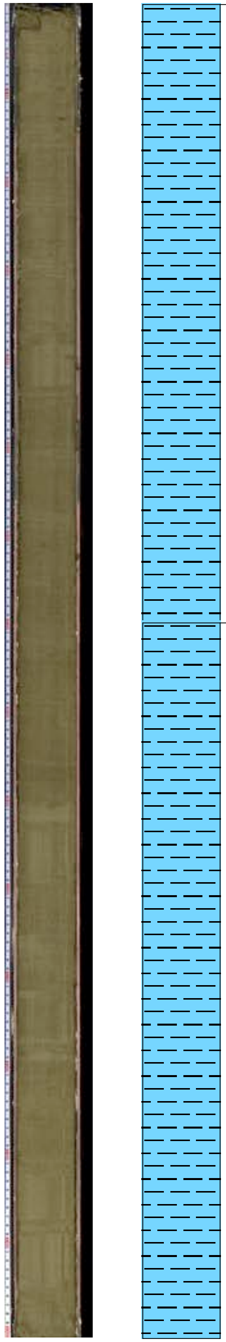
113.0-116.0 cm. Foraminifer. foraminifers rich, patch.

0.0-42.0 cm. Soupy.

901-C9002A-1H-2; 0.0–1.51

depth Interval (m) | section photo | lithology-distribution | sedimentary structure-distribution Sedimentary structures | Lithologic accesories | Fossils | drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450
1.500



1H–2, 0.0 cm.

Silty clay. visual description. Olive black, massive silty clay containing olive balck patches, with H2S–like smell.

1H–2, 70.0 cm.

Silty clay. visual description. Olive black massive silty clay bearing foraminfers, with H2S–like smell

12.0–13.0 cm. Patch. olive balck patches.

38.0–42.0 cm. Patch. Olive black pacthes.

48.0–51.0 cm. Patch. Olive black pacthes.

56.0–57.0 cm. Patch. Olive black pacthes.

59.0–61.0 cm. Patch. Olive black pacthes.

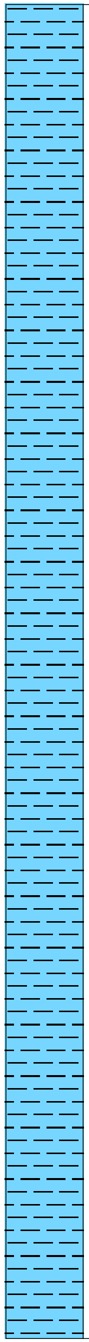
65.0–70.0 cm. Patch. Olive black pacthes.

70.0–150.0 cm. Foraminifer.olive black patches.

901-C9002A-1H-3; 0.0–1.52

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450
1.500



1H-3, 0.0 cm.

Silty clay. visual description. Olive black silty clay bearing foraminifers, massive, smelled like H2S.

1H-3, 152.0 cm.

28.0-30.0 cm. Bioturbation.

28.0-30.0 cm. Patch. Grayish olive patch, moderate bioturbated.

40.0-50.0 cm. Foraminifer.rich foraminifers.

85.0-90.0 cm. Foraminifer.rich foraminifers.

97.0-101.0 cm. Foraminifer.rich foraminifers.

117.0-120.0 cm. Bioturbation.

119.0-120.0 cm. Patch.Grayish olive patch, moderate bioturbated.

123.0-126.0 cm. Patch.Grayish olive patch, moderate bioturbated.

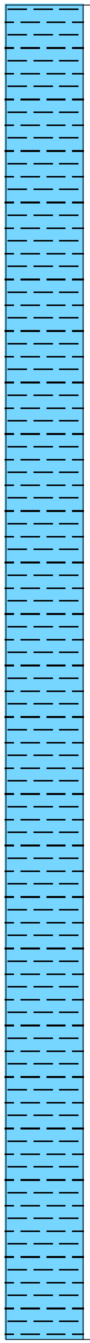
125.0-130.6 cm. Bioturbation.

127.5-128.5 cm. Patch.Grayish olive patch, moderate bioturbated.

901-C9002A-1H-4; 0.0–1.5

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450



1H-4, 0.0 cm.

15.0-15.0 cm. Wood Fragments.

Silty clay. visual description. olive black massive w/ foraminifers (common)

126.0-126.0 cm. Black band.vein???.

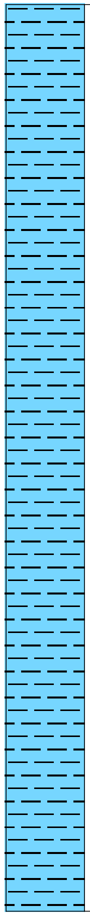
136.0-147.0 cm. Foraminifer. Foraminifers abundant.

1H-4, 150.0 cm.

901-C9002A-1H-5; 0.0–1.02

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000



1H-5, 0.0 cm.

Silty clay. visual description. olive gray massive, w/ foraminifers

1H-5, 101.9 cm.

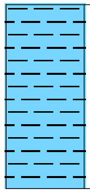
17.5-17.5 cm. Wood Fragments.

39.0-39.0 cm. Shell fragments.shell fragment.

901-C9002A-1H-CC; 0.0–0.21

depth Interval (m) | section photo | lithology-distribution | sedimentary structure-distribution Sedimentary structures | Lithologic accesories | Fossils | drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200



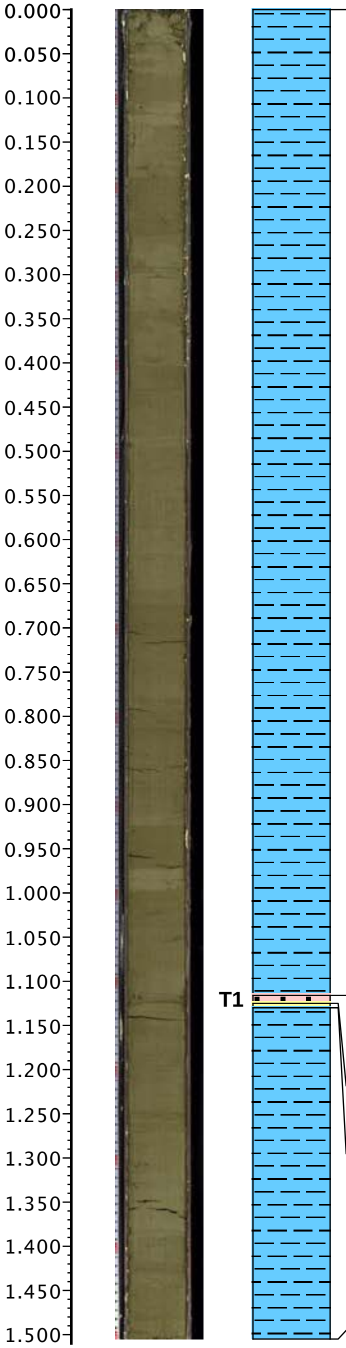
1H–CC, 0.0 cm.

Silty clay. visual description. olive black massive, w/ foraminifers (common)

1H–CC, 21.0 cm.

901-C9002A-2H-1; 0.0–1.51

depth Interval (m)	section photo	lithology!distribution	sedimentary structure!distribution Sedimentary structures	Lithologic accesories	Fossils	drilling!disturbance Drilling Disturbance



2H-1, 0.0 cm.

Silty clay. visual description. Massive, olive black silty clay, w/ foraminifers (common)

2H-1, 111.6 cm.

pumice. visual description. silty clay bearing pumice

2H-1, 112.5 cm.

sand. visual description. very fine sand

2H-1, 113.0 cm.

Silty clay. the same lithology as 2H-1, 0.0-111.6 cm.

2H-1, 150.5 cm.

Lithologic accesories:

51.6-51.6 cm. Pumice. Pumice (diameter 1.5 mm).

80.4-80.4 cm. Pumice. Pumice (diameter 1.5 mm).

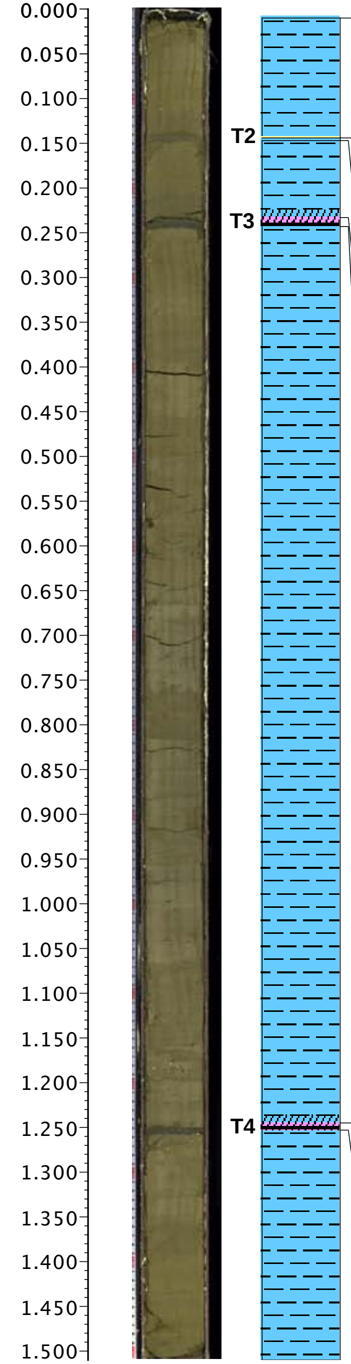
112.0-112.5 cm. Pumice.pumice rich.

135.5-135.5 cm. Pumice.pumice (diameter 3mm).

144.0-144.0 cm. Pumice.pumice (diameter 2mm).

901-C9002A-2H-2; 0.0–1.51

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithol...	Fossils	drilling-disturbance Drilling Disturbance



2H−2, 1.0 cm.

Silty clay. visual description. Massive olive black silty clay, w/ foraminifera (common)

2H−2, 14.4 cm. sharp contact.

Very fine sand. visual description. incl. two very fine sand layers (upper: light colored; lower: dark colored)

2H−2, 14.7 cm. sharp contact.

Silty clay. the same lithology as 2H−2, 1.0−14.4 cm.

2H−2, 23.3 cm. gradual contact.

scoriaceous sand. visual description. Very fine−grained, bottom: sharp, slightly perturbated; top: gradual

2H−2, 24.3 cm. sharp contact.

Silty clay. the same lithology as 2H−2, 1.0−14.4 cm.

2H−2, 124.5 cm. gradual contact.

scoriaceous sand. the same lithology as 2H−2, 23.3−24.3 cm.

2H−2, 125.3 cm. sharp contact.

Silty clay. the same lithology as 2H−2, 1.0−14.4 cm.

Sedimentary structures:

138.0−150.0 cm. Bioturbation.

Fossils:

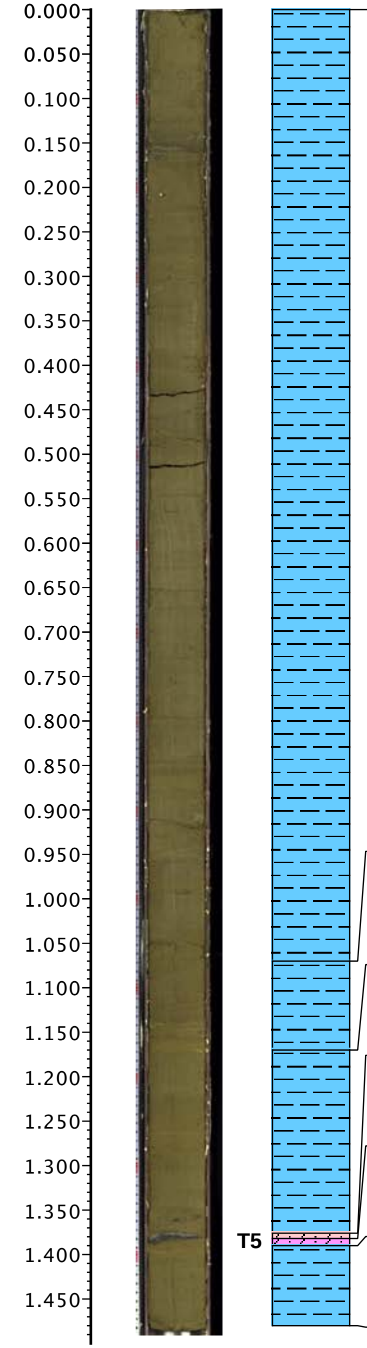
10.0−10.0 cm. Shell fragments. Shell fragment.

112.0−112.0 cm. Shell fragments.Shell fragment.

117.0−123.0 cm. Shell fragments.Shell fragment.

901-C9002A-2H-3; 0.0–1.5

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedimentary structures | Lithologic accesories | Fossils | drilling!disturbance Drilling Disturbance



2H-3, 0.0 cm.

Silty clay. visual description. Massive, olive black silty clay, w/foraminifers

2H-3, 107.0 cm.

Silty clay. visual description. alternating beds of olive balck/dark olive colored silty clay with a few cm interval

2H-3, 117.0 cm.

Silty clay. the same lithology as 2H-3, 0.0-107.0 cm.

2H-3, 137.6 cm.

ash. visual description. fine sand-sized light gray ash

2H-3, 138.2 cm. gradual contact.

ash. visual description. fine sand-sized dark-gray ash

2H-3, 139.0 cm.

Silty clay. the same lithology as 2H-3, 0.0-107.0 cm.

2H-3, 148.0 cm.

Sedimentary structures:

84.5-86.0 cm. Planer lamination, faintly.

107.0-117.0 cm. Planer lamination, faintly.

124.7-127.0 cm. Planer lamination, faintly.

Fossils:

22.5-22.5 cm. Shell fragments.Shell fragment.

91.0-91.0 cm. Shell fragments.Shell fragment.

139.0-140.0 cm. Foraminifer. Foraminfer-rich.

901-C9002A-2H-4; 0.0–1.5

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedi... | Lithologic accesories | Fossils | drilling!disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
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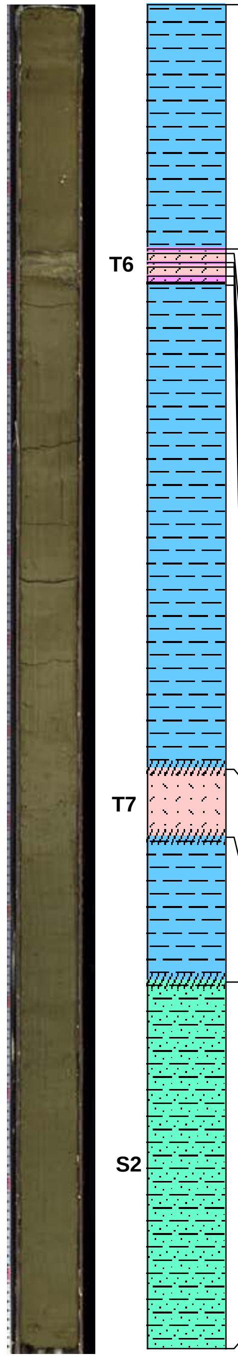
1.350
1.400
1.450



2H-4, 0.0 cm.

Silty clay. visual description. Olive black silty clay ---> fine sandy clay bearing foraminifers and shell fragment, massive, smelled like H2S

2H-4, 27.0 cm.

ash. visual description. Olive black vitric-crust ash (fine sand sized) intercalating grayish olive vitric ash (fine sand sized) fiberous

2H-4, 27.5 cm.

Ash. visual description. Grayish olive vitric ash (fine sand sized), thickness: 0.3-1cm

2H-4, 28.5 cm.

Ash. visual description. Olive gray cryst-lithic ash (fine sand sized)

2H-4, 29.0 cm.

Ash. visual description. Grayish olive vitric-cryst ash bearing shell fragment/lithic

2H-4, 30.0 cm.

Ash. visual description. Olive black lithic-cryst ash bearing shell fragment, eroded base

2H-4, 31.0 cm. sharp contact. eroded base

Silty clay. visual description. Grayish olive silty clay bearing shell fragment, massive, smelled like H2S

2H-4, 84.5 cm. gradual contact.

Sandy clay (ash). visual description. Grayish olive sandy clay (ash) bearing pumice (<2mm diameter)

2H-4, 92.0 cm. gradual contact.

Silty clay. visual description. Grayish olive silty clay, massive

2H-4, 108.0 cm. gradual contact.

Sandy clay. visual description. Grayish olive sandy clay bearing foraminifers, mnassive

2H-4, 148.5 cm.

Fossils:

20.0-20.0 cm. Shell fragments.Shell fragment.

37.0-40.0 cm. Shell fragments.Shell fragment.

45.0-46.0 cm. Shell fragments.Shell fragment.

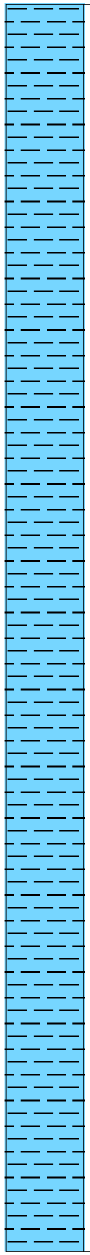
Lithologic accesories:

136.0-136.0 cm. Gravel. blackish lithic granule.

901-C9002A-2H-5; 0.0–1.56

depth Interval (m) | section photo | lithology-distribution | sedimentary structure-distribution Sedimentary structures | Lithologic accesories | Fossils | drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450
1.500
1.550



2H-5, 0.0 cm.

Silty clay. visual description. Massive silty clay, w/ foraminifera (common)

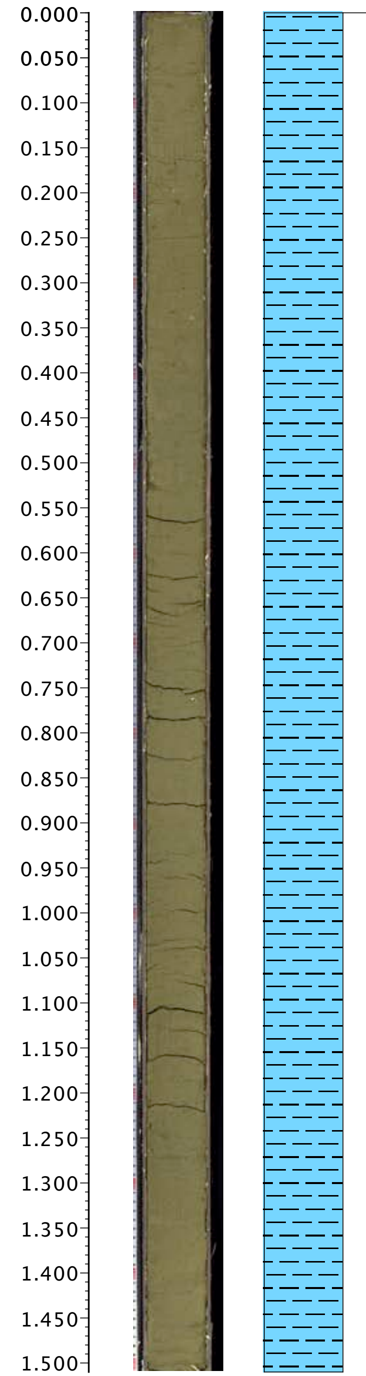
2H-5, 146.0 cm.

51.6-51.6 cm. Shell fragments.Shell fragment.

104.0-104.0 cm. Pumice.Pumice diameter 3mm.

901-C9002A-2H-6; 0.0–1.51

depth Interval (m) | section photo | lithology-distribution | sedimentary structure-distribution Sedi... | Lithologic accesories | Fossils | drilling-disturbance Drilling Disturbance



2H-6, 0.0 cm.

Silty clay. visual description. Massive olive black silty clay, w/ foraminifers (common)

76.5-76.5 cm. Pumice. Pumice (diameter: 3mm).

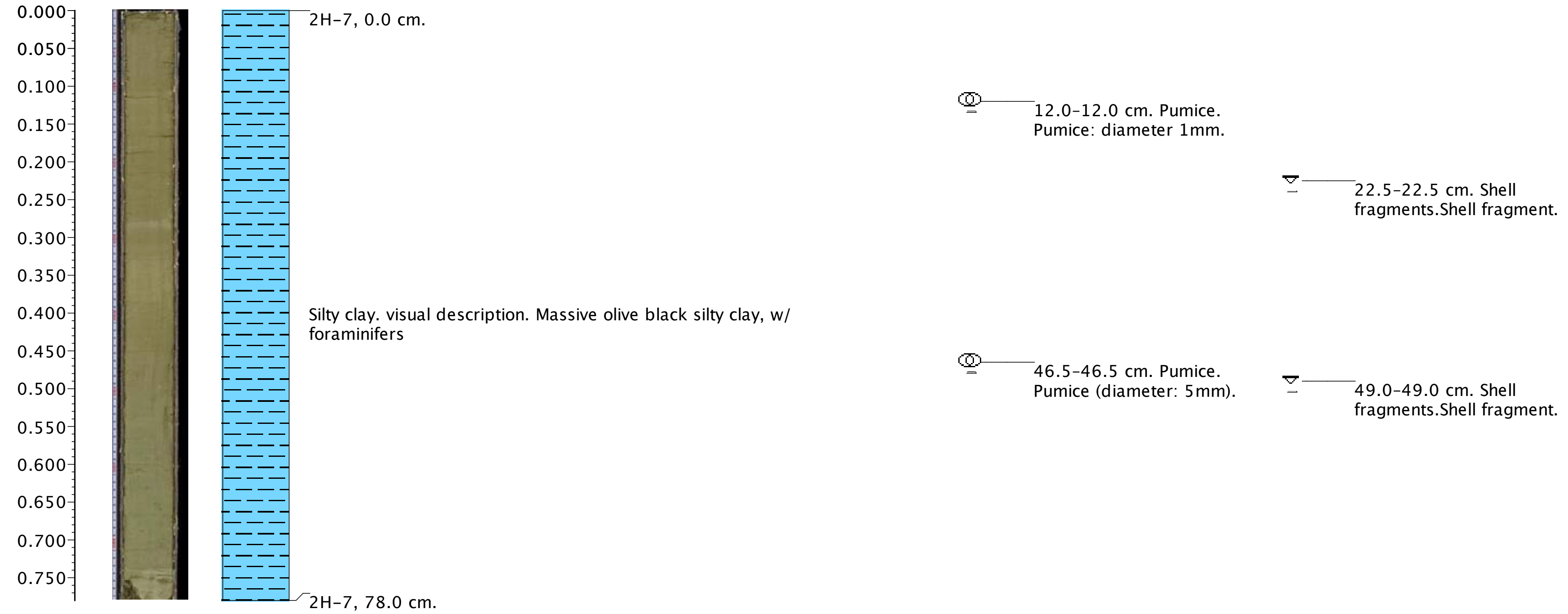
110.4-110.4 cm. Others. Mineral filled crack.

20.0-20.0 cm. Shell fragments.Shell fragment.

34.0-34.0 cm. Shell fragments.Shell fragment.

901-C9002A-2H-7; 0.0–0.78

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedi...	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance

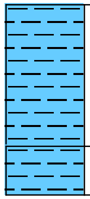


901-C9002A-2H-CC; 0.0–0.4

depth | section photo | lithology!distribution | sedimentary structure!distribution | drilling!disturbance

Interval (m) | Sedimentary structures | Lithologic acc... | Fossils | Drilling Disturbance

0.000
0.050
0.100
0.150
0.200



2H-CC, 0.0 cm.

Silty clay. visual description. Massive olive black silty clay with foraminifera

2H-CC, 16.0 cm.

Silty clay. the same lithology as 2H-CC, 0.0-16.0 cm.

2H-CC, 21.5 cm.

2.0-2.0 cm. Patch.dark spot.

6.5-6.5 cm. Patch.dark spot.

11.5-11.5 cm. Patch.dark spot.

16.0-21.5 cm.
Highly Disturbed.

901-C9002A-3H-1; 0.0–1.4

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedimentary structures | Lithologic accesories | Fossils | drilling!disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350

T8

3H-1, 0.0 cm.

Silty clay. visual description. High water content, olive gray silty clay

3H-1, 14.0 cm. gradual contact.

Silty clay. visual description. Olive gray silty clay bearing foraminifera

3H-1, 70.0 cm.

alternation of (1) Silty clay (1.0 cm) and (2) sandy clay (1.0 cm). Silty clay (lithology of alternation member 1). the same lithology as 3H-1, 14.0-70.0 cm. sandy clay (lithology of alternation member 2). visual description. two sandy clay lenses

3H-1, 72.0 cm.

Silty clay. the same lithology as 3H-1, 14.0-70.0 cm.

3H-1, 140.0 cm.

2.0-2.0 cm. Patch.dark spot.

6.5-6.5 cm. Patch.dark spot.

11.5-11.5 cm. Patch. dark spot.

39.0-39.0 cm. Gravel. Scoria fragment, angular (diameter 4mm).

49.0-49.0 cm. Gravel. Scoria fragment, angular (diameter: 4mm).

51.0-51.0 cm. Gravel. volcanic fragment, granule angular.

136.5-136.5 cm. Pumice.Pumice.

56.4-68.0 cm. Foraminifer.relatively rich foraminifers.

121.0-123.0 cm. Foraminifer.Foraminifers.

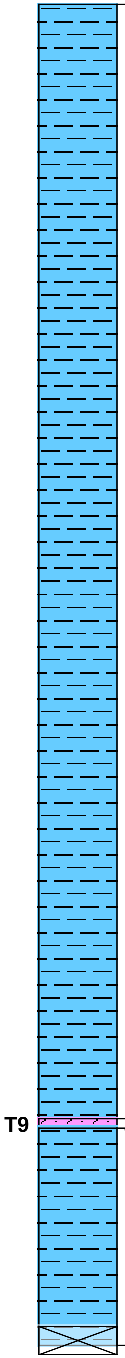
0.0-14.0 cm. Soupy.

16.0-21.5 cm. Highly Disturbed.

901-C9002A-3H-2; 0.0–1.43

depth Interval (m)	section photo	lithology!distribution	sedimentary structure!distribution Sedimentary structures	Lithologic accesories	Fossils	drilling!disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400



3H-2, 0.0 cm.

Silty clay. visual description. olive gray massive silty clay, w/ foraminifers

3H-2, 118.0 cm.

scoria sand (ash). visual description. very fine scoria sand (ash)

3H-2, 119.0 cm.

Silty clay. the same lithology as 3H-2, 0.0-118.0 cm.

3H-2, 142.0 cm.

68.5-68.5 cm. Patch. dark spot.

101.5-101.5 cm. Patch. dark spot.

114.0-114.0 cm. Patch. Scoria sand, patch.

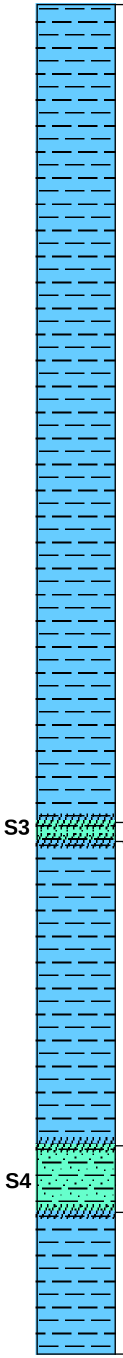
33.0-33.0 cm. Shell fragments.Shell fragment.

84.5-84.5 cm. Shell fragments.Shell fragment.

901-C9002A-3H-3; 0.0–1.42

depth Interval (m)	section photo	lithology!distribution	sedimentary structure!distribution Sedimentary structures	Lithologic accesories	Fossils	drilling!disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400



3H-3, 0.0 cm.

Silty clay. visual description. Olive gray silty clay bearing foraminifera

3H-3, 86.0 cm. gradual contact.

Sandy clay. visual description. Olive gray sandy clay

3H-3, 88.0 cm. gradual contact.

Silty clay. the same lithology as 3H-3, 0.0-86.0 cm.

3H-3, 120.0 cm. gradual contact.

Sandy clay. the same lithology as 3H-3, 86.0-88.0 cm.

3H-3, 127.0 cm. gradual contact.

Silty clay. the same lithology as 3H-3, 0.0-86.0 cm.

3H-3, 141.9 cm.

42.0-42.0 cm. Gravel. Sandstone (greywache), angular granule (diameter 3mm).

30.0-32.0 cm. Foraminifer.foraminifers.

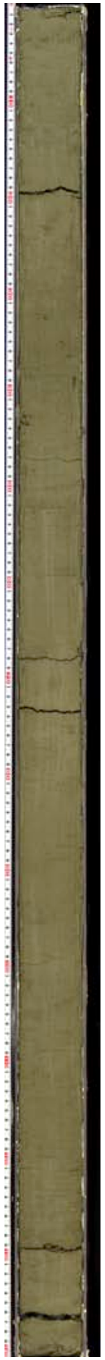
104.0-104.0 cm. Foraminifer.foraminifers.

130.0-133.0 cm. Foraminifer.foraminifers.

901-C9002A-3H-4; 0.0–1.41

depth Interval (m) | section photo | lithology-distribution | sedimentary structure-distribution Sedimentary structures | Lithologic accesories | Fossils | drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400



3H-4, 0.0 cm.

Silty clay. visual description. olive black massive silty clay, w/ foraminifera

3H-4, 140.7 cm.

99.9-99.9 cm. Patch. light gray ash patch.

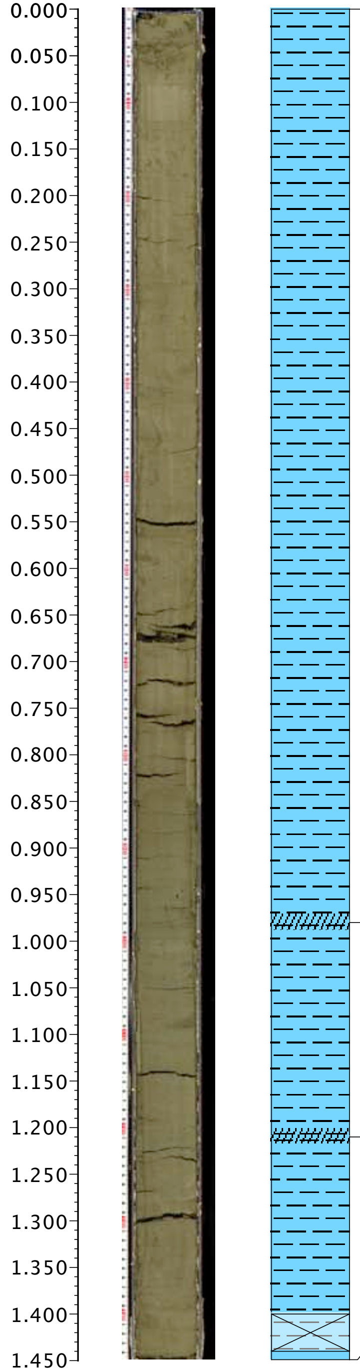
28.0-28.0 cm. Shell fragments.Shell fragment.

76.0-76.0 cm. Shell fragments.Shell fragment.

125.5-125.5 cm. Shell fragments.Shell fragment.

901-C9002A-3H-5; 0.0–1.45

depth Interval (m) | section photo | lithology-distribution | sedimentary structure-distribution Sedimentary structures | Lithologic accesories | Fossils | drilling-disturbance Drilling Disturbance



3H-5, 0.0 cm.

Silty clay. visual description. Olive black silty clay, massive

3H-5, 98.0 cm. gradual contact.

Silty clay. visual description. Olive balck / olive gray, gradually changed

3H-5, 121.0 cm. gradual contact.

Silty clay. visual description. Olive gray

3H-5, 144.9 cm.

93.8-93.8 cm. Patch. black patch.

94.8-95.3 cm. Gravel. sub-rounded granule, 0.3x0.4cm, dark gray, chart?.

130.9-130.9 cm. Gravel.sub-angular granule, 0.15x0.2cm, dark gra, chart?.

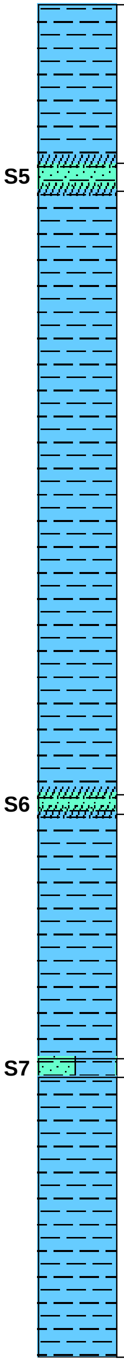
132.0-132.0 cm. Gravel.sub-angular granule, 0.15x0.3cm, dark gray, chart?.

0.0-89.0 cm. Foraminifer.

901-C9002A-3H-6; 0.0–1.45

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedimentary structures | Lithologic accesories | Fossils | drilling!disturbance Drilling Disturbance

0.000 0.050 0.100 0.150 0.200 0.250 0.300 0.350 0.400 0.450 0.500 0.550 0.600 0.650 0.700 0.750 0.800 0.850 0.900 0.950 1.000 1.050 1.100 1.150 1.200 1.250 1.300 1.350 1.400 1.450



3H-6, 0.0 cm.

Silty clay. visual description. Olive black silty clay

3H-6, 17.0 cm. gradual contact.

Sandy clay. visual description. Olive black silty to sandy clay bearing shell fragments (correlated with sandy clay at C9002B-1H-4 0-3)

3H-6, 20.0 cm. gradual contact.

Silty clay. visual description. Olive black silty clay bearing foraminifera

3H-6, 84.7 cm. gradual contact.

Sandy clay. visual description. Sandy clay

3H-6, 86.8 cm. gradual contact.

Silty clay. the same lithology as 3H-6, 20.0-84.7 cm.

3H-6, 113.0 cm.

alternation of (1) sandy clay (1.0 cm) and (2) Silty clay (1.0 cm). sandy clay (lithology of alternation member 1). visual description. sandy clay lens Silty clay (lithology of alternation member 2). the same lithology as 3H-6, 20.0-84.7 cm.

3H-6, 115.0 cm.

Silty clay. the same lithology as 3H-6, 20.0-84.7 cm.

3H-6, 145.0 cm.

Sedimentary structures:

69.0-69.0 cm. Patch. black patch.

76.0-77.0 cm. Patch. brownish.

Lithologic accesories:

37.0-37.0 cm. Pumice. altered pumice granule.

131.0-131.0 cm. Gravel.Sandstone granule.

Fossils:

17.0-20.0 cm. Shell fragments.

35.0-67.5 cm. Foraminifer.slightly rich forams..

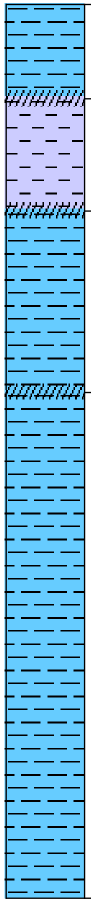
86.0-140.0 cm. Foraminifer.Slightly rich foraminifers.

901-C9002A-3H-7; 0.0–1.0

depth Interval (m)	section photo	lithology!distribution	sedimentary structure!distribution Sedimentary structures	Lithologic accesories	Fossils	drilling!disturbance Drilling Disturbance

0.000 0.050 0.100 0.150 0.200 0.250 0.300 0.350 0.400 0.450 0.500 0.550 0.600 0.650 0.700 0.750 0.800 0.850 0.900 0.950

T10



3H-7, 0.0 cm.

Silty clay. visual description. Olive black silty clay, massive

3H-7, 10.5 cm. gradual contact.

Clayey silt. visual description. olive black clayey silt containing ash

3H-7, 23.0 cm. gradual contact.

Silty clay. visual description. olive black silty clay containing ash

3H-7, 43.2 cm. gradual contact.

Silty clay. the same lithology as 3H-7, 0.0-10.5 cm.

3H-7, 99.5 cm.

Sedimentary structures

18.0-18.0 cm. Patch. rhyolitic tephra.

18.5-20.0 cm. Patch. rhyolitic tephra.

21.8-23.6 cm. Patch. rhyolitic tephra.

23.0-23.0 cm. Patch. rhyolitic tephra.

55.8-57.7 cm. Patch. greenish black tephra.

Lithologic accesories

86.4-86.4 cm. Gravel. diameter 4mm.

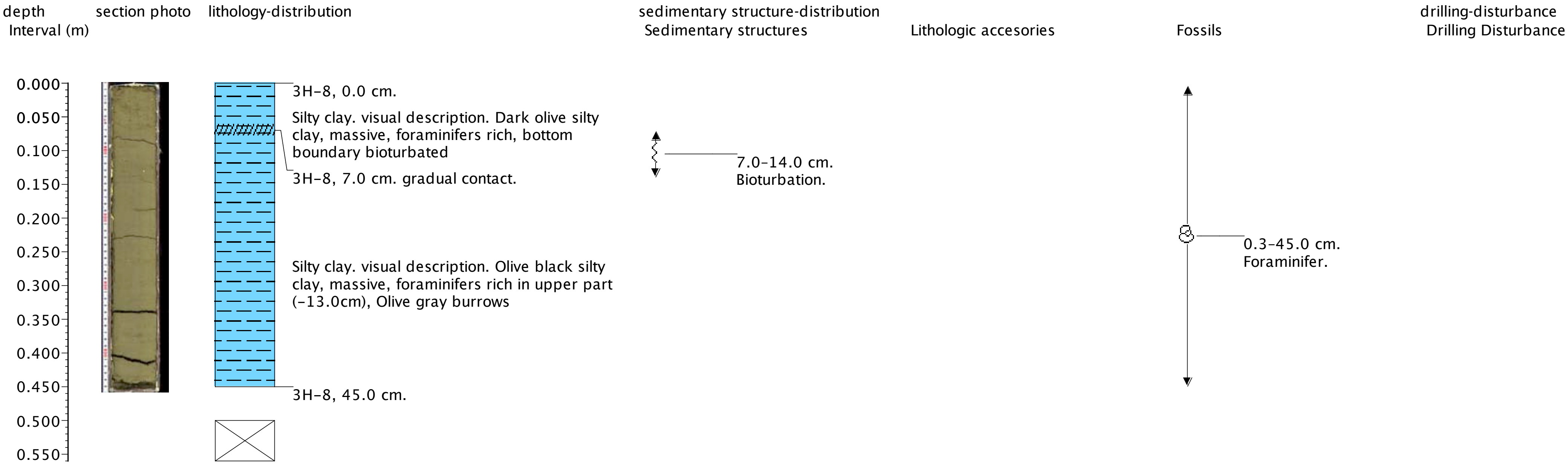
Fossils

6.7-6.7 cm. Foraminifer.

60.0-60.0 cm. Shell fragments.

79.5-79.5 cm. Shell fragments.

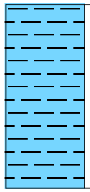
901-C9002A-3H-8; 0.0–0.56



901-C9002A-3H-CC; 0.0–0.21

depth Interval (m) | section photo | lithology-distribution | sedimentary structure-distribution Sedimentary structures | Lithologic accesories | Fossils | drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200



3H–CC, 0.0 cm.

Silty clay. visual description. Silty clay, massive

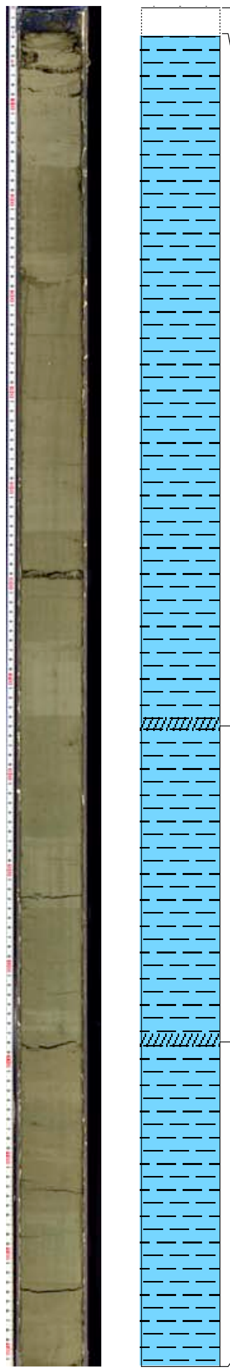
3H–CC, 21.0 cm.

3.1–3.1 cm. Shell fragments.

13.0–13.3 cm. Shell fragments.

901-C9002B-1H-1; 0.0–1.42

depth Interval (m) | section photo | lithology-distribution | sedimentary structure-distribution Sedimentary structures | Lithol... | Fossils | drilling-disturbance Drilling Disturbance



depth Interval (m)
0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400

1H–1, 0.0 cm.

Empty. visual description.

1H–1, 2.7 cm.

Silty clay. visual description. Dark olive – olive gray Silty clay, massive

37.0–37.0 cm. Shell fragments.

1H–1, 75.0 cm. gradual contact.

77.8–77.8 cm. Patch.dark gray patches.

81.0–81.0 cm. Patch.dark gray patches.

83.9–83.9 cm. Patch.dark gray patches.

85.0–85.0 cm. Patch.dark gray patches.

Silty clay. visual description. blackish fine–sand scattered

92.5–92.5 cm. Patch.dark gray pathces.

106.0–107.3 cm. Patch. blackish fine sand patch.

1H–1, 108.0 cm. gradual contact.

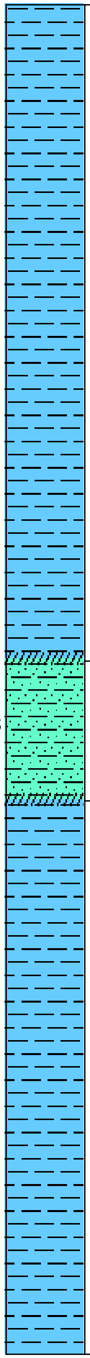
Silty clay. visual description. Olive gray silty clay with some foraminifera

1H–1, 141.9 cm.

901-C9002B-1H-2; 0.0–1.4

depth Interval (m)	section photo	lithology!distribution	sedimentary structure!distribution Sedimentary structures	Lithologic accesories	Fossils	drilling!disturbance Drilling Disturbance

S8



0.000 – 1H-2, 0.0 cm.

0.300 – 29.5-29.5 cm. Shell fragments.

0.350 – Silty clay. visual description. Olive gray

0.600 – 60.0-60.0 cm. Gravel. diameter 9mm.

0.650 – 1H-2, 67.6 cm. gradual contact.

0.750 – Sandy clay. visual description. Sandy clay, dark grayish sand concentrrated in some horizons

0.800 – 81.0-81.0 cm. Gravel. diameter 4mm.

0.850 – 1H-2, 82.0 cm. gradual contact.

0.900 – 89.0-89.0 cm. Gravel. diameter 1cm rounded .

1.100 – Silty clay. the same lithology as 1H-2, 0.0-67.6 cm.

1.150 – 113.0-113.0 cm. Others.dark spot.

1.300 – 115.0-140.0 cm. Bioturbation.

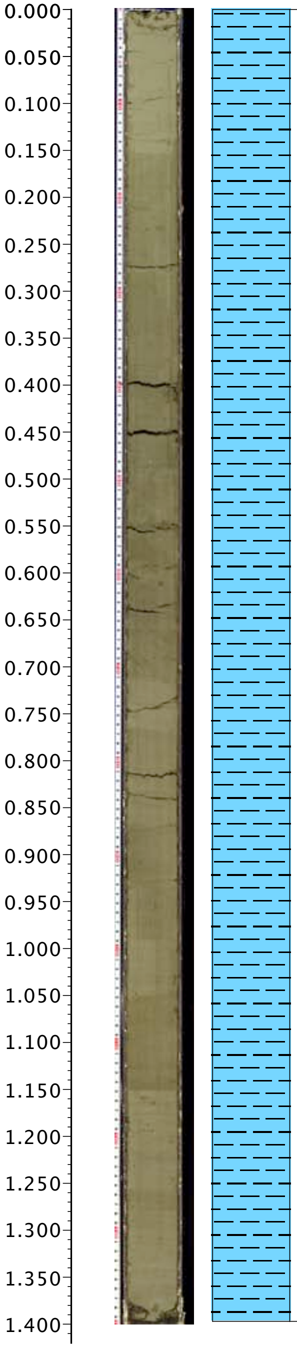
1.300 – 130.0-130.0 cm. Others.dark spot.

1H-2, 139.0 cm.

Depth scale (m): 0.000, 0.050, 0.100, 0.150, 0.200, 0.250, 0.300, 0.350, 0.400, 0.450, 0.500, 0.550, 0.600, 0.650, 0.700, 0.750, 0.800, 0.850, 0.900, 0.950, 1.000, 1.050, 1.100, 1.150, 1.200, 1.250, 1.300, 1.350

901-C9002B-1H-3; 0.0–1.42

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance



1H–3, 0.0 cm.

115.0–140.0 cm. Bioturbation.

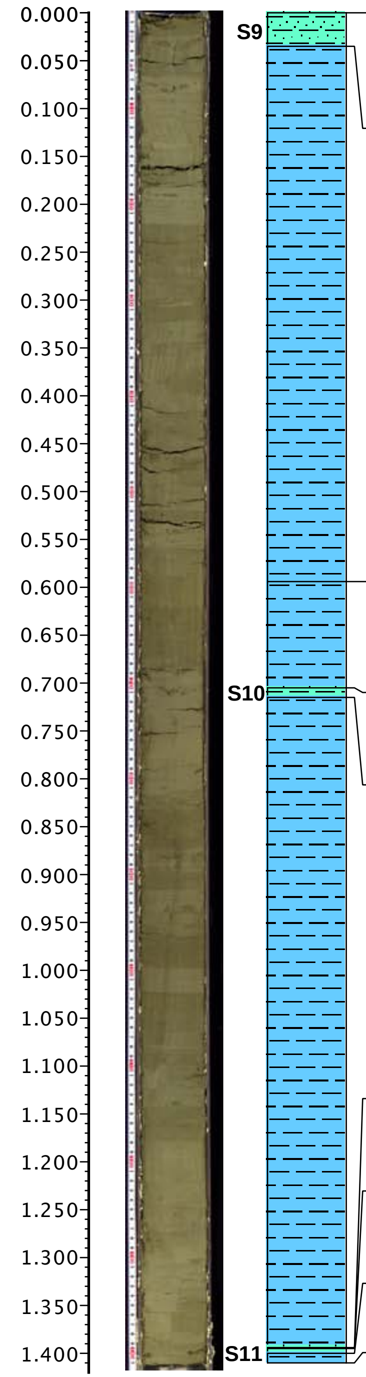
Silty clay. visual description. Olive black silty clay bearing foraminifera, massive

114.0–114.0 cm. Others. blackish lens.

1H–3, 139.7 cm.

901-C9002B-1H-4; 0.0–1.42

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedimentary structures | Lithologic accesories | Fossils | drilling!disturbance Drilling Disturbance



1H-4, 0.0 cm.

Sandy clay. visual description. olive black, fine-sandy clay bearing foraminifera (correlated with sandy clay at C9002A-3H-6 17-20)

1H-4, 3.5 cm.

Silty clay. visual description. Grayish olive sulty clay

1H-4, 59.4 cm.

Silty clay. visual description. Grayish olive silty clay bearing foraminfers in common

1H-4, 70.5 cm.

Sandy clay. visual description. fine-sandy clay bearing foraminifers

1H-4, 71.5 cm.

silty clay. visual description. grayish olive silty clay bearing foraminifer commonly

1H-4, 139.4 cm.

Sandy clay. the same lithology as 1H-4, 70.5-71.5 cm.

1H-4, 139.5 cm.

sandy clay. visual description. fine sandy clay bearing foraminifers

1H-4, 140.0 cm.

silty clay. visual description.

1H-4, 141.0 cm.

Sedimentary structures: 60.0-70.0 cm. Bioturbation.visible bioturbation.

Lithologic accesories: 69.0-69.0 cm. Gravel. bluish gray fine tuff fragment, diameter 4mm.

Fossils:

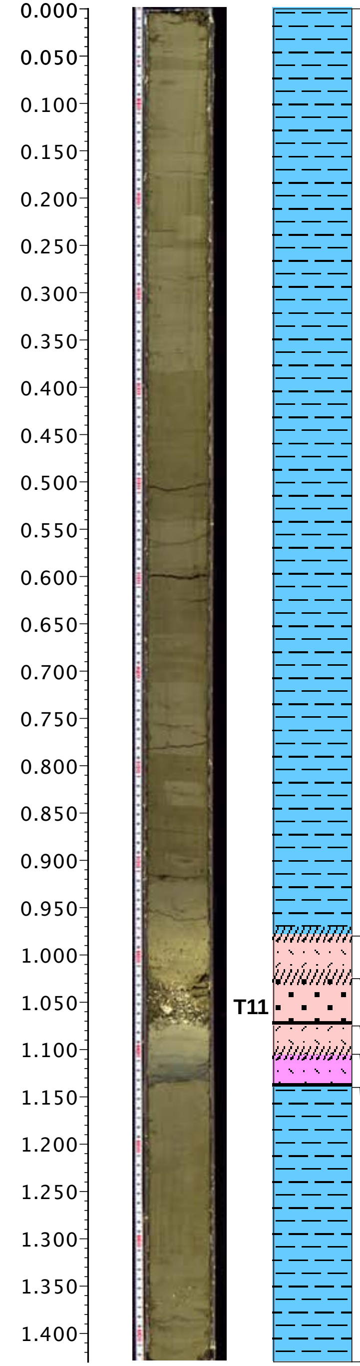
0.0-4.0 cm. Foraminifer.

26.0-26.0 cm. Foraminifer.

49.1-139.3 cm. Foraminifer.

901-C9002B-1H-5; 0.0–1.43

depth Interval (m) | section photo | lithology-distribution | sedimentary structure-distribution Sedimentary structures | Lithologic accesories | Fossils | drilling-disturbance Drilling Disturbance



1H-5, 0.0 cm.

Silty clay. visual description. Massive, bearing foraminifera

1H-5, 98.0 cm. gradual contact.

Ashy clay. visual description. Massive ashy clay, with pumice granules (< 3 mm phi, angluar)

1H-5, 102.5 cm. gradual contact.

Pumice. visual description. Pumiceous tephra, < 1 mm ~ 1.3 mm phi, subrounded ~ angular

1H-5, 107.5 cm. sharp contact.

Ashy clay. visual description. Ashy silty clay, massive

1H-5, 110.5 cm. gradual contact.

Tephra. visual description. tephra, scoriaceous, dark-grayish, very fine grained

1H-5, 114.0 cm. sharp contact.

Silty clay. the same lithology as 1H-5, 0.0-98.0 cm.

1H-5, 143.0 cm.

Sedimentary structures: 102.0-107.6 cm. Graded Bedding (Normal).

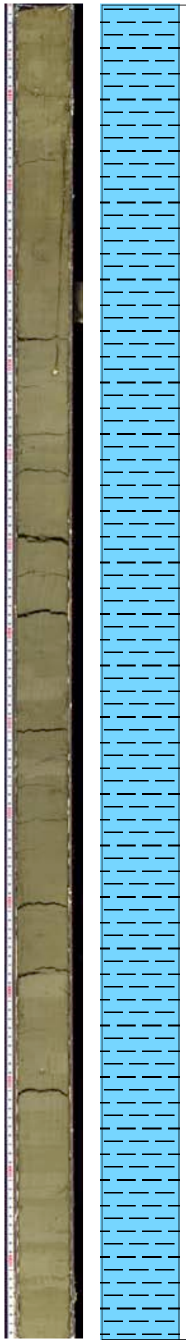
Lithologic accesories: 97.9-103.3 cm. Pumice.pumice angular granules, ~3 mm in diameter.

Fossils: 125.9-137.0 cm. Shell fragments.

901-C9002B-1H-6; 0.0–1.49

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance

0.000 0.050 0.100 0.150 0.200 0.250 0.300 0.350 0.400 0.450 0.500 0.550 0.600 0.650 0.700 0.750 0.800 0.850 0.900 0.950 1.000 1.050 1.100 1.150 1.200 1.250 1.300 1.350 1.400 1.450



1H–6, 0.0 cm.

Silty clay. visual description. Olive black silty clay bearing foraminifera, massive

1H–6, 149.0 cm.

Lithologic accesories:

9.0–9.0 cm. Gravel.

41.0–41.0 cm. Pumice. pumice, diameter 8mm.

49.2–49.8 cm. Pumice. Pumice, diameter 1mm.

82.8–83.0 cm. Others. blackish lens.

110.0–110.0 cm. Pumice.Pumice, diameter 1mm.

Fossils:

5.2–6.8 cm. Shell fragments.

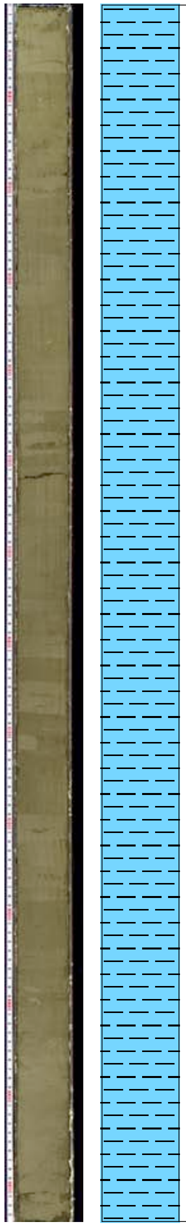
13.3–15.2 cm. Foraminifer.

118.6–119.3 cm. Shell fragments.

135.5–135.5 cm. Shell fragments.

901-C9002B-1H-7; 0.0–1.47

depth Interval (m) | section photo | lithology-distribution | sedimentary structure-distribution Sedimentary structures | Lithologic accesories | Fossils | drilling-disturbance Drilling Disturbance



0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450

1H-7, 0.0 cm.

Silty clay. visual description. Olive black Silty clay bearing foraminifers, massive

1H-7, 134.0 cm.

Lithologic accesories:

10.0-10.2 cm. Gravel. pumice, diameter 1mm.

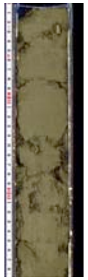
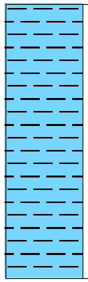
36.7-37.2 cm. Pumice. Pumice.

Fossils:

12.7-13.4 cm. Shell fragments.

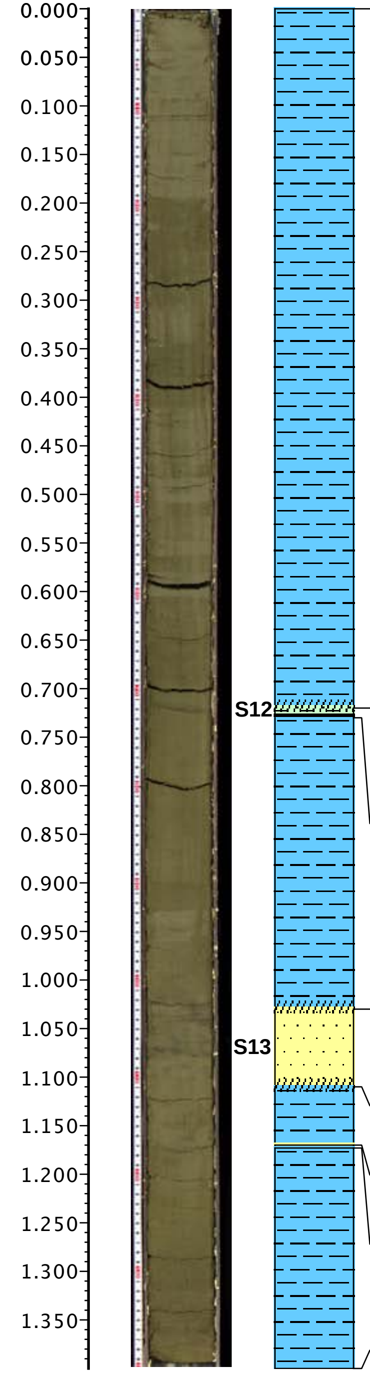
82.7-83.9 cm. Foraminifer.

901-C9002B-1H-CC; 0.0–0.29

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance
0.000 0.050 0.100 0.150 0.200 0.250		 1H–CC, 0.0 cm. Silty clay. visual description. Olive black Silty clay, massive 1H–CC, 29.0 cm.		2.2–3.3 cm. Pumice.light gray pumice, sub-angular: 0.5x1.1cm; . 14.3–15.4 cm. Pumice. light gray pumice fragment, angular: 0.3 x1.1cm. 18.7–19.5 cm. Gravel. sub-rounded pebble, black chart, 0.3x0.5cm. 21.2–21.6 cm. Pumice. sub-rounded pumice: 0.2x0.4 cm; light gray.	6.0–6.6 cm. Foraminifer. 15.0–27.0 cm. Foraminifer.foraminifers scattering.	

901-C9002B-2H-1; 0.0–1.4

depth Interval (m)	section photo	lithology!distribution	sedimentary structure!distribution Sedimentary structures	Lithologic ...	Fossils	drilling!disturbance Drilling Disturbance



2H-1, 0.0 cm.

Silty clay. visual description. Olive black silty clay bearing few foraminifers, massive

2H-1, 72.0 cm. gradual contact.

Sandy silt. visual description. Olive black foraminifer rich sandy silt (5mm thick), relatively sharp and tilted base and gradual top graded into silty clay

2H-1, 73.0 cm. sharp contact.

Silty clay. the same lithology as 2H-1, 0.0-72.0 cm.

71.0-73.7 cm. Graded Bedding (Normal).

2H-1, 103.0 cm. gradual contact.

Fine sand. visual description. Olive black fine sand interfingered with olive black silty clay

2H-1, 111.0 cm. gradual contact.

Silty clay. the same lithology as 2H-1, 0.0-72.0 cm.

2H-1, 117.0 cm.

sand. visual description. olive black fine sand lens

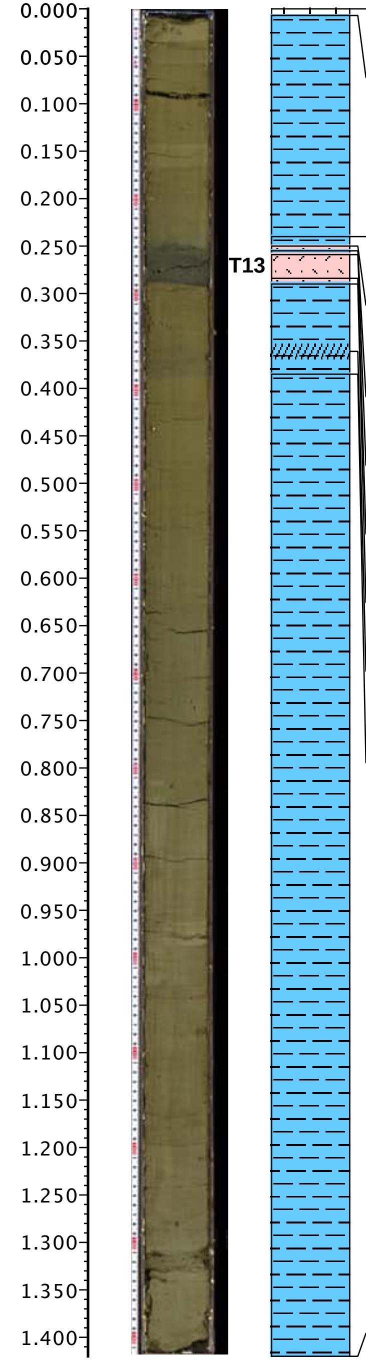
2H-1, 117.3 cm.

Silty clay. the same lithology as 2H-1, 0.0-72.0 cm.

2H-1, 140.0 cm.

901-C9002B-2H-2; 0.0–1.42

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedimentary structures | Lithologic accesories | Fossils | drilling!disturbance Drilling Disturbance



2H-2, 0.0 cm.

empty . visual description. empty

2H-2, 0.7 cm.

Silty clay. visual description. Grayish olive silty clay bearing few foraminifers

2H-2, 24.0 cm.

Silty clay. visual description. Olive black silty clay

2H-2, 25.0 cm.

ash. visual description. dark olive gray, lithic-cryst (Qtz rich) volc. fss (ash) w/glass

2H-2, 25.5 cm. sharp contact.

Silty clay. the same lithology as 2H-2, 24.0-25.0 cm.

2H-2, 25.9 cm. sharp contact.

ash. the same lithology as 2H-2, 25.0-25.5 cm.

2H-2, 28.4 cm. gradual contact.

ash. visual description. black, lithic-crystal volcanic fine sand (ash)

2H-2, 29.0 cm. sharp contact.

Silty clay. visual description. glayish olive silty clay

2H-2, 36.1 cm. gradual contact.

Silty clay. visual description. olive black silty clay, slightly sharp base and graduall top

2H-2, 38.5 cm.

silty clay. visual description. grayish olive silty clay bearing few foraminifers

2H-2, 142.0 cm.

Sedimentary structures:

24.9-29.0 cm. Graded Bedding (Normal).

134.9-137.0 cm. Patch.brownish patches.

Lithologic accesories:

73.0-73.7 cm. Pumice.pumice granule, angular.

81.2-81.3 cm. Gravel.sandstone granule, angular.

Fossils:

20.0-20.2 cm. Shell fragments.

33.0-33.2 cm. Shell fragments.

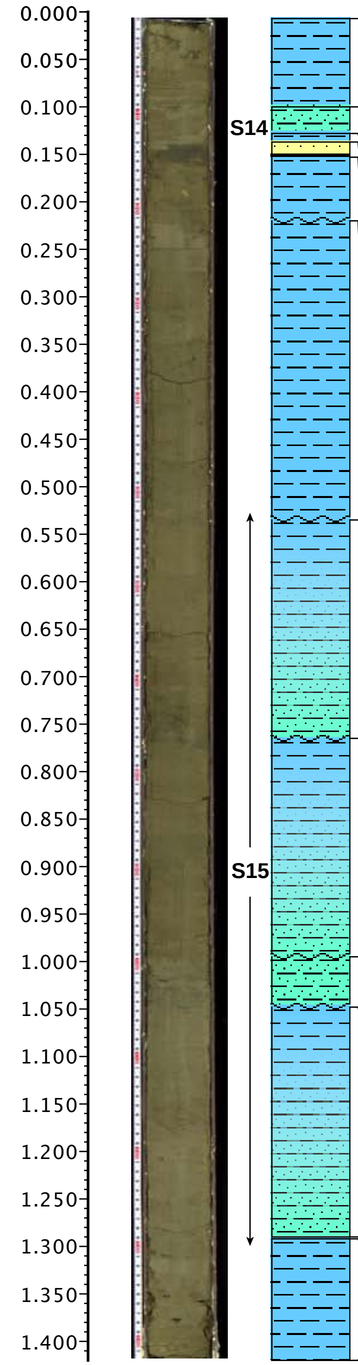
43.0-43.2 cm. Shell fragments.

97.0-97.2 cm. Shell fragments.

117.4-129.5 cm. Foraminifer.relatively rich.

901-C9002B-2H-3; 0.0–1.42

depth Interval (m)	section photo	lithology!distribution	sedimentary structure!distribution Sedimentary structures	Lithologic accesories	Fossils	drilling!disturbance Drilling Disturbance



Lithology

2H-3, 0.7 cm.

Silty clay. visual description. olive gray silty clay, massive

2H-3, 10.0 cm.

sandy clay. visual description. very fine sand rich

2H-3, 12.8 cm.

clay. visual description. olive gray clay

2H-3, 13.7 cm.

sand. visual description. gray fine sand, with wavy base and some patches

2H-3, 15.3 cm. sharp contact. wavy boundary

clay. visual description. olive gray clay, with wavy bioturbated? base

2H-3, 22.0 cm. wavy contact. bioturbated?

silty clay. visual description. olive gray silty clay, massive,

2H-3, 53.5 cm. wavy contact. bioturbated

gradation from sandy clay to silty clay. sandy clay (bottom end lithology). visual description. olive gray very fine sandy sily clay, with wavy base silty clay (top end lithology). visual description. grayish olive silty clay, with bioturbated top

2H-3, 76.5 cm. wavy contact.

gradation from sandy silt to silty clay. sandy silt (bottom end lithology). visual description. olive gray very fine sand scattered, wavy base silty clay (top end lithology). visual description. olive gray siltiy clay

2H-3, 99.5 cm. wavy contact.

sandy clay. visual description. olive black very fine sandy silty clay, with wavy base. turbidite?

2H-3, 104.8 cm. wavy contact.

gradation from sandy clay to silty clay. sandy clay (bottom end lithology). visual description. grayish olive very fine sand rich caly silty clay (top end lithology). visual description. grayish olive silty clay, with very fine sand scattering, bioturbation, upward fining from very fine sandy clay

2H-3, 129.0 cm.

2H-3, 129.2 cm.

silty clay. visual description. grayish olive silty clay, massive

2H-3, 142.0 cm.

Sedimentary structures

19.0-22.0 cm. Patch.very fine sand rich patches.

36.2-36.3 cm. Patch.brownish patch, 1 mm in diameter.

40.5-40.8 cm. Patch.brownish patch.

53.5-53.6 cm. Bioturbation.

53.5-78.1 cm. Graded Bedding (Normal).

76.5-99.5 cm. Graded Bedding (Normal).

104.8-129.0 cm. Bioturbation.

104.8-129.0 cm. Graded Bedding (Normal).

Lithologic accesories

35.7-36.0 cm. Gravel.sub-rounded dark gray granule, 2mm x 3 mm.

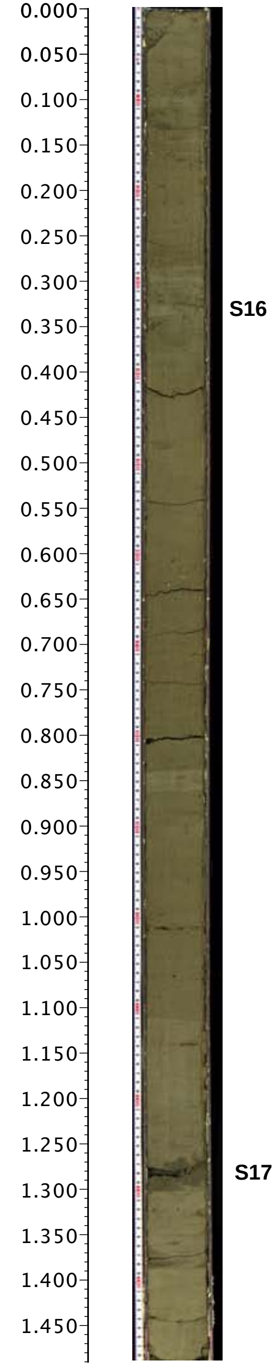
124.7-125.4 cm. Gravel.dark gray granule, sub-angular, 2 x 4 mm.

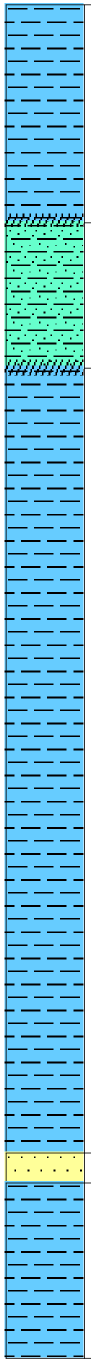
Fossils

18.3-18.5 cm. Shell fragments.

901-C9002B-2H-4; 0.0–1.49

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance





2H-4, 0.0 cm.

silty clay. visual description.

2H-4, 24.0 cm. gradual contact.

sandy clay. visual description. heterogeneous sand content

2H-4, 40.0 cm. gradual contact.

silty clay. the same lithology as 2H-4, 0.0-24.0 cm.

2H-4, 126.4 cm.

sand. visual description. olive gray very fine sand

2H-4, 129.7 cm.

silty clay. the same lithology as 2H-4, 0.0-24.0 cm.

2H-4, 149.0 cm.

Sedimentary structures

13.0-14.0 cm. Patch. dark gray very fine sand patch.

16.5-16.7 cm. Patch. light gray very fine sand patch.

119.9-120.0 cm. Patch. dark spot.

Lithologic accesories

61.0-61.3 cm. Pumice. pumice, 3 mm in diameter.

126.0-126.6 cm. Gravel. chert pebble, 6 mm in diameter.

144.0-144.5 cm. Gravel. scoria granule, angular, 5 mm in diameter.

Fossils

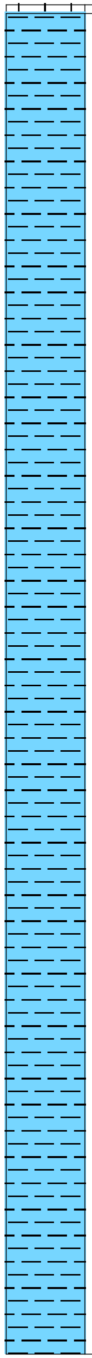
34.0-34.0 cm. Shell fragments.

99.0-99.1 cm. Shell fragments.

901-C9002B-2H-5; 0.0–1.4

depth Interval (m)	section photo	lithology-distribution		sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350



2H-5, 0.0 cm.
Empty. visual description.
2H-5, 0.9 cm.

silty clay. visual description. olive black sity clay bearing foraminfer

2H-5, 139.0 cm.

69.5-70.5 cm.
Gravel.chert
pebble, rounded,
1 cm in diameter.

85.0-85.1 cm.
Patch.very fine
sand patch,
scoriaceous.

117.0-117.1 cm.
Shell fragments.

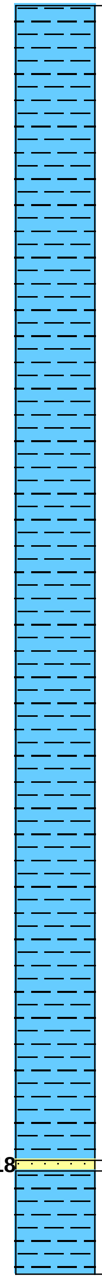
131.0-131.4 cm.
Gravel.scoria
granule, angular,
4 mm in
diameter.

901-C9002B-2H-6; 0.0–1.41

depth Interval (m)	section photo	lithology!distribution	sedimentary structure!distribution Sedimentary structures	Lithologic accesories	Fossils	drilling!disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400

S18



2H-6, 0.5 cm.

silty clay. visual description.

2H-6, 120.2 cm.

sand. visual description. scoriaceous very fine sand patch. mix of white and dark gray sands

2H-6, 121.3 cm.

silty clay. the same lithology as 2H-6, 0.5-120.2 cm.

2H-6, 132.0 cm.

Lithologic accesories:

11.5-12.1 cm. Gravel.scoria, angular, 6 mm in diameter.

22.5-23.1 cm. Gravel.scoria, angular, 6 mm in diameter.

31.0-33.0 cm. Pumice.pumice pebble, angular, 2.8 cm x 0.5 cm, containing euhedral Hbl.

97.5-98.0 cm. Gravel.scoria pebble, sub-rounded, 5 mm in diameter.

98.3-100.8 cm. Pumice. pumice pebble, angular, 8 mm in diameter.

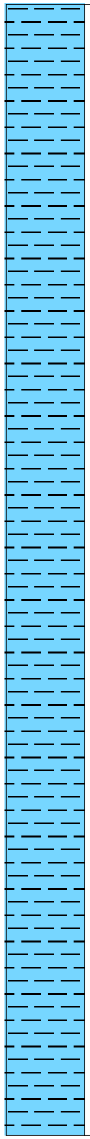
Fossils:

95.0-95.2 cm. Shell fragments.

901-C9002B-2H-7; 0.0–1.23

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200



2H-7, 0.0 cm.

silty clay. visual description. olive black silty clay, massive, bearing foraminifers

2H-7, 118.0 cm.

33.0-33.0 cm. Shell fragments.

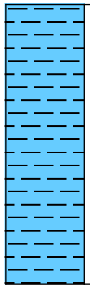
42.1-43.0 cm. Gravel.chert pebble, sub-angular, 4 mm in diameter.

82.0-82.1 cm. Shell fragments.

901-C9002B-2H-CC; 0.0–0.33

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedimentary structures | Lithologic accesories | Fossils | drilling!disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300



2H-CC, 0.0 cm.

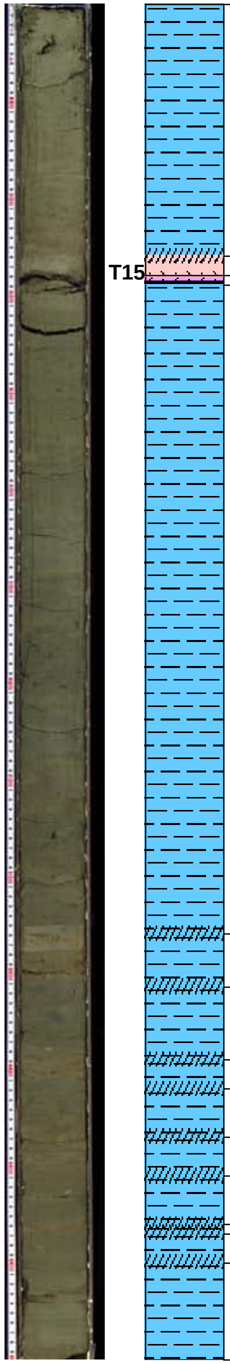
silty clay. visual description. olive black silty clay bearing foraminifers

2H-CC, 29.0 cm.

901-C9002B-3H-1; 0.0–1.4

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedimentary structures | Lithologic accesories | Fossils | drilling!disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350



3H-1, 0.0 cm.

silty clay. visual description. olive black to olive gray silty clay with intense horizontal bioturbation

3H-1, 26.0 cm. gradual contact.

ash. visual description. olive gray volcanic clay (ash), interfingered with silty clay

3H-1, 28.0 cm.

ash. visual description. olive black volcanic very fine sand (crystal-lithic ash)

3H-1, 29.0 cm. sharp contact. eroded base

silty clay. visual description. olive black to olive gray silty clay with internse horizontal bioturbation

3H-1, 96.0 cm. gradual contact.

silty clay. visual description. alternating beds of grayish olive and olive black silty clay, with moderate bioturbation, gradual boundary in top and base

3H-1, 101.5 cm. gradual contact.

silty clay. the same lithology as 3H-1, 29.0-96.0 cm.

3H-1, 109.0 cm. gradual contact.

silty clay. the same lithology as 3H-1, 96.0-101.5 cm.

3H-1, 112.0 cm. gradual contact.

silty clay. the same lithology as 3H-1, 29.0-96.0 cm.

3H-1, 117.0 cm. gradual contact.

silty clay. the same lithology as 3H-1, 96.0-101.5 cm.

3H-1, 121.0 cm. gradual contact.

silty clay. the same lithology as 3H-1, 29.0-96.0 cm.

3H-1, 126.0 cm. gradual contact.

silty clay. the same lithology as 3H-1, 96.0-101.5 cm.

3H-1, 127.0 cm. gradual contact.

silty clay. the same lithology as 3H-1, 29.0-96.0 cm.

3H-1, 130.0 cm. gradual contact.

silty clay. visual description. olive black sity clay, massive

3H-1, 140.0 cm.

Sedimentary structures

0.0-26.0 cm. Heavy Bioturbation.

29.0-96.0 cm. Heavy Bioturbation.

96.0-101.5 cm. Bioturbation.

101.5-109.0 cm. Heavy Bioturbation.

109.0-112.0 cm. Bioturbation.

111.9-117.0 cm. Heavy Bioturbation.

117.0-121.0 cm. Bioturbation.

121.0-126.0 cm. Heavy Bioturbation.

125.9-127.1 cm. Bioturbation.

127.0-130.0 cm. Heavy Bioturbation.

Lithologic accesories

66.3-66.5 cm. Gravel.2mm in diameter.

87.0-87.0 cm. Gravel.sandstone granule, 4mm in diameter.

99.0-99.2 cm. Pumice.pumice granule, 2mm in diameter, angular.

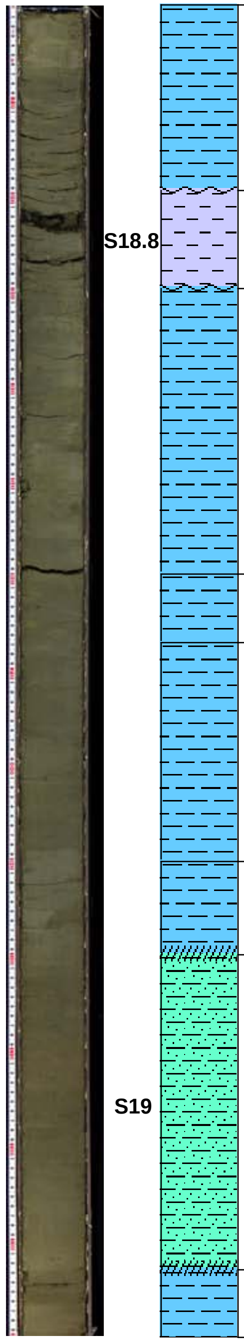
Fossils

108.5-108.5 cm. Shell fragments.

123.0-123.2 cm. Shell fragments.

901-C9002B-3H-2; 0.0–1.4

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedimentary structures | Litholog... Fossils | drilling!disturbance Drilling Disturbance



3H-2, 0.0 cm.

silty clay. visual description. olive gray silty clay with burrows, bioturbation

3H-2, 19.5 cm. wavy contact. conboluted

silt. visual description. olive gray silty clay intercalating silt rich layers bearing partly concentrated very fine sand, with coboluted base

3H-2, 29.8 cm. wavy contact.

silty clay. the same lithology as 3H-2, 0.0-19.5 cm.

3H-2, 59.8 cm.

silty clay. visual description. olive gray silty clay, moderately silt rich

3H-2, 67.0 cm.

silty clay. the same lithology as 3H-2, 0.0-19.5 cm.

3H-2, 90.0 cm.

silty clay. visual description. olive gray silty clay, massive

3H-2, 99.8 cm. gradual contact.

sandy clay. visual description. olive gray very fine sandy clay, massive, gradually changing to adjacent lithology

3H-2, 132.9 cm. gradual contact.

silty clay. visual description. olive gray silty clay, massive

3H-2, 140.0 cm.

0.0-19.5 cm. Heavy Bioturbation.

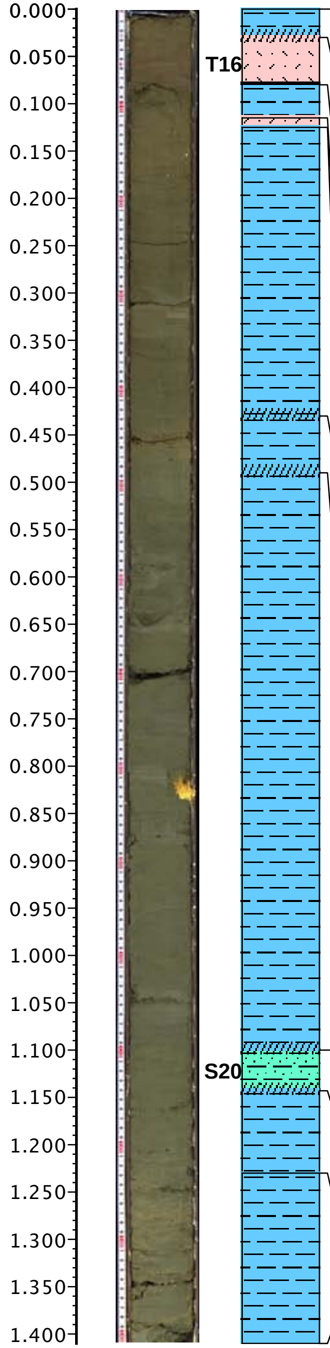
23.1-26.4 cm. Patch.light-grey tephra patch (very-fine sand).

30.0-90.0 cm. Heavy Bioturbation.

100.0-112.0 cm. Foraminifer.

901-C9002B-3H-3; 0.0–1.41

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedimentary structures | Lithologic accesories | Fossils | drilling!disturbance Drilling Disturbance



Lithology

3H-3, 0.0 cm.
silty clay. visual description. grayish olive silty clay
3H-3, 3.0 cm. gradual contact.
silty fine sand (ash). visual description. graish olive silty fine volcanic sand (ash) with sharp base
3H-3, 8.0 cm. sharp contact.
silty clay. visual description. olive black silty clay, massive
3H-3, 11.5 cm.
silty fine sand (ash). visual description. grayish olive gray silty fine sand (ash) lens
3H-3, 12.5 cm.
silty clay. visual description. olive black silty clay bearing shell fragments and pumice gravels, massive
3H-3, 43.0 cm. gradual contact.
silty clay. visual description. horizontally bioturbated alternating beds of olive black and grayish olive silty clays
3H-3, 49.0 cm. gradual contact.
silty clay. visual description. olive black silty clay bearing shell fragments
3H-3, 110.0 cm. gradual contact.
sandy clay. visual description.
3H-3, 114.3 cm. gradual contact.
silty clay. the same lithology as 3H-3, 49.0-110.0 cm.
3H-3, 123.0 cm.
silty clay. the same lithology as 3H-3, 43.0-49.0 cm.
3H-3, 141.0 cm.

Sedimentary structures

3.0-8.0 cm. Graded Bedding (Normal).
43.0-49.0 cm. Bioturbation.horizontal.
95.0-96.0 cm. Bioturbation.weak, horizontal.
123.0-140.0 cm. Bioturbation.

Lithologic accesories

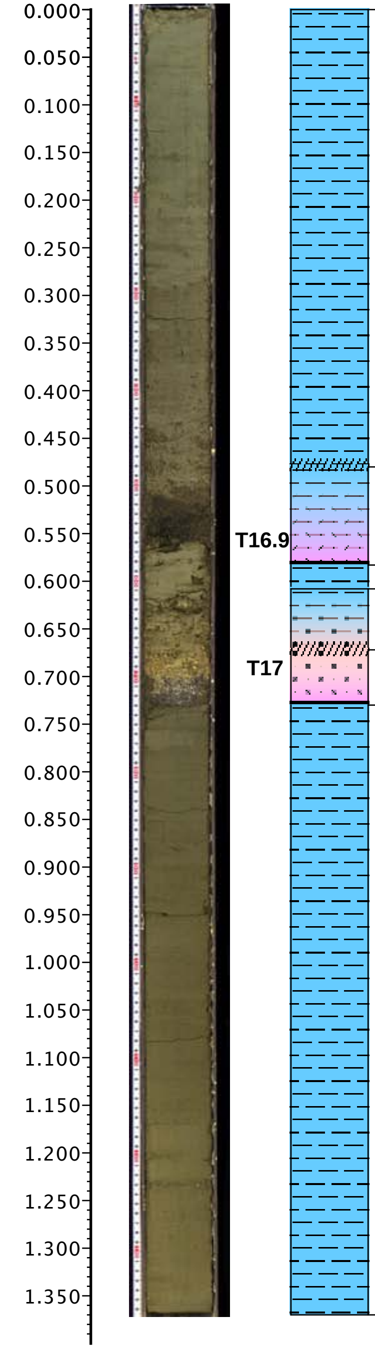
11.2-12.0 cm. Pumice. pumice granule, angular.
81.5-83.5 cm. Calcareous. calcite crystal pocket, medium sand size .

Fossils

17.5-17.5 cm. Shell fragments.

901-C9002B-3H-4; 0.0–1.4

depth Interval (m)	section photo	lithology!distribution	sedimentary structure!distribution Sedimentary structures	Lithologic accesories	Fossils	drilling!disturbance Drilling Disturbance



3H-4, 0.0 cm.

silty clay. visual description. olive black to olive gray silty clay bearing foraminifera, with holizontal bioturbation

3H-4, 48.0 cm. gradual contact.

gradation from sand (ash) to silty clay. sand (ash) (bottom end lithology). visual description. dark gray scoriaceous fine to medium sand (ash), with sharp base and gradual top silty clay (top end lithology). the same lithology as 3H-4, 0.0-48.0 cm.

3H-4, 58.3 cm. sharp contact.

silty clay. visual description.

3H-4, 60.8 cm.

gradation from lapilli to silty clay. lapilli (bottom end lithology). visual description. silty clay (top end lithology). the same lithology as 3H-4, 58.3-60.8 cm.

3H-4, 67.2 cm. gradual contact.

gradation from sand (ash) to lapilli. sand (ash) (bottom end lithology). visual description. very-fine dark-greyish llithic volcanic sand (ash) lapilli (top end lithology). visual description. pebble~medium sand size pumice w/ silty clay matrix

3H-4, 73.0 cm. sharp contact.

silty clay. the same lithology as 3H-4, 58.3-60.8 cm.

3H-4, 137.0 cm.

Sedimentary structures:

0.0-48.0 cm. Bioturbation.

53.0-59.0 cm. Graded Bedding (Normal).

60.0-73.0 cm. Graded Bedding (Reversed).

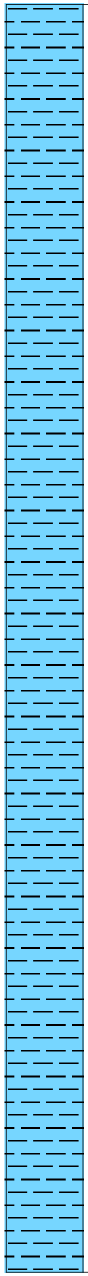
Fossils:

123.0-124.0 cm. Foraminifer.

901-C9002B-3H-5; 0.0–1.4

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350



3H-5, 0.0 cm.

silty clay. visual description. olive black to olive gray silty clay bearing foraminifera with horizontal bioturbation

3H-5, 133.0 cm.

44.0-44.2 cm. Patch. dark spd.

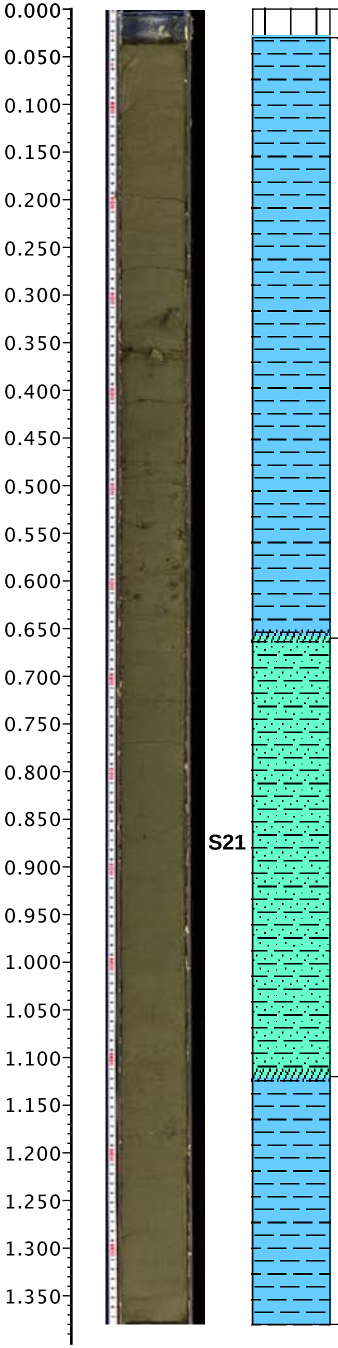
50.0-50.1 cm. Patch. dark spd.

56.0-56.0 cm. Patch.

0.0-133.0 cm. Bioturbation.

901-C9002B-3H-6; 0.0–1.4

depth Interval (m)	section photo	lithology!distribution	sedimentary structure!distribution Sedimentary structures	Lithologic accesories	Fossils	drilling!disturbance Drilling Disturbance



3H-6, 0.0 cm.
Empty. visual description.
3H-6, 3.0 cm.

silty clay. visual description. olive black silty clay

35.9-36.5 cm. Pumice. pumice granule, 1.4cm in diameter, greenish grey.

47.8-62.0 cm. Pumice. Relatively granule-rich, pumice and scoria, diameter: 2 - 6mm.

3H-6, 66.0 cm. gradual contact.

65.2-112.0 cm. Foraminifer.relatively foraminifer-rich.

sandy clay. visual description. olive black sandy clay, relatively rich in foraminilfera, intercalating some more sandy layers with vague boundary

3H-6, 112.0 cm. gradual contact.

silty clay. the same lithology as 3H-6, 3.0-66.0 cm.

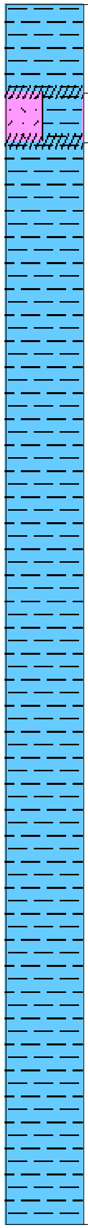
3H-6, 138.0 cm.

901-C9002B-3H-7; 0.0–1.31

depth Interval (m)	section photo	lithology-distribution		sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300

T18



3H-7, 0.0 cm.

silty clay. visual description. olive black silty clay bearing foraminifera

3H-7, 9.3 cm. gradual contact.

alternation of (1) sand (mafic ash) (1.0 cm) and (2) silty clay (1.0 cm). sand (mafic ash) (lithology of alternation member 1). visual description. dark gray scoriaceous very fine sand interfingered with silty clay silty clay (lithology of alternation member 2). the same lithology as 3H-7, 0.0-9.3 cm.

3H-7, 14.5 cm. gradual contact.

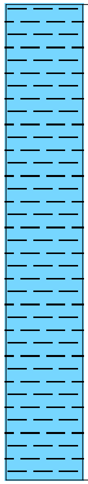
silty clay. the same lithology as 3H-7, 0.0-9.3 cm.

3H-7, 128.0 cm.

901-C9002B-3H-CC; 0.0–0.51

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary s...	Lithologic acc...	Fossils	drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500



3H–CC, 0.0 cm.

silty clay. visual description. olive gray silty clay bearing foraminifera, massive

3H–CC, 51.0 cm.

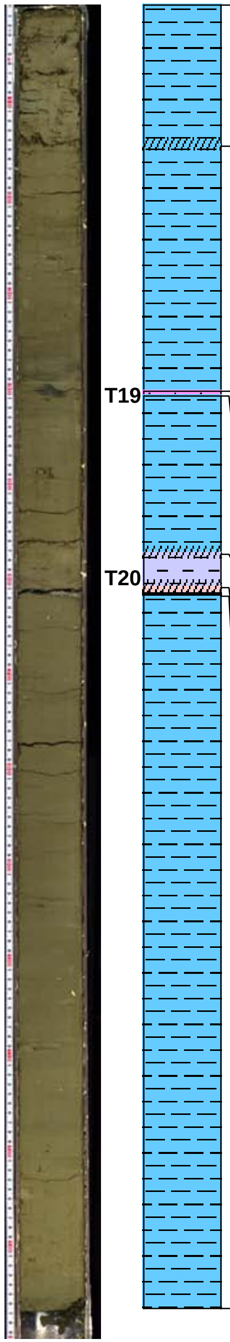
5.4–5.4 cm. Shell fragments.

39.0–39.0 cm. Shell fragments.

901-C9002B-4H-1; 0.0–1.4

depth Interval (m)	section photo	lithology!distribution	sedimentary structure!distribution Sedimentary structures	Lithologic accesories	Diag...	Fossils	drilling!distance Drilling Distance

Depth scale (m): 0.000, 0.050, 0.100, 0.150, 0.200, 0.250, 0.300, 0.350, 0.400, 0.450, 0.500, 0.550, 0.600, 0.650, 0.700, 0.750, 0.800, 0.850, 0.900, 0.950, 1.000, 1.050, 1.100, 1.150, 1.200, 1.250, 1.300, 1.350



Lithology

4H-1, 0.0 cm.

silty clay. visual description. olive black silty clay, soft

4H-1, 14.8 cm. gradual contact.

silty clay. visual description. olive black silty clay bearing foraminifera, massive

4H-1, 40.5 cm.

ash. visual description. dark olive gray ash patch

4H-1, 41.0 cm.

silty clay. the same lithology as 4H-1, 14.8-40.5 cm.

4H-1, 57.6 cm. gradual contact.

clayey silt. visual description. olive gray to gray ashy clayey silt

4H-1, 61.1 cm. gradual contact.

ash. visual description. gray (upper) to dark olive gray (lower) ash, with sharp basse

4H-1, 62.0 cm. sharp contact.

silty clay. the same lithology as 4H-1, 14.8-40.5 cm.

4H-1, 136.7 cm.

Sedimentary structures

40.5-41.0 cm. Patch. ash patch.

Lithologic accesories

49.1-49.1 cm. Pumice. pumice granule, 3mm in diameter.

Fossils

25.0-28.3 cm. Shell fragments.

5.4-5.4 cm. Shell fragments.

39.0-39.0 cm. Shell fragments.

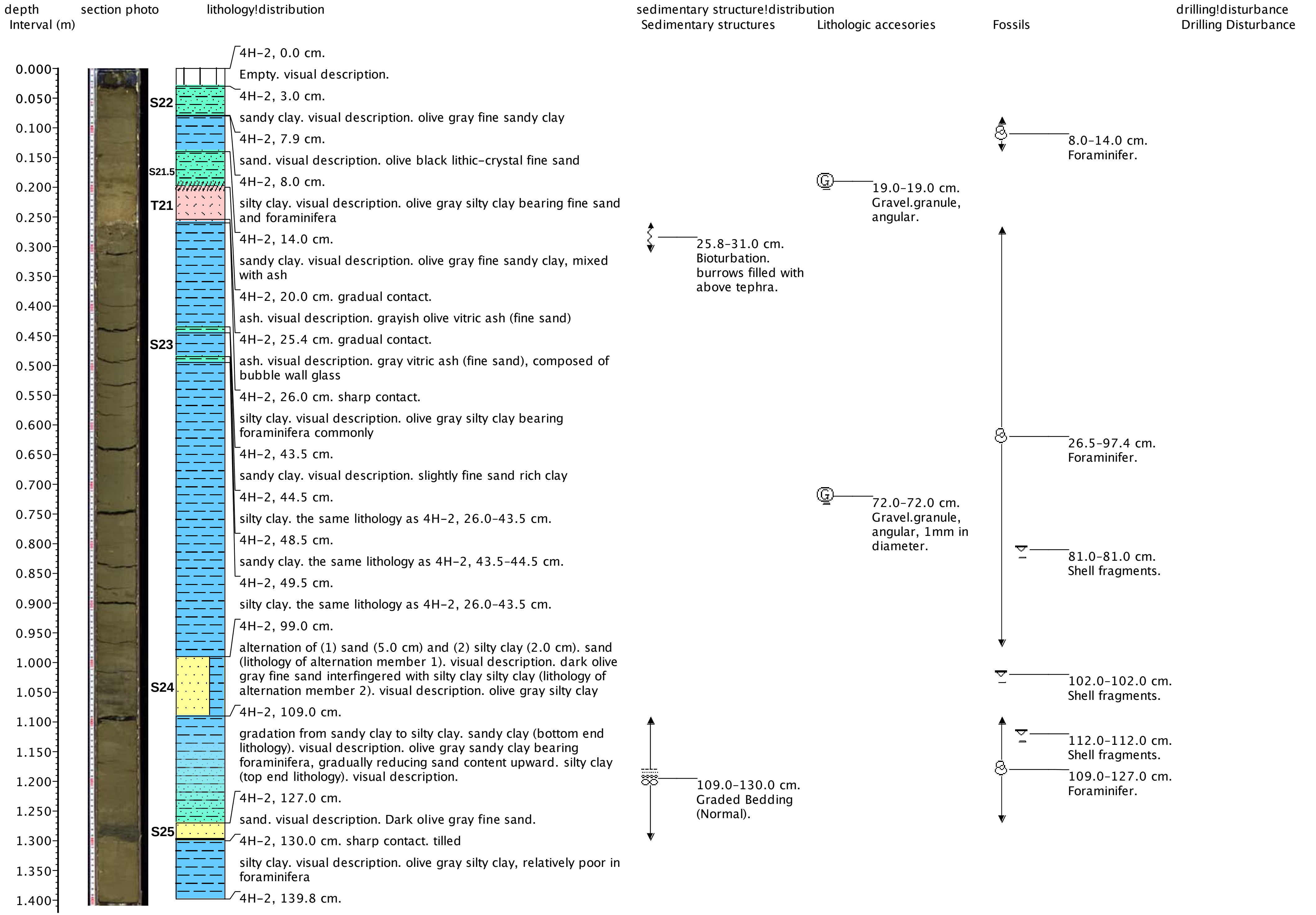
62.3-73.2 cm. Shell fragments.

102.2-102.2 cm. Shell fragments.

112.7-112.7 cm. Shell fragments.

117.9-117.9 cm. Shell fragments.

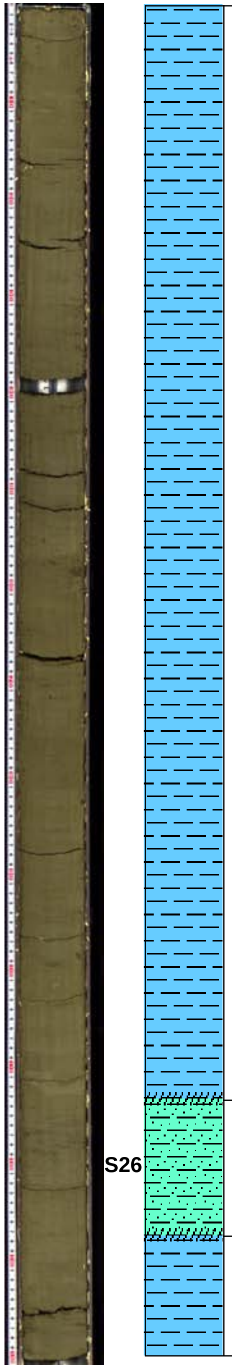
901-C9002B-4H-2; 0.0–1.42



901-C9002B-4H-3; 0.0–1.41

depth Interval (m) | section photo | lithology!distribution | sedimentary structure!distribution Sedimentary structures | Lithologic accesories | Fossils | drilling!disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400



4H-3, 0.0 cm.

silty clay. visual description. olive black silty clay bearing foraminifera, massive

4H-3, 113.5 cm. gradual contact.

sandy clay. visual description. fine sand rich interval with indistict boundaries

4H-3, 127.6 cm. gradual contact.

silty clay. the same lithology as 4H-3, 0.0-113.5 cm.

4H-3, 140.0 cm.

Fossils:

17.0-17.0 cm. Shell fragments.

31.0-45.0 cm. Foraminifer.many foraminifera visible in cracks" Globobulimina spp, Uvigerina spp, etc..

51.8-59.0 cm. Foraminifer. foraminifera and very fine sand rich.

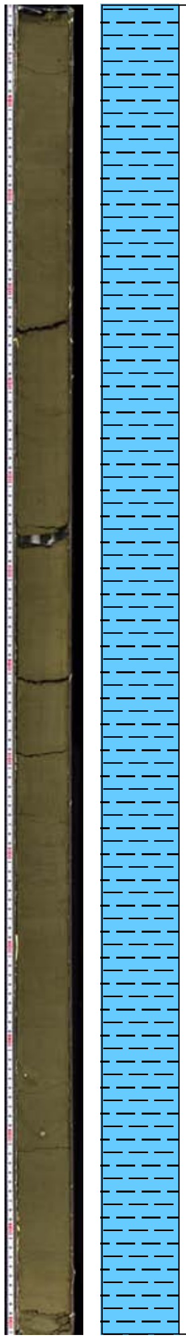
76.2-77.8 cm. Foraminifer. foraminifera rich patch"Ubigerina spp..

96.9-96.9 cm. Shell fragments.

101.8-101.8 cm. Shell fragments.

901-C9002B-4H-4; 0.0–1.42

depth Interval (m)	section photo	lithology!distribution	sedimentary structure!distribution Sedimentary structures	Lithologic accesories	Fossils	drilling!disturbance Drilling Disturbance



Depth scale (m): 0.000, 0.050, 0.100, 0.150, 0.200, 0.250, 0.300, 0.350, 0.400, 0.450, 0.500, 0.550, 0.600, 0.650, 0.700, 0.750, 0.800, 0.850, 0.900, 0.950, 1.000, 1.050, 1.100, 1.150, 1.200, 1.250, 1.300, 1.350, 1.400

4H–4, 0.0 cm.

32.6–74.5 cm. Bioturbation.

53.0–53.0 cm. Pumice. pumice granule.

silty clay. visual description. olive gray silty clay bearing foraminifera, with horizontal bioturbation in some intervals

114.0–114.0 cm. Pumice. pumice granule, 4mm in diameter, angular.

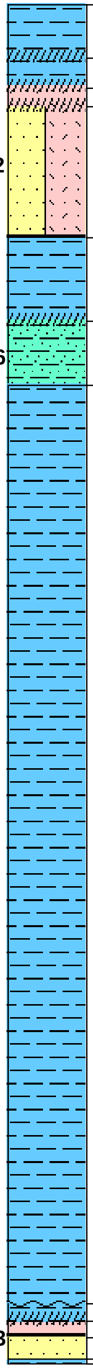
120.0–120.5 cm. Pumice. pumice granule, 8mm in diameter, angular.

4H–4, 142.0 cm.

901-C9002B-4H-5; 0.0–1.4

depth Interval (m)	section photo	lithology!distribution	sedimentary structure!distribution Sedimentary structures	Lithologic accesories	Fossils	drilling!disturbance Drilling Disturbance

Depth scale: 0.000, 0.050, 0.100, 0.150, 0.200, 0.250, 0.300, 0.350, 0.400, 0.450, 0.500, 0.550, 0.600, 0.650, 0.700, 0.750, 0.800, 0.850, 0.900, 0.950, 1.000, 1.050, 1.100, 1.150, 1.200, 1.250, 1.300, 1.350



4H-5, 0.0 cm.

silty clay. visual description. olive black silty clay, with gradual base, massive

4H-5, 5.5 cm. gradual contact.

clay. visual description. gray clay, massive

4H-5, 8.6 cm. gradual contact.

ash. visual description. gray vitric ash, well sorted

4H-5, 10.5 cm. gradual contact.

alternation of (1) sand (2.0 cm) and (2) ash (2.0 cm). sand (lithology of alternation member 1). visual description. dark gray fine sand ash (lithology of alternation member 2). visual description. gray pumice ash

4H-5, 24.0 cm. sharp contact. quite sharp

silty clay. visual description. olive black silty clay, massive, with some foraminifera rich intervals, faint burrows

4H-5, 32.6 cm. gradual contact.

sandy clay. visual description. olive black fine sand rich interval, with burrows in the middle and fine sandaccumulation at the base

4H-5, 39.2 cm.

silty clay. the same lithology as 4H-5, 24.0–32.6 cm.

4H-5, 133.8 cm. wavy contact.

clay. visual description. grayish olive clay, with burrows in the upper

4H-5, 135.6 cm. gradual contact.

ash. visual description. gray ash, sharp base, gradual top, very fine sand size

4H-5, 137.3 cm. sharp contact.

sand. visual description. dark gray fine sand, with conbotuted sharp base

4H-5, 139.5 cm. wavy contact.

silty clay. the same lithology as 4H-5, 24.0–32.6 cm.

4H-5, 140.0 cm.

Sedimentary structures

8.3–24.0 cm. Graded Bedding (Normal).

32.8–40.4 cm. Bioturbation.

72.0–86.0 cm. Bioturbation.faint burrows.

93.0–99.0 cm. Bioturbation.faint burrows.

105.0–106.0 cm. Bioturbation.faint burrows.

115.0–117.0 cm. Bioturbation.faint burrows.

Lithologic accesories

52.3–52.3 cm. Pumice.pumice granule, 2 mm x 1 mm.

63.7–64.1 cm. Pumice.pumice pebble, containing Hbl, 4 mm x 8 mm.

Fossils

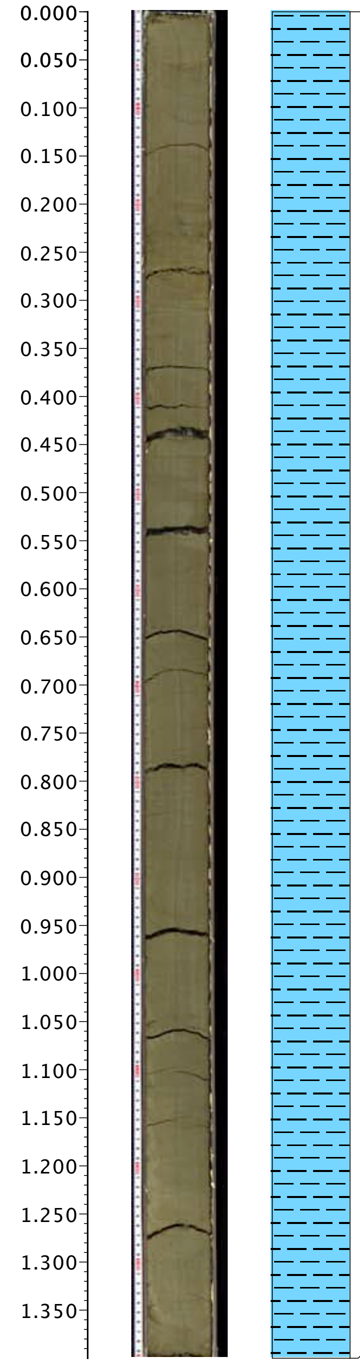
28.0–45.0 cm. Foraminifer.

57.0–133.0 cm. Foraminifer. scattered, slightly rich in 57–80 and 106–127 intervals.

138.7–140.0 cm. Foraminifer.

901-C9002B-4H-6; 0.0–1.4

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithol...	Fossils	drilling-disturbance Drilling Disturbance



4H-6, 0.0 cm.

24.2-36.7 cm. Bioturbation.

30.9-34.0 cm. Foraminifer.

35.5-35.5 cm. Foraminifer. foranimifer-rich patch.

58.0-58.5 cm. Foraminifer. foraminifer-rich patch.

silty clay. visual description. olive black silty clay bearing foraminifera, massive

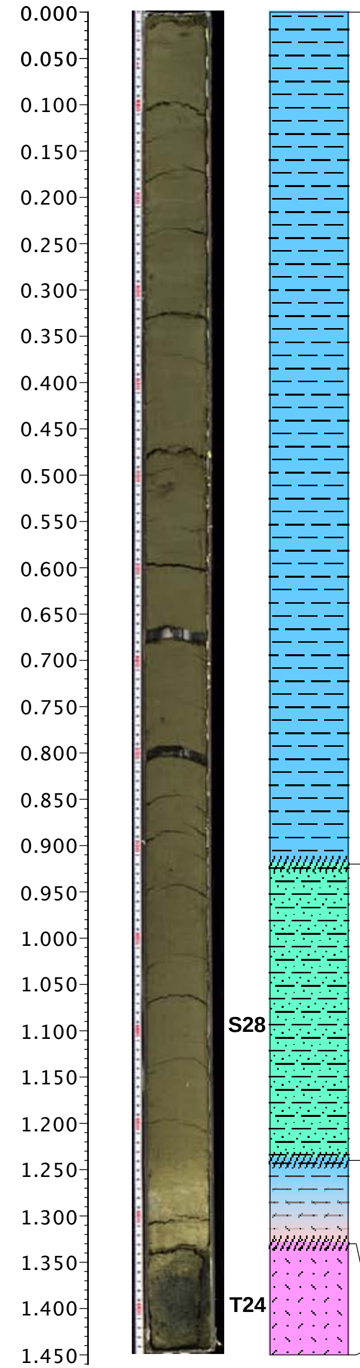
138.0-140.0 cm. Foraminifer.

4H-6, 140.0 cm.

901-C9002B-4H-7; 0.0–1.46

depth Interval (m) | section photo | lithology-distribution | sedimentary structure-distribution | drilling-disturbance

Sedimentary structures | Lithologic accesories | Fossils | Drilling Disturbance



4H-7, 0.0 cm.

silty clay. visual description. olive black silty clay bearing foraminifera, massive

51.0-53.0 cm. Patch.dark-greyish very-fine sand patch.

65.5-65.5 cm. Gravel.scoria granule, 2.5mm, angular.

74.5-74.5 cm. Shell fragments.

4H-7, 92.0 cm. gradual contact.

sandy clay. visual description. olive black sandy clay

4H-7, 124.0 cm. gradual contact.

gradation from ash to silty clay. ash (bottom end lithology). visual description. olive gray silty clay (ash) silty clay (top end lithology). visual description. olive gray silty clay

125.6-135.7 cm. Bioturbation.

4H-7, 133.0 cm. gradual contact.

ash. visual description. dark olive gray volcanic sand (ash)

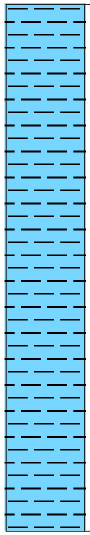
135.4-145.0 cm. Soupy.

4H-7, 145.0 cm.

901-C9002B-4H-CC; 0.0–0.56

depth Interval (m)	section photo	lithology-distribution		sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils		drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550



4H-CC, 0.0 cm.

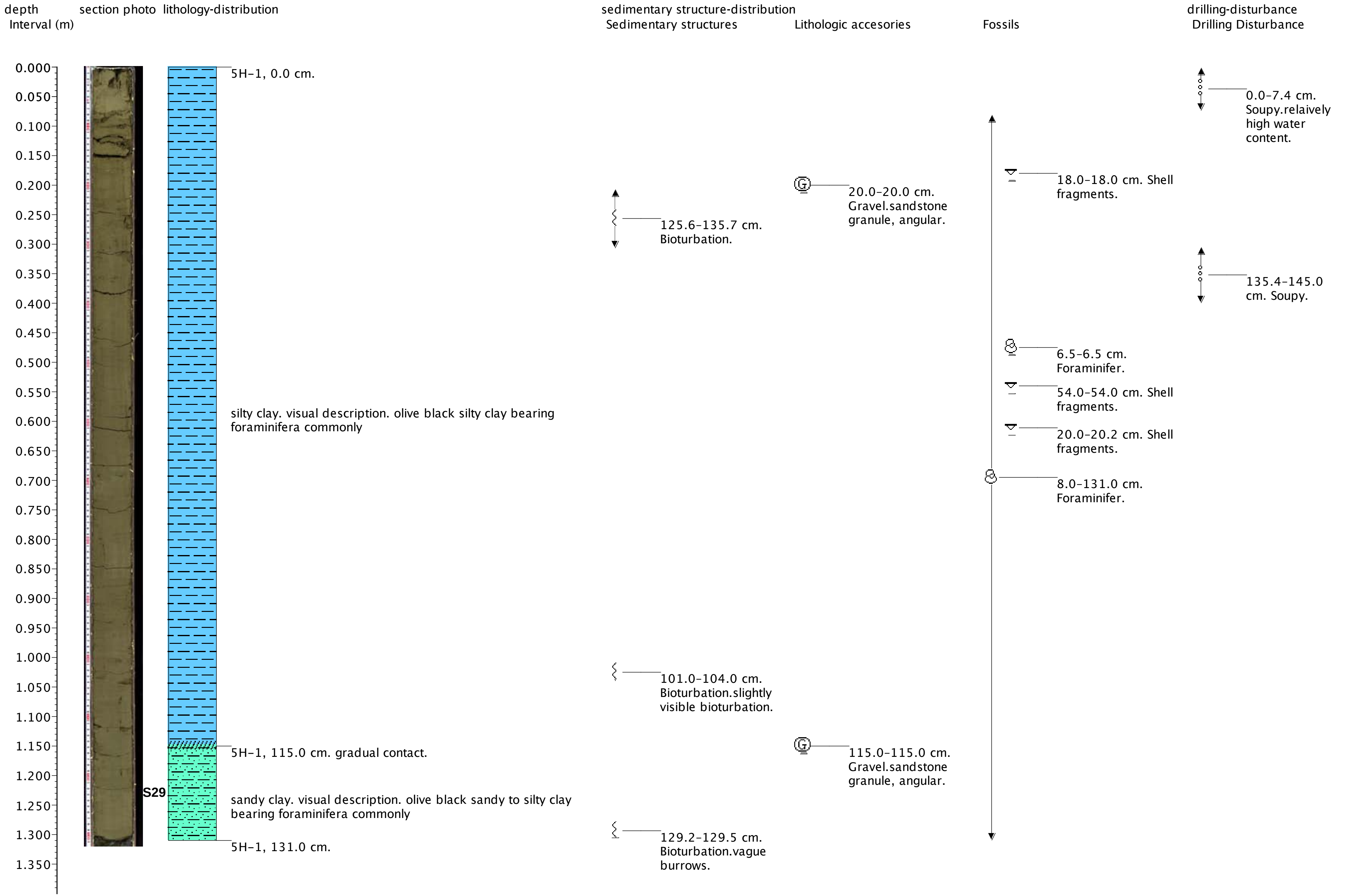
silty clay. visual description. olive black silty clay with foraminifera, massive

4H-CC, 56.0 cm.

6.5-6.5 cm. Foraminifer.

20.0-20.2 cm. Shell fragments.

901-C9002B-5H-1; 0.0–1.4



901-C9002B-5H-2; 0.0–1.49

depth Interval (m) | section photo | lithology-distribution | sedimentary structure-distribution Sedimentary structures | Lithologic accesories | Fossils | drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400
1.450

5H-2, 0.0 cm.

0.0-10.0 cm. Highly Disturbed.

18.0-18.5 cm. Patch. white ash patch.

33.0-33.0 cm. Shell fragments.

35.4-36.0 cm. Shell fragments.

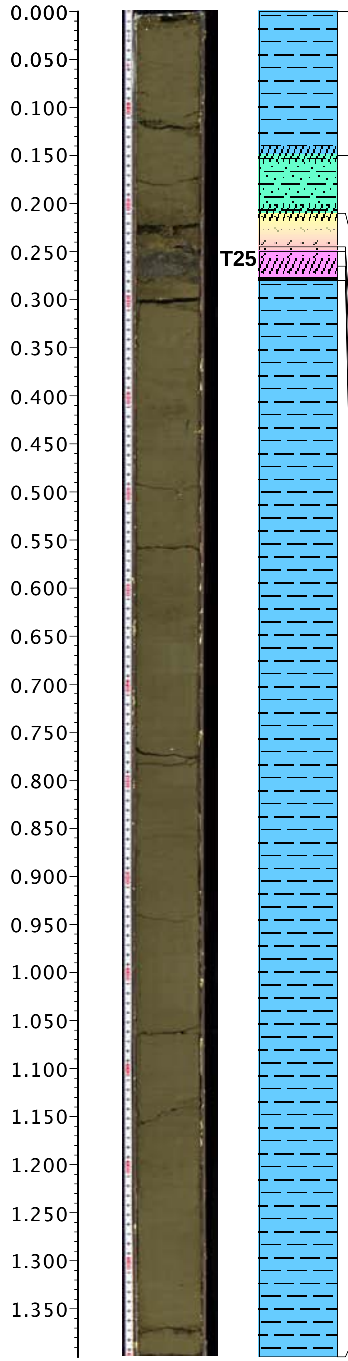
37.0-37.4 cm. Shell fragments.

silty clay. visual description. olive black silty clay bearing foraminifera

5H-2, 149.0 cm.

901-C9002B-5H-3; 0.0–1.4

depth Interval (m) | section photo | lithology-distribution | sedimentary structure-distribution Sedimentary structures | Lithologic accesories | Fossils | drilling-disturbance Drilling Disturbance



5H-3, 0.0 cm.

silty clay. visual description. olive black silty clay bearing foraminifera commonly

5H-3, 15.0 cm. gradual contact.

sandy clay. visual description. olive black fine sandy clay bearing foraminifera

5H-3, 21.0 cm. gradual contact.

gradation from ash to silty sand. ash (bottom end lithology). the same lithology as 5H-3, 24.5-25.0 cm. silty sand (top end lithology). visual description. grayish olive silty medium sand (qtz, lithic, bt), with vague top and base

5H-3, 24.5 cm. gradual contact.

ash. visual description. olive gray medium volcanic sand (hbl, px, qtz, lithic)

5H-3, 25.0 cm. gradual contact.

ash. visual description. black fine volcanic sand (px, hbl, qtz, lithic)

5H-3, 26.5 cm. gradual contact.

ash. visual description. dark olive gray fine volcanic sand (crystal-lithic ash) with sharp base

5H-3, 28.0 cm. sharp contact.

silty clay. the same lithology as 5H-3, 0.0-15.0 cm.

5H-3, 140.0 cm.

Sedimentary structures

F

21.0-28.0 cm. Fining-Upward Sequence.

28.0-31.0 cm. Bioturbation. burrows filled with above ash.

100.3-140.0 cm. Bioturbation.slightly visible bioturbation, horizontal.

Fossils

30.0-30.0 cm. Shell fragments.

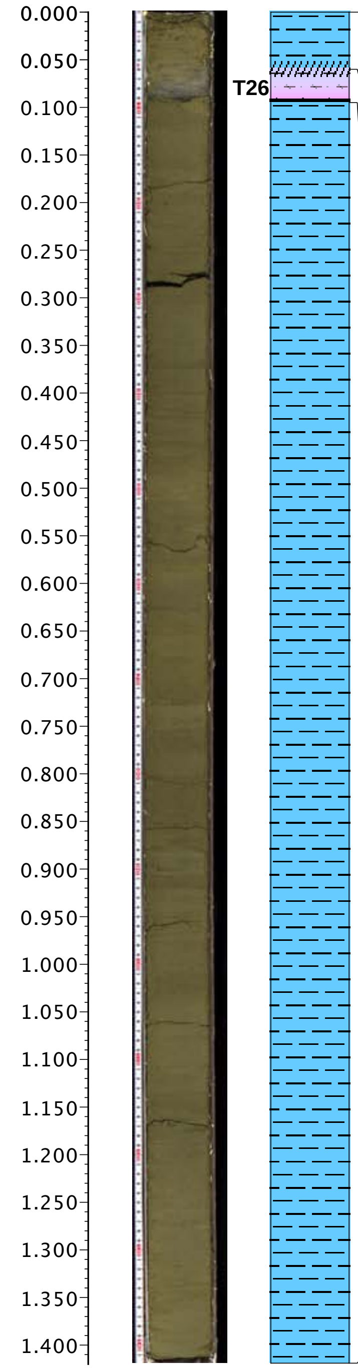
50.0-50.0 cm. Shell fragments.

49.0-61.9 cm. Foraminifer.rich.

28.0-139.2 cm. Foraminifer.

901-C9002B-5H-4; 0.0–1.42

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance



5H-4, 0.0 cm.

silty clay. visual description. grayish olive silty clay bearing foraminifera, massive

5H-4, 6.0 cm. gradual contact.

gradation from sand (ash) to silty clay. sand (ash) (bottom end lithology). visual description. black very fine lithic volcanic sand (ash) silty clay (top end lithology). visual description. greyish silt (ash) mixed with olive gray silty clay

5H-4, 9.5 cm. sharp contact.

silty clay. the same lithology as 5H-4, 0.0-6.0 cm.

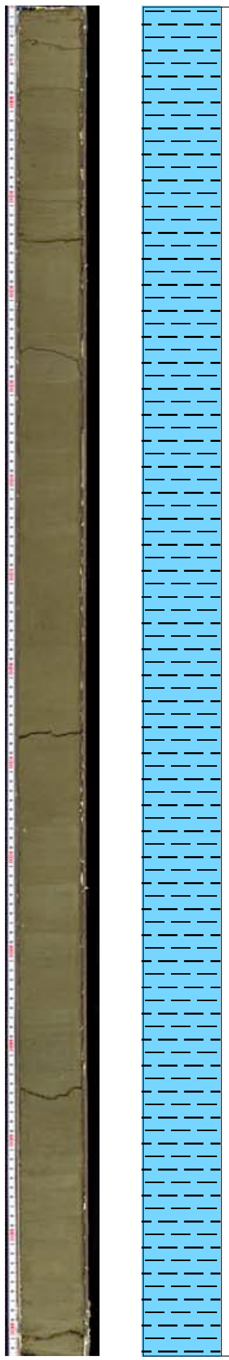
5H-4, 141.9 cm.

47.3-69.5 cm.
Heavy Bioturbation.

69.8-142.0 cm.
Bioturbation.

901-C9002B-5H-5; 0.0–1.43

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance



0.000
0.050
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0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350
1.400

5H-5, 0.0 cm.

silty clay. visual description. olive gray silty clay bearing foraminifera, massive

5H-5, 142.9 cm.

69.8–142.0 cm. Bioturbation.

7.0–7.0 cm. Patch. very-fine black lithic sand.

97.3–97.3 cm. Patch.white ash, 1 mm in diameter.

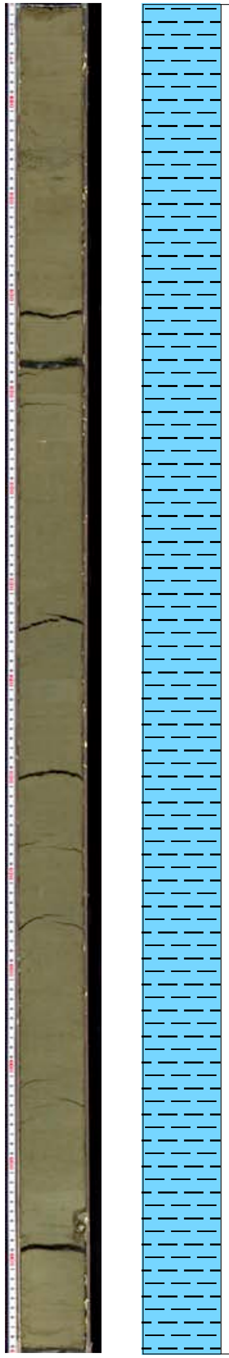
113.5–113.5 cm. Patch.white ash, 1 mm in diameter.

84.4–142.9 cm. Bioturbation.

901-C9002B-5H-6; 0.0–1.4

depth Interval (m)	section photo	lithology-distribution	sedimentary structure-distribution Sedimentary structures	Lithologic accesories	Fossils	drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
1.050
1.100
1.150
1.200
1.250
1.300
1.350



5H-6, 0.0 cm.

45.0-45.0 cm.
Shell fragments.

51.0-51.0 cm.
Shell fragments.

silty clay. visual description. dark olive to olive gray silty clay bearing a few foraminifera

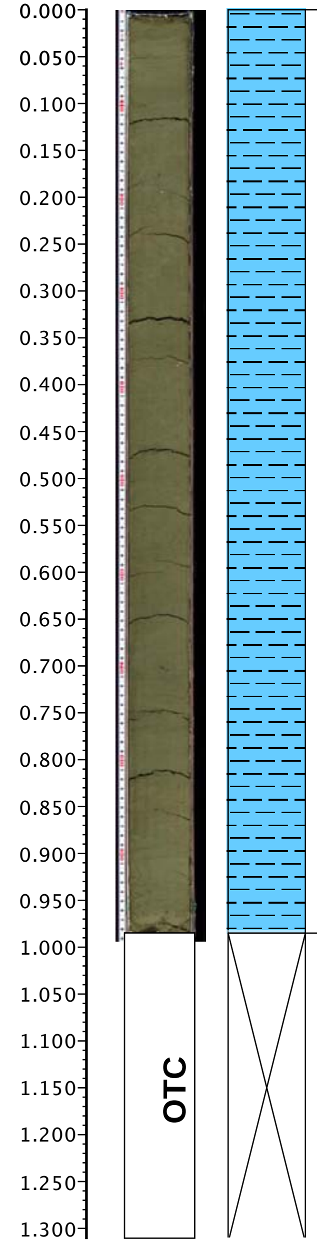
48.7-140.0 cm.
Bioturbation.

125.5-127.0 cm.
Pumice.pumice granules, 1.1cm and 6mm in diameter, angular, containing euhedral Hbl.

5H-6, 140.0 cm.

901-C9002B-5H-7; 0.0–1.31

depth Interval (m)	section photo	lithology!distribution	sedimentary structure!distribution Sedimentary structures	Lithologic accesories	Fossils	drilling!disturbance Drilling Disturbance



5H-7, 0.0 cm.

silty clay. visual description. olive gray silty clay bearing foraminifera, massive

5H-7, 98.5 cm.

0.0-98.6 cm. Bioturbation.

19.0-19.0 cm. Shell fragments.

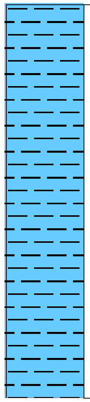
38.0-38.4 cm. Shell fragments.

69.7-70.0 cm. Wood Fragments.

901-C9002B-5H-CC; 0.0–0.42

depth Interval (m) | section photo | lithology-distribution | sedimentary structure-distribution Sedimentary structures | Lithologic accesories | Fossils | drilling-disturbance Drilling Disturbance

0.000
0.050
0.100
0.150
0.200
0.250
0.300
0.350
0.400



5H-CC, 0.0 cm.

silty clay. visual description. olive gray silty clay bearing a few foraminifera, massive

5H-CC, 42.0 cm.

23.0-23.0 cm. Shell fragments.

0.0-30.0 cm. Highly Disturbed.