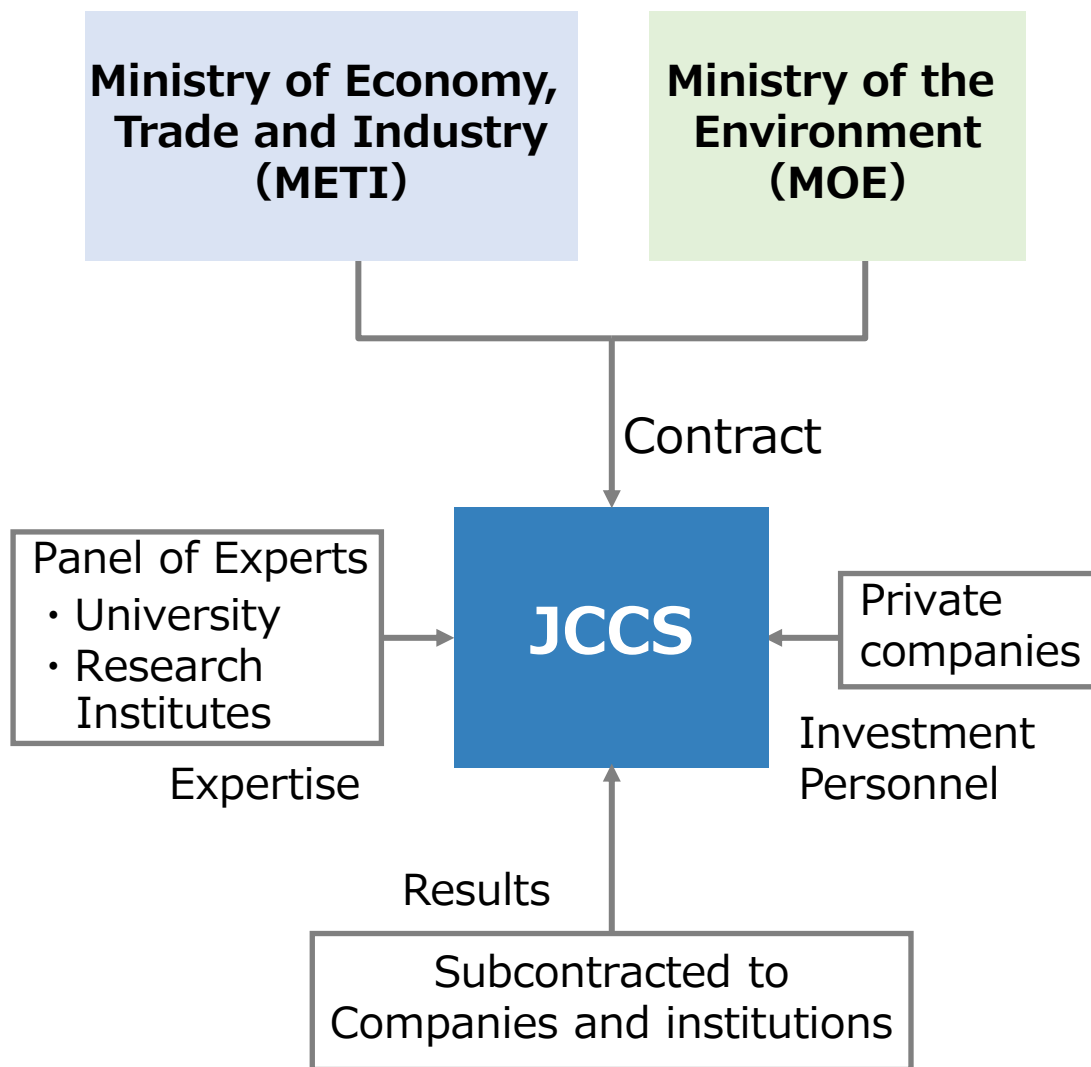


Outline of the project “Investigation of Potential Sites for CO₂ Storage in Japan”



October 20, 2021
Japan CCS Co., Ltd.

- 1. Overview of the project**
- 2. Survey methodology, Applicable technologies**
- 3. Outcomes so far, Summary**

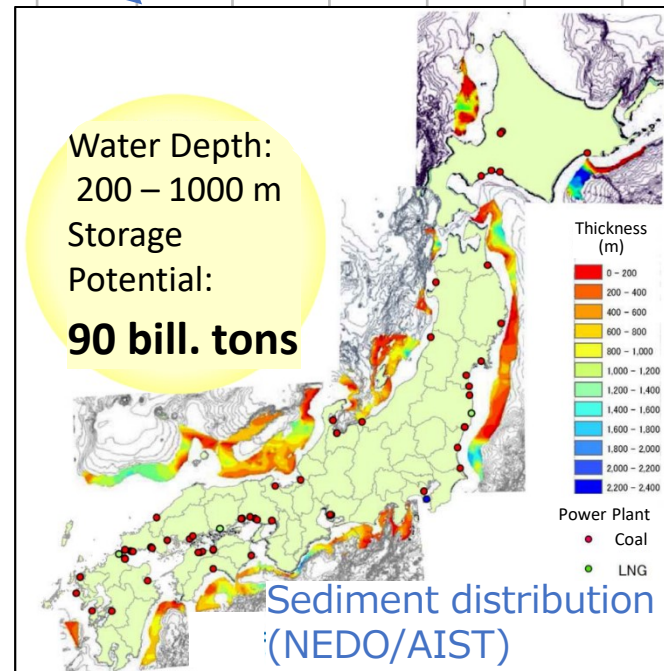
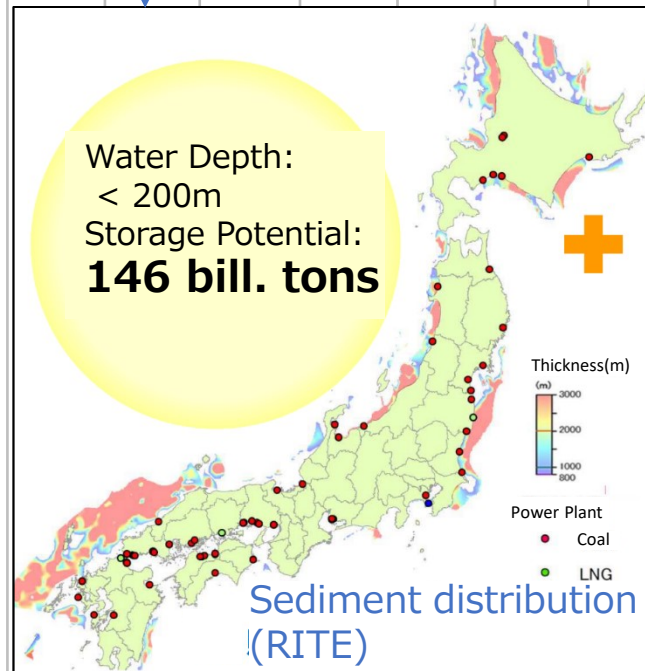
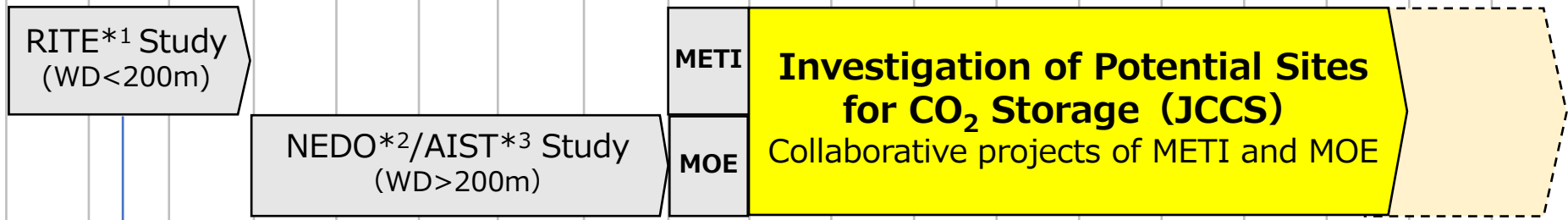


Outcome goals:

Select about three candidate sites for survey well drilling from a comprehensive perspective among prospective sites suitable for CO₂ storage by around FY2023.

Evaluation of storage potential in Japan

2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
H17	H18	H19	H20	H21	H22	H23	H24	H25	H26	H27	H28	H29	H30	H31	R2	R3	R4	R5



Compiled by Mizuho Research & Technologies, Ltd. based on "Survey of Storage Capacity in Japan(RITE,2005)" and "Evaluation report of total system from power generation to CO₂ Storage (NEDO/AIST,2012)"

*1 Research Institute of Innovative Technology for the Earth
*2 New Energy and Industrial Technology Development
*3 National Institute of Advanced Industrial Science and Technology

The above results are based on simple geological analysis using coarse density 2D seismic data.

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The reservoir has sufficient storage capacity

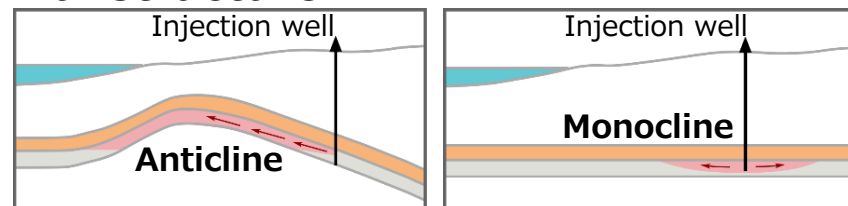
- Sufficient area and continuity to absorb pressure increase

The caprock covers the reservoir

- Sufficient seal capacity so that CO₂ does not leak
- Sufficient strength to withstand destruction by pressure increase

Geological structure in which CO₂ stays underground

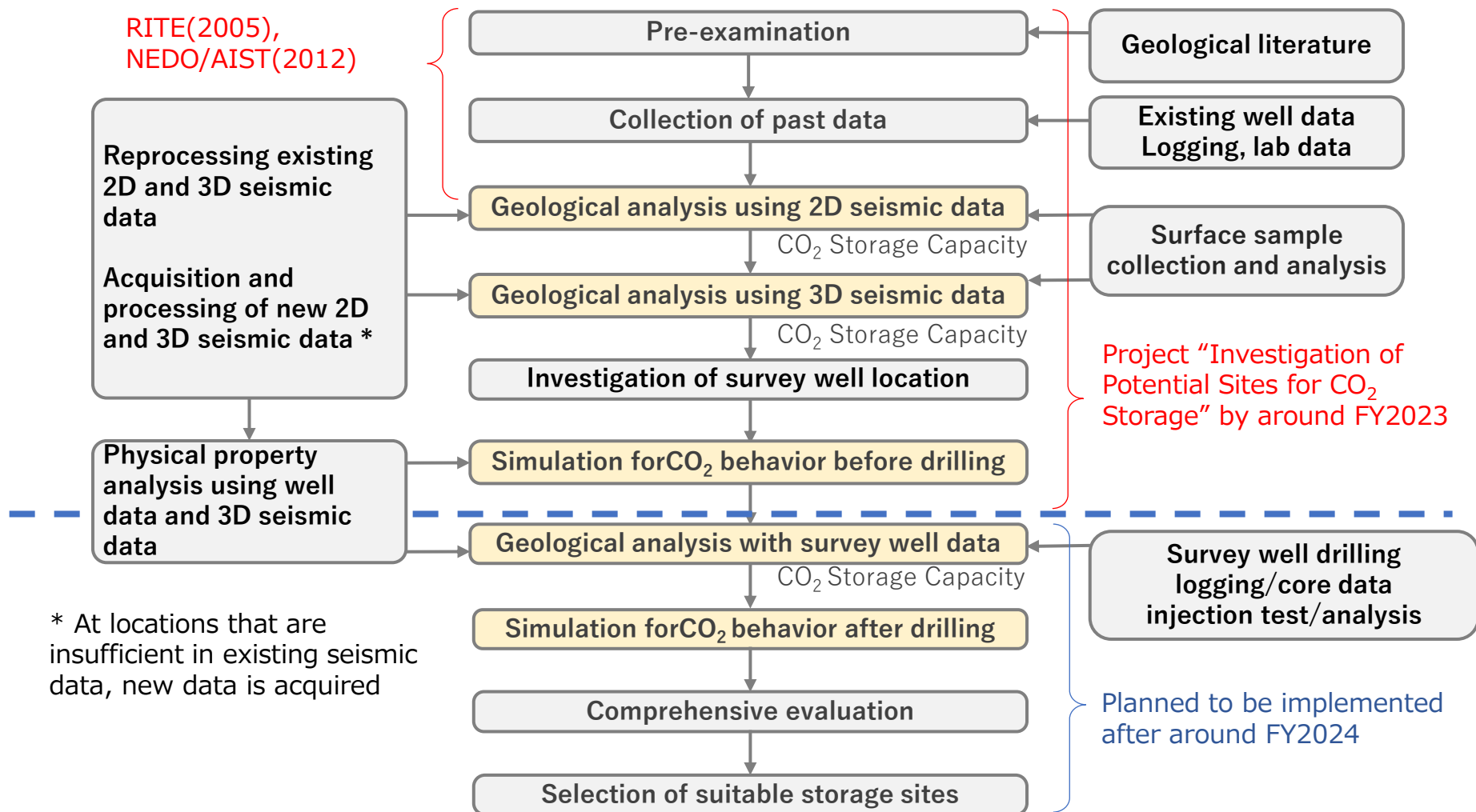
- Anticlinal structure or gentle monoclinial structure
- Appropriate depth



No faults that can be leakage paths for CO₂

Intensive earthquakes have not occurred in the past in the vicinity

Selection flow of suitable storage sites



* At locations that are insufficient in existing seismic data, new data is acquired

- In project "Investigation of Potential Sites for CO₂ Storage", evaluation accuracy is improved by using 3D seismic data.
- Drilling of survey wells is necessary to proceed to "comprehensive evaluation"

Development of active faults, complex geological structure

Large changes in reservoir properties (sedimentary basins are small)



Seismic 3D data is required from a relatively early evaluation stage to grasp the details of fault distribution, extraction of geologically stable areas, reservoir/caprock distribution and properties

Permeability is often low (reservoir facies tends to be tuffaceous, where volcanic glass easily changes into clay minerals.)



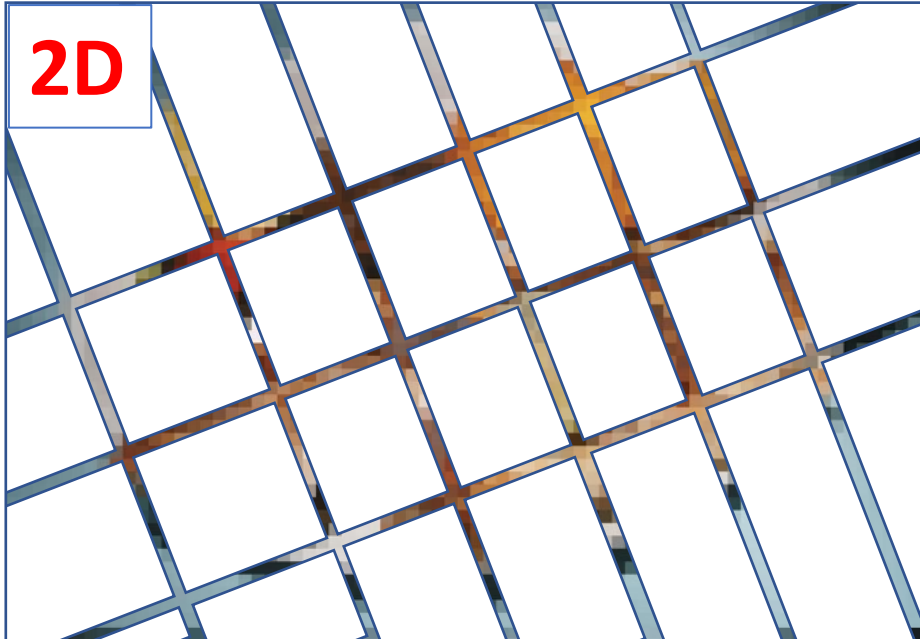
Data acquisition, core sampling, and injection test by survey wells are important for evaluating injection properties and storage capacity

Real



- 3D data has overwhelmingly more surface information than 2D data.
- 3D data shows more detail at fault connections than 2D data

2D



3D



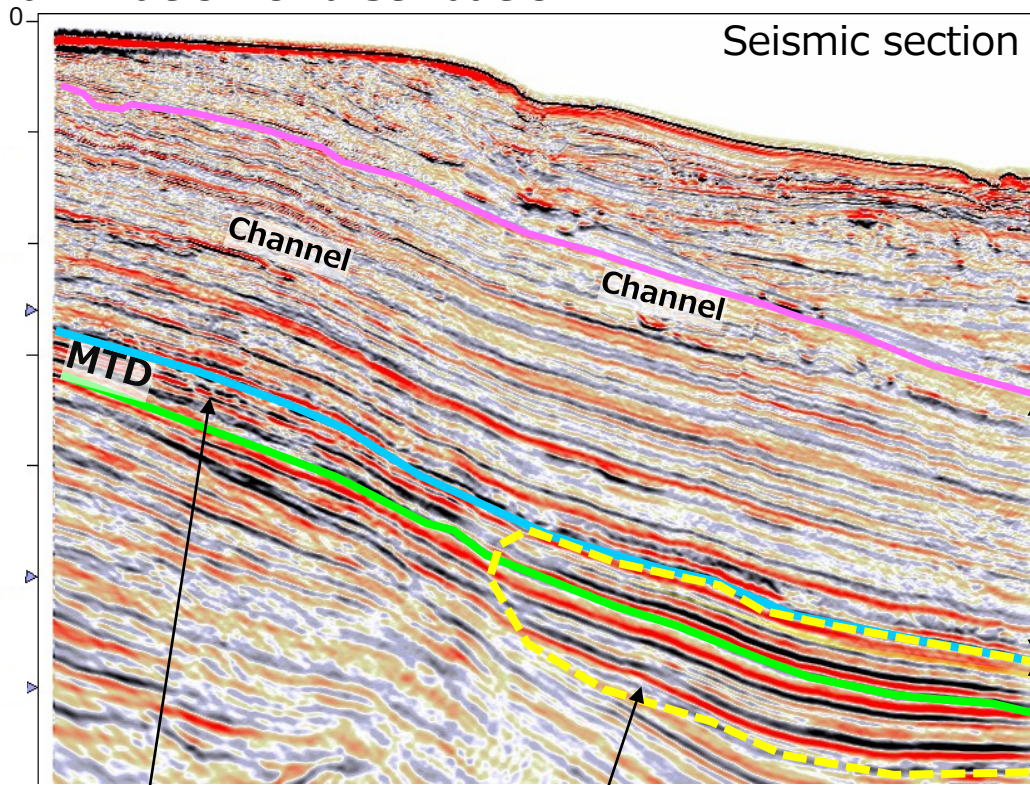
Sedimentary Facies Analysis

Using well/3D seismic data, sedimentary system is comprehended by "sedimentary facies analysis"

- Where and what sediments are deposited?
- From which direction is the sediment supplied?

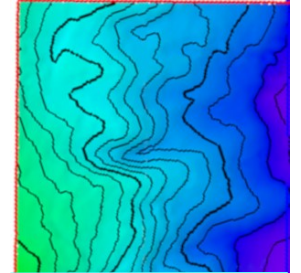
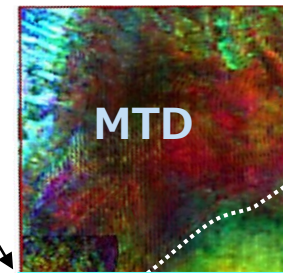
Higher quality 3D seismic data is desirable

Identifying reservoirs/caprocks, examination of distribution



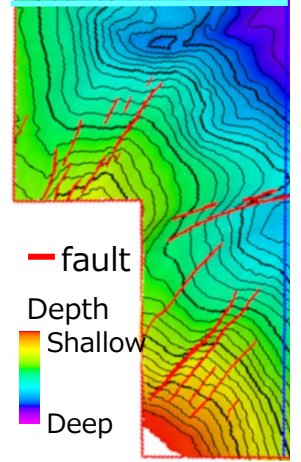
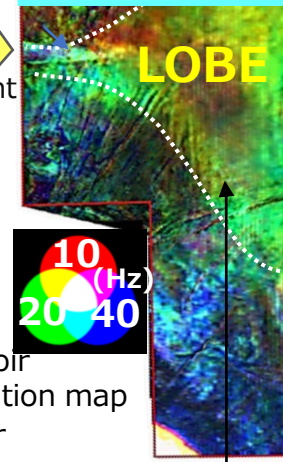
Reservoir distribution (Spectral Decomposition)

Top reservoir depth map



Section location

Sediment Supply



Mass Transportation Deposit

- Weak~Strong Amplitude
- Discontinuous, chaos

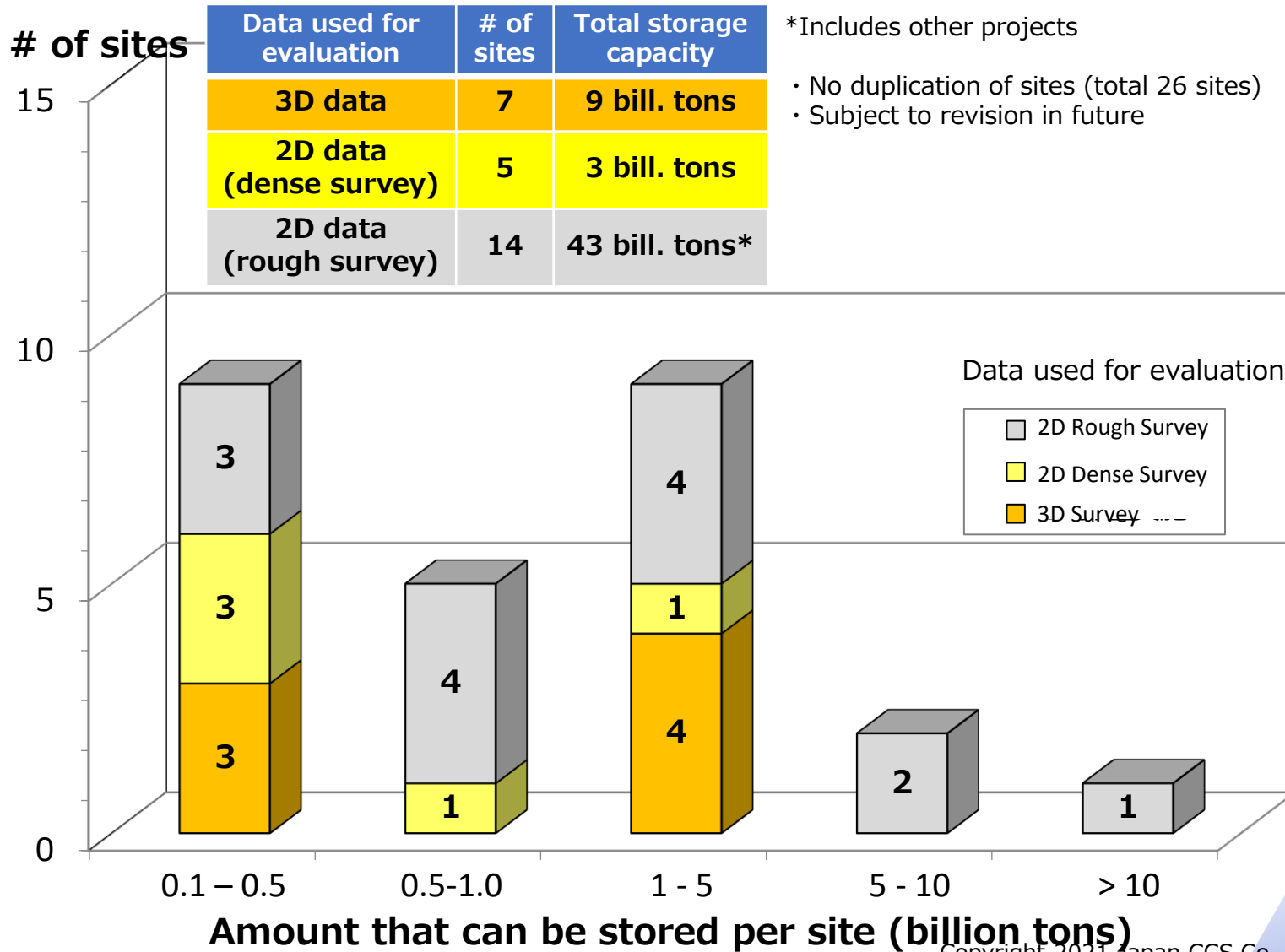
Lobe (Reservoir)

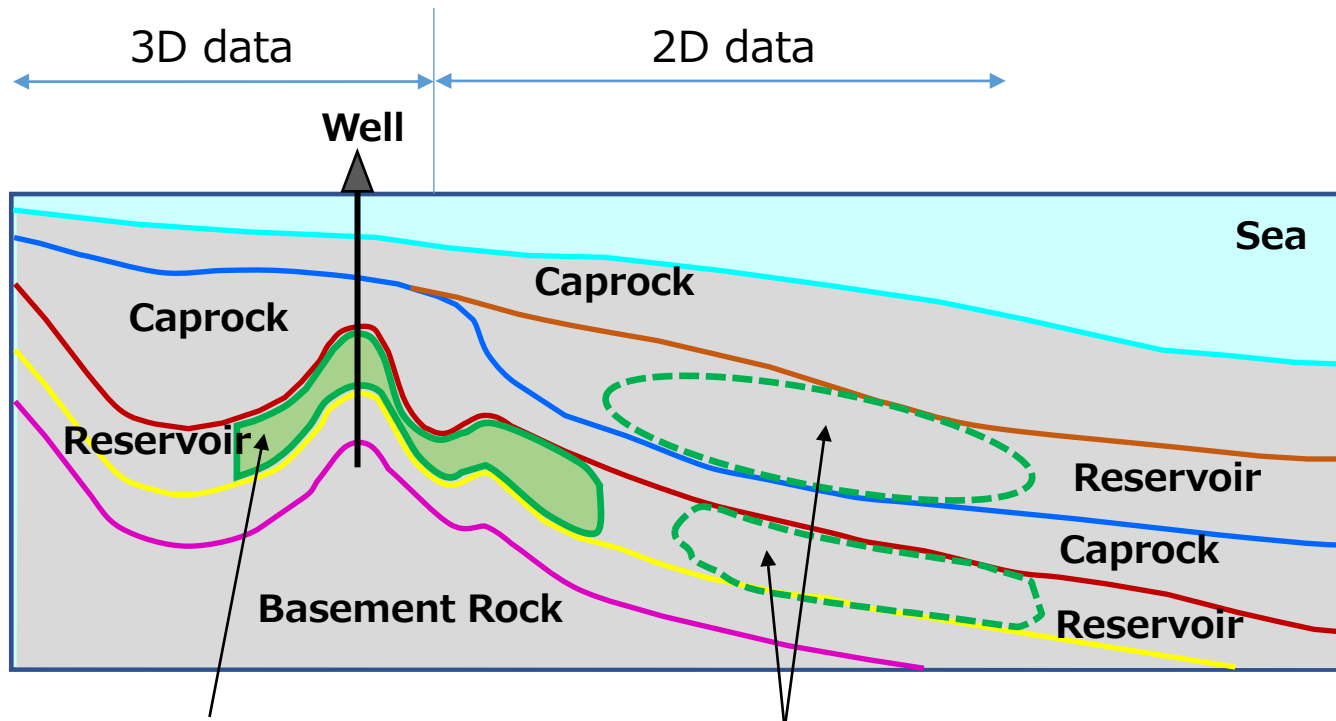
- Strong Amplitude
- Continuous, Parallel
- Fan or Elliptical distribution

Storage Capacity : 1 billion tons

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Considerable domestic storage potential in both the number of storage sites and the amount that can be stored.





Storage capacity calculated near drilled anticlinal structure

Huge additional storage potential in gentle monoclinal structure away from the well

- The storage capacity calculated area so far is limited to around anticlinal structures.
- Gentle monoclinal structure areas have possibility of huge additional potential
- In the additional potential area, there is only 2D seismic data.
⇒ Additional storage capacity can be expected by acquiring new 3D seismic data and drilling exploration wells.

1. Estimated amount of storage within the surveyed range as of March 2020 (by volumetric method):

- 3D data area : 9 billion tons in total of 7 sites
- 2D (dense) data area : 3 billion tons in total of 5 sites
- 2D (rough) data area : 43 billion tons in total of 14 sites

The entire sedimentary basin has not been evaluated, and there is a possibility of huge additional potential in monoclinical structure areas.

2. In order to reduce uncertainty in assessing the amount of storage and to improve the accuracy of risk assessments, **it is necessary to drill survey wells** to identify the reservoir/caprock layer, to evaluate the injection property of the reservoir, and to obtain data for evaluating the sealing ability.

3. **Aim to select about three candidate sites for survey well drilling** from a comprehensive perspective among prospective sites suitable for CO₂ storage by around FY2023.