On November 22, 2019, CO_2 injection was terminated.

Cumulative CO_2 Injection amount
300,110.3
tonnes

What's New

Science classes were held at five locations in Tomakomai City















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What's New

CCS Forum on "Global Warming and CCS" and site tour will be held on November 14 (Sat).



Invited speakers

Part 1: Naomi HARADA, Ph.D.

Professor, Center for International Collaboration, Atmosphere and Ocean Research Institute, THE UNIVERSITY OF TOKYO

Theme: Antarctica - its attractiveness and the frontline of global change

Part 2: Mr. Toru Muta

Director, Carbon Dioxide Capture and Storage Policy Office, Natural Resources and Fuel Department, Agency of Natural Resources and Energy

Theme: Japan's GX/CCS policy and Tomakomai

Date: November 14, 2026 (Sat) from 13:00
Venue: Grand Hotel New Oji
Capacity: 200 persons (first-come-first-served basis)
Registration: free of charge (advance registration is required)

For more information, please visit the website of Japan CCS (in Japanese).

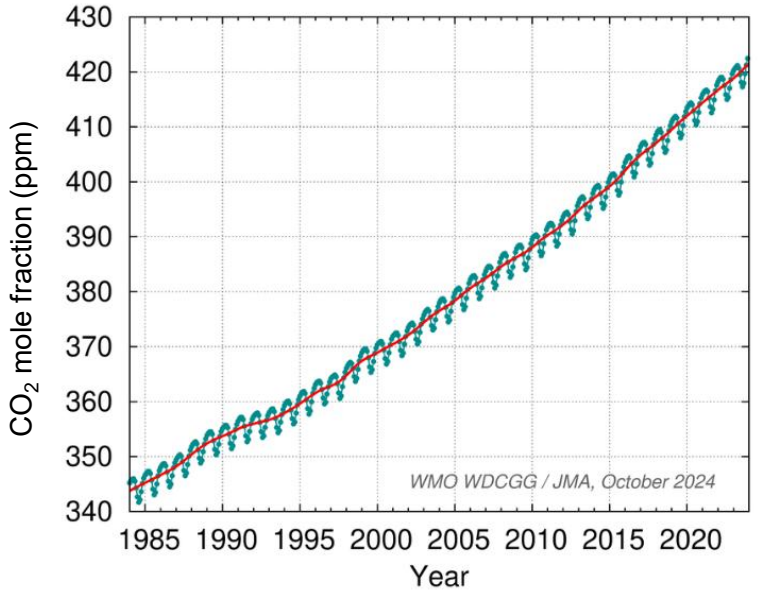
★ Site tour of JAPEX Tomakomai J-2 exploratory drilling site will be held in the morning of November 14 (limited to first 40 persons)

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Carbon dioxide (CO_2) is the most significant greenhouse gas contributing to global warming

Time-series representation of Globally Averaged CO_2 Mole Fractions

The global mean annual atmospheric CO_2 mole fraction was 420.0 ppm in 2023, an increase of 2.3 ppm from the previous year. This is 51% higher than the pre-industrial level (about 278 ppm).

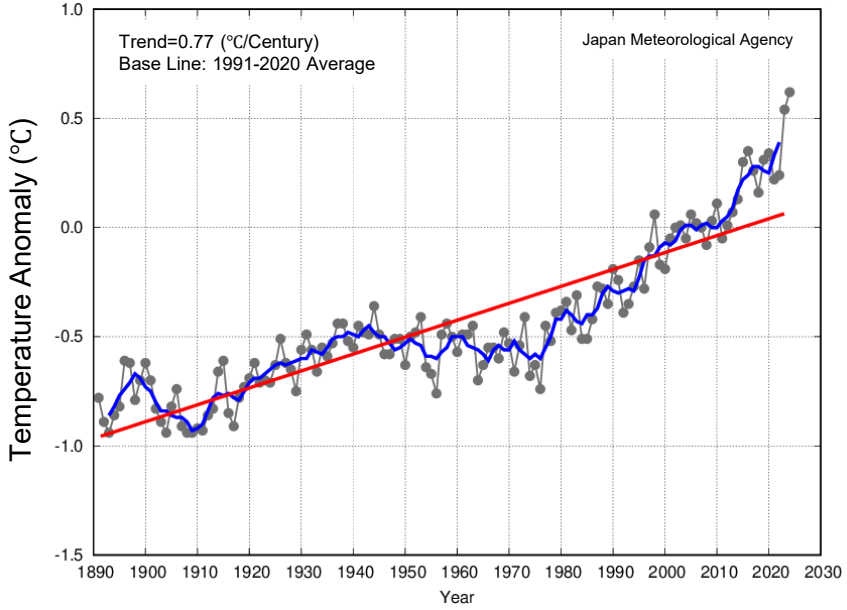


Blue: monthly mean concentration
Red: monthly mean with seasonal variations removed

Source: Japan Meteorological Agency "Globally averaged mole fractions" (updated on March 25, 2025); as modified by Japan CCS Co., Ltd. https://www.data.jma.go.jp/ghg/kanshi/ghgp/co2_e.html

Annual anomalies of Global Average Surface Temperature

The global average surface temperature is rising while repeatedly experiencing various fluctuations. In particular, since the mid-1990s, there has been an increasing number of years with high temperatures.



Black thin line: surface temperature anomaly of each year
Blue line: 5-year running mean
Red line: long-term linear trend

Source: Japan Meteorological Agency "Global Average Surface Temperature Anomalies"; as modified by Japan CCS Co., Ltd. https://www.data.jma.go.jp/tcc/tcc/products/gwp/temp/ann_wld.html

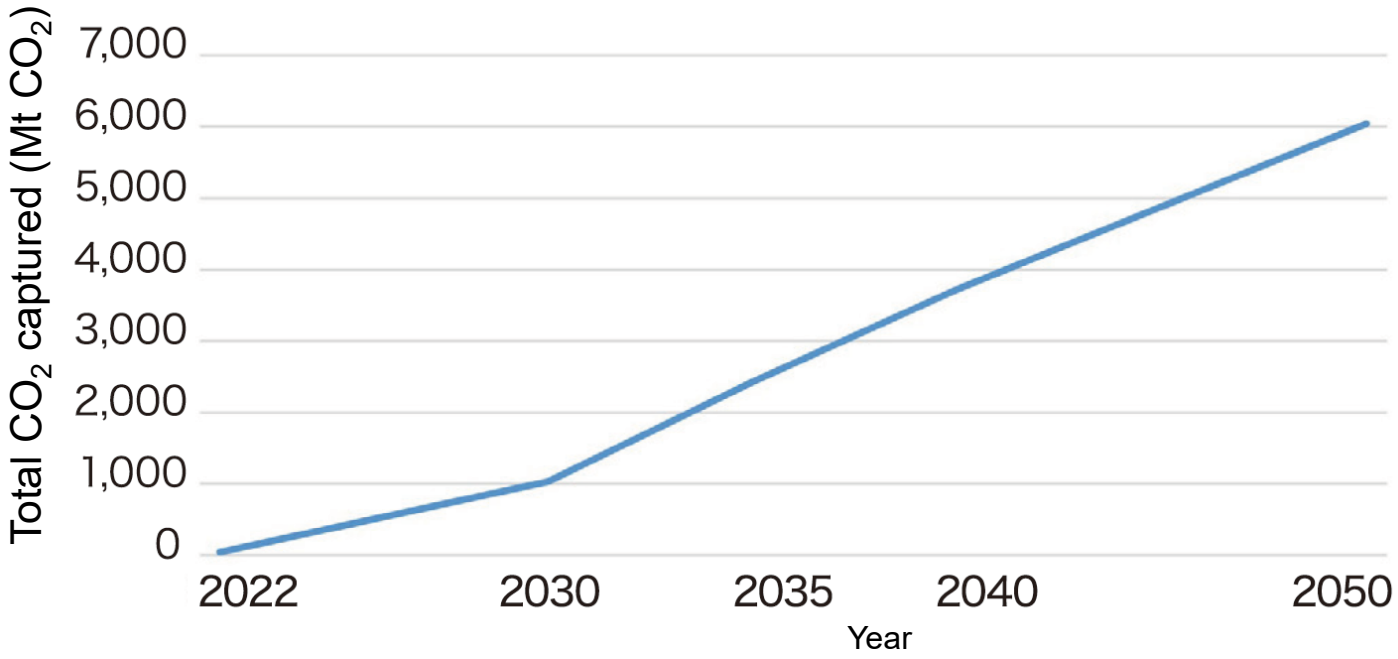
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Potential of CO_2 reduction by CCUS

- **CO_2 capture amount based on Net Zero Emissions by 2050 Scenario (NZE Scenario)**



According to the IEA (International Energy Agency), to achieve net zero by 2050, the amount of CO_2 that will need to be captured globally by CCUS is estimated to be approximately 6 billion tonnes per year at that point.

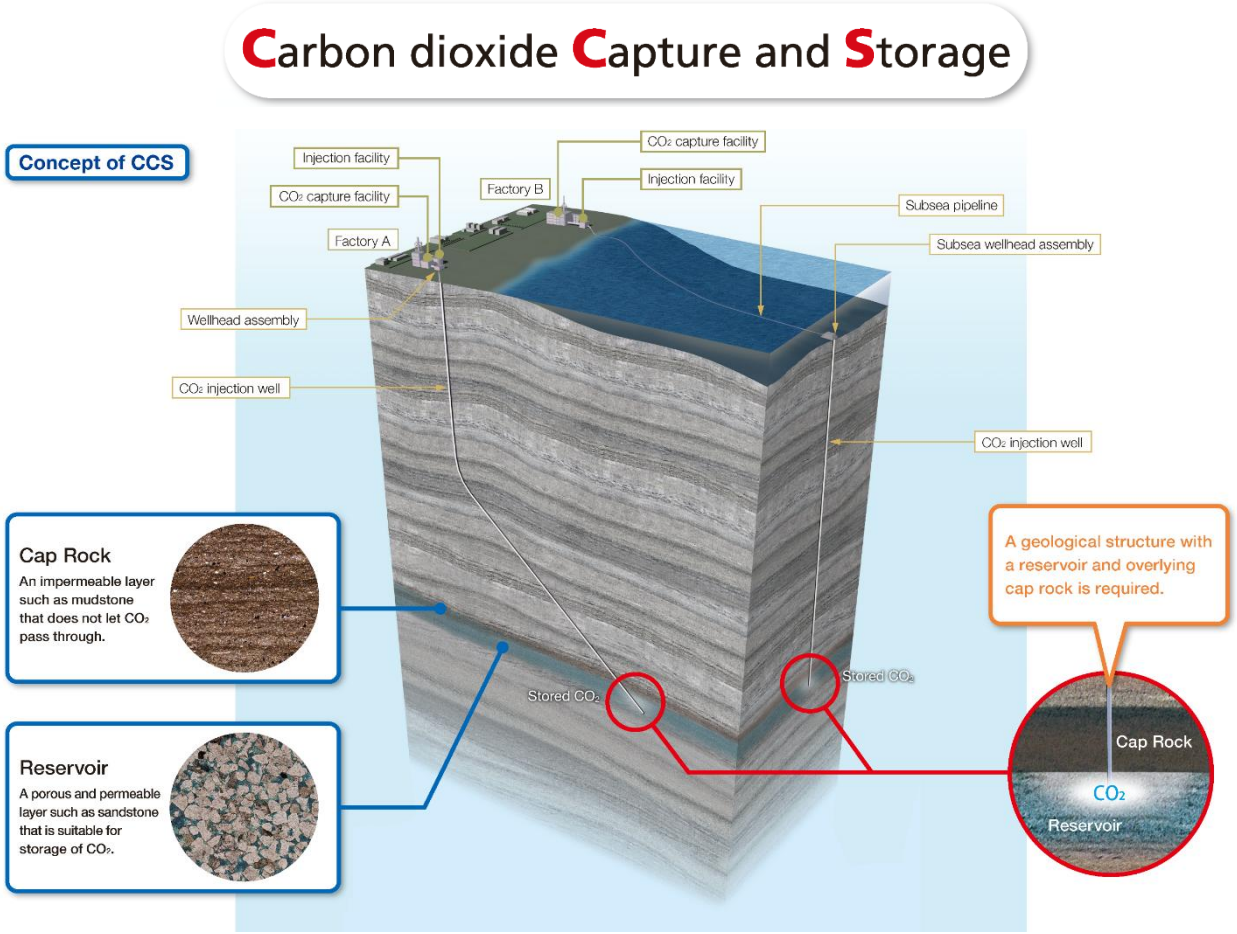
Source: IEA Net Zero Roadmap 2023 “Table A. 4: World CO_2 emissions”; as modified by Japan CCS Co., Ltd.

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Cumulative CO_2 Injection amount
300,110.3 tonnes

What is CCS?



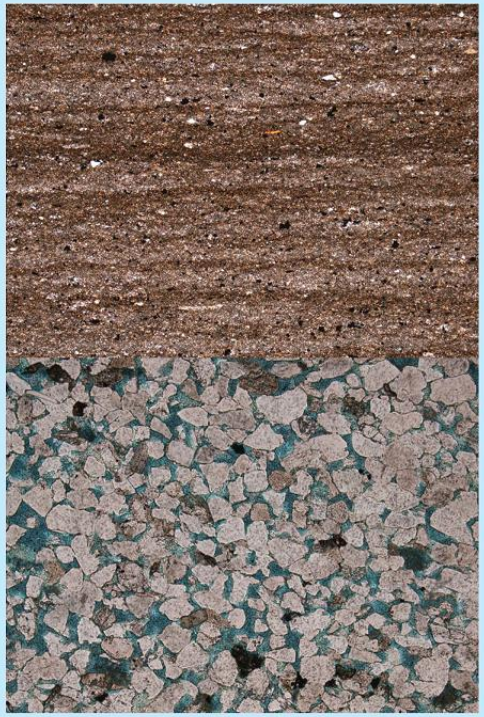
CCS is a technology to prevent carbon dioxide (CO_2) emitted by facilities such as power plants and factories from being released into the atmosphere. The technology involves capturing the CO_2, injecting it into subsurface geological formations and storing it permanently. Along with energy efficiency and renewable energy, CCS is a key countermeasure against global warming.

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How to store CO_2



■Features of Caprock
Mudstone etc., made of fine mud grains
- Impervious
- Sufficient blocking ability
- Covering reservoir layer widely and thickly

■Features of Reservoir
Sandstone, volcanic rock, etc., made of coarse grains
- Sufficient pore spaces to store CO_2
- Pervious

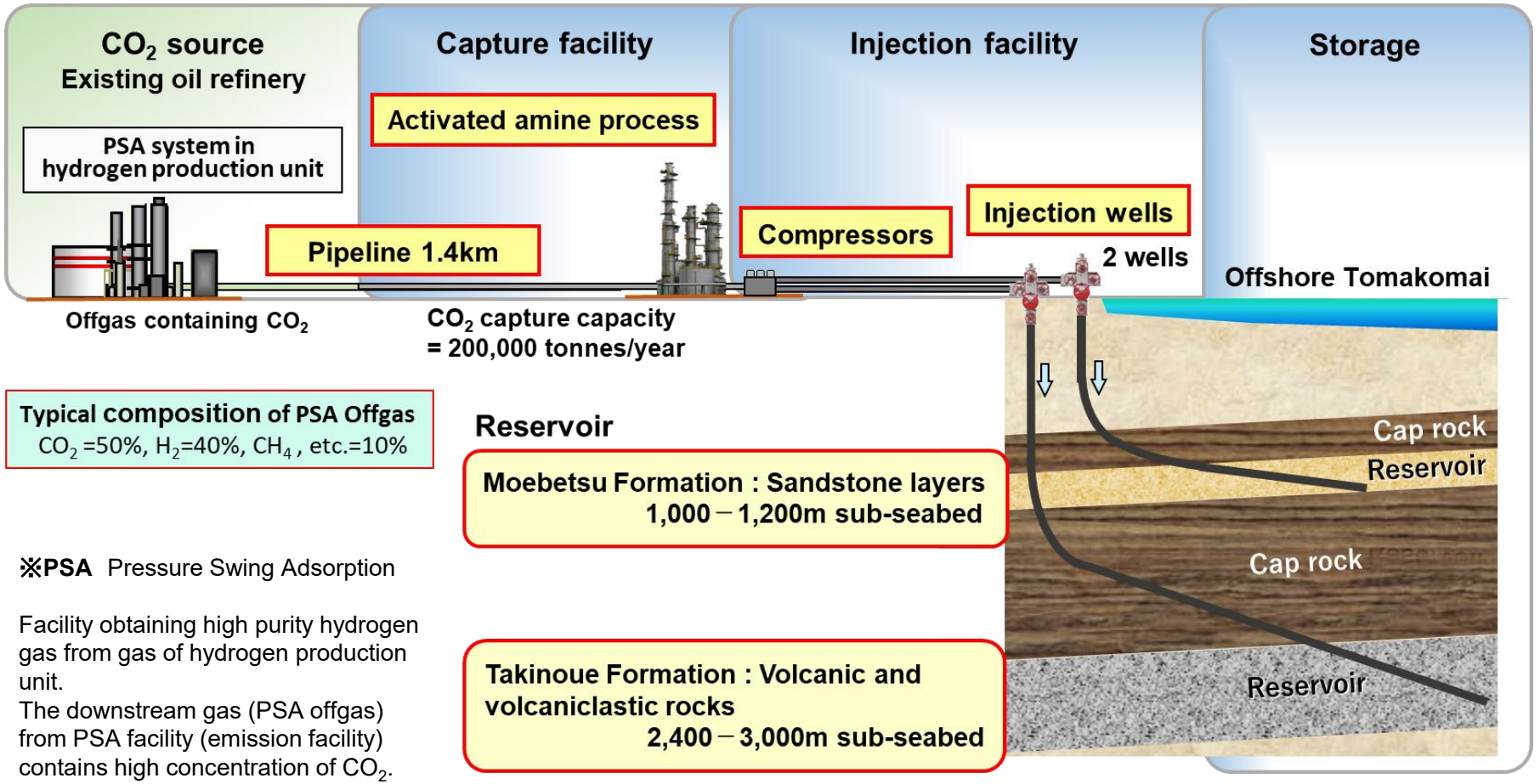
In order to store CO_2 in the subsurface under the seabed, a geological structure where a reservoir is overlain by a cap rock is required. The cap rock blocks the leakage of injected CO_2 from the reservoir.

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Cumulative CO_2 Injection amount
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Flow Scheme of Tomakomai Demonstration Project



Typical composition of PSA Offgas
CO_2 =50%, H_2=40%, CH_4 , etc.=10%

Reservoir

Moebetsu Formation : Sandstone layers
1,000－1,200m sub-seabed

Takinoue Formation : Volcanic and volcaniclastic rocks
2,400－3,000m sub-seabed

※PSA Pressure Swing Adsorption

Facility obtaining high purity hydrogen gas from gas of hydrogen production unit.
The downstream gas (PSA offgas) from PSA facility (emission facility) contains high concentration of CO_2.

CO_2 is captured from offgas containing CO_2 generated by a hydrogen production unit of a refinery, pressurized (up to 23 MPa) to the pressure required for injection, injected at a scale of about 100,000 tonnes of CO_2 per year and stored in two sub-seabed reservoirs offshore Tomakomai.

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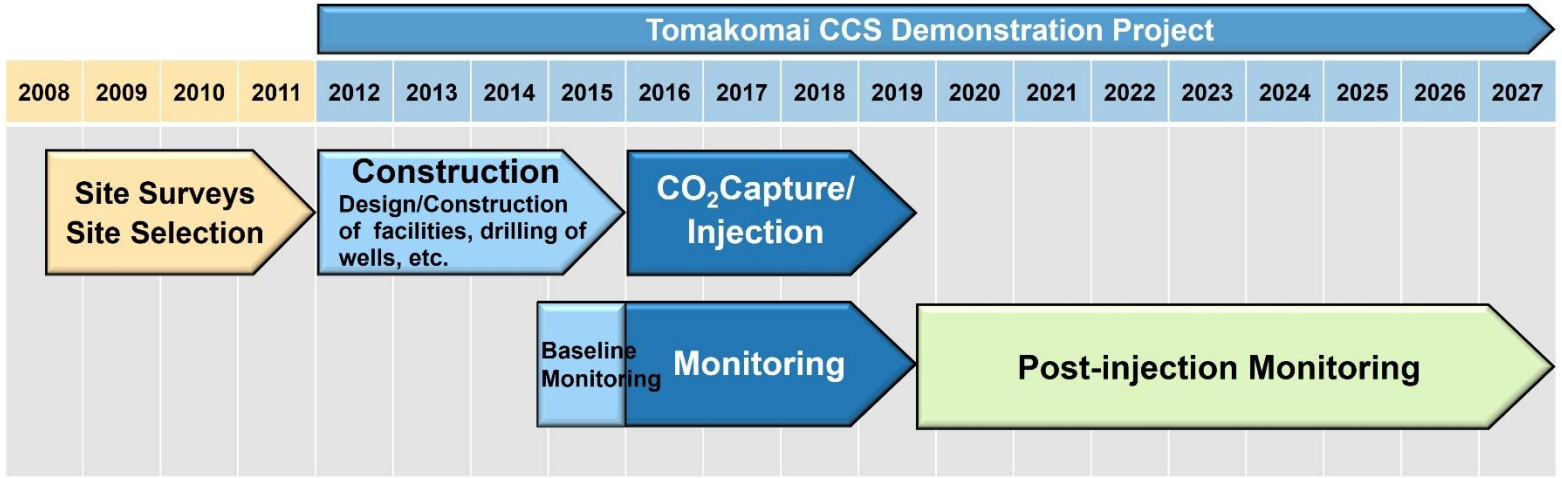
On November 22, 2019, CO_2 injection was terminated.

Cumulative CO_2 Injection amount
300,110.3 tonnes

Schedule of Tomakomai Demonstration Project (from JFY2012 -)

Contract Period: From JFY2012 -

- From JFY2012 to JFY2015: Construction
  Activities including the design and construction of facilities, drilling of wells, baseline monitoring, and preparation for demonstration operation were carried out.
- From April 2016 to November 2019: CO_2 capture/injection (On November 22, 2019, the target of 300 thousand tonnes of CO_2 injection was achieved, and injection was terminated.)
- From JFY2016: Monitoring of CO_2(*) : being continued after termination of injection
- From JFY2021 to JFY2024: Study/preparation of the interoperation of CCS and CCU



(*) Monitoring the behavior (migration, distribution) of the injected CO_2, continuous monitoring of micro-seismicity and natural earthquakes, marine environmental monitoring to detect for possible CO_2 leakage/seepage are being conducted.

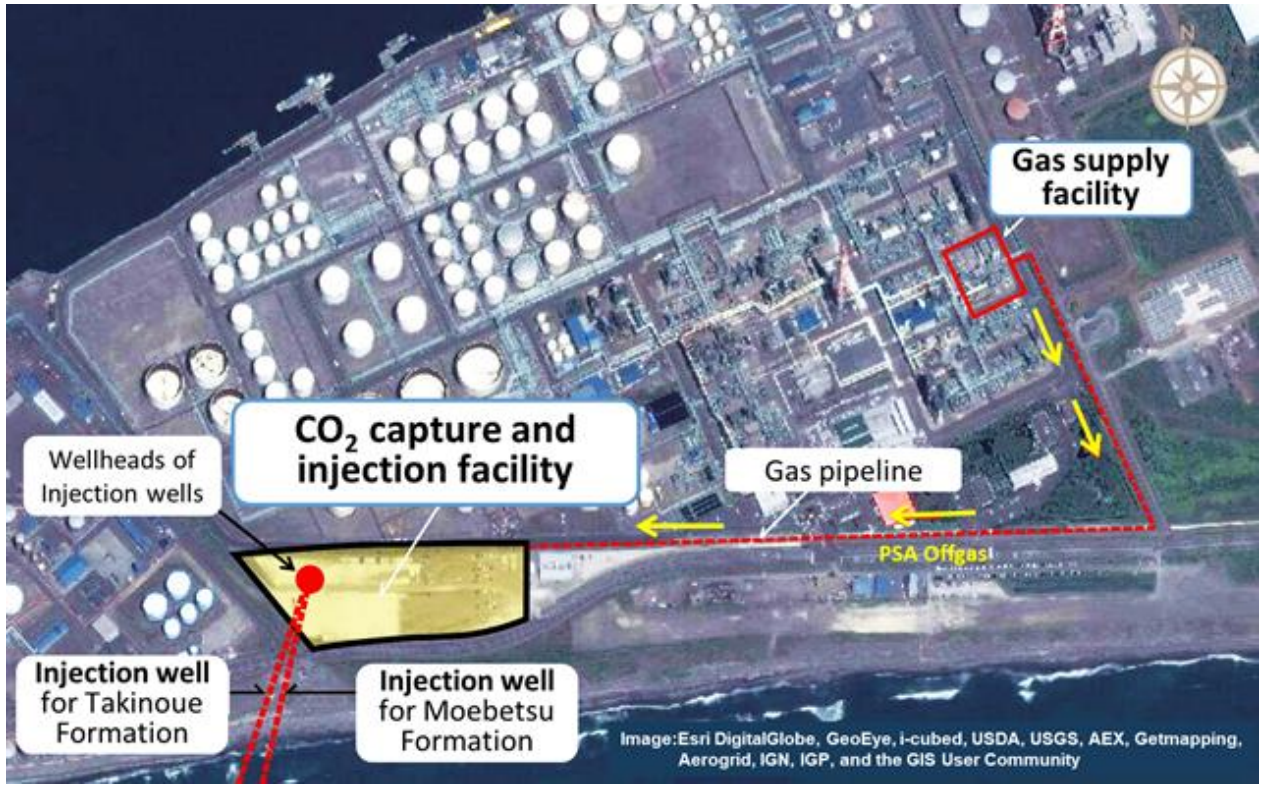
※Years are in Japanese Fiscal Years (JFY: from April of calendar year to March of following year)

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On November 22, 2019, CO_2 injection was terminated.

Cumulative CO_2 Injection amount
300,110.3 tonnes

Positional Relation of Onshore Facilities



In the "Gas supply facility“, PSA offgas (CO_2 containing gas) is generated in the hydrogen production process of the refinery and sent to the Tomakomai Project “CO_2 capture and injection facility" via a 1.4 km gas pipeline.

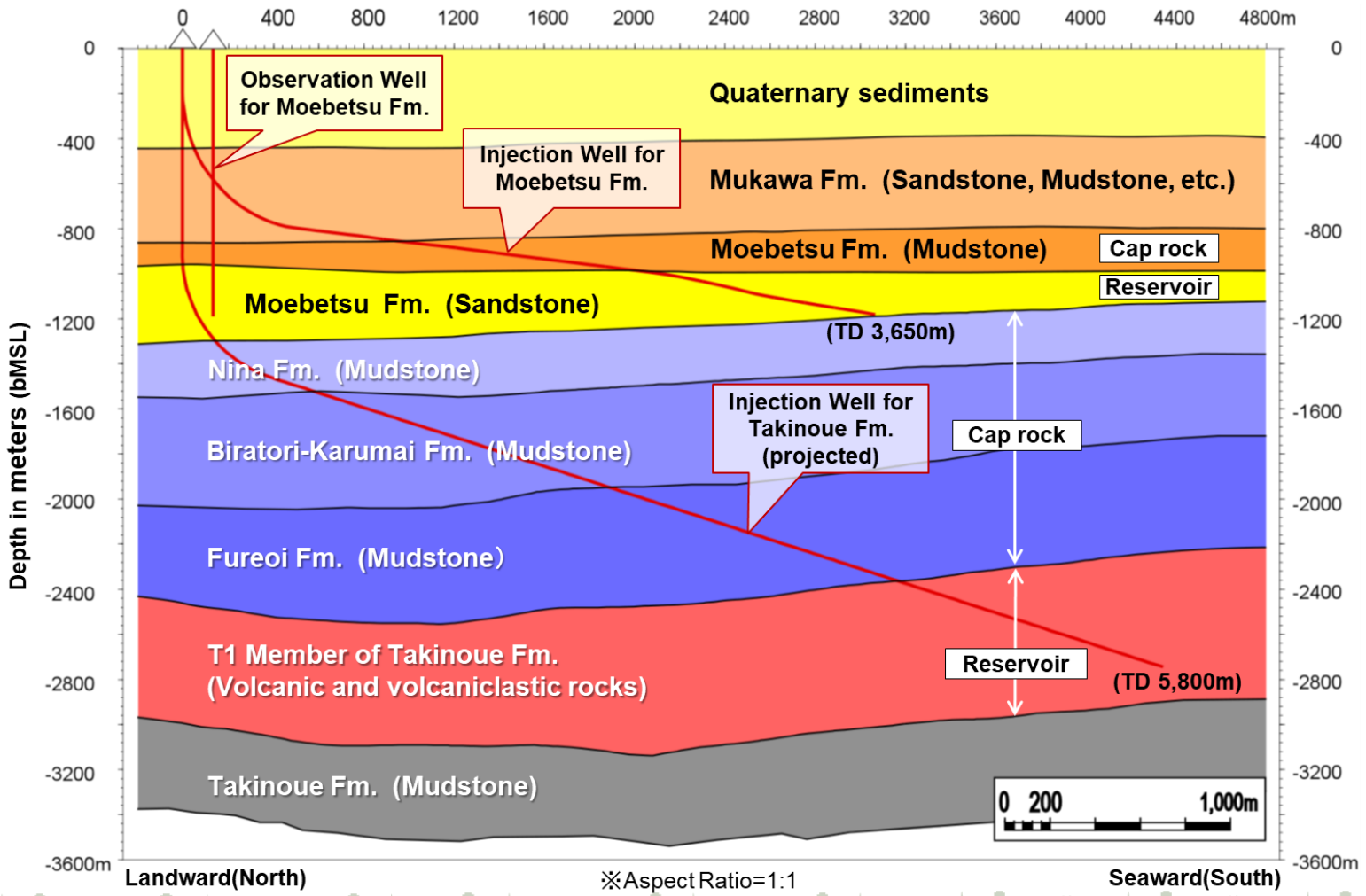
At the “CO_2 capture and injection facility", CO_2 is captured at purity of 99% or more from the PSA offgas sent through the Gas pipeline, pressurized by compressors, and injected by 2 injection wells into offshore sub-seabed reservoirs for storage.

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On November 22, 2019, CO_2 injection was terminated.

Cumulative CO_2 Injection amount
300,110.3 tonnes

Schematic Geological Section



This is a schematic geological section showing how the CO_2 is injected by two injection wells extending to the two reservoirs, the Takinoue Formation T1 Member (volcanic rocks) and Moebetsu Formation (sandstone).

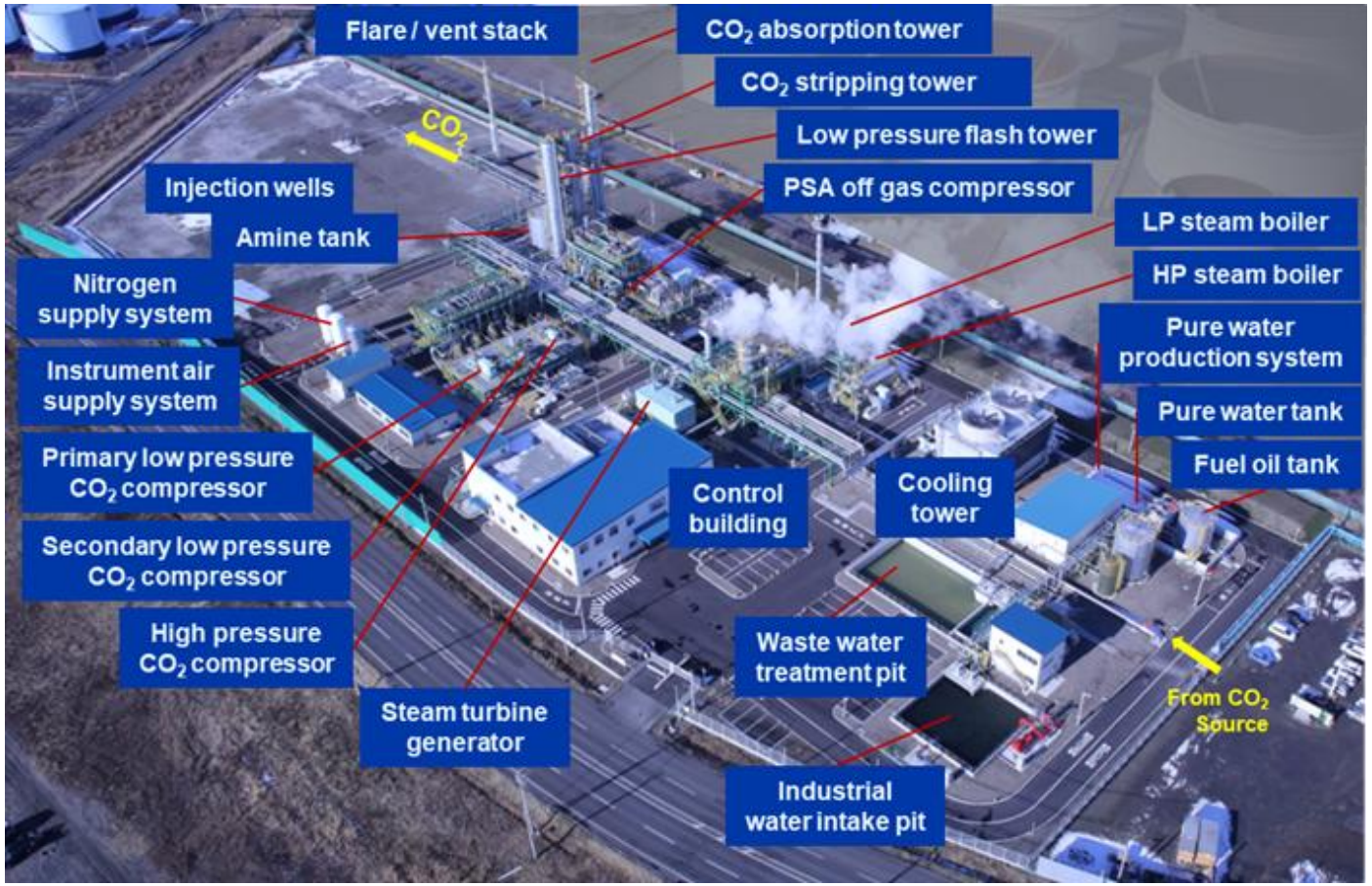
The Takinoue Formation injection well is a directional well with a total depth of 5,800m and maximum inclination of 72 degrees. The Moebetsu Formation injection well is a directional well with a total depth of 3,650m and maximum inclination of 83 degrees.

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On November 22, 2019, CO_2 injection was terminated.

Cumulative CO_2 Injection amount
300,110.3 tonnes

Bird's Eye View of Capture and Injection Facilities



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On November 22, 2019, CO_2 injection was terminated.

Cumulative CO_2 Injection amount
300,110.3
tonnes

CO_2 Capture Facilities and Compressors



CO_2 Capture Facility
Captures CO_2 from PSA Offgas

3 stage CO_2 Compressors
Increases pressure of captured CO_2 to the pressure required for injection

Copyright 2026 Japan CCS Co., Ltd.

On November 22, 2019, CO_2 injection was terminated.	Cumulative CO_2 Injection amount **300,110.3** tonnes

CO_2 Injection Report

Injection was terminated on November 22, 2019.

Cumulative CO_2 Injection amount
(April 06, 2016～November 22, 2019)

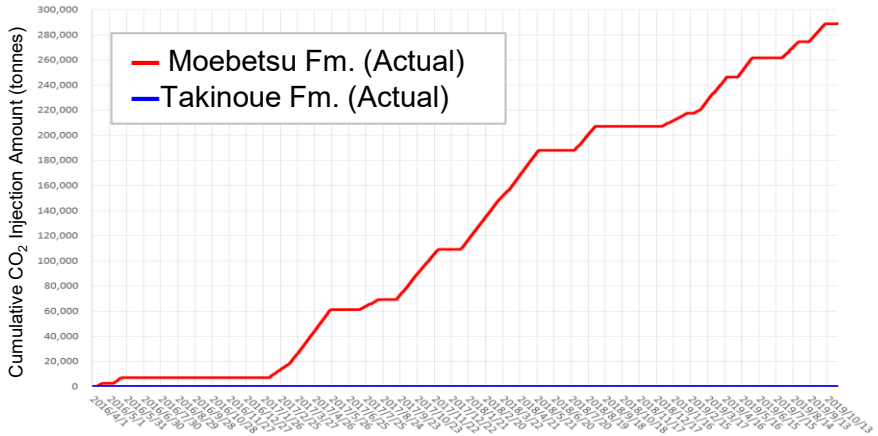
300,110.3

tonnes

Injection Amount in November 2019

	Injection Amount/month (November 2019)	Cumulative CO_2 Injection Amount (As of November 22)
Moebetsu Fm.	10,793.5 tonnes	300,012.2 tonnes
Takinoue Fm.	0.0 tonnes	98.2 tonnes

Change of cumulative CO_2 Injection Amount

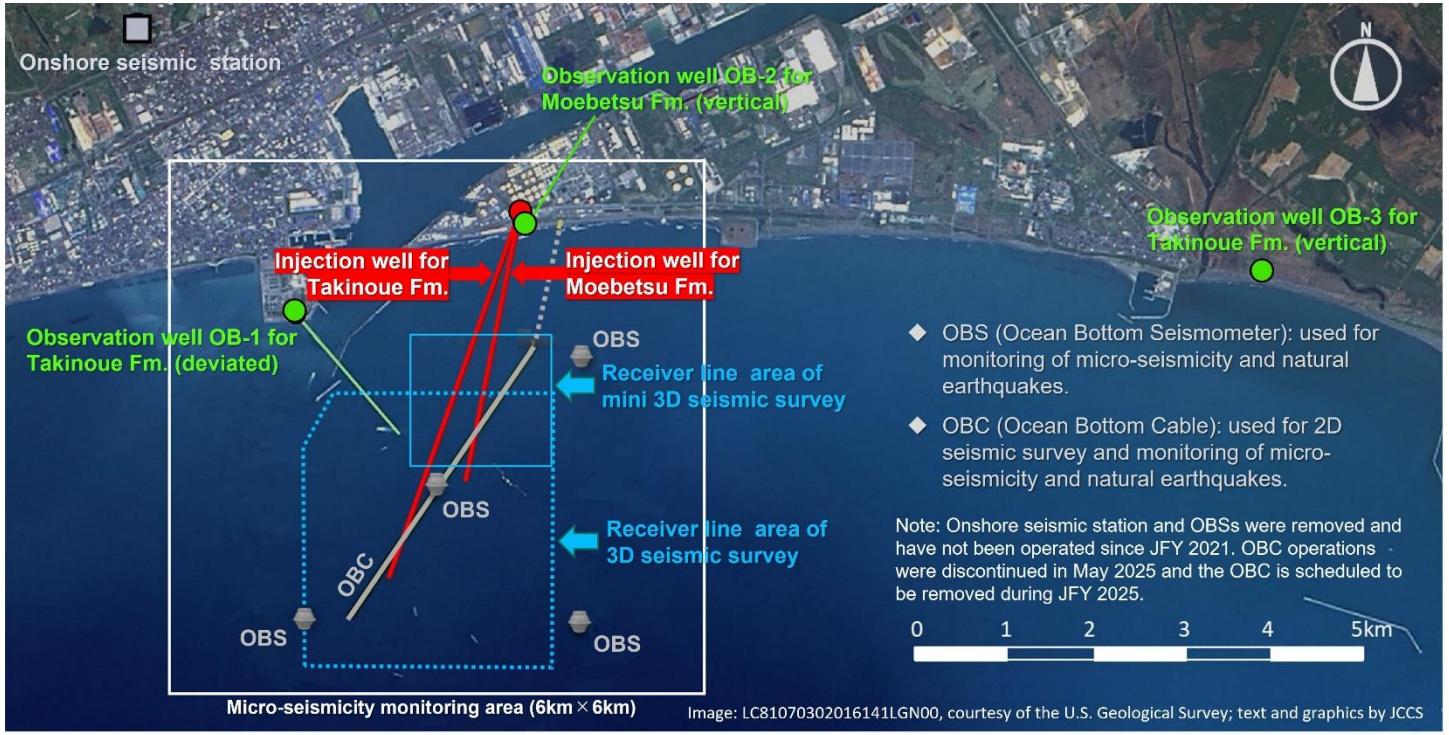


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Layout of Monitoring Network



A monitoring network was constructed near and around the CO_2 injection point, and continuous monitoring over six years comprising before CO_2 injection (1 year), during CO_2 injection (3 years) and after termination of injection (over 6 years) is being carried out.

- The formation pressures and temperatures of the wells - observation wells (3 wells) drilled around the CO_2 injection point and CO_2 injection wells (2 wells) are being monitored.
- Seismometers were installed in the observation well and on the seabed to monitor earthquakes (including micro-seismicity - minute tremors that cannot be felt by humans).
- Observed data is controlled centrally at the Tomakomai Demonstration Center and continuous monitoring for the presence of abnormal conditions is being carried out.

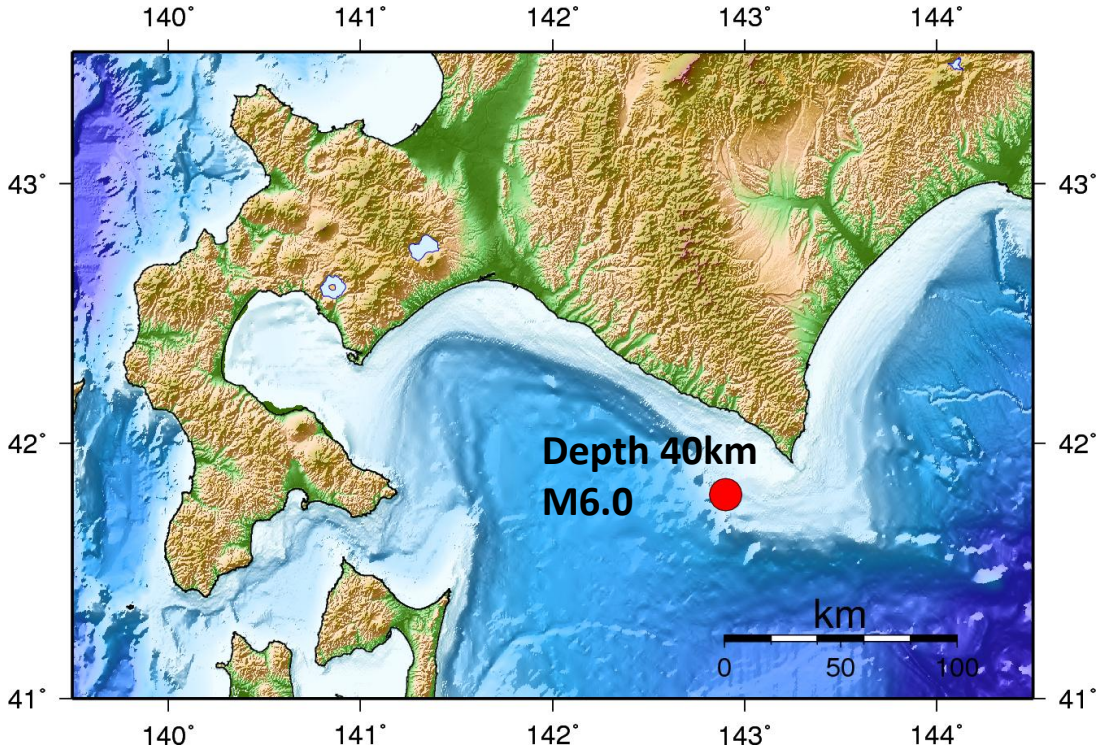
Note) Based on the results of an optimization study of the micro-seismicity monitoring system, the operation of the onshore seismic station and ocean bottom seismometers (OBS) was suspended in FY2021, and the operation of the permanent OBC was suspended in FY2025 (Suspended items are shown in gray). Micro-seismicity monitoring is currently being continued by the observation wells.

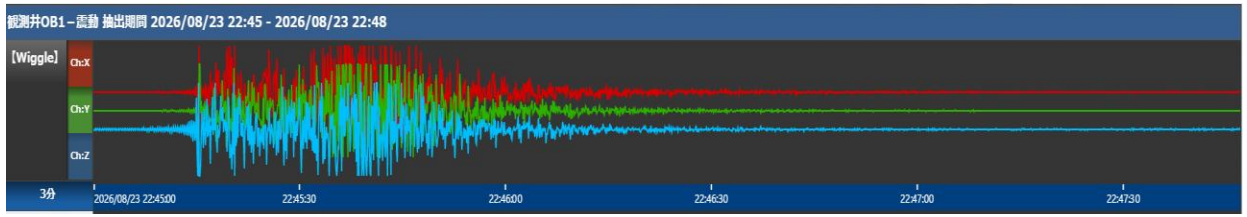
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On November 22, 2019, CO_2 injection was terminated.

Cumulative CO_2 Injection amount
300,110.3 tonnes

Most recent perceptible earthquake observed in Tomakomai





Earthquake Information
Announced by the Japan Meteorological Agency

Time & Date	22:45 (JST) 23 Aug, 2026
Hypocenter	Lat. 41° 48'N Lon. 142° 54'E Depth 40km
Magnitude	6.0
Seismic Intensity at Tomakomai-city	2

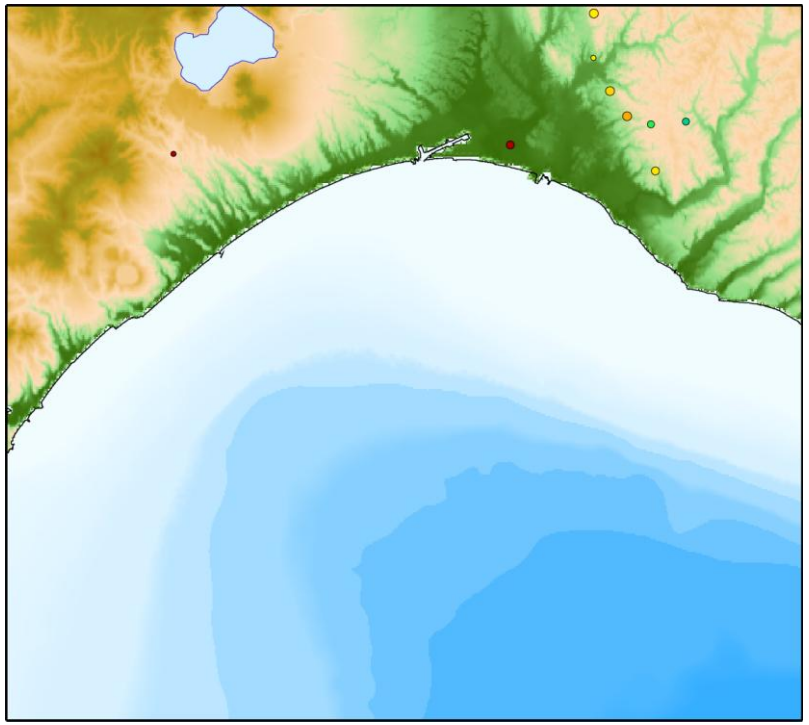
Geomorphic map is prepared from Geographical Survey Institute numerical map 250 m mesh (altitude) and Japan Marine Safety Agency 'Japan Oceanographic Data Center' 500 m mesh water depth data

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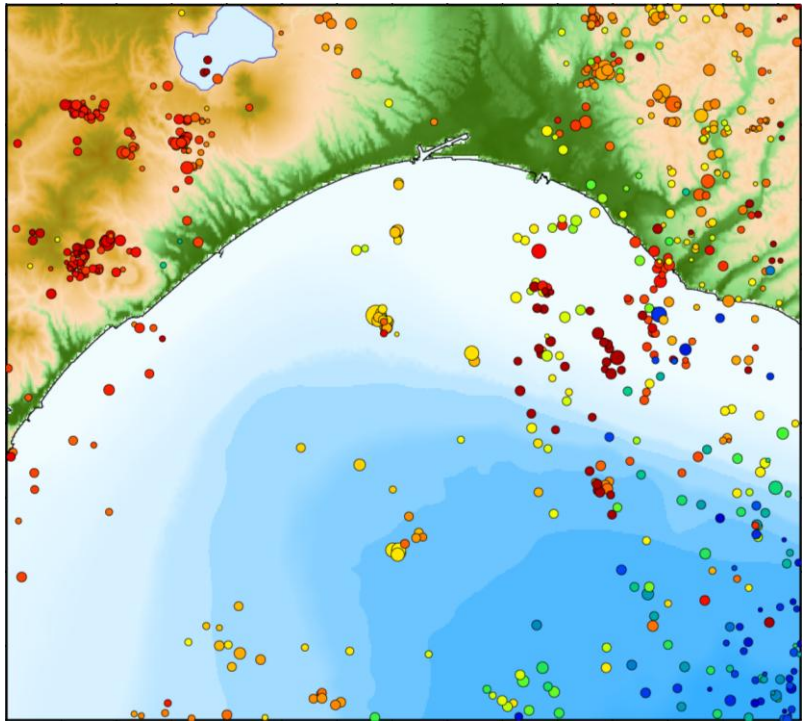
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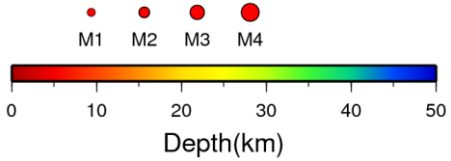
Distribution of Natural Earthquakes around Tomakomai

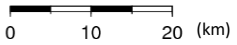


Natural earthquake hypocenter distribution in Sep 2026



Natural earthquake hypocenter distribution occurred from 2001 to 2010





The hypocenters in the figure is from the JMA Unified Hypocenter Catalog.
Earthquakes with the hypocenter depth of 50 km or less are displayed.

Geomorphic map is prepared from Geographical Survey Institute numerical map 250 m mesh (altitude) and Japan Marine Safety Agency 'Japan Oceanographic Data Center' 500 m mesh water depth data

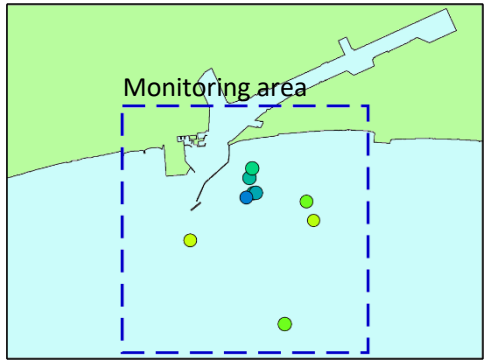
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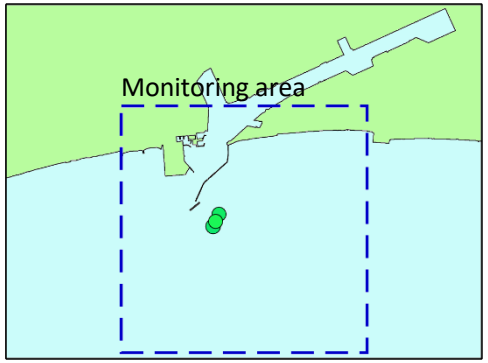
Cumulative CO_2 Injection amount
300,110.3 tonnes

Micro-seismic events nearby injection point

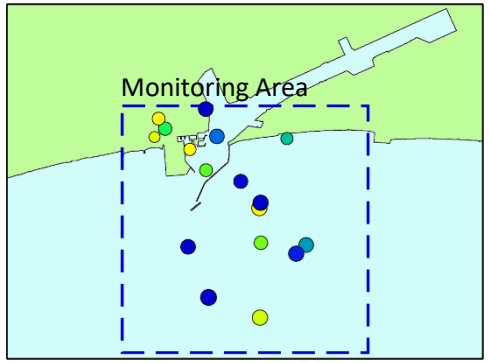
Pre-injection events (2015/2/1-2016/4/5)

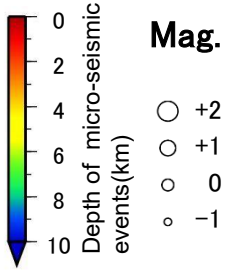


Events during CO_2 injection (2016/4/6-2019/11/22)



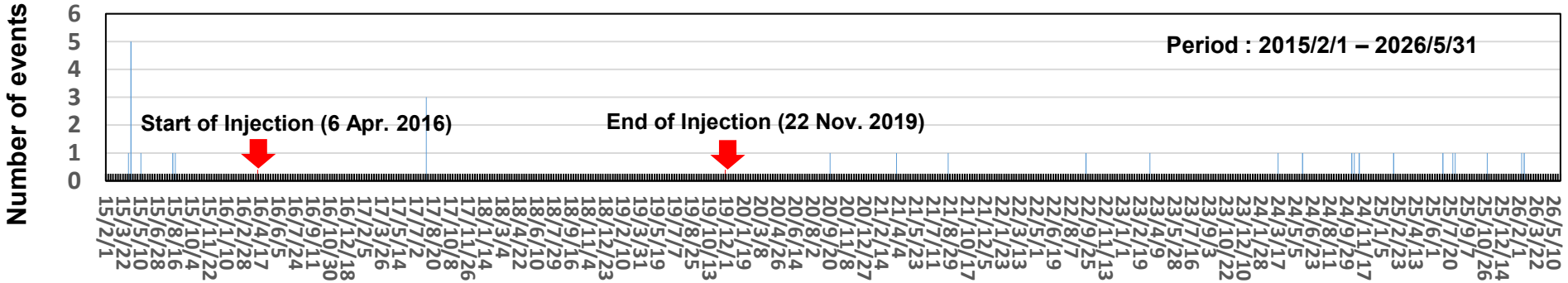
Post-injection events (2019/11/23-2026/5/31)





The left map is created based on the base map Information coastline data of Geospatial Information Authority of Japan.

Detection of micro-seismic events (weekly)



- There are perceptible earthquakes that can be felt, and imperceptible earthquakes that cannot be felt even though there are actual vibrations.
- In this project, particularly small (less than magnitude 1) imperceptible earthquakes are defined as micro-seismicity.
- In this project, micro-seismicity with a magnitude of -0.5 or more with a depth of less than 50 km in the vicinity of the injection point are monitored, due to restrictions on the placement of observation points, and constraints on seismograph detection capability, etc.

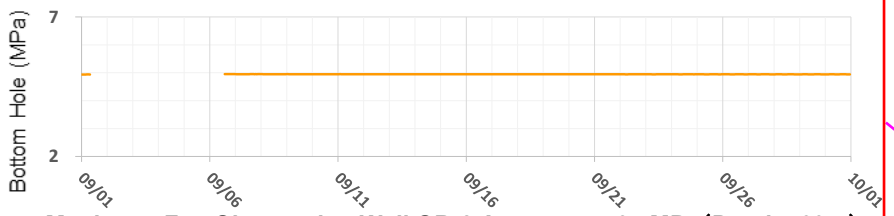
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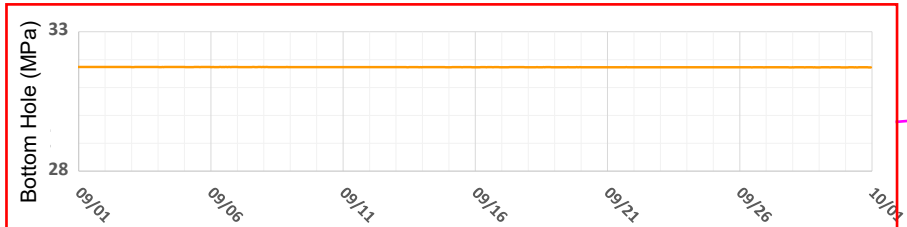
Cumulative CO_2 Injection amount
300,110.3 tonnes

Observation of pressure in the wells (Sep 2026)

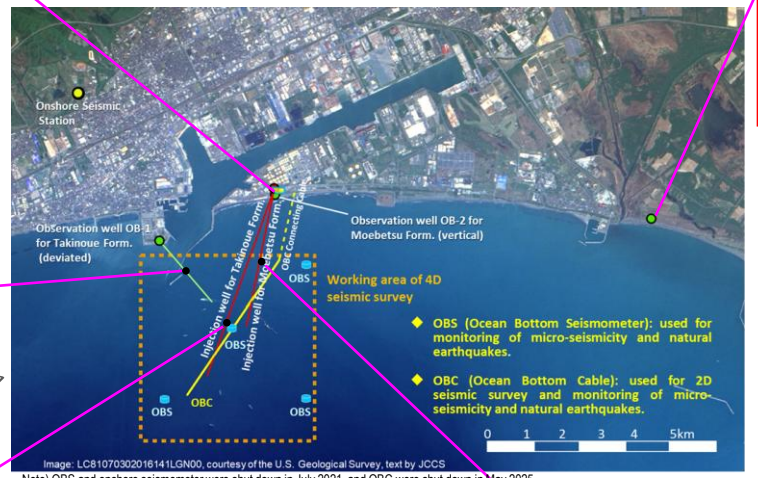
（9/1-6 Missing data due to maintenance）



Moebetsu Fm. Observation Well OB-2 Average: 4.95 MPa（Depth 469m）

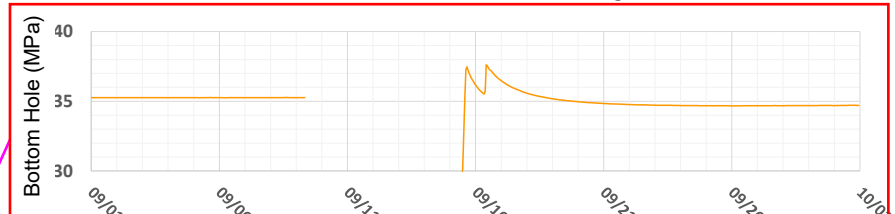


Takinoue Fm. Observation Well OB-1 Average: 31.73MPa（Depth 2238m）



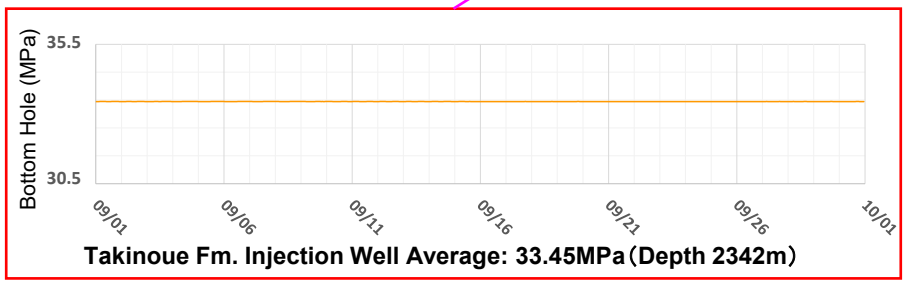
Note) OBS and onshore seismometer were shut down in July 2021, and OBC were shut down in May 2025.

（9/9-14 Missing data due to maintenance）

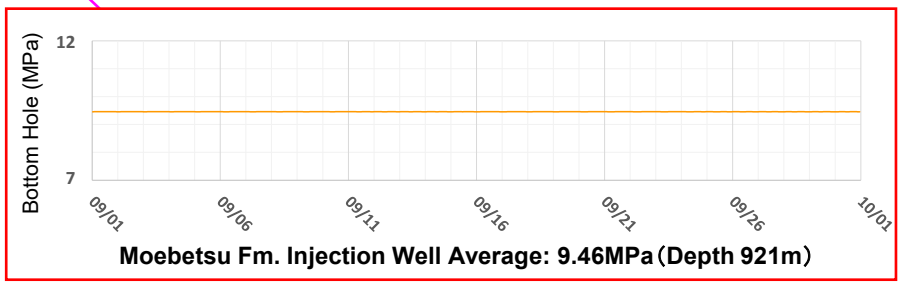


Takinoue Fm. Observation Well OB-3 Average: 34.90MPa（Depth 2150m）

（Pressure fluctuations are due to maintenance work）



Takinoue Fm. Injection Well Average: 33.45MPa（Depth 2342m）



Moebetsu Fm. Injection Well Average: 9.46MPa（Depth 921m）

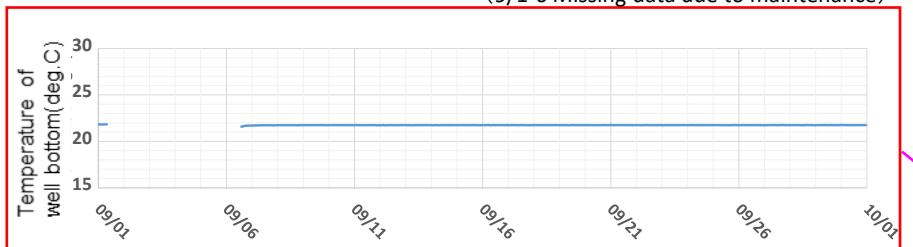
Copyright 2026 Japan CCS Co., Ltd.

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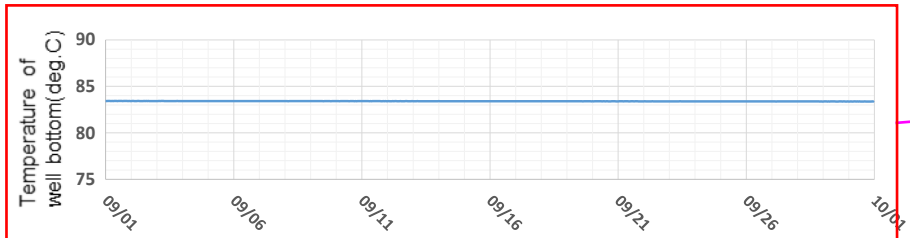
Cumulative CO_2 Injection amount
300,110.3 tonnes

Observation of temperature in the wells (Sep 2026)

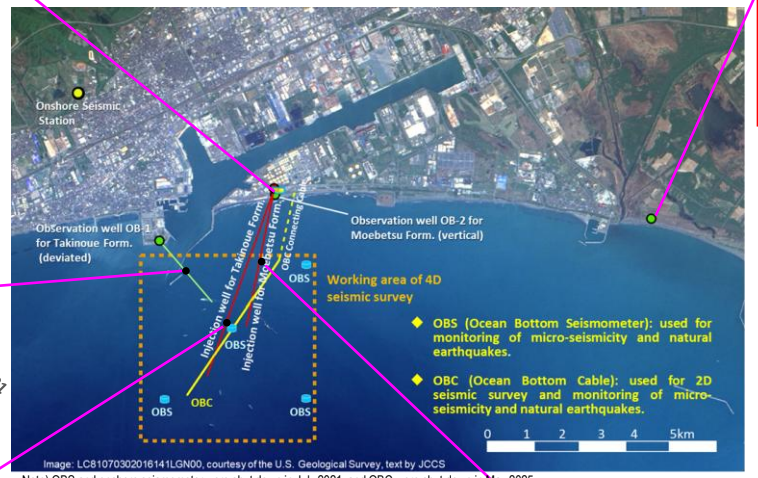
（9/1-6 Missing data due to maintenance）



Moebetsu Fm. Observation Well OB-2 Average: 21.7 ℃（Depth 469m）

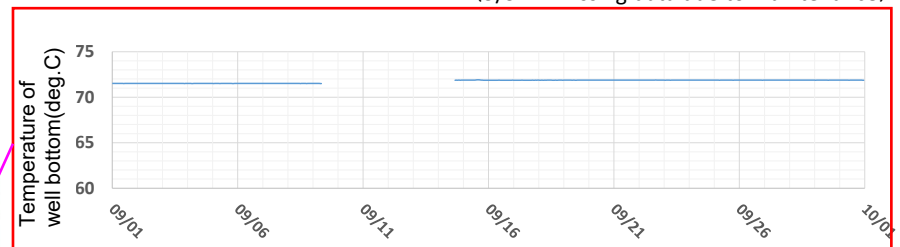


Takinoue Fm. Observation Well OB-1 Average: 83.4℃（Depth 2238m）

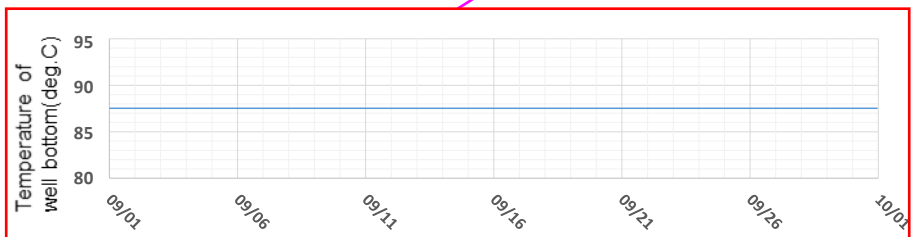


Note) OBS and onshore seismometer were shut down in July 2021, and OBC were shut down in May 2025.

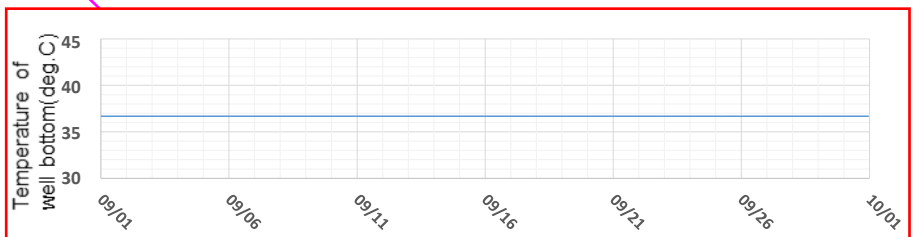
（9/9-14 Missing data due to maintenance）



Takinoue Fm. Observation Well OB-3 Average: 71.8℃（Depth 2150m）



Takinoue Fm. Injection Well Average: 87.5℃（Depth 2342m）



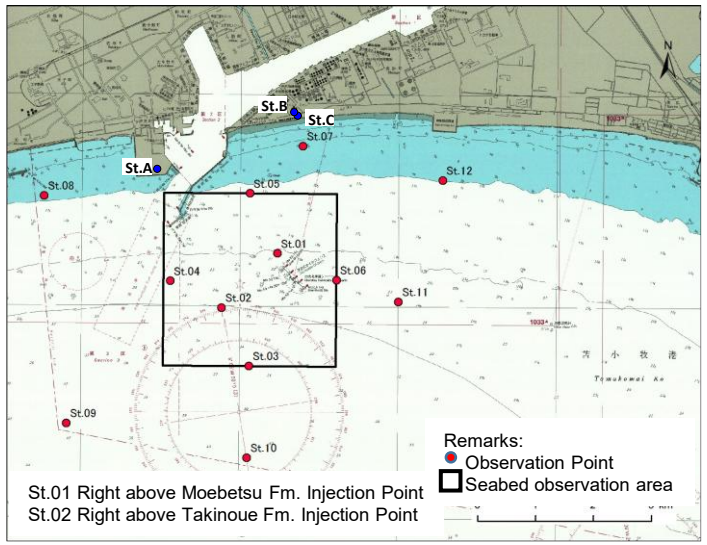
Moebetsu Fm. Injection Well Average: 36.7℃（Depth 921m）

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On November 22, 2019, CO_2 injection was terminated.

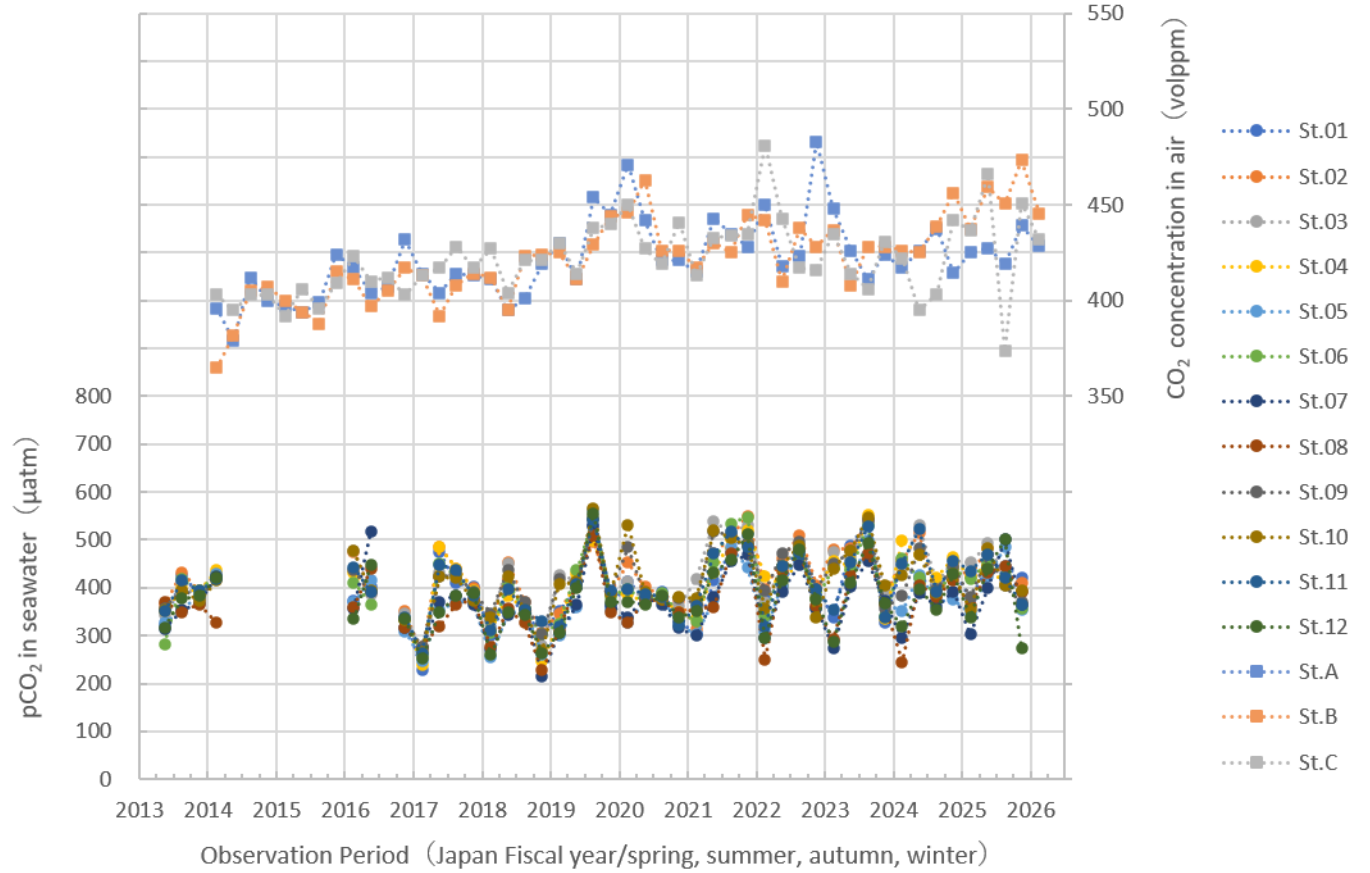
Cumulative CO_2 Injection amount
300,110.3 tonnes

CO_2 Concentration around injection point（seasonal）



Cruise to the Japan Coast Guard issue navigation chart (W1034)

Seasonal observation of CO_2 concentration is conducted at three onshore points (St.A to C) and 12 offshore points (St.01 to 12). The concentration of CO_2 is indicated as Volume ratio (unit: volppm) at the onshore observation points, and as partial pressure (unit: μ atm) at the offshore points. The figures of the offshore points are based on the measurement at 2 meters above the seabed.



* Offshore observation was not conducted in fall 2016.

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