The First Offshore MH Production Test

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Japan's Methane Hydrate R&D Program (announced in 2001)

Phase 1 (FY 2001 – FY2008)

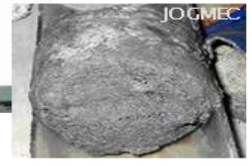
Basic Research

Onshore Production Tests

- 1st Production Test in 2002
- 2nd Production Test in 2008

Resource Assessment in Eastern Nankai Trough

- Seismic Surveys (2D, 3D)
- Exploratory Drillings



Phase 2 (FY 2009 – FY2015)

Technological Research and Production Tests

Production Tests

- 1st Offshore Production Test in 2013
- Middle to Long-term Onshore Production Test

Technological Studies

- Designing and Manufacturing Systems for Flow Test
- Studying Production Methods
- Assessing Environmental Impacts
- Resource Assessment

Phase 3 (FY2016 – FY2018)

Establishment of Technological Platform

To conduct studies to establish the technological platform for commercialization of methane hydrate

- Middle to Long-term Offshore Production Test
- Preparatory study for Commercial Production
- Economical Feasibility
- Evaluation of Environmental Impacts
- Overall Evaluation of the Total Program

etc.

Outline of the First Offshore MH Production Test

When ? FY2011– FY2013

- Preparatory Drilling in FY2011
- Flow Test in FY2012
- Well abandonment in FY2013

Where ? At Eastern Nankai Trough

- Daini Atsumi Knoll

A sand core containing methane hydrate which fills its pore. The core was sampled at eastern Nankai trough

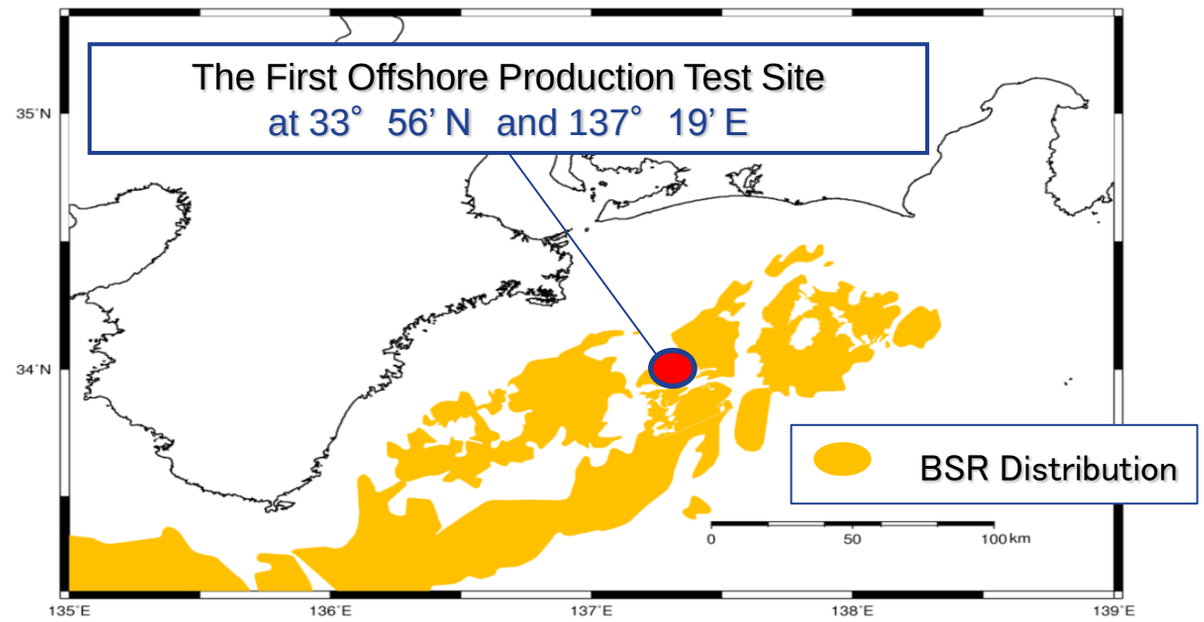
Source : Research Consortium for Methane Hydrate Resources in Japan

Who ?

- Implementing Body: JOGMEC
- Operator: JAPEX
- Operating Vessel: deep sea drilling vessel "Chikyu" owned by JAMSTEC

How ? To produce methane hydrate offshore applying depressurization method

- Depressurization method was verified in the onshore production test conducted in Canada in 2008.

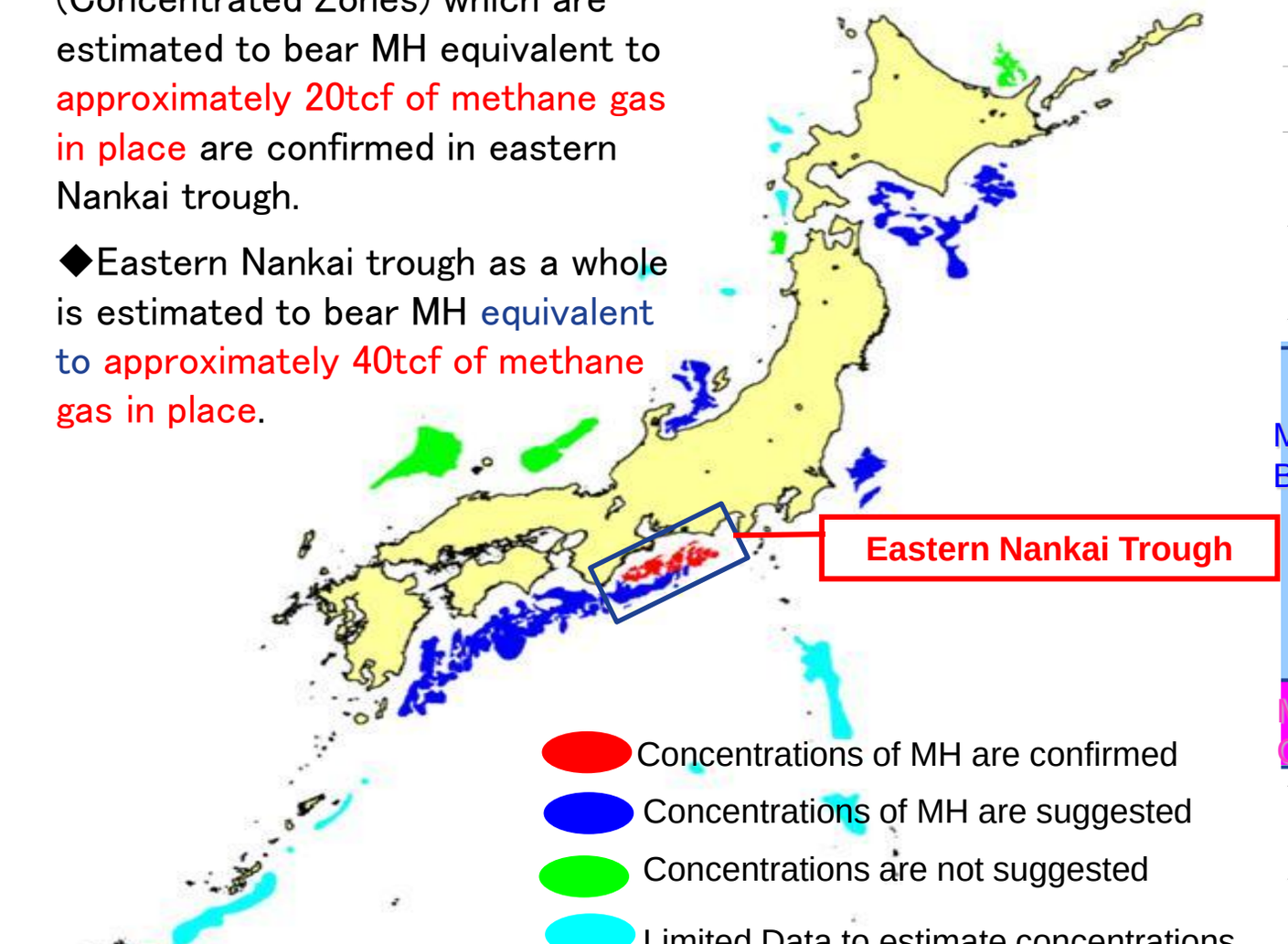


Distribution of MH and Selection of the First Offshore Production Test Site

MH Distributed Areas Offshore Japan Estimated by BSR Occurrence

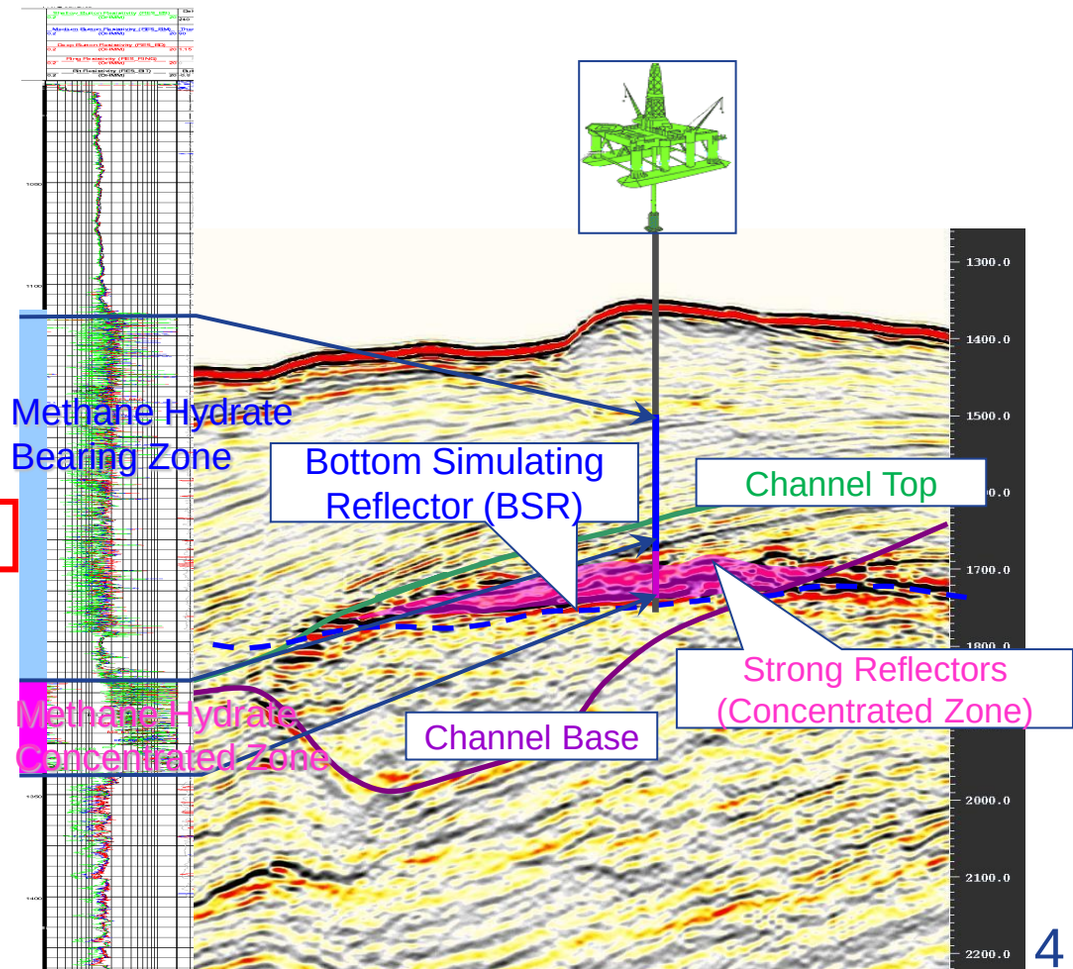
◆More than ten concentrations (Concentrated Zones) which are estimated to bear MH equivalent to approximately 20tcf of methane gas in place are confirmed in eastern Nankai trough.

◆Eastern Nankai trough as a whole is estimated to bear MH equivalent to approximately 40tcf of methane gas in place.

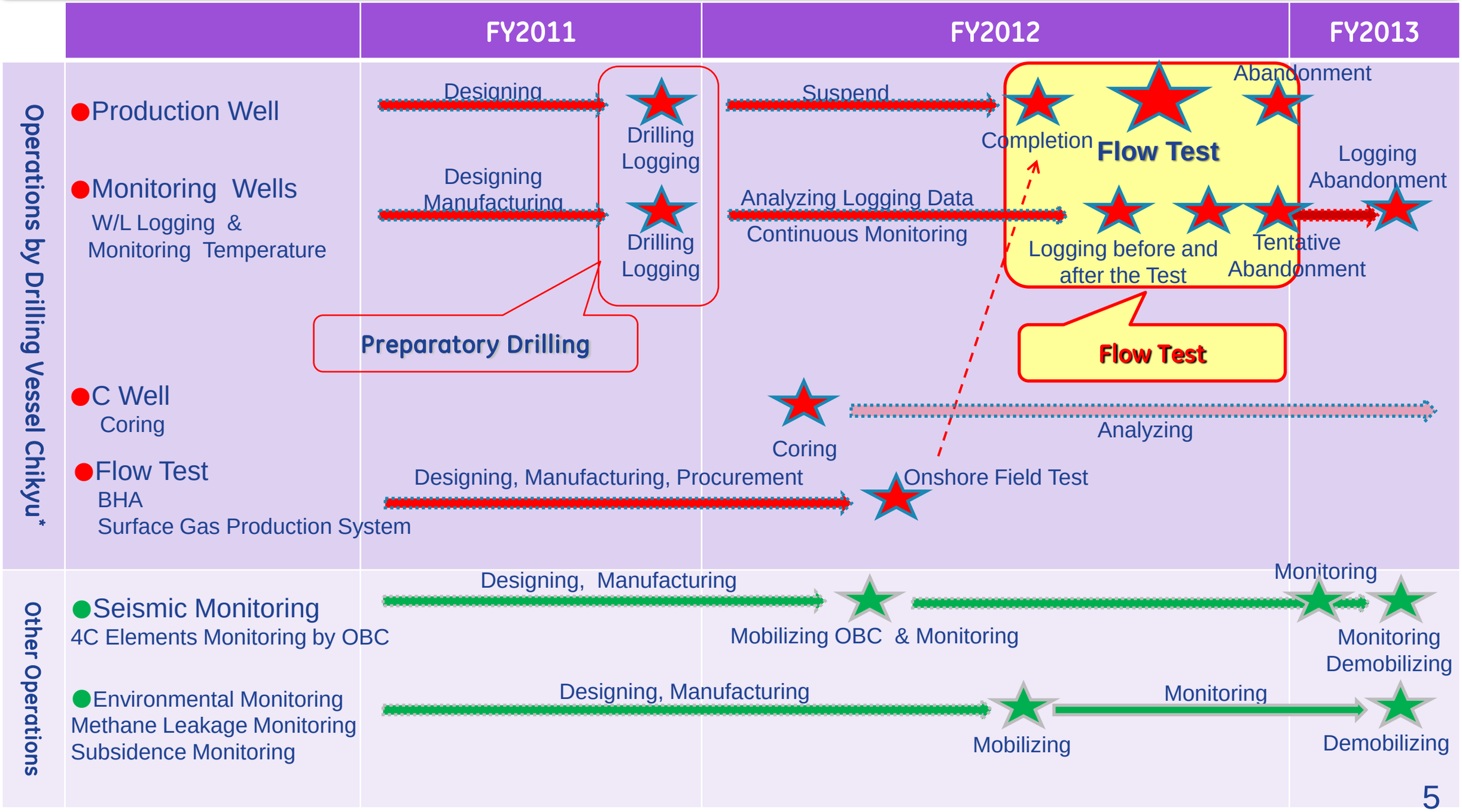


Selection of the Test Site at Eastern Nankai Trough

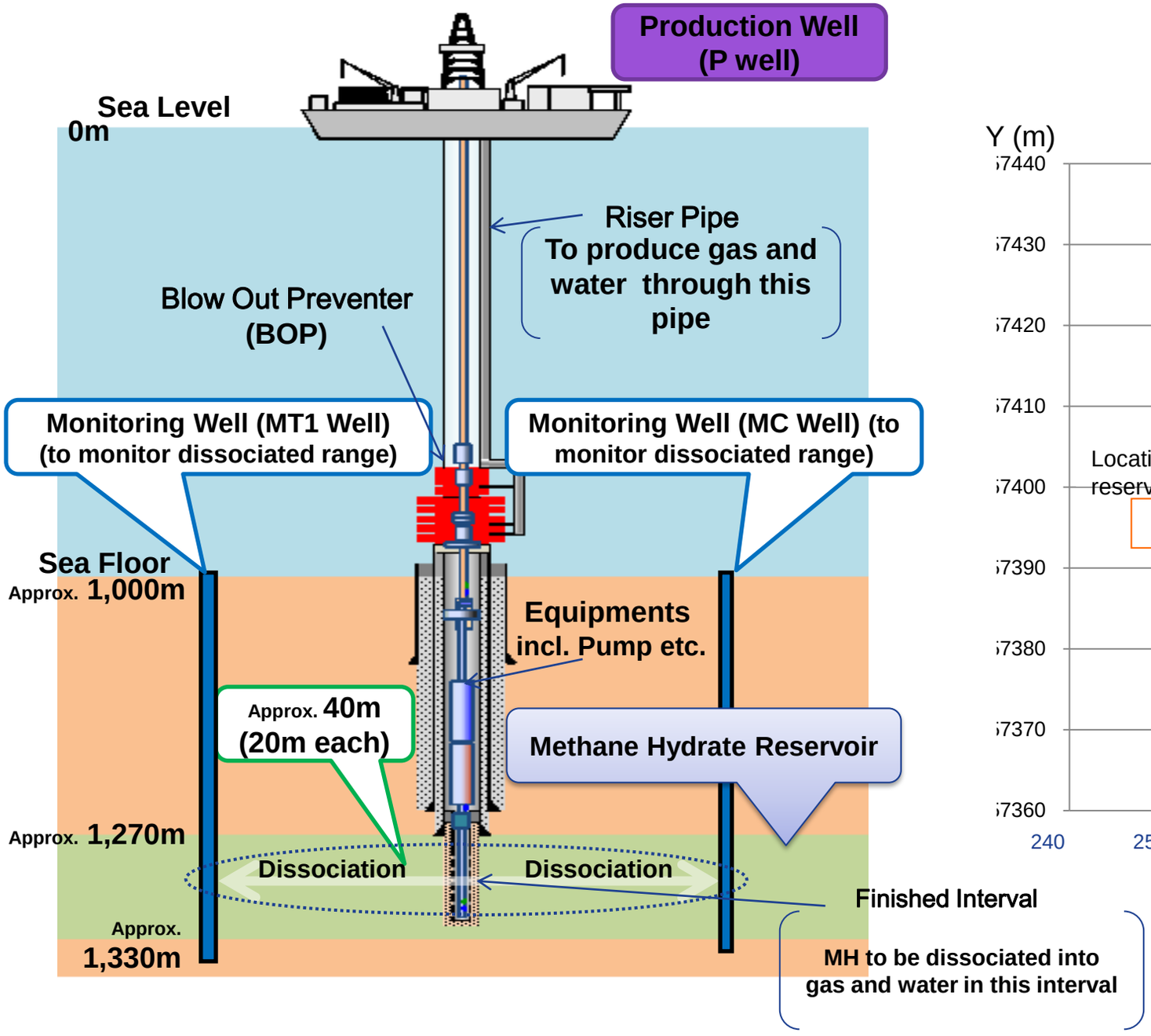
◆Selected the site where MH concentrated zones are confirmed through seismic surveys and exploratory borings and structure of the sea floor does not have problems.

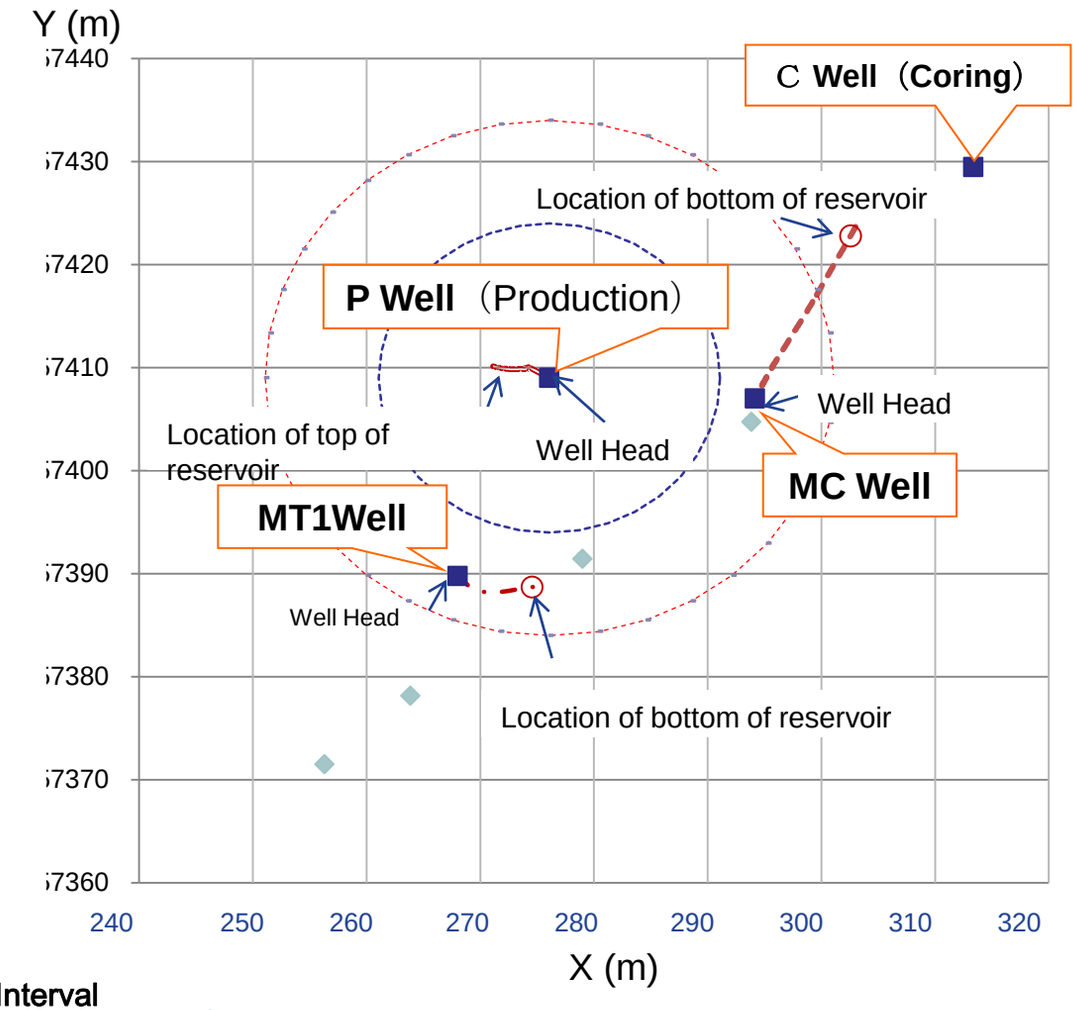


Overall Schedule of the First Offshore Production Test



Layout of Production Test Wells





Results of Flow Test

●Progress of the Operation (Jan.28-Apr.1, 2013)

- March 12:

5:40: Started flow test, decreasing pressure

9:30: Confirmed gas production considered from methane hydrate formations

10:00: Ignited flaring

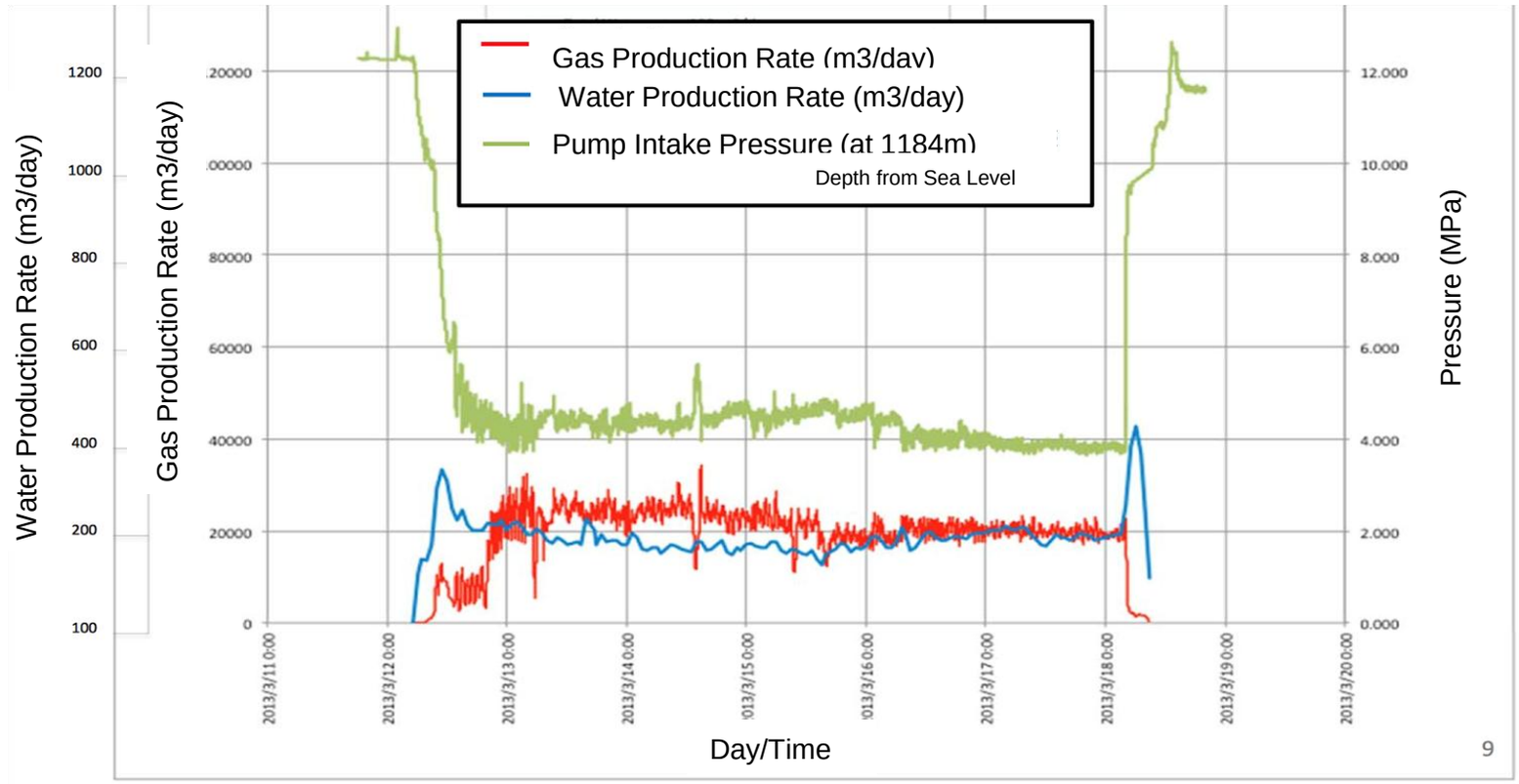
- March 18:

4:00: Confirmed sand production on board

15:00: Completed kill well and ended flow test

●Gas Production

- **Duration：approx. 6 days**
- **Cumulative gas production：approx. 120,000m³**
- **Average gas production：approx. 20,000m³/day**



Results and Issues of the First Offshore Production Test: Current Conclusion

- It was verified at least for a short period of time that depressurization was able to be realized at the ocean well and gas was able to be produced through MH dissociation.
- **On the other hand, obstructive factors against safety depressurization in long-term such as sand production was revealed.**

→ In order to evaluate economical feasibility, since it is essential to confirm long-term gas production behavior, it will be necessary to verify in the real fields ultimately, although it is tried to enhance accuracy of prediction through combining results of the test and modeling technologies.

From the above,

- Once overcoming technical issues, it is essential to conduct a field verification of stable and economically effective technologies.
- Therefore, it would be required to start preparations for necessary technology development and for production tests both onshore and offshore targeting for middle to long-term production period.

appendix

Coring Tool for Pressured Sample

●Hybrid Pressure Coring System (Hybrid PCS)

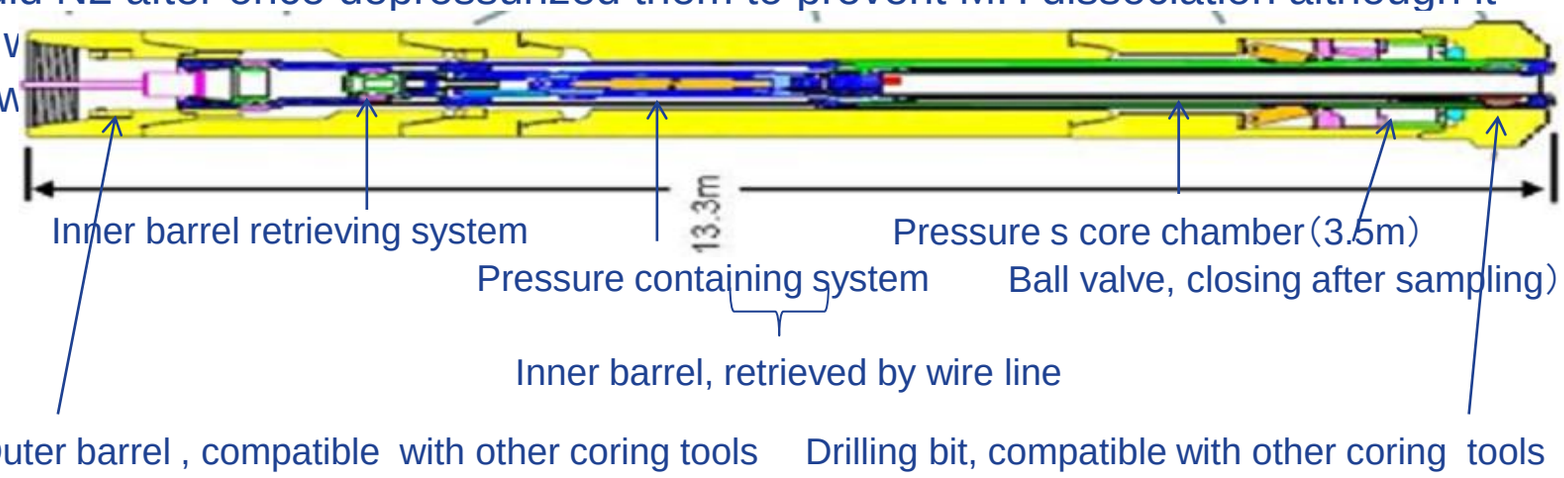
Pressured core sampling tool manufactured by utilizing PTCS* technology developed by JOGMEC, a core with 2 inches in diameter and max. 3.5m in length can be acquired.

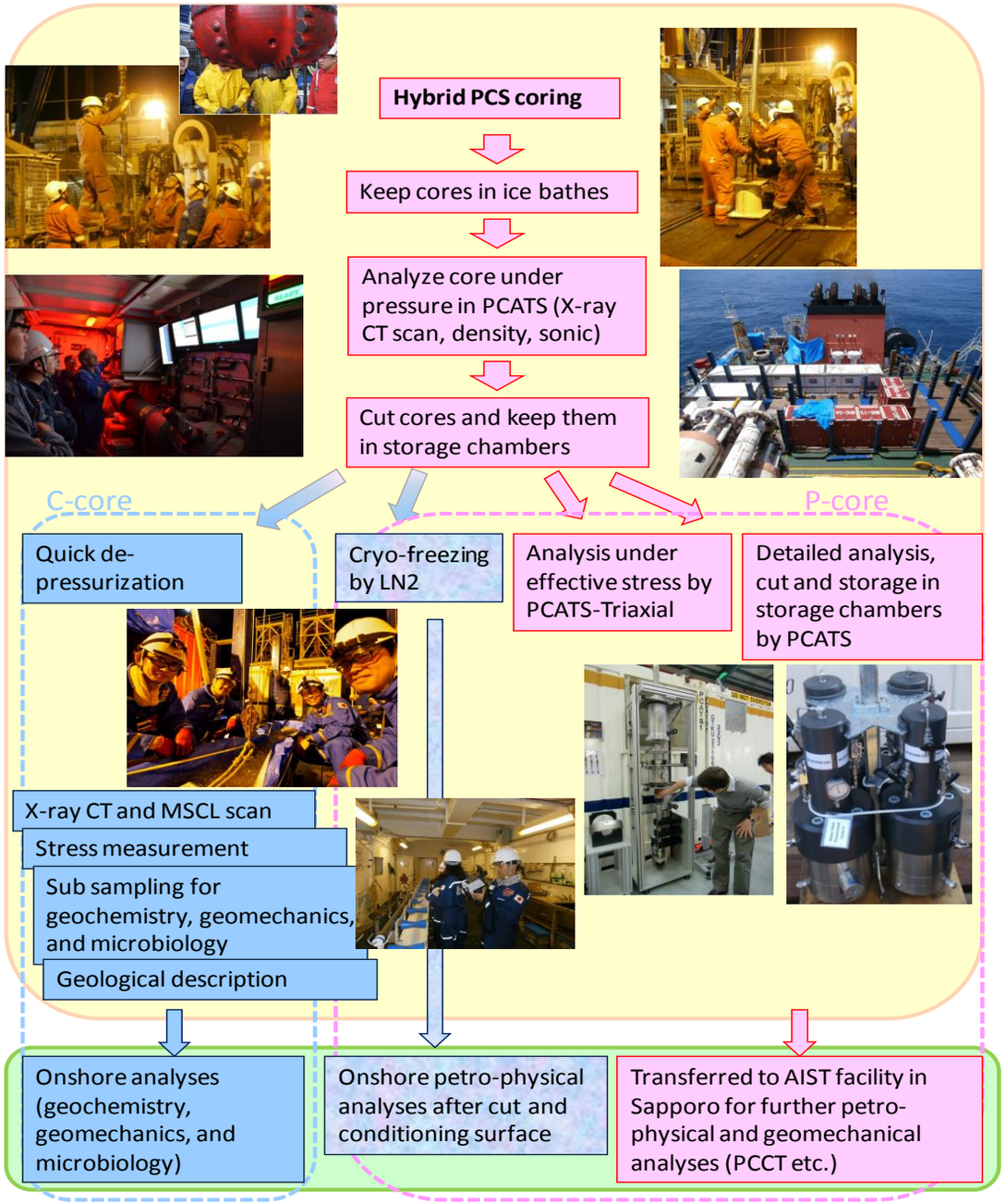
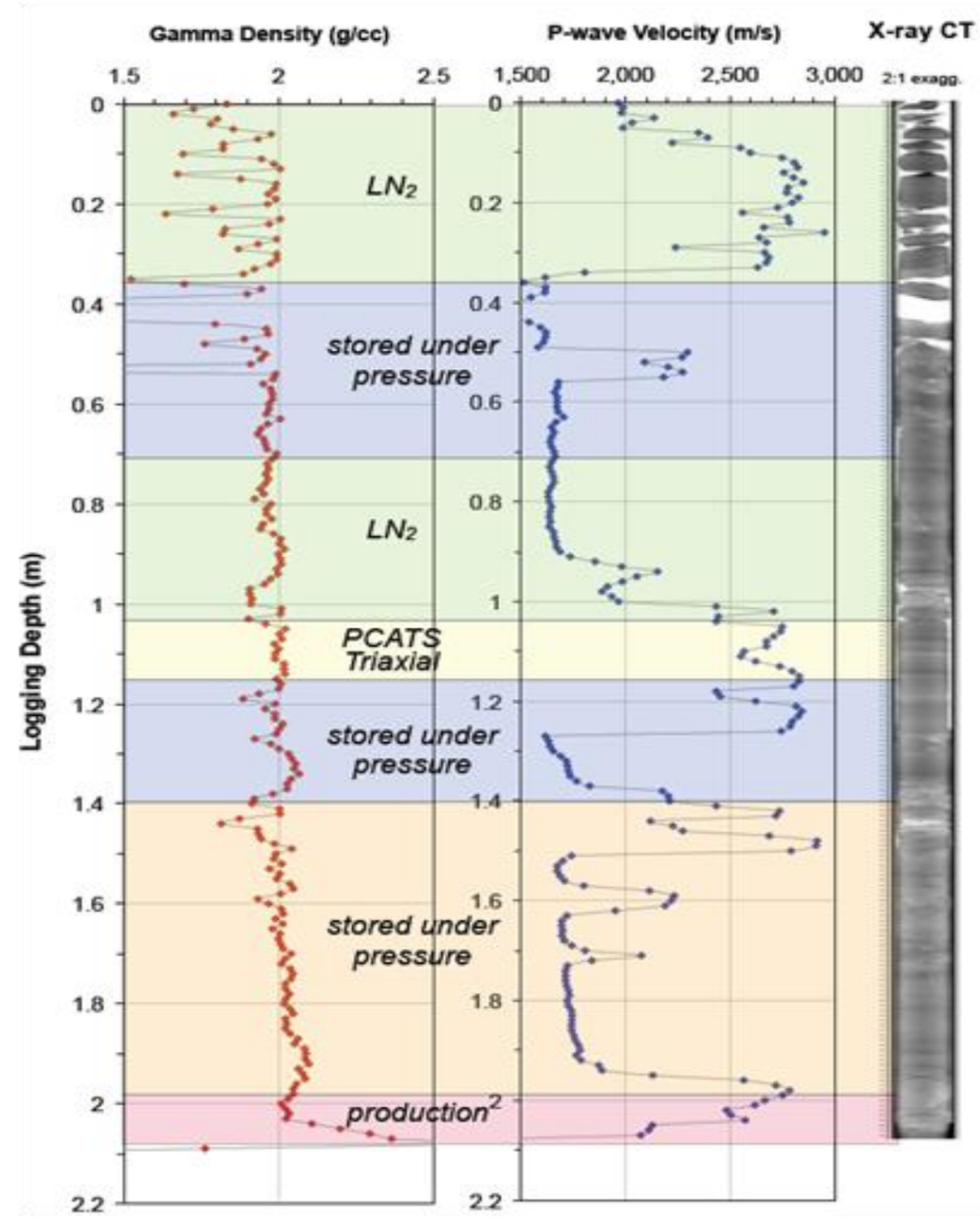
*PTCS: Pressure Temperature Coring System：used in exploratory drilling in 2004, 'Tokai_oki-Kumano_nada'

- This system is compatible with conventional core samplers which are used in experimental drillings on deep sea drilling vessel Chikyu and can continuously acquire pressured cores and conventional cores alternately.
- This system has flange connector and ball valve to be connected to analyzer, experimental facilities in universities or other organizations, and sample treatment facilities for investigations while containing high pressure*.

*PTCS requires cooling cores by liquid N2 after once depressurized them to prevent MH dissociation although it makes samples worse in quality, w
temperature (same temperature w

＜Operation Scene＞



＜Whole Drawings of Hybrid PCS＞

Results of Pressured Coring