

***R/V Kaimei* and Seafloor Sampling Capabilities**

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Future of US Marine Seafloor and Sub-Seafloor Sampling Capabilities
Workshop

Research Fleet



Yokosuka
 Built: 1990
 L×B: 105.2×16.0 (m)
 Gross tonnage: 4,439
 Accommodation: 60 (15)
 (for researcher)
 Main objective: Deepsea research



Kaimei
 Built: 2016
 L×B: 100.5×20.5 (m)
 Gross tonnage: 5,747
 Accommodation: 65 (38)
 (for researcher)
 Main objective: Subseafloor research



Mirai
 Built: 1997
 L×B: 128.5×19.0 (m)
 Gross tonnage: 8,706
 Accommodation: 80 (46)
 (for researcher)
 Main objective: Atmospheric and Oceanographic research

Research Fleet



Hakuho maru

Built: 1989
L×B: 100.0×16.0 (m)
Gross tonnage: 4,073
Accommodation: 89 (35)
(for researcher)
Main objective:
Oceanographic research

Shinsei maru

Built: 2013
L×B: 66.0×13.0 (m)
Gross tonnage: 1,635
Accommodation: 41 (15)
(for researcher)
Main objective:
Oceanographic research

Chikyu

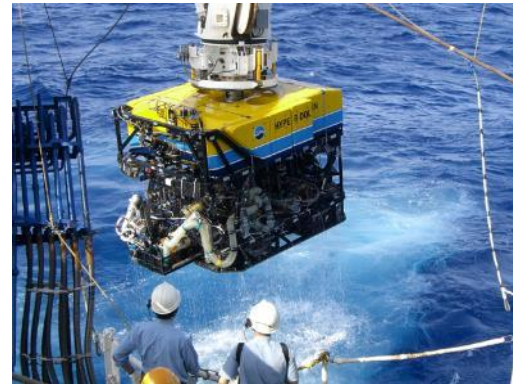
Built: 2005
L×B: 210×38 (m)
Gross tonnage: 56,752
Accommodation: 200 (50)
(for researcher)
Main objective:
Deepwater seafloor drilling

Underwater Vehicles

HOV



ROV



Shinkai 6500

Built: 1989
Max operating depth: 6,500m
Capacity: 3
Payload: 300kg (in air)
Support Vessel: *Yokosuka*

Kaiko Mk-IV

Built: 2013
Max operating depth : 4,500m
Payload : 300kg (in air)
 100kg (in water)
Support Vessel: *Kaimei,*
 Shinsei maru

Hyper-Dolphin

Built: 2000
Max operating depth : 4,500m
Payload : 300kg (in air)
 100kg (in water)
Support Vessel: *Kaimei,*
 Shinsei maru

KM-ROV

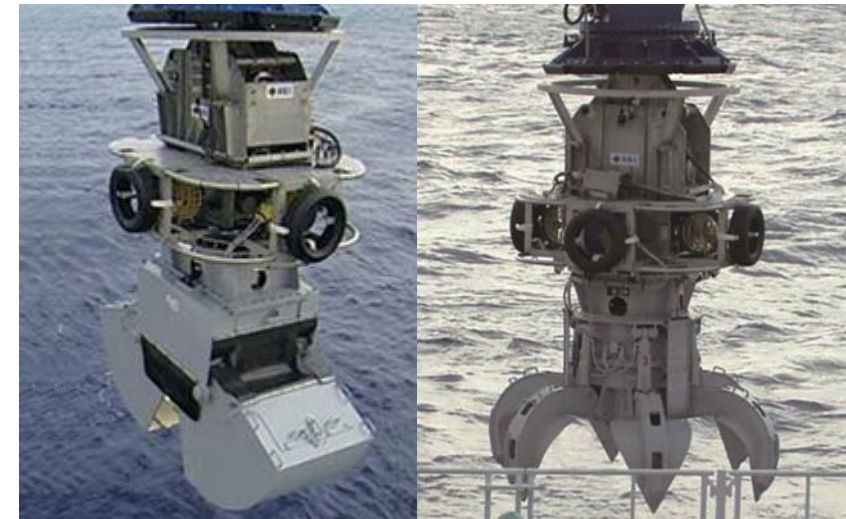
Built: 2016
Max operating depth : 3,000m
Payload : 250kg (in air)
 100kg (in water)
Support Vessel: *Kaimei,*

Underwater Vehicles

AUV



Others



R/V Kaimei's sampling equipments

- Remotely operated seafloor drilling rig (BMS: left photo)
- Power grabs (above 2 photos)

Urashima

Built: 2009
Max operating depth : 3,500m
Support Vessel: *Yokosuka*

Jinbei

Built: 2012
Max operating depth : 3,000m
Support Vessel: *Kaimei, others*

R/V Kaimei



- ✓ Structure exploration under the seafloor using the 3-mode seismic exploration system (MCS)
- ✓ Collecting strata samples using a 3,000m class BMS (Boring Machine System)
- ✓ Collection of strata samples using Full Depth 40m class GPC (Giant Piston Corer) and 20m class PC
- ✓ Sampling sediments and rocks on the seabed using 6,000m class Power Grab
- ✓ Full depth CTD observation
- ✓ Undersea survey using the 3,000m class remotely operated vehicle KM-ROV
- ✓ ROV and AUV operation
- ✓ General atmospheric and oceanographic research

Boring Machine System (BMS)



General Specification :

L×B×H 3.2m×2.4m×5.6m

Weight 13t (in air)、10t (in water)

Max operation depth 3,000m

Tools

T146 core barrels : Φ 120mm (Max. 7.5m)

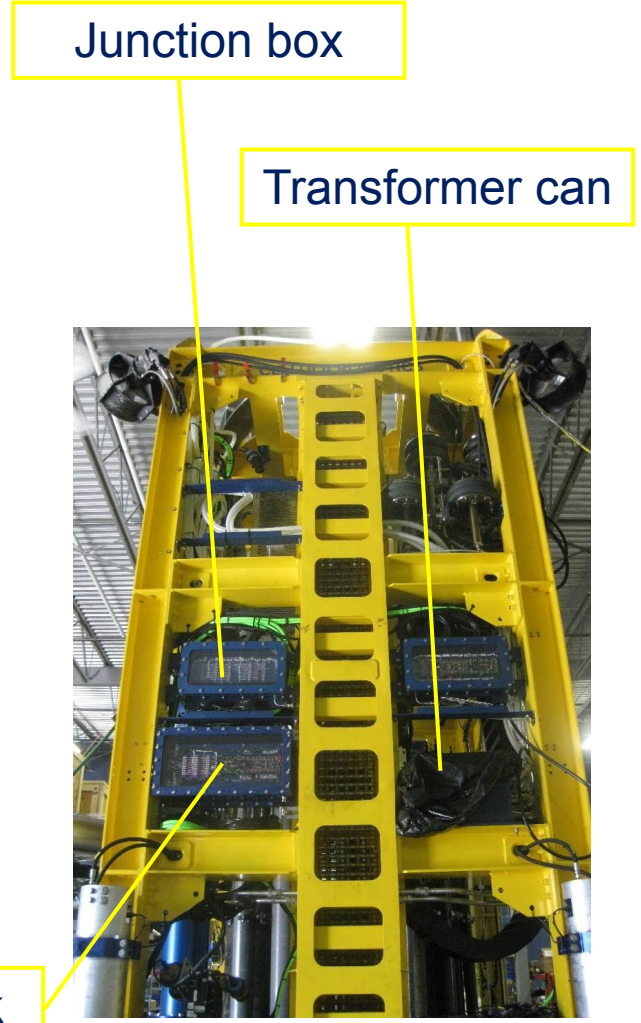
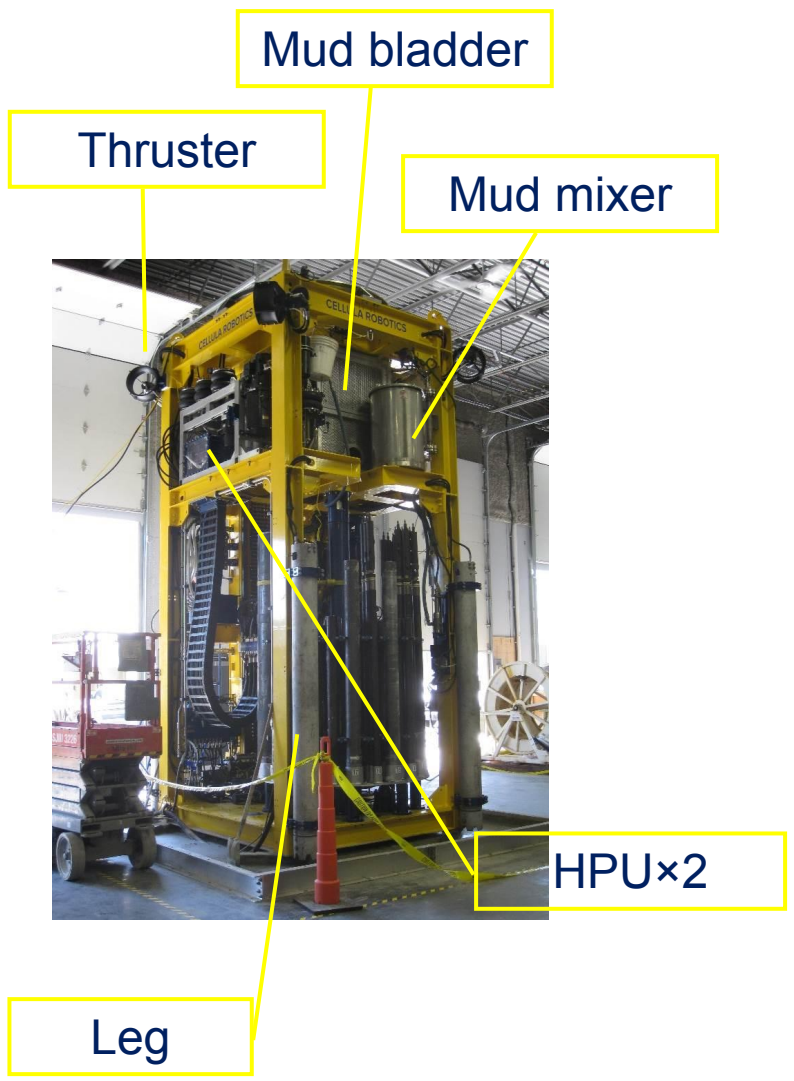
H-size core barrels : Φ 63mm (Max. 60m)

※Core sample 1.5m/core

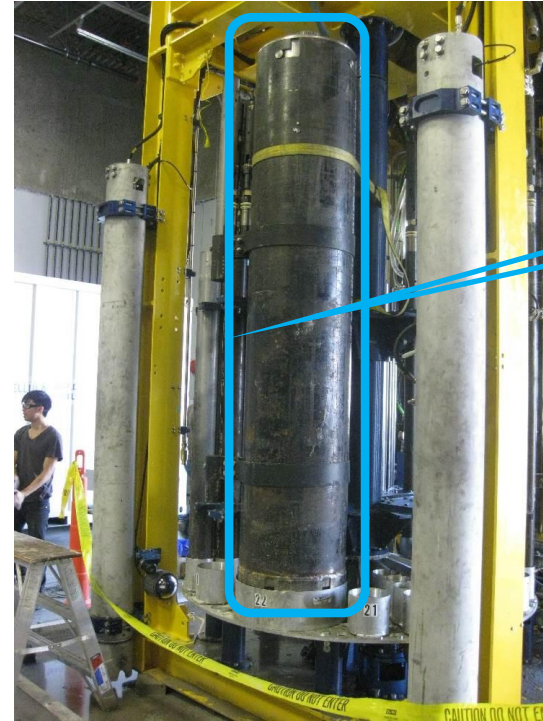
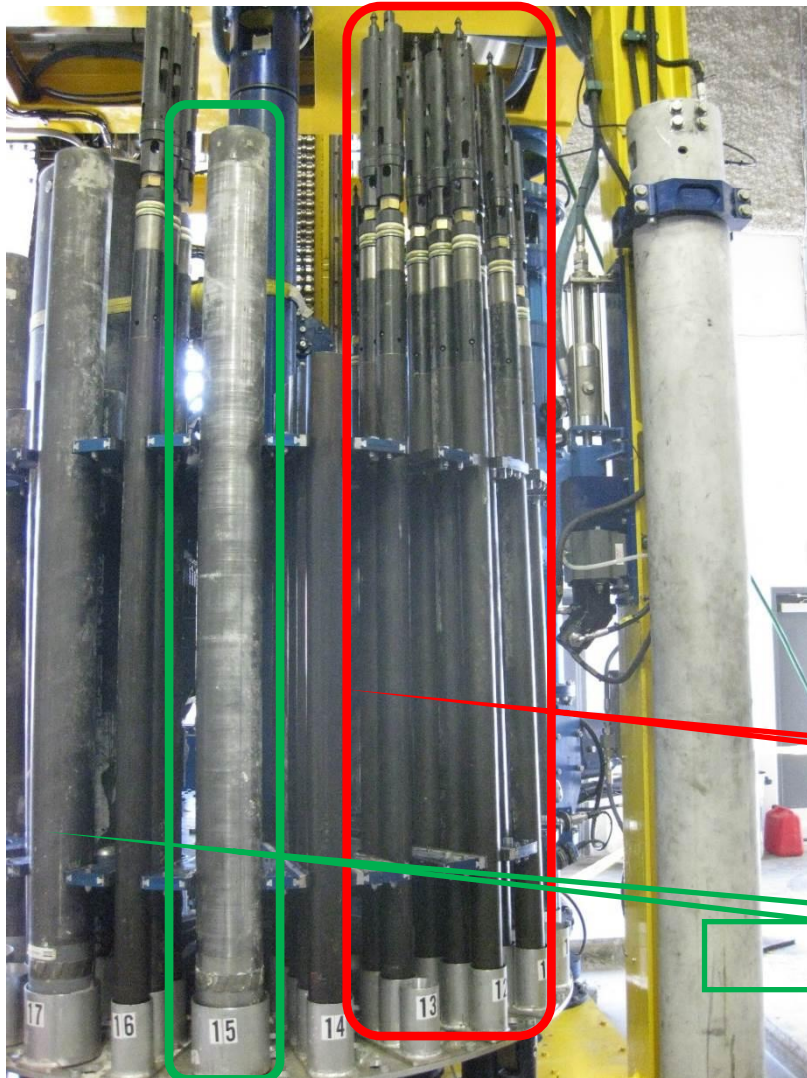
Casing : Φ 450mm (Max. 2.5m)

Manufactured by CELLULA ROBOTICS

Boring Machine System (BMS)



Boring Machine System (BMS)



Φ450mm casing

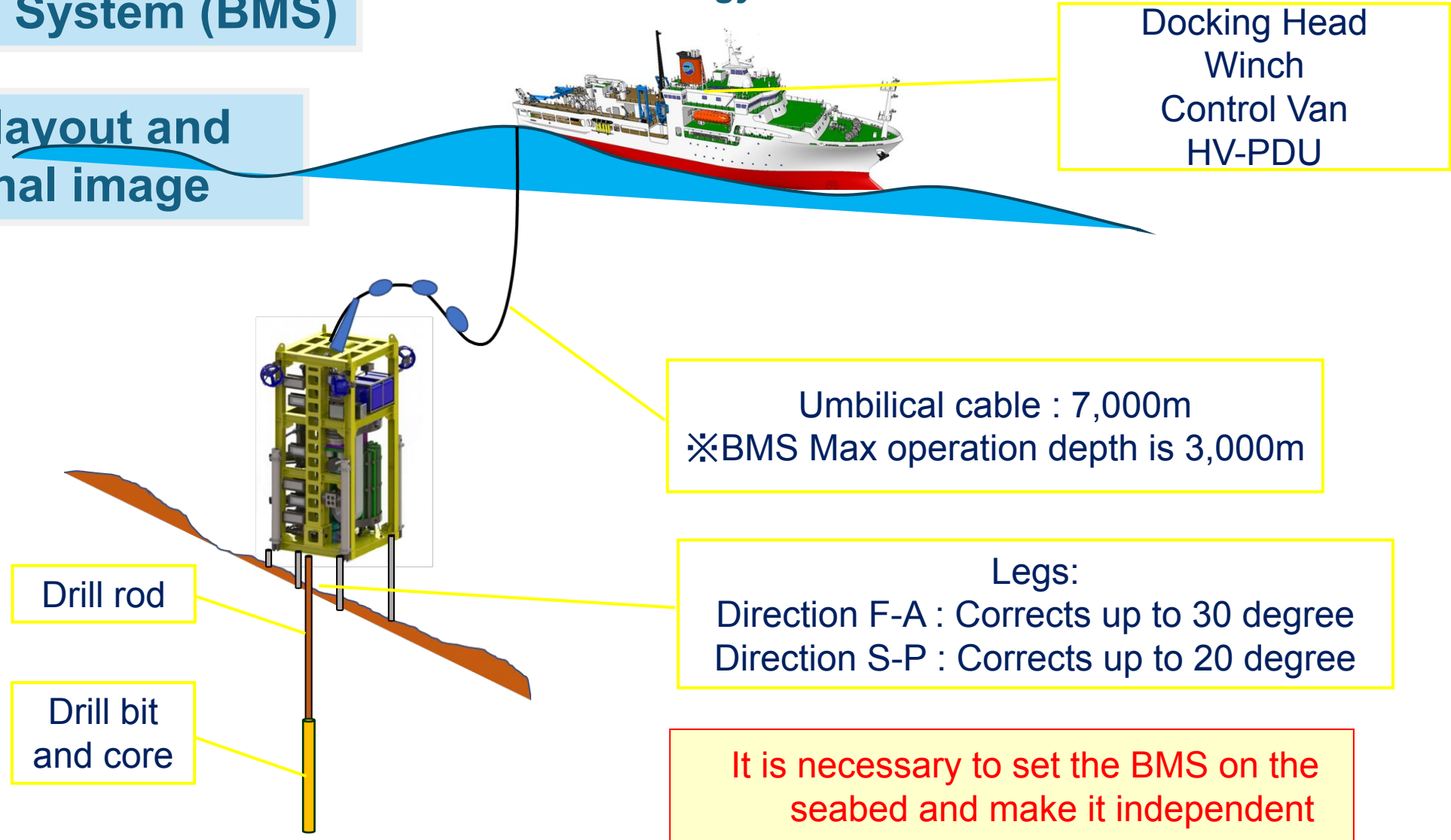
H-Size core barrels

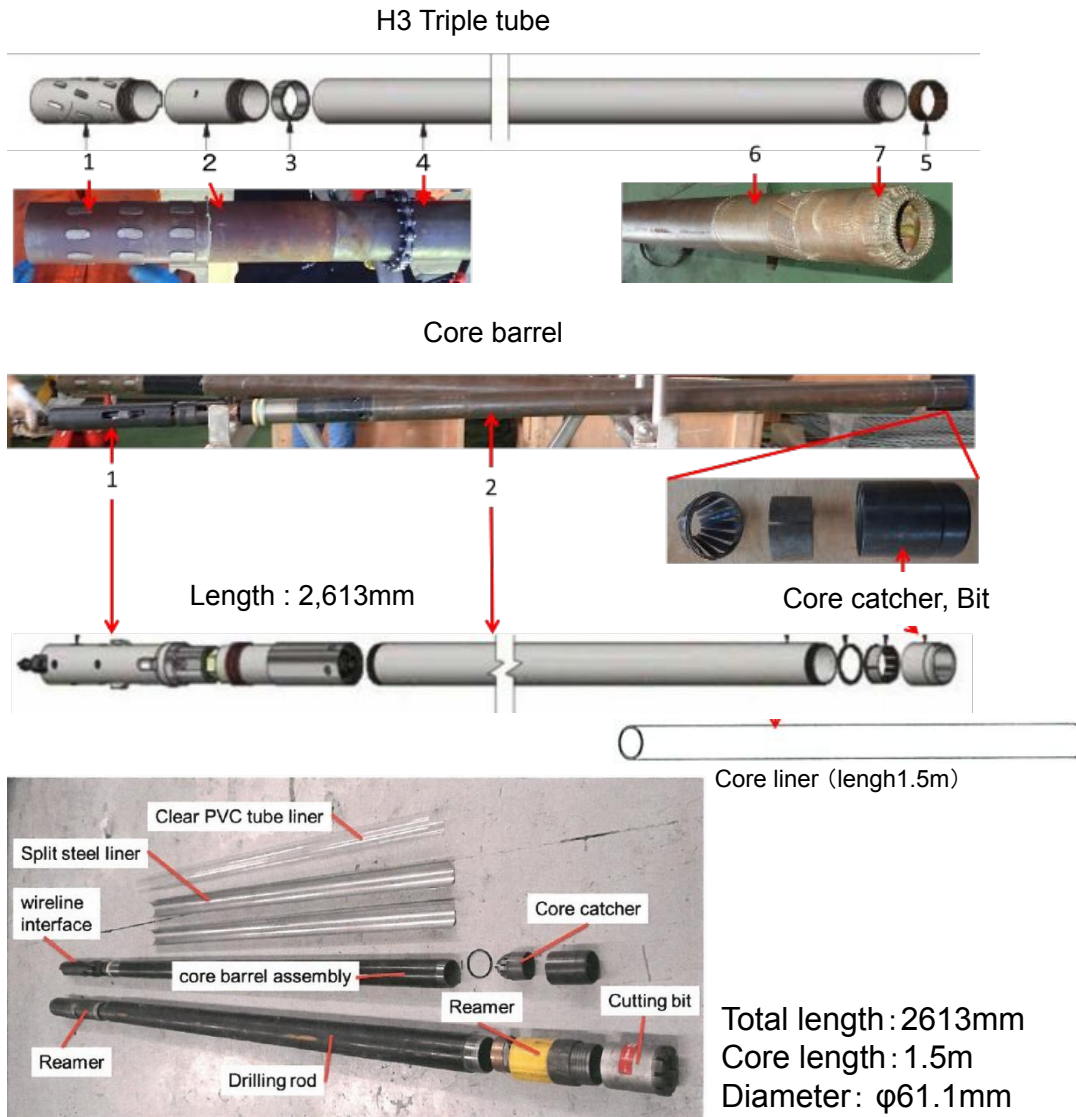
T146 core barrels



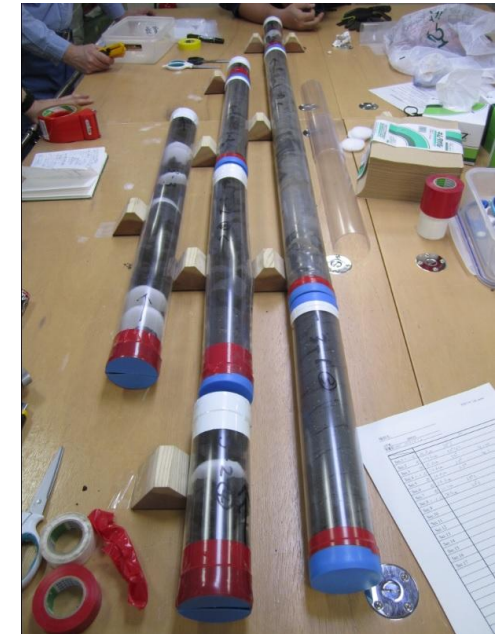
Boring Machine System (BMS)

Onboard layout and
operational image



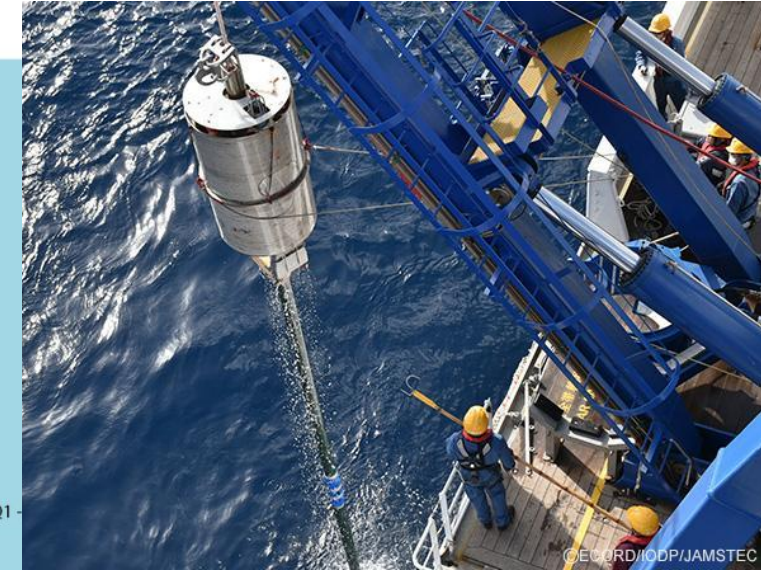
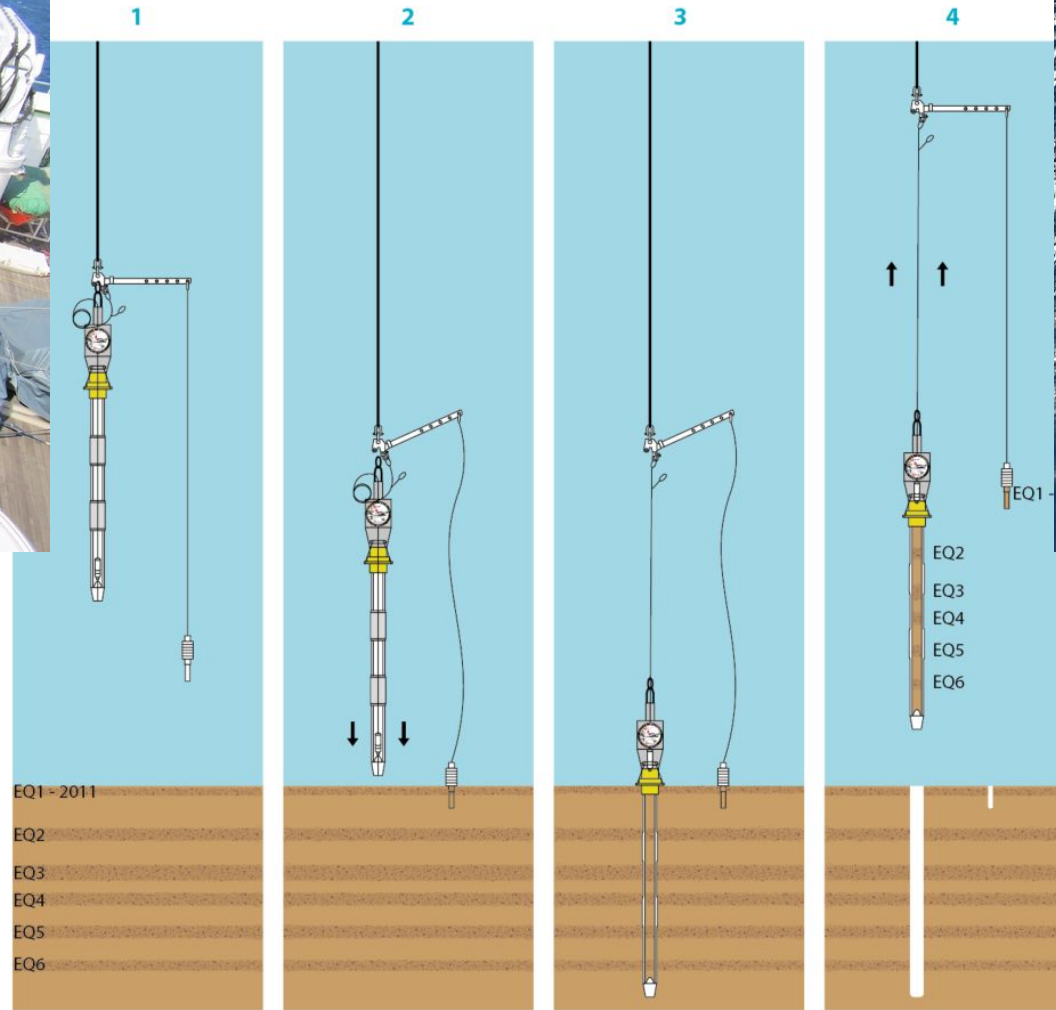
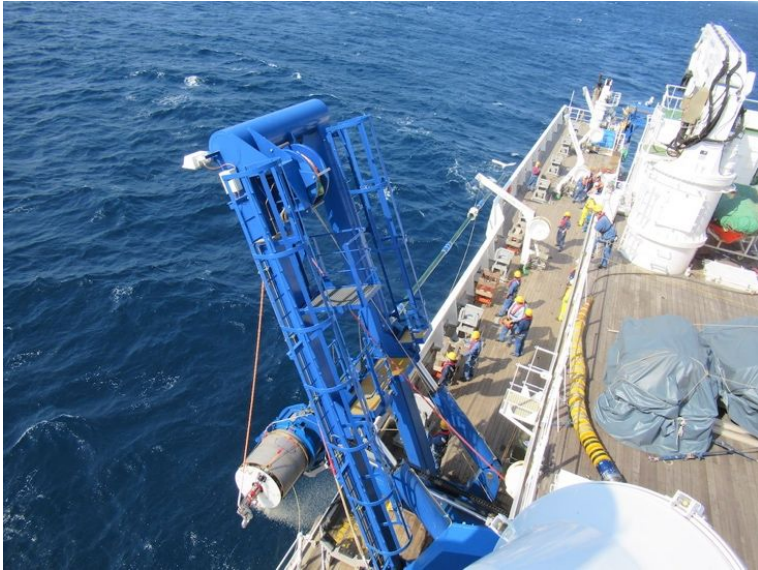


○ Split steel core liner :
 $\Phi 66 \times 61.1\text{mm}$ 1537mm



○ Polycarbonate core liner :
 $\Phi 66 \times 62\text{mm}$ 1540m
 * Not reusable
 * Used when MSCL measurement with a whole core

Giant Piston Core (GPC)



Giant Piston Core (GPC)

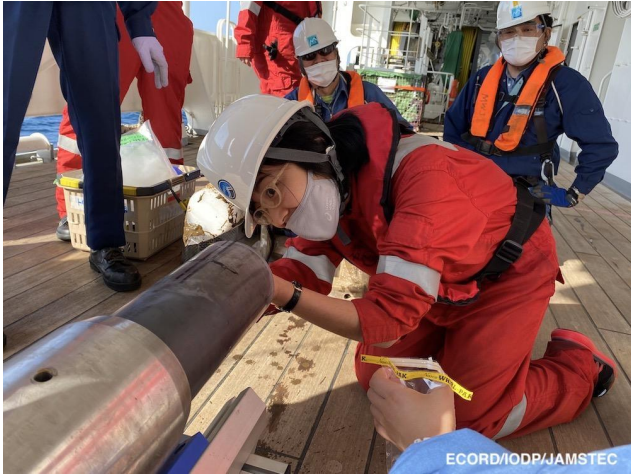


Comparison of GPC and normal PC

	GPC	normal PC
Max. sampling length	40m	20m
Max. barrel weight	6,300kg	1,200kg
Barrel material	Alloy steel	Aluminum
outer diameter	168mm	92mm
inner diameter	129mm	80mm
Total (Max.)	10,060kg	1,350kg

Giant Piston Core (GPC)

IW Sampling



Chemical analysis

MSCL



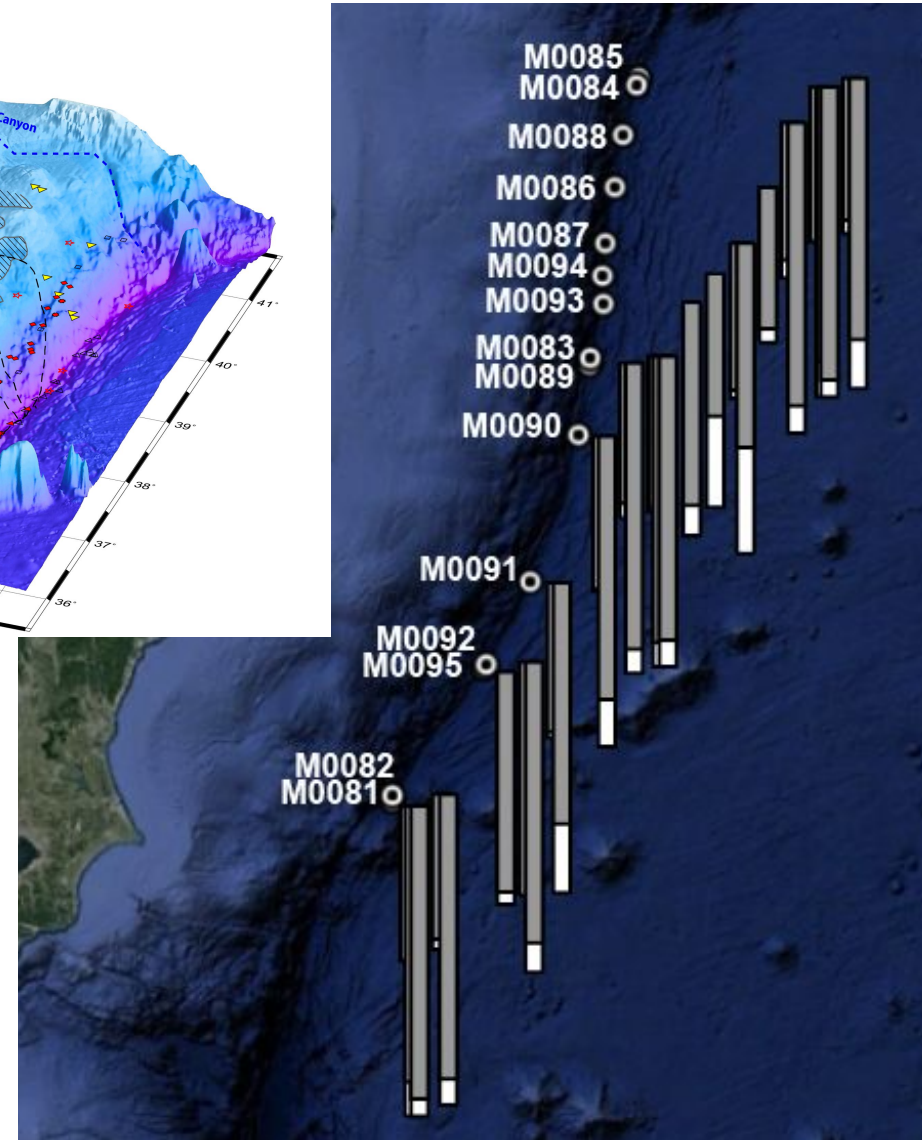
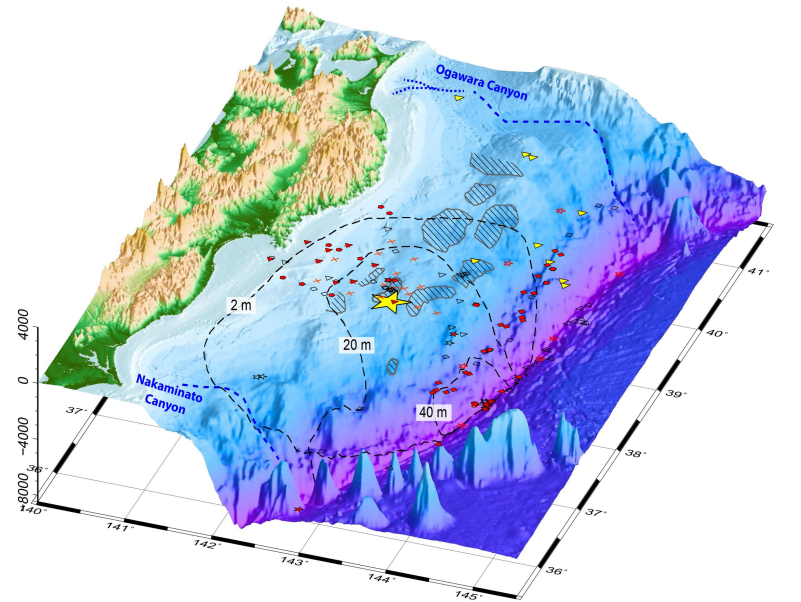
Giant Piston Core (GPC)

IODP Exp. 386

Apr.13~Jun.1, 2021

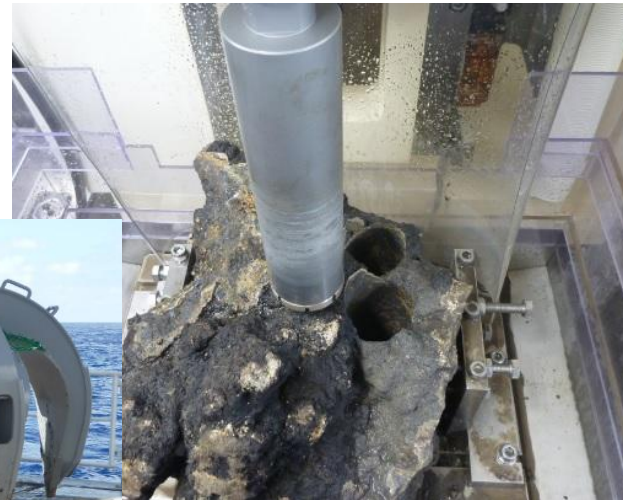
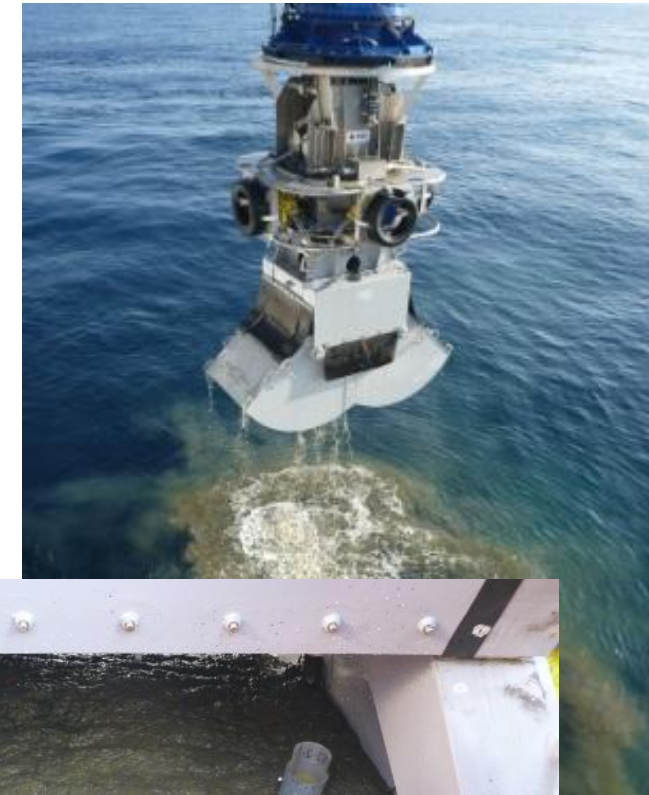
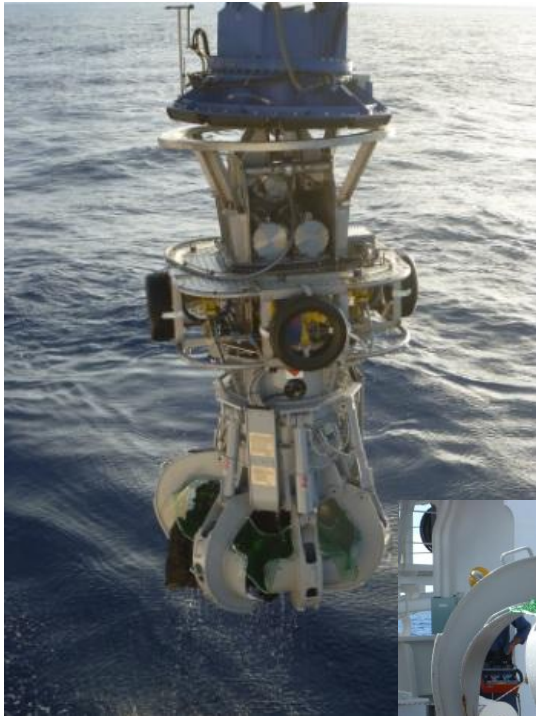
This expedition has been planned and conducted by the European Consortium for Ocean Research Drilling (ECORD) to study the seismic history of Japan Trench.

- ❖ 15 sites (18 planned)
- ❖ 29 coring (36 planned)
- ❖ 20m x11, 30m x4, 40m x 14
- ❖ Average recovery, 87.8%
- ❖ Total core length, 830m
- ❖ Water Depth, 7,445 – 8,023 m



Power Grab (PG)

- ❖ Capable of sampling rocks or sediments from seabed up to a maximum depth of 6,000m.
- ❖ Closeable 6 claw type (PGC) for rock sampling and shell type (PGS) for sediment sampling.





Thank you!
Any Question?