NiPR
National Institute of Polar Research

FARO 2023
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Japan's Update to FARO 2023 on Arctic Science Activities

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Arctic Challenge for Sustainability Ⅱ 2020-2025

<< *Project Goal* >>

Promoting advanced and interdisciplinary research on the Arctic, aiming social implement of its results.

4 Strategic Goals

Strategic Goal 1 — Advanced Observation of Arctic Environmental Change

Strategic Goal 2 — Improvement of Weather and Climate Prediction

Strategic Goal 3 — Impact of Arctic Environmental Change on Society

Strategic Goal 4 — Legal/Policy Response and Research Implementation for a Sustainable Arctic

2 Priority Subjects

Priority Subject 1 — Capacity Building and Research Promotion

Priority Subject 2 — Strategic Dissemination of Arctic Information

11 Research Programs

- Atmosphere
- Ocean
- Cryosphere
- Land
- Teleconnection
- Climate Prediction
- Human Society
- Arctic Sea Routes
- Coastal Environments
- International Law
- International Relations

- **>220 Researchers participating**
- **Total budget >5 Billion Yen (34 MEUR)**

Research Infrastructures

- International Collaboration Site
- Research Vessel
- Earth Observation Satellite Data
- Arctic Data archive System

New initiative toward the International Platform for Arctic Science

"Call for Early Career Scientists' proposal for R/V Mirai 2023 Arctic cruise"

In accordance with the objectives of the Arctic Challenge for Sustainability II (ArCS II) project (ongoing Japan's Arctic research project), especially for Priority Subject 1. "Capacity Building and Research Promotion" & in collaboration with the Association of Polar Early Career Scientists (APECS), we conducted a "Call for Early Career Scientists' proposal for R/V Mirai 2023 Arctic cruise" from not only Japan but also other countries.

Mar.-May, 2022 Decision to conduct this call made!! Announcement of this call at international meetings

Mar.-Aug. Preparation of this call in ArCS II project (Japanese Arctic research project) and JAMSTEC.

Sept. 8 Start of this call (Disseminate widely to the national/international Arctic research community)

Oct. 20 Deadline for the call：16 proposals from 8 countries were submitted.

- A review committee of researchers with experience in Arctic Ocean observation was established. Applications are reviewed from the viewpoints of scientific importance and feasibility, and accepted proposals were determined.

☆ 12 proposals were accepted!! (JPN(4), US(3), UK(2) Denmark, Norway, and Portugal)

Nov. 2 Notification of Review Results

- As a result of the arrangements, 17 members from 11 proposals will embark on the 2023 cruise (see right pictures), and 3 from 1 proposal (US) will embark on the 2024 voyage.

Feb.-Mar., 2023 Cruise planning meeting will be conducted. Arrangements for observation will be done.

We continue preparations for the coming R/V Mirai 2023 Arctic cruise with accepted ECSs.

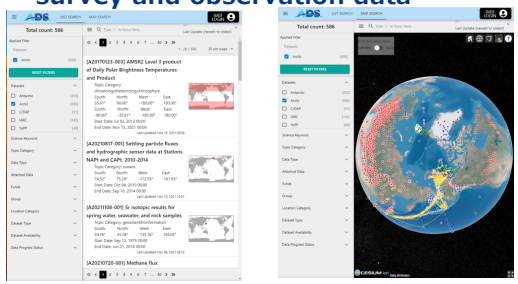
RIs: Arctic Data archive System (ADS)

Overview of Arctic Data archive System(ADS)

The Arctic Data archive System (ADS) aims to develop an Open Science infrastructure for Arctic research, and will promote the mutual distribution of the Big Data of Arctic research. Furthermore, ADS will develop analysis and visualization Web services for integrated Big Data, and intends to generate new value with Big Data.

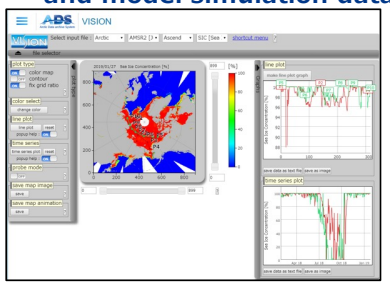
Data publication, analysis and provision by **ADS**

Registration and publication of the survey and observation data



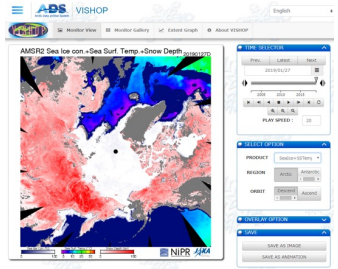
ADS database（KIWA）

Online Analysis of satellite and model simulation data



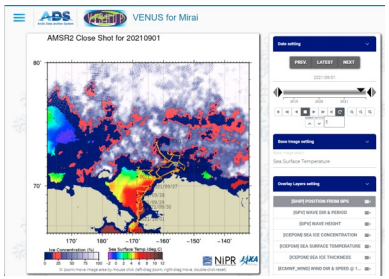
(VISION)

Near real-time polar environmental monitoring system



(VISHOP)

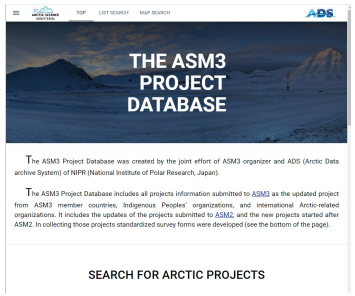
Ship navigation support service "VENUS"

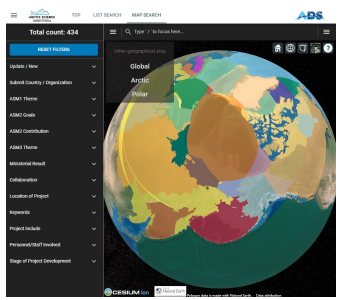


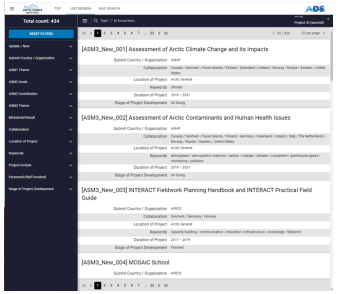
(VENUS for MIRAI Cruse)

Contribution to 3rd Arctic Science Ministerial **(ASM3)**

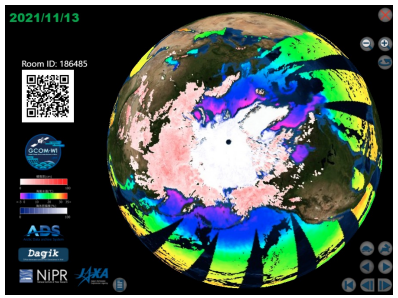
Development of the Project Database mapping all of the ASM3 submitted projects







Enhanced educational content



Development of a 3D globe that can be controlled with a smartphone

RIs: International Collaboration Sites

In ArCS II, observation and research sites in the Pan-Arctic are allocated as 'International Collaboration Sites' under MOUs with key Arctic institutes to promote advanced joint studies by precisely monitoring changes in the area and to utilize them as on-site platforms for capacity building of ECRs.

- 11 Arctic sites in 6 countries (Qaanaaq-Siorapaluk & Pallas-Sodankylä have been newly added in ArCS II)

- NIPR started integrated Arctic observations based at Ny-Ålesund in 1991 under close collaboration with Norwegian Polar Institute and NySMAC. In 2019, the new 'NIPR Observatory' was inaugurated.

- Since 1999, IARC/UAF has been taking a pivotal role in promoting US-Japan collaborative studies and training ECRs especially from JAXA, JAMSTEC and HU.

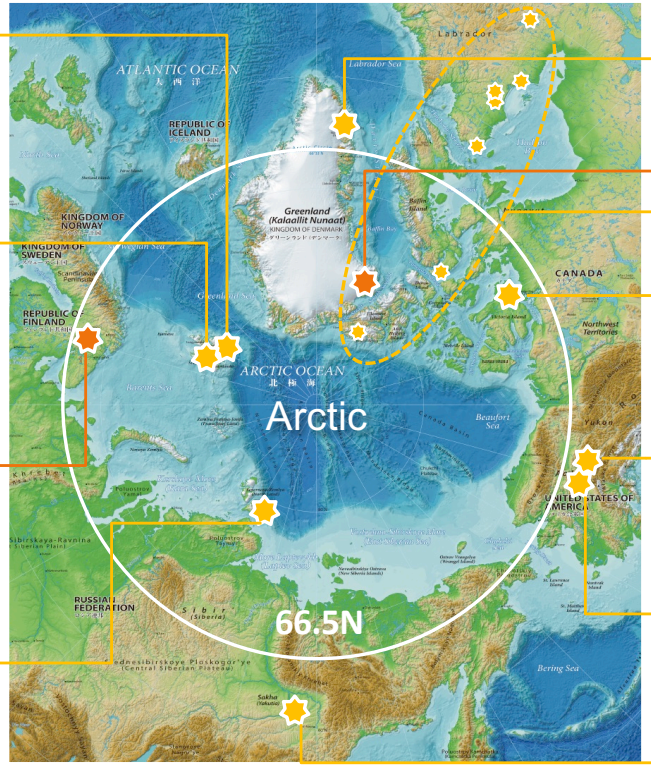
- Based on MOUs with IBPC and AARI of Russia, Russia-Japan joint studies and programs have been continued in Yakutia and at Ice Base Cape Baranova.

Ny-Ålesund NIPR Observatory

University Centre in Svalbard (UNIS)

Pallas-Sodankyla GAW station

Ice Base Cape Baranova



Greenland Institute of Natural Resources (GINR)

Qaanaaq-Siorapaluk Research Base

Centre d'etudes Nordiques (CEN)

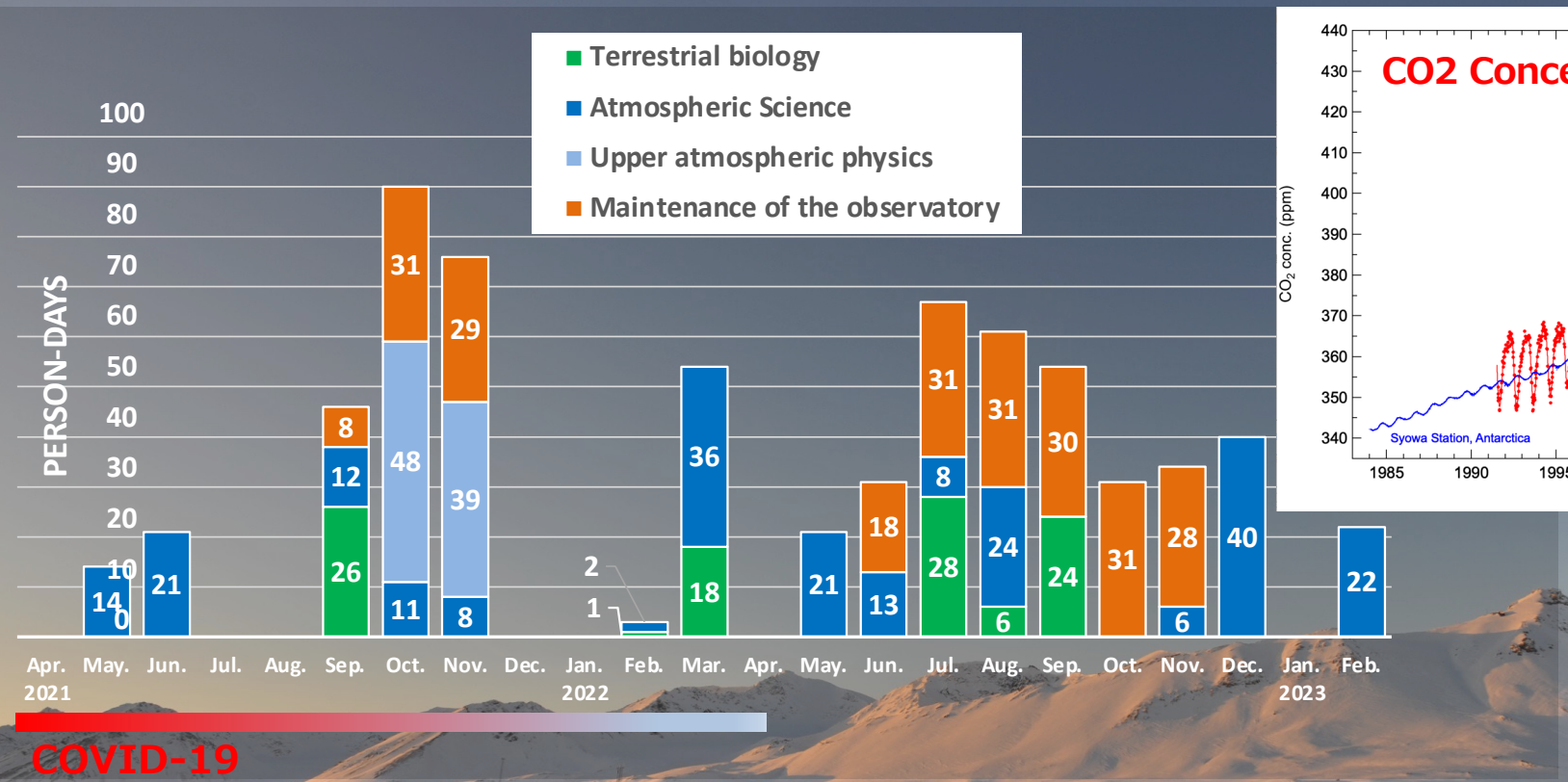
Poker Flat Research Range (PFRR)

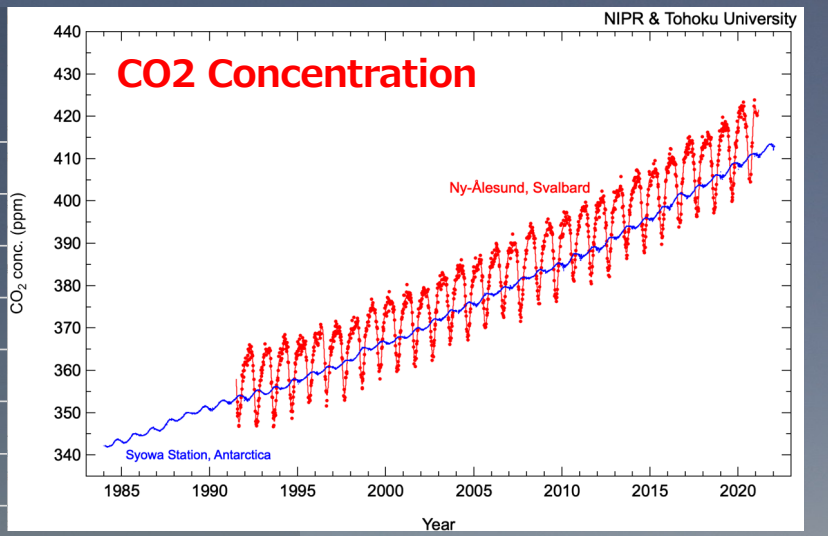
Canadian High Arctic Research Station (CHARS)

International Arctic Research Center (IARC/UAF)

Spasskaya Pad Forest Station

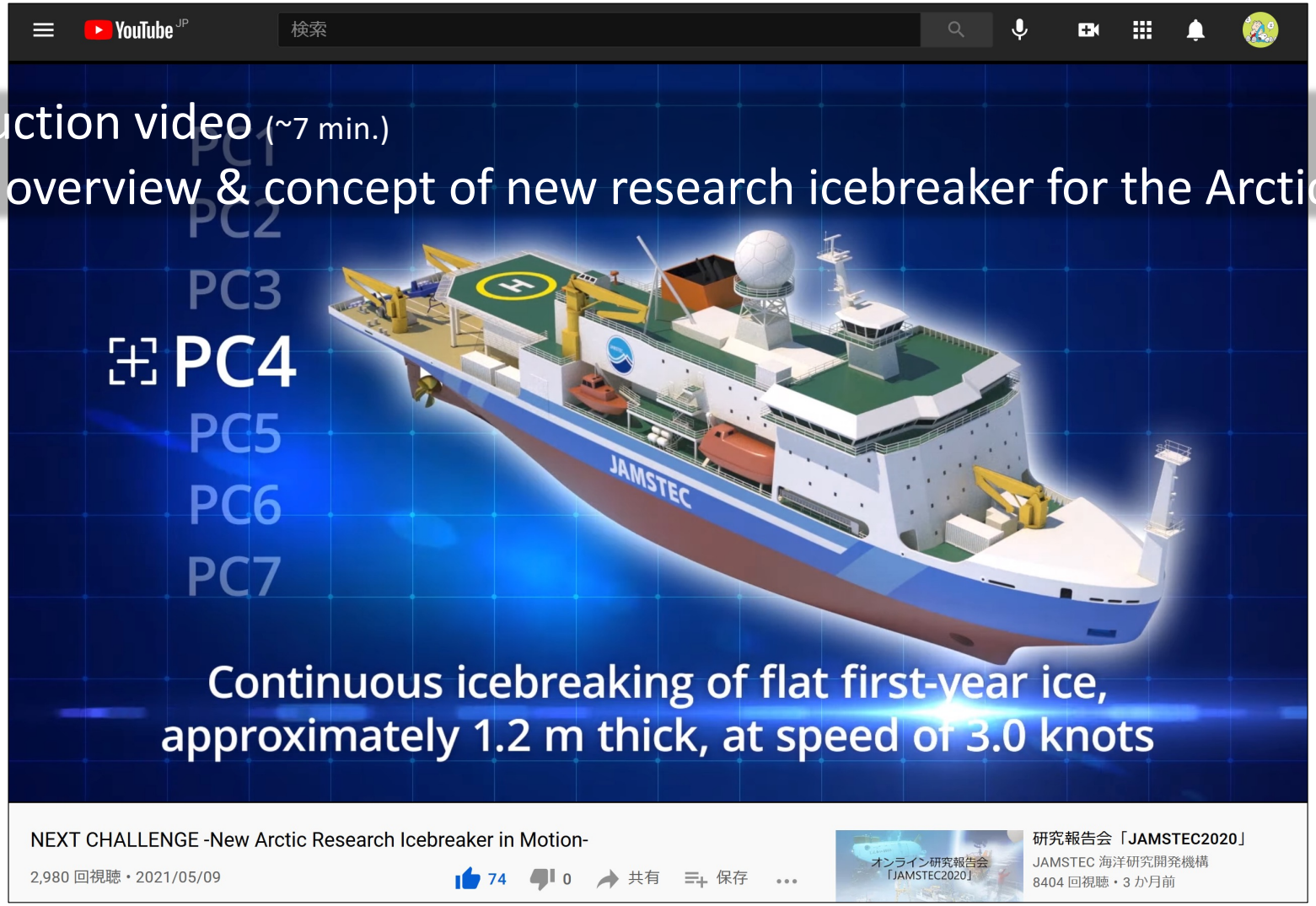
Japanese activities at Ny-Ålesund since 2021





Veksthuset NIPR Observatory 2019～

Introduction video (~7 min.)
on the overview & concept of new research icebreaker for the Arctic Ocean



* Note that there is an introduction video (~7 min.) on the overview & concept of a new research icebreaker for the Arctic Ocean at **JAMSTEC Youtube channel**, https://www.youtube.com/watch?v=DcH_UA4cf8k

Japan's new research icebreaker for the Arctic Ocean

Scientific and political background

- **Rapid changes in the Arctic environment and their impact on society** were recognized as not only Arctic local but also global issues. **Japan has been conducting multi-disciplinary observation in the Pacific sector of the Arctic Ocean using R/V Mirai** (JAMSTEC).
- Japan was granted **observer status at the Arctic Council**, in 2013.
- **Japan's Arctic Policy** was presented in October 2015. And then, it was the first time that "to promote Japan's Arctic Policy" was included as one of the primarly measures in the Third Basic Plan on Ocean Policy in May 2018.

Length	:	128 m
Beam	:	23 m
Depth	:	12.4 m
Draught	:	8 m
Gross tonnage	:	13,000 tons
Ice breaking capability	:	Up to 1.2m thick first-year ice at 3.0 knots
Polar Class	:	PC4
Accommodation	:	99 persons

(Upper) Schematic of Japan's new research icebreaker for the Arctic Ocean
(Lower) Planned specification of the icebreaker

The construction of a new research icebreaker for the Arctic Ocean had been decided in December 2020 !!

- JAMSTEC is responsible for the construction and operation of the icebreaker.
- The steel-cutting ceremony was held in March 2022.
- We hope that the first (trial) observation cruise will be conducted in JFY2026 and later.

Concept of Japan's new research icebreaker

- ✓ **International platform for the Arctic research**
- ✓ Improvement of the environment for the utilization of NSR
- ✓ Contribution & involvement in the formation of international frameworks and rules

Japan would continue research cooperation with the Arctic and non-Arctic countries and will be leading a role in the Pan-Arctic Ocean observation using Japan's new research icebreaker.

JAMSTEC

NiPR National Institute of Polar Research

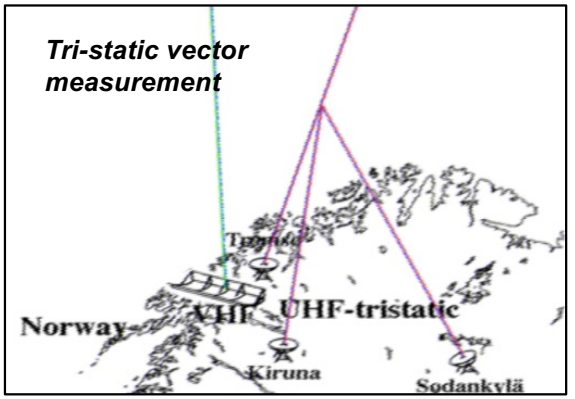
EISCAT (European Incoherent SCATter)

The EISCAT Scientific Association is an international research organization operating the world's largest-class incoherent scatter radar system to undertake cutting edge sciences for atmospheric, ionospheric and geospace studies, space weather and global change. ***Affiliated in the Association in 1996, Japan*** has jointly contributed to the operation and sciences with the EISCAT radars in collaboration with member countries.

Associates:

Affiliates:

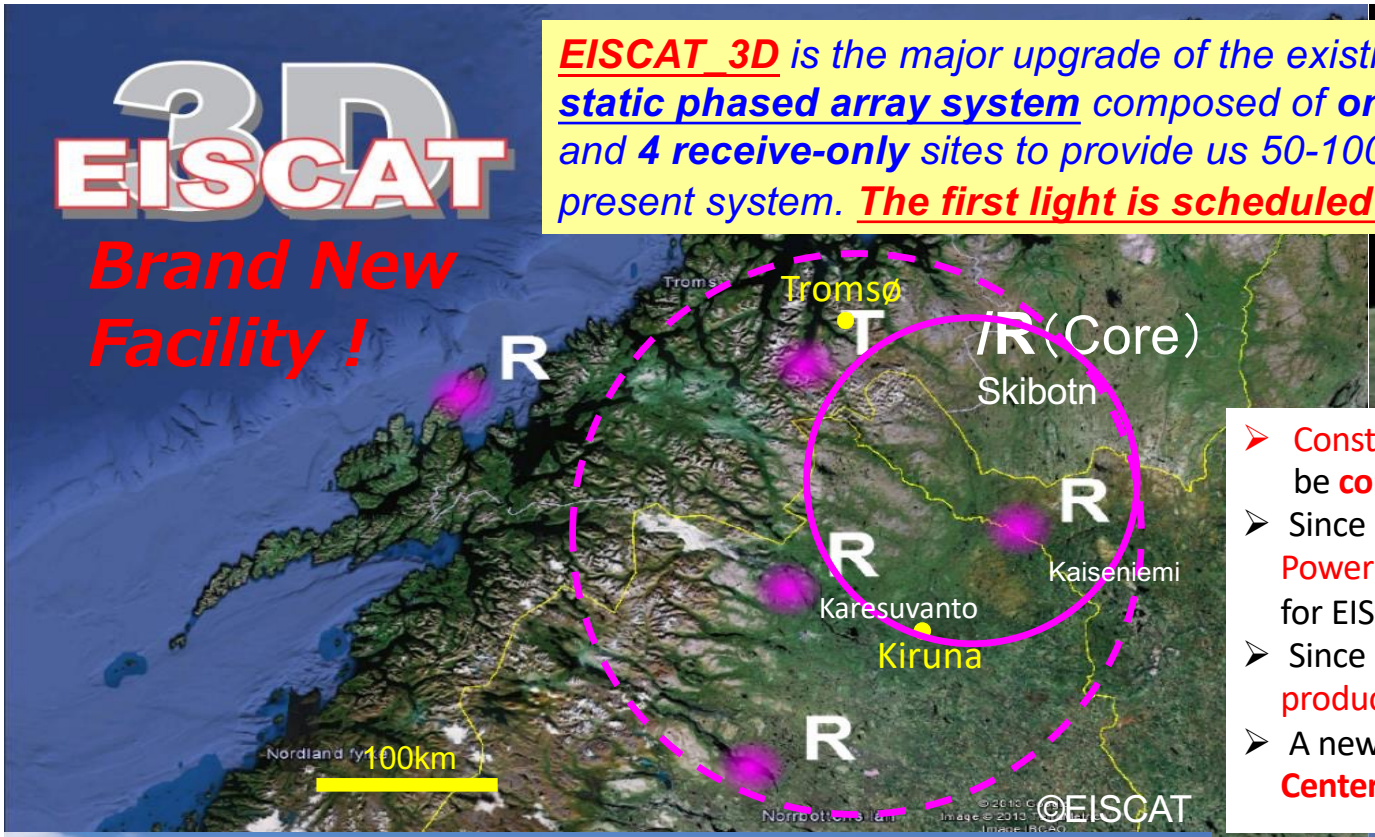
Japan has contributed to the construction of the EISCAT Svalbard radar



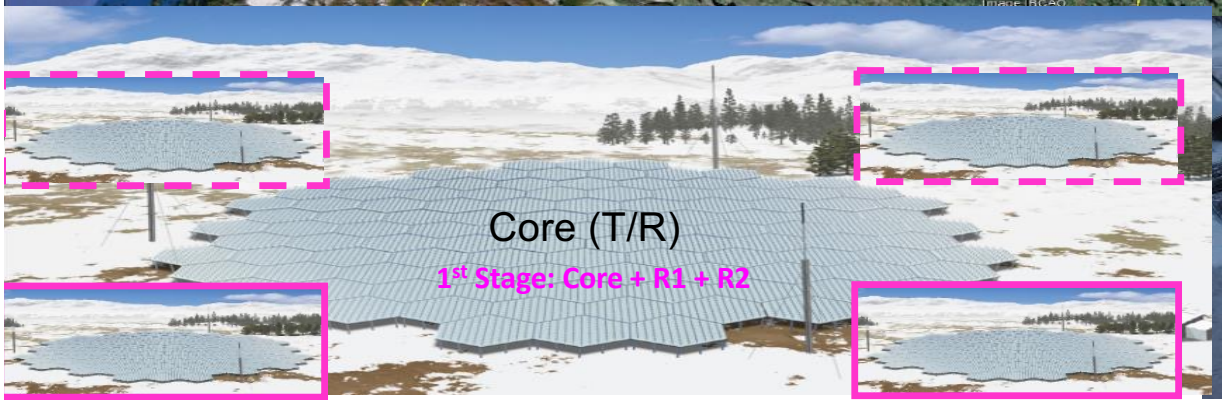
EISCAT 3D

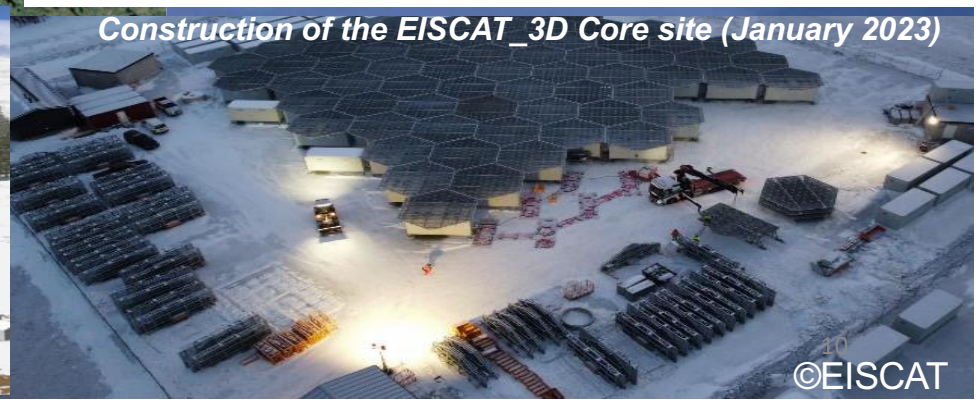
Brand New Facility !

EISCAT_3D *is the major upgrade of the existing EISCAT mainland radars, with* ***a multi-static phased array system*** *composed of* ***one central*** *active (transmit-receive) site and* ***4 receive-only*** *sites to provide us 50-100 times higher temporal resolution than the present system.* ***The first light is scheduled in Autumn 2023!***



- Construction of the 1st stage of EISCAT_3D is underway to be **completed by the end of 2023.**
- Since 2014 NIPR has been developing energy-efficient High-Power Amplifiers for EISCAT3D-PfP, a test sub-array system for EISCAT_3D.
- Since 2018 NIPR has been in-cash contributing to mass-productions of Transmitter units for Core site.
- A new center "**Advanced Radar Research promotion Center (ARRC)" was established** in NIPR in April, 2022.





Construction of the EISCAT_3D Core site (January 2023)