

Arctic Research Vessel (ARV) Mirai II

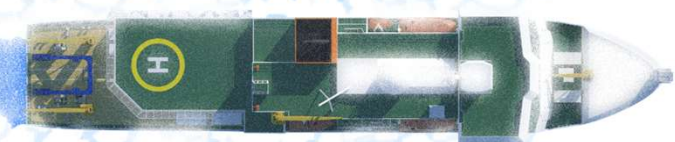
– Japan's New Research Platform for Arctic Ocean Observation
and International Collaboration.



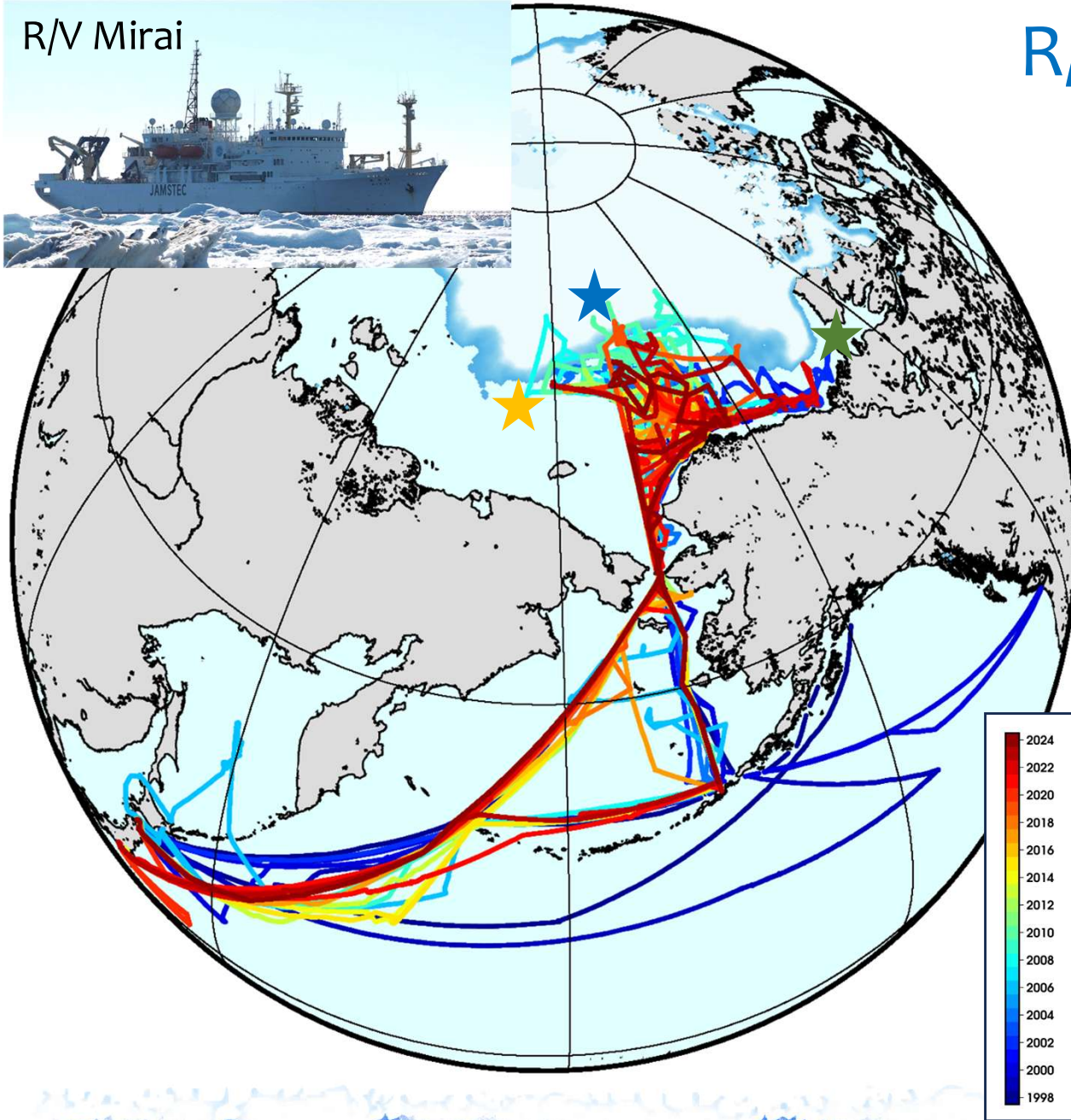
KIKUCHI, Takashi (菊地 隆)

Director,
Inst. Arctic Climate and Environment Res., Research Inst. Global Change,
Japan Agency for Marine-Earth Science and Technology
(IACE/RIGC/JAMSTEC)

Online Arctic Symposium by the Consular Office of Japan in Anchorage
at 11:15-11:35 (JST) on January 15, 2026



R/V Mirai



R/V Mirai Arctic cruise

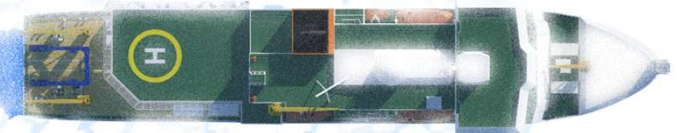
23 times for 28 years (1998~2025)

1998, 1999, 2000, 2001, 2002, 2003, 2004,
2005, 2006, 2007, 2008, 2009, 2010, 2011,
2012, 2023, 2014, 2015, 2016, 2017, 2018,
2019, 2020, 2021, 2022, 2023, 2024, 2025

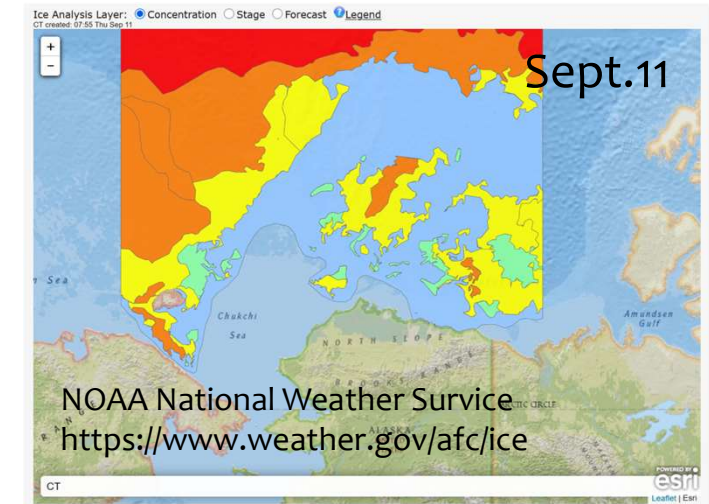
Some statistic

- Total days: 1,069 days (572 days in the Arctic Ocean)
- Total distance: about 400,000 km
(equivalent to circling the Earth ten times)
- Number of total participants 946
- Number of total young researchers 150
- Most Northern point: 79d 11m N (2010)
- Most Eastern point: 127d W (2004)
- Most Western point: 174d E (2008)

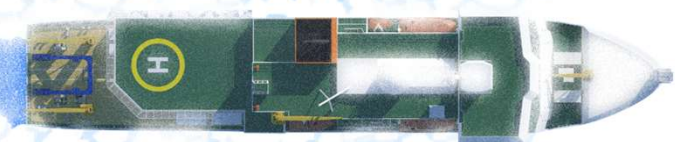
Online Arctic Symposium by the Consular Office of Japan in Anchorage
at 11:15-11:35 (JST) on January 15, 2026



The Final Arctic Ocean cruise of R/V Mirai in 2025



Online Arctic Symposium by the Consular Office of Japan in Anchorage
at 11:15-11:35 (JST) on January 15, 2026



May 2013

Oct. 2015

Dec. 2020

March 2023

Mar. 2025

Nov. 2026

Summer 2027

Japan became an observer of AC.
Japan's Arctic Policy was presented.

A construction of
Japan's new research icebreaker had been decided.

Steel cutting ceremony

Launching ceremony

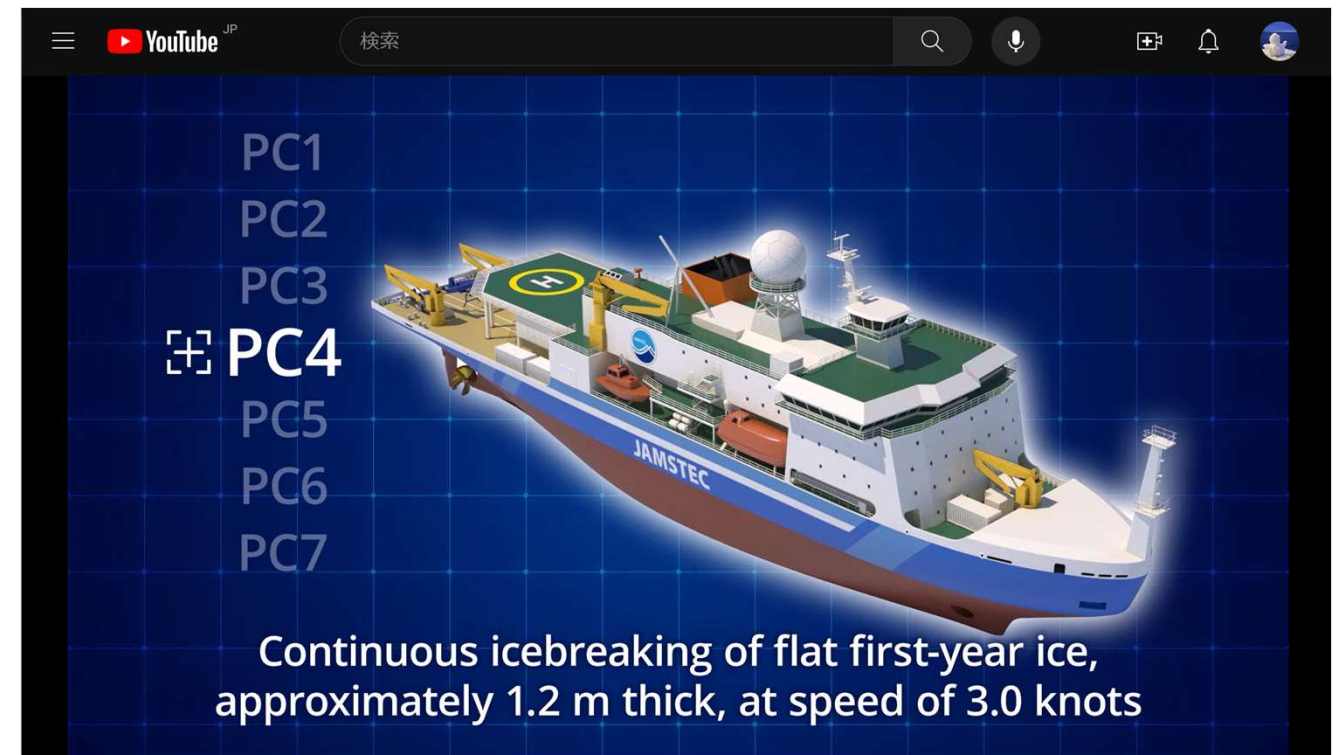
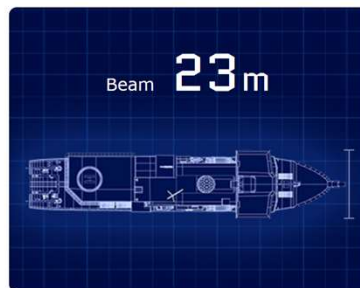
Delivery to JAMSTEC

First Arctic cruise (plan)

- Arctic research vessel

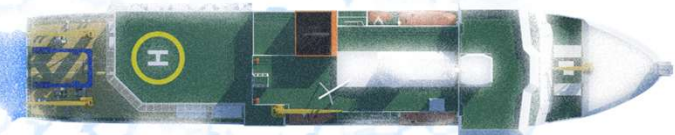
- Consider the design of a research vessel for the Arctic as a new international Arctic research platform, with functions to enable participation in international Arctic observation projects using equipment such as autonomous underwater vehicles (AUV).

Introduction YouTube movie of
new Japan's Arctic research icebreaker



https://www.youtube.com/watch?v=DcH_UA4cf8k

Online Arctic Symposium by the Consular Office of Japan in Anchorage
at 11:15-11:35 (JST) on January 15, 2026



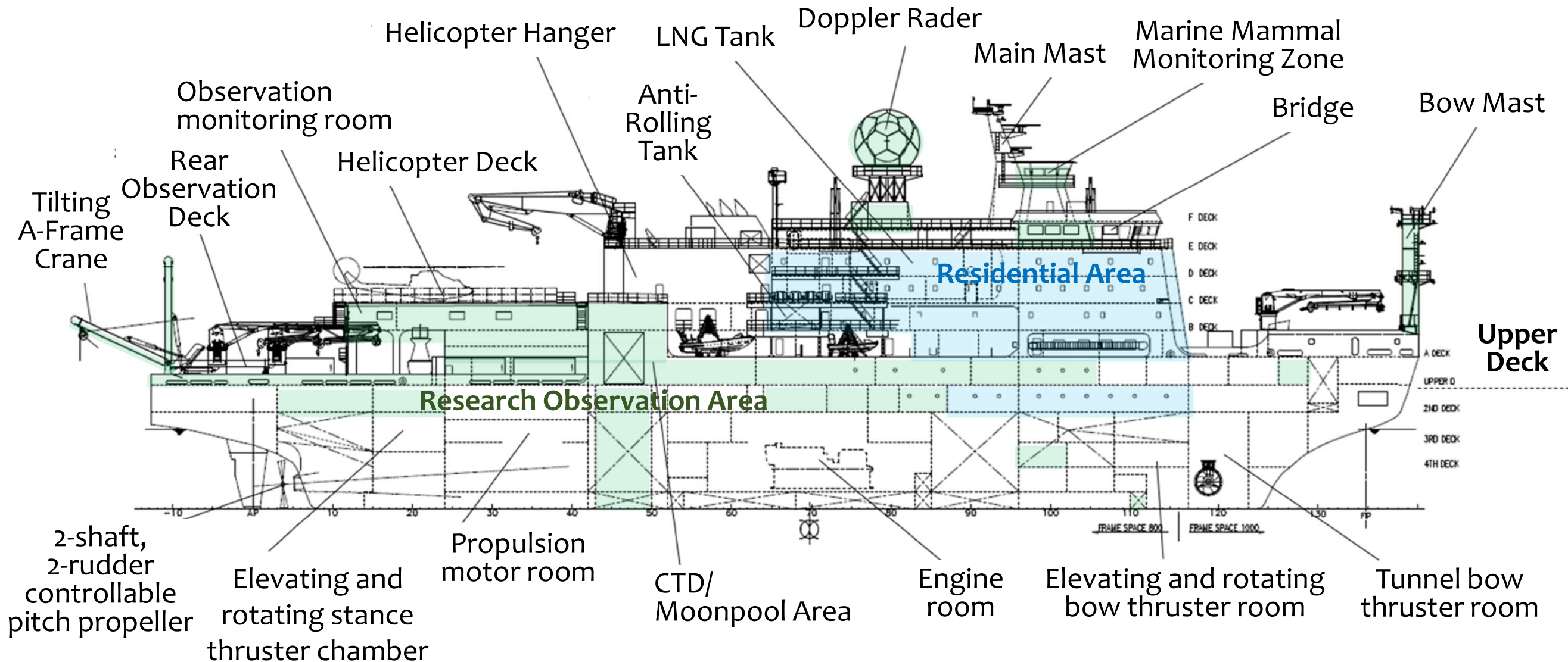
YouTube動画：【みらいⅡ】建造の軌跡～進水ver.～

https://www.youtube.com/watch?v=aVPW_HN3ahY



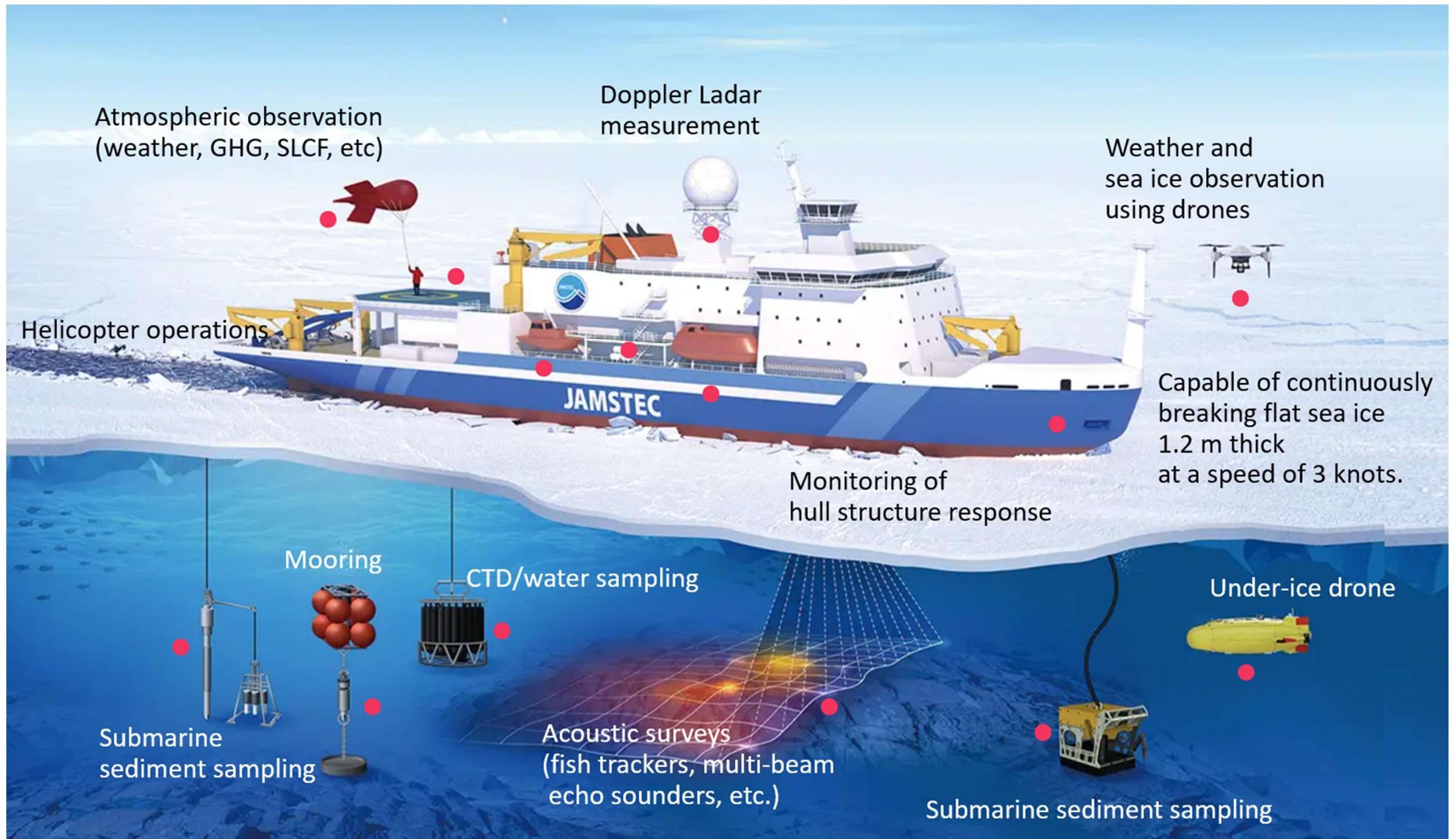
2024-09-06 07:59:58

Main Research Observation Areas and Facilities



Online Arctic Symposium by the Consular Office of Japan in Anchorage
at 11:15-11:35 (JST) on January 15, 2026





Schematic of observation capabilities and equipment of ARV Mirai II

◆ New initiatives toward ARV Mirai II as “International research platform”

Summer 2022

- **Call for early-career scientists’ (ECSs’) proposals for R/V Mirai 2023 cruise**

13 ECSs were able to join the cruise from Japan, USA, UK, Denmark, Norway and Portugal.

November 2023

- **The first International Workshop on Arctic Ocean Observation in Tokyo**

January 2025

- **JAMSTEC to serve as secretariat for Synoptic Arctic Survey (SAS)**

October 2025

- **The Second International Workshop on Arctic Ocean Observation in Yokohama on Oct. 27, 2025**

along with the 8th symposium for Arctic Research (ISAR-8) in Hachioji on Oct. 28-30, 2025

NOW !!

April 2027

- **Arctic Science Summit Week (ASSW) in Hakodate, Hokkaido**

Spring 2027

- **Call for ECSs’ & international collaboration proposals for ARV Mirai II cruise in 2028 & 2029**

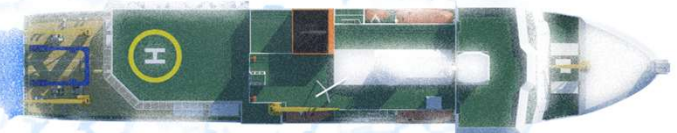
August - October 2027

- **First Arctic Ocean cruise by ARV Mirai II**

November 2026



Online Arctic Symposium by the Consular Office of Japan in Anchorage
at 11:15-11:35 (JST) on January 15, 2026



● Call for Early Career Scientists (ECS) participation in ARV Mirai II Arctic cruise

- JAMSTEC conducted a “**Call for Early Career Scientists’ proposal for R/V Mirai 2023 Arctic cruise**” from not only Japan but also other countries. As a result, we were able to invite six foreign ECSs from four countries (US, DE, UK, PT) for R/V Mirai Arctic cruise in 2023 and 2024.
- **Once the cruise and observation framework on the new icebreaker, ARV Mirai II, is established, we plan to once again issue an open call for ECS proposals from other countries.** This initiative aims to develop ECS personnel, promote exchanges between Japanese and foreign researchers, and foster future joint collaborative research, thereby contributing to the advancement of Arctic research.

e.g. **Spring 2027**: Call for ECS proposal for ARV Mirai II cruise → Review...

→ Participations of accepted ECSs in ARV Mirai II 2028 or 2029 Arctic cruise!!

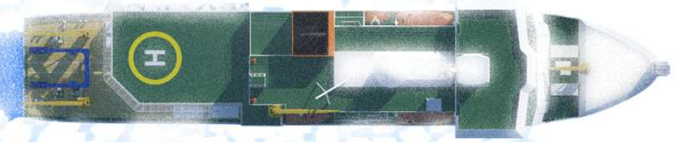
R/V Mirai (Japan) in the Arctic



ECS participation in
R/V Mirai 2023
Arctic cruise



Online Arctic Symposium by the Consular Office of Japan in Anchorage
at 11:15-11:35 (JST) on January 15, 2026



- The second International workshop on Arctic Ocean observation
@Yokohama Symposia on October 27, 2025
along with the 8th symposium for Arctic Research (ISAR-8)
in Hachioji on Oct. 28-30, 2025



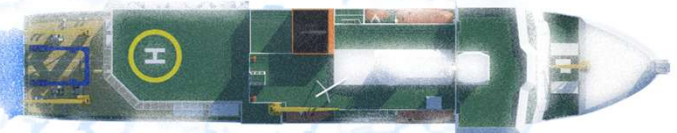
Craig Lee (UW)

Jackie Grebmeier (U. Maryland)



Group photo of the second international workshop on Arctic Ocean observation in Yokohama on October 27, 2025
81 participants from 9 countries (Canada 13, Germany 4, Korea 1, Norway 5, Spain 2, Switzerland 1, UK 3, **US 4**)

Online Arctic Symposium by the Consular Office of Japan in Anchorage
at 11:15-11:35 (JST) on January 15, 2026



● The First Mid-term Plan for Arctic Ocean Observations with the Arctic Research Vessel Mirai II (ARV Mirai II)

Following the first workshop and based on discussions held in Japan as well as within several international projects and frameworks, JAMSTEC and NIPR have established a joint promotion group to formulate the **First Mid-term Plan for Arctic Ocean Observations with the ARV Mirai II** (hereafter “the Plan”), in collaboration with Japan Consortium for Arctic Environmental Research (JCAR).



June 18, 2025

National Institute of Polar Research (NIPR) &
Japan Agency for Marine-Earth Science and Technology
(JAMSTEC)

First Mid-term Plan for Arctic Ocean Observations
with the Arctic Research Vessel Mirai II (ARV *Mirai II*)
(Draft)

● The First Mid-term Plan for Arctic Ocean Observations with the Arctic Research Vessel Mirai II (ARV Mirai II)

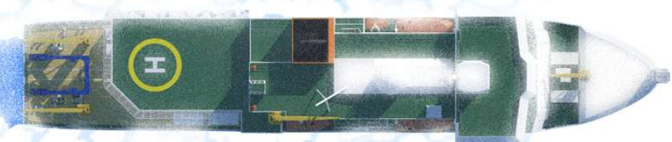
(Objective)

The first Mid-term Plan for Arctic Ocean Observation with the Arctic Research Vessel Mirai II (ARV Mirai II) (hereinafter referred to as “the Plan”) outlines a medium-term (approximately three to five years) Arctic Ocean observation program by ARV Mirai II. Chapters 1 to 4 provide an overview of recent changes occurring in the Arctic and their impacts (Chapter 1), present the significance of Arctic observation and research as an important contribution to the international community and as a critical issue to Japan (Chapter 1), specify the scientific research themes and

1. Situation in the Arctic
2. Research and Activities
 1. Environmental research themes
 2. Utilization measures other than environmental research themes
 3. Human resource development
3. International collaboration
4. Public relations and outreach initiatives

General Overview and Direction

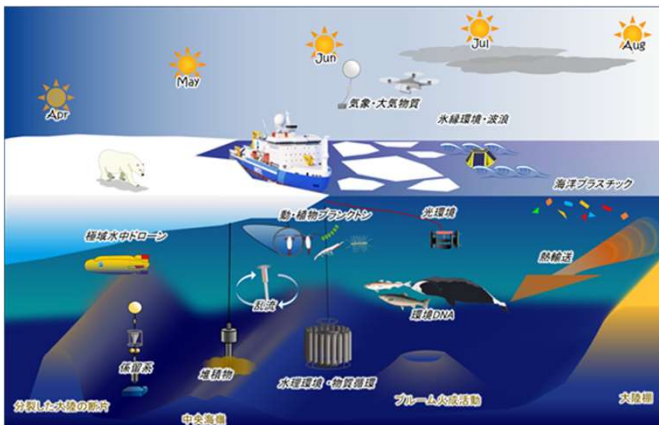
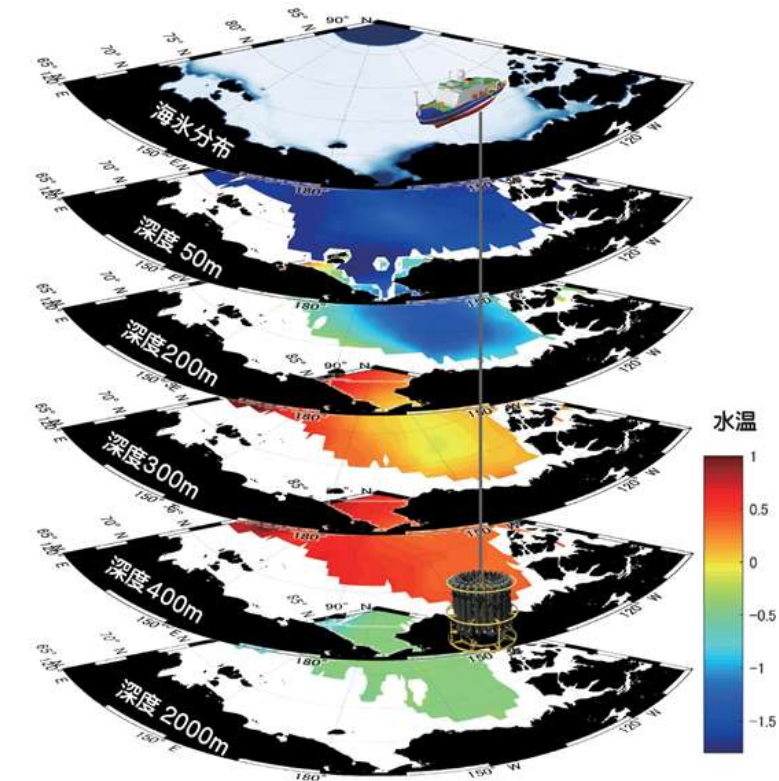
Online Arctic Symposium by the Consular Office of Japan in Anchorage
at 11:15-11:35 (JST) on January 15, 2026



2. Research and Activities

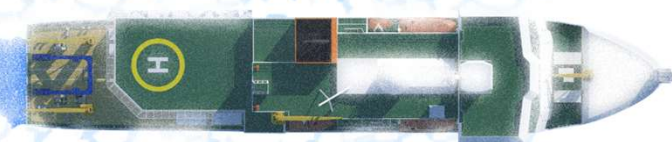
- Research theme to be addressed are...

- ✓ Understanding the effects of ocean “underfloor heating” (subsurface warm water) on sea ice reduction
- ✓ Understanding the dynamic changes in the Arctic Ocean during the spring “Polar Morning” and early winter “Polar Evening”
- ✓ Understanding changes in water, heat, and mass transport by “Atmospheric Rivers” to the Arctic and evaluating their impacts on climate, environmental change, and ecosystem.
- ✓ Accumulation of scientific data and knowledge that contributes to the conservation and utilization of fishery resources in the Arctic Ocean
- ✓ Reconstructing and understanding the past environment history of the Arctic Ocean from long-term seafloor records



- Monitoring, verification, feedback and use as a platform for industrial product development through navigation in icy and cold seas
- Utilization for improvement of ice water navigation technology
- Practicing STEAM education in collaboration with Social and Human sciences
- Contribution to develop the next generation of scientists and engineers

Online Arctic Symposium by the Consular Office of Japan in Anchorage
at 11:15-11:35 (JST) on January 15, 2026



● The First Mid-term Plan for Arctic Ocean Observations with the Arctic Research Vessel Mirai II (ARV Mirai II)

(Objective)

The *first Mid-term Plan for Arctic Ocean Observation* with the Arctic Research Vessel *Mirai II* (ARV *Mirai II*) (hereinafter referred to as “the Plan”) outlines a medium-term (approximately three to five years) Arctic Ocean observation program by ARV *Mirai II*. Chapters 1 to 4 provide an overview of recent changes occurring in the Arctic and their impacts (Chapter 1), present the significance of Arctic observation and research as an important contribution to the international

5. Plans of Arctic Ocean observation cruises in 2027-2029

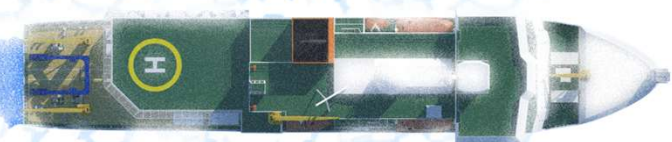
1. ARV Mirai II Arctic cruise in 2027
2. ARV Mirai II Arctic cruise in 2028
3. First leg of ARV Mirai II 2029 Arctic cruise
4. Second leg of ARV Mirai II 2029 Arctic cruise
5. Toward the International Polar Year (2032-2033)

6. Proposal recruitment and selection

1. Call for international joint observation research proposals
2. Call for observation research proposals from Early Career Scientists
3. Other open calls for proposals, etc.

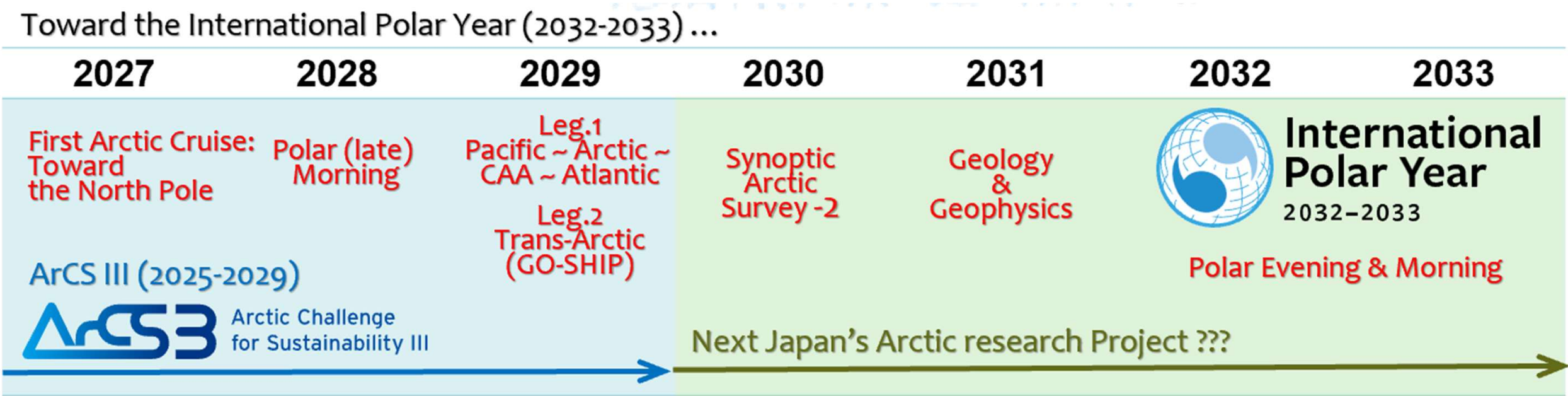
Specific Details

Online Arctic Symposium by the Consular Office of Japan in Anchorage
at 11:15-11:35 (JST) on January 15, 2026



● The First Mid-term Plan for Arctic Ocean Observations
with the Arctic Research Vessel Mirai II (ARV Mirai II)

5. Plans of Arctic Ocean observation cruises in 2027-2029



Online Arctic Symposium by the Consular Office of Japan in Anchorage
at 11:15-11:35 (JST) on January 15, 2026



Cruise plan of 2027

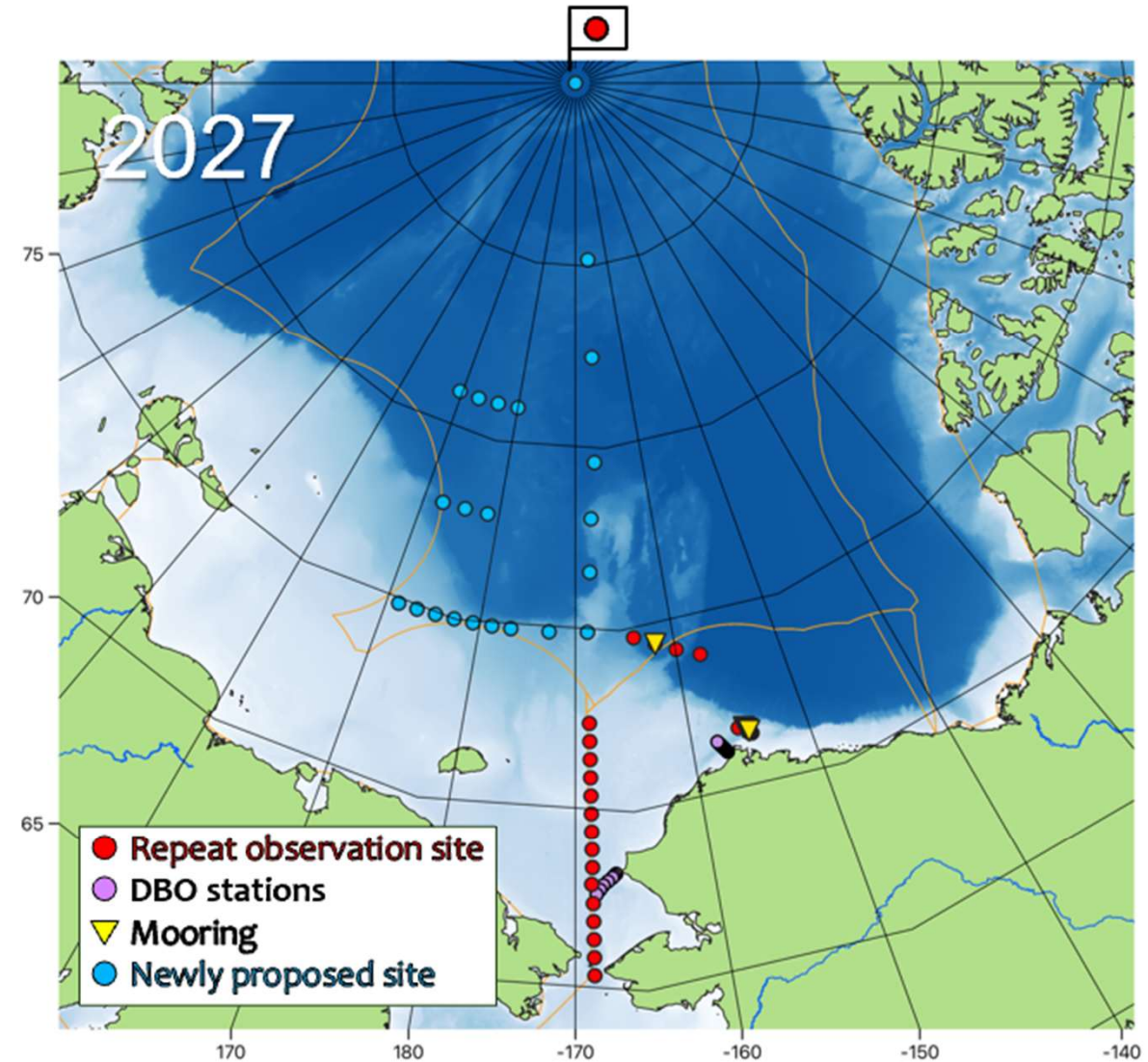
From Pacific sector of the Arctic Ocean toward the North Pole

Early August Departure from Japan
Mid August Arrival at/Departure from Dutch Harbor (DH),
Alaska, US

Pacific sector of the Arctic Ocean to the North Pole for 45 ~ 60 days

Early or Mid October Arrival at/Departure from DH
Mid or Late October Arrival at Japan

- Interdisciplinary observation in the Pacific sector of the Arctic Ocean is planned to confirm that the observations that have been carried out with R/V Mirai can be carried out without any problems.
- The first cruise toward the North Pole for navigation and observation in sea ice area of the central Arctic Ocean will be conducted.

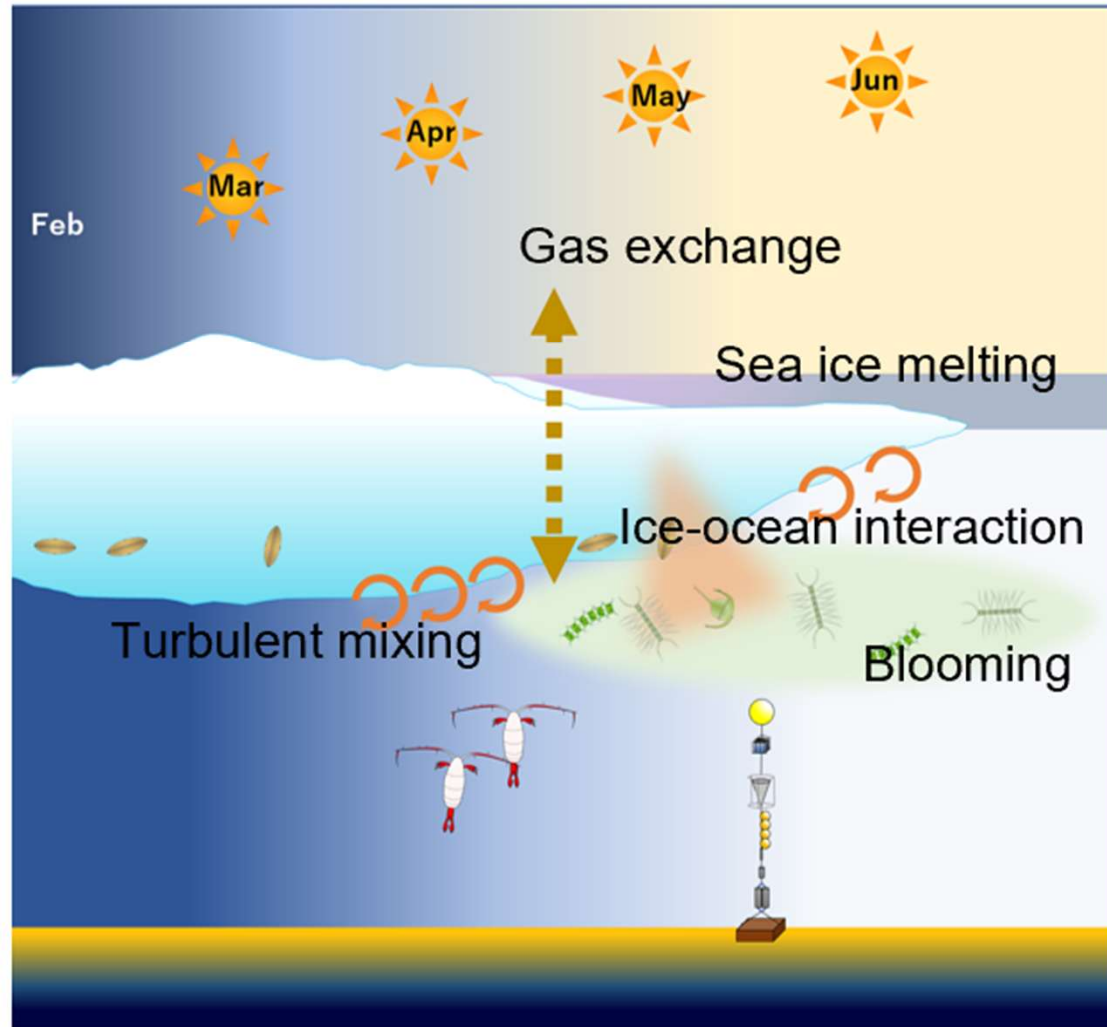


Online Arctic Symposium by the Consular Office of Japan in Anchorage
at 11:15-11:35 (JST) on January 15, 2026



Cruise plan of 2028

Polar (late) Morning in the Pacific sector: Ice drifting station



Schematics of Polar Morning

Early June Departure from Japan
Mid-Late June Arrival at/Departure from Dutch Harbor (DH),
Alaska, US

Pacific sector of the Arctic Ocean for 45 ~ 60 days

Early or Mid August Arrival at/Departure from DH
Mid or Late August Arrival at Japan

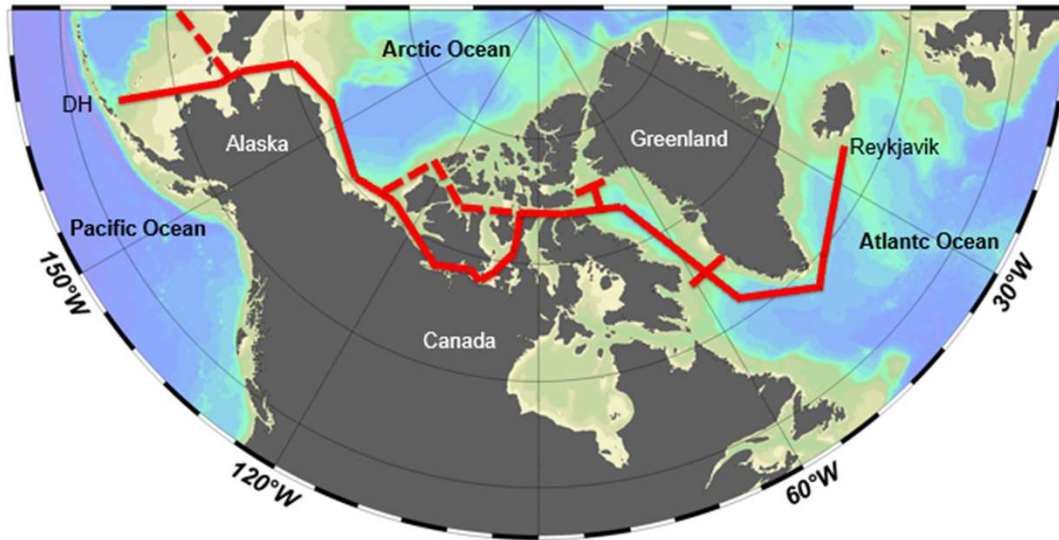
- To cover the data gap period during the late stage of sea ice melting (early summer) that has never been conducted before.
- To capture changes in the ocean, sea ice, atmosphere and ecosystem which accompany sea ice melting.

Note that drifting observation by mooring the icebreaker alongside sea ice and drifting together with it will be conducted for a week to ten days



Cruise plan of Leg. 1 in 2029

From Pacific-Arctic through Canadian Arctic Archipelago to Atlantic



Late June
Early July

Departure from Japan
Arrival at/Departure from Dutch Harbor (DH),
Alaska, US

**Arctic Ocean ~ Canadian Arctic Archipelago (CAA) ~
~ Baffin Bay ~ Atlantic Ocean for 45 ~ 60 days**

* Note that we will consider replacing scientists and other crew members,
loading equipment, and refueling at towns in the Canadian Arctic Islands
(Cambridge Bay, Resolute, etc.).

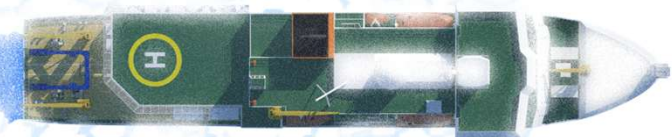
Late August Arrival at Reykjavik, Iceland



Sea ice condition at M'Clure Strait of CAA
on August 22, 2008

- To clarify transformation of water mass on the flow path from Pacific Ocean through Arctic Ocean to Atlantic Ocean (Three-Oceans)
- To investigate sea ice condition on the Northwest Passage and compare with satellite data for validation
- To study interaction between ocean and ice sheet in the waters surrounding Greenland

Online Arctic Symposium by the Consular Office of Japan in Anchorage
at 11:15-11:35 (JST) on January 15, 2026



Cruise plan of Leg. 2 in 2029

Trans-Arctic cruise (GO-SHIP observation)

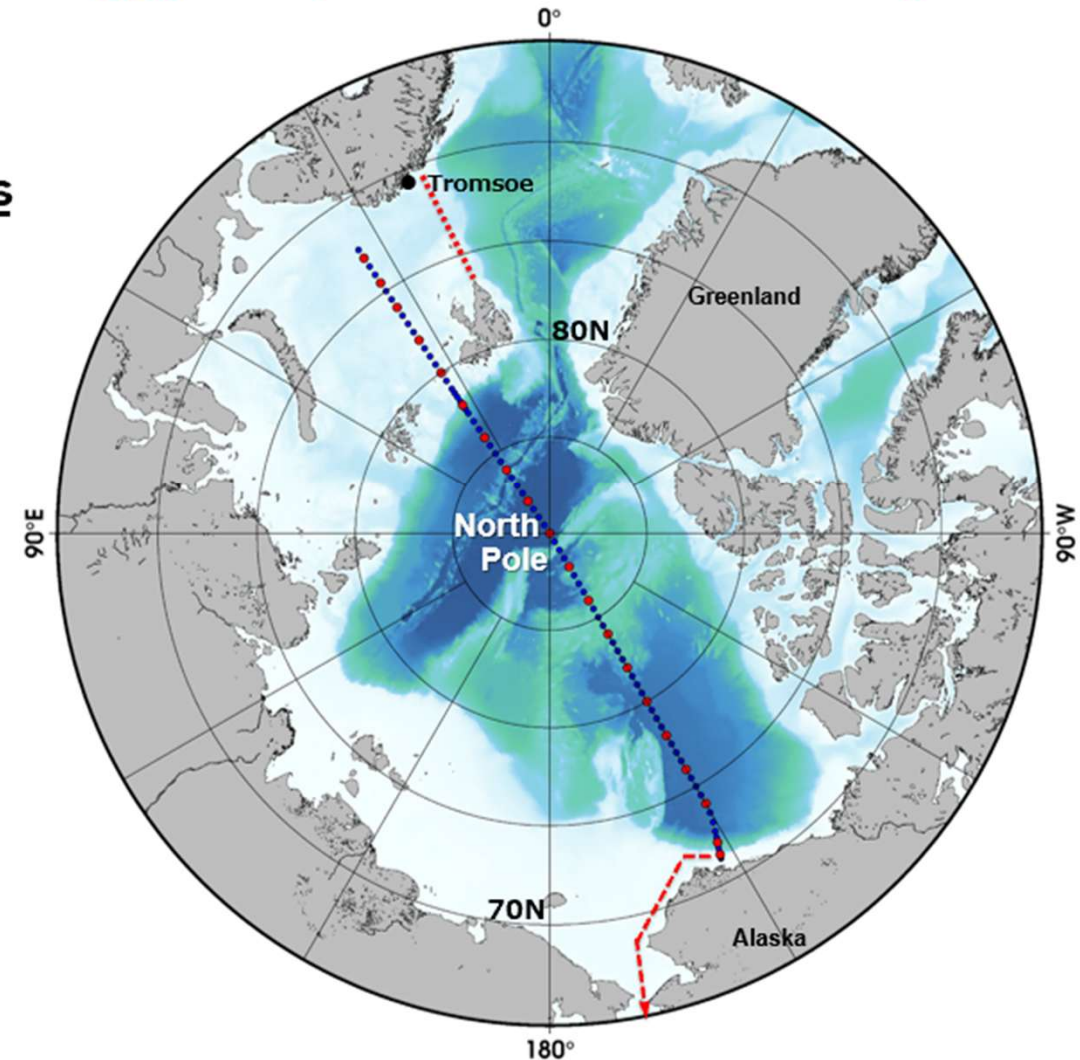
Early September Departure from Tromsøe, Norway

**Trans-Arctic Ocean (Barents Sea, Nansen, Amundsen,
Makarov, and Canada basins) for 45 ~ 60 days**

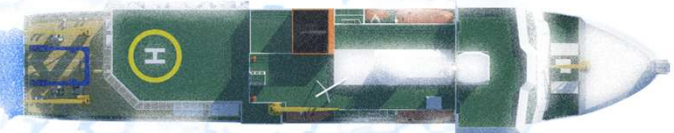
Late October Arrival at/Departure from DH

Early November Arrival at Japan

- To fill in the data gaps in the lack of time series to launch and augment a holistic understanding on long-term fluctuation of global scale ocean circulation including the Arctic Ocean
- To understand ocean heat, salt (freshwater), material balance/cycle and their roles in climate change on a global scale as well as in the Arctic region

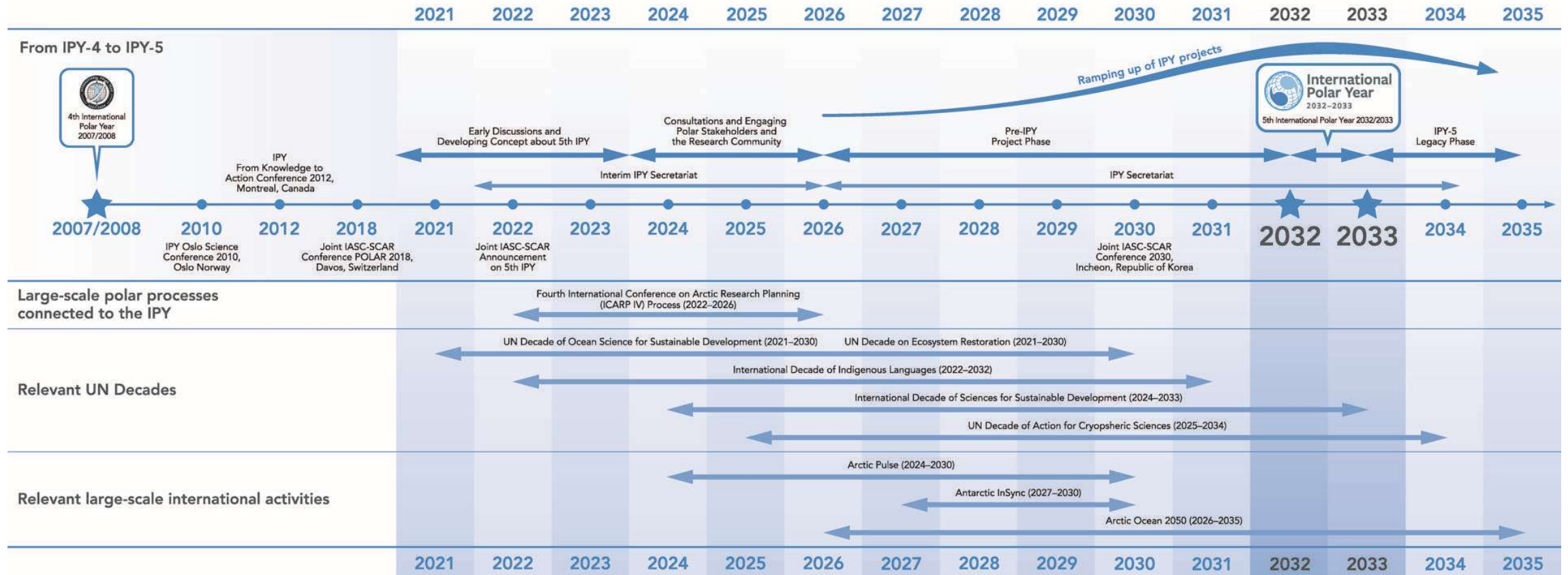


Online Arctic Symposium by the Consular Office of Japan in Anchorage
at 11:15-11:35 (JST) on January 15, 2026



● The First Mid-term Plan for Arctic Ocean Observations with the Arctic Research Vessel Mirai II (ARV Mirai II)

5. Plans of Arctic Ocean observation cruises in 2027-2029

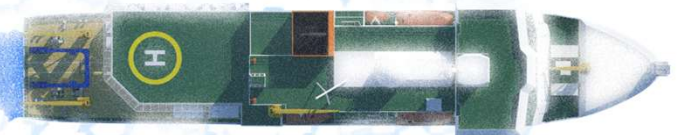


IPY Timeline (see <https://ipy5.info/about/timeline/>)

ARV Mirai II observation

ArCS III

Online Arctic Symposium by the Consular Office of Japan in Anchorage
at 11:15-11:35 (JST) on January 15, 2026



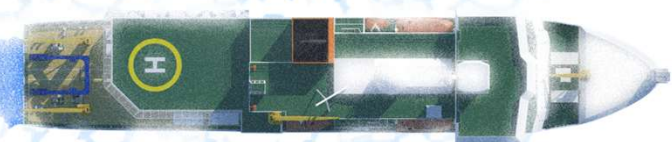


ASSW2027 in Hakodate, Japan

- Date: April 11 -20, 2027
- Venue: Hakodate Civic Hall & Hakodate Arena



Online Arctic Symposium by the Consular Office of Japan in Anchorage
at 11:15-11:35 (JST) on January 15, 2026





ASSW2027 in Hakodate, Japan

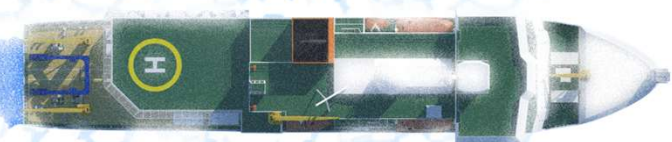
- Date: April 11 -20, 2027
- Venue: Hakodate Civic Hall & Hakodate Arena

- Business and community meetings
- Science Symposium (ISAR-9)
- Open tour of ARV Mirai II at the port of Hakodate
- Public lecture

and so on...



Online Arctic Symposium by the Consular Office of Japan in Anchorage
at 11:15-11:35 (JST) on January 15, 2026



Thank you very much for your attentions.



We would be very pleased to welcome all of the Arctic Research Community
in Hakodate, Hokkaido, Japan in April 2027!

Online Arctic Symposium by the Consular Office of Japan in Anchorage
at 11:15-11:35 (JST) on January 15, 2026

