
# Operational options for offshore drilling

Nobu Eguchi

Director of Operations, Operation Dept.

MarE3/JAMSTEC

# Two potential vessels for new SOD


DV CHIKYU

Riser/Riserless Drilling


RV KAIMEI

Giant Piston Core System (GPC)

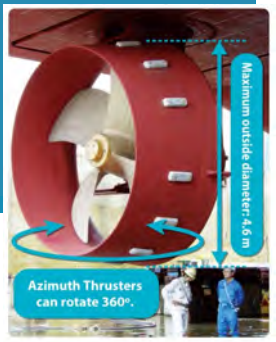
Boring Machine System (BMS)

# Deep-Sea Scientific Drilling Vessel *Chikyu*

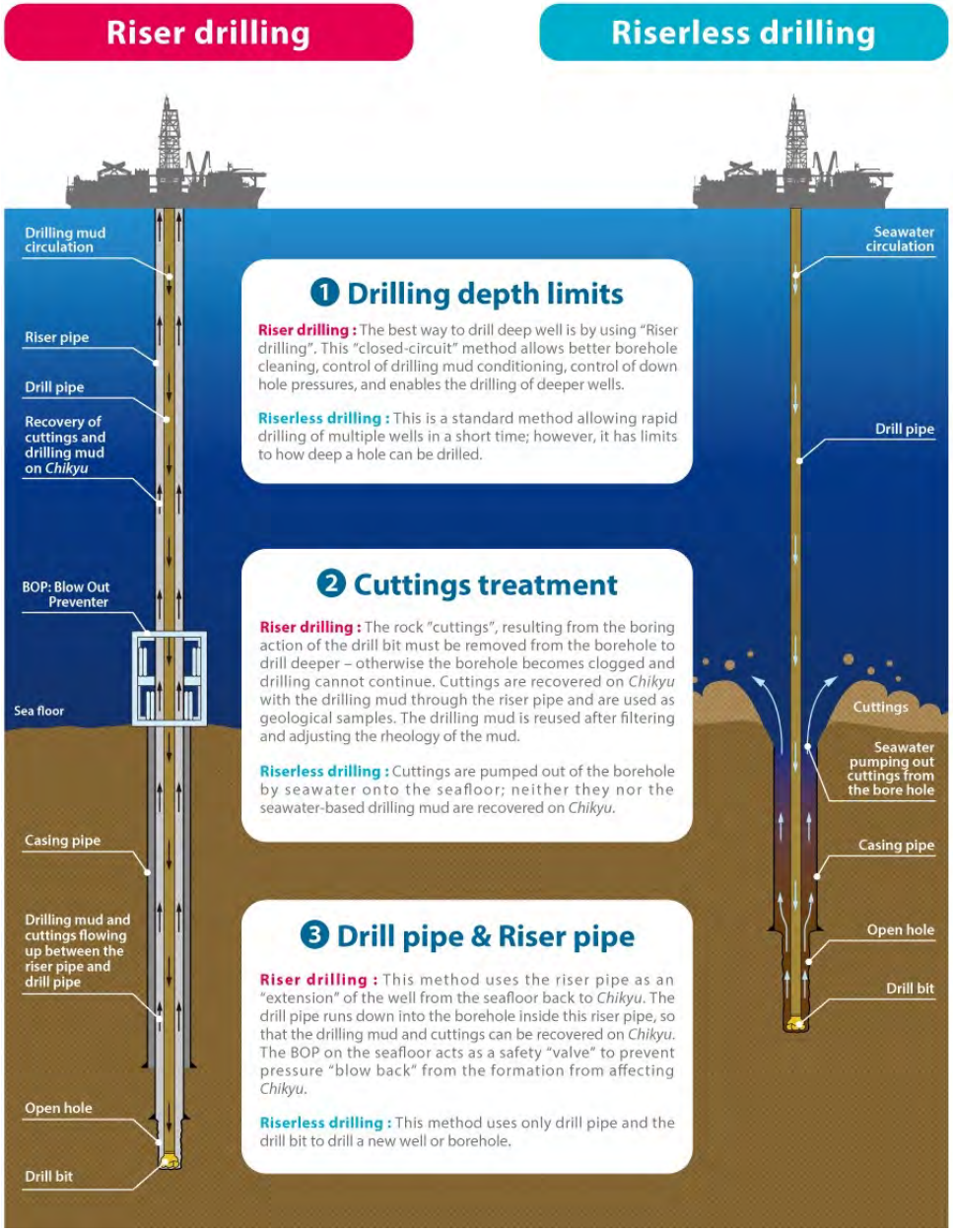

## Principle Particulars

| | |
|---|---|
| Length overall | 210.0m |
| Breadth | 38.0m |
| Depth | 16.2 m |
| Height | 130.0m |
| Draft | 9.2 m |
| Gross Tonnage | 56752 ton |
| Accommodation | 200 people |
| Transit Speed | 11.5knots |

- 50 science berth (incl. lab technicians)
- ROV (max. 3,000mbsl) available
- UWTV (max. 7,000mbsl) available
- Riser operation WD limit: 2,500m
- Max. pipe length: 9,000m
- Six azimuth thrusters



# Riser drilling and Riserless drilling





## 1 Riser pipe

The riser pipe connects the ship to the BOP on the seabed, and the borehole below that. Drilling mud is cycled from the bottom of the borehole back to the ship through the riser pipe. The drill pipe also passes through the riser pipe.


## 2 Drill pipe

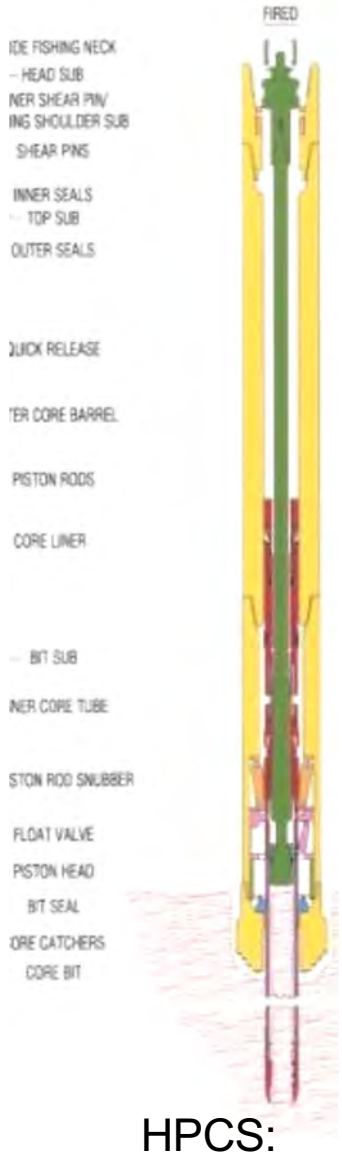
Drill pipe is used to drill the well, rotated by the top drive in the derrick. The drill bit at the end of the drill pipe "digs" the borehole. The drill pipe passes through the riser pipe and casing pipe.


## 3 Casing pipe

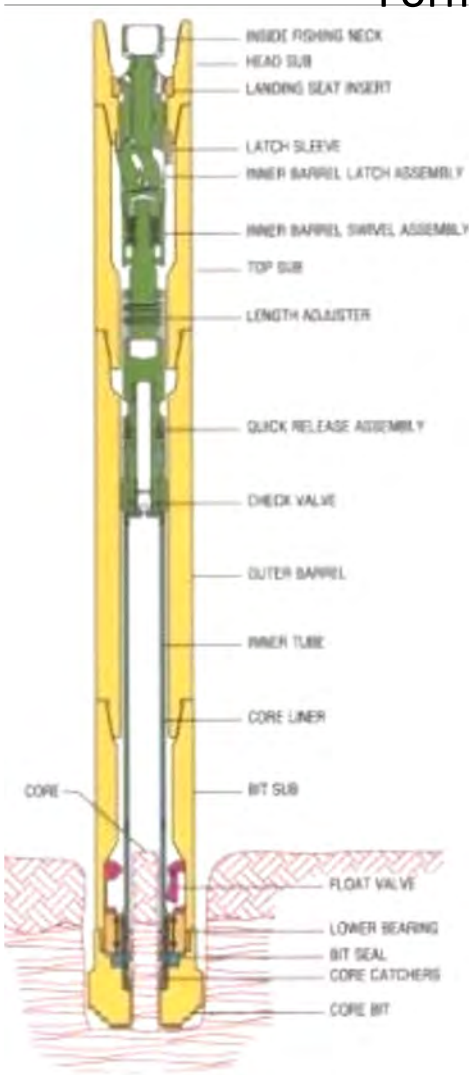
Casing pipe prevents borehole collapse. The casing pipe is run into the borehole and cemented to the sediments or rock formations below the seabed.

# Coring tools (flexible selection)

Soft Sediment ⟷ Hard Formation




- EPCS: Extended Punch Coring System
- ESCS Extended Shoe Coring System




HPCS:

Hydraulic Piston Coring System

RCB:

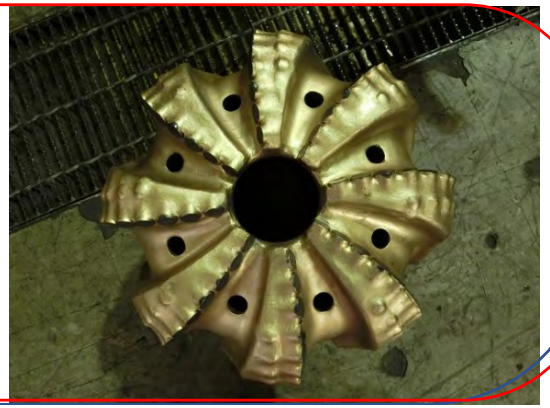
Rotary Core Barrel

# Coring and Drilling bits (flexible selection)

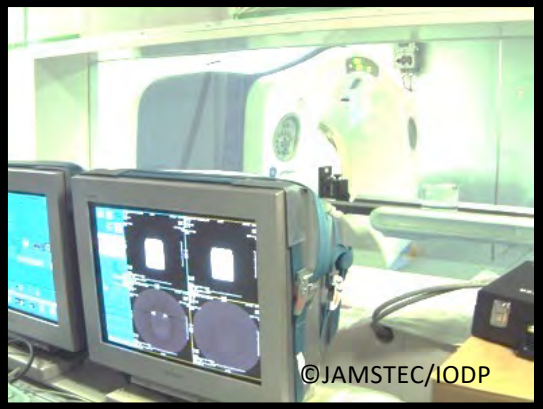
## Roller Cone type


## Fixed Cutter Type

## Coring bits



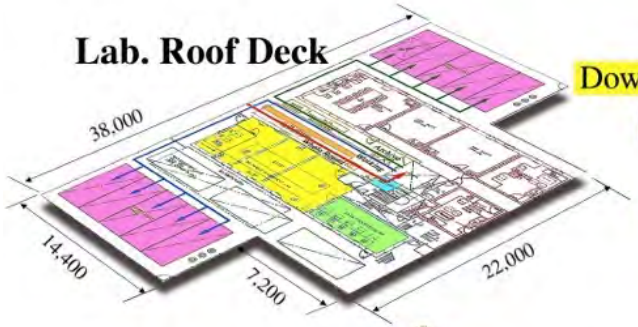
# Laboratory Area (flexible spacing)

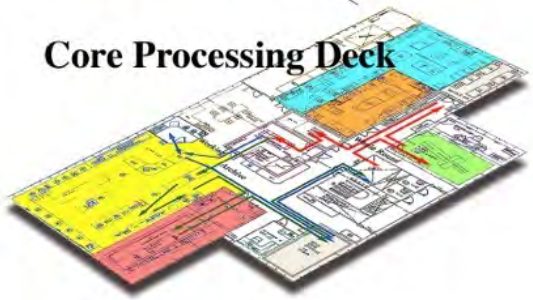




## *Laboratory Stack*




Core Register Rm
Core Cutting Area
Downhole Measure. Lab
Core Storage Space
(20ft container)
DATA Process.Rm



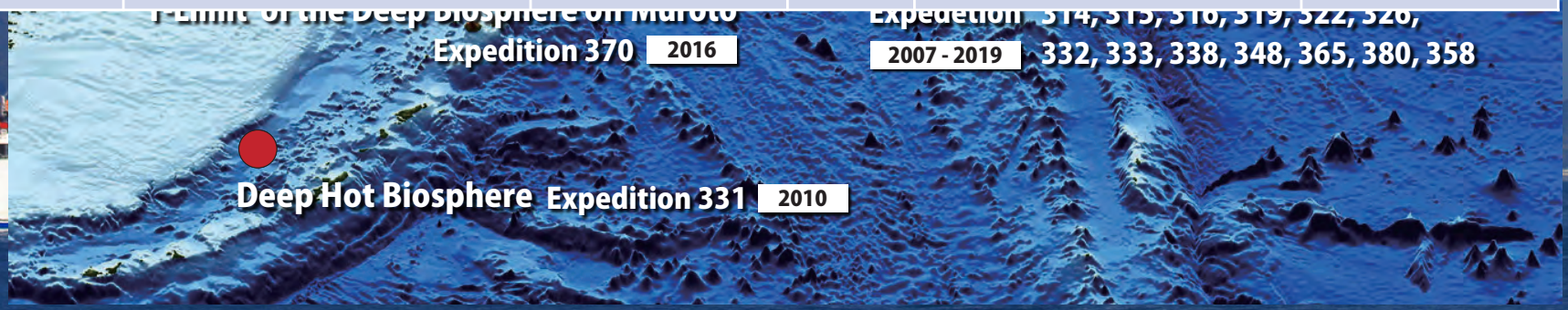

*Microbiology Lab*
*QA/QC Lab*
*X-Ray CT-Scanner Lab*
*Core Lab*
*Paleomag. Lab*


Chemistry Lab
Sample Prep. Rm
Thin Sect. Rm
Paleo/Petro. Lab
Clean.Rm


Conference Rm
Computer User Rm
Library
Data Integrated Rm
Office
Lounge

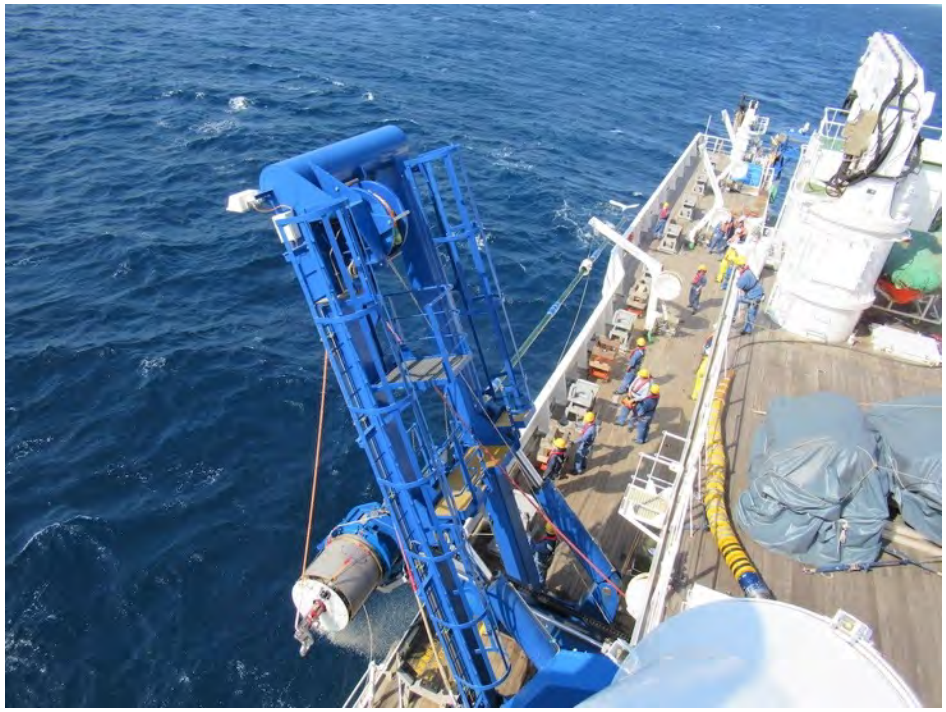
# Previous IODP Expeditions (flexible duration)

| Expedition | | Duration (days) | Expedition | | Duration (days) |
|---|---|---|---|---|---|
| 314 | NanTro SEIZE | **56** | 348 | NanTro SEIZE | **139** |
| 315 | NanTro SEIZE | **33** | 365 | NanTro SEIZE | **32** |
| 316 | NanTro SEIZE | **50** | 380 | NanTro SEIZE | **27** |
| 319 | NanTro SEIZE | **114** | 358 | NanTro SEIZE | **176** |
| 322 | NanTro SEIZE | **31** | 331 | Deep Hot Biosphere | **34** |
| 326 | NanTro SEIZE | **33** | 343 | JFAST | **54** |
| 332 | NanTro SEIZE | **48** | 343T | JFAST | **15** |
| 333 | NanTro SEIZE | **30** | 337 | Deep Coalbed Biosphere | **67** |
| 338 | NanTro SEIZE | **105** | 370 | T-Limit | **75** |

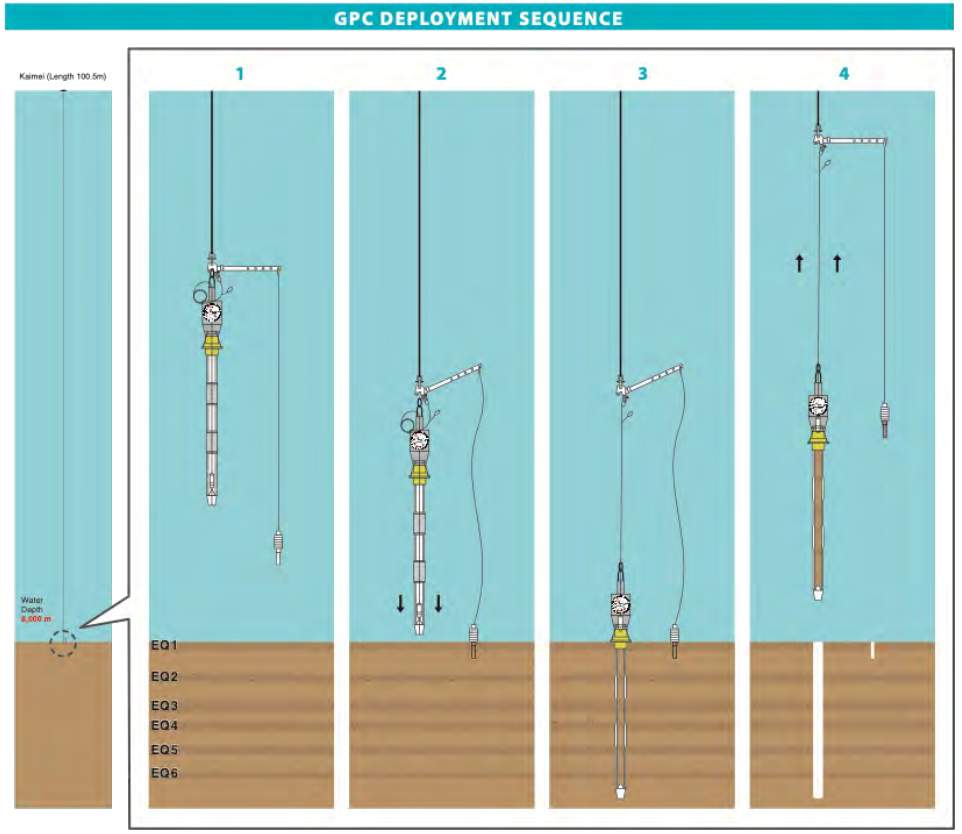



Expedition duration is flexible, 15 days to 176 days

# Giant Piston Coring System (RV Kaimei)



ECORD/IODP/JAMSTEC




Main weight: 2 – 6 ton
Barrel length: 10 – 40 m
Core size: 110mm
Main cable: 12,000 m

Exp. 386 Japan Trench
The deepest site ever drilled and cored: 8,023 mbsl
The deepest sub-sea level sample taken at 8,061 mbsl.

# Boring Machine System ： BMS (RV Kaimei)


Cellula Robotics（Canada）


Principal Particulars

| | |
|---|---|
| W x D x H | 3.1x3.1x5.7m |
| Maximum depth | 3,000m |
| Weight in air | 13tf |
| Hydraulic source | 40 hp x 2 |
| Power source | 3300V 3phase |
| Thruster | Hydraulic drive system x 4 |
| Observation | 8 cameras & Lights |
| Boring Performance<br>Diameter<br>x Excavation | Coring<br>H8:ϕ61.1mm×60m<br>146T:ϕ123mm×7.5m<br>Casing<br>ϕ450mm×2.0m |
| Boring Equipments | Drill-head, Wireline,<br>Tool arms, Carousel,<br>Foot clamp,<br>Mud water system |
| Navigation Sensors<br>& Positioning | Depth, Heading,<br>Atitude, Altitude,<br>Acousic Responder |

## Chikyu Facts

18 expeditions completed (2007-2019)

Deepest water: 6,897.5 mbsl (+844.5mbsf coring)

Deepest penetration: 3,262.5mbsf (riser operation)

Highest current experienced: > 6 knots

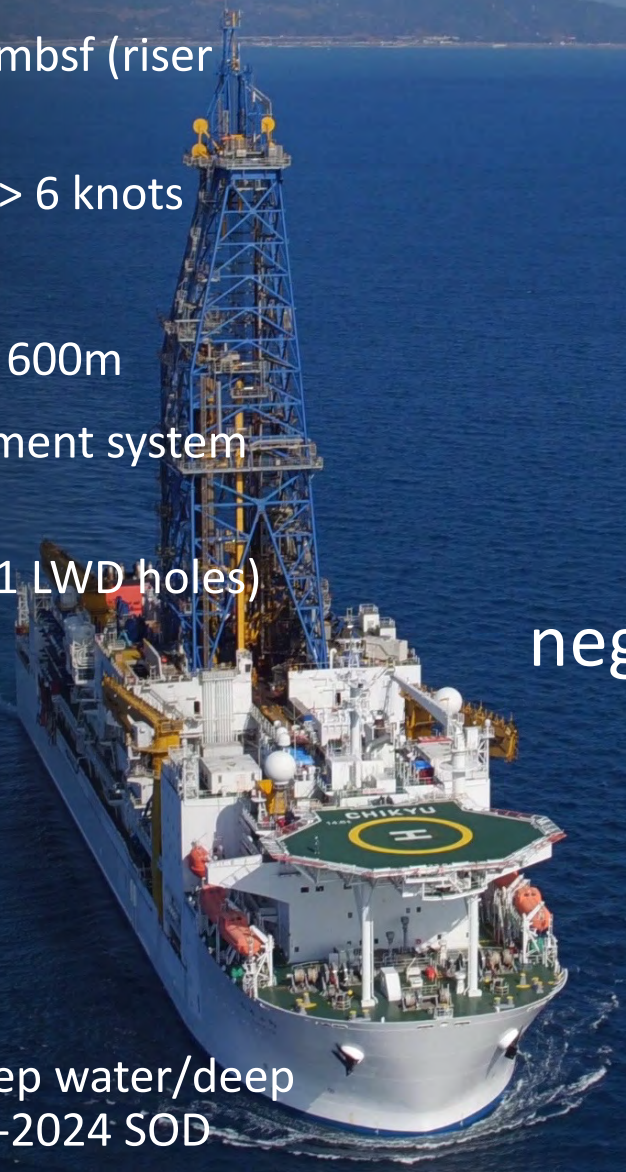
Longest expedition (176 days)

Shallowest limit of operation: 600m

Long-time borehole measurement system installation: 3 sites

Drilled boreholes: 114 (incl. 21 LWD holes)

Core recovered: 5,777m




Chikyu is a crucial MSP for deep water/deep penetration operation in post-2024 SOD

Thank you!

Any questions?

Nobu Eguchi
neguchi@jamstec.go.jp