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R/V Natsushima – Hyperdolphin
NT06-05 Cruise in Sagami Bay

March 22 (Yokosuka) – March 29 (Yokosuka), 2006

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Yohei Tada, Katsunori Fujikura, Hiroyuki Yamamoto, Hiroshi Kitazato

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1. Introduction

1-1. General Introduction

Marginal seas along continental margin are characterized by high accumulations of both organic and inorganic materials. The high rates of sedimentation at continental margin are thought to be sustained by both vertical input from sea surface primary production and lateral input from coastal area. This material transportation is more typically appeared at an arc-trench system where active material transportation is taken place both from water column and from land areas. High input of nutrients both from land areas and coastal upwelling keeps ocean surface in a eutrophic condition. Sagami Bay is a typical marginal sea where active depositional processes have taken place (Kitazato, ed., 2003).

Material budgets at sediment-water interface should control finally material cycle at oceans. Benthic activities occurred at sea floor play a key role for understanding material cycle at deep-sea floor. Thus, monitorings of benthic activities are required for getting basic data of material cycles at sediment-water interface. However, very rough estimation of material budgets was gotten at continental margins up to present, in particular to those at arc-trench systems. We should measure quantitatively *in situ* material fluxes at sediment-water interface of the sea floor. Detailed profiles of biogeochemical components at sediment-water interface with sediment core analyses, planer optode imaging, microelectrode measurements, benthic chamber measurements and *in situ* feeding experiments with ^{13}C-labeled food materials should be suitable approaches for elucidating benthic processes at deep-sea floor.

Cold seepages are typically distributed in active contineltal margins. Seepage is thought to be outgoing locality of biogeochemical components at continental margin with active tectonic forcing. In Sagami Bay, *Calyptogena* colonies flourish at seepage sites. Activities of Calyptogena colonies give us important signal for understanding outgoing fluxes from sediment to seawater. Growth rates of *Calyptogena* may provide a good key for understanding vital condition of clams. Clear “daily” rings are developed in *Calyptogena* shell. However, it still is unknown actual meaning of rings.

Marking experiment with strontium sulfide and calcein is direct methods for estimating what kinds of environmental factors should relate to “daily” ring formation.

Multidisciplinary researches mentioned above plan to be done during and after the dive cruise NT06-05. I hope that we can draw clear images of continental margin processes through our collaborative studies. This dive cruiuse is partly supported by the Grant-in-Aid from Japan Society of the Promotion of Science, Fundamental Research A to H.K.

Cruise Coordinator for the cruise NT06-05

Hiroshi Kitazato
(Institute for Research on Earth Evolution,
Japan Agency for Marine-Earth Science and Technology, Japan)

1-2. Area of Investigation

Sagami Bay is a deep-sea that situates in the central part of the Japanese Islands facing to the Pacific Ocean. A north-south extended deep trough lies at the central part of the bay where the water depth reaches at more than 2000 m. Sagami Bay is surrounded with land areas. Only the southern part opens to the Pacific.

Most diving campaigns were performed at a deep-sea permanent station (St. OBB II; 35˚00.7'N, 139˚22.5'E, depth 1450m) in the central part of Sagami Bay, Japan, which borders the Pacific Ocean. The station is located on a flat bottom of the Sagami Trough. The station is located on a flat bottom region of the Sagami Trough. Three water masses are recognized in the central part of Sagami Bay (Iwata, 1987). The upper a few hundreds of meters are occupied by relatively saline waters of the Kuroshio current (>34.6‰); the Subarctic Intermediate Water (= Intermediate Oyashio Water; 34.1‰) resides below this water to a depth of about 1000m, beneath which occurs the Pacific Deep Water. The North Pacific Deep Water overlies the station SB. The bottom water is characterized by temperatures of 2.3 ± 0.1˚C, salinities of 34.5 ± 0.2‰, and dissolved oxygen concentration of 1.1 ± 0.2 ml/L. Bottom temperatures in the central part of Sagami Bay do not change throughout the year (Miya and Nemoto, 1991; Momma et al., 1993). Both salinity and dissolved oxygen concentration may also be invariant throughout a year.

Cold seepage site at southeast off Hatsushima Island is another diving site. This seepage intimately connected with fault activity of Sagami Bay West fault, one of active submarine fault system for bordering western end of the Sagami Bay. *Calyptogena* colonies are distributed at the site. Microbial mat occasionally develop at specific area where outgoing flow may exist. Deep-sea Permanent Observatory that has established by JAMSTEC has been located at the site since 1993. Bottom water environments has monotired at the station.

1-3. General Purpose

For the aims to elucidate both ecological and biogeochemical processes at sediment-water interface in the continental margin environmental settings, we try to conduct *in situ* measurements on the sea floor with profiling lander, incubation with benthic chamber, *in situ* feeding experiments and faunal analyses of meiobenthos at the central part of Sagami Bay where decadal long observations of depositional processes have been carrying out at a permanent deep-sea station, OBB II. In addition to central Sagami Bay, we also work at cold seepage site off Hatsushima Island, western Sagami Bay for understanding outgoing flux from seep to seawater. Observation of *Calyptogena* activities is a good signal for estimating outgoing organic flux from seep to seawater. For the purpose, we have been carrying out marking experiment for Calyptogena individuals with calcein and strontium sulfide. Through the experiment, we can detect growth rates of Calyptogena shell.

2. Participants on board

2-1. Scientists

Name	Affiliation	Occupation / Institute	E-mail / Mailing Address	Bording Term
	Tel No. Fax No.			
Hiroshi Kitazato	JAMSTEC	Program Director / IFREE 4		06.3.22-29
Hiroyuki Yamamoto	JAMSTEC	Group Leader / XBR		06.3.22-29
Kazumasa Oguri	JAMSTEC	Researcher / IFREE 4		06.3.22-29
Hidetaka Nomaki	JAMSTEC	PostDoc Researcher / IFREE 4		06.3.22-29
Youhei Tada	JAMSTEC	Ph.D Student / IFREE 4		06.3.22-29
Glud Ronnie	University of Copenhagen	Professor / Marine Biological Laboratory		06.3.22-29
Middelboe Mathias	University of Copenhagen	Professor / Marine Biological Laboratory		06.3.22-29
Staahl Henrik	University of Copenhagen	Scientist / Marine Biological Laboratory		06.3.22-29

Thamdrup Bo		Professor		06.3.22-29
	University of Southery Denmark	University of Southery Denmark		
Wenzhoefer Frank		Reader		06.3.22-29
	Max Plank Institnte for Marine Microbiology	Max Plank Institnte for Marine Microbiology		
Maki Ito		Marine Technician		06.3.22-29
	Nippon Marine Enterprises, LTD.	Marine Science Dept.		

2-2. Crew members (in Japanese)

HPD Operation Team

千葉　和宏	運行長	徳光　好廣	二等潜技士	近藤　友栄	二等潜技士
千葉　勝志	三等潜技士	菊谷　茂	三等潜技士	戸塚　健介	三等潜技士
木戸　哲平	三等潜技士	梶原　祐太	三等潜技士		

Natsushima Crew

齋藤　房夫	船長	須左美智嗣	一等航海士	岩崎　芳治	次一等航海士
今井　松夫	二等航海士	紙屋　一則	三等航海士		
吉川　博美	機関長	松川喜巳男	一等機関士	小谷　誠	二等機関士
森　雄司	三等機関士				
那須東輝登	電子長	梅谷　有一	二等電子士		
白井　義章	甲板長	宅野　修二	甲板手	庄子　欣也	甲板手
久保田隆夫	甲板手	薩摩　敬二	甲板手	地本　強	甲板手
永井　大誠	甲板員				
八幡　喜好	操機長	椎野　正紀	操機手	丸太　良次	操機手
船渡　啓太	機関員	渡辺　昇太	機関員		
高島　香	司厨長	波左谷吉信	司厨手	平山　和宏	司厨手
佐々木末人	司厨手	安部　崇裕	司厨員		

3. Dive results

Following pdf files exist in separated folders

3-1. Dive Results

Dive log, Dive report, Abstract, Topography, Event list, Track chart

3-2. CTD data

Dive Log of HPD Dive #530 Area:Sagami-bay **2005/3/22**

Time (JST)	Depth (m)	Altitude (m)	Heading (Deg)	Description	Remarks
13:56	310	—	270	仆 稚魚 大群	
14:43	1448	2.3	270	着底	
14:43	1448	3.1	270	ニスキン(赤・緑) 採水	
14:46	1449	2.7	270	⑫へ 移動開始	
14:49	1999	2.9	270	ゲンゲ 撮影 (HIV)	
14:52	1450	2.8	270	⑫ホーマー確認. 現場培養装置確認.	
14:56	1453	0.0	45	現場培養装置前に着底.	
14:59	1453	0.0	45	離 現場培養. に異常(シリンジが既に押されてる) 設置中止	
15:06	1453	0.0	45	赤白 現場培養装置 セット	
15:10	1453	0.0	45	青白 現場培養 コア部分が落下. セット直して回収.	
15:14	1453	0.0	45	青 現場培養 回収.	
15:15	1453	0.0	45	赤 現場培養 回収.	
15:19	1450	2.0	50	OBBIIから 約50m北 着底	
15:23	1452	0.0	50	黒緑MBARIコアで採泥	隣接
15:28	1452	0.0	50	黄(MBARI)コアで採泥	隣接
15:30	1452	0.0	50	緑 MBARIコアで採泥	
15:34	1452	0.0	50	赤1 MBARI(●)で採泥.	
15:37	1452	0.0	50	黒 MBARI(●)で採泥.	(途中で堆積物落下?)
15:40	1452	0.0	50	白 MBARI(●)で採泥.	
15:42	1452	0.0	50	1m 前進.	
15:44	1452	0.0	50	黄黒 MBARI (穴あき) で採泥.	
15:46	1452	0.0	50	赤2 MBARI で採泥	
15:49	1452	0.0	50	黄2 MBARIで採泥	
15:53	1452	0.0	50	緑2 MBARIで採泥	
15:54	1452	0.0	50	OBBIIへ移動.	
16:00	1451	1.8	256	OBBII確認.	
16:08	1453	0.0	233	ホーマー再設置.	
16:12	1450	0.0	94	離底.	

ハイパードルフィン　潜航記録

平成　18　年　　NT06-05　行動　　記載者　　菊谷　茂

潜航年月日　2006/03/23
潜航回数　1回
通算潜航回数　530回

位置　作図中心位置
緯度　35° 00.850 ' N
経度　139° 21.700 ' E
WGS-84

潜航海域　相模湾　　相模トラフ

潜航目的　調査潜航　現場計測と現場実験による堆積物－水境界の動態と物質循環の解明

調査主任　北里　洋
ビークル指揮　千葉　和宏

Ｐｉｌｏｔ　近藤　友栄
Co. Pilot　菊谷　茂

作業経過時刻	
吊　揚	13:15
着　水	13:21
潜航開始	13:39
着　底	14:43
離　底	16:12
浮　上	16:50
揚収完了	17:09

累計時間		
潜航時間		3:11
通算潜航		2463:17
ケーブル	ケーブルNo.	3
	使用時間	3:54
	通算時間	1065:13

気象・海象

天候	風向	風力	風浪	うねり	視程
c	NNE	4	3	3	7

最大潜航深度　1453 m
着底深度　1449 m
着底底質　泥

離底深度　1450 m
離底底質　泥

記事　海底を観察しながら航走し、採泥・採水及び現場培養装置の設置・回収を行った。

平成１８年
ハイパードルフィン 調査潜航
＃５３０ＤＩＶＥ
相模湾　相模トラフ

２００６年０３月２３日

１．測 地 系　　ＷＧＳ－８４（世界測地系）

２．測　位　　Ｄ－ＧＰＳ（ＭＸ９４００Ｎ　ＬＥＩＣＡ）

３．ＸＢＴ　　計測済み　　Ｓ／Ｖ＝１４８６．７ｍ／ｓ　（Ｄ＝１５００ｍ）

４．ＸＰＯＮＤＥＲ　　セジメントトラップ係留系取付
Ｕ／Ｃ：６０１　　１３．５ＫＨｚ

５．作図中心　　３５－００．８５０Ｎ　　ＡＮＧＬＥ　　０°
１３９－２１．７００Ｅ　　ＳＣＡＬＥ　１／３０００

６．着底点（特異点①）　　３５－００．８２８Ｎ　　Ｄ＝１４５０ｍ
１３９－２１．７０６Ｅ　　Ｃｏ＝

７．潜航配置　　指　　揮　：　運航長
ｺﾝﾃﾅ PILOT　：　近藤　　菊谷　　甲板PILOT　：　戸塚

８．潜航目的　　現場計測と現場実験による堆積物－水境界の動態と物質循環の解明

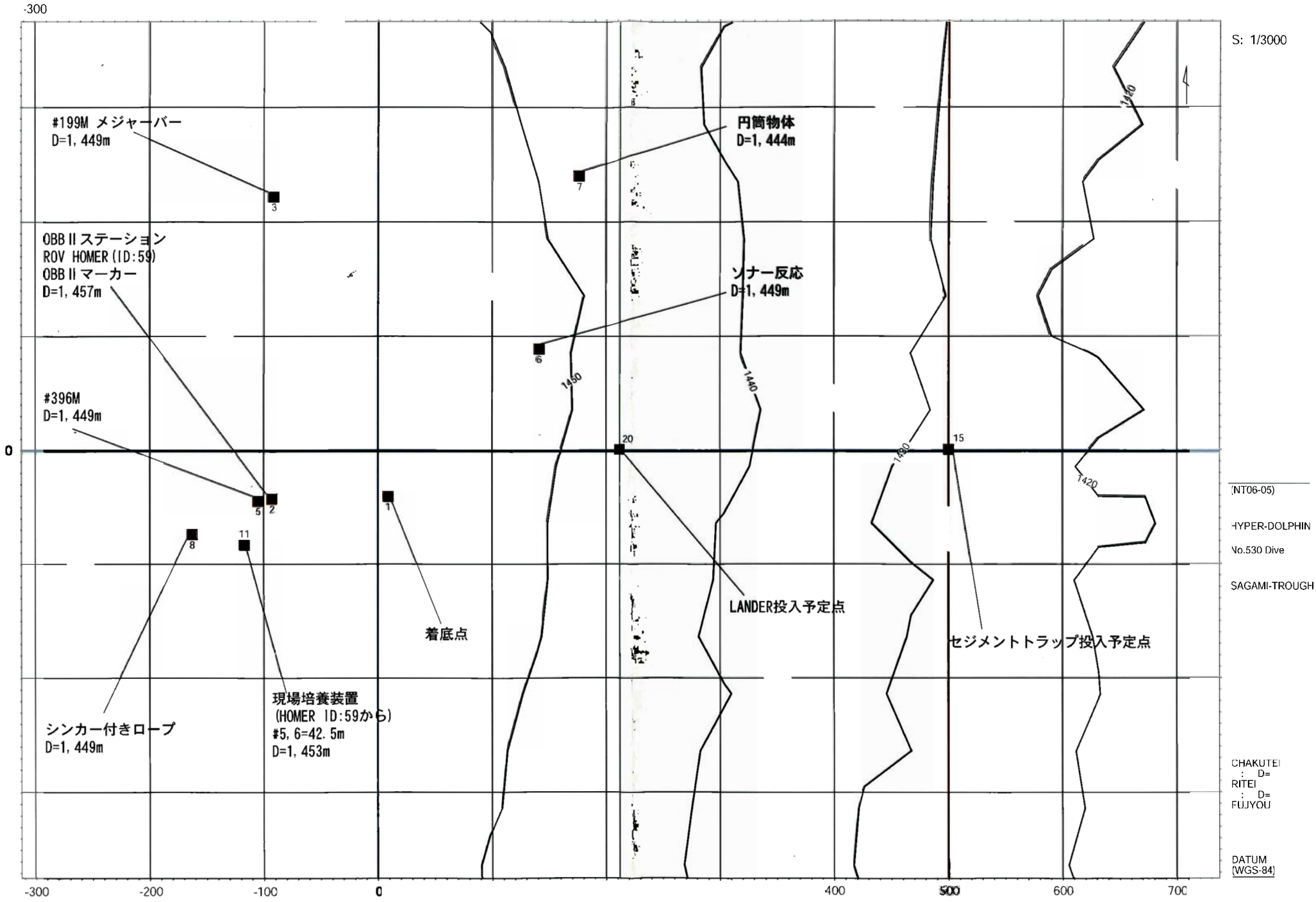
９．作業内容　　海底観察、採泥、採水、ﾗﾝﾀﾞｰ関連作業
(ﾆｽｷﾝ採水器2本、MBARI採泥器5本、現場培養装置3本、ﾃﾞﾝﾏｰｸ式ｺｱ5本、ﾗﾝﾀﾞｰ回収索一式、ｶﾏｷﾘｶｯﾀｰ)

１０．日　程

相模トラフ海域着
０６：４５　作業開始
セジメントトラップ係留系投入
着底確認、位置キャリブレーション
ランダー投入
着底確認、位置キャリブレーション
ビークル作動確認
１０：００　潜航開始　Ｎｏ．１
～
１６：３０　ビークル浮上
１７：００　揚収完了
終了後、付近海域漂泊

１１．備　考

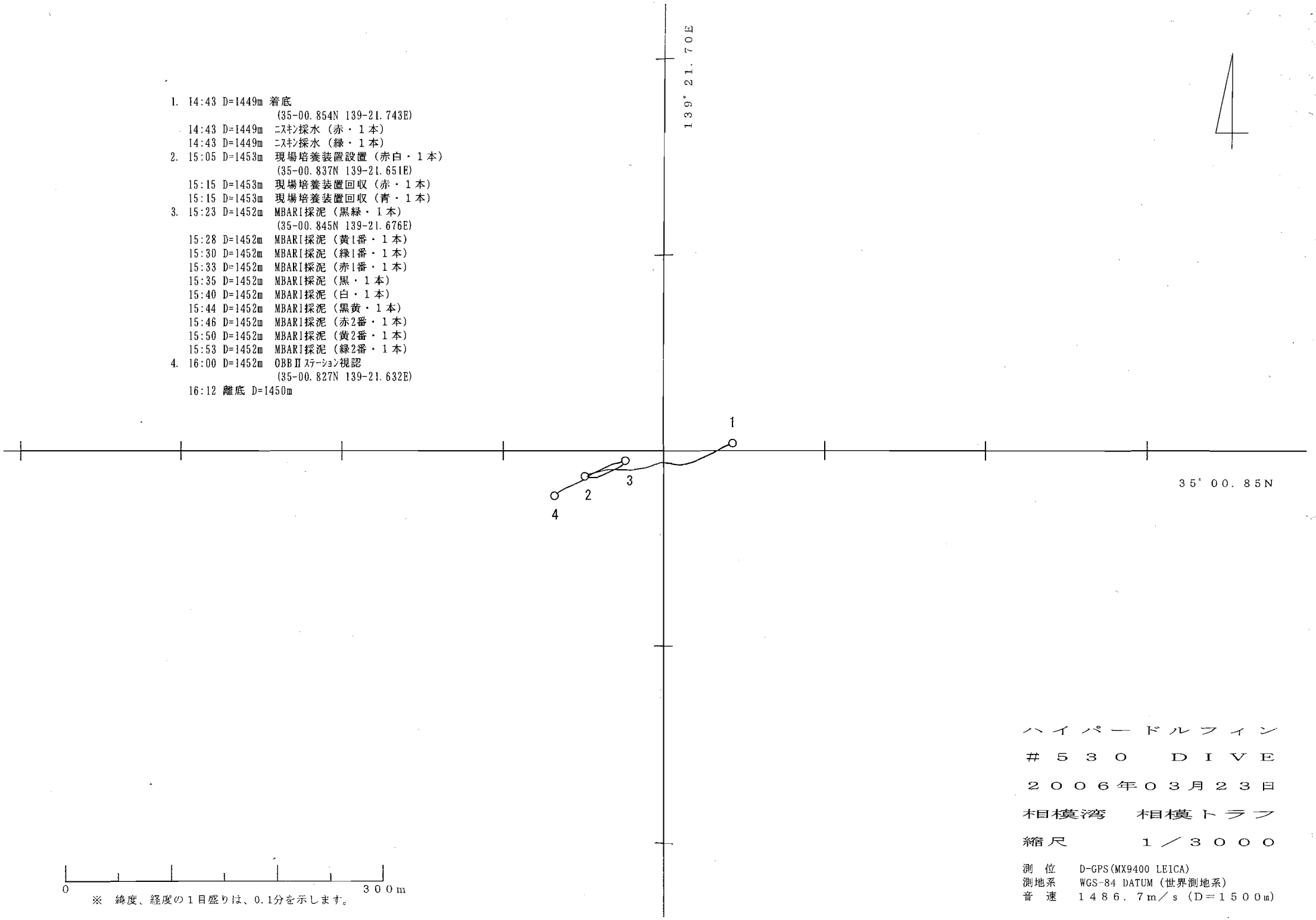
・特異点は「別紙」参照
・＃４アルゴス送信機／２Ａ－１　ＪＸトランスポンダ
・セジメントトラップ係留系投入予定点⑮
３５－００．８５０Ｎ　１３９－２２．０３０Ｅ
・ランダー投入予定点⑳
３５－００．８５０Ｎ　１３９－２１．８４０Ｅ
・ランダー測位機器
ベントストランスポンダ　１４．０ＫＨｚ
ＲＯＶ　ＨＯＭＥＲ：ＩＤ＝４６


-300
S: 1/3000
#199M メジャーバー
D=1, 449m
円筒物体
D=1, 444m
OBB II ステーション
ROV HOMER (ID:59)
OBB II マーカー
D=1, 457m
ソナー反応
D=1, 449m
#396M
D=1, 449m
1450
1440
1430
1420
0
20
15
着底点
LANDER投入予定点
セジメントトラップ投入予定点
シンカー付きロープ
D=1, 449m
現場培養装置
(HOMER ID:59から)
#5, 6=42.5m
D=1, 453m
(NT06-05)
HYPER-DOLPHIN
No.530 Dive
SAGAMI-TROUGH
CHAKUTEI
: D=
RITEI
: D=
FUJYOU
DATUM
(WGS-84)
-300
-200
-100
0
400
500
600
700
XY ORIGIN 35-0.850N 139-21.700E
CENTER 35-0.850N 139-21.840E

別　紙

特異点				
	緯　度	経　度	深さ m	備　考
②	３５－００．８２７Ｎ	１３９－２１．６３９Ｅ	1457 m	OBBⅡｽﾃｰｼｮﾝ ROV HOMER(ID:59) OBBⅡﾏｰｶｰ
③	３５－００．９７０Ｎ	１３９－２１．６４０Ｅ	1449 m	#199M.ﾒｼﾞｬｰﾊﾞｰ
④				
⑤	３５－００．８２６Ｎ	１３９－２１．６３１Ｅ	1449 m	#396M
⑥	３５－００．８９８Ｎ	１３９－２１．７９３Ｅ	1449 m	ソナー反応物体
⑦	３５－００．９８０Ｎ	１３９－２１．８１６Ｅ	1444 m	円筒物体
⑧	３５－００．８１０Ｎ	１３９－２１．５９３Ｅ	1449 m	シンカー付ロープ
⑨	３５－００．９５５Ｎ	１３９－２１．２２０Ｅ		立ち入り禁止区域
⑩	３５－００．７２５Ｎ	１３９－２１．３８０Ｅ		立ち入り禁止区域
⑪	３５－００．８０５Ｎ	１３９－２１．６２３Ｅ	1453 m	現場培養装置 (HOMER ID:59から) #5,6=42.5m
⑮	３５－００．８５０Ｎ	１３９－２２．０３０Ｅ	1427 m	ｾｼﾞﾒﾝﾄﾄﾗｯﾌﾟ係留系 投入予定点
⑳	３５－００．８５０Ｎ	１３９－２１．８４０Ｅ	1446 m	ﾗﾝﾀﾞｰ投入予定点

1. 14:43 D=1449m 着底
(35-00.854N 139-21.743E)
14:43 D=1449m ﾆｽｷﾝ採水（赤・１本）
14:43 D=1449m ﾆｽｷﾝ採水（緑・１本）
2. 15:05 D=1453m 現場培養装置設置（赤白・１本）
(35-00.837N 139-21.651E)
15:15 D=1453m 現場培養装置回収（赤・１本）
15:15 D=1453m 現場培養装置回収（青・１本）
3. 15:23 D=1452m MBARI採泥（黒緑・１本）
(35-00.845N 139-21.676E)
15:28 D=1452m MBARI採泥（黄1番・１本）
15:30 D=1452m MBARI採泥（緑1番・１本）
15:33 D=1452m MBARI採泥（赤1番・１本）
15:35 D=1452m MBARI採泥（黒・１本）
15:40 D=1452m MBARI採泥（白・１本）
15:44 D=1452m MBARI採泥（黒黄・１本）
15:46 D=1452m MBARI採泥（赤2番・１本）
15:50 D=1452m MBARI採泥（黄2番・１本）
15:53 D=1452m MBARI採泥（緑2番・１本）
4. 16:00 D=1452m OBBⅡｽﾃｰｼｮﾝ視認
(35-00.827N 139-21.632E)
16:12 離底 D=1450m



0 300m

※ 緯度、経度の１目盛りは、0.1分を示します。

ハイパードルフィン
＃５３０ ＤＩＶＥ
２００６年０３月２３日
相模湾 相模トラフ
縮尺 １／３０００

測 位 D-GPS(MX9400 LEICA)
測地系 WGS-84 DATUM（世界測地系）
音 速 １４８６．７m／s（D＝１５００m）

3.30

Dive Log of HPD Dive #531 Area:Sagami-bay **2005/3/24**

Time (JST)	Depth (m)	Altitude (m)	Heading (Deg)	Description	Remarks
				HTV:(青)ランドビーストンが下がっているので確認	
11:27	300			伝統食の解禁	
12:01	1449	0	090	着底	
12:04	1449	3.0	090	ニスキン採水 (赤線)	
12:06	1441	8.7	090	ランダー 右側確認	
12:20	1445	0.0	049	ランダー 右側のボタンを押す	
12:22	1445	0.0	049	ランダー 左側のボタンを押す (電源ON)	
12:33	~~1439~~ 1439	7.8	124	ランダー 海底面から5mの所より降ろす。	
				(一番初めの着底位置から20m位移動)	
13:00	1439	3.9	~~324~~ 360	ランダー 再降下	
				(二度目の着底位置より10m位移動)	
13:01	1439	3.6	0	ランダー 移動完了	
13:19	1463	0	270	OBBL離して着底	
13:24	1463	0	270	LEDライト設置	
13:32	1453	0	12	#4に到着	
13:35	1453	0	12	青白現場培養装置設置	
13:40	1453	0	46	着底、柱状採泥と開始する。	
13:43	1453	0	46	Denmark 黄コア採泥	
13:47	1453	0	46	Denmark 赤コア採泥	
13:51	1453	0	46	Denmark 白コア採泥	
13:55	1453	0	47	Denmark 黒コア採泥	
13:59	1453	0	46	Denmark 緑コア採泥	移動
14:04	1453	0	46	MBARI 黒黄採泥	
14:09	1453	0	47	MBARI 黒緑採泥	
14:10	1453	0	46	MBARI 青白採泥	
14:13	1453	0	47	MBARI 灰採泥 (ちょっと噴いた)	
14:17	1453	0	47	MBARI 黄赤採泥	
14:19	1453	0	90	#11番へ向かう	
14:27	1453	0	266	#11に到着	
14:34	1453	0	266	黄&青現場培養装置回収	
14:36	1453	0	266	緑&橙現場培養装置回収	
14:39	1453	0	266	ランダー(#20)へ向かう	
14 44	1450	2.1	77	黒をのむ	

Dive Log of HPD Dive #531 Area:Sagami-bay **2005/3/24**

Time (JST)	Depth (m)	Altitude (m)	Heading (Deg)	Description	Remarks
14:00	1480.4	2.2	110	傾斜計の台	
15:03	1480.2	2.0	104	DIVE 544 の重シ.	
15:07	1448.7	2.0	75	エイ	
15:13	1446.9	2.4	82	黒いフラグ"	
15:30	1446.5	00	64	灰色の魚 (ソコダラの一種?) 頭が大きめ	
15:33	1440.0	4.0	65	ランダー 確認	
15:56	1443.3	0	115	右側のボタンを押す	
15:57	1443.3	0	115	左隣りの " (2度目の電源ON)	
15:59	1439.6	3.6	115	ランダー 移動開始	
16:01	1435.7	7.2	0	ランダー 移動後 (10m) ゆっくり落とす	
16:05	1442 ~~1443.2~~	~~0.9~~	0	離底	

ハイパードルフィン　潜航記録

平 成　18　年　　NT06-05　行動　　記載者

潜 航 年 月 日　2006/03/24　　位置　作図中心位置

潜 航 回 数　　緯度　35° 00.850 ' N

通算潜航回数　531 回　　経度　139° 21.700 ' E

WGS-84

潜 航 海 域　相模湾　　相模トラフ

潜 航 目 的　調査潜航　現場計測と現場実験による堆積物－水境界の動態と物質循環の解明

調 査 主 任　北里 洋　　Ｐｉｌｏｔ　菊谷 茂

ビークル 指揮　千葉 和宏　　Co. Pilot　木戸 哲平

作業経過時刻	
吊　揚	10:45
着　水	10:50
潜航開始	11:06
着　底	12:01
離　底	16:05
浮　上	16:45
揚収完了	17:02

累計時間		
潜航時間		5:39
通算潜航		2468:56
ケーブル	ケーブルNo.	3
	使用時間	6:17
	通算時間	1071:30

気 象 ・ 海 象

天候	風向	風力	風浪	うねり	視程
c	NNE	5	3	2	7

最大潜航深度

着 底 深 度　　離 底 深 度　1442 m

着 底 底 質　　離 底 底 質

海底を観　しながら　し、採泥・　水及び現場培　置の設置・回収、ラン
一装置移動作業を行った。

平成１８年
ハイパードルフィン 調査潜航
＃５３１ＤＩＶＥ
相模湾　相模トラフ

２００６年０３月２４日

１．測 地 系　　ＷＧＳ－８４（世界測地系）

２．測　位　　Ｄ－ＧＰＳ（ＭＸ９４００Ｎ　ＬＥＩＣＡ）

３．ＸＢＴ　　計測済み　　Ｓ／Ｖ＝１４８６．７ｍ／ｓ　（Ｄ＝１５００ｍ）

４．ＸＰＯＮＤＥＲ　　セジメントトラップ係留系取付
Ｕ／Ｃ：６０１　　１３．５ＫＨｚ

５．作図中心　　３５－００．８５０Ｎ　　ＡＮＧＬＥ　　０°
１３９－２１．７００Ｅ　　ＳＣＡＬＥ　１／３０００

６．着底点（特異点①）　　３５－００．８２８Ｎ　　Ｄ＝１４５０ｍ
１３９－２１．７０６Ｅ　　Ｃｏ＝

７．潜航配置　　指　　揮　：　運航長
ｺﾝﾃﾅ PILOT　：　菊谷　　木戸　　甲板PILOT　：　戸塚

８．潜航目的　　現場計測と現場実験による堆積物－水境界の動態と物質循環の解明

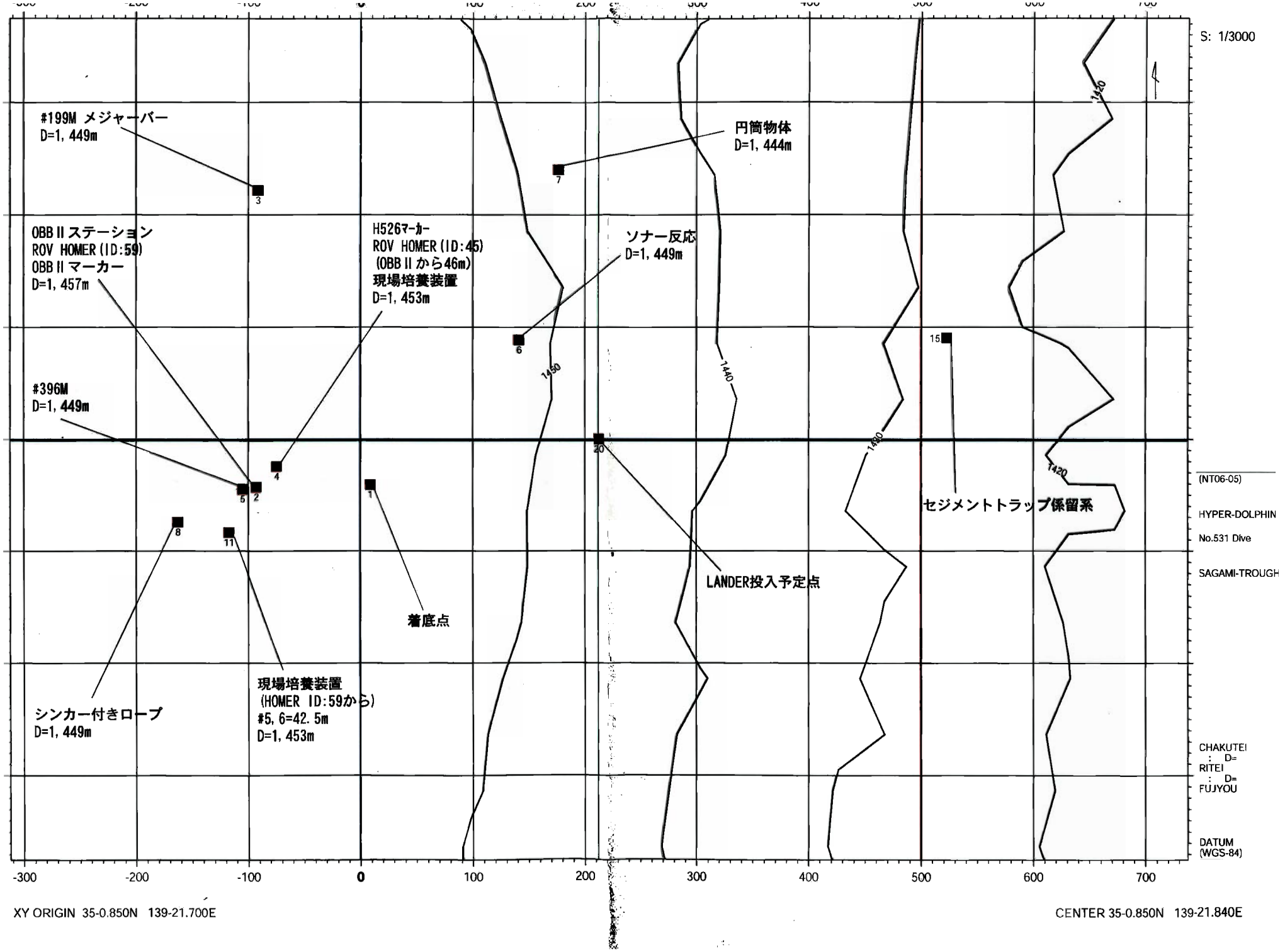
９．作業内容　　海底観察、ﾍﾞﾝｼｯｸﾁｬﾝﾊﾞｰ設置
(ﾍﾞﾝｼｯｸﾁｬﾝﾊﾞｰ(HOMER:ID=41)、ﾗﾝﾀﾞｰ回収索一式、ｶﾏｷﾘｶｯﾀｰ)

１０．日　程

相模トラフ海域着
０７：００　作業開始
ランダー投入
着底確認、位置キャリブレーション
０７：５０　ビークル作動確認
０８：３０　潜航開始　Ｎｏ．２
〜
１１：３０　ビークル浮上
１２：００　揚収完了

１１．備　考

・特異点は「別紙」参照
・＃４アルゴス送信機／２Ａ－１　ＪＸトランスポンダ
・ランダー投入予定点⑳
３５－００．８５０Ｎ　　１３９－２１．８４０Ｅ
・ランダー測位機器
ベントストランスポンダ　　１４．０ＫＨｚ
ＲＯＶ　ＨＯＭＥＲ：ＩＤ＝４６

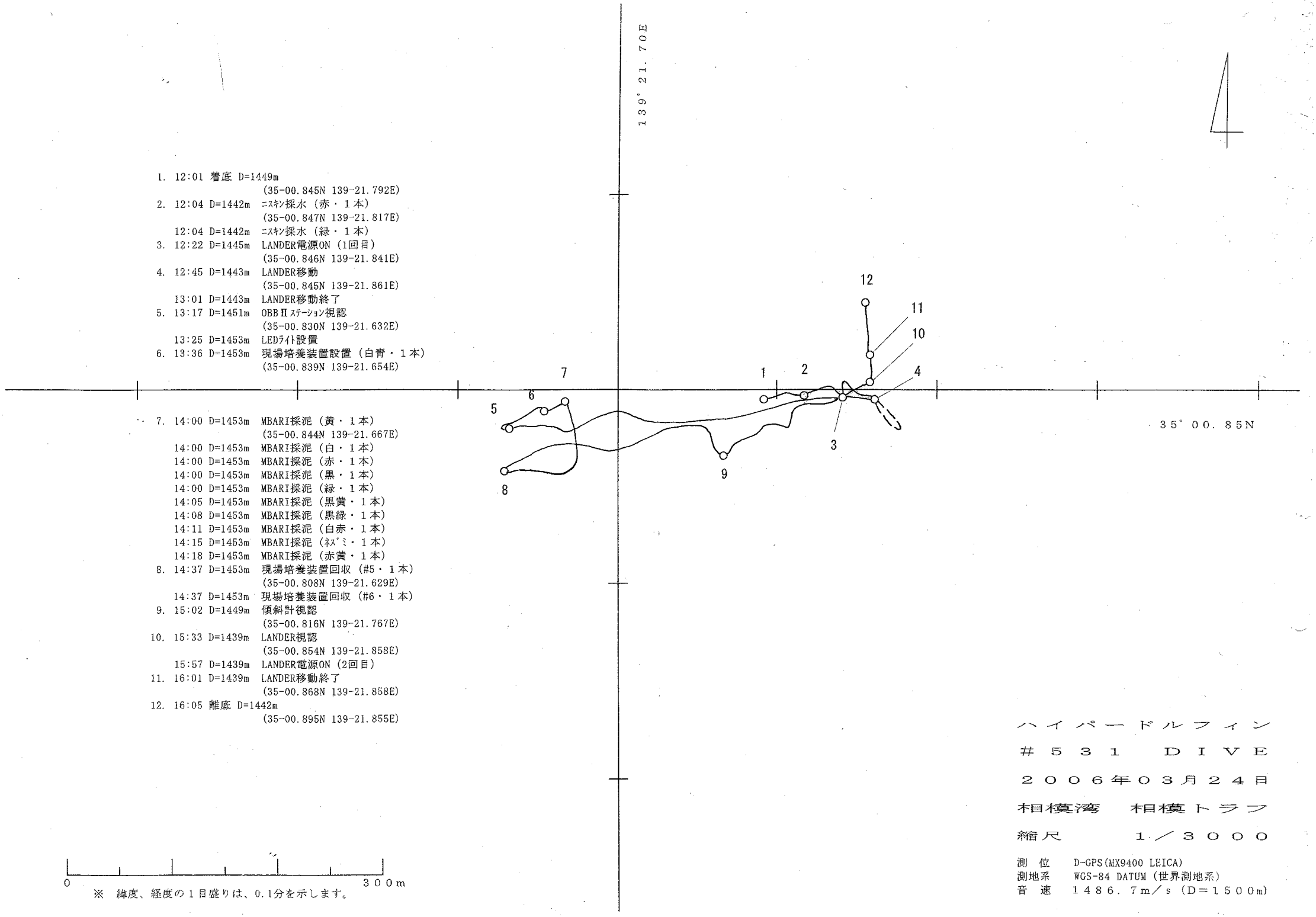

S: 1/3000
#199M メジャーバー
D=1, 449m
円筒物体
D=1, 444m
OBB II ステーション
ROV HOMER (ID:59)
OBB II マーカー
D=1, 457m
H526マーカー
ROV HOMER (ID:45)
(OBB II から46m)
現場培養装置
D=1, 453m
ソナー反応
D=1, 449m
#396M
D=1, 449m
着底点
LANDER投入予定点
セジメントトラップ係留系
現場培養装置
(HOMER ID:59から)
#5, 6=42.5m
D=1, 453m
シンカー付きロープ
D=1, 449m
1420
1430
1440
1450
1460
(NT06-05)
HYPER-DOLPHIN
No.531 Dive
SAGAMI-TROUGH
CHAKUTEI : D=
RITEI : D=
FUJYOU
DATUM (WGS-84)
-300
-200
-100
0
100
200
300
400
500
600
700
XY ORIGIN 35-0.850N 139-21.700E
CENTER 35-0.850N 139-21.840E

別　紙

特異点				
	緯　度	経　度	深さ m	備　考
②	３５－００．８２７Ｎ	１３９－２１．６３９Ｅ	1457 m	OBBⅡｽﾃｰｼｮﾝ ROV HOMER(ID:59) OBBⅡﾏｰｶｰ
③	３５－００．９７０Ｎ	１３９－２１．６４０Ｅ	1449 m	#199M.ﾒｼﾞｬｰﾊﾞｰ
④	３５－００．８３７Ｎ	１３９－２１．６５１Ｅ	1453 m	H526ﾏｰｶｰ ROV HOMER:ID=45 (OBBⅡから46m) 現場培養装置
⑤	３５－００．８２６Ｎ	１３９－２１．６３１Ｅ	1449 m	#396M
⑥	３５－００．８９８Ｎ	１３９－２１．７９３Ｅ	1449 m	ソナー反応物体
⑦	３５－００．９８０Ｎ	１３９－２１．８１６Ｅ	1444 m	円筒物体
⑧	３５－００．８１０Ｎ	１３９－２１．５９３Ｅ	1449 m	シンカー付ロープ
⑨	３５－００．９５５Ｎ	１３９－２１．２２０Ｅ		立ち入り禁止区域
⑩	３５－００．７２５Ｎ	１３９－２１．３８０Ｅ		立ち入り禁止区域
⑪	３５－００．８０５Ｎ	１３９－２１．６２３Ｅ	1453 m	現場培養装置 (HOMER ID:59から) #5,6=42.5m
⑮	３５－００．８９９Ｎ	１３９－２２．０４４Ｅ	1405 m	ｾｼﾞﾒﾝﾄﾄﾗｯﾌﾟ係留系
⑳	３５－００．８５０Ｎ	１３９－２１．８４０Ｅ	1446 m	ﾗﾝﾀﾞｰ投入予定点

1. 12:01 着底 D=1449m
(35-00.845N 139-21.792E)
2. 12:04 D=1442m ﾆｽｷﾝ採水（赤・１本）
(35-00.847N 139-21.817E)
12:04 D=1442m ﾆｽｷﾝ採水（緑・１本）
3. 12:22 D=1445m LANDER電源ON（1回目）
(35-00.846N 139-21.841E)
4. 12:45 D=1443m LANDER移動
(35-00.845N 139-21.861E)
13:01 D=1443m LANDER移動終了
5. 13:17 D=1451m OBBⅡｽﾃｰｼｮﾝ視認
(35-00.830N 139-21.632E)
13:25 D=1453m LEDﾗｲﾄ設置
6. 13:36 D=1453m 現場培養装置設置（白青・１本）
(35-00.839N 139-21.654E)

7. 14:00 D=1453m MBARI採泥（黄・１本）
(35-00.844N 139-21.667E)
14:00 D=1453m MBARI採泥（白・１本）
14:00 D=1453m MBARI採泥（赤・１本）
14:00 D=1453m MBARI採泥（黒・１本）
14:00 D=1453m MBARI採泥（緑・１本）
14:05 D=1453m MBARI採泥（黒黄・１本）
14:08 D=1453m MBARI採泥（黒緑・１本）
14:11 D=1453m MBARI採泥（白赤・１本）
14:15 D=1453m MBARI採泥（ﾈｽﾞﾐ・１本）
14:18 D=1453m MBARI採泥（赤黄・１本）
8. 14:37 D=1453m 現場培養装置回収（#5・１本）
(35-00.808N 139-21.629E)
14:37 D=1453m 現場培養装置回収（#6・１本）
9. 15:02 D=1449m 傾斜計視認
(35-00.816N 139-21.767E)
10. 15:33 D=1439m LANDER視認
(35-00.854N 139-21.858E)
15:57 D=1439m LANDER電源ON（2回目）
11. 16:01 D=1439m LANDER移動終了
(35-00.868N 139-21.858E)
12. 16:05 離底 D=1442m
(35-00.895N 139-21.855E)



0 300m

※ 緯度、経度の１目盛りは、0.1分を示します。

ハイパードルフィン
＃５３１ ＤＩＶＥ
２００６年０３月２４日
相模湾 相模トラフ
縮尺 １／３０００

測 位 D-GPS(MX9400 LEICA)
測地系 WGS-84 DATUM（世界測地系）
音 速 １４８６．７m／s（D＝１５００m）

Dive Log of HPD Dive #532 Area:Sagami-bay **2005/3/25**

Time (JST)	Depth (m)	Altitude (m)	Heading (Deg)	Description	Remarks
9:32	1445	6.4	6	チャンバー設置準備．	
9:35	1450	2.8	6	チャンバー持ち上げ，前方へ出す	
9:36	1452	0.7	6	チャンバー設置；ビークル着底	
9:41	1452	0.8	6	チャンバー設置作業終了 (OBB口から70m東)	
9:55	1440	3.7	136	Lander到着	
9.07	1442	2.1	102	着底．作業開始	
10.02	1444	0	102	Lander電源ON．移動開始	
10.13	1441	8	21	着底、下ろしなおし．	
10.16	1443	3.2	20	~~着~~ Lander移動作業終了．離底！	

ハイパードルフィン　潜航記録

平成 18 年　NT06-05　行動　　記載者　木戸 哲平

潜航年月日　2006/03/25
潜航回数　3回
通算潜航回数　532回

位置　作図中心位置
緯度　35° 00.850 ' N
経度　139° 21.700 ' E
WGS-84

潜航海域　相模湾　相模トラフ

潜航目的　調査潜航　現場計測と現場実験による堆積物－水境界の動態と物質循環の解明

調査主任　北里 洋
ビークル指揮　千葉 和宏

Pilot　木戸 哲平
Co. Pilot　近藤 友栄

作業経過時刻	
吊揚	08:17
着水	08:22
潜航開始	08:39
着底	09:36
離底	10:16
浮上	10:57
揚収完了	11:14

累計時間		
潜航時間		2:18
通算潜航		2471:14
ケーブル	ケーブルNo.	3
	使用時間	2:57
	通算時間	1074:27

気象・海象

天候	風向	風力	風浪	うねり	視程
c	NNE	5	3	2	7

最大潜航深度　1452 m
着底深度　1452 m
着底底質　泥

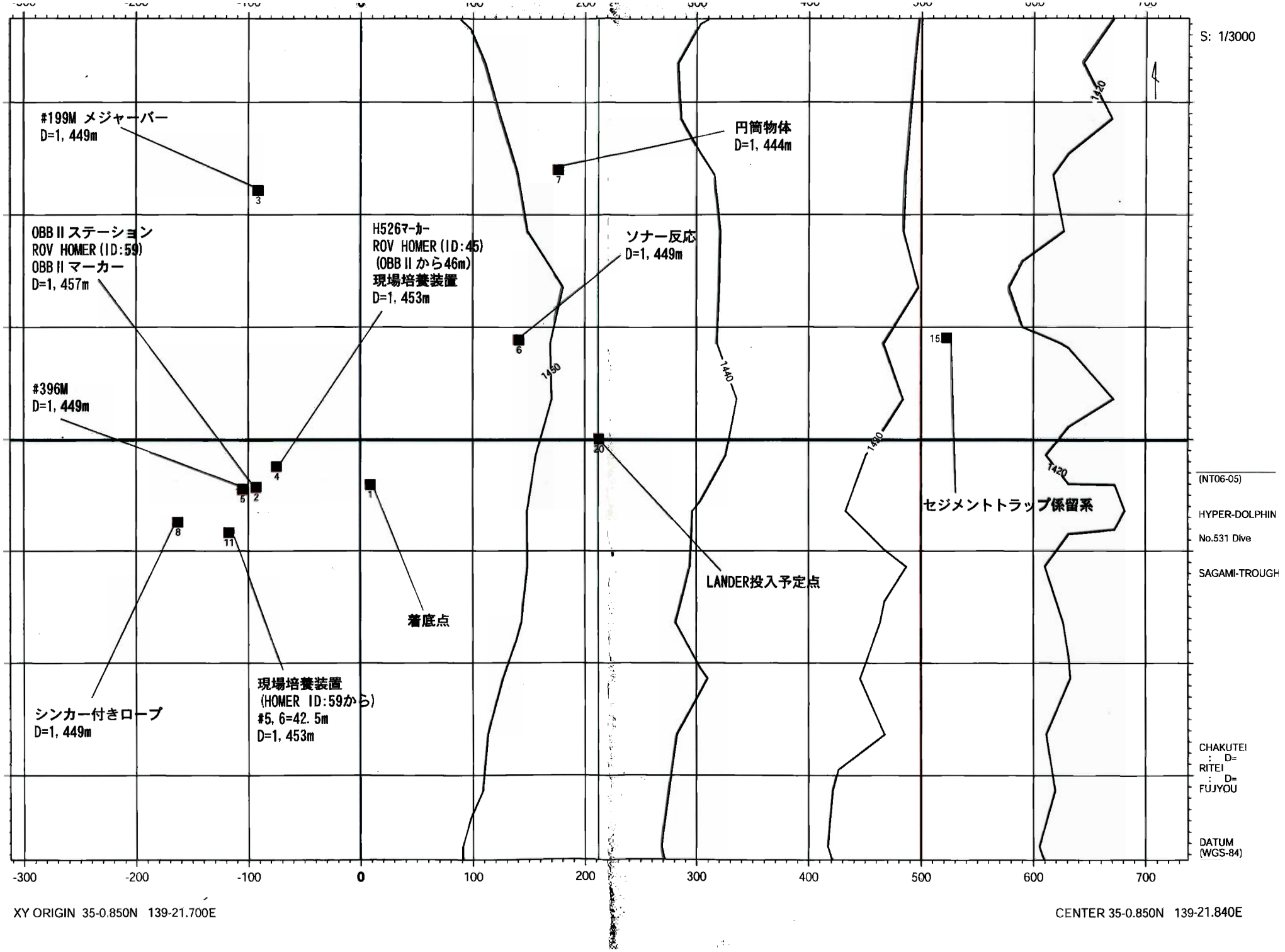
離底深度　1443 m
離底底質　泥

記事　海底を観察しながら航走し、ベンシックチャンバーの設置及びランダー装置移動作業を行った。

平成１８年
ハイパードルフィン調査
＃５３２ＤＩＶＥ
相模トラフ

２００６年０３月２５日

１．測 地 系	ＷＧＳ－８４（世界測地系）
２．測　位	Ｄ－ＧＰＳ（ＭＸ９４００Ｎ　ＬＥＩＣＡ）
３．ＸＢＴ	計測済み　　Ｓ／Ｖ＝１４８６．７ｍ／ｓ　（Ｄ＝１５００ｍ）
４．ＸＰＯＮＤＥＲ	セジメントトラップ係留系取付 Ｕ／Ｃ：６０１　　３．５ＫＨｚ
５．作図中心	３５－００．８５０Ｎ　ＡＮＧＬＥ　　０° １３９－２１．７００Ｅ　ＳＣＡＬＥ　１／３０００
６．着底点（特異点①）	３５－００．８２８Ｎ　　Ｄ＝１４５０ｍ １３９－２１．７０６Ｅ　Ｃｏ＝
７．潜航配置	指　　揮　：運航長 ｺﾝﾃﾅ PILOT　：木戸　　近藤　　甲板PILOT　：戸塚
８．潜航目的	現場計測と現場実験による堆積物－水境界の動態と物質循環の解明
９．作業内容	ﾍﾞﾝｼｯｸﾁｬﾝﾊﾞｰ設置 (ﾍﾞﾝｼｯｸﾁｬﾝﾊﾞｰ(HOMER:ID=41)
１０．日　程	相模トラフ海域着 ０７：５０　ビークル作動確認 ０８：３０　潜航開始　Ｎｏ．３ 〜 １１：３０　ビークル浮上 １２：００　揚収完了
１１．備　考	・特異点は「別紙」参照 ・＃４アルゴス送信機（ＩＤ＝２Ｃ６９Ｂ３５） ・２Ａ－１　ＪＸトランスポンダ ・ランダー測位機器 ベントストランスポンダ　　１４．０ＫＨｚ ＲＯＶ　ＨＯＭＥＲ：ＩＤ＝４６

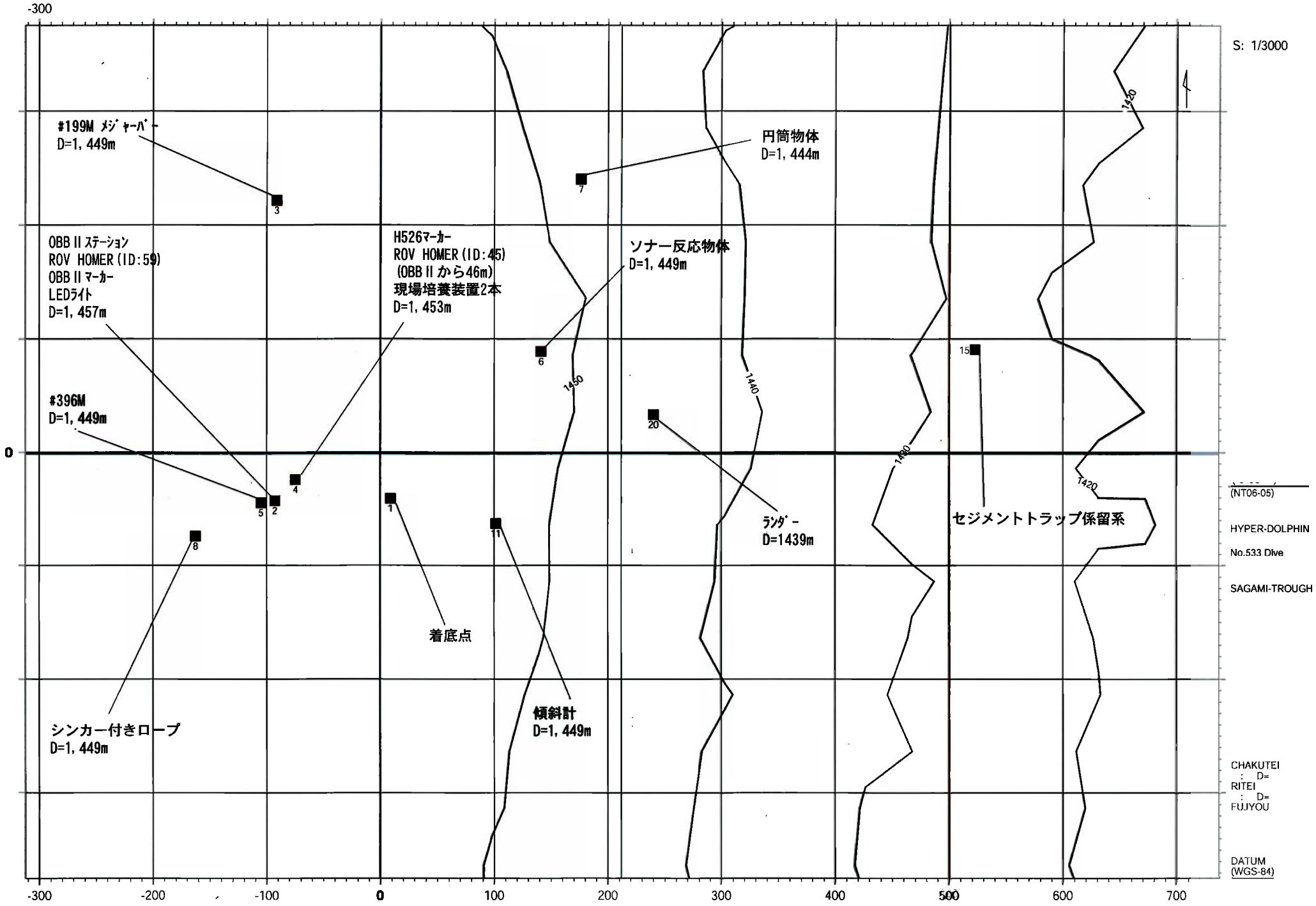

S: 1/3000
#199M メジャーバー
D=1, 449m
円筒物体
D=1, 444m
OBB II ステーション
ROV HOMER (ID:59)
OBB II マーカー
D=1, 457m
H526マーカー
ROV HOMER (ID:45)
(OBB II から46m)
現場培養装置
D=1, 453m
ソナー反応
D=1, 449m
#396M
D=1, 449m
着底点
LANDER投入予定点
セジメントトラップ係留系
現場培養装置
(HOMER ID:59から)
#5, 6=42.5m
D=1, 453m
シンカー付きロープ
D=1, 449m
1420
1430
1440
1450
1460
(NT06-05)
HYPER-DOLPHIN
No.531 Dive
SAGAMI-TROUGH
CHAKUTEI : D=
RITEI : D=
FUJYOU
DATUM (WGS-84)
-300
-200
-100
0
100
200
300
400
500
600
700
XY ORIGIN 35-0.850N 139-21.700E
CENTER 35-0.850N 139-21.840E

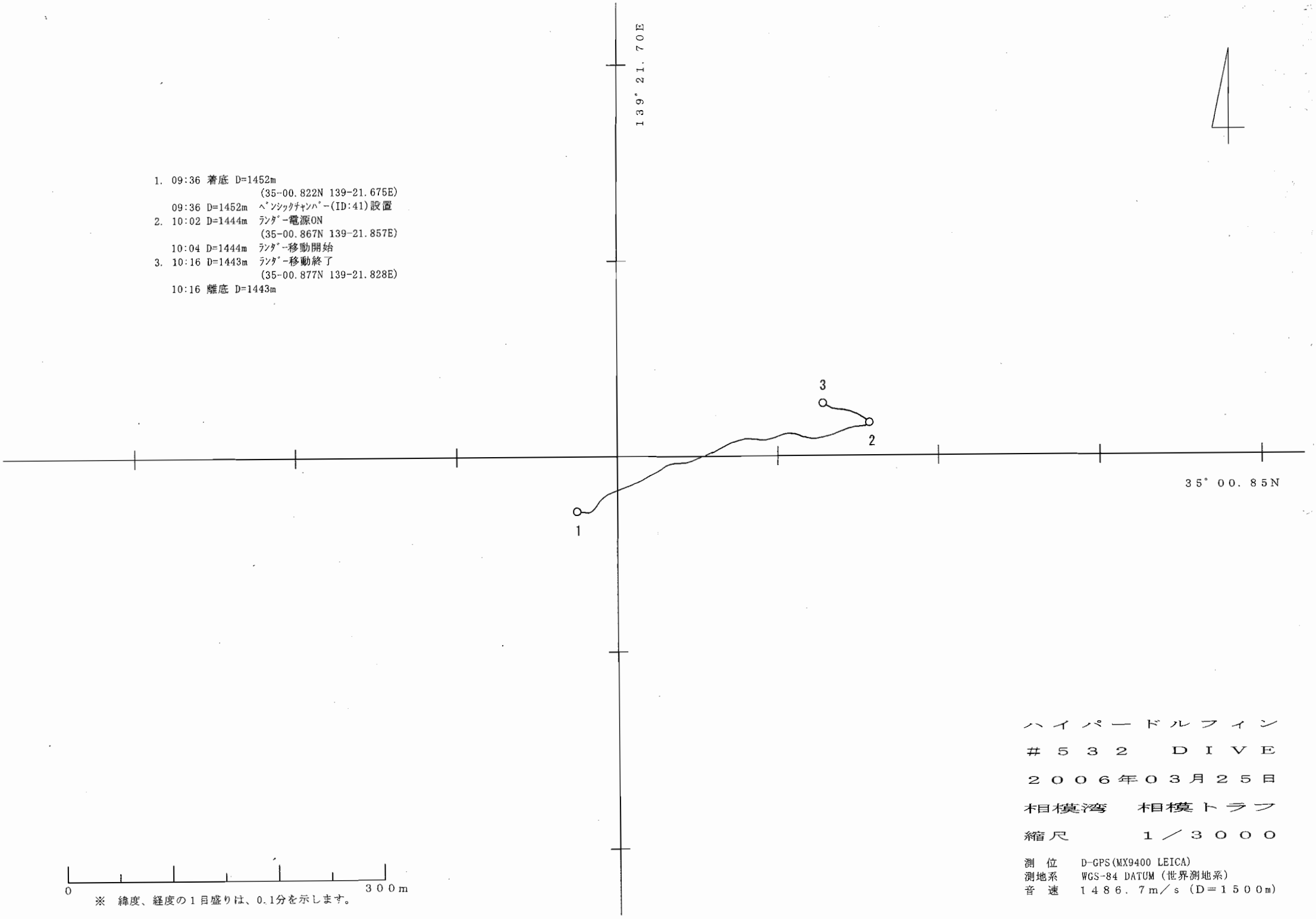
別　紙

特異点				
	緯　度	経　度	深さ m	備　考
②	３５－００．８２７Ｎ	１３９－２１．６３９Ｅ	1457 m	OBBⅡｽﾃｰｼｮﾝ ROV HOMER(ID:59) OBBⅡﾏｰｶｰ
③	３５－００．９７０Ｎ	１３９－２１．６４０Ｅ	1449 m	#199M.ﾒｼﾞｬｰﾊﾞｰ
④	３５－００．８３７Ｎ	１３９－２１．６５１Ｅ	1453 m	H526ﾏｰｶｰ ROV HOMER:ID=45 (OBBⅡから46m) 現場培養装置
⑤	３５－００．８２６Ｎ	１３９－２１．６３１Ｅ	1449 m	#396M
⑥	３５－００．８９８Ｎ	１３９－２１．７９３Ｅ	1449 m	ソナー反応物体
⑦	３５－００．９８０Ｎ	１３９－２１．８１６Ｅ	1444 m	円筒物体
⑧	３５－００．８１０Ｎ	１３９－２１．５９３Ｅ	1449 m	シンカー付ロープ
⑨	３５－００．９５５Ｎ	１３９－２１．２２０Ｅ		立ち入り禁止区域
⑩	３５－００．７２５Ｎ	１３９－２１．３８０Ｅ		立ち入り禁止区域
⑪	３５－００．８０５Ｎ	１３９－２１．６２３Ｅ	1453 m	現場培養装置 (HOMER ID:59から) #5,6=42.5m
⑮	３５－００．８９９Ｎ	１３９－２２．０４４Ｅ	1405 m	ｾｼﾞﾒﾝﾄﾄﾗｯﾌﾟ係留系
⑳	３５－００．８５０Ｎ	１３９－２１．８４０Ｅ	1446 m	ﾗﾝﾀﾞｰ投入予定点

別　紙

特異点				
	緯　度	経　度	深さ m	備　考
②	３５－００．８２７Ｎ	１３９－２１．６３９Ｅ	1457 m	OBBⅡｽﾃｰｼｮﾝ ROV HOMER(ID:59) OBBⅡﾏｰｶｰ LEDﾗｲﾄ
③	３５－００．９７０Ｎ	１３９－２１．６４０Ｅ	1449 m	#199M.ﾒｼﾞｬｰﾊﾞｰ
④	３５－００．８３７Ｎ	１３９－２１．６５１Ｅ	1453 m	H526ﾏｰｶｰ ROV HOMER:ID=45 (OBBⅡから46m) 現場培養装置2本
⑤	３５－００．８２６Ｎ	１３９－２１．６３１Ｅ	1449 m	#396M
⑥	３５－００．８９８Ｎ	１３９－２１．７９３Ｅ	1449 m	ソナー反応物体
⑦	３５－００．９８０Ｎ	１３９－２１．８１６Ｅ	1444 m	円筒物体
⑧	３５－００．８１０Ｎ	１３９－２１．５９３Ｅ	1449 m	シンカー付ロープ
⑨	３５－００．９５５Ｎ	１３９－２１．２２０Ｅ		立ち入り禁止区域
⑩	３５－００．７２５Ｎ	１３９－２１．３８０Ｅ		立ち入り禁止区域
⑪	３５－００．８１６Ｎ	１３９－２１．７６７Ｅ	1449 m	傾斜計
⑮	３５－００．８９９Ｎ	１３９－２２．０４４Ｅ	1405 m	ｾｼﾞﾒﾝﾄﾄﾗｯﾌﾟ係留系
⑳	３５－００．８６８Ｎ	１３９－２１．８５８Ｅ	1439 m	ﾗﾝﾀﾞｰ


S: 1/3000
#199M メジャーバー
D=1, 449m
円筒物体
D=1, 444m
OBB II ステーション
ROV HOMER (ID:59)
OBB II マーカー
LEDライト
D=1, 457m
H526マーカー
ROV HOMER (ID:45)
(OBB II から46m)
現場培養装置2本
D=1, 453m
ソナー反応物体
D=1, 449m
#396M
D=1, 449m
ランダー
D=1439m
セジメントトラップ係留系
着底点
傾斜計
D=1, 449m
シンカー付きロープ
D=1, 449m
1420
1430
1440
1450
(NT06-05)
HYPER-DOLPHIN
No.533 Dive
SAGAMI-TROUGH
CHAKUTEI
: D=
RITEI
: D=
FUJYOU
DATUM
(WGS-84)
-300
-200
-100
0
100
200
300
400
500
600
700
XY ORIGIN 35-0.850N 139-21.700E
CENTER 35-0.850N 139-21.840E



1. 09:36 着底 D=1452m
   (35-00.822N 139-21.675E)
   09:36 D=1452m ﾍﾞﾝｼｯｸﾁｬﾝﾊﾞｰ(ID:41)設置
2. 10:02 D=1444m ﾗﾝﾀﾞｰ電源ON
   (35-00.867N 139-21.857E)
   10:04 D=1444m ﾗﾝﾀﾞｰ移動開始
3. 10:16 D=1443m ﾗﾝﾀﾞｰ移動終了
   (35-00.877N 139-21.828E)
   10:16 離底 D=1443m

0 300m

※ 緯度、経度の１目盛りは、0.1分を示します。

ハイパードルフィン
＃５３２ ＤＩＶＥ
２００６年０３月２５日
相模湾 相模トラフ
縮尺 １／３０００

測 位 D-GPS(MX9400 LEICA)
測地系 WGS-84 DATUM (世界測地系)
音 速 １４８６．７m／s (D＝１５００m)

Dive Log of HPD Dive #533 Area:Sagami-bay **2005/3/25**

Time (JST)	Depth (m)	Altitude (m)	Heading (Deg)	Description	Remarks
13:40	1450 1451	3.1	270	着底	
13:43	1451	1.7	270	ニスキン採水 (赤、緑)	
〃	〃	〃	〃	現場培養装置付近着底、確認	
13:48	1450	0	37	#4 付近着底	
13:50	1453	0	37	Feeding Device 設置 (赤).	
13:52	1453	0	37	↳引き金を引く	
13:58	1453	0	37	Feeding Device 回収 (赤)	
13:55	1453	0	37	Feeding Device 回収 (赤、白)	
14:03	1451	0	78	着底、作業開始	
14:04	1452	0	79	Denmark 黄コア採泥	
14:06	1452	0	79	Denmark 白コア採泥	
14:08	1452	0	79	Denmark 赤コア採泥	
14:10	1452	0	79	Denmark 黒コア採泥	
14:13	1452	0	77	Denmark 緑コア採泥	
14:17	1452	0	79	MBARI 緑黒コア採泥	
14:19	1452	0	79	MBARI 黄赤コア採泥	
14:21	1452	0	79	MBARI 赤白コア採泥	
14:22	1452	0	79	MBARI 白色コア採泥	
14:24	1452	0	79	MBARI 黄黒コア採泥	
14:29	1447	4.1	80	ランダー 回収確認	
14:34	1446	0	~~319~~ 319	ランダー 持ち上げ	
14:41	1435	10.1	319	ランダー 再投下	
14:42	1435	10.1	319	離底	

ハイパードルフィン　潜航記録

平成　18　年　　NT06-05　行動　　記載者　　近藤　友栄

潜航年月日	2006/03/25
潜航回数	4回
通算潜航回数	533回

位置	作図中心位置
緯度	35° 00.850 ' N
経度	139° 21.700 ' E
	WGS-84

潜航海域　相模湾　　相模トラフ

潜航目的　調査潜航　　現場計測と現場実験による堆積物－水境界の動態と物質循環の解明

調査主任　北里　洋　　Pilot　近藤　友栄

ビークル指揮　千葉　和宏　　Co. Pilot　菊谷　茂

作業経過時刻	
吊揚	12:21
着水	12:26
潜航開始	12:42
着底	13:40
離底	14:39
浮上	15:33
揚収完了	15:53

累計時間		
潜航時間		2:51
通算潜航		2474:5
ケーブル	ケーブルNo.	3
	使用時間	3:32
	通算時間	1077:59

気象・海象

天候	風向	風力	風浪	うねり	視程
bc	NNE	3	2	2	7

最大潜航深度	1453 m
着底深度	1451 m
着底底質	泥

離底深度	1446 m
離底底質	泥

記事　海底を観察しながら航走し、採泥、採水、現場培養装置の設置・回収及びランダー装置の回収を行った。

平成１８年
ハイパードルフィン 調査潜航
＃５３３ＤＩＶＥ
相模湾　相模トラフ

２００６年０３月２５日

１．測 地 系　　ＷＧＳ－８４（世界測地系）

２．測　位　　Ｄ－ＧＰＳ（ＭＸ９４００Ｎ　ＬＥＩＣＡ）

３．ＸＢＴ　　計測済み　　Ｓ／Ｖ＝１４８６．７ｍ／ｓ　（Ｄ＝１５００ｍ）

４．ＸＰＯＮＤＥＲ　　セジメントトラップ係留系取付
Ｕ／Ｃ：６０１　　１３．５ＫＨｚ

５．作図中心　　３５－００．８５０Ｎ　　ＡＮＧＬＥ　　０°
１３９－２１．７００Ｅ　　ＳＣＡＬＥ　１／３０００

６．着底点（特異点①）　　３５－００．８２８Ｎ　　Ｄ＝１４５０ｍ
１３９－２１．７０６Ｅ　　Ｃｏ＝

７．潜航配置　　指　　揮　：　運航長
ｺﾝﾃﾅ PILOT　：　近藤　　菊谷　　甲板PILOT　：　戸塚

８．潜航目的　　現場計測と現場実験による堆積物－水境界の動態と物質循環の解明

９．作業内容　　海底観察、採泥、採水、現場培養装置設置・回収、ﾗﾝﾀﾞｰ関連作業・回収
(ﾆｽｷﾝ採水器2本、MBARI採泥器5本、ﾃﾞﾝﾏｰｸ式採泥器5本、現場培養装置1本、ﾗﾝﾀﾞｰ回収索一式、ｶﾏｷﾘｶｯﾀｰ)

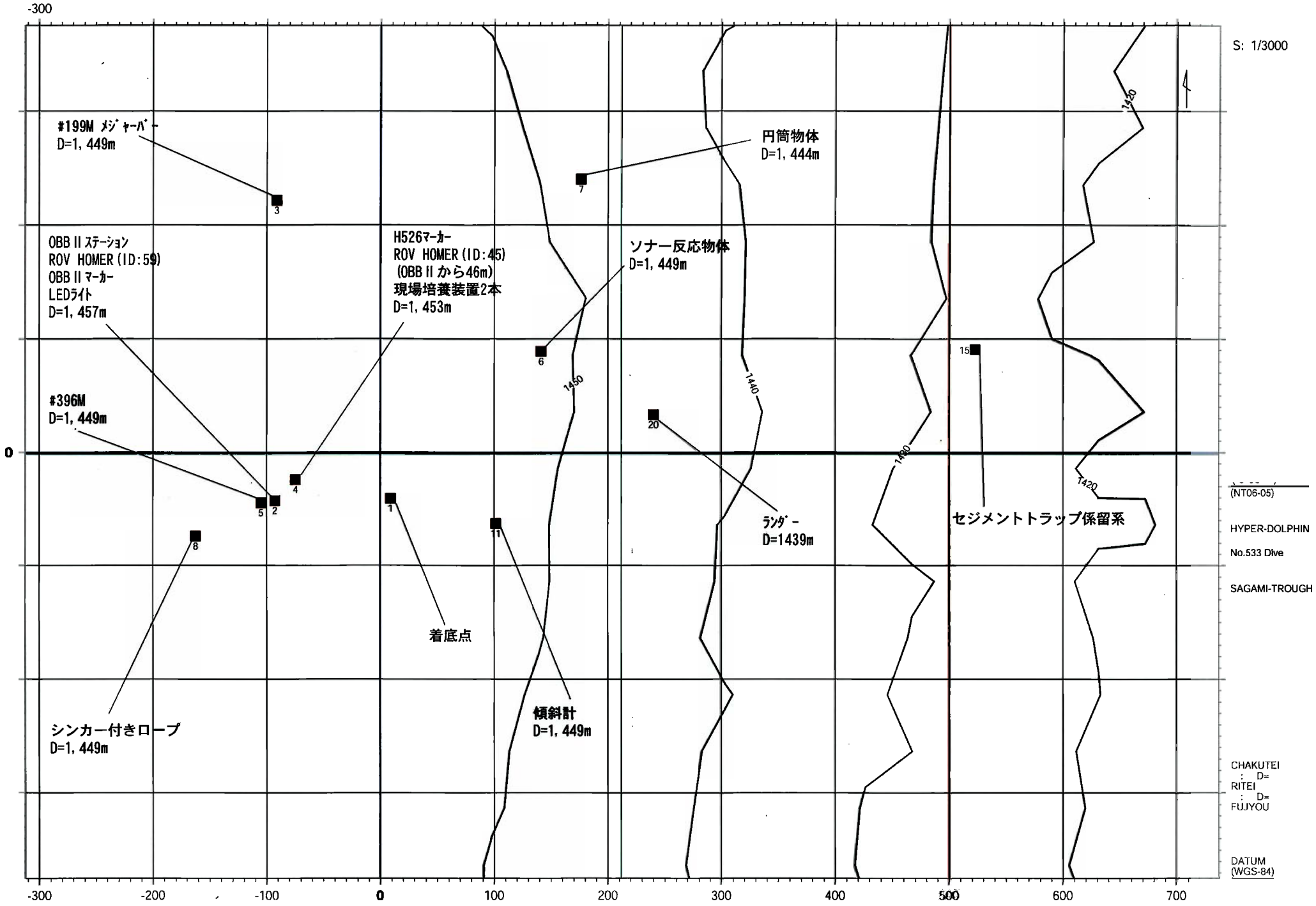
１０．日　程　　１３：００　潜航開始　Ｎｏ．４
〜
１６：３０　ビークル浮上
１７：００　揚収完了
終了後、付近海域漂泊

１１．備　考　　・特異点は「別紙」参照

・＃４アルゴス送信機（ＩＤ＝２Ｃ６９Ｂ３５）

・２Ａ－１　ＪＸトランスポンダ

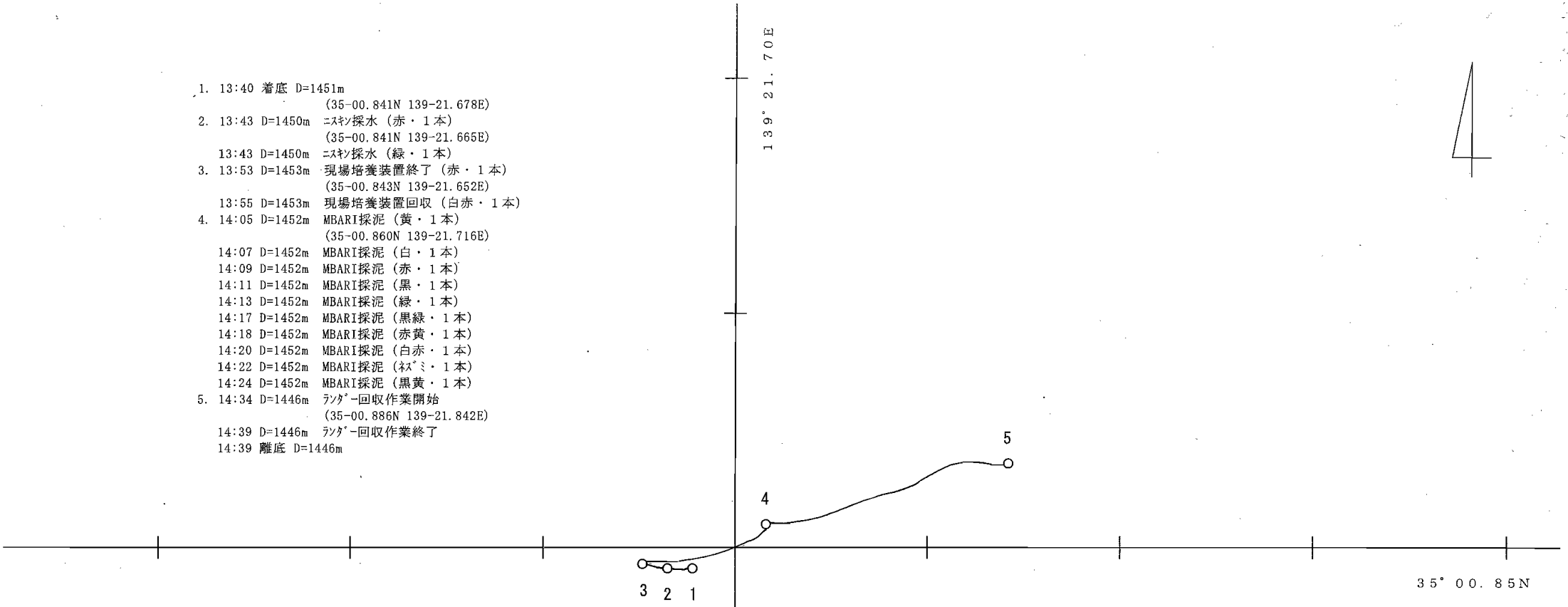
・ランダー測位機器
ベントストランスポンダ　　１４．０ＫＨｚ
ＲＯＶ　ＨＯＭＥＲ：ＩＤ＝４６


S: 1/3000
#199M メジャーバー
D=1, 449m
円筒物体
D=1, 444m
OBB II ステーション
ROV HOMER (ID:59)
OBB II マーカー
LEDライト
D=1, 457m
H526マーカー
ROV HOMER (ID:45)
(OBB II から46m)
現場培養装置2本
D=1, 453m
ソナー反応物体
D=1, 449m
#396M
D=1, 449m
ランダー
D=1439m
セジメントトラップ係留系
着底点
傾斜計
D=1, 449m
シンカー付きロープ
D=1, 449m
1420
1430
1440
1450
(NT06-05)
HYPER-DOLPHIN
No.533 Dive
SAGAMI-TROUGH
CHAKUTEI
: D=
RITEI
: D=
FUJYOU
DATUM
(WGS-84)
-300
-200
-100
0
100
200
300
400
500
600
700
XY ORIGIN 35-0.850N 139-21.700E
CENTER 35-0.850N 139-21.840E

別　紙

特異点				
	緯　度	経　度	深さ m	備　考
②	３５－００．８２７Ｎ	１３９－２１．６３９Ｅ	1457 m	OBBⅡｽﾃｰｼｮﾝ ROV HOMER(ID:59) OBBⅡﾏｰｶｰ LEDﾗｲﾄ
③	３５－００．９７０Ｎ	１３９－２１．６４０Ｅ	1449 m	#199M.ﾒｼﾞｬｰﾊﾞｰ
④	３５－００．８３７Ｎ	１３９－２１．６５１Ｅ	1453 m	H526ﾏｰｶｰ ROV HOMER:ID=45 (OBBⅡから46m) 現場培養装置2本
⑤	３５－００．８２６Ｎ	１３９－２１．６３１Ｅ	1449 m	#396M
⑥	３５－００．８９８Ｎ	１３９－２１．７９３Ｅ	1449 m	ソナー反応物体
⑦	３５－００．９８０Ｎ	１３９－２１．８１６Ｅ	1444 m	円筒物体
⑧	３５－００．８１０Ｎ	１３９－２１．５９３Ｅ	1449 m	シンカー付ロープ
⑨	３５－００．９５５Ｎ	１３９－２１．２２０Ｅ		立ち入り禁止区域
⑩	３５－００．７２５Ｎ	１３９－２１．３８０Ｅ		立ち入り禁止区域
⑪	３５－００．８１６Ｎ	１３９－２１．７６７Ｅ	1449 m	傾斜計
⑮	３５－００．８９９Ｎ	１３９－２２．０４４Ｅ	1405 m	ｾｼﾞﾒﾝﾄﾄﾗｯﾌﾟ係留系
⑳	３５－００．８６８Ｎ	１３９－２１．８５８Ｅ	1439 m	ﾗﾝﾀﾞｰ

1. 13:40 着底 D=1451m
(35-00.841N 139-21.678E)
2. 13:43 D=1450m ﾆｽｷﾝ採水（赤・１本）
(35-00.841N 139-21.665E)
13:43 D=1450m ﾆｽｷﾝ採水（緑・１本）
3. 13:53 D=1453m 現場培養装置終了（赤・１本）
(35-00.843N 139-21.652E)
13:55 D=1453m 現場培養装置回収（白赤・１本）
4. 14:05 D=1452m MBARI採泥（黄・１本）
(35-00.860N 139-21.716E)
14:07 D=1452m MBARI採泥（白・１本）
14:09 D=1452m MBARI採泥（赤・１本）
14:11 D=1452m MBARI採泥（黒・１本）
14:13 D=1452m MBARI採泥（緑・１本）
14:17 D=1452m MBARI採泥（黒緑・１本）
14:18 D=1452m MBARI採泥（赤黄・１本）
14:20 D=1452m MBARI採泥（白赤・１本）
14:22 D=1452m MBARI採泥（ﾈｽﾞﾐ・１本）
14:24 D=1452m MBARI採泥（黒黄・１本）
5. 14:34 D=1446m ﾗﾝﾀﾞｰ回収作業開始
(35-00.886N 139-21.842E)
14:39 D=1446m ﾗﾝﾀﾞｰ回収作業終了
14:39 離底 D=1446m



0 300m

※ 緯度、経度の１目盛りは、0.1分を示します。

ハイパードルフィン
＃５３３ ＤＩＶＥ
２００６年０３月２５日
相模湾 相模トラフ
縮尺 １／３０００

測 位 D-GPS(MX9400 LEICA)
測地系 WGS-84 DATUM（世界測地系）
音 速 １４８６．７m／s（D＝１５００m）

Dive Log of HPD Dive #534 Area:Sagami-bay **2005/3/26**

Time (JST)	Depth (m)	Altitude (m)	Heading (Deg)	Description	Remarks
10:00	1450	1.6	270	着底	
10:03	1451	2.5	270	ニスキン採水（赤、緑）	
10:05	1452	1.7	270	#4 着底	
10:09	1453	0	271	Feeding Device 緑 差す	
10:10	1453	0	271	→ピンを抜く	
~~10:12~~	~~1453~~	~~0~~	~~271~~	~~Boxのふたを開ける~~	
10:14	1453	0	271	現場培養装置（緑青、白）回収	
10:21	1453	0	49	Boxのふたを開ける	
10:25	1453	0	50	採泥	
10:27	1453	0	50	2回目採泥	
10:30	1453	0	50	3回目採泥	
10:33	1453	0	50	熊手による採泥 完了	
10:39	1446	4.7	70	ランダー確認	
10:44	1451	0	262	ランダー 右側スイッチ押す	
10:43	1451	0	262	〃 左側 （電源ON）	
10:49	1446	7.1	263	ランダー移動	
10:56	1450	1.9	225	チャンバー確認	
11:01	1452	0	313	チャンバーにフックを引っかける。	
11:04	1452	0	313	離底	
11:06	1420	10.1	314	チャンバーついてくるのを確認	
				（11:50 浮上予定）	

ハイパードルフィン　潜航記録

平成　18　年　　NT06-05　行動　　記載者　　木戸　哲平

潜航年月日　2006/03/26
潜航回数　5回
通算潜航回数　534回

位置　作図中心位置
緯度　35° 00.850 ' N
経度　139° 21.700 ' E
WGS-84

潜航海域　相模湾　　相模トラフ

潜航目的　調査潜航　　現場計測と現場実験による堆積物－水境界の動態と物質循環の解明

調査主任　北里　洋
ビークル指揮　千葉　和宏

Ｐｉｌｏｔ　菊谷　茂
Co. Pilot　木戸　哲平

作業経過時刻	
吊　揚	08:40
着　水	08:44
潜航開始	09:00
着　底	10:00
離　底	11:04
浮　上	11:55
揚収完了	12:12

累計時間		
潜航時間		2:55
通算潜航		2477:0
ケーブル	ケーブルNo.	3
	使用時間	3:32
	通算時間	1081:31

気象・海象

天候	風向	風力	風浪	うねり	視程
bc	SW	3	2	2	6

最大潜航深度　1453 m
着底深度　1450 m
着底底質　泥

離底深度　1452 m
離底底質　泥

記事　海底を観察しながら航走し、採泥、採水、海底現場培養装置の設置・回収、ランダー装置移動作業及びベンシックチャンバーの回収を行った。

平成１８年
ハイパードルフィン 調査潜航
＃５３４ＤＩＶＥ
相模湾　相模トラフ

２００６年０３月２６日

１．測 地 系	ＷＧＳ－８４（世界測地系）	
２．測　位	Ｄ－ＧＰＳ（ＭＸ９４００Ｎ　ＬＥＩＣＡ）	
３．ＸＢＴ	計測済み　Ｓ／Ｖ=１４８６．７ｍ／ｓ　（Ｄ=１５００ｍ）	
４．ＸＰＯＮＤＥＲ	設置せず	
５．作図中心	３５－００．８５０Ｎ １３９－２１．７００Ｅ	ＡＮＧＬＥ　０° ＳＣＡＬＥ　１／３０００
６．着底点（特異点①） ﾍﾞﾝｼｯｸﾁｬﾝﾊﾞｰ （HOMER:ID=41）	３５－００．８２８Ｎ １３９－２１．７０６Ｅ	Ｄ＝１４５０ｍ Ｃｏ＝

７．潜航配置

指　　揮　：　運航長
ｺﾝﾃﾅ PILOT　：　菊谷　　木戸　　甲板PILOT　：　戸塚

８．潜航目的

現場計測と現場実験による堆積物－水境界の動態と物質循環の解明

９．作業内容

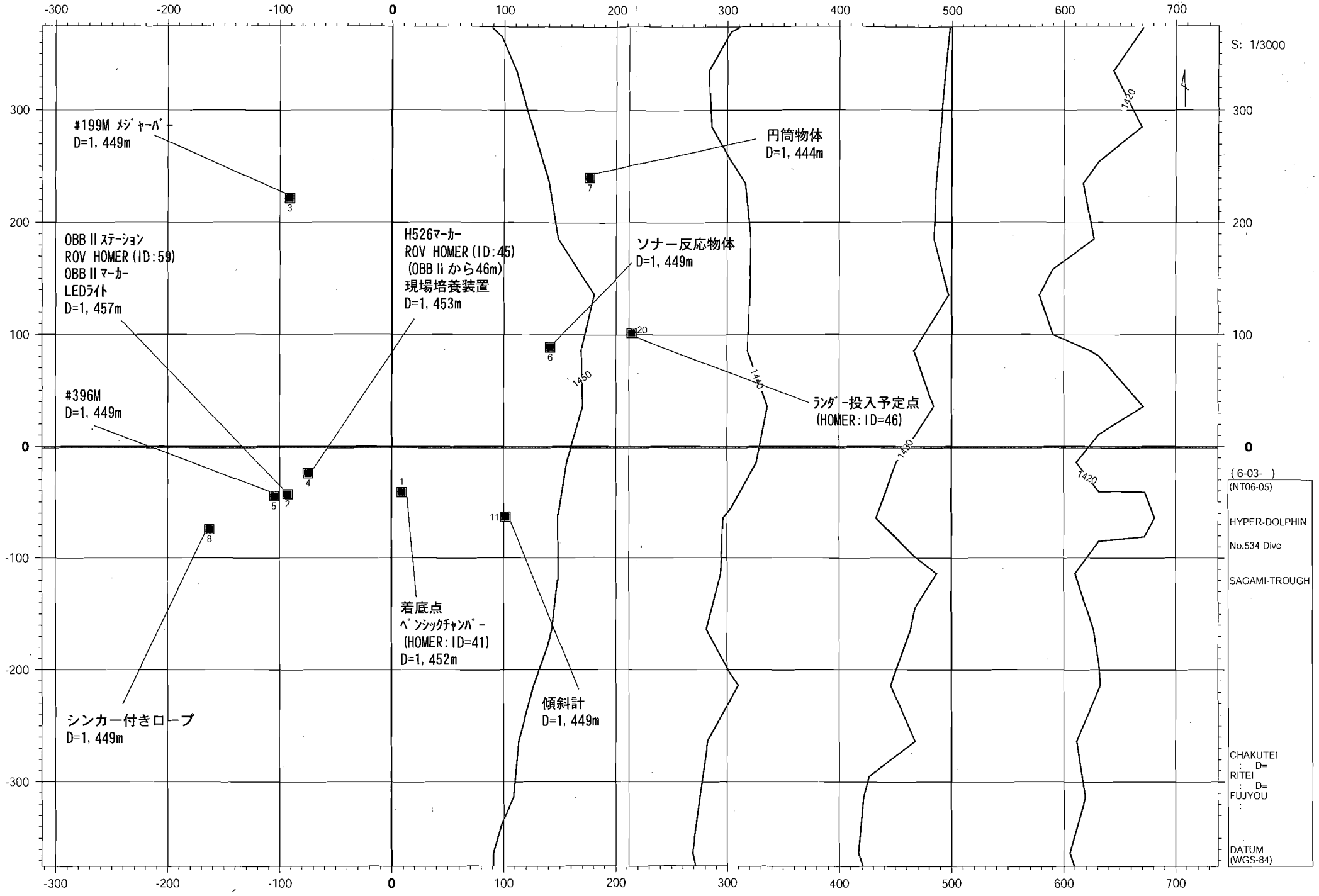
海底観察、採水、採泥、現場培養装置設置・回収、ﾗﾝﾀﾞｰ関連作業、ﾍﾞﾝｼｯｸﾁｬﾝﾊﾞｰ回収
(BOX、熊手、現場培養装置、ﾆｽｷﾝ採水器2本、ﾁｬﾝﾊﾞｰ回収索一式)

１０．日　程

	相模トラフ海域着
０７：００	作業開始
	ランダー投入
	着底確認、位置キャリブレーション
０７：５０	ビークル作動確認
０８：３０	潜航開始　Ｎｏ．５
〜	
１１：３０	ビークル浮上
１２：００	揚収完了
	終了後、初島南東沖向け

１１．備　考

・特異点は「別紙」参照
・＃４アルゴス送信機（ＩＤ＝２Ｃ６９Ｂ３５）
・２Ａ－１　ＪＸトランスポンダ
・ランダー測位機器
　ベントストランスポンダ　１４．０ＫＨｚ
　ＲＯＶ　ＨＯＭＥＲ：ＩＤ＝４６
・ランダー投入予定点⑳
　３５－００．９０５Ｎ　１３９－２１．８４１Ｅ

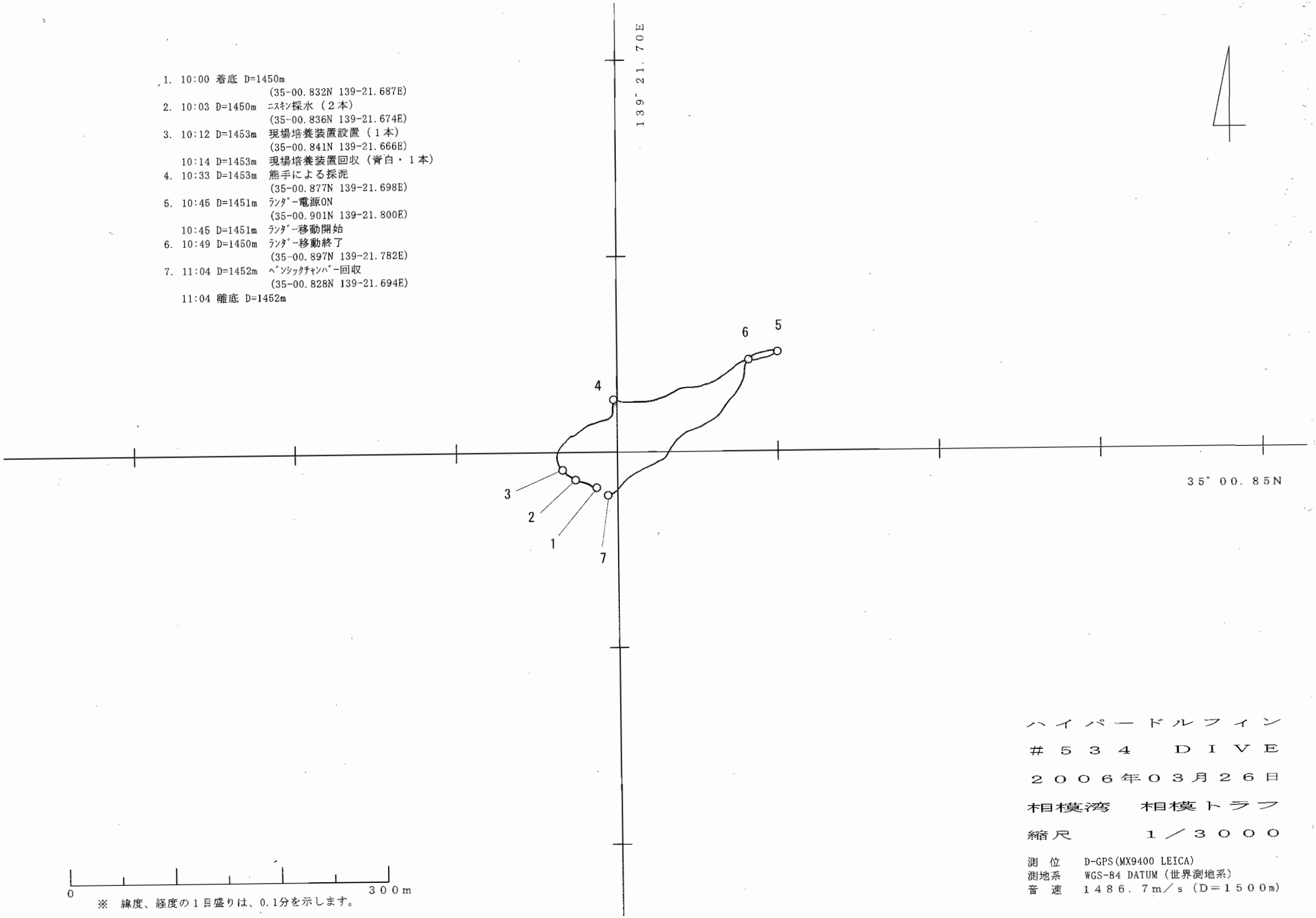

#199M メジャーバー
D=1,449m
OBB II ステーション
ROV HOMER (ID:59)
OBB II マーカー
LEDライト
D=1,457m
#396M
D=1,449m
シンカー付きロープ
D=1,449m
H526マーカー
ROV HOMER (ID:45)
(OBB II から46m)
現場培養装置
D=1,453m
着底点
ベンシックチャンバー
(HOMER:ID=41)
D=1,452m
円筒物体
D=1,444m
ソナー反応物体
D=1,449m
ランダー投入予定点
(HOMER:ID=46)
傾斜計
D=1,449m
1450
1440
1430
1420
S: 1/3000
(6-03-)
(NT06-05)
HYPER-DOLPHIN
No.534 Dive
SAGAMI-TROUGH
CHAKUTEI : D=
RITEI : D=
FUJYOU :
DATUM (WGS-84)
XY ORIGIN 35-0.850N 139-21.700E
CENTER 35-0.850N 139-21.840E

別　紙

特異点				
	緯　度	経　度	深さ m	備　考
②	３５－００．８２７Ｎ	１３９－２１．６３９Ｅ	1457 m	OBBⅡｽﾃｰｼｮﾝ ROV HOMER(ID:59) OBBⅡﾏｰｶｰ LEDﾗｲﾄ
③	３５－００．９７０Ｎ	１３９－２１．６４０Ｅ	1449 m	#199M.ﾒｼﾞｬｰﾊﾞｰ
④	３５－００．８３７Ｎ	１３９－２１．６５１Ｅ	1453 m	H526ﾏｰｶｰ ROV HOMER:ID=45 (OBBⅡから46m) 現場培養装置
⑤	３５－００．８２６Ｎ	１３９－２１．６３１Ｅ	1449 m	#396M
⑥	３５－００．８９８Ｎ	１３９－２１．７９３Ｅ	1449 m	ソナー反応物体
⑦	３５－００．９８０Ｎ	１３９－２１．８１６Ｅ	1444 m	円筒物体
⑧	３５－００．８１０Ｎ	１３９－２１．５９３Ｅ	1449 m	シンカー付ロープ
⑨	３５－００．９５５Ｎ	１３９－２１．２２０Ｅ		立ち入り禁止区域
⑩	３５－００．７２５Ｎ	１３９－２１．３８０Ｅ		立ち入り禁止区域
⑪	３５－００．８１６Ｎ	１３９－２１．７６７Ｅ	1449 m	傾斜計
⑳	３５－００．９０５Ｎ	１３９－２１．８４１Ｅ	m	ﾗﾝﾀﾞｰ 投入予定点 (HOMER:ID=46)

1. 10:00 着底 D=1450m
   (35-00.832N 139-21.687E)
2. 10:03 D=1450m ﾆｽｷﾝ採水 （２本）
   (35-00.836N 139-21.674E)
3. 10:12 D=1453m 現場培養装置設置 （１本）
   (35-00.841N 139-21.666E)
   10:14 D=1453m 現場培養装置回収 （青白・１本）
4. 10:33 D=1453m 熊手による採泥
   (35-00.877N 139-21.698E)
5. 10:45 D=1451m ﾗﾝﾀﾞｰ電源ON
   (35-00.901N 139-21.800E)
   10:45 D=1451m ﾗﾝﾀﾞｰ移動開始
6. 10:49 D=1450m ﾗﾝﾀﾞｰ移動終了
   (35-00.897N 139-21.782E)
7. 11:04 D=1452m ﾍﾞﾝｼｯｸﾁｬﾝﾊﾞｰ回収
   (35-00.828N 139-21.694E)

   11:04 離底 D=1452m



0 300m

※ 緯度、経度の１目盛りは、0.1分を示します。

ハイパードルフィン
＃５３４ ＤＩＶＥ
２００６年０３月２６日
相模湾 相模トラフ
縮尺 １／３０００

測 位 D-GPS(MX9400 LEICA)
測地系 WGS-84 DATUM（世界測地系）
音 速 １４８６．７m／s（D＝１５００m）

Dive Log of HPD Dive #535 Area:Sagami-bay **2005/3/26**

Time (JST)	Depth (m)	Altitude (m)	Heading (Deg)	Description	Remarks
14:34	1183	2.4	270	着底 #16へ向かう	
14:38	1178	1.7	270	~~スキン採水~~ ミロウリガイコロニー	
14:44	1172	2.3	90	スキン採水（赤、緑）	
14:46	1173	1.8	89	フジクラ Box 確認～ (In Situ Marking 装置)	
14:51	1175	0	101	~~正式現場~~ ミロウリガイ オリ回収 (#528)	
14:54	1175	0	102	ミロウリガイ採取（熊手）	
15:01	1175	0	101	Sample Box フタ閉じ	
15:12	1175	0	136	ミロウリガイ採取 (#525)	
15:33	1175	0	136	ミロウリガイサンプリング終了. Sample Box フタ閉じ	
15:36	1175	0	136	黒 MBARI コア採取.	
15:38	1175	0	136	ミロウリガイ逃走防止カゴ回収 (#525,528)	
15:42	1175	0	136	黄 MBARI コア採取.	
15:46	1175	0	136	赤 MBARI コア採泥	
15:48	1175	0	138	グレー MBARI コア採泥	
15:50	1175	0	138	緑 MBARI コア採泥	
15:53	1175	0	138	赤白 MBARI コア採泥	
15:56	1175	0	138	In Situ Marking 撮影	
16:00	1175	0	138	離底	

ハイパードルフィン　潜航記録

平成　18　年　　NT06-05　行動　　記載者

潜航年月日　2006/03/26　　位置　作図中心位置

潜航回数　　緯度　35° 00.200 ' N

通算潜航回数　　経度　139° 13.450 ' E

WGS-84

潜航海域　相模湾　　初島南東沖

潜航目的　調査潜航　現場計測と現場実験による堆積物－水境界の動態と物質循環の解明

調査主任　北里 洋　　Pilot　木戸 哲平

ビークル指揮　千葉 和宏　　Co. Pilot　近藤 友栄

作業経過時刻	
吊　揚	13:20
着　水	13:24
潜航開始	13:38
着　底	14:34
離　底	16:01
浮　上	16:34
揚収完了	16:54

累計時間		
潜航時間		2:56
通算潜航		2479:56
ケーブル	ケーブルNo.	3
	使用時間	3:34
	通算時間	1085:5

気象・海象

天候	風向	風力	風浪	うねり	視程
c	S	3	3	2	7

最大潜航深度

着底深度

着底底質

離底深度　1174 m

離底底質

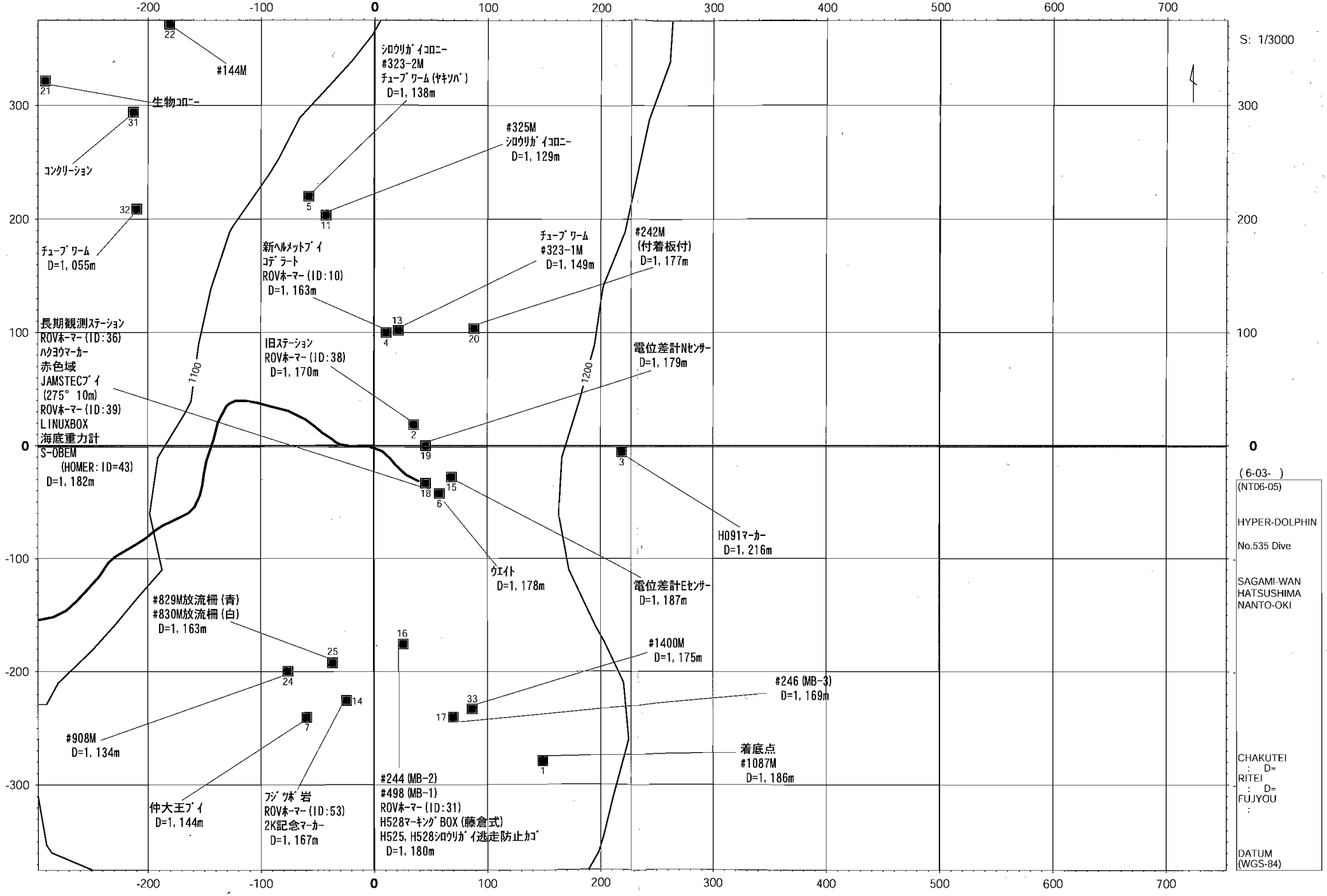
海底を観察しながら航走し、採泥、採水及び生物採集を行った。

西沢作成

平成１８年
ハイパードルフィン 調査潜航
＃５３５ＤＩＶＥ
相模湾　初島南東沖

２００６年０３月２６日

１．測 地 系	ＷＧＳ－８４（世界測地系）
２．測　位	Ｄ－ＧＰＳ（ＭＸ９４００Ｎ　ＬＥＩＣＡ）
３．ＸＢＴ	計測　　Ｓ／Ｖ=　　．　ｍ／ｓ　（Ｄ=　　ｍ）
４．ＸＰＯＮＤＥＲ	設置せず
５．作図中心	３５－００．２００Ｎ　ＡＮＧＬＥ　０ １３９－１３．４５０Ｅ　ＳＣＡＬＥ　１／３０００
６．着底点（特異点①）	３５－００．０４９Ｎ　Ｄ=１１８６ｍ １３９－１３．５４８Ｅ　Ｃｏ=
７．潜航配置	指　　揮　：運航長 ｺﾝﾃﾅ PILOT　：木戸　近藤　　甲板PILOT　：戸塚
８．潜航目的	現場計測と現場実験による堆積物－水境界の動態と物質循環の解明
９．作業内容	海底観察、生物採集、採泥、採水 (ﾆｽｷﾝ採水器2本、熊手、BOX2個、MBARI採泥器6本)
１０．日　程	初島南東沖着 １３：００　潜航開始　Ｎｏ．６ 〜 １６：３０　ビークル浮上 １７：００　揚収完了 終了後、付近海域漂泊
１１．備　考	・特異点は「別紙」参照 ・＃４アルゴス送信機：ＩＤ＝２Ｃ６９Ｂ３５ ・２Ａ－１　ＪＸトランスポンダ


S: 1/3000
#144M
生物コロニー
シロウリガイコロニー
#323-2M
チューブワーム(ヤキソバ)
D=1, 138m
#325M
シロウリガイコロニー
D=1, 129m
コンクリーション
チューブワーム
D=1, 055m
新ヘルメットブイ
コデラート
ROVホーマー(ID:10)
D=1, 163m
チューブワーム
#323-1M
D=1, 149m
#242M
(付着板付)
D=1, 177m
長期観測ステーション
ROVホーマー(ID:36)
ハクヨウマーカー
赤色域
JAMSTECブイ
(275° 10m)
ROVホーマー(ID:39)
LINUXBOX
海底重力計
S-OBEM
(HOMER:ID=43)
D=1, 182m
旧ステーション
ROVホーマー(ID:38)
D=1, 170m
電位差計Nセンサー
D=1, 179m
H091マーカー
D=1, 216m
ウエイト
D=1, 178m
電位差計Eセンサー
D=1, 187m
#829M放流柵(青)
#830M放流柵(白)
D=1, 163m
#1400M
D=1, 175m
#246 (MB-3)
D=1, 169m
#908M
D=1, 134m
着底点
#1087M
D=1, 186m
仲大王ブイ
D=1, 144m
フジツボ岩
ROVホーマー(ID:53)
2K記念マーカー
D=1, 167m
#244 (MB-2)
#498 (MB-1)
ROVホーマー(ID:31)
H528マーキングBOX(藤倉式)
H525, H528シロウリガイ逃走防止カゴ
D=1, 180m
1100
1200
(6-03-)
(NT06-05)
HYPER-DOLPHIN
No.535 Dive
SAGAMI-WAN
HATSUSHIMA
NANTO-OKI
CHAKUTEI
: D=
RITEI
: D=
FUJYOU
:
DATUM
(WGS-84)
XY ORIGIN 35-0.200N 139-13.450E
CENTER 35-0.200N 139-13.600E

特　異　点				
	緯　度	経　度	深さ m	備　考
②	３５－００．２１０Ｎ	１３９－１３．４７３Ｅ	1170 m	旧ｽﾃｰｼｮﾝ ROVﾎｰﾏｰ(ID=38)
③	３５－００．１９７Ｎ	１３９－１３．５９４Ｅ	1216 m	H091ﾏｰｶｰ
④	３５－００．２５４Ｎ	１３９－１３．４５７Ｅ	1163 m	新ﾍﾙﾒｯﾄﾌﾞｲ ｺﾃﾞﾗｰﾄ ROVﾎｰﾏｰ(ID=10)
⑤	３５－００．３１９Ｎ	１３９－１３．４１２Ｅ	1138 m	ｼﾛｳﾘｶﾞｲｺﾛﾆｰ #323-2M ﾁｭｰﾌﾞﾜｰﾑ(ﾔｷｿﾊﾞ)
⑥	３５－００．１７７Ｎ	１３９－１３．４８８Ｅ	1178 m	ｳｴｲﾄ
⑦	３５－００．０７０Ｎ	１３９－１３．４１１Ｅ	1144 m	仲大王ﾌﾞｲ
⑧				
⑨				
⑩	３５－００．４５３Ｎ	１３９－１３．３３６Ｅ	1021 m	#325ﾏｰｶｰﾌﾞｲ ｼﾝｶｲﾋﾊﾞﾘｶﾞｲ ｼﾛｳﾘｶﾞｲ
⑪	３５－００．３１０Ｎ	１３９－１３．４２２Ｅ	1129 m	#325M ｼﾛｳﾘｶﾞｲｺﾛﾆｰ
⑫				
⑬	３５－００．２５５Ｎ	１３９－１３．４６４Ｅ	1149 m	ﾁｭｰﾌﾞﾜｰﾑ #323-1M
⑭	３５－００．０７８Ｎ	１３９－１３．４３４Ｅ	1167 m	ﾌｼﾞﾂﾎﾞ岩 ROVﾎｰﾏｰ(ID=53) 2K記念ﾏｰｶｰ
⑮	３５－００．１８５Ｎ	１３９－１３．４９５Ｅ	1187 m	電位差計Eｾﾝｻｰ

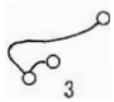
特　異　点				
	緯　度	経　度	深さ m	備　考
⑯	３５－００．１０５Ｎ	１３９－１３．４６７Ｅ	1180 m	#244(MB-2) #498(MB-1) ROVﾎｰﾏｰ(ID:31) H528ﾏｰｷﾝｸﾞ BOX (藤倉式) H525,H528 ｼﾛｳﾘｶﾞｲ逃走防止ｶｺﾞ
⑰	３５－００．０７０Ｎ	１３９－１３．４９６Ｅ	1169 m	#246(MB-3)
⑱	３５－００．１８２Ｎ	１３９－１３．４８０Ｅ	1182 m	長期観測ｽﾃｰｼｮﾝ ROVﾎｰﾏｰ(ID=36) ﾊｸﾖｳﾏｰｶｰ 赤色域 JAMSTECﾌﾞｲ (275° 10m) ROV HOMER:ID=39 LINUX BOX 海底重力計 S-OBEM(HOMER:ID=43)
⑲	３５－００．２００Ｎ	１３９－１３．４８０Ｅ	1179 m	電位差計Nｾﾝｻｰ
⑳	３５－００．２５６Ｎ	１３９－１３．５０８Ｅ	1177 m	#242M(付着板付)
21	３５－００．３７４Ｎ	１３９－１３．２５９Ｅ		生物ｺﾛﾆｰ
22	３５－００．４０１Ｎ	１３９－１３．３３１Ｅ		#144M
23	３５－００．０４９Ｎ	１３９－１３．５４８Ｅ	1186 m	#1087M
24	３５－００．０９２Ｎ	１３９－１３．４００Ｅ	1134 m	#908M
25	３５－００．０９６Ｎ	１３９－１３．４２６Ｅ	1163 m	#829M 放流柵(青) #830M 放流柵(白)
29	３５－００．４０３Ｎ	１３９－１３．２１０Ｅ		立入禁止区域
30	３４－５９．８６５Ｎ	１３９－１３．２１０Ｅ		立入禁止区域

特　異　点				
	緯　度	経　度	深さ m	備　考
31	３５－００．３５９Ｎ	１３９－１３．３１０Ｅ		ｺﾝｸﾘｰｼｮﾝ
32	３５－００．３１３Ｎ	１３９－１３．３１２Ｅ	1055 m	ﾁｭｰﾌﾞﾜｰﾑ
33	３５－００．０７４Ｎ	１３９－１３．５０７Ｅ	1175 m	#1400M
34	３４－５９．９６９Ｎ	１３９－１３．５７１Ｅ	1203 m	#409植木鉢ﾏｰｶｰ
35				
36				

139° 13. 45E

35° 00. 20N

1. 14:34 着底 D=1183m
   (35-00.107N 139-13.535E)
2. 14:45 D=1173m ﾆｽｷﾝ採水（２本）
   (35-00.089N 139-13.507E)
   15:33 D=1175m 染色したｼﾛｳﾘｶﾞｲ採集
   15:35 D=1175m MBARI採泥（黒・１本）
   15:37 D=1175m H525・H528ｼﾛｳﾘｶﾞｲ逃走防止ｶｺﾞ回収
   15:42 D=1175m MBARI採泥（黄・１本）
   15:44 D=1175m MBARI採泥（赤・１本）
   15:47 D=1175m MBARI採泥（ﾈｽﾞﾐ・１本）
   15:49 D=1175m MBARI採泥（緑・１本）
   15:52 D=1175m MBARI採泥（白赤・１本）
   16:01 離底 D=1174m
   (35-00.094N 139-13.516E)



300m

※ 緯度、経度の１目盛りは、0.1分を示します。

ハイパードルフィン

＃５３５ ＤＩＶＥ

２００６年０３月２６日

相模湾 初島南東沖

縮尺 １／３０００

D-GPS(MX9400 LEICA)
WGS-84 DATUM（世界測地系）
１４８７．８m／s（D＝１２００m）

Dive Log of HPD Dive #536 Area:Sagami-bay **2005/3/27**

Time (JST)	Depth (m)	Altitude (m)	Heading (Deg)	Description	Remarks
9:30	1193	2.4	270	着底	
9:32	1187	2.5	275	ニスキン採水 (赤).	
〃	1187	2.5	275	CCDにカレイ	
9:46	1179	3.8	288	海底重力計のケーブル (イベント #18)	
9:54	1175	0 ~~1.7~~	305	MBARI コア 採泥 (黄赤)	
9:57	1176	0	303	MBARI 〃 (黄)	
9:59	1176	0	302	長期観測ステーション CCD	
10:03	1172	0	302	サガミマンジガイ	
10:17	1174	5.5	250	ラーOBEM 視認	
10:32	1170	4.0	172	ステーションケーブル観察終了	
10:38	1178	0.0	30	ステーションから 40° 50m 着底	
10:41	1178	0.0	30	黄黒MBARI 採泥	
10:42	1178	0.0	30	赤白MBARI 採泥	
10:47	1186	0.0	139	ステーションから 88° 50m	
10:49	1186	0.0	139	グレーMBARI 採泥	
10:50	1186	0.0	139	緑 MBARI 採泥 with ゴカイ棲管	
10:50	1185	3.0	139	離底	

ハイパードルフィン　潜航記録

平成　18　年　　NT06-05　行動　　記載者　　菊谷　茂

潜航年月日　2006/03/27

潜航回数　7回

通算潜航回数　536回

位置　作図中心位置

緯度　35° 00.200 ' N

経度　139° 13.450 ' E

WGS-84

潜航海域　相模湾　　初島南東沖

潜航目的　調査潜航　　現場計測と現場実験による堆積物－水境界の動態と物質循環の解明

調査主任　北里　洋

ビークル指揮　千葉　和宏

Ｐｉｌｏｔ　近藤　友栄

Co. Pilot　菊谷　茂

作業経過時刻	
吊　揚	08:12
着　水	08:17
潜航開始	08:31
着　底	09:30
離　底	10:50
浮　上	11:20
揚収完了	11:37

累計時間		
潜航時間		2:49
通算潜航		2482:45
ケーブル	ケーブルNo.	3
	使用時間	3:25
	通算時間	1088:30

気象・海象

天候	風向	風力	風浪	うねり	視程
c	NNE	5	3	2	6

最大潜航深度　1193 m

着底深度　1193 m

着底底質　泥

離底深度　1185 m

離底底質　泥

記事　海底を観察しながら航走し、採泥・採水及び長期ステーションの観察を行った。

平成１８年
ハイパードルフィン 調査潜航
＃５３６ＤＩＶＥ
相模湾　初島南東沖

２００６年０３月２７日

１．測 地 系　　ＷＧＳ－８４（世界測地系）

２．測　位　　Ｄ－ＧＰＳ（ＭＸ９４００Ｎ　ＬＥＩＣＡ）

３．ＸＢＴ　　計測済み　　Ｓ／Ｖ＝１４８７．８ｍ／ｓ　（Ｄ＝１２００ｍ）

４．ＸＰＯＮＤＥＲ　　設置せず

５．作図中心　　３５－００．２００Ｎ　ＡＮＧＬＥ
１３９－１３．４５０Ｅ　ＳＣＡＬＥ　１／３０００

６．着底点（特異点①）　　３５－００．１８０Ｎ　Ｄ＝１１９５ｍ
１３９－１３．５５０Ｅ　Ｃｏ＝

７．潜航配置　　指　揮　：　運航長
ｺﾝﾃﾅ PILOT　：　近藤　　菊谷　　甲板PILOT　：　戸塚

８．潜航目的　　現場計測と現場実験による堆積物－水境界の動態と物質循環の解明

９．作業内容　　海底観察、生物採集、採泥、採水
(ﾆｽｷﾝ採水器2本、熊手、BOX、MBARI採泥器6本)

１０．日　程

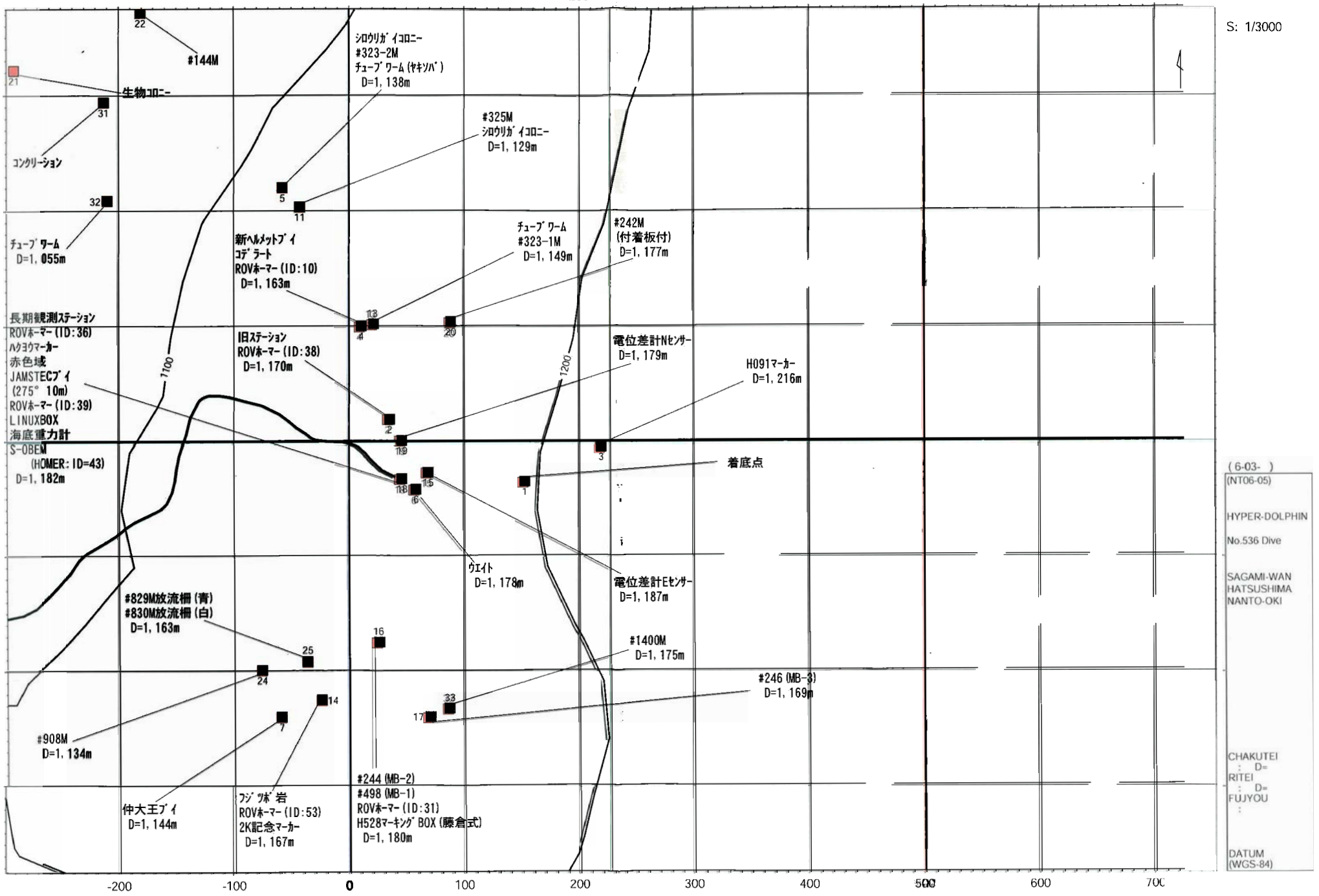
初島南東沖着
０７：５０　ビークル作動確認
０８：３０　潜航開始　Ｎｏ．７
〜
１１：３０　ビークル浮上
１２：００　揚収完了
終了後、相模トラフ向け

１１．備　考

・特異点は「別紙」参照

・＃４アルゴス送信機：ＩＤ＝２Ｃ６９Ｂ３５

・２Ａ－１　ＪＸトランスポンダ


S: 1/3000
#144M
生物コロニー
シロウリガイコロニー
#323-2M
チューブワーム(ヤキソバ)
D=1, 138m
#325M
シロウリガイコロニー
D=1, 129m
コンクリーション
チューブワーム
D=1, 055m
新ヘルメットブイ
コデラート
ROVホーマー(ID:10)
D=1, 163m
チューブワーム
#323-1M
D=1, 149m
#242M
(付着板付)
D=1, 177m
長期観測ステーション
ROVホーマー(ID:36)
ハクヨウマーカー
赤色域
JAMSTECブイ
(275° 10m)
ROVホーマー(ID:39)
LINUXBOX
海底重力計
S-OBEM
(HOMER: ID=43)
D=1, 182m
旧ステーション
ROVホーマー(ID:38)
D=1, 170m
電位差計Nセンサー
D=1, 179m
H091マーカー
D=1, 216m
着底点
ウエイト
D=1, 178m
電位差計Eセンサー
D=1, 187m
#829M放流柵(青)
#830M放流柵(白)
D=1, 163m
#1400M
D=1, 175m
#246 (MB-3)
D=1, 169m
#908M
D=1, 134m
#244 (MB-2)
#498 (MB-1)
ROVホーマー(ID:31)
H528マーキングBOX(藤倉式)
D=1, 180m
仲大王ブイ
D=1, 144m
フジツボ岩
ROVホーマー(ID:53)
2K記念マーカー
D=1, 167m
1100
1200
-200
-100
0
100
200
300
400
500
600
700
(6-03-)
(NT06-05)
HYPER-DOLPHIN
No.536 Dive
SAGAMI-WAN
HATSUSHIMA
NANTO-OKI
CHAKUTEI
: D=
RITEI
: D=
FUJYOU
:
DATUM
(WGS-84)
XY ORIGIN 35-0.200N 139-13.450E
CENTER 35-0.200N 139-13.600E

別　紙

特　異　点				
	緯　度	経　度	深さ m	備　考
②	３５－００．２１０Ｎ	１３９－１３．４７３Ｅ	1170 m	旧ｽﾃｰｼｮﾝ ROVﾎｰﾏｰ(ID=38)
③	３５－００．１９７Ｎ	１３９－１３．５９４Ｅ	1216 m	H091ﾏｰｶｰ
④	３５－００．２５４Ｎ	１３９－１３．４５７Ｅ	1163 m	新ﾍﾙﾒｯﾄﾌﾞｲ ｺﾃﾞﾗｰﾄ ROVﾎｰﾏｰ(ID=10)
⑤	３５－００．３１９Ｎ	１３９－１３．４１２Ｅ	1138 m	ｼﾛｳﾘｶﾞｲｺﾛﾆｰ #323-2M ﾁｭｰﾌﾞﾜｰﾑ(ﾔｷｿﾊﾞ)
⑥	３５－００．１７７Ｎ	１３９－１３．４８８Ｅ	1178 m	ｳｴｲﾄ
⑦	３５－００．０７０Ｎ	１３９－１３．４１１Ｅ	1144 m	仲大王ﾌﾞｲ
⑧				
⑨				
⑩	３５－００．４５３Ｎ	１３９－１３．３３６Ｅ	1021 m	#325ﾏｰｶｰﾌﾞｲ ｼﾝｶｲﾋﾊﾞﾘｶﾞｲ ｼﾛｳﾘｶﾞｲ
⑪	３５－００．３１０Ｎ	１３９－１３．４２２Ｅ	1129 m	#325M ｼﾛｳﾘｶﾞｲｺﾛﾆｰ
⑫				
⑬	３５－００．２５５Ｎ	１３９－１３．４６４Ｅ	1149 m	ﾁｭｰﾌﾞﾜｰﾑ #323-1M
⑭	３５－００．０７８Ｎ	１３９－１３．４３４Ｅ	1167 m	ﾌｼﾞﾂﾎﾞ岩 ROVﾎｰﾏｰ(ID=53) 2K記念ﾏｰｶｰ
⑮	３５－００．１８５Ｎ	１３９－１３．４９５Ｅ	1187 m	電位差計Eｾﾝｻｰ

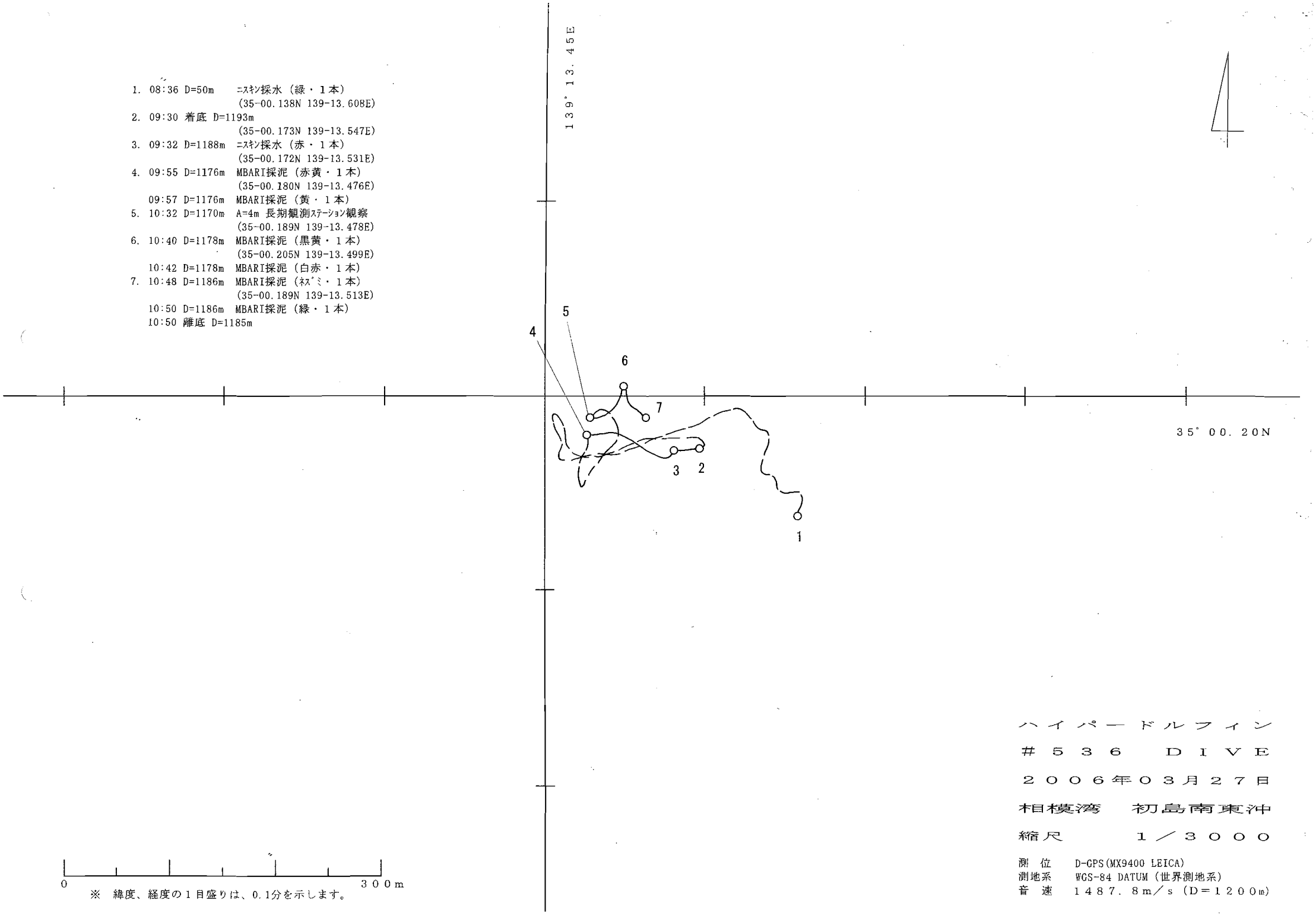
別　紙

特　異　点				
	緯　度	経　度	深さ m	備　考
⑯	３５－００．１０５Ｎ	１３９－１３．４６７Ｅ	1180 m	#244(MB-2) #498(MB-1) ROVﾎｰﾏｰ(ID:31) H528ﾏｰｷﾝｸﾞ BOX (藤倉式)
⑰	３５－００．０７０Ｎ	１３９－１３．４９６Ｅ	1169 m	#246(MB-3)
⑱	３５－００．１８２Ｎ	１３９－１３．４８０Ｅ	1182 m	長期観測ｽﾃｰｼｮﾝ ROVﾎｰﾏｰ(ID=36) ﾊｸﾖｳﾏｰｶｰ 赤色域 JAMSTECﾌﾞｲ (275° 10m) ROV HOMER:ID=39 LINUX BOX 海底重力計 S-OBEM(HOMER:ID=43)
⑲	３５－００．２００Ｎ	１３９－１３．４８０Ｅ	1179 m	電位差計Nｾﾝｻｰ
⑳	３５－００．２５６Ｎ	１３９－１３．５０８Ｅ	1177 m	#242M(付着板付)
21	３５－００．３７４Ｎ	１３９－１３．２５９Ｅ		生物ｺﾛﾆｰ
22	３５－００．４０１Ｎ	１３９－１３．３３１Ｅ		#144M
23	３５－００．０４９Ｎ	１３９－１３．５４８Ｅ	1186 m	#1087M
24	３５－００．０９２Ｎ	１３９－１３．４００Ｅ	1134 m	#908M
25	３５－００．０９６Ｎ	１３９－１３．４２６Ｅ	1163 m	#829M 放流柵(青) #830M 放流柵(白)
29	３５－００．４０３Ｎ	１３９－１３．２１０Ｅ		立入禁止区域
30	３４－５９．８６５Ｎ	１３９－１３．２１０Ｅ		立入禁止区域

別　紙

特　異　点				
	緯　度	経　度	深さ m	備　考
31	３５－００．３５９Ｎ	１３９－１３．３１０Ｅ		ｺﾝｸﾘｰｼｮﾝ
32	３５－００．３１３Ｎ	１３９－１３．３１２Ｅ	1055 m	ﾁｭｰﾌﾞﾜｰﾑ
33	３５－００．０７４Ｎ	１３９－１３．５０７Ｅ	1175 m	#1400M
34	３４－５９．９６９Ｎ	１３９－１３．５７１Ｅ	1203 m	#409植木鉢ﾏｰｶｰ
35				
36				

1. 08:36 D=50m　ﾆｽｷﾝ採水（緑・１本）
　　(35-00.138N 139-13.608E)
2. 09:30 着底 D=1193m
　　(35-00.173N 139-13.547E)
3. 09:32 D=1188m　ﾆｽｷﾝ採水（赤・１本）
　　(35-00.172N 139-13.531E)
4. 09:55 D=1176m　MBARI採泥（赤黄・１本）
　　(35-00.180N 139-13.476E)
　09:57 D=1176m　MBARI採泥（黄・１本）
5. 10:32 D=1170m　A=4m 長期観測ｽﾃｰｼｮﾝ観察
　　(35-00.189N 139-13.478E)
6. 10:40 D=1178m　MBARI採泥（黒黄・１本）
　　(35-00.205N 139-13.499E)
　10:42 D=1178m　MBARI採泥（白赤・１本）
7. 10:48 D=1186m　MBARI採泥（ﾈｽﾞﾐ・１本）
　　(35-00.189N 139-13.513E)
　10:50 D=1186m　MBARI採泥（緑・１本）
　10:50 離底 D=1185m



0　　３００ｍ

※　緯度、経度の１目盛りは、0.1分を示します。

ハイパードルフィン
＃５３６　ＤＩＶＥ
２００６年０３月２７日
相模湾　初島南東沖
縮尺　　１／３０００

測　位　D-GPS(MX9400 LEICA)
測地系　WGS-84 DATUM（世界測地系）
音　速　１４８７．８ｍ／ｓ（D＝１２００ｍ）

Dive Log of HPD Dive #537 Area:Sagami-bay **2005/3/27**

Time (JST)	Depth (m)	Altitude (m)	Heading (Deg)	Description	Remarks
14:01 ~~14:02~~				着底	
14:02	1449	3.2	280	緑 ニスキン終了	
14:04	1453	0	278	Denmark 採泥 (赤)	
14:08	1453	0	279	〃 (黒)	
14:11	1458	0	278	〃 (白)	
14:20	1458	1.0	184	イベント #4 到着	
14:22	1453	0	194	Feeding Device 錘 回収 (青)	
14:25	1453	0	193	ROV HOMER (ID:45) 回収	
1429	1452	0	222	LED ライト 点確認	
14:31	〃	〃	〃	〃 回収	
14:39	1448	4.1	90	ランダー視認	
14:44	1453	0.0	~~89~~	ランダー回収 しつつ離底	
15:38	50	~~一~~	300	赤ニスキン採水	

ハイパードルフィン　潜航記録

平成　18　年　　NT06-05　行動　　記載者　　木戸　哲平

潜航年月日　2006/03/27
潜航回数　8回
通算潜航回数　537回

位置　作図中心位置
緯度　35° 00.850 ' N
経度　139° 21.700 ' E
WGS-84

潜航海域　相模湾　　相模トラフ

潜航目的　調査潜航　現場計測と現場実験による堆積物－水境界の動態と物質循環の解明

調査主任　北里　洋
ビークル指揮　千葉　和宏

Pilot　菊谷　茂
Co. Pilot　木戸　哲平

作業経過時刻	
吊揚	12:46
着水	12:50
潜航開始	13:04
着底	14:00
離底	14:46
浮上	15:42
揚収完了	16:04

累計時間		
潜航時間		2:38
通算潜航		2485:23
ケーブル	ケーブルNo.	3
	使用時間	3:18
	通算時間	1091:48

気象・海象

天候	風向	風力	風浪	うねり	視程
c	N	2	2	2	7

最大潜航深度　1454 m
着底深度　1450 m
着底底質　泥

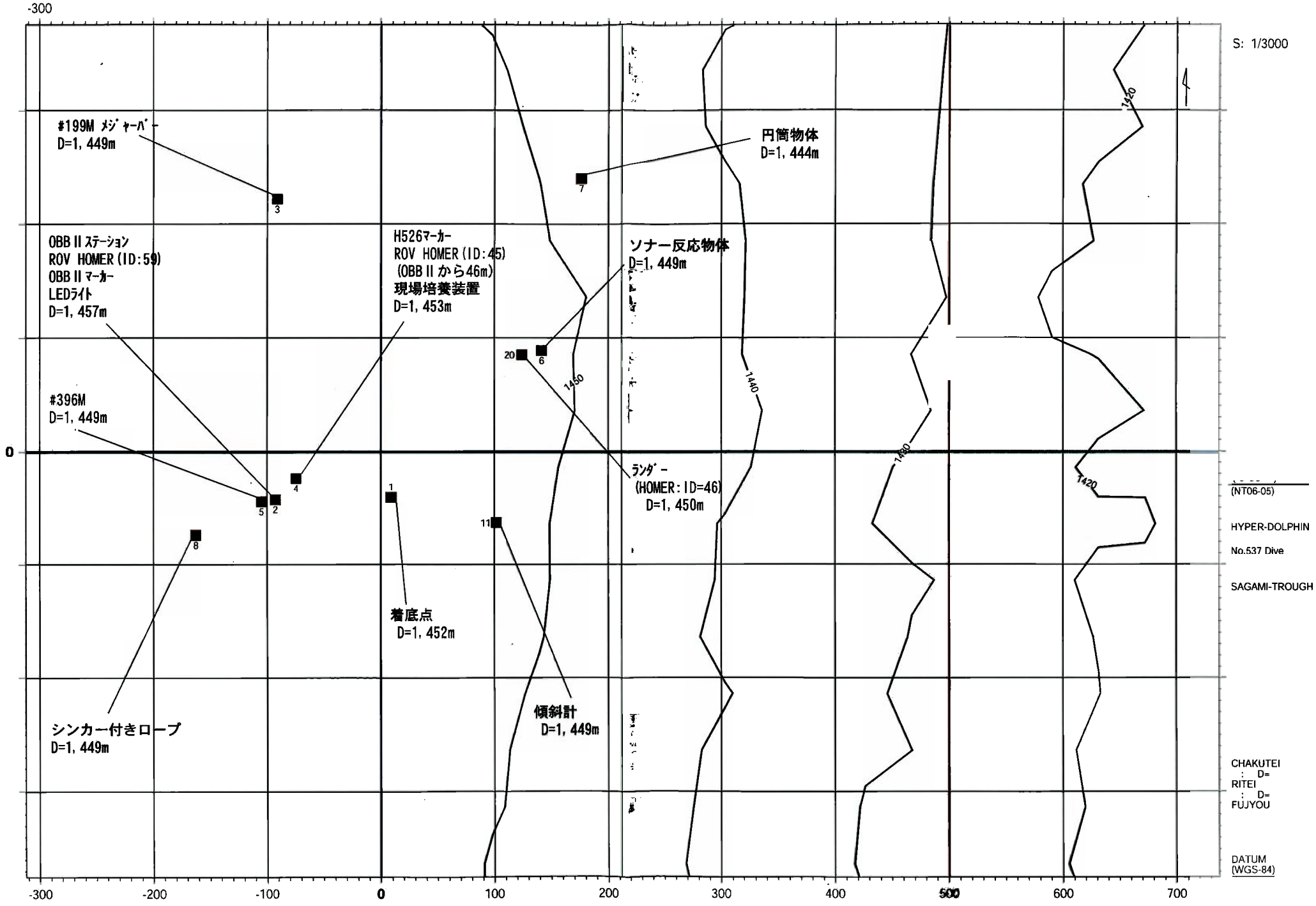
離底深度　1453 m
離底底質　泥

記事　海底を観察しながら航走し、採泥、採水及び現場培養装置・ROV-HOMER・LEDライト・ランダー装置の回収を行った。

平成１８年
ハイパードルフィン 調査潜航
＃５３７ＤＩＶＥ
相模湾　相模トラフ

２００６年０３月２７日

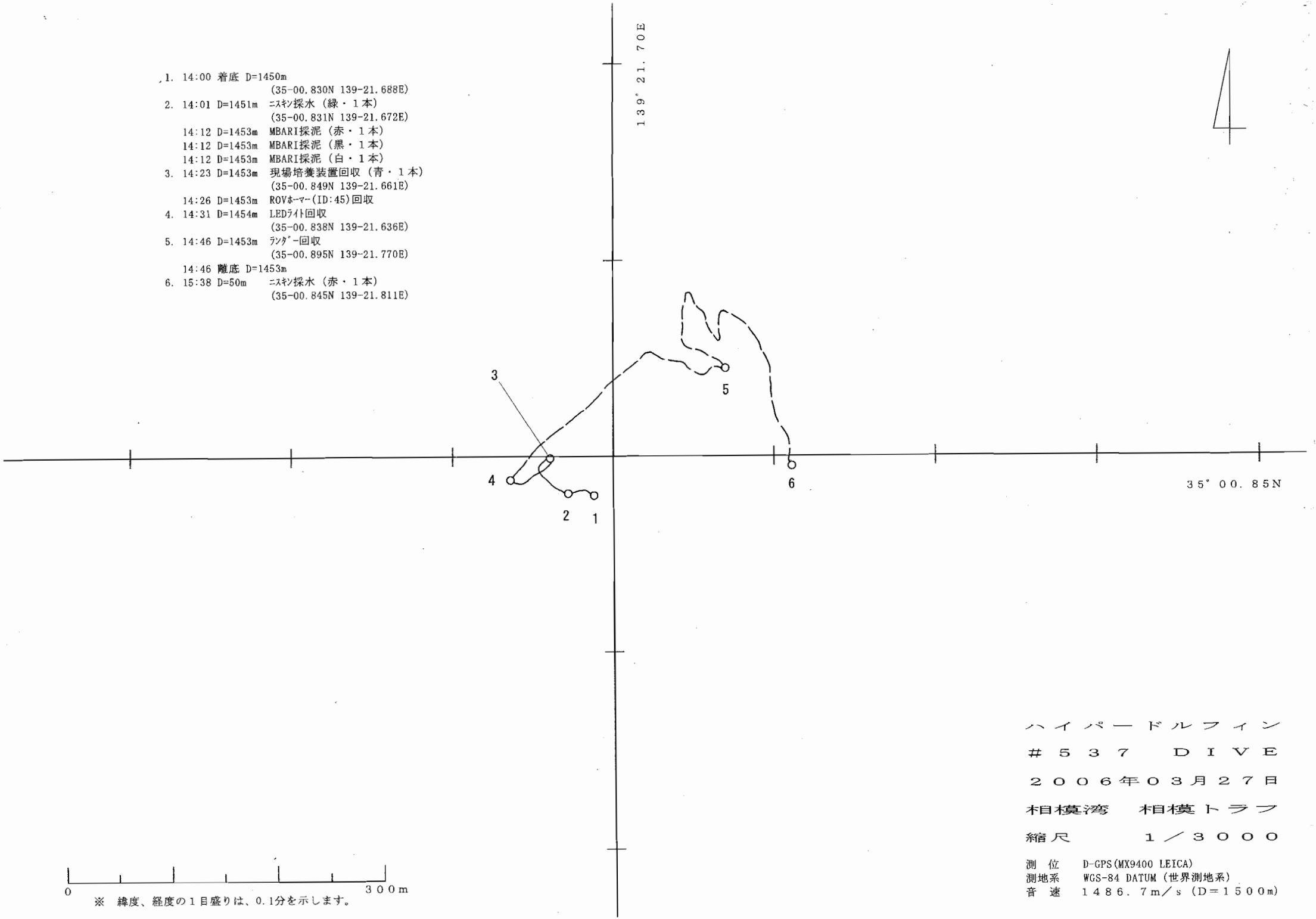
１．測 地 系	ＷＧＳ－８４（世界測地系）
２．測　位	Ｄ－ＧＰＳ（ＭＸ９４００Ｎ　ＬＥＩＣＡ）
３．ＸＢＴ	計測済み　　Ｓ／Ｖ＝１４８６．７ｍ／ｓ　（Ｄ＝１５００ｍ）
４．ＸＰＯＮＤＥＲ	設置せず
５．作図中心	３５－００．８５０Ｎ　ＡＮＧＬＥ　０° １３９－２１．７００Ｅ　ＳＣＡＬＥ　１／３０００
６．着底点（特異点①）	３５－００．８２８Ｎ　Ｄ＝１４５０ｍ １３９－２１．７０６Ｅ　Ｃｏ＝
７．潜航配置	指　　揮　：運航長 ｺﾝﾃﾅ PILOT　：菊谷　木戸　　甲板PILOT　：戸塚
８．潜航目的	現場計測と現場実験による堆積物－水境界の動態と物質循環の解明
９．作業内容	海底観察、現場培養装置・ROV HOMER・LEDﾗｲﾄ・ﾗﾝﾀﾞｰ回収 (ﾆｽｷﾝ採水器2本、回収箱、ﾗﾝﾀﾞｰ回収索一式)
１０．日　程	相模トラフ海域着 １３：００　潜航開始　Ｎｏ．８ 〜 １６：３０　ビークル浮上 １７：００　揚収完了 終了後、付近海域漂泊
１１．備　考	・特異点は「別紙」参照 ・＃４アルゴス送信機（ＩＤ＝２Ｃ６９Ｂ３５） ・２Ａ－１　ＪＸトランスポンダ ・ランダー測位機器 ベントストランスポンダ　１４．０ＫＨｚ ＲＯＶ　ＨＯＭＥＲ：ＩＤ＝４６


-300
S: 1/3000
#199M メジャーバー
D=1, 449m
円筒物体
D=1, 444m
OBB II ステーション
ROV HOMER (ID:59)
OBB II マーカー
LEDライト
D=1, 457m
H526マーカー
ROV HOMER (ID:45)
(OBB II から46m)
現場培養装置
D=1, 453m
ソナー反応物体
D=1, 449m
#396M
D=1, 449m
ランダー
(HOMER: ID=46)
D=1, 450m
着底点
D=1, 452m
傾斜計
D=1, 449m
シンカー付きロープ
D=1, 449m
1450
1440
1430
1420
0
-300
-200
-100
0
100
200
300
400
500
600
700
(NT06-05)
HYPER-DOLPHIN
No.537 Dive
SAGAMI-TROUGH
CHAKUTEI
: D=
RITEI
: D=
FUJYOU
DATUM
(WGS-84)
XY ORIGIN 35-0.850N 139-21.700E
CENTER 35-0.850N 139-21.840E

別　紙

特異点				
	緯　度	経　度	深さ m	備　考
②	３５－００．８２７Ｎ	１３９－２１．６３９Ｅ	1457 m	OBBⅡｽﾃｰｼｮﾝ ROV HOMER(ID:59) OBBⅡﾏｰｶｰ LEDﾗｲﾄ
③	３５－００．９７０Ｎ	１３９－２１．６４０Ｅ	1449 m	#199M.ﾒｼﾞｬｰﾊﾞｰ
④	３５－００．８３７Ｎ	１３９－２１．６５１Ｅ	1453 m	H526ﾏｰｶｰ ROV HOMER:ID=45 (OBBⅡから46m) 現場培養装置
⑤	３５－００．８２６Ｎ	１３９－２１．６３１Ｅ	1449 m	#396M
⑥	３５－００．８９８Ｎ	１３９－２１．７９３Ｅ	1449 m	ソナー反応物体
⑦	３５－００．９８０Ｎ	１３９－２１．８１６Ｅ	1444 m	円筒物体
⑧	３５－００．８１０Ｎ	１３９－２１．５９３Ｅ	1449 m	シンカー付ロープ
⑨	３５－００．９５５Ｎ	１３９－２１．２２０Ｅ		立ち入り禁止区域
⑩	３５－００．７２５Ｎ	１３９－２１．３８０Ｅ		立ち入り禁止区域
⑪	３５－００．８１６Ｎ	１３９－２１．７６７Ｅ	1449 m	傾斜計
⑳	３５－００．８９７Ｎ	１３９－２１．７８２Ｅ	1450 m	ﾗﾝﾀﾞｰ (HOMER:ID=46)

1. 14:00 着底 D=1450m
(35-00.830N 139-21.688E)
2. 14:01 D=1451m ﾆｽｷﾝ採水 (緑・１本)
(35-00.831N 139-21.672E)
14:12 D=1453m MBARI採泥 (赤・１本)
14:12 D=1453m MBARI採泥 (黒・１本)
14:12 D=1453m MBARI採泥 (白・１本)
3. 14:23 D=1453m 現場培養装置回収 (青・１本)
(35-00.849N 139-21.661E)
14:26 D=1453m ROVﾎｰﾏｰ(ID:45)回収
4. 14:31 D=1454m LEDﾗｲﾄ回収
(35-00.838N 139-21.636E)
5. 14:46 D=1453m ﾗﾝﾀﾞｰ回収
(35-00.895N 139-21.770E)
14:46 離底 D=1453m
6. 15:38 D=50m ﾆｽｷﾝ採水 (赤・１本)
(35-00.845N 139-21.811E)



※ 緯度、経度の１目盛りは、0.1分を示します。

ハイパードルフィン
＃５３７ ＤＩＶＥ
２００６年０３月２７日
相模湾 相模トラフ
縮尺 １／３０００

測 位 D-GPS(MX9400 LEICA)
測地系 WGS-84 DATUM (世界測地系)
音 速 １４８６．７m／s (D＝１５００m)

Dive Log of HPD Dive #538 Area:Sagami-bay **2005/3/28**

Time (JST)	Depth (m)	Altitude (m)	Heading (Deg)	Description	Remarks
9:30	1450	2	~	着底	
9:41	〃	~	~	Benthic Chamber 設置	
10:06	〃	2	40	ニスキン採水終了（緑・赤）	
11:39	~	~	-	"WARNING" の文字が書かれた未確認物体	
15:37	1452	1.2	86.2	Benthic Chamber 確認	
16:02	1453	〃	215	最後のシリンジ	
16:11	〃	〃	157	Benthic Chamber 回収	
〃	〃	〃	〃	離底	

ハイパードルフィン　潜航記録

平成　18　年　　NT06-05　行動　　記載者　　木戸　哲平

潜航年月日	2006/03/28
潜航回数	9回
通算潜航回数	538回

位置	作図中心位置
緯度	35° 00.850 ' N
経度	139° 21.700 ' E

WGS-84

潜航海域　相模湾　　相模トラフ

潜航目的　調査潜航　　現場計測と現場実験による堆積物－水境界の動態と物質循環の解明

調査主任	北里　洋
ビークル指揮	千葉　和宏
Pilot	木戸　哲平
Co. Pilot	近藤　友栄

作業経過時刻	
吊　揚	08:17
着　水	08:22
潜航開始	08:35
着　底	09:31
離　底	16:11
浮　上	16:55
揚収完了	17:12

累計時間		
潜航時間		8:20
通算潜航		2493:43
ケーブル	ケーブルNo.	3
	使用時間	8:55
	通算時間	1100:43

気象・海象

天候	風向	風力	風浪	うねり	視程
o	NNE	3	3	1	5

最大潜航深度	1453 m
着底深度	1450 m
着底底質	泥

離底深度	1453 m
離底底質	泥

記事　海底を観察しながら航走し、採水、中層観察及びベンシックチャンバーの設置・回収を行った。

平成１８年
ハイパードルフィン 調査潜航
＃５３８ＤＩＶＥ
相模湾　相模トラフ

２００６年０３月２８日

１．測 地 系	ＷＧＳ－８４（世界測地系）
２．測　位	Ｄ－ＧＰＳ（ＭＸ９４００Ｎ　ＬＥＩＣＡ）
３．ＸＢＴ	計測済み　　Ｓ／Ｖ＝１４８６．７ｍ／ｓ　（Ｄ＝１５００ｍ）
４．ＸＰＯＮＤＥＲ	設置せず
５．作図中心	３５－００．８５０Ｎ　ＡＮＧＬＥ　０° １３９－２１．７００Ｅ　ＳＣＡＬＥ　１／３０００
６．着底点（特異点①）	３５－００．８２８Ｎ　Ｄ＝１４５０ｍ １３９－２１．７０６Ｅ　Ｃｏ＝
７．潜航配置	指　　揮　：運航長 ｺﾝﾃﾅ PILOT　：木戸　近藤　甲板PILOT　：戸塚
８．潜航目的	現場計測と現場実験による堆積物－水境界の動態と物質循環の解明
９．作業内容	海底観察、採泥、ﾍﾞﾝｼｯｸﾁｬﾝﾊﾞｰ設置・回収 (ﾍﾞﾝｼｯｸﾁｬﾝﾊﾞｰ(HOMER:ID=41)、ﾁｬﾝﾊﾞｰ回収索一式、MBARI採泥器3本)

１０．日　程

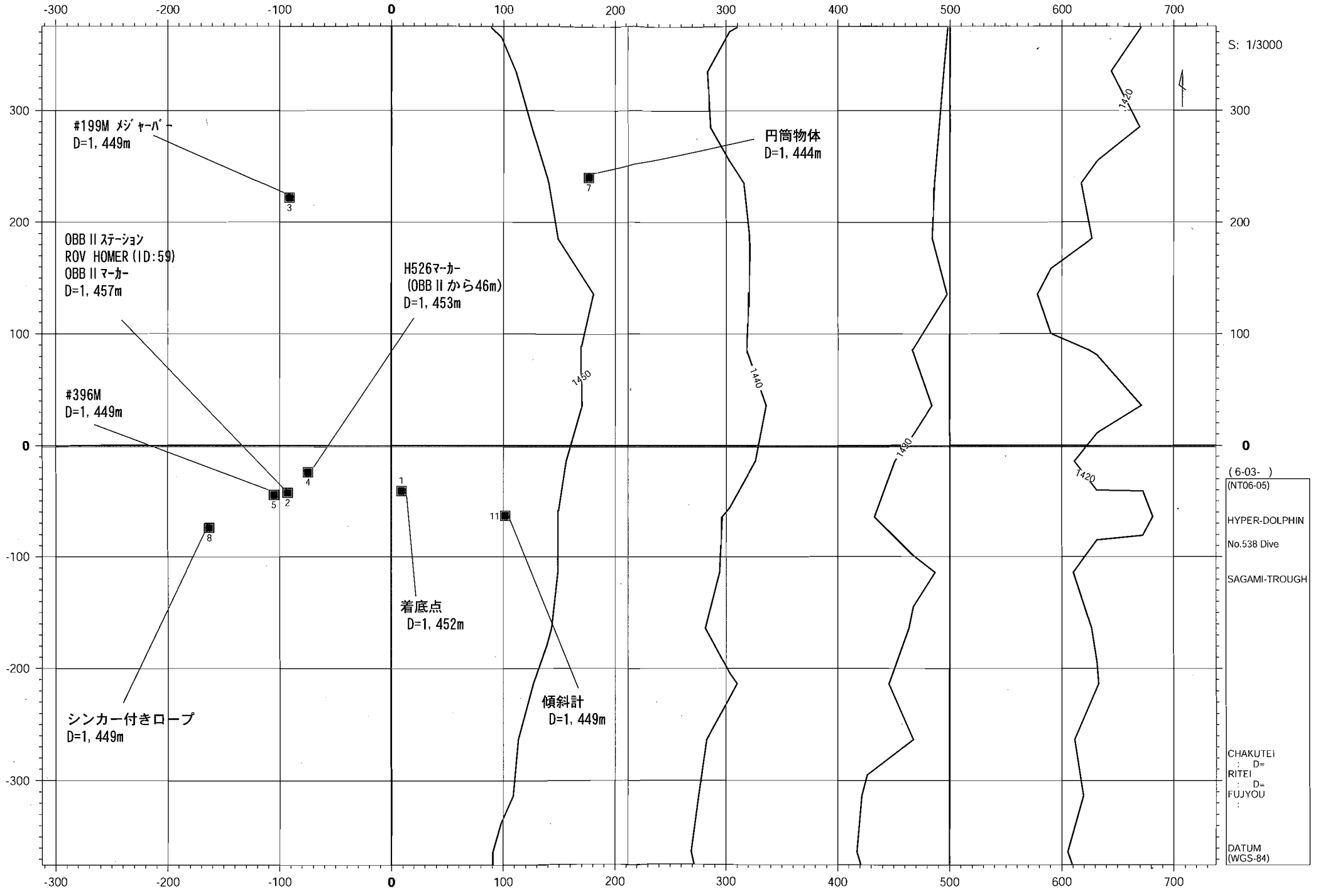
	相模トラフ海域着
０７：５０	ビークル作動確認
０８：３０	潜航開始　Ｎｏ．９
〜	
１６：３０	ビークル浮上
１７：００	揚収完了
	終了後、機構向け

１１．備　考

・特異点は「別紙」参照

・＃４アルゴス送信機（ＩＤ＝２Ｃ６９Ｂ３５）

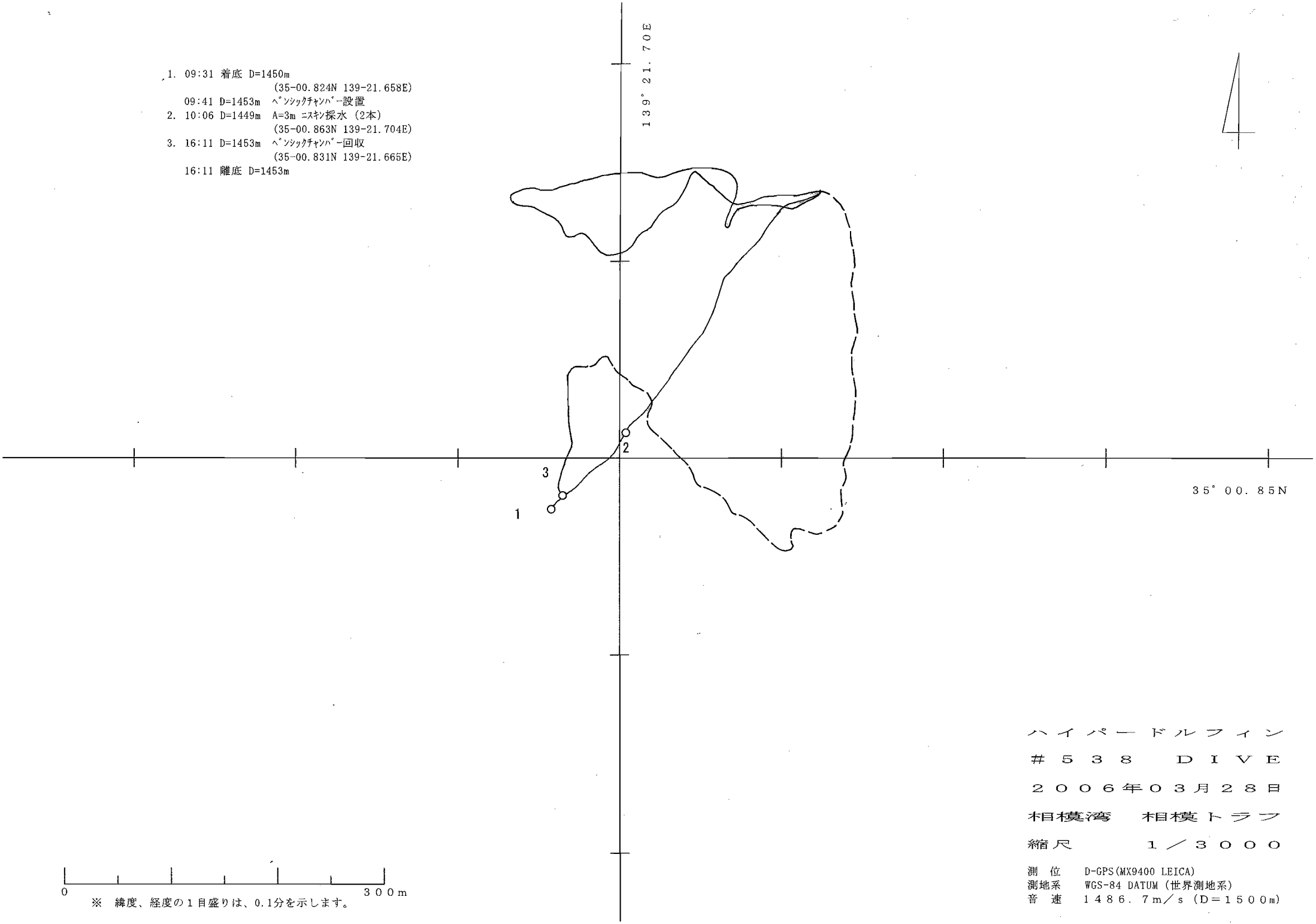
・２Ａ－１　ＪＸトランスポンダ


S: 1/3000
#199M メジャーバー
D=1, 449m
OBB II ステーション
ROV HOMER (ID:59)
OBB II マーカー
D=1, 457m
#396M
D=1, 449m
H526マーカー
(OBB II から46m)
D=1, 453m
円筒物体
D=1, 444m
着底点
D=1, 452m
傾斜計
D=1, 449m
シンカー付きロープ
D=1, 449m
1450
1440
1430
1420
(6-03-)
(NT06-05)
HYPER-DOLPHIN
No.538 Dive
SAGAMI-TROUGH
CHAKUTEI
: D=
RITEI
: D=
FUJYOU
:
DATUM
(WGS-84)
XY ORIGIN 35-0.850N 139-21.700E
CENTER 35-0.850N 139-21.840E

別　紙

特異点				
	緯　度	経　度	深さ m	備　考
②	３５－００．８２７Ｎ	１３９－２１．６３９Ｅ	1457 m	OBBⅡｽﾃｰｼｮﾝ ROV HOMER(ID:59) OBBⅡﾏｰｶｰ
③	３５－００．９７０Ｎ	１３９－２１．６４０Ｅ	1449 m	#199M.ﾒｼﾞｬｰﾊﾞｰ
④	３５－００．８３７Ｎ	１３９－２１．６５１Ｅ	1453 m	H526ﾏｰｶｰ (OBBⅡから46m)
⑤	３５－００．８２６Ｎ	１３９－２１．６３１Ｅ	1449 m	#396M
⑥				
⑦	３５－００．９８０Ｎ	１３９－２１．８１６Ｅ	1444 m	円筒物体
⑧	３５－００．８１０Ｎ	１３９－２１．５９３Ｅ	1449 m	シンカー付ロープ
⑨	３５－００．９５５Ｎ	１３９－２１．２２０Ｅ		立ち入り禁止区域
⑩	３５－００．７２５Ｎ	１３９－２１．３８０Ｅ		立ち入り禁止区域
⑪	３５－００．８１６Ｎ	１３９－２１．７６７Ｅ	1449 m	傾斜計

1. 09:31 着底 D=1450m
(35-00.824N 139-21.658E)
09:41 D=1453m ﾍﾞﾝｼｯｸﾁｬﾝﾊﾞｰ設置
2. 10:06 D=1449m A=3m ﾆｽｷﾝ採水 (2本)
(35-00.863N 139-21.704E)
3. 16:11 D=1453m ﾍﾞﾝｼｯｸﾁｬﾝﾊﾞｰ回収
(35-00.831N 139-21.665E)
16:11 離底 D=1453m

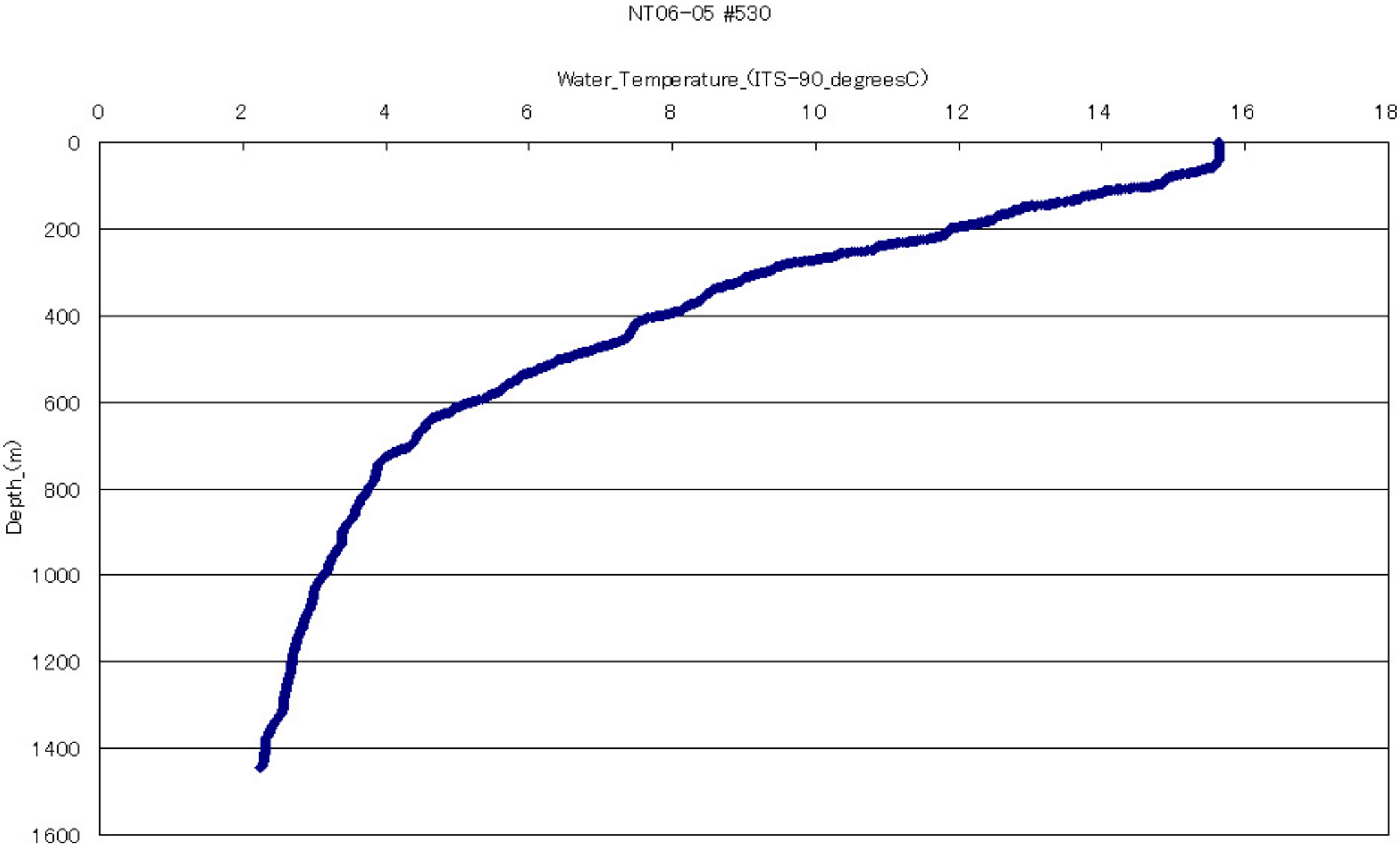


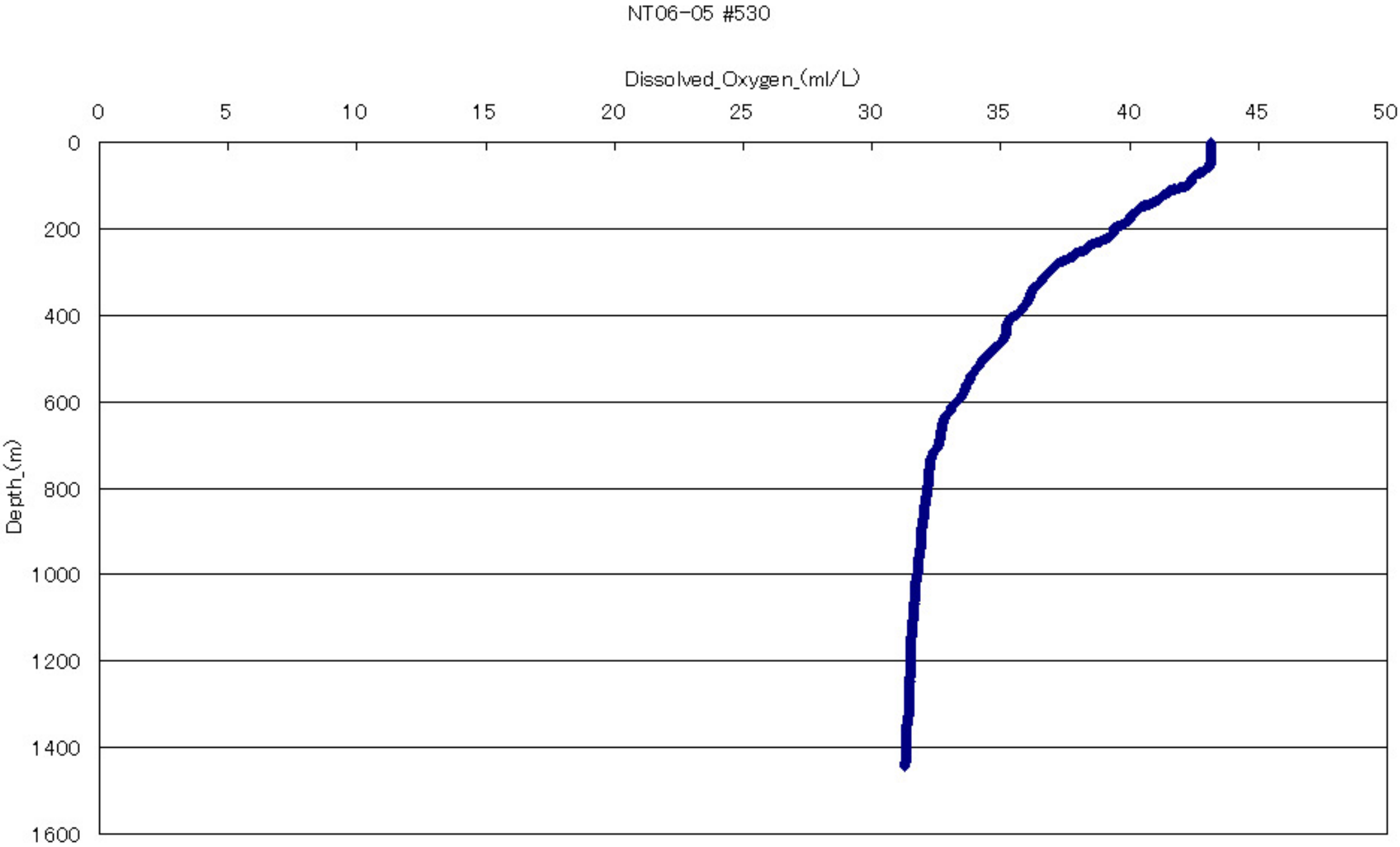
0 300m

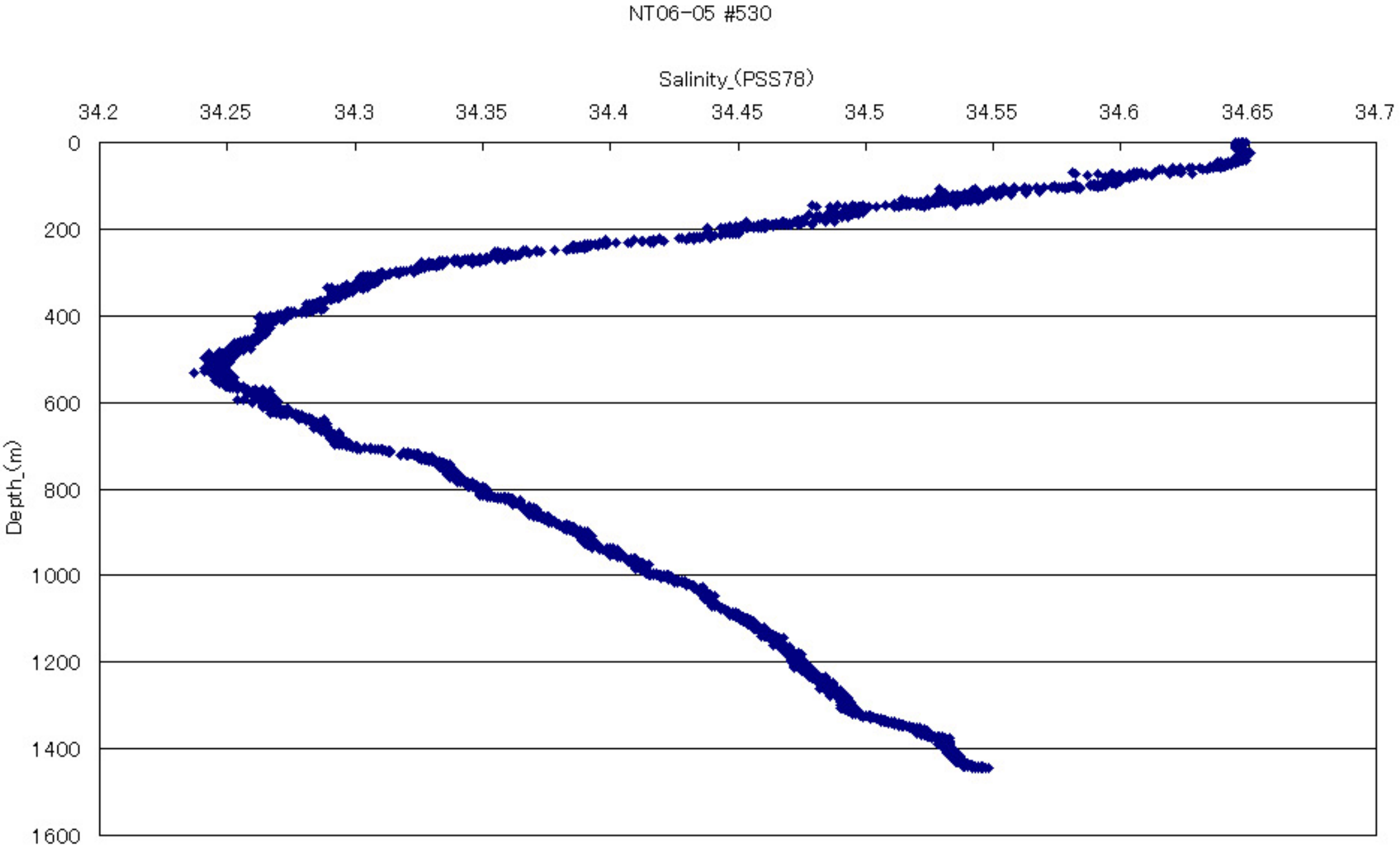
※ 緯度、経度の１目盛りは、0.1分を示します。

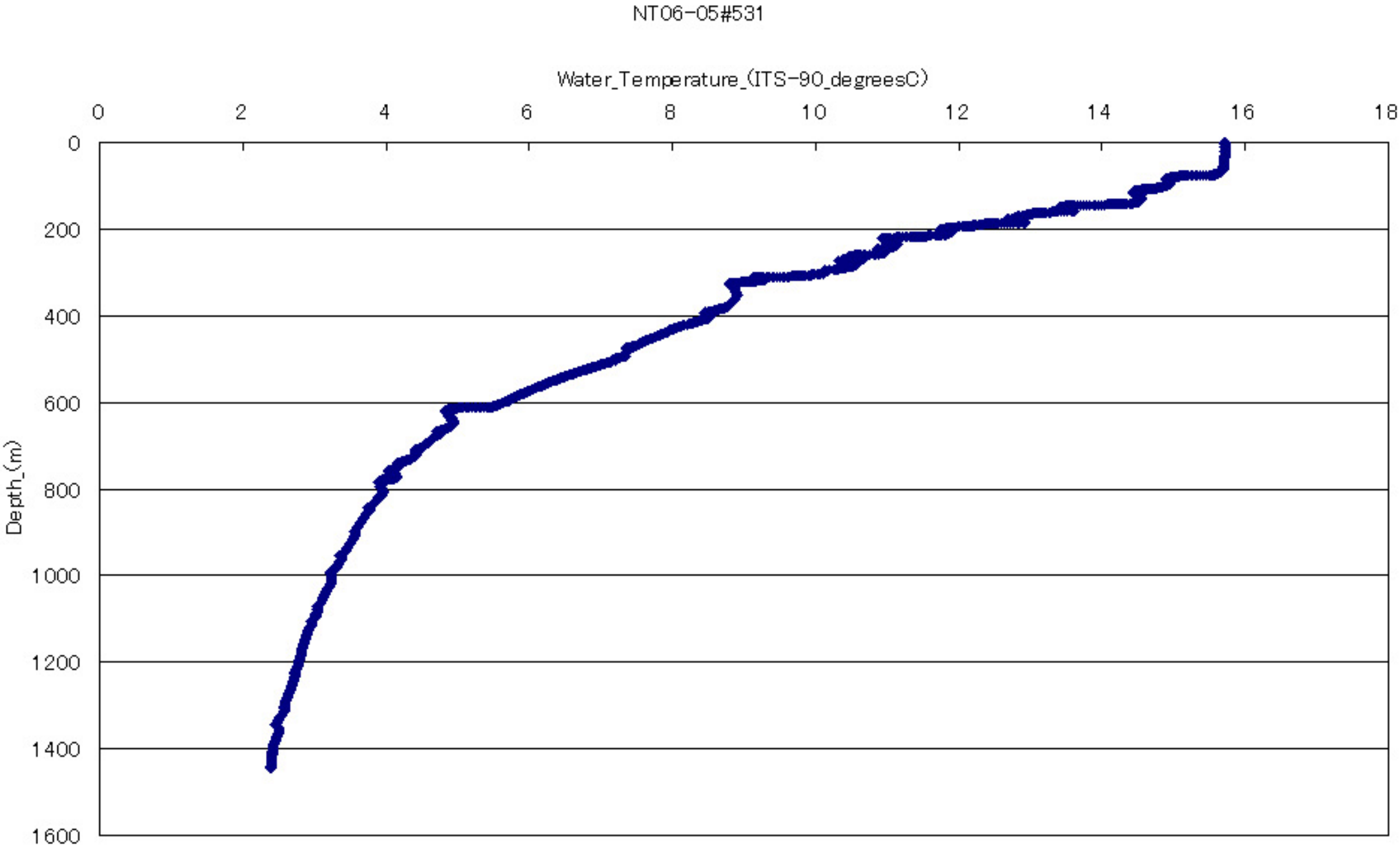
ハイパードルフィン
＃５３８ ＤＩＶＥ
２００６年０３月２８日
相模湾 相模トラフ
縮尺 １／３０００

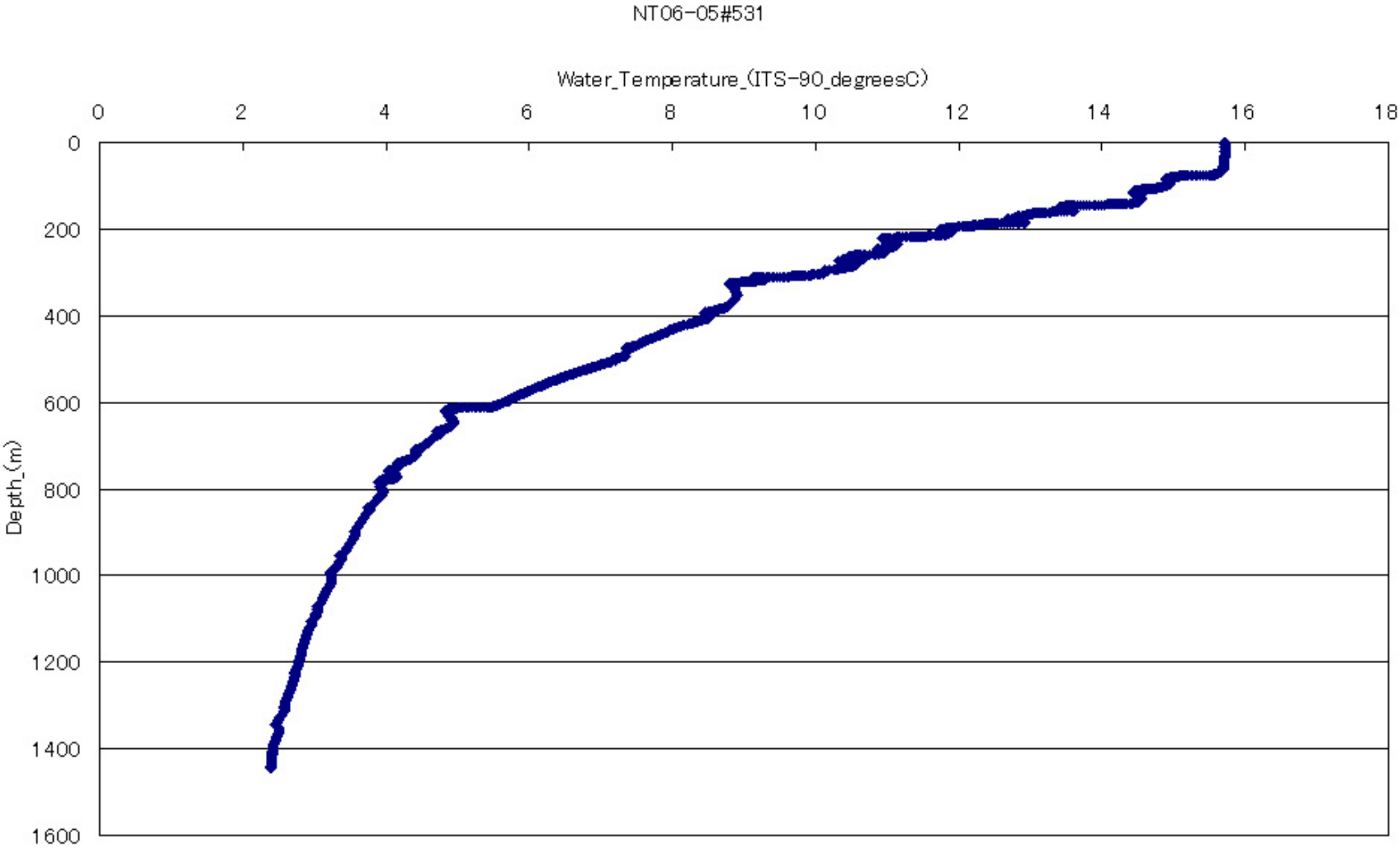
測 位 D-GPS(MX9400 LEICA)
測地系 WGS-84 DATUM (世界測地系)
音 速 １４８６．７m／s (D＝１５００m)

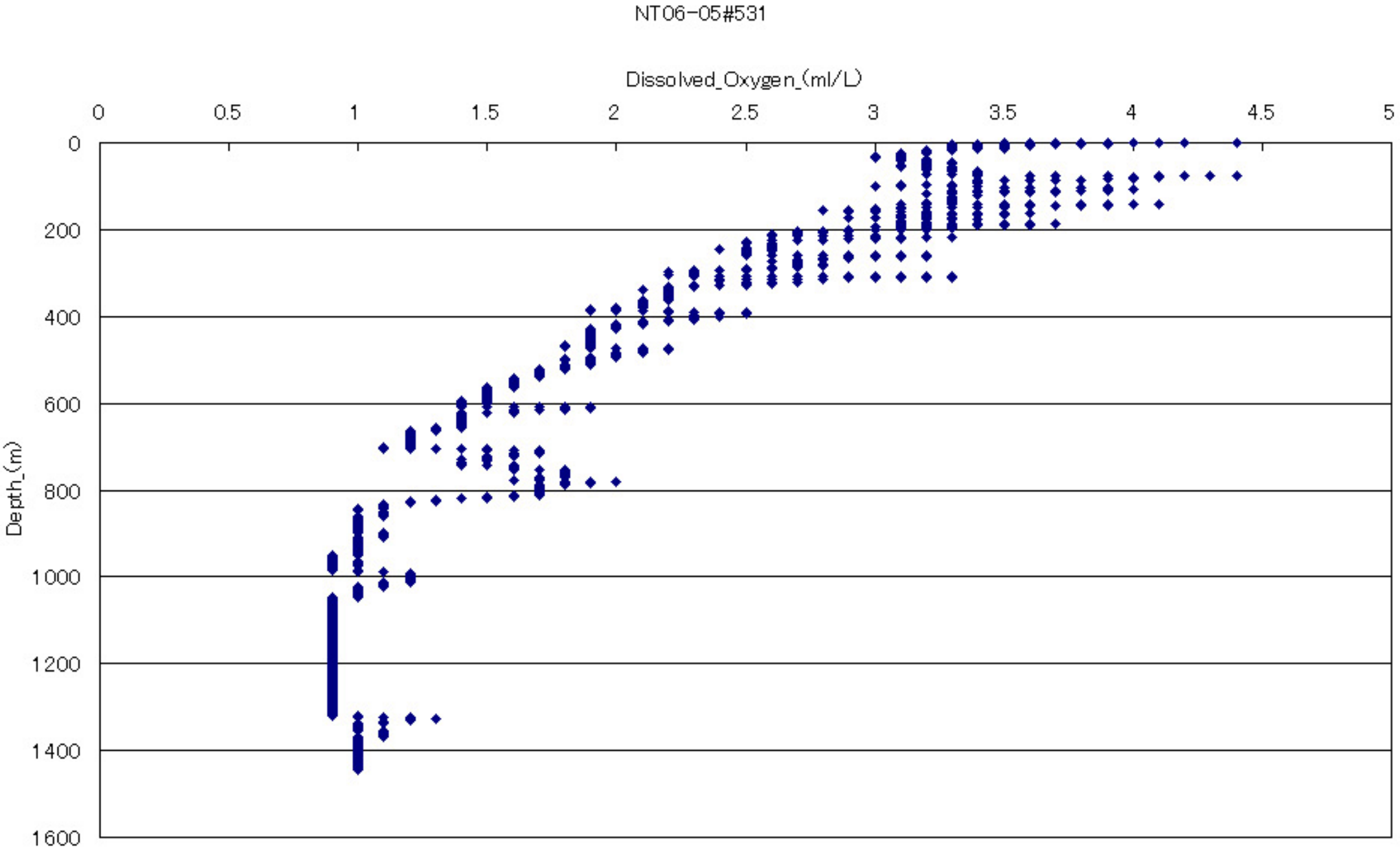

NT06-05 #530
Water_Temperature_(ITS-90_degreesC)
0
2
4
6
8
10
12
14
16
18
Depth_(m)
0
200
400
600
800
1000
1200
1400
1600

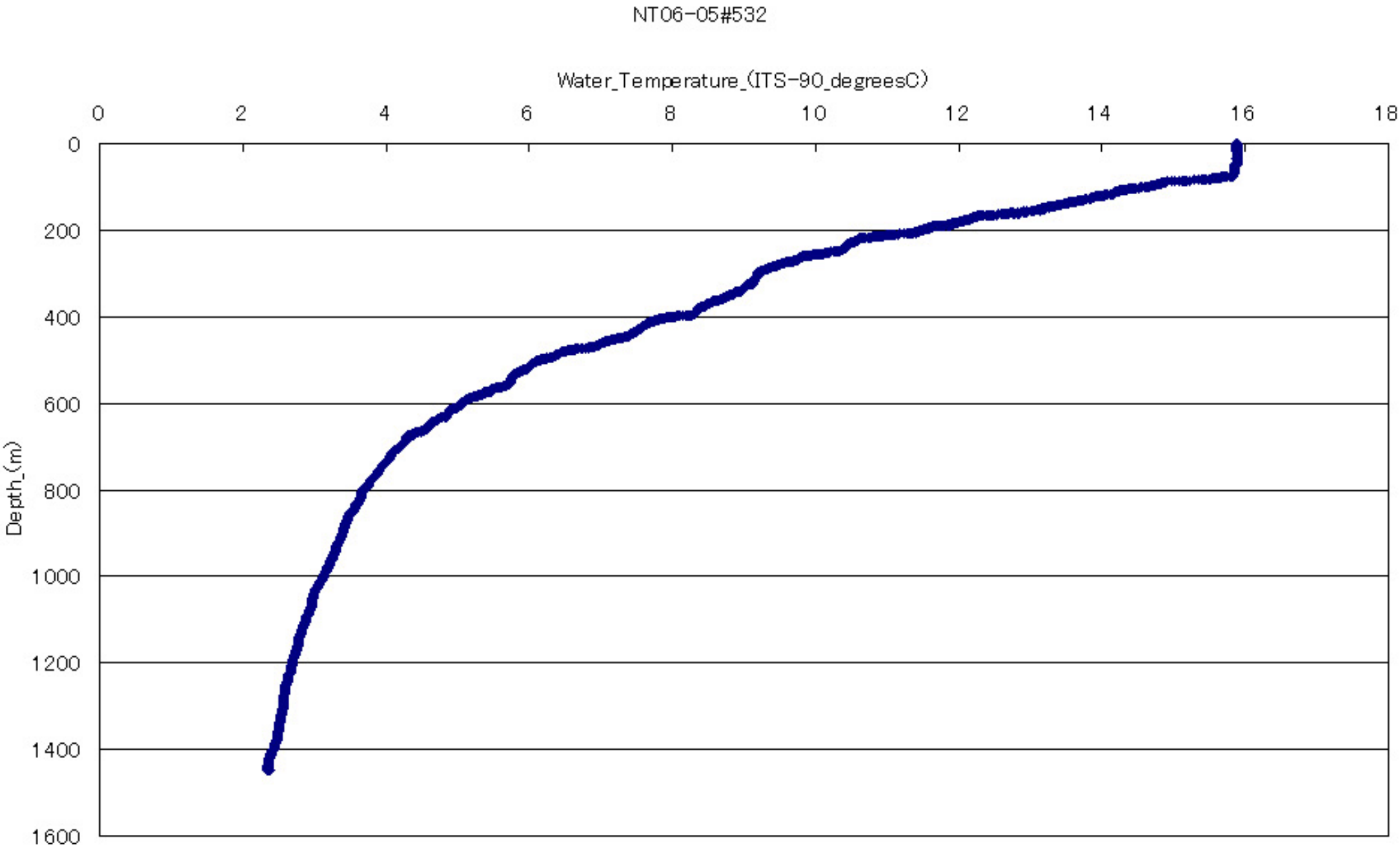

NT06-05 #530
Dissolved_Oxygen_(ml/L)
0
5
10
15
20
25
30
35
40
45
50
Depth_(m)
0
200
400
600
800
1000
1200
1400
1600

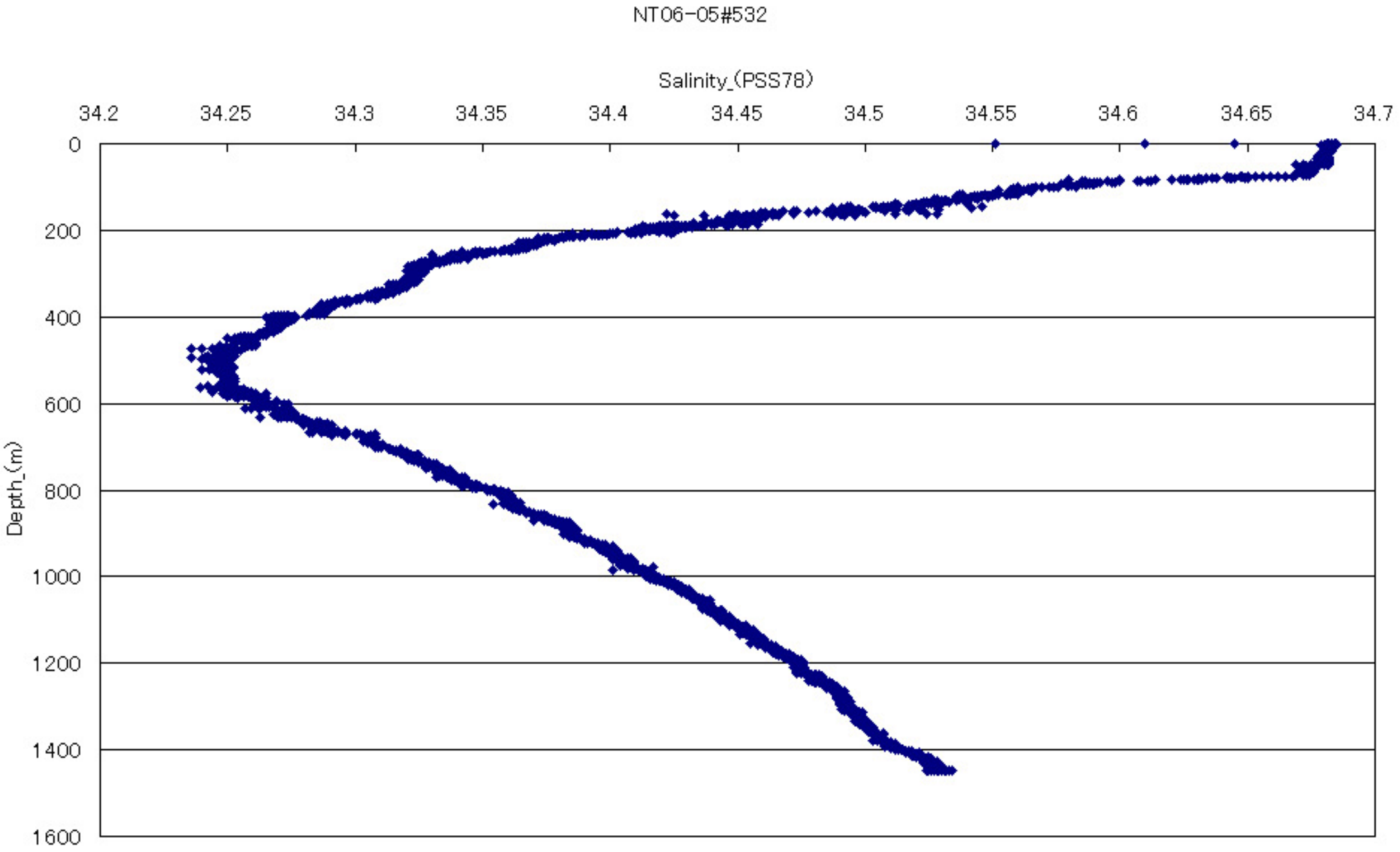

NT06-05 #530
Salinity_(PSS78)
34.2
34.25
34.3
34.35
34.4
34.45
34.5
34.55
34.6
34.65
34.7
Depth_(m)
0
200
400
600
800
1000
1200
1400
1600


NT06-05#531
Water_Temperature_(ITS-90_degreesC)
0
2
4
6
8
10
12
14
16
18
Depth_(m)
0
200
400
600
800
1000
1200
1400
1600


NT06-05#531
Water_Temperature_(ITS-90_degreesC)
0
2
4
6
8
10
12
14
16
18
Depth_(m)
0
200
400
600
800
1000
1200
1400
1600


NT06-05#531
Dissolved_Oxygen_(ml/L)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Depth_(m)
0
200
400
600
800
1000
1200
1400
1600


NT06-05#532
Water_Temperature_(ITS-90_degreesC)
0
2
4
6
8
10
12
14
16
18
Depth_(m)
0
200
400
600
800
1000
1200
1400
1600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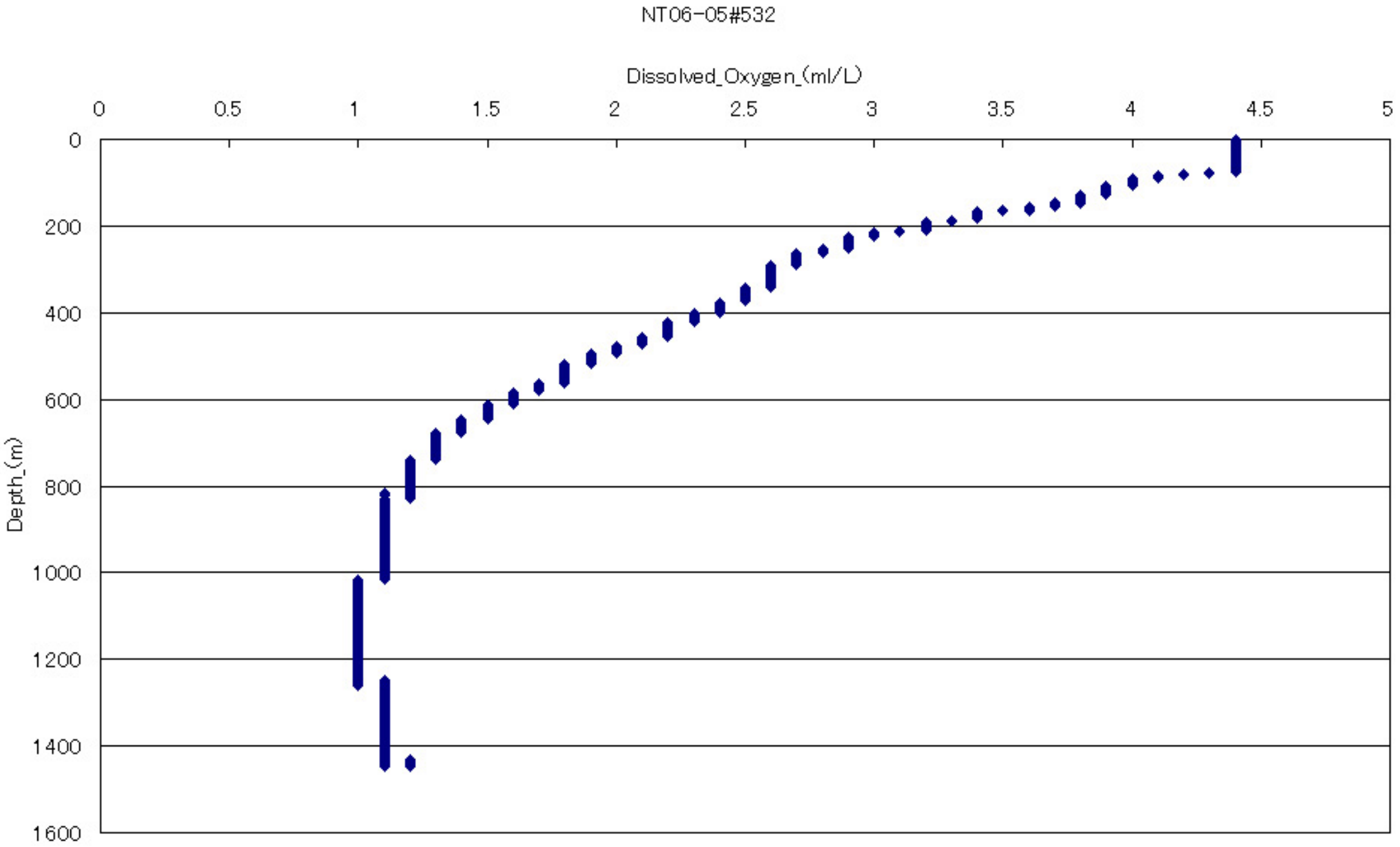
Depth_(m)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5
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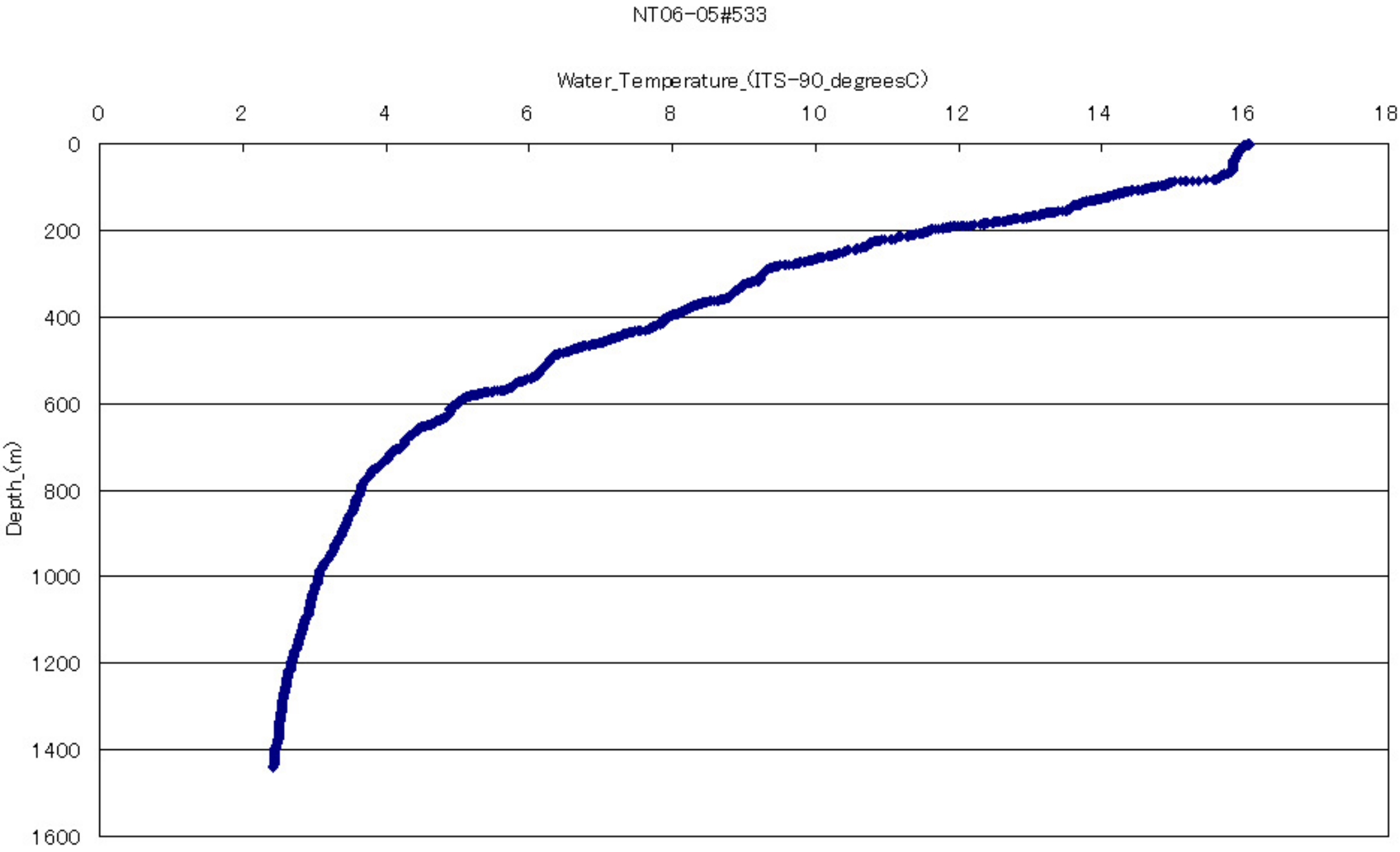
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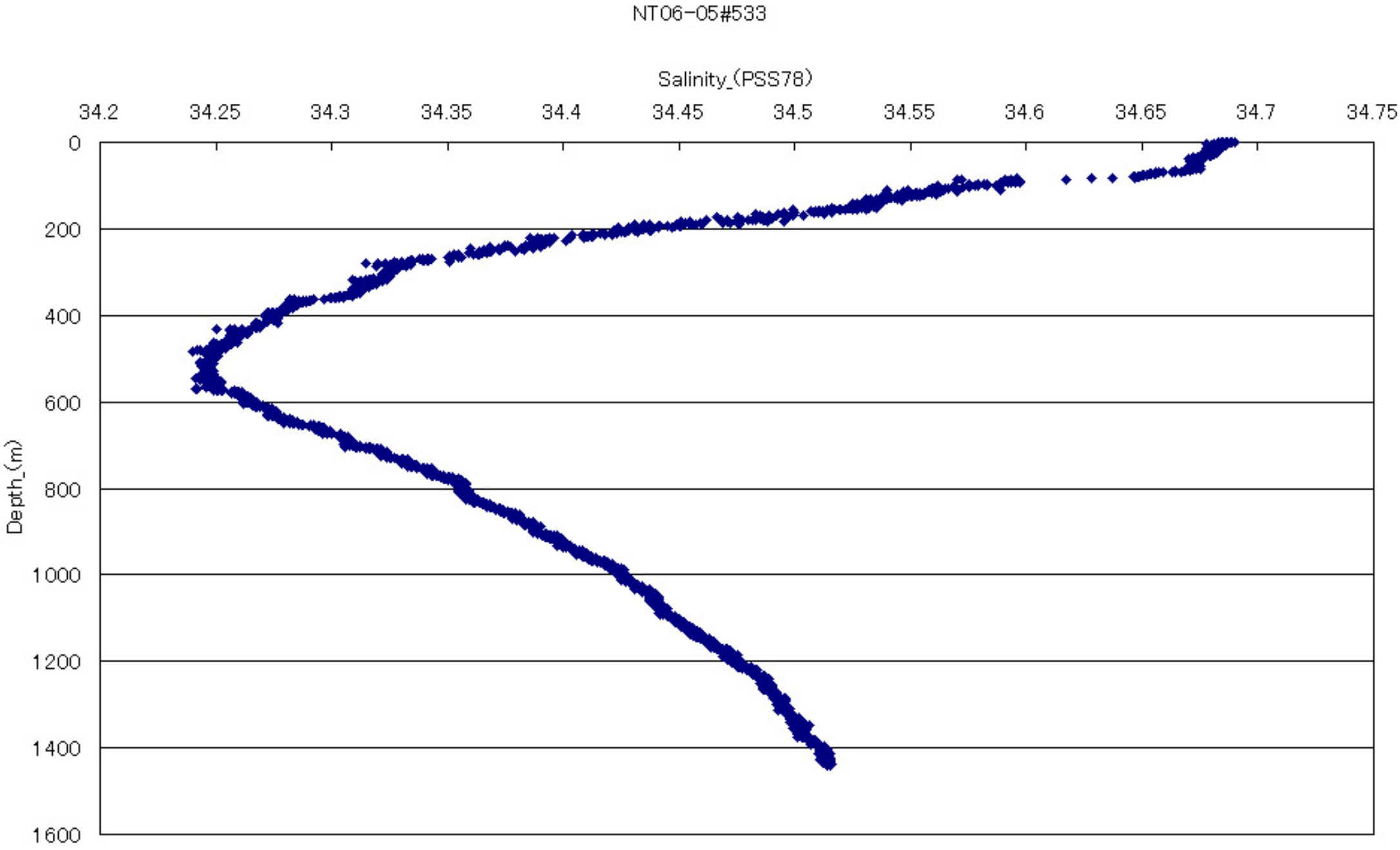
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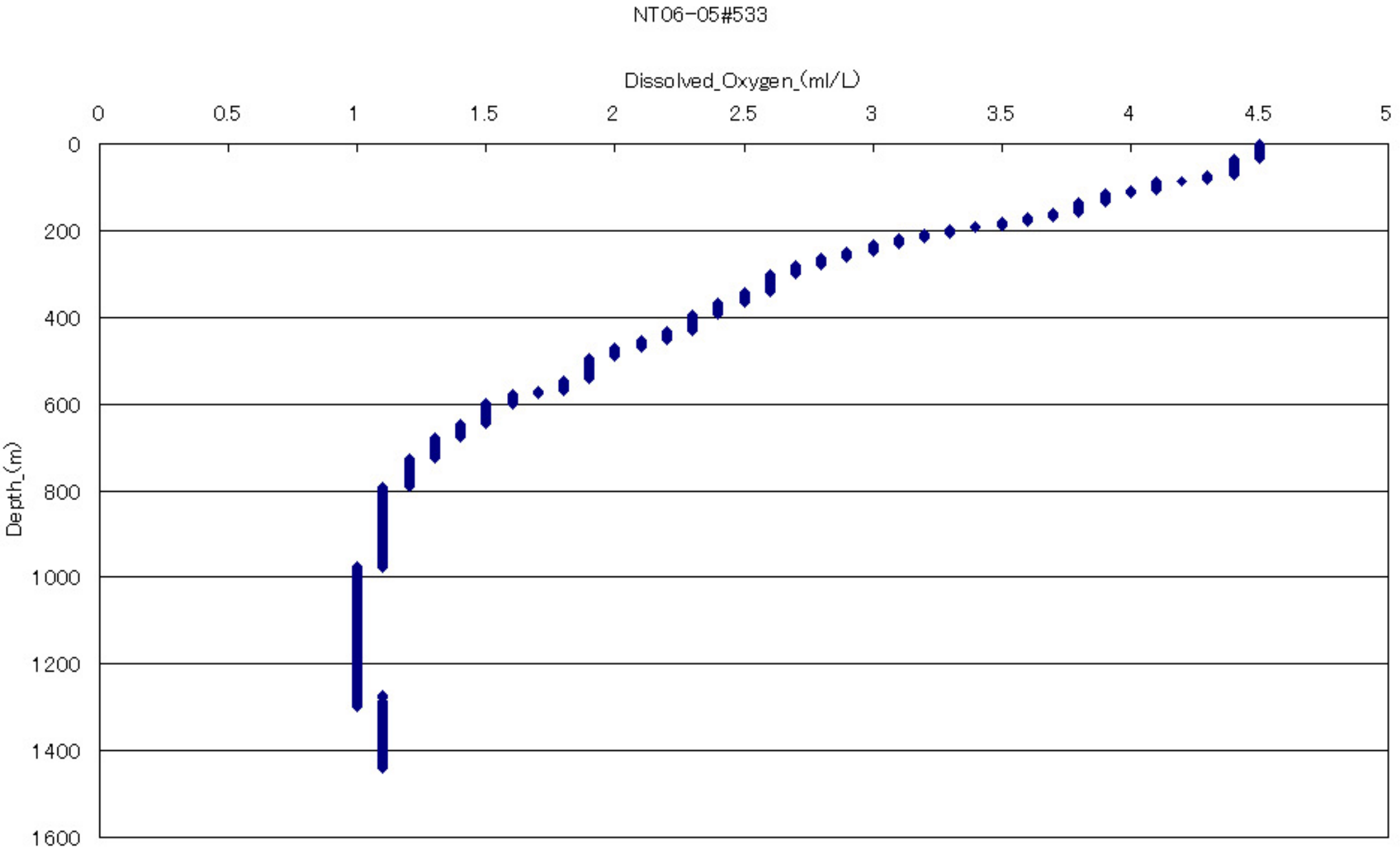
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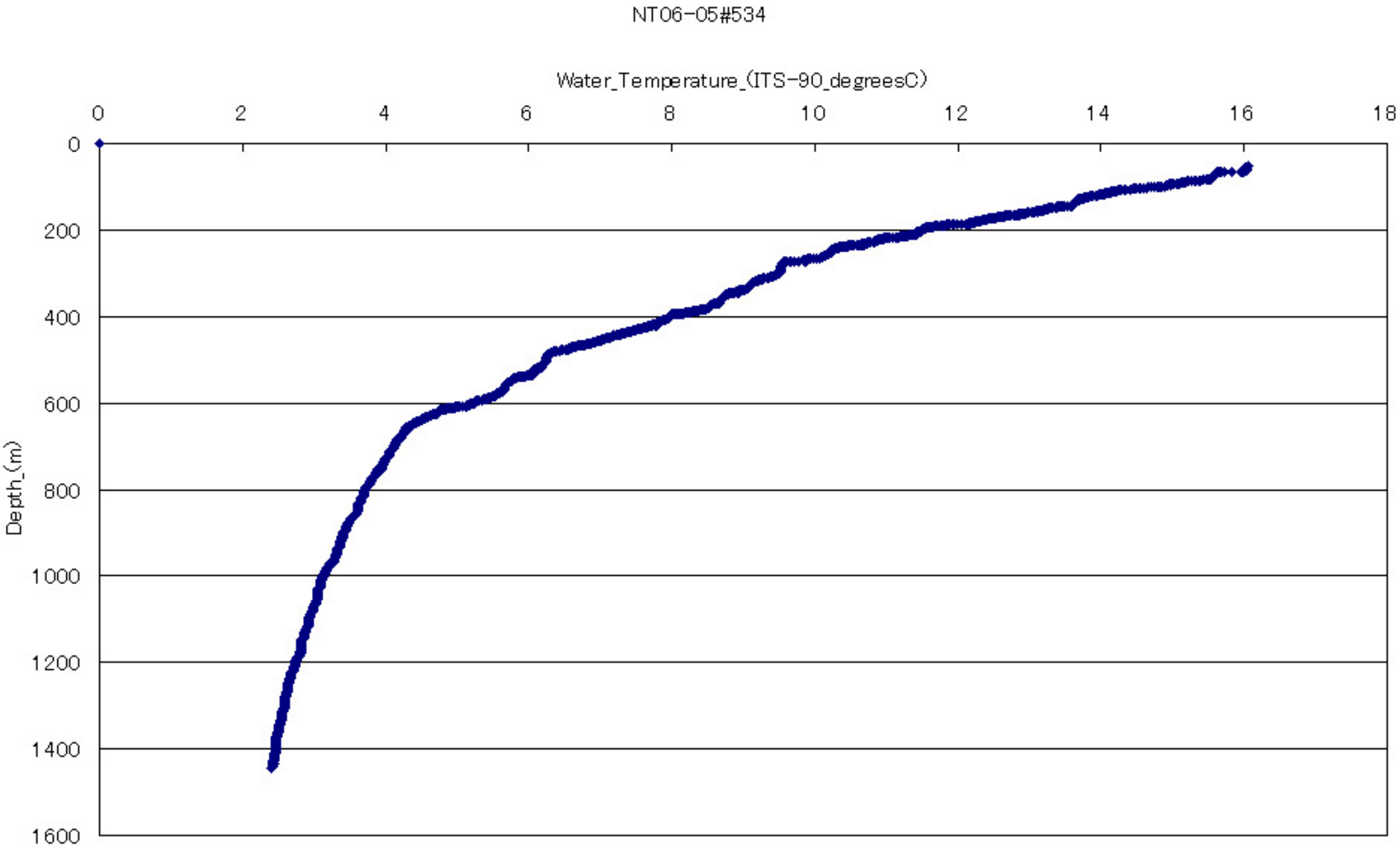
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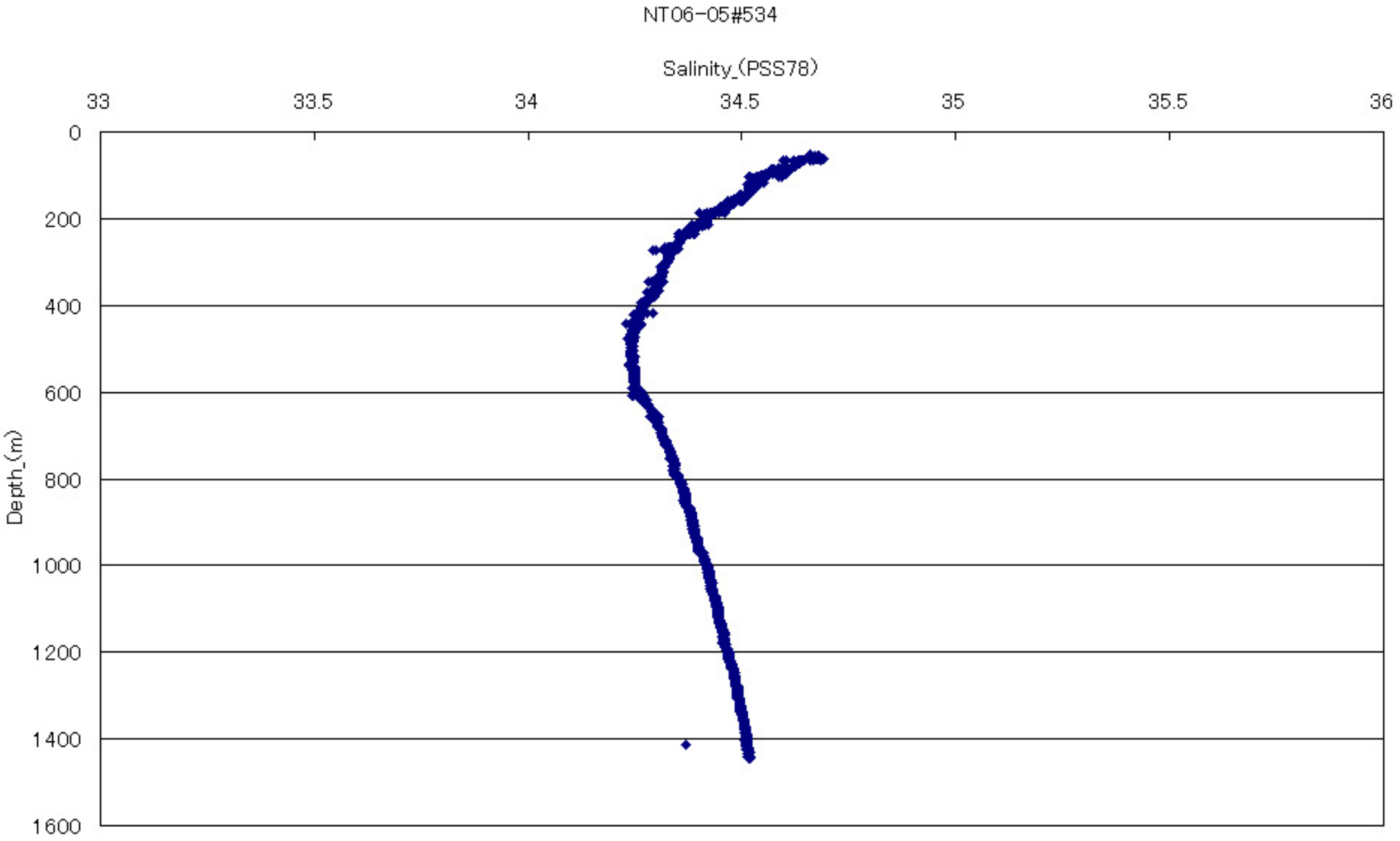
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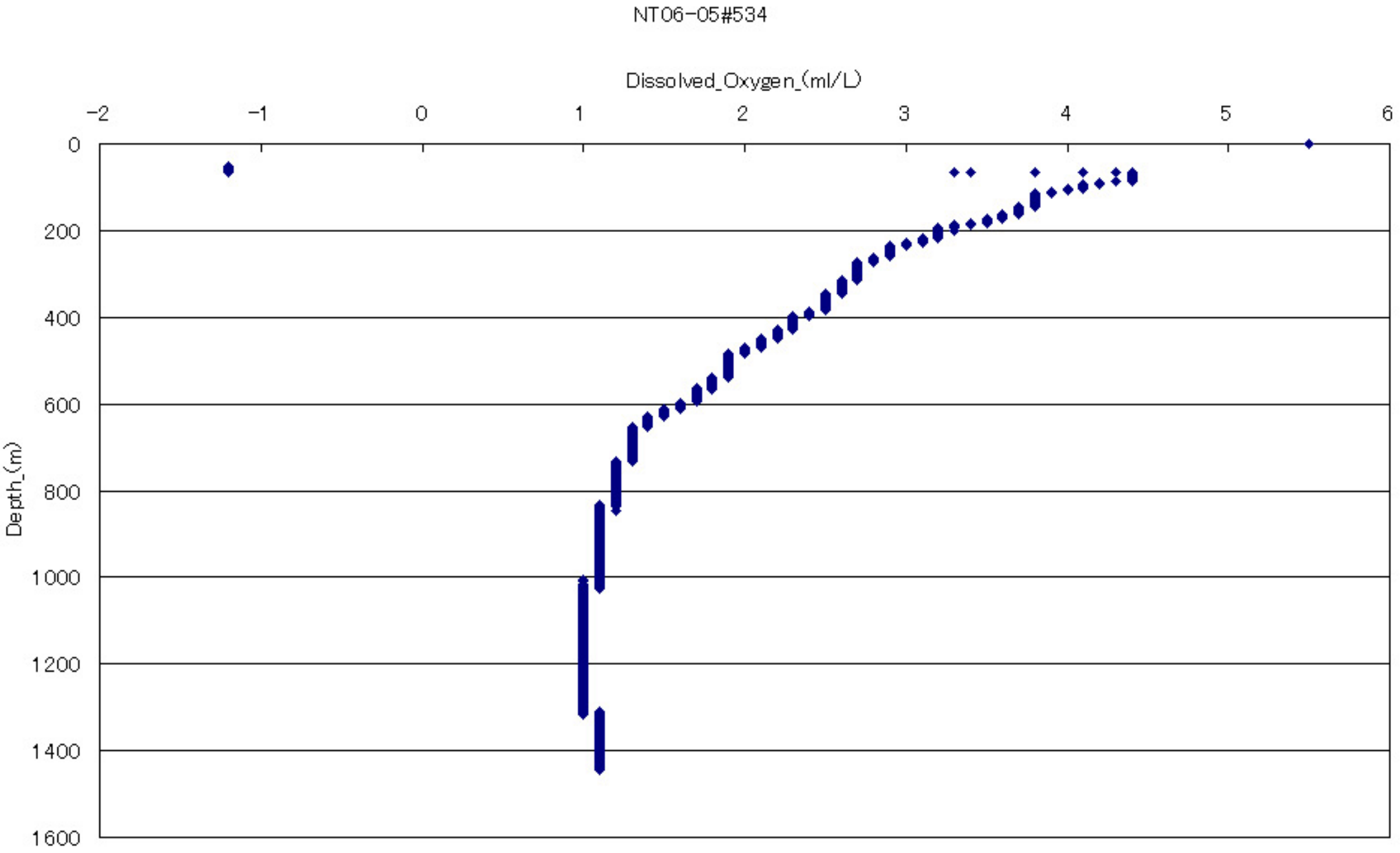
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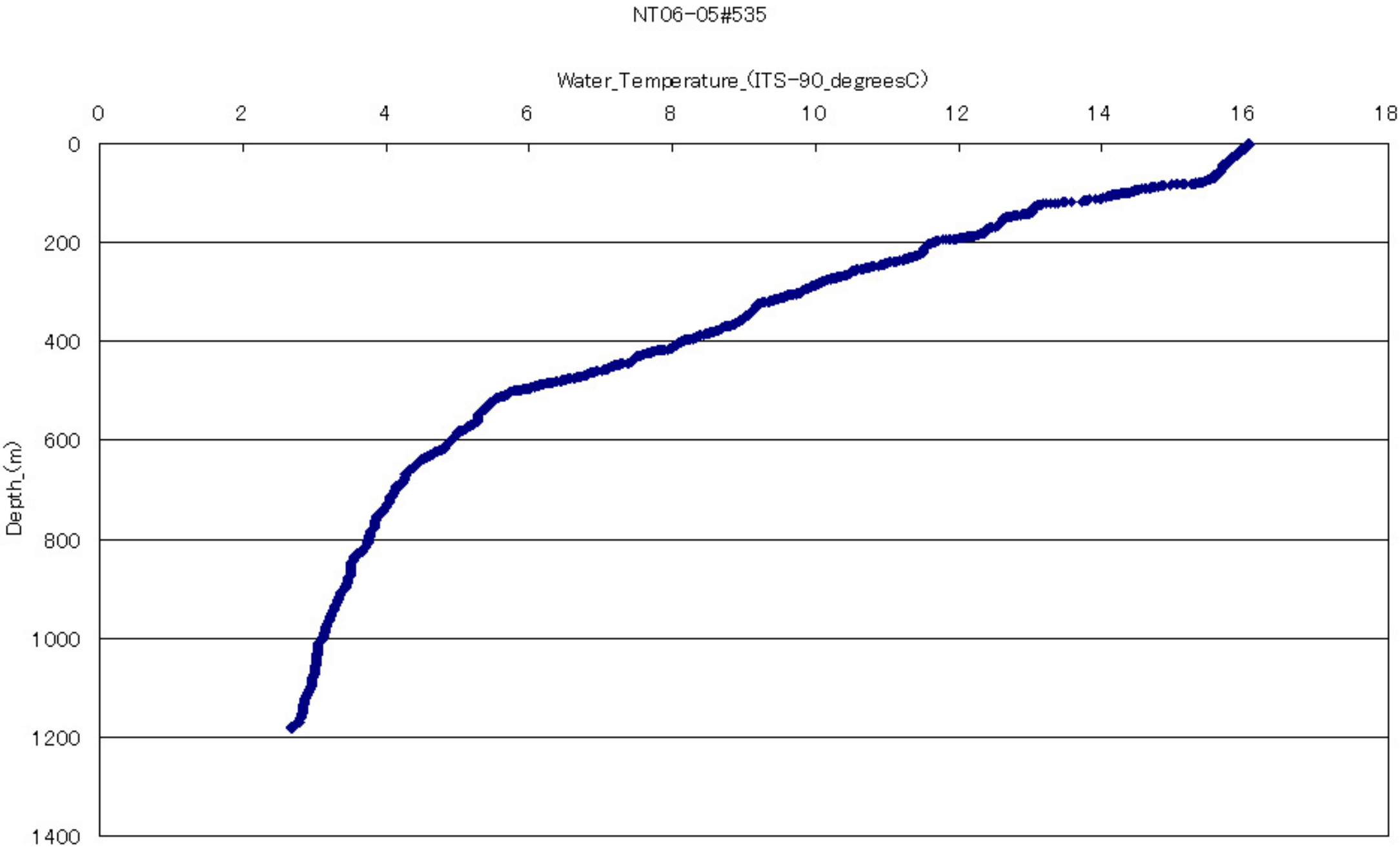
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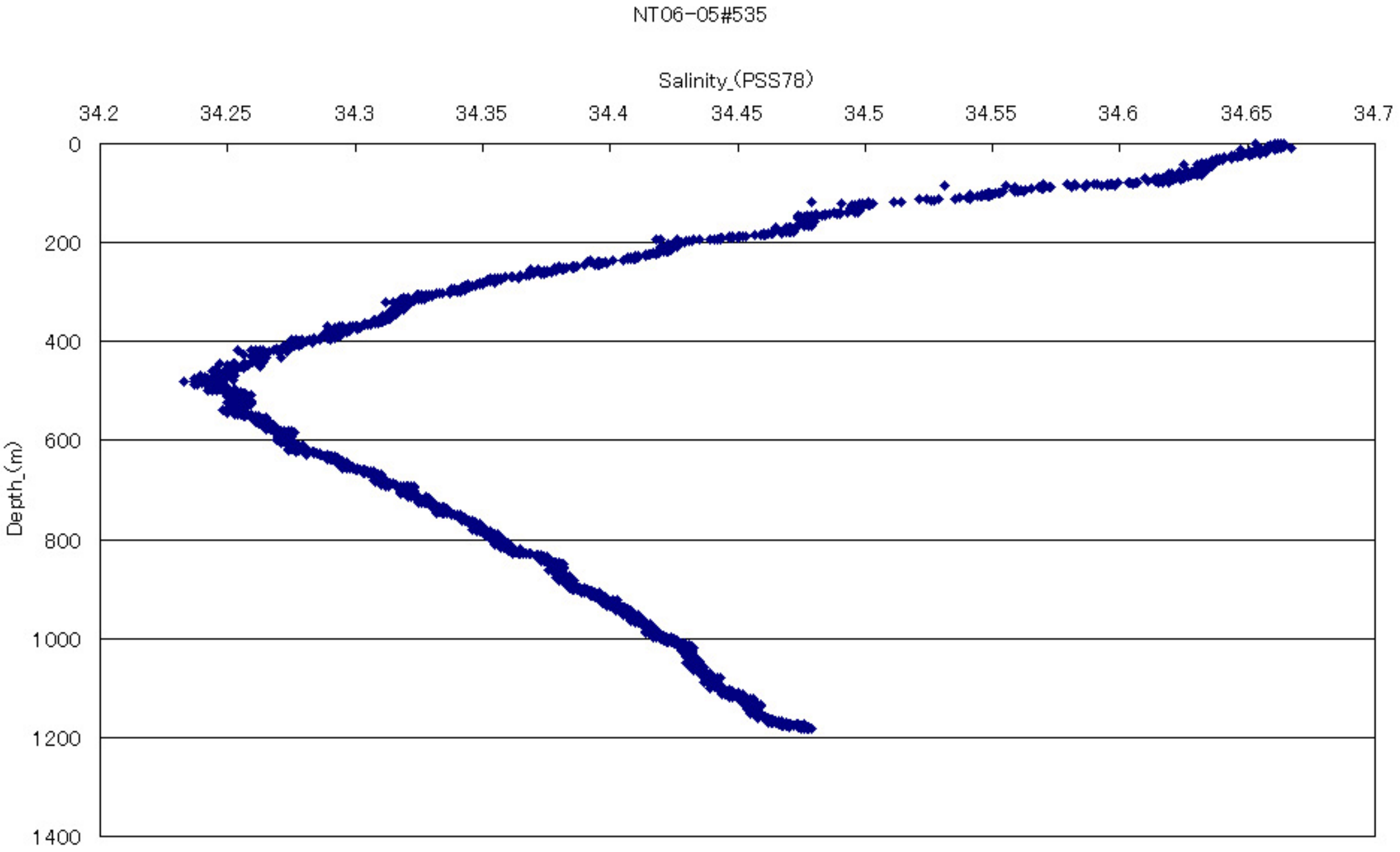
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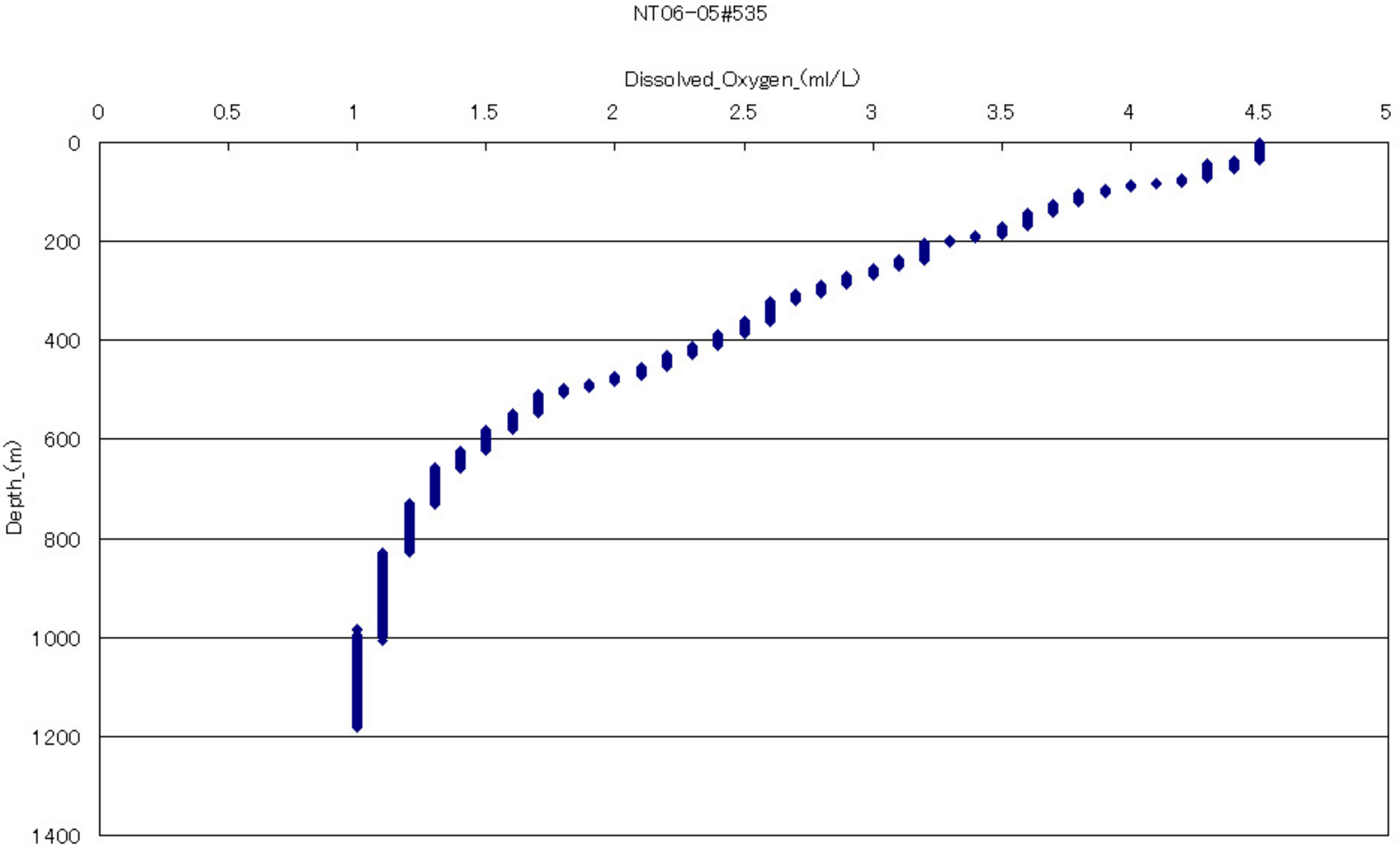
Depth_(m)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Depth_(m)
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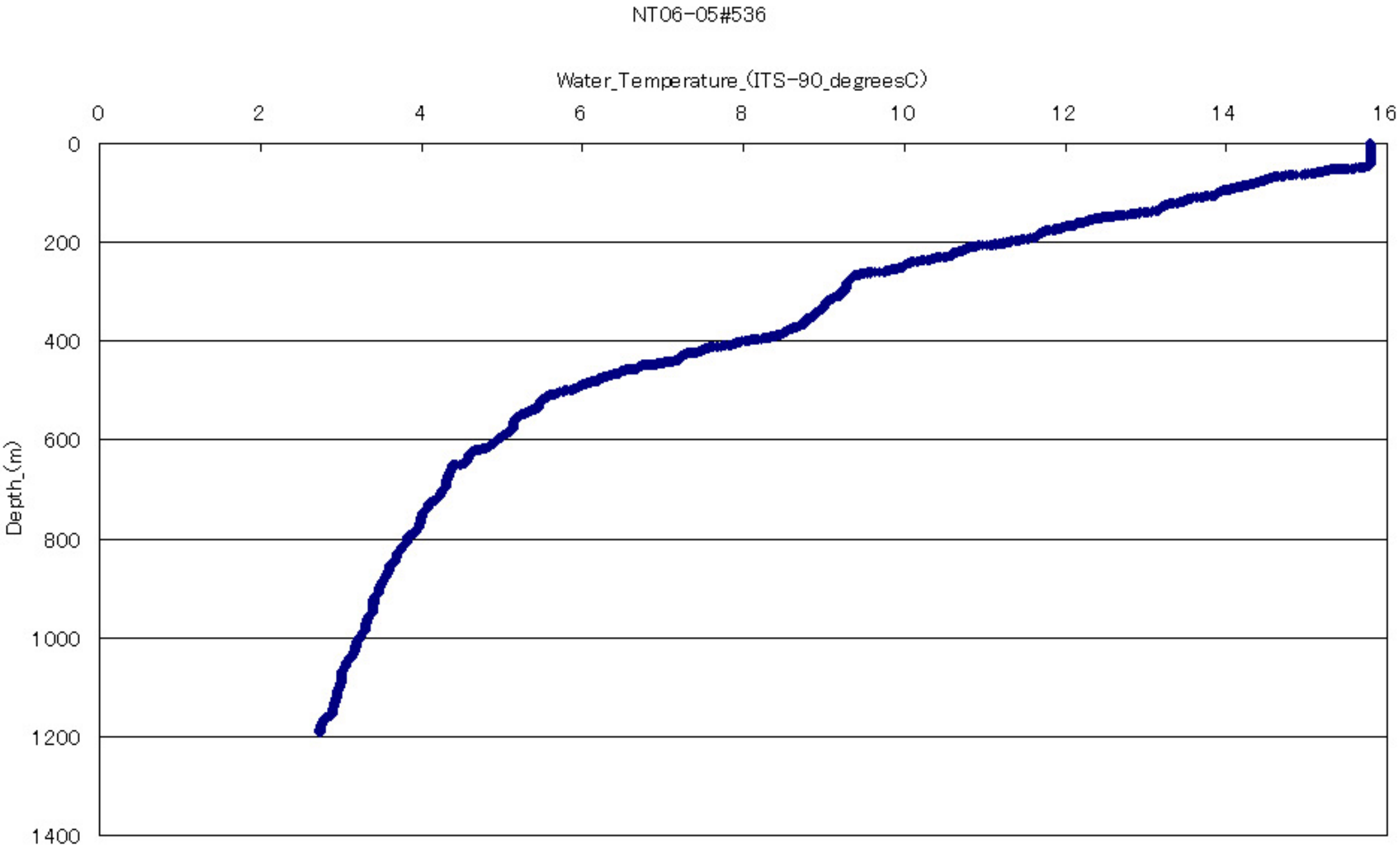
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Depth_(m)
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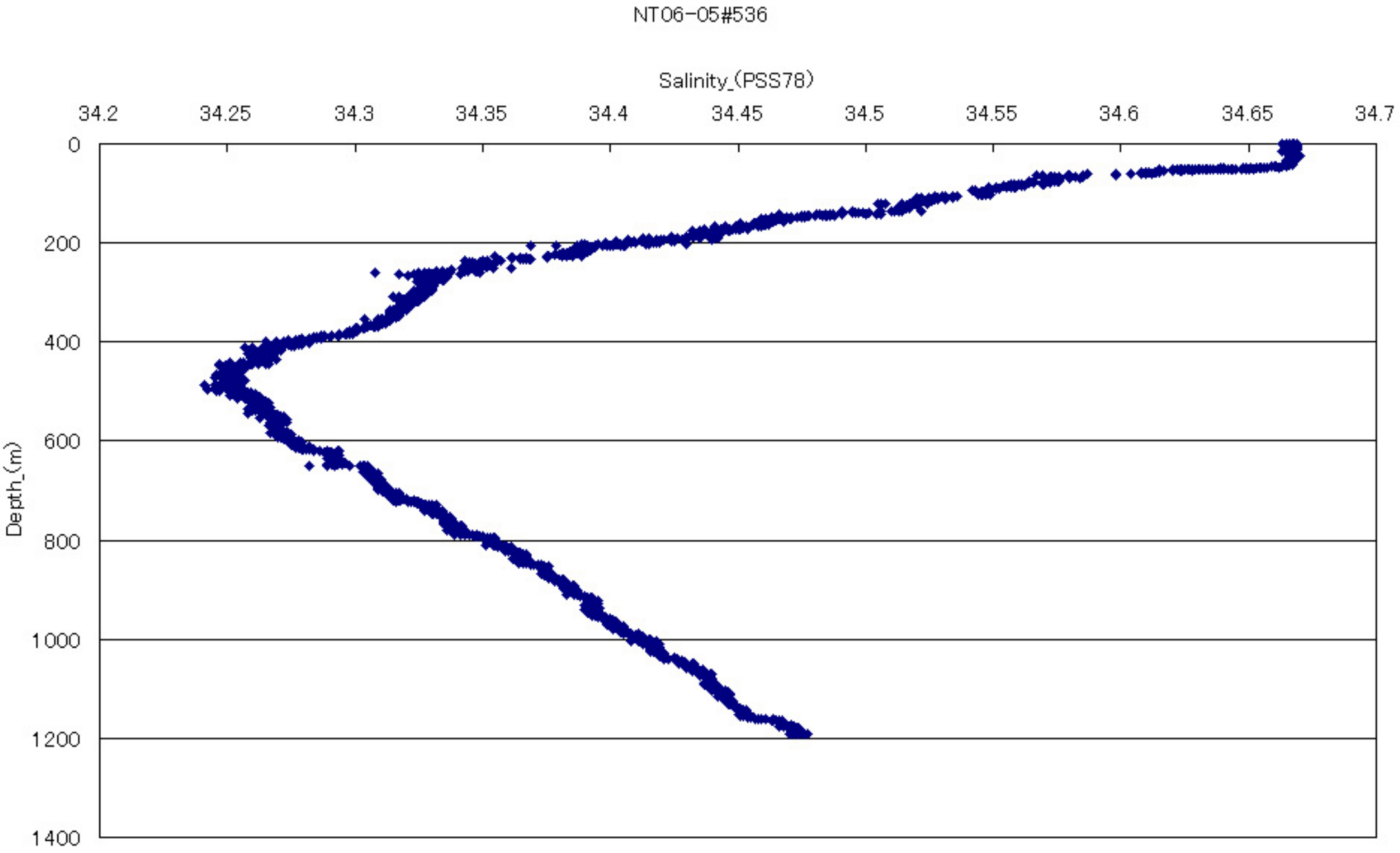
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34.7
Depth_(m)
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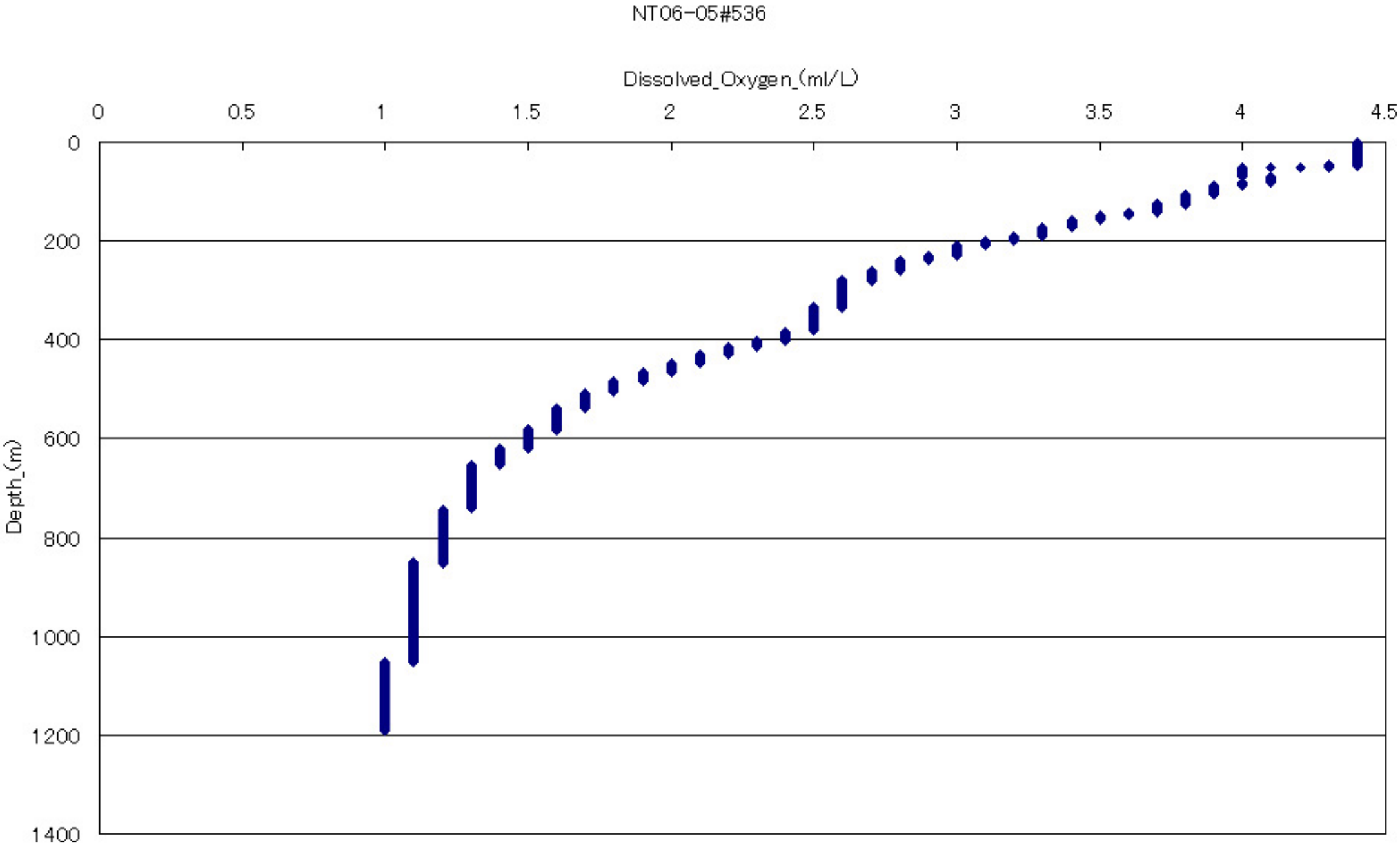
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2.5
3
3.5
4
4.5
Depth_(m)
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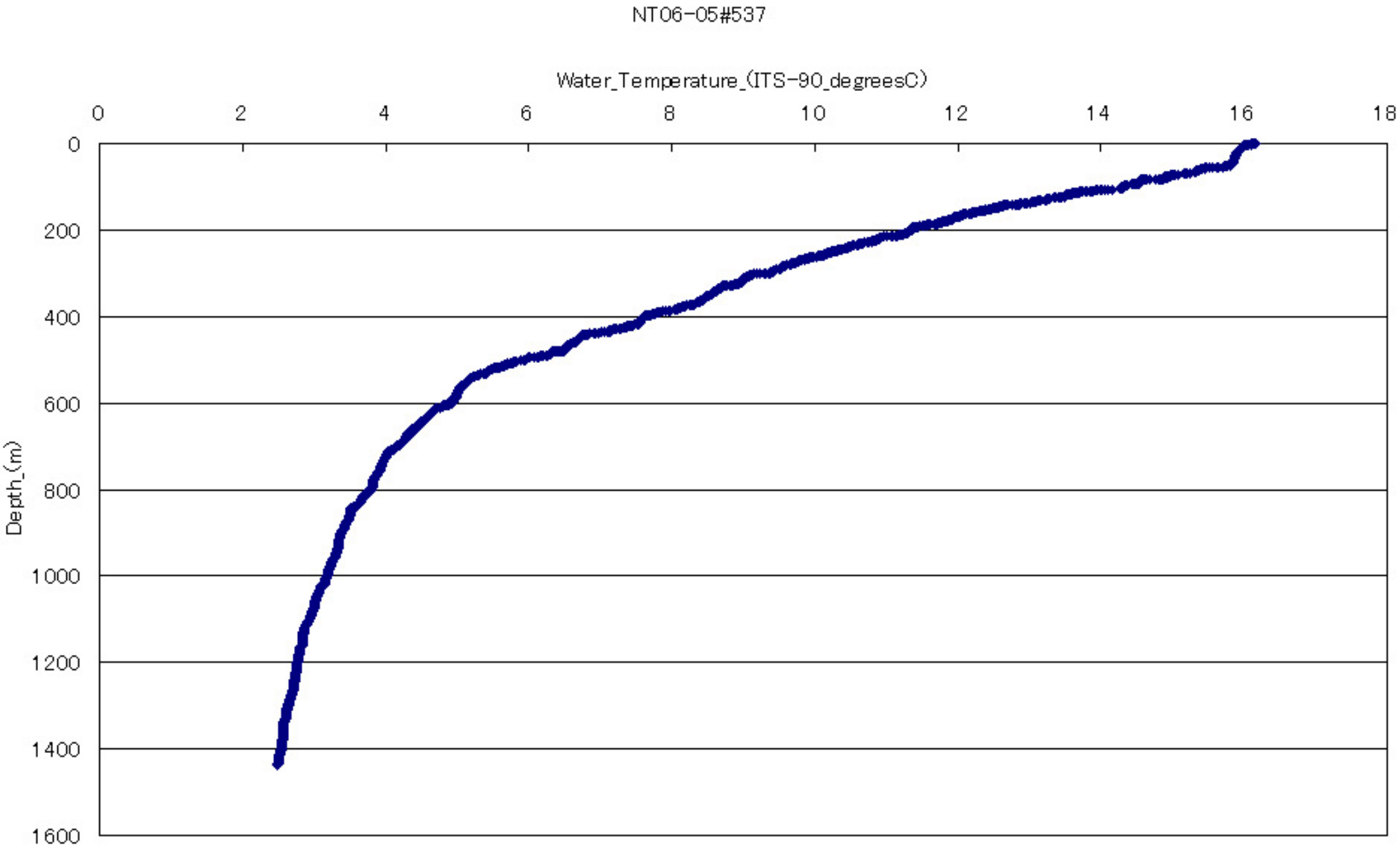
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Depth_(m)
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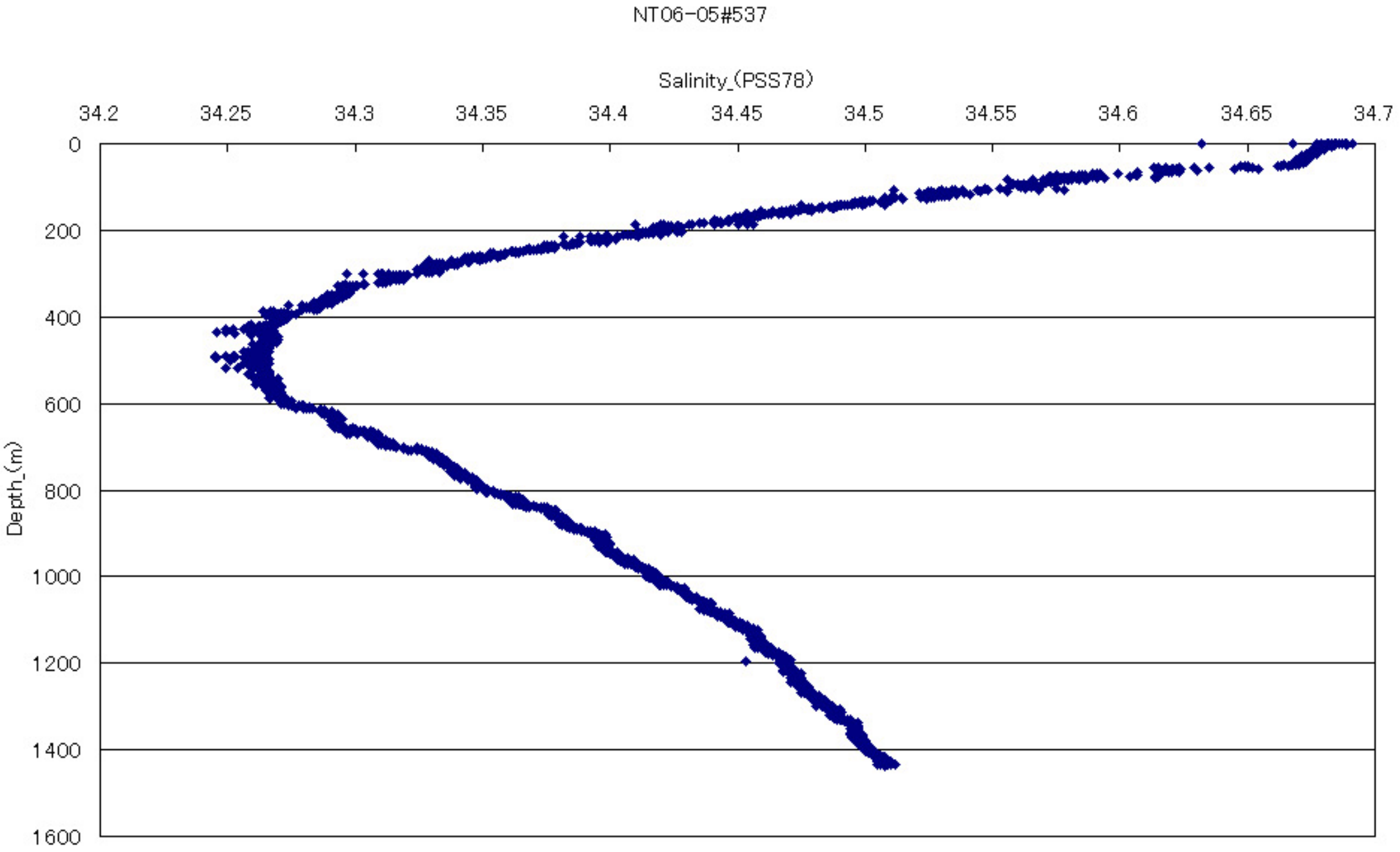
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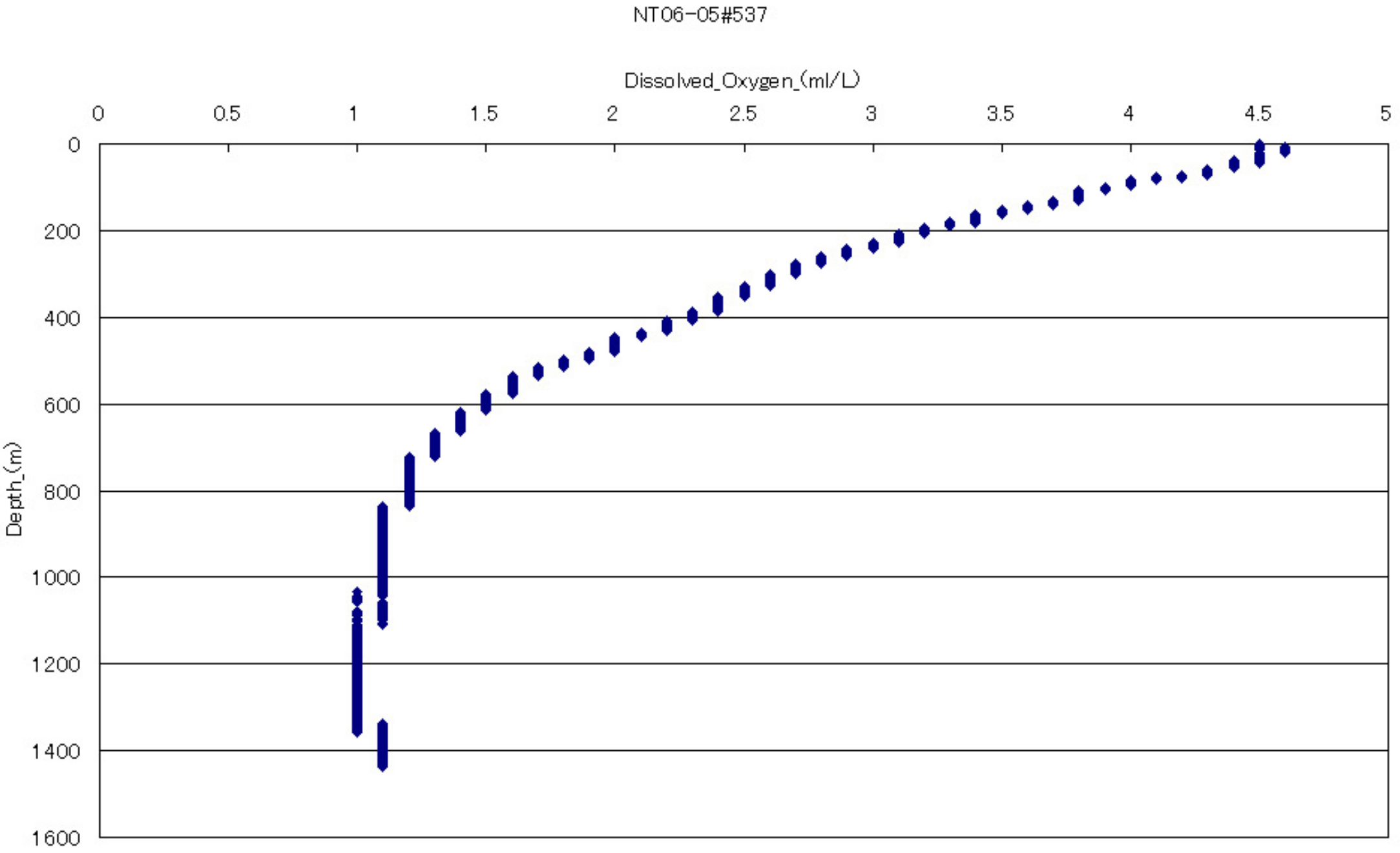
Depth_(m)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3.5
4
4.5
5
Depth_(m)
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400
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1200
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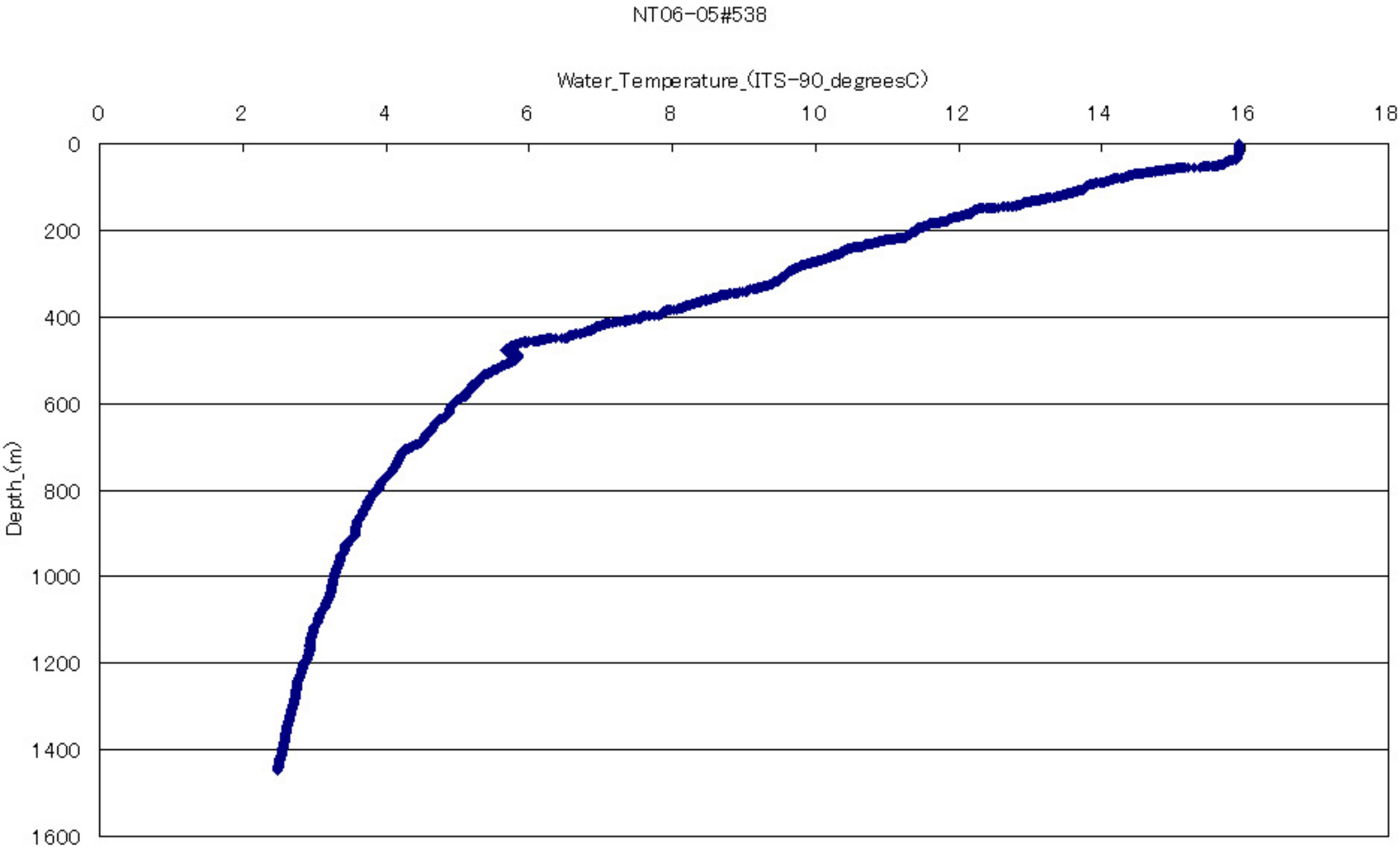
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18
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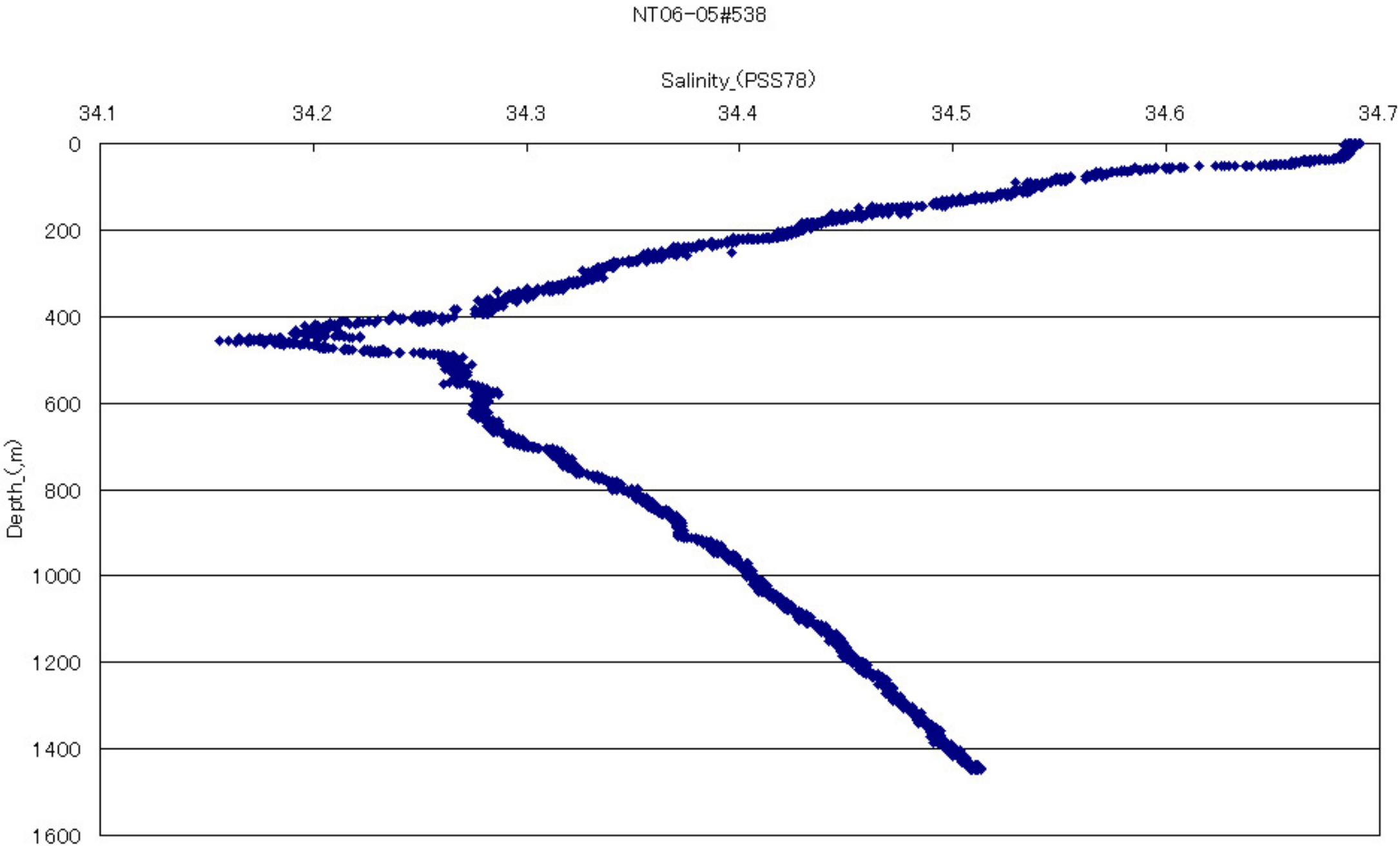
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34.6
34.7
0
200
400
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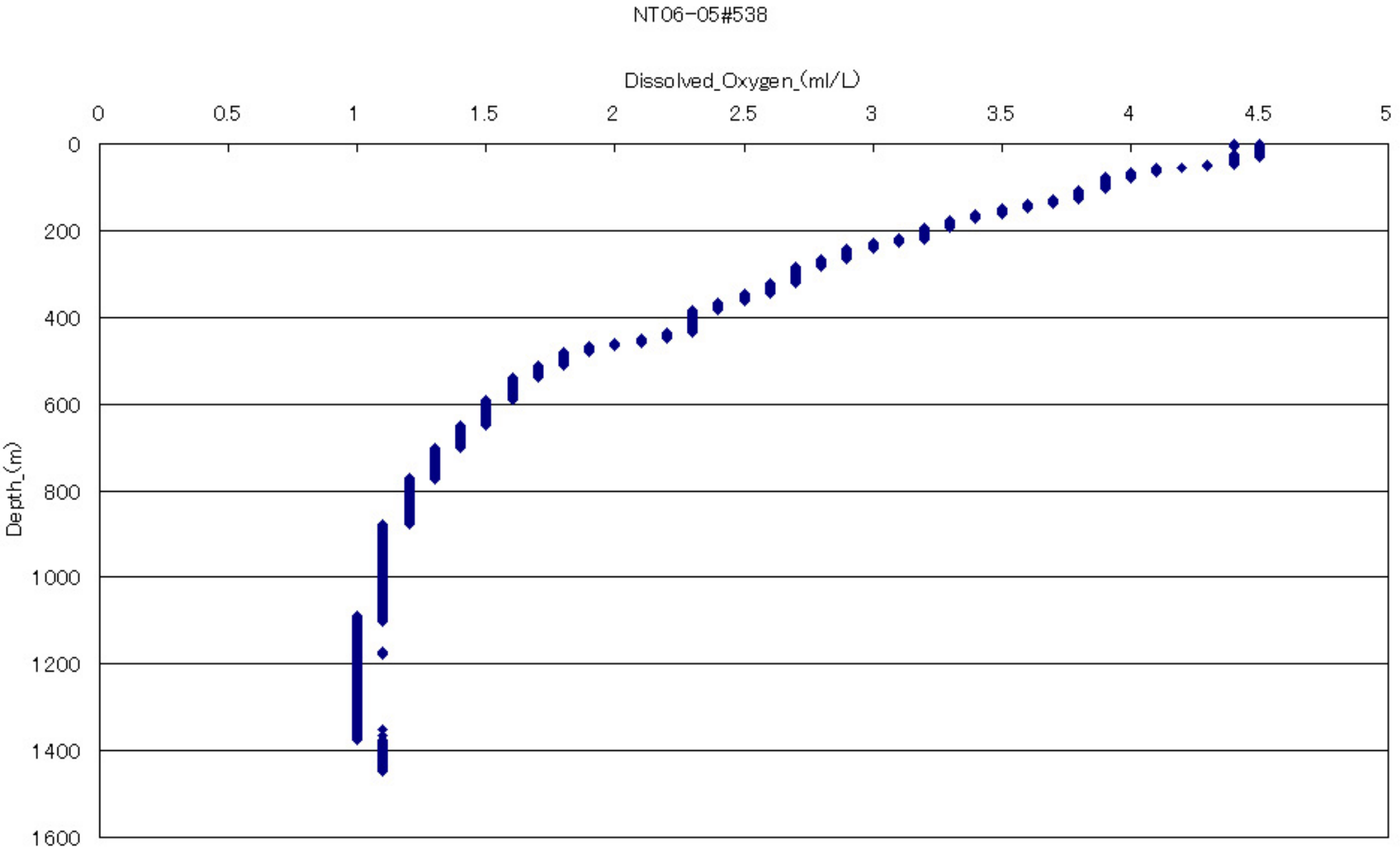
Depth_(,m)


NT06-05#538
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0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Depth_(m)
0
200
400
600
800
1000
1200
1400
1600

4. Individual Scientific Report

(Introduction, Method, Results and future studies)

4-1. Bacterial endosymbiosis in foraminifera

Hiroshi Kitazato, Aiko Iwasaki, Takashi Toyofuku, Masashi Tsuchiya, Hiroyuki Yamamoto and Katsuyuki Uematsu
(JAMSTEC)

Introduction

Recently, bacterial symbiosis has reported for foraminifers that are dwelling in extreme environments such as oxygen depleted environment with existence of hydrogen sulfide and oligotrophic abyssal plains (Bernhard *et al*., 2002; Gooday *et al*., accepted). Bacterial endosymbiosis should be a key phenomenon for foraminifera that are dwelling at extreme environments. What kinds of bacterial groups do exist in foraminiferal cells? What kind of function do they have among food webs or biogeochemical cycles? How do foraminifers catch bacteria in their cells? What is a meaning of bacterial symbiosis in evolution of foraminifera? For answering these series of questions, we are investigating foraminifera that are dwelling in extreme environments. Bacterial cells are commonly occurred in foraminiferal cells that live in extreme environments. We focus to collect living foraminifera from extreme environments, such as cold seepage, hydrothermal vent, and also from normal sediments, for documenting variety of bacterial species in foraminiferal cells.

Method

Foraminiferal individuals are picked from samples immediately after sample collections are finished at extreme environments. Individuals are sorted at species level under stereo-microscope and are carried out pre-fixed procedure with glutaraldehyde solution. The specimens will be fixed again with osmic acid in laboratory, then observed with Transmission Electron Microscope of JAMSTEC. DNA will be extracted from living foraminifera and will be analyzed nucleotide

sequences of 16s SSU sites for identifying bacterial groups in foraminiferal cell.

Results on board

During the Dive #535 of NT06-05 cruise, we have collected MBARI core samples from south colony at Hatsushima cold seepage site. We picked four species, *Bulimina striata, Bulimina subornata, Rutherfordoides cornuta* and *Chilostomella oolina/ovoidea,* from Red coloured core. These species are commonly reported from oxygen minimum zone or cold seepage sites of the Pacific Ocean (Akimoto *et al*., 2003; Rathburn *et al.,* 2005). All the specimens belonging to four species were fixed with glutaraldehyde solution, were linsed three times with bottom waters and were stored in a refrigerator until after-fix procedure will be made.

Future study

We systematically plan to collect benthic foraminifera from different extreme environments, such as salt brines, anoxic basins, oxygen minimum zones, deep trenches, salty aquifers and others. We shall analyze these foraminifera with both DNA and TEM. Then, we try to categorize endosymbiosis of foraminifera in relation to environmental characters with data sets and to discuss adaptive strategy of foraminifera against extreme environments. Relationship of bacterial symbiosis with biogeochemical cycle is another topic for understanding ecology of foraminifera. Through these approaches, we can understand role of foraminifera in benthic food web. Finally, we are dreaming to explain evolution of foraminifera through the Earth History in relation to bacterial symbiosis.

4-2. Cruise report - ”Denmark team”

RN Glud, M Middelboe, H Staahl, B Thamdrup, F Wenzhöfer (alphabetically)

Introduction

The efficiency of the benthic mineralization processes, primarily driven by microbes, determines the fractions of C and N that are remobilized or retained in the sediment record. The sediment on one hand acts as a source of nutrients and dissolved inorganic carbon and thereby sustain the continued organic carbon production in the overlying water, however, on the other hand the sediment also acts as a sink in the C and N cycle by removing organic material via burial and transforming fixed N to N_2 by denitrification and anammox. The microbial activity of marine sediments thus plays a central role for the local as well as global C and N cycle. Most studies on benthic degradation processes have been confined to coastal settings and to a lesser extent the abyssal plains, but very little focus has been given to the continental slopes. These areas - especially to the extent they are situated close to land - could play a key role by receiving large input of down-slope transported organic material and from the intensified water column production following upwelling. The central Sagami Bay represents such a location and the established database and logistic for the area (Kitazato et al. 2003) offers a unique opportunity to evaluate the importance of deep slope sediments for regional (and global) element cycling.

During autumn 2003 detailed studies of the spatial variation in benthic O_2 dynamics and virus activity were performed in central Sagami Bay (Glud et al. 2005, Middelboe et al. 2006). The very large database on oxygen distribution documented an extensive small-scale variability (mainly expressed at spatial scales below 2 cm) in the O_2 penetration depth (a proxy for the benthic diagenetic activity) and a surprisingly high benthic activity with an average O_2 uptake of 2.6 ± 1.6 mmol m^{-2} d^{-1} (n=45) which is equivalent to 8% of the estimated average primary production for the area (Nakatsuka et al. 2003). The average O_2 penetration depth amounted to 3.9 ± 1.5 mm (n=347). The small scale variability was also expressed in the horizontal variability in virus and bacterial abundances. Anoxic incubations documented that virus production was positively correlated to the metabolic activity of the bacteria and that virus infections were responsible for a prokaryotic mortality rate equivalent to 7-48% of the bacterial

production.

Together with the suspected importance of the deeper slope sediments these findings called for a more thorough investigation of the biogeochemistry and the microbial ecology of the sediments in central Sagami Bay.

The aims of the present study in the sediments of central Sagami Bay were to quantify:

- The in situ O_2 dynamics,
- The total degradation of organic material,
- The relative importance of the different heterotrophic degradation pathways,
- The relative importance of denitrification and anammox for the N_2 production,
- The virus and bacterial abundance and production,
- The importance of the viral loop,
- and the sedimentation rates of organic material, living bacteria and virus

Materials & Methods

Lander system

To follow the in situ O_2 dynamics we applied a benthic lander system hosting two modules for measuring microprofiles (O_2, pH, H_2S) and O_2-images, respectively. The lander was deployed at an approximate sinking speed of 40 m min^{-1}. Once standing on the seafloor, the measuring cycles were initiated by the ROV pressing two magnetic switches. The instrument was repeatedly repositioned by the ROV to obtain as many measuring cycles as the diving schedule allowed. Subsequently the lander was hooked up to the ROV and brought back to the sea surface where it was taken onboard the ship.

The profiling module is a slightly modified version of the original module (Gundersen and Jørgensen 1990) carrying four O_2-, two pH-, two H_2S-microelectrodes, and one resisitivity sensor, the latter was used for an independent determination of the position of the sediment surface relative to the microsensors. Positioned at the sediment surface the central cylinder gradually moved the sensors downwards in increments of 100 μm for a total distance of 15 cm and the sensor recordings were

stored internally. Afterwards the sensors were moved back to the starting position where they waited until a new measuring cycle was initiated by the ROV. Sensors were calibrated prior to deployment and for the O_2 sensors the readings in the bottom water of know O_2 concentration and in the anoxic sediment was used to cross-check the calibration curves.

The planar optode module was a slightly upgraded version of the module described in (Glud et al. 2001, Glud et al. 2005). The periscope was equipped by a transparent porphyrin-based sensor foil (Oguri et al. 2006) and green LED's were used as excitation light. The O_2 distribution in front of the sensor foil was quantified by two-windows lifetime-based fluorescent sensing. Once settled at the seafloor the periscope was moved down in steps of various lengths (7.5 – 2.0 cm) and a series of images were recorded at a frequency of 30 sec after an equilibration time of 22 min. In most instances images were obtained both in the bottom water and in the fully anoxic sediment allowing for a subsequent pixel-to-pixel calibration. After the measuring session had ended, the periscope moved back to the original position awaiting the initiation of a new measuring cycle.

Benthic Chamber

A small frame equipped with a central, stirred cylindrical chamber (i.d. 19 cm) was used to measure the total benthic exchange of O_2, NO_3^-, NH_4^+, and Dissolved Inorganic Carbon (DIC). Oxygen was measured continuously by two Elinor-microelectrodes, while five spring-loaded syringes were used to collect water from the chamber for later quantification of concentration changes in NO_3^-, NH_4^+ and DIC. The chamber was placed by the ROV and the water height inside the chamber was determined by the ROV-cameras. After the incubation the chamber was recovered by the ROV and brought back to the ship.

The total core incubation

The total exchange rates of O_2, NO_3^-, NH_4^+ and DIC were also measured in five recovered Push-cores (i.d. 7.4 cm) placed at in situ temperature and O_2 concentration. After 12 h pre-incubation the cores were capped and water samples were recovered to monitor the concentration changes of the respective solutes. Another five push-cores were used to determine the denitrification rate by the Isotope Pairing technique (IPT)

(Nielsen 1992). Combined with a "bag-incubation-approach" (see below) these data can also used to access the relative importance of anammox for the benthic N_2 production (Dalsgaard and Thamdrup 2002, Risgaard-Petersen et al. 2005).

Bag incubations for biogeochemistry and virus/bacteria production

A set of five push cores were cut into 6 slices at a depth resolution of 1 to 4 cm. The slices from the different cores were pooled and homogenized in gastight Würgler bags (Hansen et al. 2000). During the anoxic incubations, samples were extracted to follow the production of DIC, NH_4^+, Fe^{2+}, Mn^{2+}, (H_2S), and consumption of NO_3^- and SO_4^{2-} in the respective bags. The data will be used to quantify the total degradation of organic material and together with denitrification and sulphate reduction measurements the data will be used to evaluate the relative importance of the respective heterotrophic pathways in the respective sediment horizon (Canfield et al. 1993, Thamdrup & Canfield 1996).

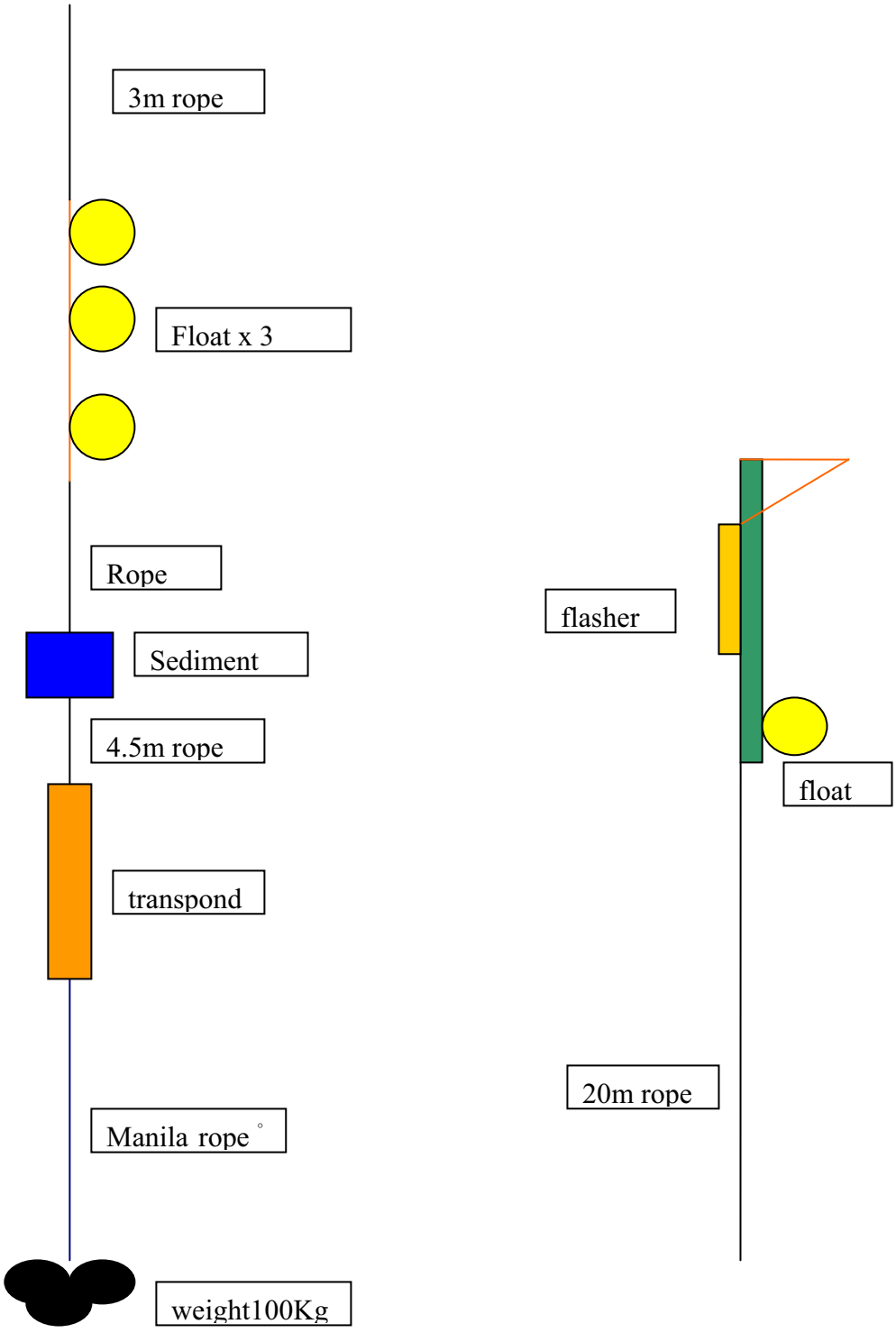
A similar set of bags was established from five other cores for the 0-2, 2-4, and 4-6 cm depth horizons, but here the sediment was exposed to three different treatment - addition of; i)$^{15}NO_3^-$, ii) $^{15}NH_4$ and iii) $^{15}NH_4$ + $^{14}NO_3$. Samples were extracted to follow the accumulation rates of $^{28}N_2$, $^{29}N_2$ and $^{30}N_2$ in each bag. The data will allow us to quantify the rates and relative importance of the anammox process for the total N_2 production in these sediments (Dalsgaard & Thamdrup 2002) findings that will be complemented by and compared to values extracted from the IPT procedure (Risgaard-Petersen et al. 2005).

Four sediment cores were sliced at a depth resolution of 0.5-4.0 cm down to a sediment depth of 18 cm. The porewater was extracted for measuring concentration profiles of: DIC, NO_3^-, NO_2^-, NH_4^+, Fe^{2+}, Mn^{2+}, H_2S, and SO_4^{2-}, while the solid phase will be used to quantify the distribution of iron oxides, manganese oxides and iron sulfides. Three cores were recovered and will be brought back to Denmark for determination of sulphate reduction rate profiles (Fossing & Jørgensen 1989), porosity, Corg and C/N ratios.

Sediment trap

A sediment trap array with four traps was deployed 25 m above the sediment surface and it collected sediment for 3 days. After recovery the collected material was

filtered and the sedimentation rate of organic carbon (POC), bacteria and virus will be determined after analysis in Denmark.



Virus/bacteria analysis

Samples for quantifying the bacteria and virus abundance in bottom and surface water, sediment trap material and at various sediment depth were obtained. Further, samples for following changes in abundance during water and sediment incubations were taken. The bacteria and virus were extracted from sediments and particles by sonication and previously described washing procedures (Danovaro et al. 2001, Middelboe et al. 2003, Glud & Middelboe 2004). Additionally, alternative washing procedures were tested to evaluate the optimal approach providing the most efficient extraction. After extraction bacteria and virus were stained with SYBR gold, mounted on glass slides and stored in the freezer for later enumeration.

Preliminary Scientific results

Lander system:

The in situ equipment worked perfectly and a total of 12 O_2 microprofiles were obtained. The data confirmed the high spatial variability of the Sagami Bay sediments resolved in 2003 with an O_2 penetration depth ranging from 4.5 to 11.1 mm with an average of 6.3 ± 2.1 mm (Fig 1).

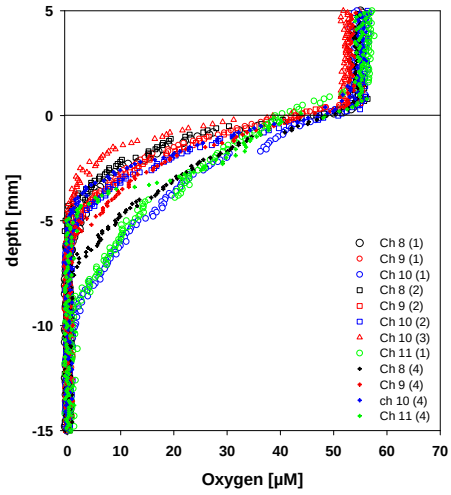


Fig 1. The resolved in situ profiles during NT06-05, Y=0 indicates the position of the sediment surface

As expected this is somewhat deeper than the values measured during autumn 2003 (3.9 ± 1.5 mm) probably reflecting the lower input of labile organic matter during winter and early spring. We have not yet calculated the diffusive exchange from the

profiles this will be done upon our return to Denmark. The H_2S profiles documented that there was no free H_2S down to a sediment depth of 10 cm. The pH profiles remain to be analysed.

A total of 500 O_2 images were obtained at four sites. The data were obtained with variable frequency and we have thus resolved any O_2 dynamics with frequencies of 30 sec and 20-30 min. These data also confirmed a high degree of small scale spatial variability but generally the images resolved the same O_2 penetration depths as measured by the O_2 microelectrodes (Fig 2). On several occasions activity of meio- and macrofauna was observed along with the effect on the O_2 distribution.

In many instances a flocculent layer of detritus covered the sediment surface. This layer was often vibrated/undulated by the water movements and presumably convection added to the solute transport within this zone. Consequently the O_2 distribution at the very surface was very dynamic and the vertical profiles in such areas were irregular. Obviously the many images await a full analysis that will be performed back in Denmark.

Benthic chamber

Two deployments were performed - but only one has been analyzed - this resolved a total O_2 uptake of 0.7 mmol m^{-2} d^{-1}. This is lower than expected and indicate that the settling material has a low "feeding quality". The in situ measurements were complemented by total exchange determinations in recovered sediment cores (n=5). The total O_2 uptake measured in the laboratory amounted to 2.8 ± 1.3 mmol m^{-2} d^{-1} this is higher than the in situ data which probably reflect the extreme spatial variability of the Sagami Bay sediments (Potential effects of recovery artefacts – will be evaluated later (Glud et al. 1994)). But again it was confirmed that the activity in sediments during winter/early spring is lower than during the autumn.

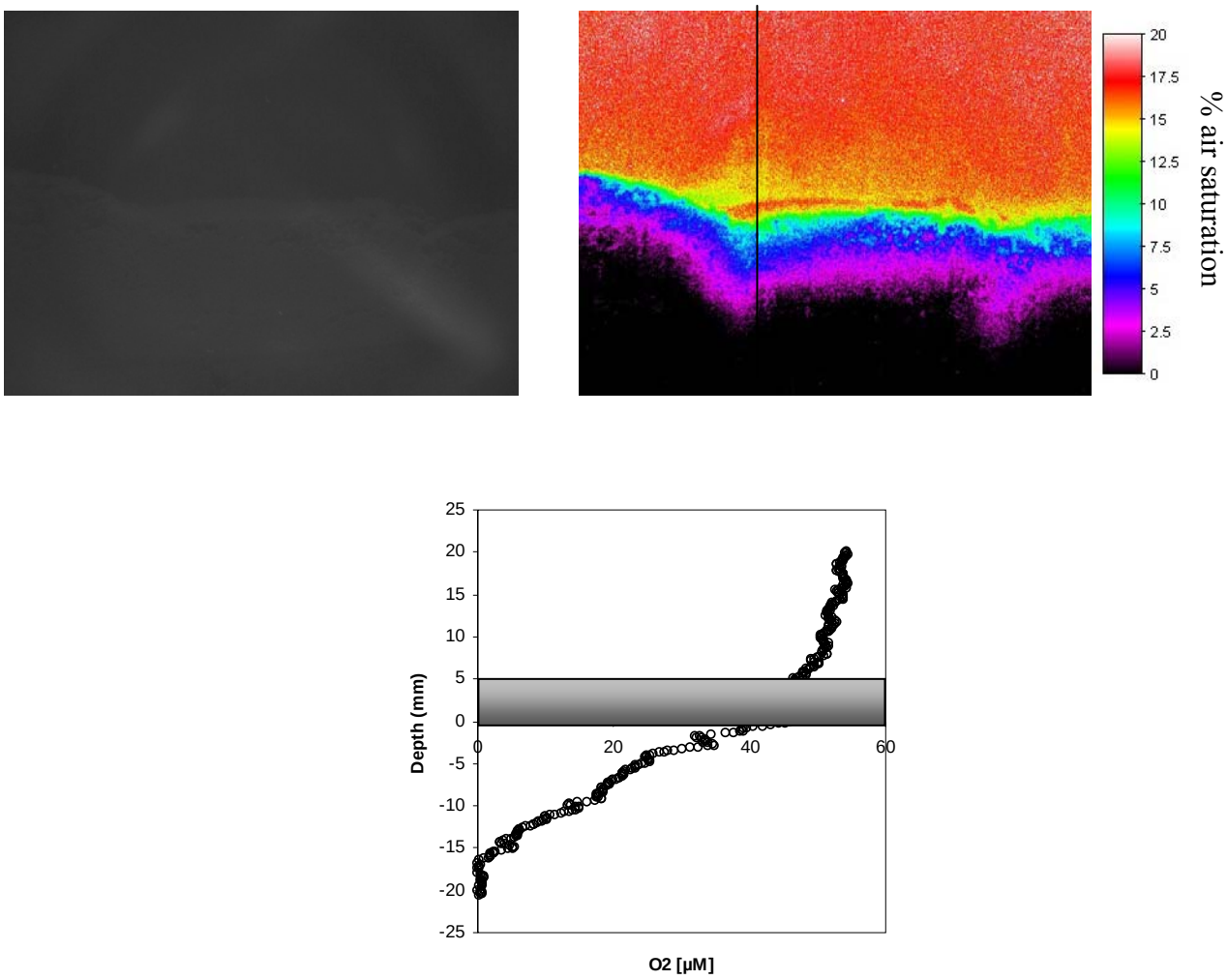


Fig 2 An example of a black-white image and the corresponding O_2 image. An example of an O_2 profiles extracted along the black line in panel 2 is included. The grey zone indicate the position of a fluff layer.

Degradation processes and N cycling

Whereas O_2 only offers a proxy for total organic carbon degradation it provides no insight in the importance of the respective partway by which the material is oxidized. This can be evaluated from our bag incubations. However, any conclusion must await chemical analysis of the samples and the sulphate reduction measurements that will be performed back home. At present we can not provide any results from these efforts.

The same goes for our measurements of denitrification and anammox that will be analysed later. However, this is the first time that anammox is measured at depth below

700m and it will be exciting to see the importance of this process in deeper slope sediments. In order to evaluate the potential importance of nitrate-accumulating foraminifera for the benthic N cycling, eight species (and approximately 280 individuals) from different sediment depth horizons were collected by H Kitazato, the intracellular concentration of nitrate as a function of species and sediment depth will be evaluated later.

Benthic ecology (bacteria, virus)

The sediment trap samples still await analysis but preliminary microscopic investigations indicate that the marine snow particles were enriched with virus and bacteria as compared to the free water masses. The vertical transport of bacteria and virus is, however, probably of minor importance when compared the inherent benthic production. The production rates of virus in the benthic water masses were very low and lower than the corresponding rates for the sediment. These, however, appeared to be lower than the measurements performed during autumn – again confirming a seasonality in the benthic activity. Overall the virus (and bacteria) abundance was related to the metabolic activity of the communities as also encountered in other environments. Final quantitative conclusions await a large enumeration task.

Future studies

Obviously the analysis and the full evaluations of the current efforts will inspire to future studies in Sagami Bay – especially in relation to benthic N-cycling (e.g. anammox, denitrification coupling, between N and metal cycles, importance of nitrate accumulating meiofauna).

However, from the work in 2003 and the present study it is obvious that the Sagami Bay sediment express high spatial and temporal dynamics. The existing possibility to connect our measuring modules (microprofiler, planar optode, “intelligent” chamber) to the Hatsushima sea-floor observatory for power supply and data transfer offers a unique opportunity to study the temporal and spatial variability in benthic solute distribution (O_2, H_2S, pH). This potential ought to be explored. Such an effort would, however, at present be constrained to work at the seep sites – to establish a similar possibility in central Sagami Bay would been extremely interesting for studying more representative deep slope sediments. Small scale benthic variability could be

investigated by transecting vehicles and temporal dynamics in solute distribution of important biogeochemical constituents could be studied on scales from seconds to seasonal changes. We would be very interested in a collaboration adapting our instrumentations to such platforms and to explore the potential for transecting instrumentation.

Despite a prime interest in the more "normal" sediments of Sagami Bay the diversity in biogeochemical processes around the seeps sites as evident from the different microbial mats and sediment coloration (and fauna occurrence), also has our interest. The microprofiling and planar optode facilities could easily be deployed at such sites and would provide detailed information on the chemical conditions at these locations, the functioning of the different microbial communities and the seeps themselves. This includes virus-bacterial interactions in microbial communities with a relatively low diversity.

It appears that the benthic macrofauna play a key role in the function of the sediment. The sediment is densely populated by a diverse fauna dominated by polychaets. They must be important for the bioturbation (maintaining a high microbial metal respiration?), for structuring the patchiness in microbial activity, and for the initial phases in the degradation cascade. Detailed laboratory based investigations with "state of the art" O_2 microsensing equipment around recovered specimens of infauna would complement the in situ work extremely well. This would allow making a coupling between benthic O_2 dynamics and fauna behaviour (bioirrigation and bioturbation) and would provide important background information for detailed biogeochemical studies of the sediments. We propose to undertake such efforts.

Financial support

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4-3. *In situ* durability experiment of an O_2-pH combined planar optode sensor foil

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Introduction

O_2 is a key element for understanding biological respiration and organic carbon degradation at sediment water interface (SWI). Because macro-meio benthic activities at SWIs make heterogeneous O_2 distributions and causes time-series changes, bio-geochemical processes at sea bottom are not simple. To understand such processes, planar optode technique measuring two-dimensional and time-series O_2 profiles was developed (e.g., Glud et al., 1996; Wenzhöfer and Glud, 2004; Precht et al., 2004; Oguri et al., in press). Recently, pH planar optodes have also introduced (Hulth et al., 2002; Zhu et al., 2005; Staahl et al, in press), and a combination of two-dimensional O_2 and pH profiles are expected to extend knowledge on bio-geochemical cycles at sea floor (Arvidsson, 2000). Such sensor foils, however, degradation effect during long time measurement at sea bottom has not yet explored at all. In this cruise, we perform an *in situ* light excitation test for newly developed combined sensor foil and examine how optical characteristics change after the excitation. The result from this experiment must provide basic and significant information for long-term O_2-pH monitoring at SWI, which will be deployed in near future.

Material and method

Planar optode sensor foil

In this experiment, two O_2-pH combined planar optode sensor foils (prototype) were prepared on the slide glass (50x50x2 mm). In the sensor foils, two luminophores were contained in the ethylcellulose membrane: Platinum (II) meso-Tetrapentafluorophenylporphyrin (PtTFPP) for O_2 and 8 Hydroxypyrene 1,3,6, trisulphonic acid salt (HPTS) for pH measurements, respectively. Sensing schemes for O_2 was based on measuring phosphorescence lifetime (Holst et al., 1998), and for pH

was luminescence intensity ratio obtained by exciting two different wavelengths (Wolfbeis ed., 1992), respectively. Before experiment, quenching of red phosphorescence from PtTFPP and green luminescence from HPTS were confirmed by a multigateable CCD camera (Hamamatsu Photonics K.K.) to excite the sensor foil with respective light sources. However, luminescence from HPTS was weak. To solve the problem is in progress.

Light source and the electronics

The sensor foil was attached on a window of a pressure cylinder modified from video camera system (Figure 1). In the cylinder, excitation light source, timer circuit and batteries were installed. The light source was made from 10 pieces of high-power three-color LEDs (PARA light). Since PtTFPP and HPTS were excited by 535 nm, 405 nm and 450 nm, respectively (Amao et al., 2000; Wolfbeis ed., 1991), both green and blue LEDs were used. Red LEDs were not used for this experiment. For LEDs, DC 20 mA per single LED (i.e., 400mA total) was supplied through a constant current regulator circuit.

Timer circuit consisted of a peripheral interface controller chip, and the timings for LED switching were programmed using a serial port with dedicated software runs on MS Windows (TriState Technology). The timer configurations for the experiment were as follows: LEDs were switched on after 2 hours when the timer was started, and the excitation was continued for 24 hours.

For batteries, rechargeable Ni-MHs were used. Total battery capacity was 10.8 A/hour. Therefore, the LEDs are capable of more than 24 hours illumination.

Experimental procedure

One sensor foil was attached on a plexyglass window of the light source cylinder. The window part was put into the sediment with a ROV operation. Lighting of the sensor foil was started before the deployment. Excitation light from LEDs were confirmed when light source was put on sediment (Figure 2). The window part of the cylinder was put in the sediment. Deployed site was a side of station OBB II (35°00’827” N 139°21’639” E water depth 1457 m). Dive number and the time for a series of the experiment are shown in table, respectively. Total deployment time was 73 hours and 7 minutes. Photographs taken at the deployment are shown in figures 1 and 2.

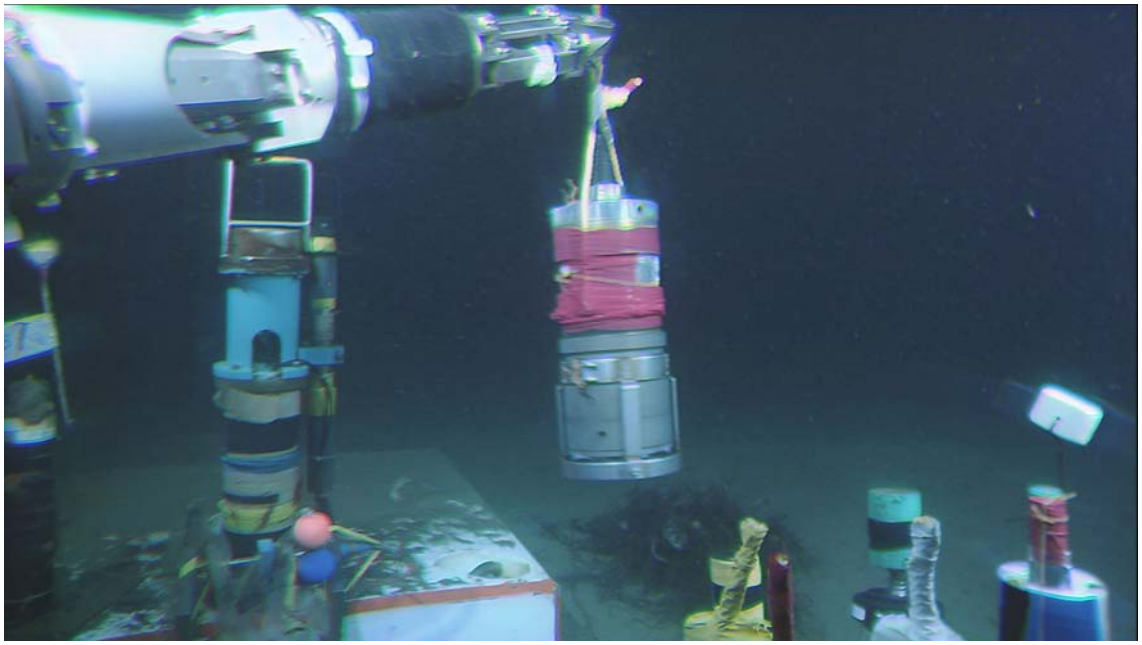

Figure 1. Pressure cylinder of the light source. Left square box is a basement of station OBB II.

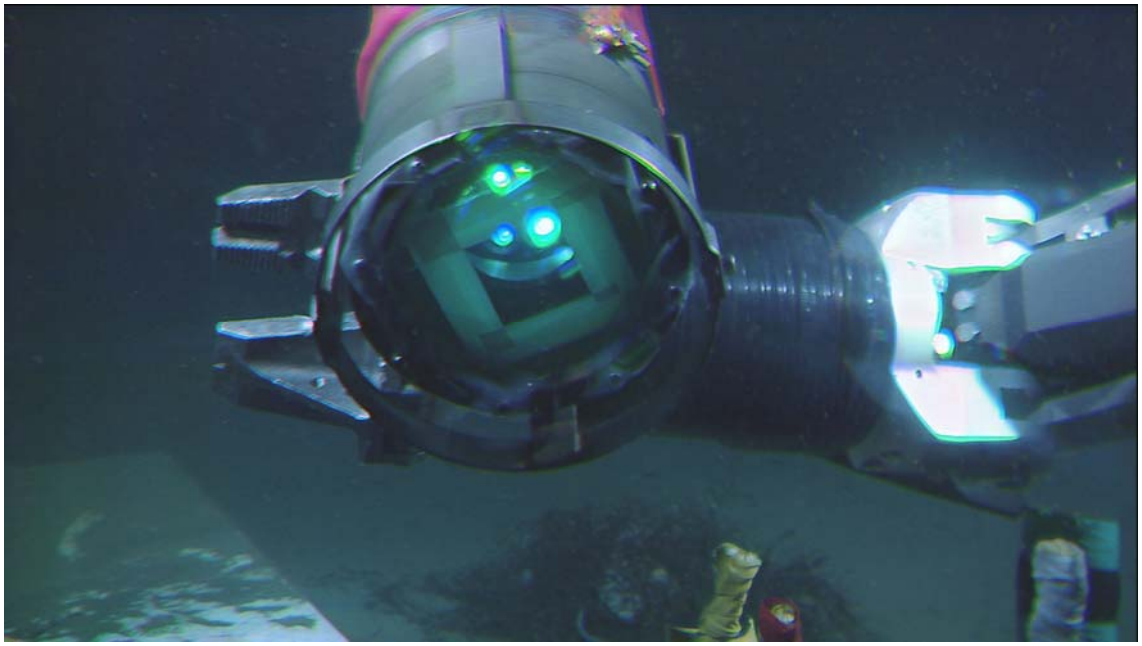

Figure 2. Sensing foil attached on the window (fixed by white tapes). Illumination of blue-green LEDs were confirmed before the deployment.

Table. Dive number, date, switching times of the LEDs and the deployment time.

Dive	Date	LED		Deployment	
No.		On	Off	Start	End
531	24.Mar.2006	12:05	-	13:24	-
-	25.Mar.2006	-	12.05	-	-
537	27.Mar.2006	-	-	-	14:31

3. Future works

After recovery of the sensor foil, both phosphorescence lifetime from PtTFPP and intensity ratio of the luminescence from HPTS will be measured in laboratory, respectively. Durability of the sensor foil is examined to compare these results with the same sensor foil which is stored in the laboratory. These data provides significant information to determine the lifetime of the sensor foil itself, or hint for the findings of another useful luminophore or gas permeable membrane for long-term *in situ* O_2 and pH monitoring.

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4-4. Chemosynthetic community in deep-sea ecosystem of the Sagami Bay

Hiroyuki Yamamoto
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Introduction

The Sagami Bay is recognized as the very productive area with deep sea (max 1500 m depth). The sedimentation, followed with abundant photosynthetic production in surface layer, could suspend the activity of benthopelagic organisms. The chemical resources from the seafloor such as cold seepages maintain the chemosynthetic community, which is another primary productive part of deep-sea ecosystem. The contiguous existence of two-type energy supplying is a remarkable feature of Sagami Bay deep-sea. These productions transfer to predators and deliver to other organisms through the microbial loop and food chain system. The data of population size and growth activities may be a reliable index to estimate the production of the deep-sea ecosystem. The physicochemical conditions of benthopelagic water column and sediment are not only regulates their growth activities but also extents of habitats and size of community. Therefore, the long-term observation of deep-sea environment could provide a valuable data to understand the mechanism of ecosystem. The main purpose of this cruise is to collect the samples, primary data of environment and to examine several technical issues on determination of bio-production in chemosynthetic community.

Preliminary Scientific Results

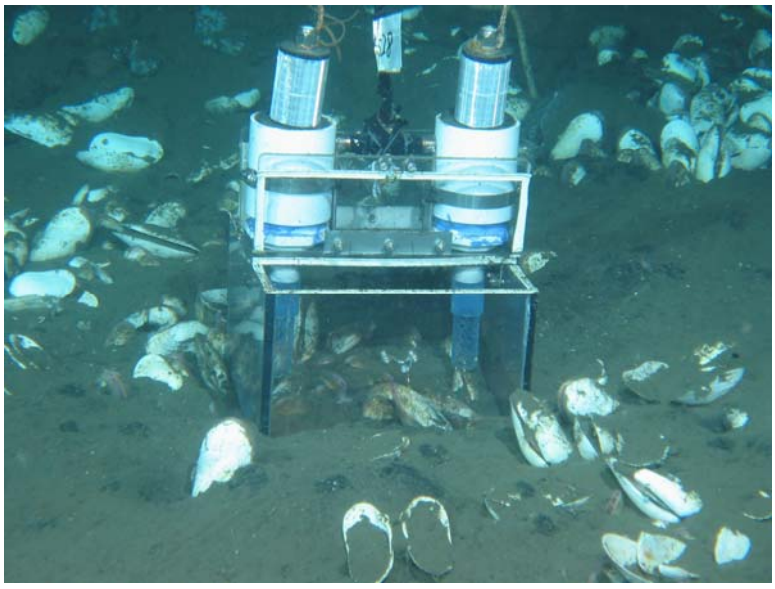
Sample collection

The following samples will be used for preliminary examination to determine the microbial population size and structure, and to detect lactobacilli harboring in marine sediments. Those subjects will be performed with several collaborators; Hideto Takami (XBR/JAMSTEC), and Hidtoshi Morita (Azabu Universtiy).

#530 sediment sample of MBARI core, 10ml, microbiological study
#533 head space water of in situ feeding device, 100ml, microbiological study
#533 head space water of MBARI core, 100ml, microbiological study
#535 head space water of MBARI core, 100ml, microbiological study
#535 sediment sample of MBARI core, 10ml, microbiological study

Observation of *in situ* incubator in the clam colony of off Hatushima

The *in situ* incubator in the colony of deep-sea clam *Calyptogena*, which deployed by chief researcher Katunori Fujikura in NT06-04, completed the operation to open the vent flaps by electrolysis trigger. The fluorescent regents within the incubator, which were released into as the first operation in NT05-04, has flowed out through the vents. All of the clams appear to held normal condition in the incubator. This incubator and clams will be collected in the cruise of December 2006.



The *in situ* incubator in the colony of deep-sea clam *Calyptogena*

4-5. Benthic carbon flow at the deep-sea
-*In situ* tracer experimental study-

Hidetaka Nomaki, Hiroshi Kitazato
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Introduction

Phytodetritus, originated from primary production, transports substantial amount of carbon from ocean surface to the seafloor. The phytodetritus and its degraded components are thought to be major food sources for deep-sea benthic ecosystems. At the same time, organic carbon produced at the seafloor by microbial activity from dissolved organic carbon (DOC) is also an important food source for the deep-sea benthic ecosystems. Thus the fate of phytodetritus and bacterial carbon at the deep-sea floor is important information to understand carbon cycle in the ocean. To know the carbon pathways originated from phytodetritus and bacteria on the seafloor, we operated a stable carbon isotope labeled experiment *in situ*. Incorporation of labeled algal carbon and glucose into benthic organisms will be analyzed each organic compound level.

Materials and Methods

Total 6 culture cores were prepared for the experiment (Figure 1, Table 1). The surface sediment area of the core is 52.8 cm^2 (ϕ=8.2cm). Every core has couple of 5ml syringes that can contain ^{13}C-labeled algae, *Chlorella sp.*, and uniformly ^{13}C-labeled glucose (Cambridge Isotope Co. ltd). Hereafter, the culture cores are named C-*n* and G-*n*, where C and G indicate ^{13}C-labeled food materials (Chlorella and Glucose, respectively), and *n* indicates incubation time (d).

Two culture cores (C-9 and G-9) were settled on the seafloor (water depth 1453 m) by the ROV Hyperdolphin at dive #526 (14th March, NT06-04). Culture cores were placed 46m away from the OBB2 station and kept some tens cm away from each other (Figure 1, 2). After positioning the culture cores, ^{13}C-labeled food materials were introduced onto the surface sediments. On the dive # 530 (23rd March, NT06-05), C-9 and G-9 cores were recovered, and another culture device (G-2) was placed some tens

cm away from the previous cores. On the dive #531 (24th March, NT06-05), C-2 core was placed on the seafloor one meter away from G-2. G-2 and C-2 cores were recovered on board on the dive #533 (25th March) and dive #534 (26th March), respectively. G-1 core was placed on the dive #534 (26th March) and recovered on the dive #537 (27th March). G-0 core was recovered as "time-zero" control on the dive #533, immediately after the injection of the ^{13}C-labeled glucose onto seafloor.

Preliminary results: On board processing

On board, recovered culture cores were kept at 4°C prior to core processing (within one hour). Overlying water was collected for the determination of ^{13}C concentration in dissolved inorganic carbon (DIC). They were fixed by adding a drop of $AgCl_2$ solution and preserved at 4°C. Sediments were sliced at 1-cm intervals from 0 to 5 cm in depth followed by 5-7, 7-10, 10-15cm sediment depth samples (Table 1). Subsamples (15 cm^3) of the sediments were used for an analysis of bulk organic matter. These samples were kept frozen at –80°C until the analysis. The remaining sediments of 0 to 5cm in depth were used for the determination of carbon isotopic compositions of lipid compounds in benthic organisms. They were sieved on a 125-μm mesh with seawater and then stored at –80°C prior to the isolation of benthic organisms from the sediments.

Future works

Mineralization rate of organic carbon by total benthic community will be evaluated from ^{13}C concentrations in DIC of the overlying water. Benthic foraminifera and metazoans will be picked out from the sieved sediments. Lipids will be extracted from both bulk sediment and organism samples. Identification and quantification of separated lipids will be performed by GC/MS. Compounds specific carbon isotopic compositions will be determined by using GC/C/MS. Using these data, incorporation and alteration of algae (phytodetritus) and glucose (DOC) by organisms will be examined.

Table 1. Sample list of *in situ* experimental sediment cores.

Core name	C-9	G-9	C-2	G-2	G-1	G-0
Recovered Dive #	530	530	534	533	537	533
Set Dive #	526	526	531	530	534	533
Overlying water	3 samples	3 samples	3 samples	(3 samples)	3 samples	3 samples
0-1cm	BS+Foram	BS+Foram	BS+Foram	(BS)	BS+Foram	BS+Foram
1-2cm	BS+Foram	BS+Foram	BS+Foram	—	BS+Foram	BS+Foram
2-3cm	BS+Foram	BS+Foram	BS+Foram	—	BS+Foram	BS+Foram
3-4cm	BS+Foram	BS+Foram	BS+Foram	—	BS+Foram	BS+Foram
4-5cm	BS+Foram	BS+Foram	BS+Foram	—	BS+Foram	BS+Foram
5-7cm	BS	BS	BS	—	BS	BS
7-10cm	BS	BS	BS	—	BS	BS
10-15cm	BS	BS	BS (10-13)	—	BS (10-14)	BS

BS = bulk sediment sample

Foram = foraminifera and metazoan meio-macrofauna samples

— = no sample

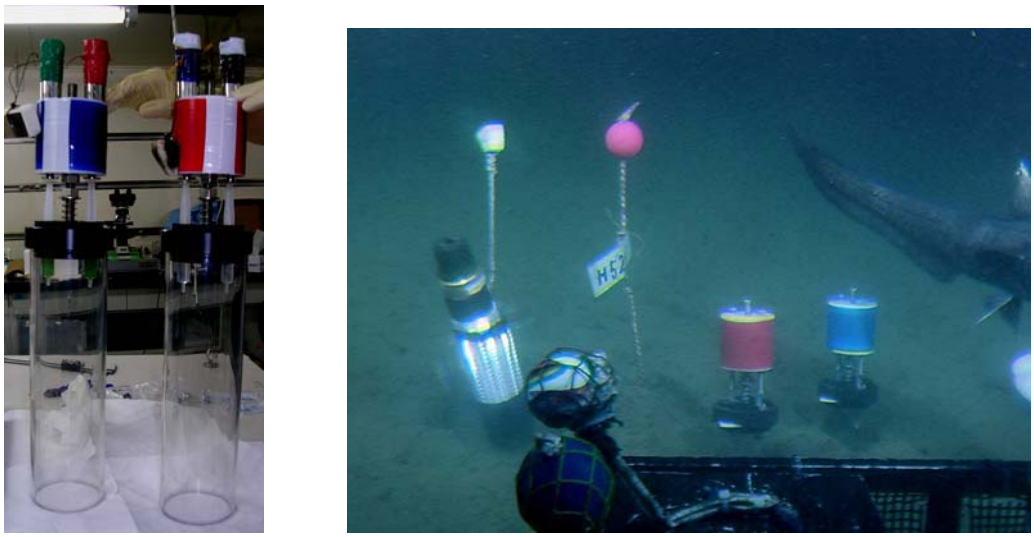

Figure 1. I-K type *in situ* feeding cores before setting (left) and after setting on the deep-sea floor (right).

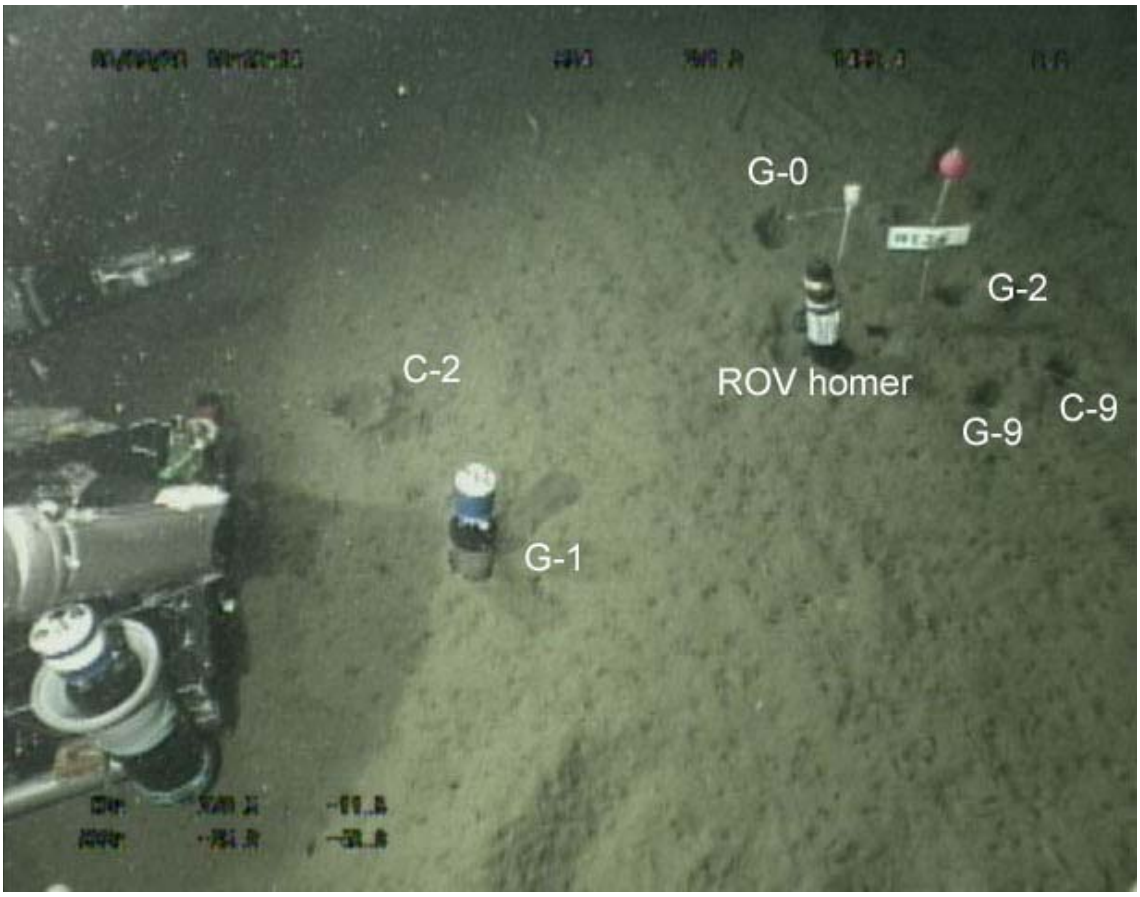

Figure 2. Positions of the feeding cores on the deep-sea floor.

4-6. In situ marking experiment for estimation of shell growth rate of *Calyptogena* clams

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Introduction

Several workers estimated the growth rates and ages of the cold seep giant clam *Calyptogena*. The growth rates, estimated from the shell dissolution experiment and the shell radio isotope analyses, included large error and disagreement. We observed micro growth rings from the polished shell sections of *Calyptogena soyoae* by SEM analysis. Similar growth rings of inner and lower tidal bivalves are formed with lunar day cycle, and the growth rate of these bivalves can be estimated to count those rings. In NT06-04 and NT06-05 cruise, we will perform in situ marking experiment during 2 weeks, and reveal the growth rate of *Calyptogena* clams by the counting of the micro growth rings formed during this experiment.

Proposals

In situ marking experiment to calculate the growth rate of the shells of *Calyptogena* was performed with new *in situ* culture chambers, “I-K type” and “In Situ Marking”. The shells were stained with calcein and SrCl2 solution at two points (#525 and #528) during the last cruise, NT06-04. In this cruise (NT06-05), we collected them, grew for 2 weeks after *in situ* marking experiment.

Methods

The details for in situ marking experiment are described in Cruise Report of NT06-04. In present cruise, we collected the marked clams by the Japanese submersible Hyper Dolphin. To obtain the environmental parameters, we collect the sea surface and bottom water (for $\delta^{18}O_{water}$, $\delta^{13}C_{DIC}$ and DO analyses) by Niskin type water sampler and

the pore water (for $\delta^{18}O_{water}$ and $\delta^{13}C_{DIC}$ analyses) by MBARI type core.

Preliminary Scientific Results

The stained clams were collected from sea floor on Off Hatsushima Island (35˚00'5"N, 139˚13'30"E) at 1,175 m depth on 26 March 2006, by a dive HPD 535 of the Hyper Dolphin. After removing the cages for *Calyptogena*, set during NT06-04 cruise to prevent from escape of clams, stained clams were got with sediments and un-marking clams. 16 and 15 living clams are collected from the point #525 and #528 (Fig. 1), respectively. The soft tissues of 8 specimens of them were dissected and frozen for stable carbon isotope analysis. Their shells were washed and air-dried. The shells of other specimens were frozen with soft tissues. Parts of each clam leg were separated and frozen for DNA analysis to classify *Calyptogena* species. The thermometers attached to cages were recorded bottom water temperatures at intervals of 10 minutes during *in situ* marking experiment.

To extract the pore water, three sediment samples were collected by MBARI type cores. One (HC-01, see Fig. 1) was collected from near by *Calyptogena* colony (35˚00'5"N, 139˚13'30"E) at 1,175 m depth on 26 March 2006 by a dive HPD535, and others (HC-02 and HC-03, see Fig. 2) were near by Hatsushima Deep Sea Station (35˚00'11"N, 139˚13'18"E) at 1,176 m depth on 27 March 2006 by a dive HPD 536. Both cores had H_2S smell. 4 pore water samples were extract from HC-01 and 2 samples were from HC-02 and HC-03, respectively. Each of these samples was divided to several 2 ml vials for $\delta^{18}O_{water}$ analysis. The surface waters of the cores were divided to several 2 ml and 20 ml vials for $\delta^{18}O_{water}$ and $\delta^{13}C_{DIC}$ analyses. For fixation, $HgCl_2$ solution was added to the samples for $\delta^{13}C_{DIC}$ analysis.

The water samples for analysis of DO concentrations were collected from sea surface (35˚00'8"N, 139˚13'37"E at 50 m depth) and bottom (35˚00'5"N, 139˚13'60"E at 1173 m depth and 35˚00'10"N, 139˚13'32"E at 1188 m depth) on Off Hatsushima Island. The DO concentrations of sea surface and bottom waters calculated by the Winkler titration with no corrections were from 4.89 to 4.52 ml/L and from 1.63 to 1.34 ml/L, respectively.

Proposal for Future Studies

Collected shells will be cut along the growth axis, and polished. From the fluorescence microscope, scanning electron microscope and stereoscopic microscope observations, we will detect the shell growth rate of *Calyptogena* clams during 2 weeks. To count the micro growth rings formed during 2 weeks, we can calculate the cycle of the growth ring formation of *Calyptogena* clams. The shell $\delta^{18}O$ values of bivalves are varied by the changes of ambient seawater temperatures and $\delta^{18}O_{water}$ values. Using the $\delta^{18}O_{water}$ values of bottom seawater and pore waters, we can estimate the records of ambient water temperatures of *Calyptogena* clams and compare to actual temperatures of bottom water.

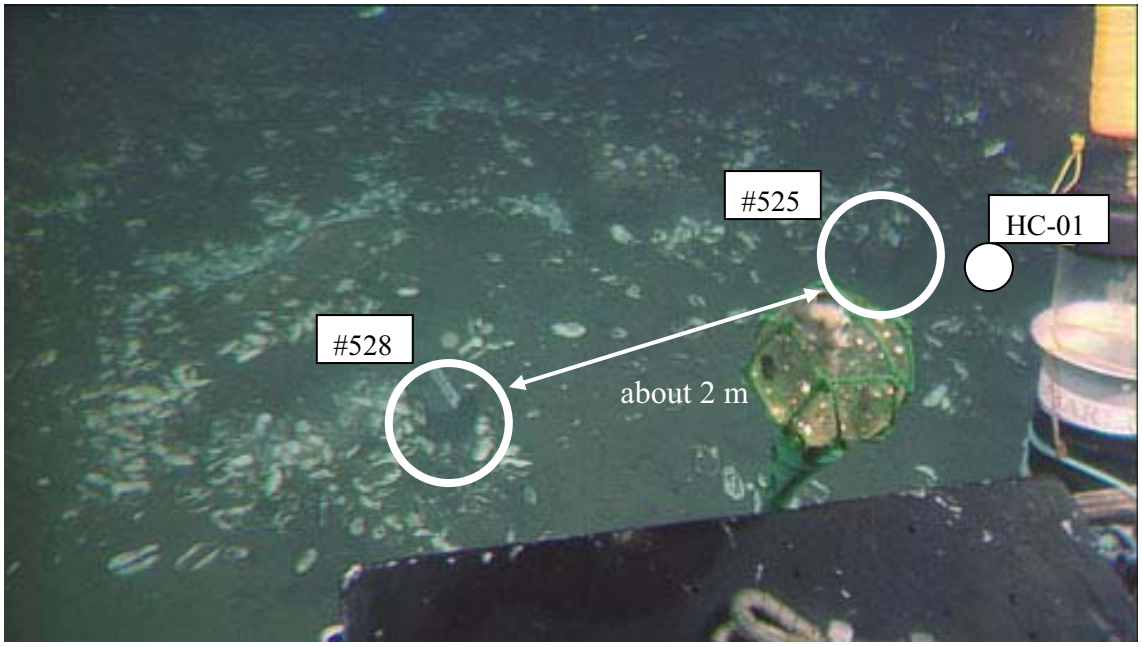

Figure 1. Two cage points are neighbored, and the core sample HC-01 is adjacent to point #525.

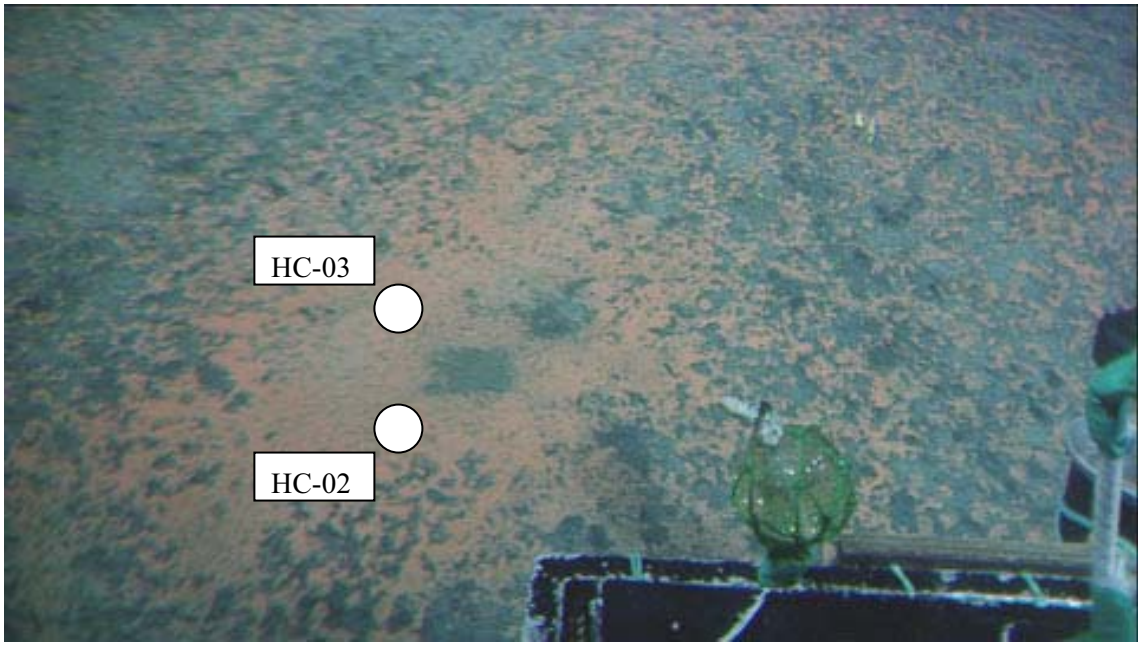

Figure 2. HC-02 and HC-03 cores were collected from reductive seafloor. The red color of the seafloor is presented by the mat of filamentous bacteria.

Appendix 1. Sample List

Appendix_1_Samplelist.xls exists in the folder.

３．採取サンプルのインベントリ情報　※船上分析で終了した（データが得られた）ものは対象外です。それ以外のサンプルについて記載して下さい。　　航海番号：NT06-05　　プロポーザル番号：S05-15　　課題提案者氏名：北里　洋

Sample name	Sampling instrument	Date (UTC)	Sampling point			Number of subsamples	Purpose	精度管理情報　※1	Person responsible	E-mail Adress	公開留保時期　※3	Picture	Note
Seawater	Niskin Bottle	2006/3/23 14:43	Latitude	緯度：35-00.854	N	2	Chemical analysis	陸上にて補正予定	Kazumasa Oguri		３年後	なし	Amount分取量は1本の採水器から採取したサンプルの
			Longitude	経度：139-21.743	E								
			Water depth:	深度：1449	m								
Seawater	Niskin Bottle	2006/3/23 14:43	Latitude	緯度：35-00.854	N	2	Chemical analysis	陸上にて補正予定	Kazumasa Oguri		３年後	なし	分取量は1本の採水器から採取したサンプルの数
			Longitude	経度：139-21.743	E								
			Water depth:	深度：1449	m								
Sediment	I-K type feeding core	2006/3/23 15:15	Latitude	緯度：35-00.837	N	8	Chemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1つの現場培養装置から採取したサンプルの
			Longitude	経度：139-21.651	E								
			Water depth:	深度：1453	m								
Sediment	I-K type feeding core	2006/3/23 15:15	Latitude	緯度：35-00.837	N	8	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1つの現場培養装置から採取したサンプルの
			Longitude	経度：139-21.651	E								
			Water depth:	深度：1453	m								
Sediment	MBARICore	2006/3/23 15:23	Latitude	緯度：35-00.845	N	18	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-21.676	E								
			Water depth:	深度：1452	m								
Sediment(1-530	push-core DK	2006/3/23 15:25	Latitude	緯度：35-00.845	N	core 7.4 id	combined biogeochem & virus incubati	陸上にて補正予定	Ronnie N Glud		３年後	あり	
			Longitude	経度：139-21.676	E								
			Water depth:	深度：1452	m								
Sediment(2-530	push-core DK	2006/3/23 15:29	Latitude	緯度：35-00.845	N	core 7.4 id	combined biogeochem & virus incubati	陸上にて補正予定	Ronnie N Glud		３年後	あり	
			Longitude	経度：139-21.676	E								
			Water depth:	深度：1452	m								
Sediment(3-530	push-core DK	2006/3/23 15:34	Latitude	緯度：35-00.845	N	core 7.4 id	combined biogeochem & virus incubati	陸上にて補正予定	Ronnie N Glud		３年後	あり	
			Longitude	経度：139-21.676	E								
			Water depth:	深度：1452	m								
Sediment(4-530	push-core DK	2006/3/23 15:35	Latitude	緯度：35-00.845	N	core 7.4 id	combined biogeochem & virus	陸上にて補正予定	Ronnie N Glud		３年後	あり	
			Longitude	経度：139-21.676	E								
			Water depth:	深度：1452	m								
Sediment(5-530	push-core DK	2006/3/23 15:39	Latitude	緯度：35-00.845	N	core 7.4 id	combined biogeochem & virus incubati	陸上にて補正予定	Ronnie N Glud		３年後	あり	
			Longitude	経度：139-21.676	E								
			Water depth:	深度：1452	m								
Sediment	MBARICore	2006/3/23 15:44	Latitude	緯度：35-00.845	N	1	Chemical analysis	陸上にて補正予定	Hidetaka Nomaki	r	３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-21.676	E								
			Water depth:	深度：1452	m								
Sediment	MBARICore	2006/3/23 15:46	Latitude	緯度：35-00.845	N	1	Chemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-21.676	E								
			Water depth:	深度：1452	m								
Sediment	MBARICore	2006/3/23 15:50	Latitude	緯度：35-00.845	N	1	Chemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-21.676	E								
			Water depth:	深度：1452	m								
Sediment	MBARICore	2006/3/23 15:53	Latitude	緯度：35-00.845	N	1	Chemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-21.676	E								
			Water depth:	深度：1452	m								
Seawater	Niskin Bottle	2006/3/24 12:04	Latitude	緯度：35-00.847	N	2	Chemical analysis	陸上にて補正予定	Kazumasa Oguri		３年後	なし	分取量は1本の採水器から採取したサンプルの数
			Longitude	経度：139-21.817	E								
			Water depth:	深度：1442	m								
Seawater	Niskin Bottle	2006/3/24 12:04	Latitude	緯度：35-00.847	N	2	Chemical analysis	陸上にて補正予定	Kazumasa Oguri		３年後	なし	分取量は1本の採水器から採取したサンプルの数
			Longitude	経度：139-21.676	E								
			Water depth:	深度：1442	m								
Sediment(1-531	push-core DK	2006/3/24 13:43	Latitude	緯度：35-00.844	N	core 7.4 id	porewater profiles	陸上にて補正予定	Ronnie N Glud		３年後	あり	
			Longitude	経度：139-21.667	E								
			Water depth:	深度：1453	m								
Sediment(2-531	push-core DK	2006/3/24 13:48	Latitude	緯度：35-00.844	N	core 7.4 id	porewater profiles	陸上にて補正予定	Ronnie N Glud		３年後	あり	
			Longitude	経度：139-21.667	E								
			Water depth:	深度：1453	m								
Sediment(3-531	push-core DK	2006/3/24 13:52	Latitude	緯度：35-00.844	N	core 7.4 id	denitrification & anammox	陸上にて補正予定	Ronnie N Glud		３年後	あり	
			Longitude	経度：139-21.667	E								
			Water depth:	深度：1453	m								

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Sample name	Sampling instrument	Date (UTC)	Sampling point			Number of subsamples	Purpose	精度管理情報　※1	Person responsible	E-mail Adress	公開留保時期　※3	Picture	Note
Sediment(4-531)	push-core DK	2006/3/24 13:56	Latitude Longitude Water depth:	緯度：35-00.844 経度：139-21.667 深度：1453	N E m	core 7.4 id	denitrification & anammox	陸上にて補正予定	Ronnie N Glud		３年後	あり	
Sediment(5-531)	push-core DK	2006/3/24 14:00	Latitude Longitude Water depth:	緯度：35-00.844 経度：139-21.667 深度：1453	N E m	core 7.4 id	denitrification & anammox	陸上にて補正予定	Ronnie N Glud		３年後	あり	
Sediment(6-531)	MBARICore	2006/3/24 14:04	Latitude Longitude Water depth:	緯度：35-00.844 経度：139-21.667 深度：1453	N E m	core 6.8 id	denitrification & anammox	陸上にて補正予定	Ronnie N Glud		３年後	なし	
Sediment(7-531)	MBARICore	2006/3/24 14:08	Latitude Longitude Water depth:	緯度：35-00.844 経度：139-21.667 深度：1453	N E m	core 6.8 id	denitrification & anammox	陸上にて補正予定	Ronnie N Glud		３年後	なし	
Sediment(8-531)	MBARICore	2006/3/24 14:11	Latitude Longitude Water depth:	緯度：35-00.844 経度：139-21.667 深度：1453	N E m	core 6.8 id	denitrification & anammox	陸上にて補正予定	Ronnie N Glud		３年後	なし	
Sediment	MBARICore	2006/3/24 14:05	Latitude Longitude Water depth:	緯度：35-00.837 経度：139-21.651 深度：1453	N E m	18	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
Sediment	MBARICore	2006/3/24 14:08	Latitude Longitude Water depth:	緯度：35-00.837 経度：139-21.651 深度：1453	N E m	1	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
Sediment	MBARICore	2006/3/24 14:11	Latitude Longitude Water depth:	緯度：35-00.845 経度：139-21.676 深度：1452	N E m	1	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
Sediment	MBARICore	2006/3/24 14:15	Latitude Longitude Water depth:	緯度：35-00.845 経度：139-21.676 深度：1452	N E m	1	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
Sediment	MBARICore	2006/3/24 14:18	Latitude Longitude Water depth:	緯度：35-00.845 経度：139-21.676 深度：1452	N E m	1	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
Sediment	I-K type feeding core	2006/3/25 14:37	Latitude Longitude Water depth:	緯度：35-00.808 経度：139-21.629 深度：1453	N E m	8	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1つの現場培養装置から採取したサンプルの数
Sediment	I-K type feeding core	2006/3/25 14:37	Latitude Longitude Water depth:	緯度：35-00.808 経度：139-21.629 深度：1453	N E m	8	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1つの現場培養装置から採取したサンプルの数
Seawater	Niskin Bottle	2006/3/25 13:43	Latitude Longitude Water depth:	緯度：35-00.841 経度：139-21.665 深度：1450	N E m	2	Chemical analysis	陸上にて補正予定	Kazumasa Oguri		３年後	なし	分取量は1本の採水器から採取したサンプルの数
Seawater	Niskin Bottle	2006/3/25 13:43	Latitude Longitude Water depth:	緯度：35-00.841 経度：139-21.665 深度：1450	N E m	2	Chemical analysis	陸上にて補正予定	Kazumasa Oguri		３年後	なし	分取量は1本の採水器から採取したサンプルの数
Sediment	I-K type feeding core	2006/3/25 13:53	Latitude Longitude Water depth:	緯度：35-00.843 経度：139-21.652 深度：1453	N E m	8	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1つの現場培養装置から採取したサンプルの数
Sediment	I-K type feeding core	2006/3/25 13:55	Latitude Longitude Water depth:	緯度：35-00.843 経度：139-21.652 深度：1453	N E m	8	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1つの現場培養装置から採取したサンプルの数
Sediment(1-533)	push-core DK	2005/3/25 14:06	Latitude Longitude Water depth:	緯度：35-00.844 経度：139-21.667 深度：1453	N E m	core 7.4 id	total exchange rates	陸上にて補正予定	Ronnie N Glud		３年後	あり	
Sediment(2-533)	push-core DK	2005/3/25 14:08	Latitude Longitude Water depth:	緯度：35-00.844 経度：139-21.667 深度：1453	N E m	core 7.4 id	total exchange rates	陸上にて補正予定	Ronnie N Glud		３年後	あり	
Sediment(3-533)	push-core DK	2005/3/25 14:10	Latitude Longitude Water depth:	緯度：35-00.844 経度：139-21.667 深度：1453	N E m	core 7.4 id	total exchange rates	陸上にて補正予定	Ronnie N Glud		３年後	あり	

3．採取サンプルのインベントリ情報　※船上分析で終了した（データが得られた）ものは対象外です。それ以外のサンプルについて記載して下さい。

航海番号： NT06-05　　プロポーザル番号： S05-15　　課題提案者氏名： 北里　洋

Sample name	Sampling instrumen	Date (UTC)	Sampling point			Number of su	Purpose	精度管理情報　※1	Person responsib	E-mail Adress	公開留保時期　※3	Picture	Note
Sediment(4-533)	push-core DK	2005/3/25 14:12	Latitude	緯度：35-00.844	N	core 7.4 id	total exchange rates	陸上にて補正予定	Ronnie N Glud		３年後	あり	
			Longitude	経度：139-21.667	E								
			Water depth:	深度：1453	m								
Sediment(5-533)	push-core DK	2005/3/25 14:14	Latitude	緯度：35-00.844	N	core 7.4 id	total exchange rates	陸上にて補正予定	Ronnie N Glud		３年後	あり	
			Longitude	経度：139-21.667	E								
			Water depth:	深度：1453	m								
Sediment(6-533)	MBARICore	2005/3/25 14:16	Latitude	緯度：35-00.844	N	core 6.8 id	Porewater profiles	陸上にて補正予定	Ronnie N Glud		３年後	あり	
			Longitude	経度：139-21.667	E								
			Water depth:	深度：1453	m								
Sediment(7-533)	MBARICore	2005/3/25 14:18	Latitude	緯度：35-00.844	N	core 6.8 id	Porewater profiles	陸上にて補正予定	Ronnie N Glud		３年後	あり	
			Longitude	経度：139-21.667	E								
			Water depth:	深度：1453	m								
Sediment(8-533)	MBARICore	2005/3/25 14:19	Latitude	緯度：35-00.844	N	core 6.8 id	Porewater profiles	陸上にて補正予定	Ronnie N Glud		３年後	あり	
			Longitude	経度：139-21.667	E								
			Water depth:	深度：1453	m								
Sediment	MBARICore	2006/3/25 14:17	Latitude	緯度：35-00.860	N	18	Chemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-21.716	E								
			Water depth:	深度：1452	m								
Sediment	MBARICore	2006/3/25 14:18	Latitude	緯度：35-00.860	N	1	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-21.716	E								
			Water depth:	深度：1452	m								
Sediment	MBARICore	2006/3/25 14:20	Latitude	緯度：35-00.860	N	1	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-21.716	E								
			Water depth:	深度：1452	m								
Sediment	MBARICore	2006/3/25 14:22	Latitude	緯度：35-00.860	N	1	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-21.716	E								
			Water depth:	深度：1452	m								
Sediment	MBARICore	2006/3/25 14:24	Latitude	緯度：35-00.860	N	1	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-21.716	E								
			Water depth:	深度：1452	m								
Seawater	Niskin Bottle	2006/3/26 10:03	Latitude	緯度：35-00.836	N	2	Chemical analysis	陸上にて補正予定	Kazumasa Oguri		３年後	なし	分取量は1本の採水器から採取したサンプルの数
			Longitude	経度：139-21.674	E								
			Water depth:	深度：1450	m								
Seawater	Niskin Bottle	2006/3/26 10:03	Latitude	緯度：35-00.836	N	2	Chemical analysis	陸上にて補正予定	Kazumasa Oguri		３年後	なし	分取量は1本の採水器から採取したサンプルの数
			Longitude	経度：139-21.674	E								
			Water depth:	深度：1450	m								
Sediment	I-K type feeding core	2006/3/26 10:14	Latitude	緯度：35-00.841	N	8	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1つの現場培養装置から採取したサンプルの数
			Longitude	経度：139-21.666	E								
			Water depth:	深度：1453	m								
Sediment	Kumade Scoop Sampler	2006/3/26 10:33	Latitude	緯度：35-00.877	N	1	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1つのサンプラーから採取したサンプルの数
			Longitude	経度：139-21.698	E								
			Water depth:	深度：1453	m								
Seawater	Niskin Bottle	2006/3/26 14:45	Latitude	緯度：35-00.089	N	2	Chemical analysis	陸上にて補正予定	Kazumasa Oguri		３年後	なし	分取量は1本の採水器から採取したサンプルの数
			Longitude	経度：139-13.507	E								
			Water depth:	深度：1173	m								
Seawater	Niskin Bottle	2006/3/26 14:45	Latitude	緯度：35-00.089	N	7	Chemical analysis	陸上にて補正予定	Kazumasa Oguri		３年後	なし	分取量は1本の採水器から採取したサンプルの数
			Longitude	経度：139-13.507	E								
			Water depth:	深度：1173	m								
Calyptogena clam	Kumade Scoop Sampler	2006/3/26 15:33	Latitude	緯度：35-00.089	N	31 ind.	Biogeochemical analysis	陸上にて補正予定	Yohei Tada		３年後	あり	
			Longitude	経度：139-13.507	E								
			Water depth:	深度：1175	m								
Sediment	MBARICore	2006/3/26 15:35	Latitude	緯度：35-00.089	N	4	Biogeochemical analysis	陸上にて補正予定	Yohei Tada		３年後	あり	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-13.507	E								
			Water depth:	深度：1175	m								
Sediment	MBARICore	2006/3/26 15:42	Latitude	緯度：35-00.089	N	18	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-13.507	E								
			Water depth:	深度：1175	m								

３．採取サンプルのインベントリ情報　※船上分析で終了した（データが得られた）ものは対象外です。それ以外のサンプルについて記載して下さい。　　航海番号： NT06-05　　プロポーザル番号： S05-15　　課題提案者氏名： 北里　洋

Sample name	Sampling instrumen	Date (UTC)	Sampling point			Number of su	Purpose	精度管理情報　※1	Person responsible	E-mail Adress	公開留保時期　※3	Picture	Note
Sediment	MBARICore	2006/3/26 15:44	Latitude	緯度：35-00.089	N	1	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-13.507	E								
			Water depth:	深度：1175	m								
Sediment	MBARICore	2006/3/26 15:47	Latitude	緯度：35-00.089	N	1	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-13.507	E								
			Water depth:	深度：1175	m								
Sediment	MBARICore	2006/3/26 15:49	Latitude	緯度：35-00.089	N	1	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-13.507	E								
			Water depth:	深度：1175	m								
Sediment	MBARICore	2006/3/26 15:52	Latitude	緯度：35-00.089	N	1	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-13.507	E								
			Water depth:	深度：1175	m								
Seawater	Niskin Bottle	2006/3/27 8:36	Latitude	緯度：35-00.138	N	2	Chemical analysis	陸上にて補正予定	Kazumasa Oguri		３年後	なし	分取量は1本の採水器から採取したサンプルの数
			Longitude	経度：139-13.608	E								
			Water depth:	深度：50	m								
Seawater	Niskin Bottle	2006/3/27 9:32	Latitude	緯度：35-00.172	N	2	Chemical analysis	陸上にて補正予定	Kazumasa Oguri		３年後	なし	分取量は1本の採水器から採取したサンプルの数
			Longitude	経度：139-13-531	E								
			Water depth:	深度：1188	m								
Sediment	MBARICore	2006/3/27 9:55	Latitude	緯度：35-00.180	N	2	Biogeochemical analysis	陸上にて補正予定	Yohei Tada		３年後	あり	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-13.476	E								
			Water depth:	深度：1176	m								
Sediment	MBARICore	2006/3/27 9:57	Latitude	緯度：35-00.180	N	3	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-13.476	E								
			Water depth:	深度：1176	m								
Sediment	MBARICore	2006/3/27 10:40	Latitude	緯度：35-00.205	N	1	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-13.499	E								
			Water depth:	深度：1178	m								
Sediment	MBARICore	2006/3/27 10:42	Latitude	緯度：35-00.205	N	1	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-13.499	E								
			Water depth:	深度：1178	m								
Sediment	MBARICore	2006/3/27 10:48	Latitude	緯度：35-00.189	N	1	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-13.513	E								
			Water depth:	深度：1186	m								
Sediment	MBARICore	2006/3/27 10:50	Latitude	緯度：35-00.189	N	1	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1本のコアから採取したサンプルの数
			Longitude	経度：139-13.513	E								
			Water depth:	深度：1186	m								
Seawater	Niskin Bottle	2006/3/27 14:01	Latitude	緯度：35-00.831	N	2	Chemical analysis	陸上にて補正予定	Kazumasa Oguri		３年後	なし	分取量は1本の採水器から採取したサンプルの数
			Longitude	経度：139-21.672	E								
			Water depth:	深度：1451	m								
Sediment(1-537)	push-core DK	2006/3/27 14:06	Latitude	緯度：35-00.844	N	core 7.4 id	total exchange rates	陸上にて補正予定	Ronnie N Glud		３年後	あり	
			Longitude	経度：139-21.667	E								
			Water depth:	深度：1453	m								
Sediment(2-537)	push-core DK	2006/3/27 14:08	Latitude	緯度：35-00.844	N	core 7.4 id	total exchange rates	陸上にて補正予定	Ronnie N Glud		３年後	あり	
			Longitude	経度：139-21.667	E								
			Water depth:	深度：1453	m								
Sediment(3-537)	push-core DK	2006/3/27 14:10	Latitude	緯度：35-00.844	N	core 7.4 id	total exchange rates	陸上にて補正予定	Ronnie N Glud		３年後	あり	
			Longitude	経度：139-21.667	E								
			Water depth:	深度：1453	m								
Sediment	I-K type feeding core	2006/3/27 14:23	Latitude	緯度：35-00.849	N	8	Biogeochemical analysis	陸上にて補正予定	Hidetaka Nomaki		３年後	なし	分取量は1つの現場培養装置から採取したサンプルの数
			Longitude	経度：139-21.661	E								
			Water depth:	深度：1453	m								
Seawater	Niskin Bottle	2006/3/27 15:38	Latitude	緯度：35-00.845	N	2	Chemical analysis	陸上にて補正予定	Kazumasa Oguri		３年後	なし	分取量は1本の採水器から採取したサンプルの数
			Longitude	経度：139-21.811	E								
			Water depth:	深度：50	m								
Seawater	Niskin Bottle	2006/3/28 10:06	Latitude	緯度：35-00.863	N	1	Chemical analysis	陸上にて補正予定	Ronnie N Glud		３年後	なし	分取量は1本の採水器から採取したサンプルの数
			Longitude	経度：139-21.658	E								
			Water depth:	深度：1449	m								
Seawater	Niskin Bottle	2006/3/28 10:06	Latitude	緯度：35-00.863	N	1	Chemical analysis	陸上にて補正予定	Ronnie N Glud		３年後	なし	分取量は1本の採水器から採取したサンプルの数
			Longitude	経度：139-21.658	E								
			Water depth:	深度：1449	m								

Appendix 2. Videotape List

Dive No.	IFREE 4		Denmark team (2 tapes for each)	
	HTV	CCD	HTV	CCD
#530 (20060323)	120min x2	120min x2	120min x2	120min x2
#531 (20060324)	120min x3	120min x3	120min x3	120min x3
#532 (20060325)	120min x2	120min x2	120min x2	120min x2
#533 (20060325)	120min x2	120min x2	120min x2	120min x2
#534 (20060326)	120min x2	120min x2	120min x2	120min x2
#535 (20060326)	120min x2	120min x2	120min x2	120min x2
#536 (20060327)	120min x2	120min x2	120min x2	120min x2
#537 (20060327)	120min x2	120min x2	120min x2	120min x2
#538 (20060328)	120min x4	120min x4	120min x4	120min x4

Appendix 3. Payload Pictures

Dive #530 (20060323)

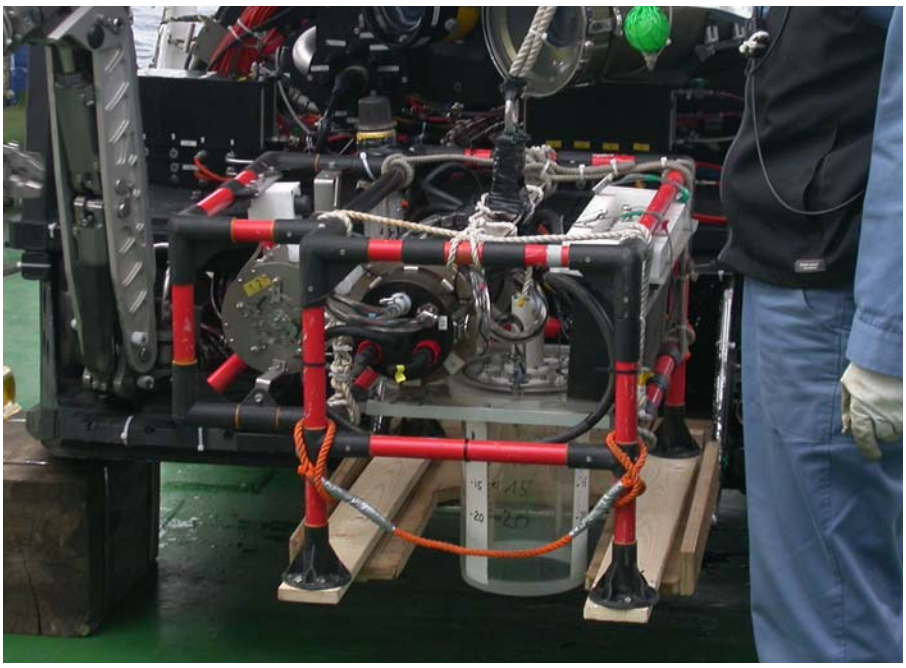
3 feeding devices, 5 Denmark core, 5 MBARI core, 2 Niskin bottles, CTD-DO

Dive #531 (20060324)

2 feeding devices, 5 Denmark core, 5 MBARI core, 1 Oguri's O2-pH double sensor film test device, 2 Niskin bottles, CTD-DO

Dive #532 (20060325)

Benthic chamber, CTD-DO

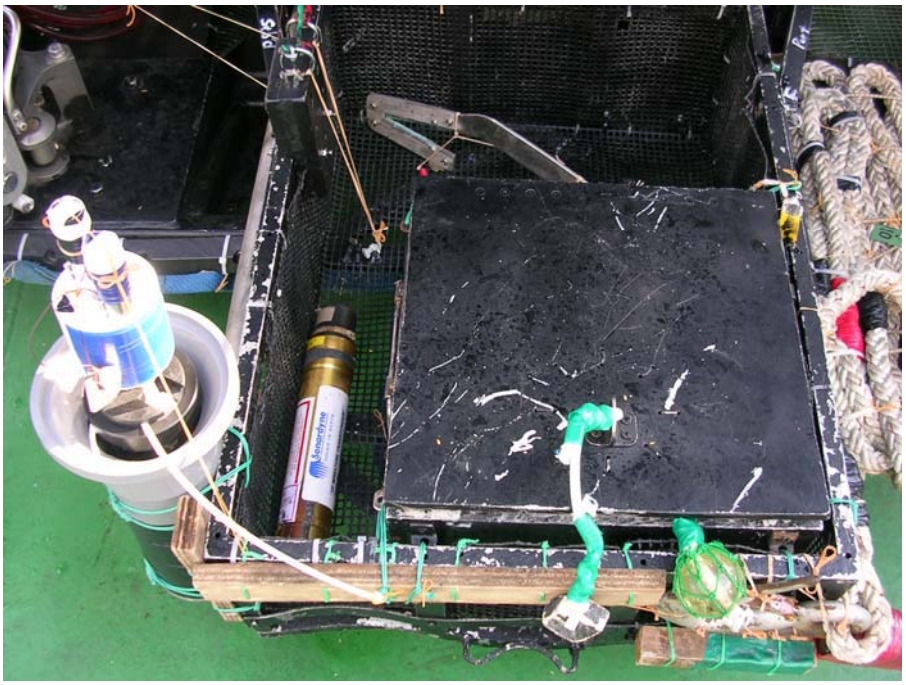


Dive #533 (20060325)

2 feeding devices, 5 Denmark core, 5 MBARI core, 2 Niskin bottles, CTD-DO

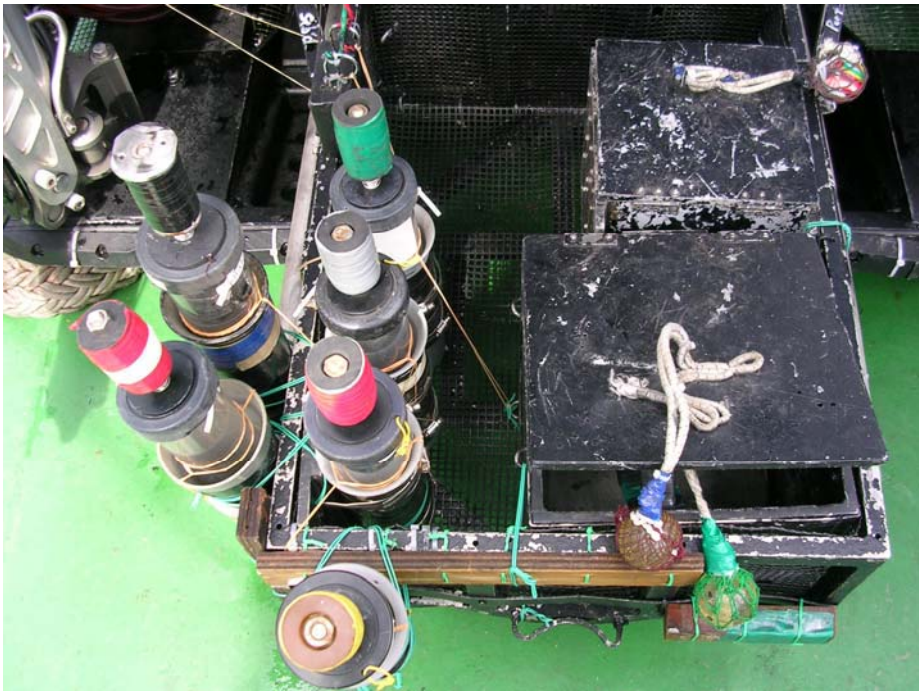
Dive #534 (20060326)

Sample box, 1 feeding device, 2 Niskin bottles, CTD-DO



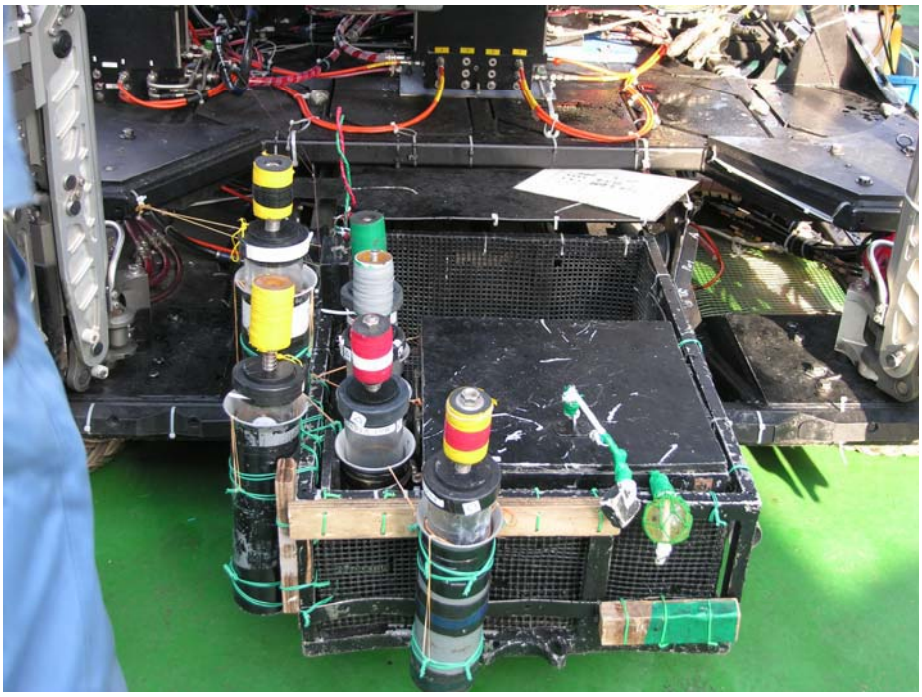
Dive #535 (20060326)

2 sample boxes, 6 MBARI core, 2 Niskin bottles, CTD-DO



Dive #536 (20060327)

1 sample box, 6 MBARI core, 2 Niskin bottles, CTD-DO

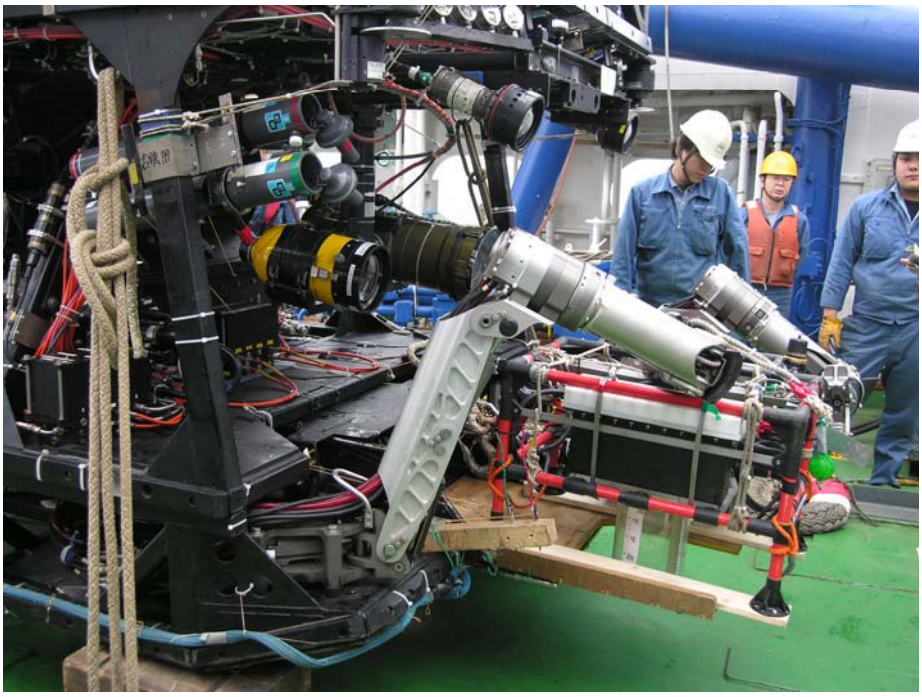


Dive #537 (20060327)

1 Feeding device socket, 2 Niskin bottles, CTD-DO

Dive #538 (20060328)

Benthic chamber, 2 Niskin bottles, CTD-DO



Appendix 4. Shipboard log

March 22, 2006

13:00 All scientists embarked on R/V Natsushima.

14:00 R/V Natsushima departed from JAMSTEC Pier

19:30 stay at off Hiratsuka City, northern Sagami Bay.

March 23, 2006

Because of bad weather, initial dive plan has delayed until it becomes better condition.

Mooring sediment-trap at Central Sagami Bay Site

11:30-12:10 Start to throw down sediment-trap

13:00 Sediment trap on bottom (50m north from throw point

Hyperdolphin #530 Dive, Central Sagami Bay Site depth of 1450m, deploying and recovering in situ feeding experimental devices at OBB II station. (Payload: 3 feeding devices, 5 Denmark core, 5 MBARI core, 2 Niskin bottles, CTD-DO)

13:00 ROV stand by

13:40 ROV started down

14:43 ROV on bottom 1450m

14:44 two Niskin bottle sampling

14:59~15:15 One feeding device set on sea floor near OBB II station. Two were failed. Two devices recovered.

15:20~15:54 Ten Push core samplings (Green-black, D-Yellow, D-green, D-red, D-black, D-white, Yellow-black, Red, Yellow, Green)

16:00 OBB II station was precisely observed. ROV homer set again on OBB II.

16:12 left bottom

March 24, 2006

Because of strong northern wind, we should wait until wind is coming down.

Throw Lander System

9:30 stand by for throw down lander system

09:51 Lander started down

Hyperdolphin #531 Dive, central Sagami Bay Site, depth of 1450m, deploying profiling lander, benthic chamber and water sampling with Niskin bottles. (Payload: 2 feeding devices, 5 Denmark core, 5 MBARI core, 1 Oguri's O2-pH double sensor film test device, 2 Niskin bottles, CTD-DO)

10:42 stand by

11:05 ROV start down

12:00 ROV on bottom, 1451m

12:03 Niskin water sampling

12:06 watch profiling lander

12:20-22 lander switched on

12:35 moved profiling lander 20m from settling position. Free falled from altitude 3.5m

12:56 moved lander again to 10m north from the last position. Bring slowly down onto bottom and release

13:10 OBB II station. Put O2-pH film test device beside OBB II

13:34 set feeding device. One sticked on sea floor.

13:43~14:18 Ten push core samplings

14:35 Two old feeding devices recovered

15:30 Sit in front of lander

15:58 Lander switched on again

16:02 Lander set again 10m north from the former position

16:05 ROV left bottom

17:00 ROV on deck

March 25, 2006

Hyperdolphin # 532 Dive, central Sagami Bay Site, depth of 1455m, push cores and bottom water sampling by Niskin bottles and recover experimental devices.

08:40 ROV start down with benthic chamber

09:36 ROV on bottom, 1450m and set benthic chamber (15 cm)

10:02 Lander switch on

10:16 move lander 30m north from the last position

10:18 ROV left bottom

11:10 ROV on deck

Hyperdolphin #533 Dive, central Sagami Bay Site, depth of 1450m (Payload: 2 feeding devices, 5 Denmark core, 5 MBARI core, 2 Niskin bottles, CTD-DO), Lander recovery

12:15 ROV stand by

12:45 ROV start down

13:40 ROV on bottom, 1451m

13:43 Two Niskin bottle samplings (2m above sea floor)

13:52 1 feeding device (Red) set and recover. 1 feeding device (White-Red) that was set two days before is also recovered.

14:04~14:23 Ten push core samplings

14:39 pick up lander and leave bottom

15:25 ROV on deck

15:40 Lander on deck

16:34 sediment trap release remotely from sea surface connecting part between mooring system and weight part.

16:55 sediment trap on deck

19:00

March 26, 2006

Throw lander

07:08 Lander throw in

08:00 Lander on bottom

Hyperdolphin #534 Dive, central Sagami Bay, depth of 1450m (Payload: 1 feeding device, 2 Niskin bottles, CTD-DO), both benthic chamber and Oguri device recovery

08:00 CTD-DO calibration using both zero and saturated seawater

08:37 ROV stand by

08:59 ROV go down

10:00 ROV on bottom, 1450m

10:03 Niskin bottles (2m above sea floor)

10:09 Feeding device(blue) set and one device (Blue-white) recovered

10:18~33 surface sediment collected with scoop

10:43 Lander switched on and move 22 m west

11:02 Benthic chamber was connected with recovery rope of ROV

11:04 ROV leave bottom with benthic chamber

11:50 ROV on deck

Hyperdolphin #535 Dive, south of Hatsushima Island, depth 1170m (Payload: 2 sample boxes, 6 MBARI core, 2 Niskin bottles, CTD-DO)

13:38 ROV started down

14:34 ROV on bottom, 1392m

14:45 Niskin bottles at south colony (1.7m above sea floor)

14:50~58 H528 cage sampling

15:10~33 H525 cage sampling

15:35 MBARI core (black) beside H528 colony

15:37 Two cages recovered

15:37~53 Five MBARI cores

15:55~ Fujikura box observation

16:00 ROV left bottom

16:39 ROV on deck

18:30 drift at close to Ito City, Izu Peninsula

March 27, 2006

Hyperdolphin #536 Dive, south east from Hatsushima Island, depth 1170m, observing station, landscapes and colonies.

08:10 ROV stand by

08:30 ROV start down

08:35 Niskin bottle (50m deep)

09:30 ROV on bottom, depth 1193m

Niskin bottle (2m above sea floor)

Red carpet of bacterial colony (2 MBARI cores)

visit deep-sea station

10:40 Two cores at 47m northeast from the station

10:48 Two cores at 50m east from the station

10:51 ROV left bottom

11:30 ROV on deck

Hyperdolphin #537 Dive, central Sagami Bay site, depth 1450m, recovering feeding device, Oguri device and profiling lander, (Payload: 1 Feeding device socket, 2 Niskin bottles, CTD-DO).

12:44 ROV stand by

13:05 ROV start down

14:01 ROV on bottom, 1450m

14:02 Niskin bottle (2m above sea floor)

14:04~11 Three Denmark type core (Red, Black and White)

14:22 One feeding device recovered. ROV homer #45 recovered.

14:31 Oguri device recovered

14:45 Lander was connected with ROV recovery rope

14:57 ROV left bottom with profiling lander

15:55 ROV on deck (Lander moves from main deck to upper deck with clane)

18:30 Drift at northern part of Sagami Bay off Hiratsuka

March 28, 2006

Hyperdolphin #538 Dive, central Sagami Bay site, depth 1455m, (benthic chamber measurement)

08:10 ROV stand by

08:34 ROV start down with benthic chamber

09:32 ROV on bottom and benthic chamber set on bottom, 1450m

10:06 Niskin bottles (2m above sea floor)

15:39 ROV sat in front of benthic chamber and waited for the last syringe was pulled.

16:11 Benthic chamber was connected with ROV by recovery rope and left bottom

17:15 ROV and benthic chamber on deck

20:30 Natsushima anchored in front of JAMSTEC

March 29, 2006

R/V Natsushima ported at JAMSTEC pier at 09:00. We unloaded every equipments and then disembarked from the ship. NT06-05 cruise has ended with great success.