



“R/V Yokosuka Cruise Report”  
YK20-E02

Biological survey using high-resolution imaging system  
(高解像度イメージングシステムによる海洋生物調査)

Sagami Bay, Suruga Bay

Feb. 22, 2020 - Feb. 28, 2020

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

## **Acknowledgement**

We are grateful to Captain Mr. T. Aoki, Chief Officer Mr. T. Ohara and Chief Engineer Mr. T. Ota for their safe navigation and their skillful handling of “R/V Yokosuka”. Great thanks are due to Deep-Tow Operation Team of Marine Works Japan under Mr. Y. Hashimoto for their operations in surveying.

We thank all the JAMSTEC personnel who have supported us.

Finally, we would like to appreciate all the people who directly or indirectly supported this cruise.

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## 1. LIST OF PARTICIPANTS

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### *Captain and crew of the R/V Yokosuka*

Captain	Takafumi AOKI
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2nd Officer	Yuki ITO
3rd Officer	Keisuke KUSUMI
Jr. 3rd Officer	Keita USHIMARU
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Quarter Master	Kohsei KAWAMURA
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Sailor	Takumi MIURA
Sailor	Taisei MATSUDA
Sailor	Shuichi YAMAMOTO
No.1 Oiler	Katsuyuki YOSHIDA
Oiler	Sota MISAGO
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Steward	Shinobu OHYU
Steward	Toshiyuki ASANO
Steward	Kina ABE
Steward	Tsuyoshi NAGATOMO

## 2. SHIPBOARD LOG OF *R/V YOKOSUKA*

- 22 Feb 2020**    9:00    Embarkment (JAMSTEC pier)  
                  9:30    Brief instruction of ship life  
                  10:00    Scientific meeting  
                  13:30    Emergency training  
                  15:00    Norpac Net Towing at off Itou  
[Sagami Bay (35-01.5N, 139-19.5E), Fine but cloudy, Wind: SSW-7, Wave: 5 (rough), Swell: 3 (moderate short), Visibility: 8 miles]
- 23 Feb 2020**    15:30    Launched 6KCDT#44 at Whale site, off Hatsushima  
                  17:00    Retrieval of 6KCDT on deck  
                  17:24    XBT  
[Off Itou Port, (34-58.8N, 139-06.3E), Fine but cloudy, Wind: WSW-8, Wave: 3 (slight), Swell: 1 (low swell), Visibility: 8 miles]
- 24 Feb 2020**    6:58 – 7:10    MBES survey  
                  9:00    Norpac Net Towing (PN-1) at off Hatsushima  
                  10:00    Norpac Net Towing (PN-2) at off Hatsushima  
                  17:30    Norpac Net Towing (PN-3) at off Hatsushima  
[Sagami Bay (35-05.0N, 139-11.5E) , Fine, Wind: East-2 (light breeze), Wave: 2 (smooth), Swell: 1 (low swell), Visibility: 8 miles]
- 25 Feb 2020**    9:41    Launched 6KCDT#45 at Whale site, off Hatsushima  
                  11:10    Retrieval of 6KCDT on deck  
                  14:56    Launched 6KCDT#46 at Whale site, off Hatsushima  
                  16:16    Retrieval of 6KCDT on deck  
                  16:40    Headed to Suruga Bay  
                  20:15    Arrival at Site 5, Suruga Bay  
[Sagami Bay (35-05.0N, 139-13.0E), Cloudy, Wind: Calm-0, Wave: 1 (calm), Swell: 1 (low swell), Visibility: 8 miles]
- 26 Feb 2020**    6:51    XBT  
                  7:10 – 7:36    MBES survey  
                  9:58    Launched 6KCDT#47 at site 5, Suruga Bay  
                  16:21    Retrieval of 6KCDT  
                  16:50    Headed to Site 3  
                  18:30    Arrival at Site 3, Suruga Bay  
[Suruga Bay (35-43.0N, 138-35.0E), Rain, Wind: ENE-3 (gentle breeze), Wave: 2 (smooth), swell: 1 (low swell), Visibility: 4 miles]
- 27 Feb 2020**    6:17    XBT  
                  6:40 – 6:50    MBES Survey  
                  8:27    Launched 6KCDT#48 at Site 3, Suruga Bay  
                          Retrieval of 6KCDT  
                          Headed to Sagami Bay  
                          Arrival at Sagami Bay



### **3. CRUISE SUMMARY**

The PICA3000 science payload system was tested, as was the realtime Squidle+ system. Plankton and other marine particles were collected for testing of the RamaCam unit's holographic imaging system. Underwater video footage and environmental parameters were collected to enable a comparative study on the midwater and benthopelagic fauna of Sagami and Suruga Bays.

Time synchronization and temperature data for all sensors (Deep Tow, CTD, CTDO) were found to be accurate with respect to the data logged in the PICA3000 Chatterbox log files. Salinity and depth values varied between instruments, with the causes still being analyzed. Squidle+ development was continued. A variety of different camera settings were tested.

Video data collected during this cruise should allow for a preliminary comparison to be done between the midwater fauna communities in February in Sagami and Suruga Bays.

#### **4. GENERAL BACKGROUND AND OBJECTIVES**

The purposes of this cruise were multiple. The main components were to test and refine the PICA3000 science payload system and to integrate and upgrade the realtime Squidle+ system, while providing in-the-field experience of User needs and logistics to guide further development. Another large component of the cruise was to sample plankton and other marine particles for testing of the RamaCam unit's holographic imaging system. During the process of these tests it was envisaged that underwater survey data would enable a comparative study on the midwater and benthopelagic fauna of Sagami and Suruga Bays.

## 5. DIVE REPORTS

### 6KCDT0044

Date: 23 Feb 2020 JST

Site: Whale site, Off Hatsushima, Sagami Bay. Site 2. (35°4.9838'N 139°12.9812'E)

Objectives: Instrumentation Test

Dive Summary: Dive started at 15:40 JST (06:40 UTC). Survey ended at 16:15 (07:15 UTC) at 300 m depth. On deck at 16:45 JST (07:45 UTC).

Payloads: PICA3000 system, DPI, Sony 4K stereo camera system, GoPro Stereo housing, GoPro single housing, vertical haul plankton net.

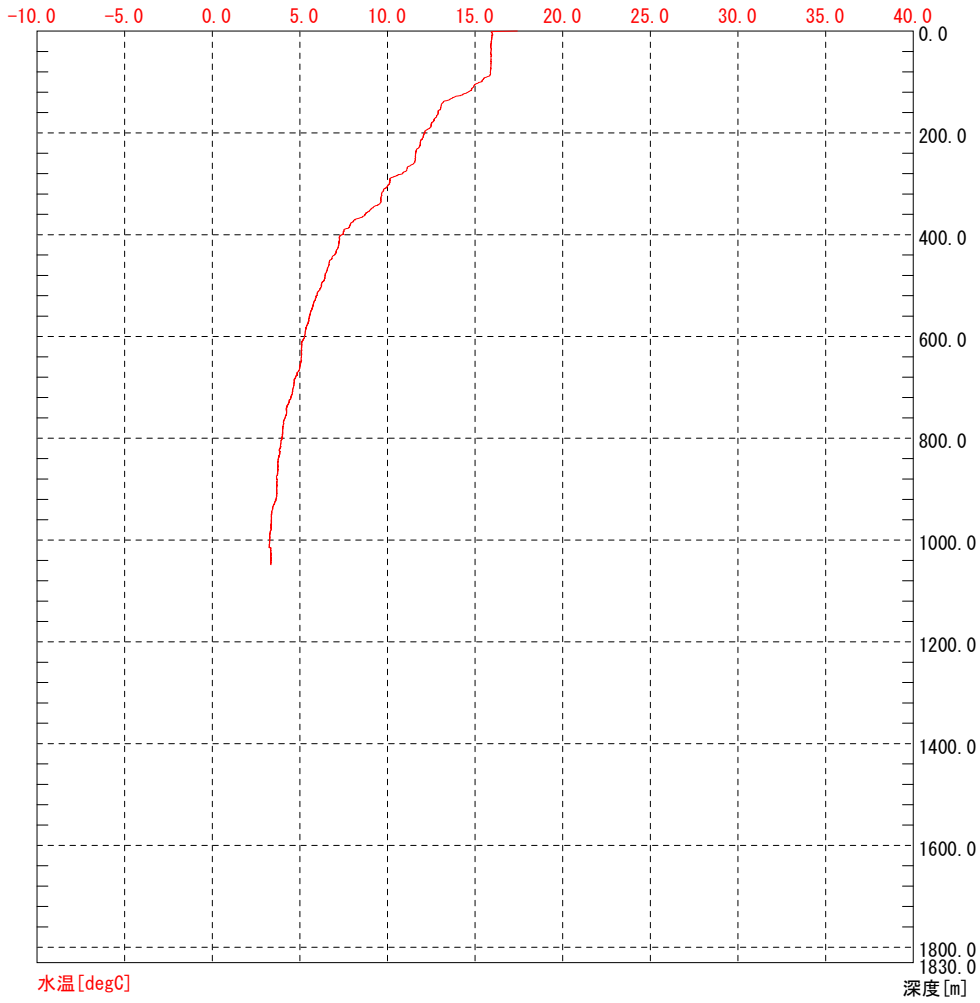
Stereo Sony 4K HandyCam image brightness (iris? Shutter? ISO?) was good for midwater but too bright to get calibration data in air.

Stereo GoPro cameras: Port ISO setting good, Starboard ISO setting too bright.

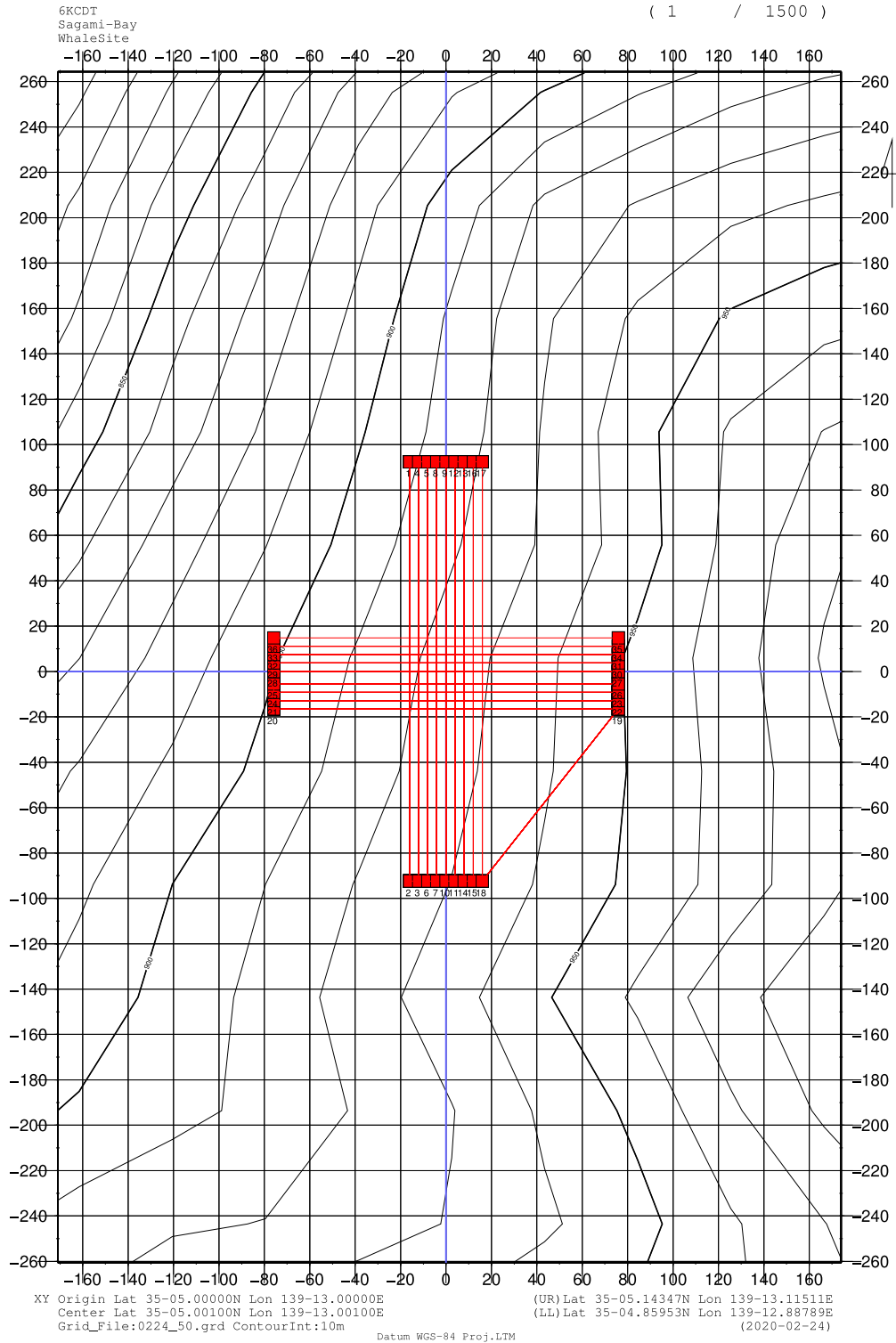
Stereo4KVPR recording units were set to different internal times so the video records were synchronized post-cruise referring to the instant the PICA3000 LED lights were turned on during Dive 44 based on the Chatterbox log record and visual confirmation of a sudden change in brightness in the video record.

*Solmissus* at 305 m depth and a squid at 321 m depth were the only identifiable organisms in the DeepTow downward-facing HD camera.

データベース名 : a:¥	デバイス名 : XBT	BATHYプローブ : 231
データ名 : BT-202002230823	プローブ名 : T-5 (TSK)	BATHY処理器 : **
データナンバ : 0094	深度係数 a : 6.828	
日付 : 2020/02/23	深度係数 b : -1.82	
時刻 : 08:24:44	最大深度(m) : 1830	
緯度 : 35-05.5962N	データ数 : 3209	深度ステップ : RAW
経度 : 139-13.6633E		
メモ :		



# Dive Track:



## 6KCDT0045

Date: 25 Feb 2020

Site: Whale site, Off Hatsushima, Sagami Bay (35°4.9252'N 139°13.1678'E)

Objectives: Instrumentation Test

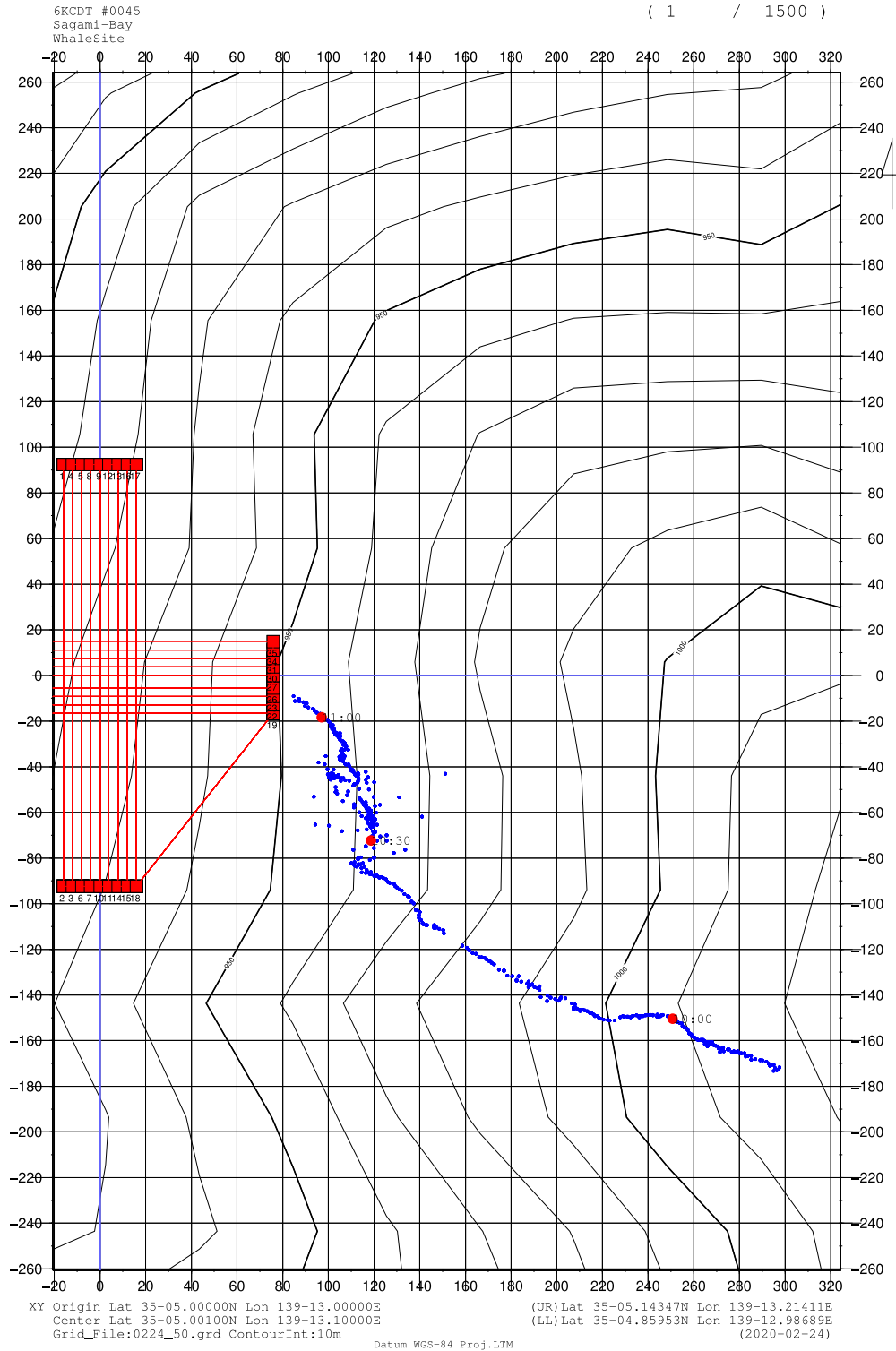
Dive Summary: Dive started at 09:41 JST (00:41 UTC). Survey ended at 10:39 (01:39 UTC) at 953 m depth. On deck at 11:10 JST (02:10 UTC).

Payloads: PICA3000 system housing, DPI (not operating), Sony 4K stereo camera system, GoPro Stereo housing, GoPro single housing, vertical haul plankton net.

An in-water stereo calibration was successful for the stereo GoPro and stereo4KVPR (RovoCam), though the port camera video did not include the entire calibration frame. In-air calibration done for stereo GoPro but only one of the RovoCams had part of the calibration cube in frame due to DeepTow trolley and deck interfering spatially.

*Nanomia bijuga* occurred at 318 m depth. The shallowest occurrence of *Arctapodema* sp. was at 561 m depth, and the shallowest occurrence of *Crossota rufobrunnea* was at 751 m depth, with both species occurring down to the benthopelagic layer at 956 m depth. Other gelatinous zooplankton that were observed included *Colobonema sericeum*, *Aeginura grimaldii*, *Poralia rufescens*, the physonect siphonophore *Bargmannia*, *Bathyclena* sp. and a *Solmissus* species. The sea urchin *Linopneustes murrayi* and the seastar *Ceramaster japonicus*, as well as Zoarcids and a Nettastomatid eel were present on the muddy seafloor.

# Dive Track:



## 6KCDT0046

Date: 25 Feb 2020

Site: Whale site, Off Hatsushima, Sagami Bay. (35°5.0171'N 139°12.9905'E)

Objectives: Instrumentation check.

Dive Summary: Dive started at 14:56 JST (05:56 UTC). Survey ended at 15:45 (06:45 UTC) at 918 m depth. On deck at 16:16 JST (07:16 UTC).

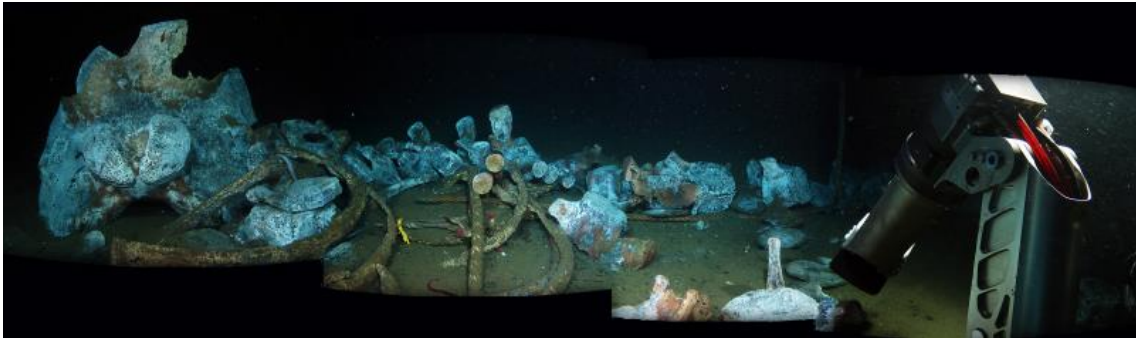
Payload: PICA3000 system, DPI (not operating), Sony 4K stereo camera system, GoPro Stereo housing, GoPro single housing, vertical haul plankton net.

An in-water stereo calibration was successful for the stereo GoPro but not for the stereo4KVPR (RovoCam). The port RovoCam had only part of the calibration cube in frame due to DeepTow trolley and deck interfering spatially.

The firefly squid *Watasenia scintillans* occurred at 446 m depth. The shallowest occurrence of *Arctapodema* sp. was at 695 m depth, and the shallowest occurrence of *Crossota rufobrunnea* was at 701 m depth, with both species occurring down to the benthopelagic layer at 927 m depth. Other gelatinous zooplankton that were observed included *Periphylla periphylla*, *Bathycytena* sp., *Halicreas minimum*, the eudoxid stage of a Diphyid siphonophore and some Narcomedusan species. The spider isopod *Munneurycope*, fish and echinoids were present on the muddy seafloor. The “whalefall” whale deployment was found on the seafloor.

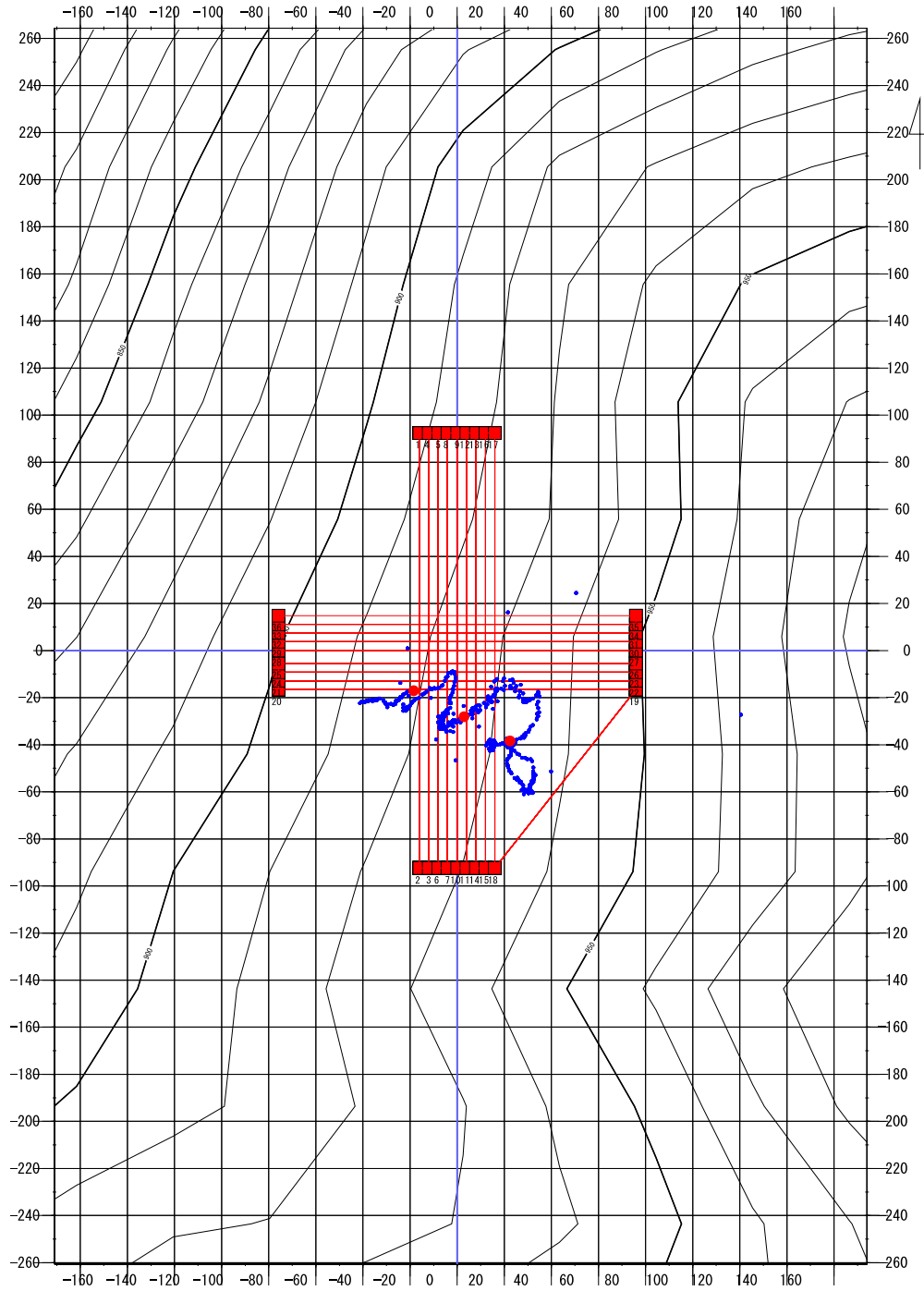


Whalebones observed during dive 46.



Original deployment of whale carcass on 16 April 2005. Above image mosaicked based on images taken during ROV Hyper-Dolphin Dive 768 (HPD0768) on 11 December 2007.

# Dive Track:



## 6KCDT0047

Date: 26 Feb 2020

Site: Site 5, Suruga Bay. (34°43.2228'N 138°35.0708'E)

Objectives:

Dive Summary: Dive started at 09:58 JST (00:58 UTC). Survey ended at 14:50 (05:50 UTC) at 1946 m depth. On deck at 16:21 JST (07:21 UTC).

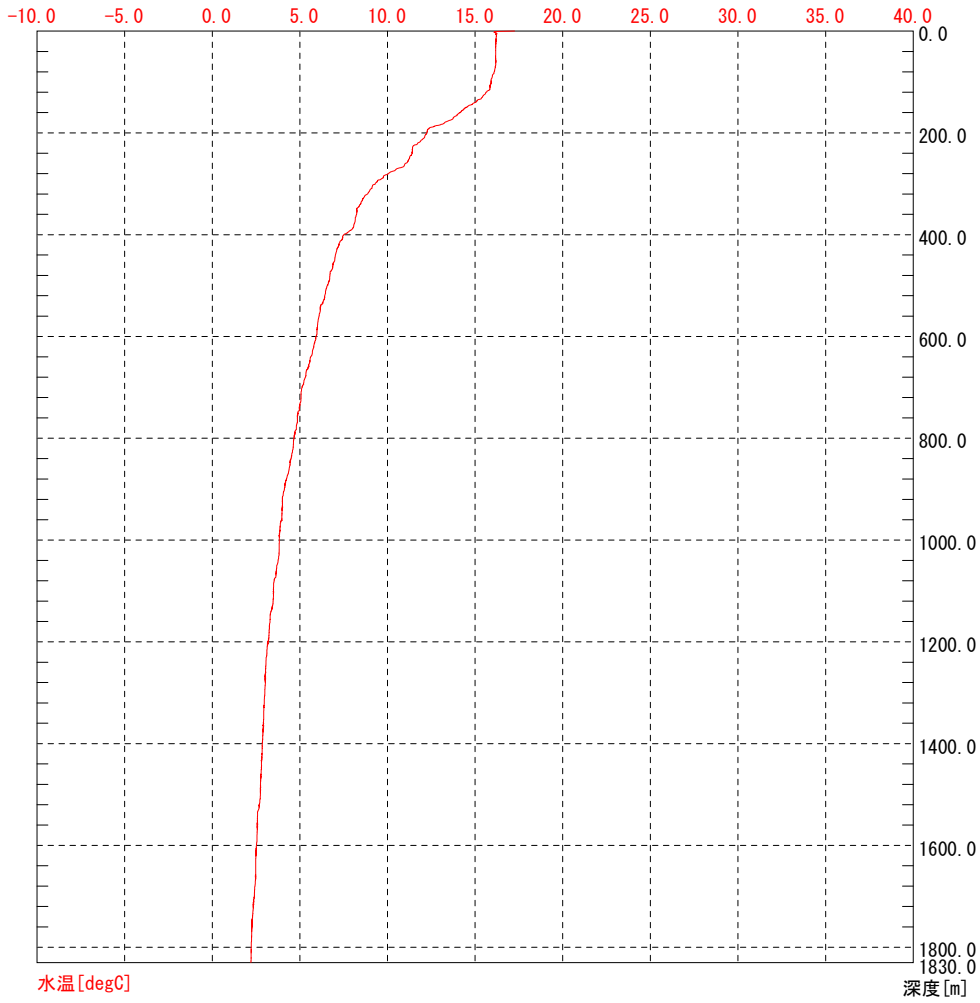
Payload: PICA3000 system, DPI (not operating), Sony 4K stereo camera system, GoPro Stereo housing, GoPro single housing, vertical haul plankton net.

An in-water and in-air stereo calibration was successful for the stereo GoPro and stereo Sony4K handycams. Calibrations were unsuccessful for 4KVPR (RovoCam).

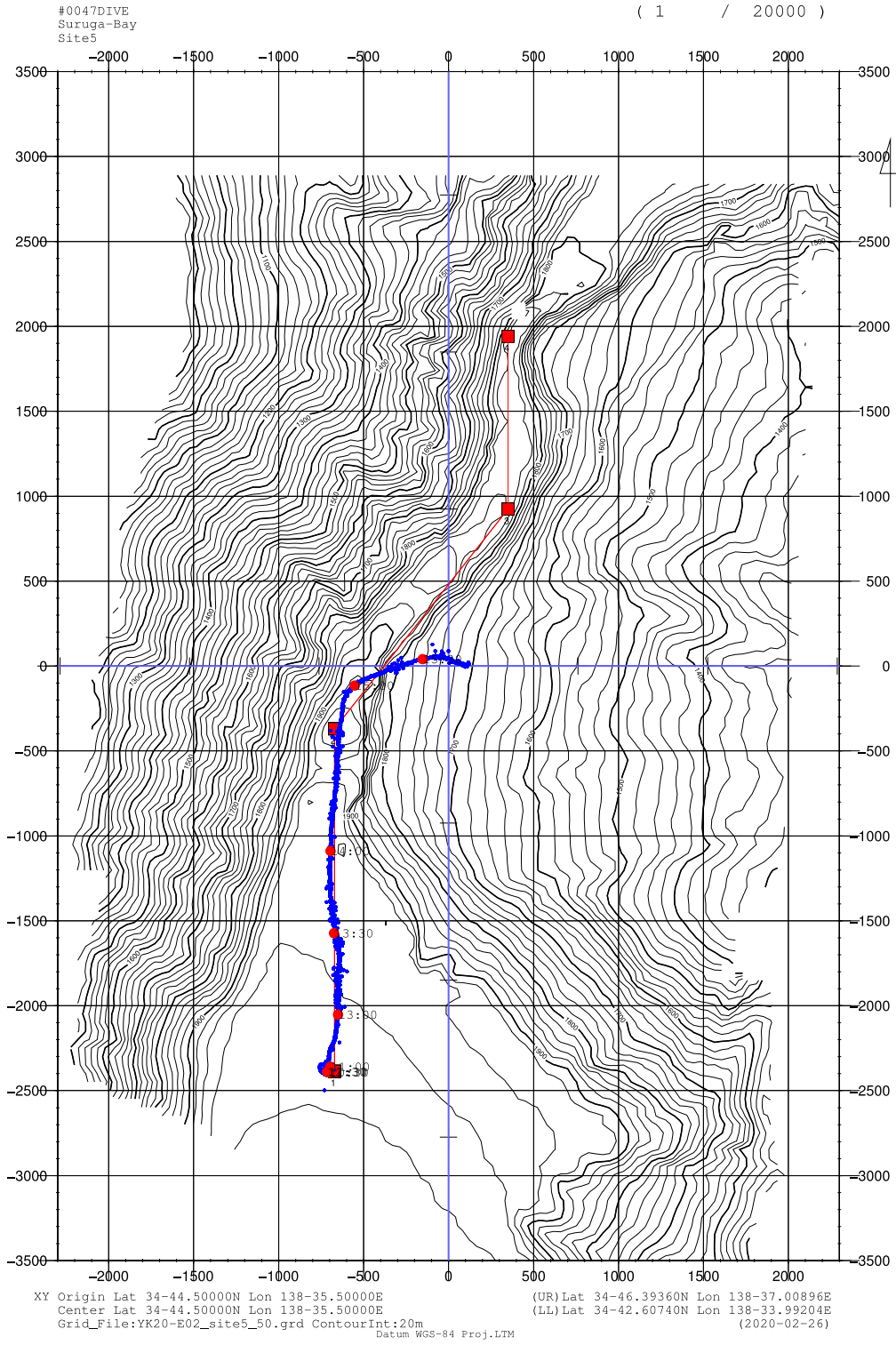
The benthopelagic layer (1963-1968m depth) contained many individuals of an undescribed species of black lobate ctenophore belonging to the genus *Bathocyroe*, with only one individual observed shallower (1624m depth) on the descent. Organisms observed in the water column during descent included the fishes *Alepisaurus ferox*, *Squalogadus modificatus*, myctophids and gonostomatids. Gelatinous zooplankton included the ctenophores *Thalassocalyce inconstans*, *Bathocyroe ?fosteri*, “Ctenoceros” horned cydippid ctenophore, the cnidarians *Colobonema sericeum*, *Atolla* sp., *Solmissus “incisa”*, *Arctapodema* sp., and the cydippid ctenophore *Bathyctena* “two-spot”.

Larvaceans such as *Bathochordaeus* and *Mesochordaeus* were also observed. Several *Poralia rufescens* ulmarid scyphomedusae, the swimming sea cucumber *Enypniastes eximia*, chimaerid fish were present in the bethopelagic layer.

データバス名 : a:¥	デバイス名 : XBT	BATHYプローブ : 231
データ名 : BT-202002252148	プローブ名 : T-5 (TSK)	BATHY処理器 : **
データナンバ : 0095	深度係数 a : 6.828	
日付 : 2020/02/25	深度係数 b : -1.82	
時刻 : 21:51:04	最大深度(m) : 1830	
緯度 : 34-42.2910N	データ数 : 5821	深度ステップ : RAW
経度 : 138-34.6638E		
メモ :		



# Dive Track:



## 6KCDT0048

Date: 26 Feb 2020 UTC (27 Feb 2020 JST)

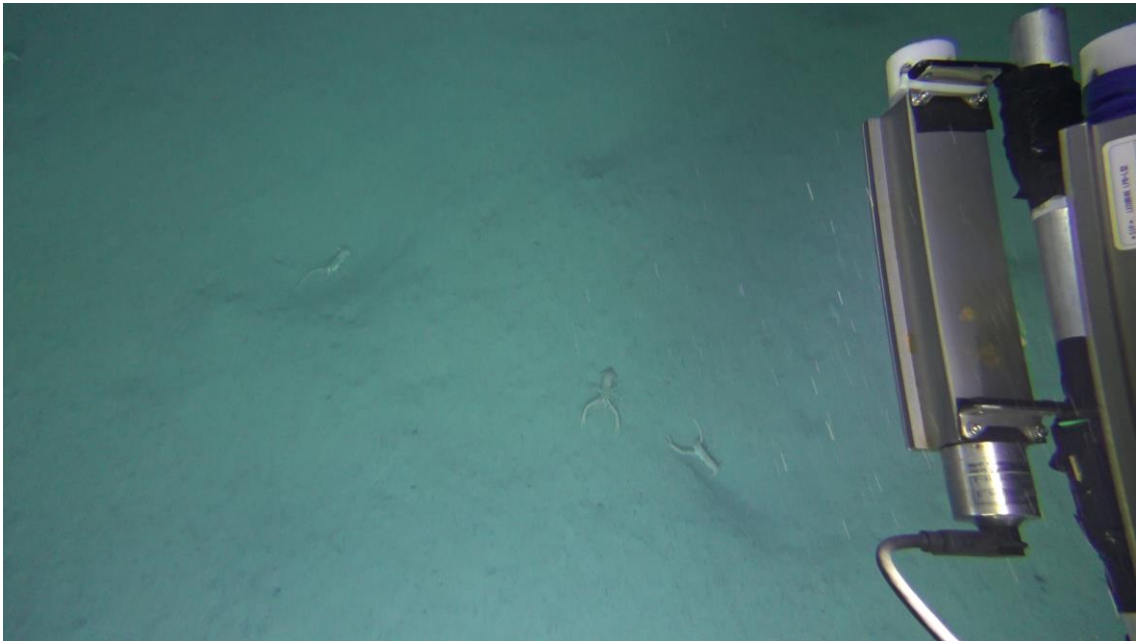
Site: Site 3, Suruga Bay (34°3.5000'N 138°34.5000'E).

Objectives: Instrumentation check.

Payload: PICA3000 system, DPI (not operating), Sony 4K stereo camera system, GoPro Stereo housing, GoPro single housing, vertical haul plankton net.

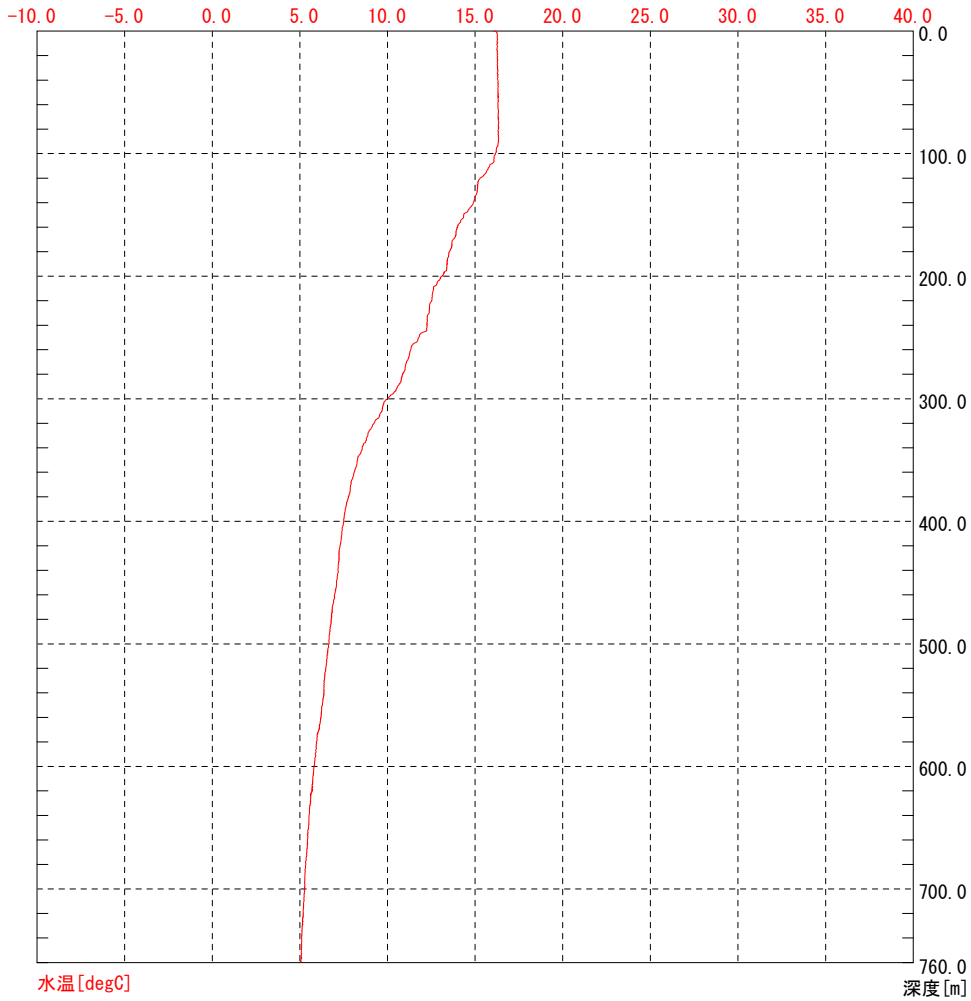
Dive Summary: Dive started at 08:17 JST (23:17 UTC). Maximum depth 441 m at 08:59 JST (23:59 UTC). Survey ended at 13:50 (04:50 UTC) at 314 m depth. On deck at 14:10 JST (05:10 UTC).

Seafloor directly after first sight mostly soft mud with many *Metanephrops* scampi shrimp, squat lobsters, *Haliporoides sibogae?* shrimps, fish, holothurians, lobates and a *Forskalia* siphonophore. Other highlights include a school of sergestid shrimp at approx. 01:22UTC, a Lophiid angler fish at 02:41UTC and a *Squatina ?nebulosa* shark at 02:42UTC.





データバス名 : a:¥	デバイス名 : XBT	BATHYプローブ : 222
データ名 : BT-202002262115	プローブ名 : T-7 (TSK)	BATHY処理器 : **
データナンバ : 0096	深度係数 a : 6.691	
日付 : 2020/02/26	深度係数 b : -2.25	
時刻 : 21:17:49	最大深度(m) : 760	深度ステップ : RAW
緯度 : 35-03.4915N	データ数 : 2461	
経度 : 138-37.1858E		
メモ :		

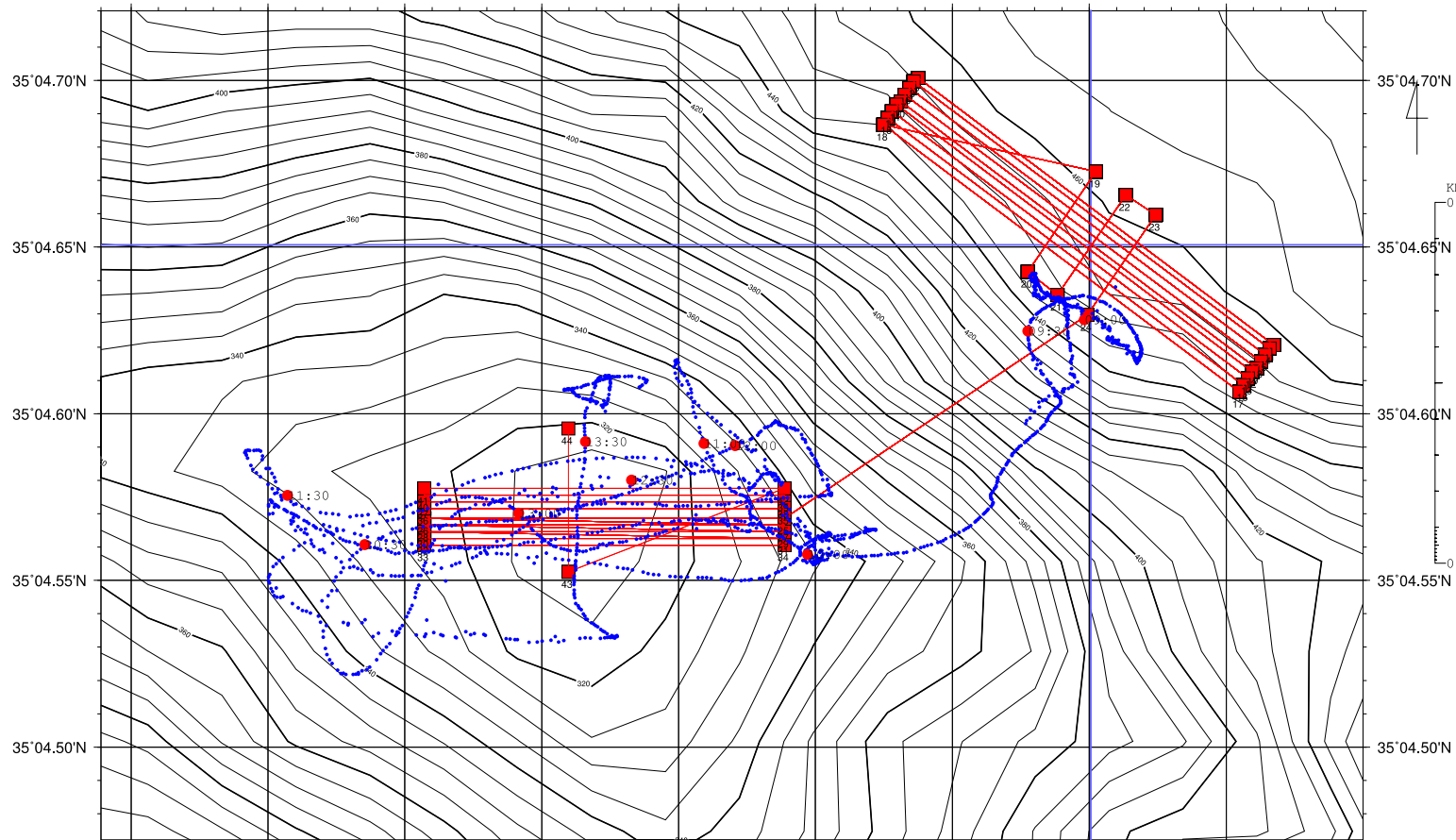


Dive Track:

#0048DIVE  
Suruga-Bay  
Site3

( 1 / 2000 )

138°34.35'E 138°34.40'E 138°34.45'E 138°34.50'E 138°34.55'E 138°34.60'E 138°34.65'E 138°34.70'E 138°34.75'E

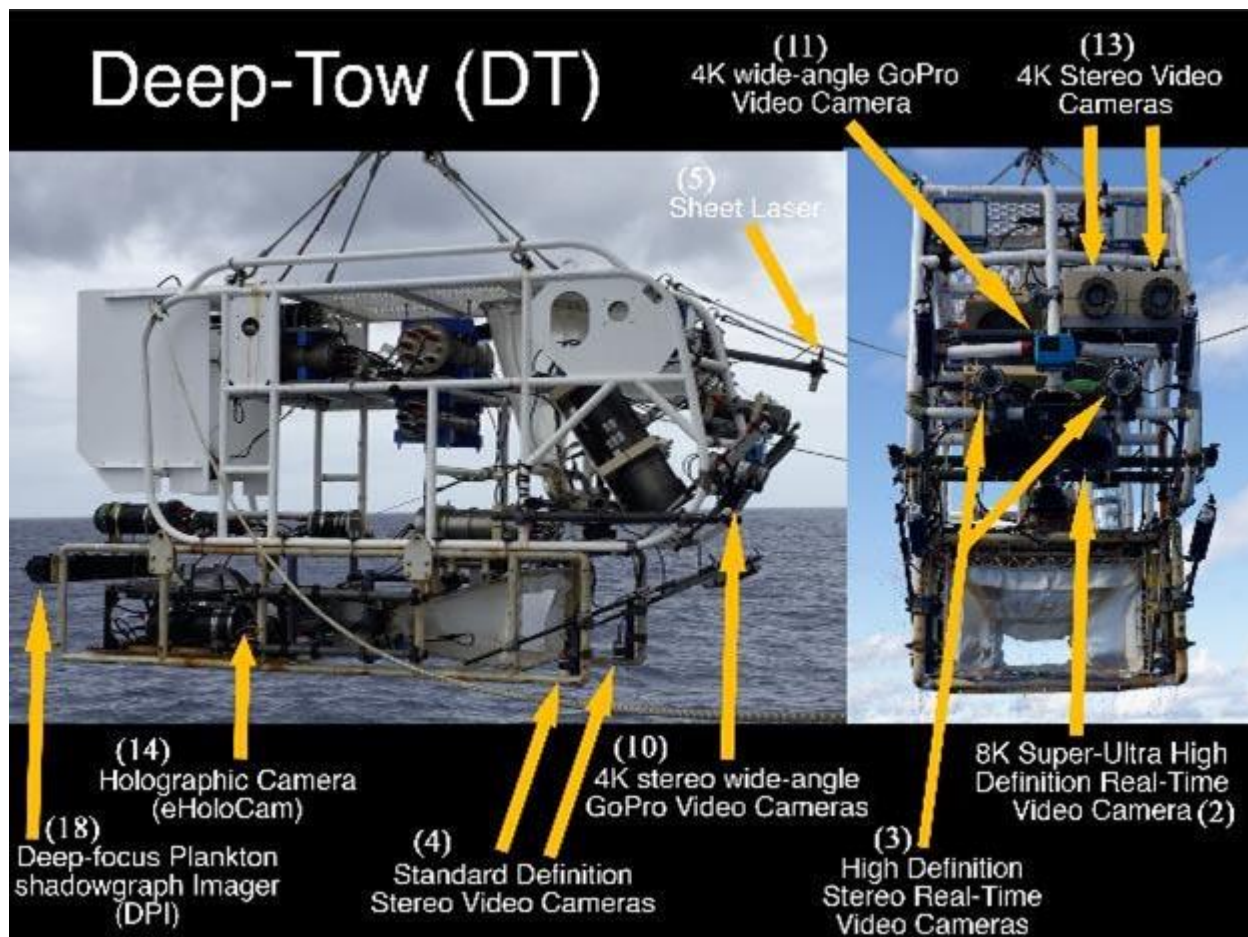


138°34.35'E 138°34.40'E 138°34.45'E 138°34.50'E 138°34.55'E 138°34.60'E 138°34.65'E 138°34.70'E 138°34.75'E  
XY Origin Lat 35-04.65000N Lon 138-34.70000E (UR) Lat 35-04.72090N Lon 138-34.79999E  
Center Lat 35-04.59600N Lon 138-34.56900E (LL) Lat 35-04.47210N Lon 138-34.33901E  
Grid\_File:227\_50.grd ContourInt:5m (2020-02-27)

Datum WGS-84 Proj.MER

## 6. PLATFORM & PAYLOAD INFORMATION

### 6KCDT



名称	6,000m カメラディープトウ (6KCDT) 及びスキッド				
使用目的	映像による生物と環境因子調査用				
大きさ (L×W×H)	300x110x250cm	空中重量	1500kg	水中重量	1200kg

ウインチは、No15 光電気複合ケーブルウインチを用い、船尾 A フレームクレーンによって着水揚収を実施する。

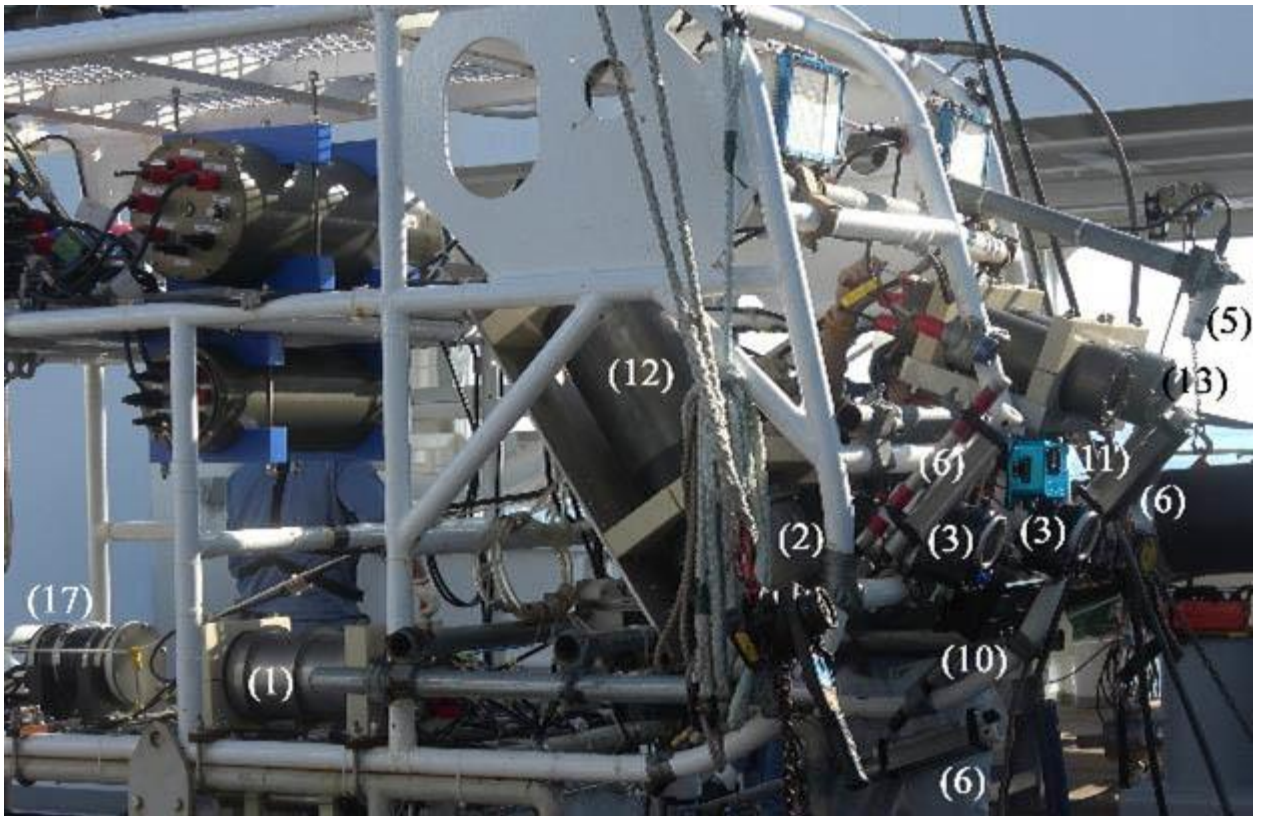
- (1) PIC3000 制御用耐圧容器 (耐圧 3000m、φ219 mm×長さ 600 mm、  
 気中重量 30.8kg 水中重量 12kg)。容器内の方位計、チルト計などで姿勢  
 を把握・記録する。

- (2) 8K ビデオカメラ (耐圧 2000m、 $\phi$ 215 mm $\times$ 長さ 641 mm、気中重量 26kg 水中重量 10kg)。高解像度の生物、海底、マリンスノーの動画 (秒 60 コマ) を撮影するために、前方下方 45°程度に配置する。
- (3) PIC3000 用 HDTV カメラ 2 台 (耐圧 3000m、 $\phi$ 95 mm $\times$ 長さ 195 mm、気中重量 2.25kg、水中重量 1kg[ $\times$ 2 台]) サイズ測定や個体数密度の計算に用いる映像データ (秒 29.97 コマ動画) を撮影するために、前方に配置する。
- (4) PIC3000 用 NTSC カメラ 2 台 (耐圧 3000m、 $\phi$ 64 mm $\times$ 長さ 95 mm、気中重量 0.5kg、水中重量 0.3kg[ $\times$ 2 台]) サイズ測定や個体数密度の計算に用いる映像データ (秒 29.97 コマ動画) を撮影するために、下方に配置し、ラインレーザーが写り込むようにする。
- (5) ラインレーザー (耐圧 6500m、 $\phi$ 38 mm $\times$ 長さ 165 mm、水中重量 0.9kg、520 nm、ライン厚さ 1.5 mm)。海底の凹凸を把握するため、また、HDTV カメラでゼラチン質動物プランクトンやマリンスノーのオプティカルスライスを撮影するため。
- (6) シート LED 照明 [6 台] (耐圧 3000m、67 mm $\times$ 43 mm $\times$ 長さ 339 mm、気中重量 1.3kg、水中重量 0.75kg[ $\times$ 6 台])。それぞれのビデオカメラに対して最適な配置で設置する。
- (7) PIC3000 用高度計 (耐圧 3000m、 $\phi$ 89 mm $\times$ 長さ 155 mm、気中重量 1kg、水中重量 0.4kg)。海底よりの高度をリアルタイムで把握・記録するため。
- (8) PIC3000 用 CTDO 計 (耐圧 2050m、 $\phi$ 65 mm $\times$ 長さ 420 mm、気中重量 2.4kg、水中重量 1.5kg)。生息環境の物理・化学的環境を把握するため。
- (9) PIC3000 用 CTD 計 (耐圧 2050m、 $\phi$ 65 mm $\times$ 長さ 420 mm、気中重量 2.3kg、水中重量 1.4kg)。生息環境の物理・化学的環境を把握するため[主にバックアップ用]。
- (10) 4KGoPro ステレオカメラ容器 (耐圧 3000m、W250mm $\times$ D71mm $\times$ H144mm、気中重量 3.5kg、水中重量 2.3kg)。超ワイドの映像で前方下方の大型物体のサイズ測定に用いる。
- (11) 4KGoPro カメラ 2 台 (耐圧 3000m、W162mm $\times$ D71mm $\times$ H144mm、気中重量 2.3kg、水中重量 1.3kg[ $\times$ 2 台])。超ワイドの映像で海底を真上から撮影記録するため。

- (12) 4KVPR ステレオビデオカメラ (耐圧 2400m、φ276 mm×長さ 899 mm、  
 気中重量 45.6kg[容器のみ])。より高解像度の明るいステレオ視映像を撮  
 影記録するため。前方下方 45°程度に配置する。
- (13) 4KSony ステレオビデオカメラ (耐圧 6000m、480 mm×240 mm×長さ 500  
 mm、気中重量 20kg[固定台含む])。より高解像度の明るいステレオ視映  
 像を撮影記録するため。前方下方 45°程度に配置する。
- (14) ホログラフィックカメラ\*\*\* (耐圧 1600m、気中重量 132kg スキッドに  
 1740 mm×760 mm×500 mm のフレームを搭載)。幼生などの微小なプラ  
 ンクトンを撮影するため。
- (15) Daitron-Omicron 水中光コネクター変換用耐圧容器 (耐圧 6500m、  
 φ64 mm×長さ 191 mm[コネクター含まず]、気中重量 3kg)
- (16) AUSOMS-ミニ深海用ハイドロフォン 2 台 (耐圧 2000m、φ60 mm×長さ  
 200 mm 気中重量 1kg、水中重量 0.6kg[×2 台])。サウンドスケープの録  
 音記録。
- (17) 変圧器容器 (耐圧 2050m、φ190 mm×長さ 280 mm 気中重量 11kg)。  
 6KCDT の AC100V のペイロード電源を DC24V に変圧するため (容量  
 500W)。
- (18) Deep-focus Plankton Imager (DPI) (耐圧 2000m、1700×2000×300 mm、  
 気中重量 85kg、水中重量 60kg)。ゼラチン質動物プランクトンを撮影す  
 るためのシャドーグラフ式撮影装置 (沖縄大学院大学より借用)。

\*\*\* (14) ホログラフィックカメラは、深度 1600m 以深の観測地点では使用しない。  
 他の機器でも、耐圧深度より深い深度では、取り外し、使用しない。







6 KCDT 搭載前及び搭載時の写真

\*上記の内、4,6の一部、14,18についてはスキットに搭載する。

## 7. RESEARCH/DEVELOPMENT ACTIVITIES

- (Individual activity title)

(Descriptions for research activities, such as:

- Responsible personnel
- Purpose, background
- Activities (observation, sampling, development)
- Methods, instruments
- Results
- Dive Information (dive number, location, payloads, dive log, sampling, dive track)
- Future plans
- QC information of data/samples
- Lists (samples, observation equipment, deployment & recovery)
- Local field map (dive tracks, sampling points, survey lines)

The PICA3000 system will be re-engineered to fix the problems identified during this cruise. An operations manual will be made for other equipment to reduce human operator error.

NHK World television program “A sharper look at amazing jellyfish” was aired on 25 March 2020, documenting the present cruise.

<https://www3.nhk.or.jp/nhkworld/en/tv/scienceview/20200325/2015232/>

## NOTICE ON USING

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

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

Users of information on this report are requested to submit Publication Report to JAMSTEC.

<http://www.godac.jamstec.go.jp/darwin/explain/1/e#report>

E-mail: [submit-rv-cruise@jamstec.go.jp](mailto:submit-rv-cruise@jamstec.go.jp)