



D/V Chikyu Cruise Report
Exp.911 (CK18-T03[Leg.2-2] & CK18-04[Leg1])



Core Barrel Sea-trial

Suruga bay off Izu peninsula

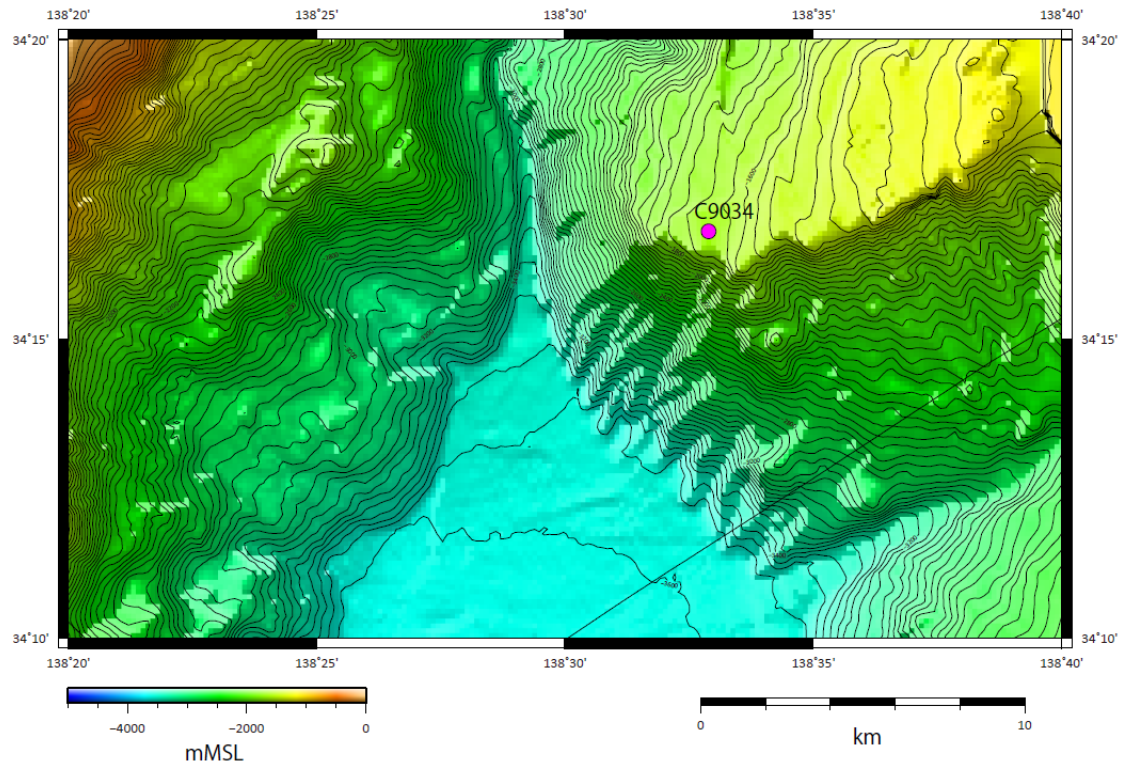
Aug. 16, 2018-Aug. 21, 2018

Oct.10, 2018 - Oct.13,2018

Japan Agency for Marine-Earth Science and Technology
(JAMSTEC)

1. Cruise Information

- Cruise ID: Exp.911(CK18-T03[Leg.2-2] and CK18-04[Leg1])
- Name of vessel: D/V Chikyu
- Title of cruise: Core Barrel Sea-trial
- Chief Scientist [Affiliation]: Yuichi Shinmoto [JAMSTEC]
- Cruise period: CK18-T03(Leg.2-2) Aug. 16, 2018 – Aug. 21, 2018,
CK18-04(Leg1): Oct. 10, 2018-Oct.13, 2018.
- Ports of departure / call / arrival:
CK18-T03: Shimizu port to Shimizu port
CK18-04: Shimizu port to off Kii peninsula (for Exp.358)
- Research area: Suruga bay off Izu peninsula
- Research map



2. Research/Development Activities

2.1 Objectives

Sea-trial test of core barrels for the IODP Exp.358“Nankai Trough Seismogenic Zone Experiment [NanTroSEIZE]” was conducted. Some parts of small diameter-rotary core barrel (SD-RCB) and rotary core barrel (RCB) were modified and tested in Suruga-bay off Izu peninsula with deep sea drilling vessel CHIKYU.

2.2 Methods

In order to confirm the coring performance of modified SD-RCB and RCB, the sea trial was carried out in the actual sea area. It was predicted that a hard-volcanic rock layer would appear from the surface layer according to the site survey results around the site. Therefore, we chose the site for the core barrel test.

Concept design of various core barrels (8-1/2inch SD-RCB, 7-3/8inch SD-RCB and improved 10-5/8inch RCB) were shown in figure below. The inner stopper sub below the core liner was improved for 8-1/2”SD-RCB. And the 7-3/8”SD-RCB was newly developed based on the 8-1/2”SD-RCB but some inner parts such as latch section were completely new design. For 10-5/8”RCB, the core bit connection strength (Make up torque) was improved from approximately 23kN-m to 77kN-m.

2.3 Results

A total of 3 holes (holes A, B, C) were drilled and cored at the site C9034 (water depth: 1668.5m). Two boreholes were cored using 7-3/8"SD-RCB (7 times in total) and one hole was cored with 8-1/2"SD-RCB (3 times in total). After approx. 60m drill out section, 7-3/8"SD-RCB was confirmed to achieve the objective to obtain appropriate cores. As it expected, volcanic rocks considered to be basaltic were collected from approximately 60m (60mbsf) below the sea floor. For 8-1/2"SD-RCB, unfortunately the core contacted the side of core liner and the core liner was broken so that it was decided to retest. RCB coring was not possible due to time over for the test expedition.

About two months later, second test cruise (CK18-04) was conducted. two holes (holes D and E) were cored (after drill out about 50m section from the sea-floor) at the same site C9034 (same water depth 1663.5m-MSL). At borehole D, the modified 8-1/2"SD-RCB was used and we confirmed that the problem of the core contact on the side of core liner has been solved and performing coring three times in same borehole. Also coring with improved RCB (high M/U torque on the core bit) was performed a total of 3 times and it was confirmed that the function was satisfied. The type of the coring tool was mentioned as "K" for SD-RCB (both 8-1/2"and 7-3/8") and as "R" for RCB (Core diameter of about 60 mm). Below is the latitude (Lat.) And longitude (Long.) Of each hole. And summary of coring results (coring number, tool type, depth (m-BRT [Below-rotary table], m-bsf[below sea floor]), drill out length [advance], core length, geological profile@ inner barrel shoe section and core recovery rate).

Geologist evaluated that the core recovery for soft sediment of RCB was better than of 8-1/2"SD-RCB, but cores of RCB would be broken to short pieces as compared with those of 8-1/2"SD-RCB in X-CT images. Therefore, the RCB cores would be more rotated while coring. Recovery for hard rocks of both coring system is not so different, but cores of RCB were more broken as compared with 8-1/2 SD-RCB in this sea trial.

Borehole position information

Hole #	Latitude	Longitude	Water depth mMSL (mBRT*)
C9034A	34° 16.8000' N	138° 32.9000' E	1668.5 (1697.0)
C9034B	34° 16.8054' N	138° 32.9000' E	
C9034C	34° 16.8054' N	138° 32.9065' E	
C9034D	34° 16.8006' N	138° 32.9003' E	
C9034E	34° 16.7974' N	138° 32.8876' E	

*mMSL : meter below Mean Sea Level、mBRT : meter below Rotary Table

mBRT = mMSL+Elevaton(28.5m)

Summary of hole C9034A

Core	Type	Below Rotary Table (mBRT)		Below Seafloor (mbsf)		Advance (m)	Core Length (m)	Lithology @ shoe	Core Recovery (%)
		Top of Core	Btm of Core	Top of Core	Btm of Core				
		1697.00	1761.00	0.0	64.00	64.00			
1	K	1761.00	1766.00	64.00	69.00	5.00	0.500	Blowish black altered mafic volcanic rocks	10.0
2	K	1766.00	1775.50	69.00	78.50	9.50	1.335	Blowish black altered mafic volcanic rocks	14.1
3	K	1775.50	1782.00	78.50	85.00	6.50	0.235	Greenish gray mafic volcanic rock	3.6

Summary of hole C9034B

Core	Type	Below Rotary Table (mBRT)		Below Seafloor (mbsf)		Advance (m)	Core Length (m)	Lithology @ shoe	Core Recovery (%)
		Top of Core	Btm of Core	Top of Core	Btm of Core				
		1697.00	1750.00	0.0	53.00	53.00			
1	K	1750.00	1759.00	53.00	62.00	9.00	1.220	Dark gray firm silty clay	13.6
2	K	1759.00	1764.50	62.00	67.50	5.50	0.110	Olive black.mafic volcanic rocks.	2.0
3	K	1764.50	1769.50	67.50	72.50	5.00	0.440	Olive black.mafic volcanic rocks	8.8
4	K	1769.50	1779.00	72.50	82.00	9.50	0.995	Brawnish gray-dark greenish gray mafic volcanic rocks	10.5

Summary of hole C9034C

Core	Type	Below Rotary Table (mBRT)		Below Seafloor (mbsf)		Advance (m)	Core Length (m)	Lithology @ shoe	Core Recovery (%)
		Top of Core	Btm of Core	Top of Core	Btm of Core				
		1697.00	1747.00	0.0	50.00	50.00			
1	K	1747.00	1754.50	50.00	57.50	7.50	0.910	Dark greenish gray soft very fine sandy silt	12.1
2	K	1754.50	1764.00	57.50	67.00	9.50	0.330	Volcaniclastics, Angular basaltic fragments (dark gray) and Pumiceous tuff matrix (yellowish gray)	3.5
3	K	1764.00	1772.00	67.00	75.00	8.00	1.910	Dark gray.mafic volcanic rocks	23.9

Summary of hole C9034D

Core	Type	Below Rotary Table (mBRT)		Below Seafloor (mbsf)		Advance (m)	Core Length (m)	Lithology @ shoe	Core Recovery (%)
		Top of Core	Btm of Core	Top of Core	Btm of Core				
		1697.00	1747.00	0.0	50.00	50.00			
1	K	1747.00	1754.50	50.00	57.50	7.50	0.910	Dark greenish gray soft very fine sandy silt	12.1
2	K	1754.50	1764.00	57.50	67.00	9.50	0.330	Volcaniclastics, Angular basaltic fragments (dark gray) and Pumiceous tuff matrix (yellowish gray)	3.5
3	K	1764.00	1772.00	67.00	75.00	8.00	1.910	Dark gray.mafic volcanic rocks	23.9

Summary of hole C9034E

Core	Type	Below Rotary Table (mBRT)		Below Seafloor (mbsf)		Advance (m)	Core Length (m)	Lithology @ shoe	Core Recovery (%)
		Top of Core	Btm of Core	Top of Core	Btm of Core				
		1697.00	1747.00	0.0	50.00	50.00			
1	K	1747.00	1754.50	50.00	57.50	7.50	0.910	Dark greenish gray soft very fine sandy silt	12.1
2	K	1754.50	1764.00	57.50	67.00	9.50	0.330	Volcaniclastics, Angular basaltic fragments (dark gray) and Pumiceous tuff matrix (yellowish gray)	3.5
3	K	1764.00	1772.00	67.00	75.00	8.00	1.910	Dark gray.mafic volcanic rocks	23.9

3. Cruise Log

CK18-T03

Date	Time	Log
2018/8/16	17:00-23:00	Sail from off Shimizu to coring test location (Suruga bay off Izu peninsula).
	23:00-23:30	Arrive location and set DP mode.
2018/8/17	02:30-04:00	MU 7-3/8" SD-RCB BHA and install center bit.
	07:00-10:45	Run 7-3/8" SD-RCB BHA to 1300mBRT.
	14:30-15:30	ROV dive from surface to sea bed around 1,670m below sea level.
	15:30-16:30	Run 7-3/8" SD-RCB BHA Tag sea bed at 1,697mBRT.
	18:45-21:00	Drill down from 1728.5mBRT to 1761mBRT.
	22:00-24:00	Trouble shooting of sinker bar not retrieve center bit assy.
2018/8/18	01:00-2:15	Retrieved center bit assy w/sinker bar.
	03:00-7:30	#1(A hole), 7-3/8"SD-RCB coring.
	07:45-12:15	#2 (A hole), 7-3/8" SD-RCB coring.
	12:15-16:45	#3 (A hole), 7-3/8" SD-RCB coring.
	16:45-17:15	POOH 7-3/8"SD-RCB BHA from 1,782.0mBRT to 1,633.0mBRT (Above seabed).
	18:15-19:00	Run 7-3/8" SD-RCB BHA from 1,633mBRT to 1,697mBRT.
	19:00-23:30	Lower the string and wash/drill down from 1,697mBRT to 1,750.0mBRT.
	23:30-24:00	Retrieved center bit assy w/sinker bar.
2018/8/19	00:45-01:15	#1(B hole), 7-3/8"SD-RCB coring.
	02:45-06:15	#2 (B hole), 7-3/8" SD-RCB coring.
	0615-09:00	#3 (B hole), 7-3/8" SD-RCB coring.
	09:00-12:30	#4 (B hole), 7-3/8" SD-RCB coring.
	12:30-20:30	BHA POOH to surface.
	20:30-24:00	MU & Run 8-1/2"SD-RCB BHA to 1600mBRT.
2018/8/20	01:45-07:30	Drop center bit and washdown.
	10:45-13:00	#1 (C hole), 8-1/2"SD-RCB coring (Unable to retrieve core liner from inner barrel).
	13:00-16:45	#2 (C hole), 8-1/2"SD-RCB coring (Unable to retrieve core liner from inner barrel).
	16:45-18:30	#3 (C hole), 8-1/2"SD-RCB coring (drop inner barrel without core liner).
	18:30-19:30	POOH 8-1/2" SD-RCB BHA to 1482mBRT (215m above seabed).
	22:30-24:00	Drop #4 inner barrel for liner deformation check.
2018/8/21	00:30-05:00	POOH 8-1/2"SD-RCB BHA to Surface.
	05:00~	Sail to Shimizu port.

CK18-04

Date	Time	Log
2018/10/10	10:00-17:30	Sail to coring test site (C9034) from Shimizu port
	17:30-18:00	Arrive location and set DP mode.
	19:15-24:00	MU & Run 8-1/2"RCB BHA to 1,230.0mBRT.
2018/10/11	01:00-01:30	Drop center bit
	02:00-06:00	Run 8-1/2"RCB BHA to sea bed and tag sea bed and wash/drill down.
	07:30-09:45	#1 (D hole), 8-1/2"SD-RCB coring.
	09:45-13:00	#2 (D hole), 8-1/2"SD-RCB coring.
	13:00-15:30	#3 (D hole), 8-1/2"SD-RCB coring.
	15:30-21:00	POOH 8-1/2" SD-RCB BHA to surface.
	21:00-23:00	Prepare 10-5/8" RCB inner assemblies (2ea of inner barrel, 1ea of Center bit).
2018/10/12	00:00-04:30	Run 8-1/2"RCB BHA to sea bed and tag sea bed @1,697.0mBRT.
	04:30-09:00	Wash down and drill down to 1747mBRT and recover center bit.
	09:00-10:45	#1 (E hole), 10-5/8"RCB coring.
	11:15-15:30	#2 (E hole), 10-5/8"RCB coring.
	16:30-20:00	#3 (E hole), 10-5/8"RCB coring.
	20:00-24:00	POOH 10-5/8"RCB BHA to surface.
2018/10/13	00:45~	Sail to C0002 site (ETA 11:00 on 13th Oct.)

4. Notice on Using

This cruise report is a preliminary documentation as of the end of cruise.

This report is not necessarily corrected even if there is any inaccurate description (i.e. taxonomic classifications). This report is subject to be revised without notice. Some data on this report may be raw or unprocessed. If you are going to use or refer the data on this report, it is recommended to ask the Chief Scientist for latest status.

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