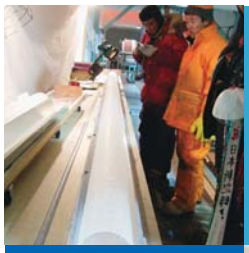
National Institute of Polar Research

Inter-University Research Institute Corporation
Research Organization of Information and Systems

2020-2021



Polar Observations

Research Support

Information

Polar Research

Collaborative Research

Outreach

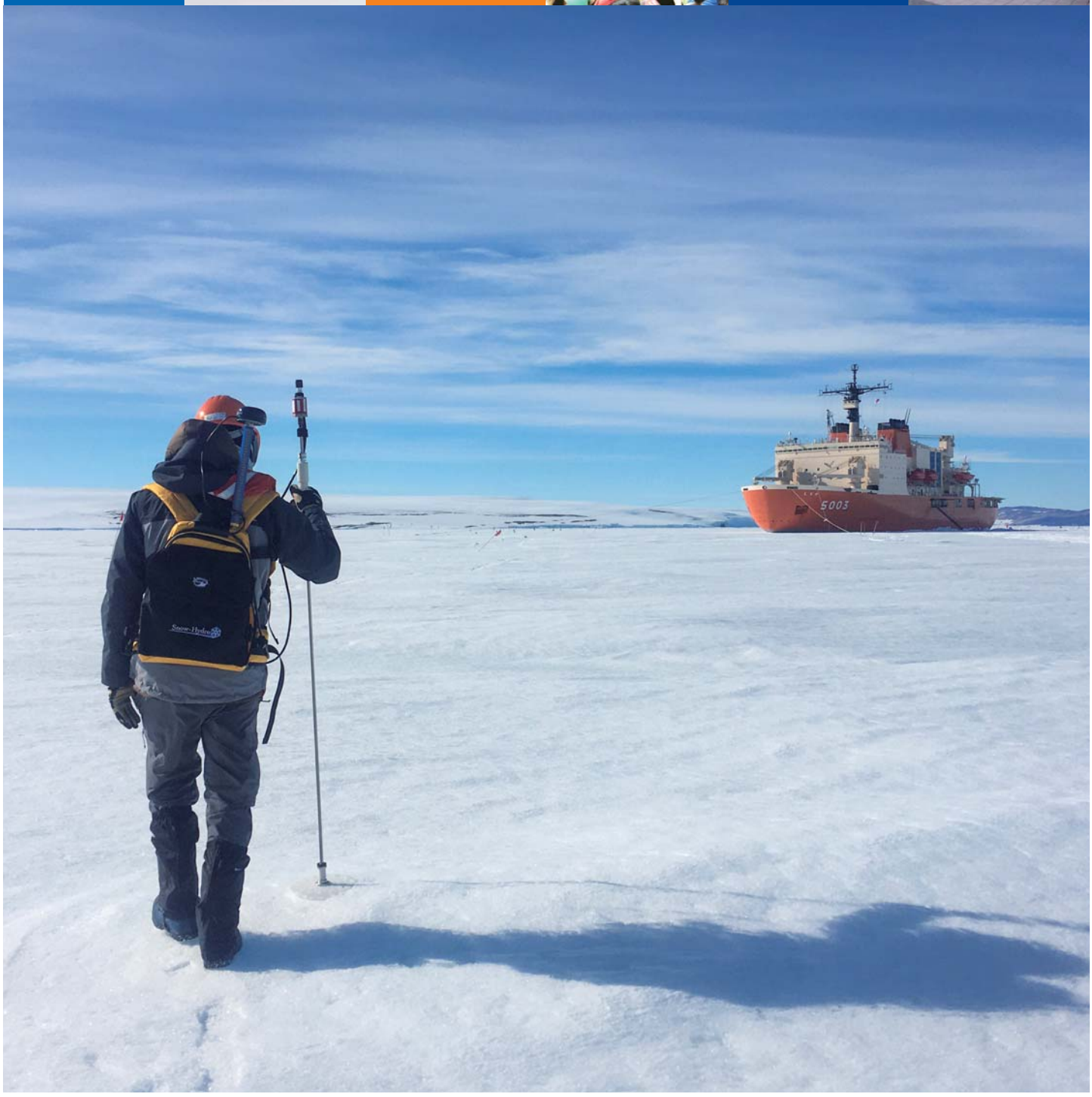


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Photo: Akihiro TACHIMOTO, JARE51

FOREWORD

The Japanese Antarctic Research Expedition (JARE) activities were first initiated in the middle of the Cold War in 1956. After the Cold War, arctic research of Japan officially started by establishing a station in Svalbard, Norway, in 1991. Founded in 1973, National Institute of Polar Research(NIPR) is an inter-university research institute that conducts comprehensive scientific research and observations in the polar regions. As one of the four institutes constituting the Research Organization of Information and Systems (ROIS), NIPR's continuous contributions benefit research universities across the country. However, since our research targets global issues, with an emphasis on the polar regions, international cooperation is a key component to fulfilling our mission.

Currently, NIPR conducts observations and research with other countries under the frameworks of various academic organizations such as the Scientific Committee on Antarctic Research (SCAR), the International Arctic Science Committee (IASC), and the Scientific Committee on Solar-Terrestrial Physics (SCOSTEP) under the International Science Council (ISC), thereby helping to hone the cutting edge of the world's pursuit of science.

The recent rapid decrease of the Arctic sea ice cover is not only affecting the global environment, it is also affecting the Earth's ecosystems along with the economic and political activities in countries surrounding the Arctic region, including Japan. Looking southward at the Antarctic continent, with tenfold the ice content than the Arctic region, has also begun to display signs of change. Should the region's ice sheets begin to melt, the resulting sea-level rise could exceed tens of meters, and would severely affect human living environments. Thus, the comprehensive monitoring of both polar regions is an urgent matter for all mankind around the globe.

Furthermore, investigations into paleo-climates such as the glacial-interglacial cycle, with periods of tens of thousands of years, and eras with exceedingly high carbon dioxide (CO_2) levels, can be expected to provide very useful information for predicting the Earth's future environmental conditions. Therefore, it is of great import to study oceanic, ice-sheet, terrain, geological, and atmospheric variations in the Arctic and Antarctic regions from multiple aspects.

At the same time, it is also important to note that the Arctic and the Antarctic regions provide windows into both geo-space and deep space. For example, since the high energy particles emitted by solar flares from the sun precipitate along the magnetic fields into the polar regions, polar regions provide the best locations for observing the effects of solar flares on our lives and society. In addition, the extremely low temperatures and the low humidity of those regions allow us to observe space using various electromagnetic spectra such as infrared and radio wave spectra.

Owing to of recent technological developments, our observations and analysis have advanced significantly. These technological advancements have resulted in an increase of data collected from polar regions. Fortunately, NIPR belongs to ROIS, which unconditionally promotes and supports data science. In 2017, the Polar Environment Data Science Center (PEDSC) was established under the Joint-Support-Center for Data Science Research of ROIS. Together with PEDSC, NIPR promotes collaborative research efforts using observational and sample data from the polar regions. We are also engaged in carrying out the IX term JARE (2016-22) mission, with a special emphasis on 'Variations of global systems revealed by Antarctic observations', and executing the Arctic region research project, entitled `Arctic Challenge for Sustainability || (ArCS||)(2020-2026).

Through these and various other efforts, we believe NIPR has a special role to play as the only institute in Japan that comprehensively pursues observations and research efforts in both the Antarctic and Arctic regions.

We appreciate your continuous support for all NIPR research activities.

Dr. Takuji NAKAMURA

Director-General, National Institute of Polar Research

What we do

As the core center for Japanese scientific research and observation of the polar regions

We engage in comprehensive research via our observation stations in the Arctic and Antarctica. We are also an inter-university research institute that provides researchers throughout Japan with infrastructure support for Arctic and Antarctic observations while simultaneously working diligently to promote polar science by soliciting collaboration research projects publicly as well as providing samples, materials, and information.

As the core institution in Japanese Antarctic Research

We plan and implement Japanese Antarctic Research Projects. Phase IX of the Japanese Antarctic Research Projects, which marks the 58th Japanese Antarctic Research Expedition, is entitled "Investigation of changes in the Earth system from Antarctica" and conducts various research observations. In addition to maintaining and operating the facilities at our Antarctic observation stations, our tasks include organizing the Japanese Antarctic Research Expedition Team, conducting various training, procuring goods and supplies necessary for observation projects (together with the development of appropriate delivery plans), as well as managing and storing the samples and data obtained from our projects.

As the core institution in observation of the Arctic region

We conduct Arctic observations that cover observations of, but not limited to; the atmosphere, ice sheets, the ecosystem, the upper atmosphere, the aurora and the Earth's magnetic field. These observations are conducted from ground-based observation stations in Svalbard, Greenland, northern Scandinavia, Iceland to name a few. We also conduct observations of the oceanic ecosystem and the atmosphere in the Arctic Ocean and its peripheral seas. Additionally, we are one of the representative institutions implementing the Arctic Challenge for Sustainability II (ArCS II) Project, which is a subsidiary project funded by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) which kicked off in FY2020.

As an educational institution to foster researchers

As part of efforts to foster researchers with a broad, global perspective and a sense of originality, we offer a five-year doctoral program for graduate students of the Department of Polar Science at the School of Multidisciplinary Sciences of SOKENDAI(the Graduate University for Advanced Studies).

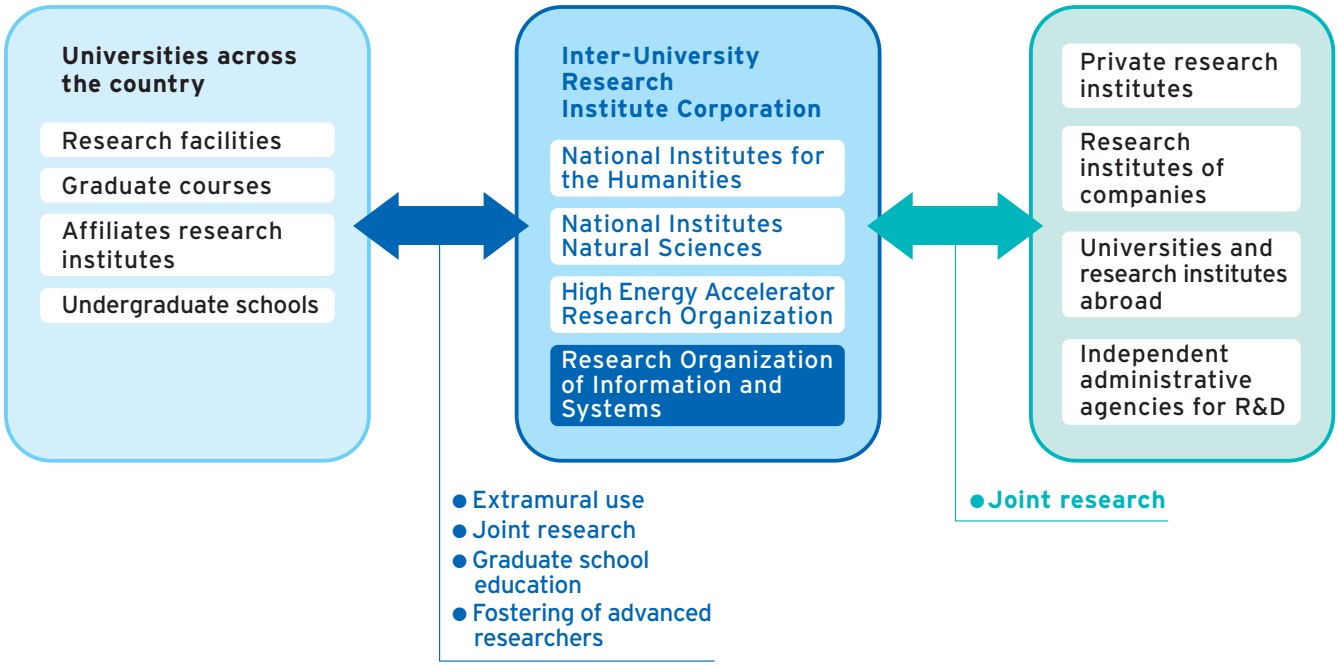
About ROIS

What are the Inter-University Research Institutes?

Inter-University Research Institutes are unique research organizations in Japan that seek to promote joint research across disciplines among universities. The institutes offer large-scale and cutting-edge facilities; large volumes of academic data; and valuable materials free of charge to researchers across Japan and member universities across different disciplines. A single university would find it difficult to generate and maintain the aforementioned data, materials and facilities.

Close collaboration amongst universities is essential.As stated above, Inter-University Research Institutes have been established as research bodies to pursue world-class studies that address areas outside the scope of any single university. Their fundamental characteristic is to offer the infrastructure needed to facilitate university-led research, and they have provided significant contributions to the academic world. Inter-University Research Institutes are likely to grow in importance in the years ahead by supporting education and research at universities, and in advancing the academic research that is principally conducted by universities. The above will be possible through Inter-University Research Institutes cutting-edge research, joint use and joint research and graduate education programs.

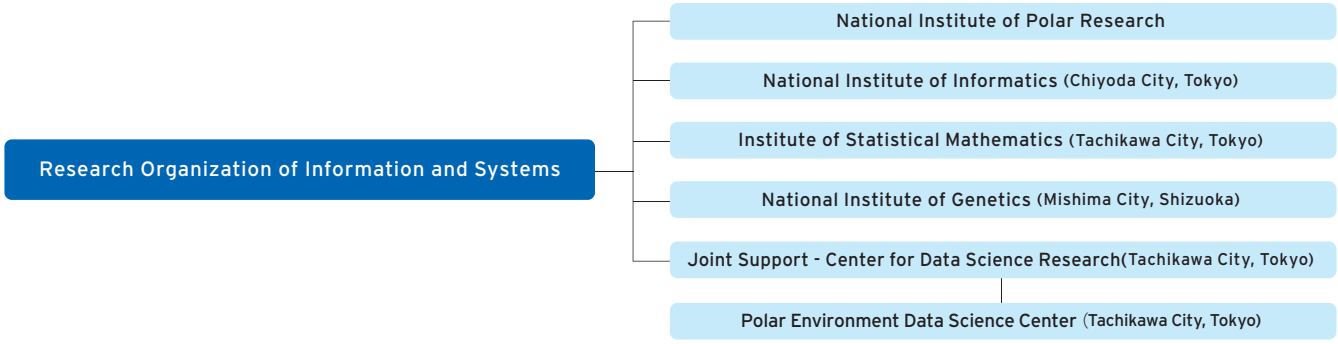
As "centers of excellence" in Japan



About Research Organization of Information and Systems

Conducting research that crosses the borders of traditional disciplines is becoming essential to solve important issues in the fields of life, environmental and information sciences that greatly impact our lives in the 21st century.

The Research Organization of Information and Systems (ROIS) is a parent organization of four national institutes.



Our mission is to fold:

1. Promote integrated, cutting-edge research that goes beyond the barriers of these institutions.
2. Facilitate the research activities of these institutions.

National Institute of Polar Research Organization Chart

Director-General
Takuji NAKAMURA

- Advisory Council
- Advisory board
- Administrative Council
- Institute Council

Vice Director-General　Yoshifumi NOGI　Hiroyuki ENOMOTO　Satoshi IMURA

Assistant Director-General　Kumiko GOTO-AZUMA　Akinori TAKAHASHI

Division for Research and Education

- Space and Upper Atmospheric Sciences Group Leader
  Masaki TSUTSUMI
- Meteorology and Glaciology Group Leader
  Shuji FUJITA
- Geoscience Group Leader　Yoshifumi NOGI
- Bioscience Group Leader　Sakae KUDOH
- Polar Engineering Group Leader　Hideaki MOTOYAMA

General Collaboration Projects

- Collaboration Projects by general invitation
  : 97 research tasks in FY2020

Project Research

KP301	Study on coupling processes in the solar-terrestrial system based on synthetic space and upper/middle atmospheric observations in both polar regions　Masaki TSUTSUMI
KP302	Behavior of polar climate-systems under global warming　Naohiko HIRASAWA
KP303	Observational study of Antarctic ice sheet - sea ice - ocean interaction　Takeshi TAMURA
KP304	Promotion of International Collaborative Study on Arctic Environmental Change　Hiroyuki ENOMOTO
KP305	Studies of climatic and environmental variations by bipolar ice-core analyses　Kumiko GOTO-AZUMA
KP306	Evolution and response of solid earth in polar regions　Yoshifumi NOGI
KP307	Evolution of early solar system inferred from extraterrestrial materials from Antarctica.　Akira YAMAGUCHI
KP308	Ecosystem Research in the Indian Sector of the Southern Ocean　Tsuneo ODATE
KP309	Responses of polar ecosystems to environmental change　Satoshi IMURA
KZ32	Study on health care and medical care system in extreme environments　Shinji OTANI and Satoshi IMURA
KZ33	Extraction of technical issues on polar observations and proposals towards their solutions part2　Hideaki MOTOYAMA

Syowa Station in Antarctic

Ny-Ålesund Research Station in Arctic

Collaboration Projects

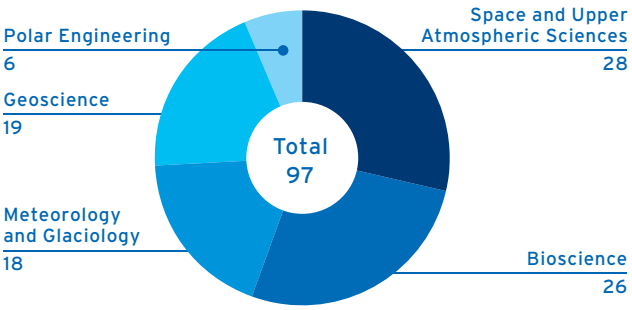
Research projects

These projects are led by NIPR faculty in cooperation with universities and research institutions to promote polar science in a focused and planned manner. Approximately 250 researchers from NIPR and other organizations are involved in projects which cover 11 research subjects.

General Collaboration Projects

Collaborative projects are initiated through an open call for applications. Led by NIPR researchers these projects are the foundation of the Institute's research. The Research Groups within NIPR correspond to the fields of general Collaboration Projects. In FY 2020 approximately 230 outside researchers will participate in 97 research tasks.

General Collaboration Projects tasks by field



Collaboration Projects based on agreements

In an effort to advance research and education and cultivate human resources, NIPR has concluded agreements with several research institutes in Japan. NIPR conducts Collaboration Projects with these partners to ensure close and effective execution and the mutual exploitation of R&D capabilities and resources.

Symposia

NIPR began hosting the interdisciplinary Symposium on Polar Science in 2010 in an effort to communicate polar science research results worldwide. This symposium is held concurrently with the annual symposia on Antarctic Meteorites, Space and Upper Atmospheric Sciences, Polar Meteorology and Glaciology, Polar Geosciences and Polar Biology to discuss the situation surrounding the latest research and field activities in these disciplines. NIPR also hosts the Symposium on Antarctic Facilities, where proposals concerning Antarctic research base operations are issued and discussed (topics include natural energy, the environment, information and communications, inland bases, transportation etc.).

Research Workshops

As part of its efforts to promote polar science research, NIPR holds research workshops to examine research policies, methodologies and results. In FY 2020, the Institute plans to issue a public call for research on Twenty-six topics and hold workshops for each.

Space and Upper Atmospheric Sciences Group

Links between space and the Earth elucidated with remote-sensing techniques

Leader Masaki TSUTSUMI

The target of the Space and Upper Atmospheric Sciences Group ranges from the stratosphere (above 10 km) to the interplanetary space of the solar system.

Study of aurora and links between solar wind, magnetosphere, and ionosphere

Visual auroras are natural optical phenomena excited by the electrons and protons precipitating from space near the Earth (geospace) into the polar atmosphere along the geomagnetic field lines. Auroral phenomena reflect the geospace environment, which changes dynamically due to the interaction between the solar wind, the magnetosphere and the ionosphere.

We have been developing ground-based network observations in the Antarctic and Arctic regions with radars, magnetometers, and auroral imagers to study the solar wind-magnetosphere-ionosphere coupling processes and the mechanisms of various aurora-related phenomena.

Auroral optical observation instruments at Syowa Station.

Study on middle and upper atmosphere

The transient region between the middle (10-90 km) and the upper (90 km -) atmosphere is a boundary region between space and the Earth. The upper atmosphere is partially ionized and acts as plasma particles ; whereas conditions in the middle atmosphere are more neutral and fluid-like. In contrast to auroras in the upper atmosphere, prominent phenomena in the polar middle atmosphere are the ozone hole, polar stratospheric clouds (PSC) and polar mesospheric clouds (PMC). In order to precisely observe the polar middle and upper atmosphere, we are carrying out various ground-based measurements in the Arctic and the Antarctic regions to capture the meteorological disturbance from below, electromagnetic impacts from above, and global meridional circulations and teleconnections of the atmosphere.

The PANSY radar in continuous operation at Syowa Station.

Meteorology and Glaciology Group

Clarify the present, past, and future global environment conditions through polar research

Leader Shuji FUJITA

In the Polar Meteorology and Glaciology (PMG) Group, our research fields include atmospheric science, meteorology, glaciology, sea ice/ocean sciences, and paleoclimatology. We study the past, present, and future conditions of the global environment and climate through studies on the polar atmosphere (troposphere, stratosphere), snow and ice, and the ocean. To this end, we conduct research on the many interrelated changes in the atmosphere, hydrosphere and cryosphere, mainly by conducting on-site observations, satellite remote sensing, and climate/ice sheet modeling. With the acceleration of global warming in recent years, the social and scientific roles of polar research have become extremely important.

Responding to many of society's questions is a social demand. What roles do the Antarctic and the Arctic regions play in global climate and environment systems? How were the ice sheets on the Antarctic continent formed, and what boundary conditions and internal structures maintain these structures/-features? The ice sheets in both polar regions are fragile and are melting at an increasing rate due to global warming, causing sea levels to rise. How will such melting proceed, and what impacts will this have on the global environment and human society? In addition, the history of climate change for the last one million years on Earth can be inferred from an archive called "ice cores". Since the polar regions are areas far removed from sources of anthropogenic substances, we can elucidate changes in the Earth's climate based on observations of these cores.

Studies to clarify the phenomena in the polar atmosphere and their mechanisms include research on the circulation and transport of atmospheric substances (e.g. aerosols, trace gases, and water) and radiation characteristics of polar aerosols and their interactions with clouds and climate. We are also investigating the radiation balance; conducting continuous observations of greenhouse gases, such as carbon dioxide and methane; and researching the heat and material cycles at the surface and in the upper-atmosphere through meteorological observations over extensive areas in both polar regions. In addition, we are investigating changes in atmospheric circulation over the Arctic and the effects that these changes have on mid-latitude weather.

Studies on the polar cryosphere using ice cores, which act as records of paleoenvironmental conditions, have clarified past global climatic and environmental changes. Ice cores are collected by drilling/boring ice sheets and glaciers in the polar regions of Antarctica and the Arctic, including Greenland. The oldest ice core that we have obtained to date is one that was drilled at Dome Fuji in Antarctica; the core covers the past 720,000 years. We aim to clarify paleoenvironmental conditions up to an age of more than one million years by future ice core drilling.

Furthermore, we are conducting research on the formation process, internal structure and flow of the ice sheets in Antarctica and Greenland, and the mass balance of the ice sheets. Melting at the margins of the ice sheets, collapse of ice shelves, changes in flow, and changes in mass balance are important factors that affect sea-level increases due to global warming, and there is a strong demand for understanding these changes in the polar regions.

We are conducting comprehensive interdisciplinary observations on the effects of changes in the Arctic cryosphere on global climate and environment through the atmosphere and ocean. Regarding the polar ocean, we are conducting research on the formation mechanisms of polynyas and Antarctic bottom water, sea ice growth/decline processes, and ocean structure/circulation characteristics. We are also investigating the effects of sea ice changes on the climate, the atmosphere over the polar ocean, and on ocean-atmosphere carbon dioxide exchange and ocean acidification.

Oceanography and Sea ice sciences

Glaciology and snow/ice sciences

Meteorology and Atmospheric sciences

Paleoclimatology

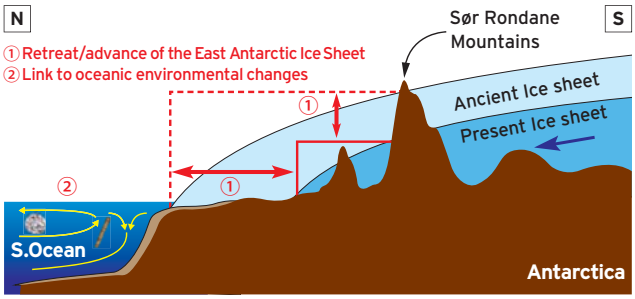
Geoscience Group

Study of the evolution of the Earth for 4.6 billion years

Leader Yoshifumi NOGI

From advanced study of geology, geomorphology and solid earth geophysics

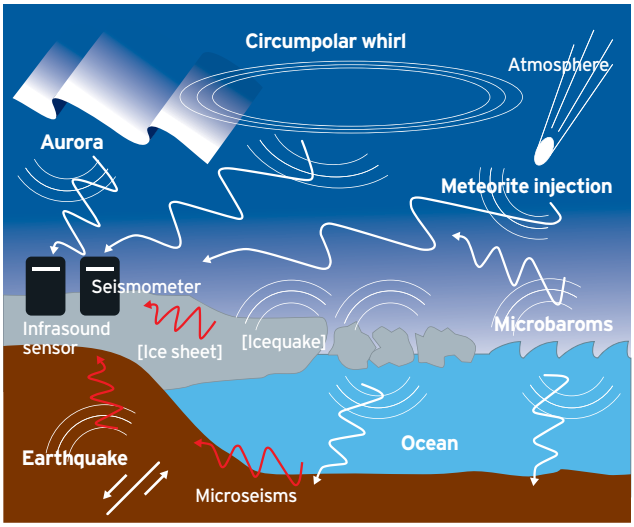
The Antarctic Continent, which is mostly covered by the Antarctic ice sheet, is comprised of a substratum that formed over a period of 4 billion years and which holds records of the retreat and advance of the ice sheet. The face of this rock is exposed on the outer edges of the ice sheet. The exposed rock and surrounding sea areas contain glacial geomorphology and deposits. The land mass and ice sheet interact with each other, allowing the observation of unique solid earth geophysics phenomena. Traces of the Gondwana supercontinent breakup can be found on the seafloor of the Antarctic Ocean and the Indian Ocean that surround the Antarctic continent. Moreover, meteorites containing clues to the creation of our solar system can be found in the Antarctic ice sheet. These events and phenomena are studied with geology, mineralogy, geomorphology, quaternary research, geodesy and solid earth geophysics to reveal the history of the universe, changes in the historical evolution of the Earth's crust, and changes in the quaternary environment accompanying the retreat and advancement of the ice sheet, as well as changes in the Earth's crust and sea surface today.



Geomorphological and geological surveys of the Sør Rondane Mountains. Our objectives are to reconstruct a detailed history of the retreat/advancement of the East Antarctic Ice Sheet based on geomorphological and geological surveys, and to understand its response to the Southern Ocean and changes in the global climate.

Geological survey at Botnnuten, East Antarctica

Inter-disciplinary physical phenomena within the multi-spheres in polar region



Various seismic, infrasonic and hydro-acoustic waves from various surface environmental sources have been detected, indicating time-space variations in polar region.

Bioscience Group

Study of the present and past to identify future changes in polar ecosystems

Leader Sakae KUDOH

To progress polar bioscience from three research fields

The fundamental task of our group is to establish how organisms have adapted and survived in the estremely harsh environments of the polar regions. It also studies the sensitive response mechanisms of marine and terrestrial communities to global environmental changes. Its studies extend to the production process in polar oceans, behavior of marine predators, and polar terrestrial biology and limnology.

1

Biological oceanography

Research focuses on the mechanisms of marine ecosystem variability in association with environmental changes in the seasonal ice zone of the Antarctic Ocean. In the particular focus on plankton variability of the Indian Sector, we have been conducting corroborative research on analysis of long-term monitoring data with Australian scientists.

Plankton sampling in the pack ice

2

Marine predator ecology

Research focus on the behaviour and ecology of polar marine predators,including seabirds, marine mammals, and fishes. Small data loggers and video cameras that can be attached to animals have been developed, an approach called biologging. Using these state-of-the-art instruments, we obtain detailed information about at-sea behaviour and ecology that is critical to assessing the effects of environmental changes on the animals.

An Adélie penguin with biologging device attached

3

Terrestrial and freshwater biology

Antarctic and Arctic terrestrial and lacustrine environments are severe for organisms due to cold temperature, aridity, and strong UV, etc. Research focuses on the origins and the diversity of the biota, the mechanisms of establishment by eco-physiologically adapting, paleo-environmental reconstruction, and response mechanisms in the polar terrestrial ecosystem including lakes to global environmental change.

Ecological survey by scuba diving in an Antarctic lake

Polar Engineering Group

Follow-up of supporting technology for polar science observation

Leader Hideaki MOTOYAMA

Function of Polar Engineering Group

Our group addresses technical challenges associated with scientific observation and logistic activities. As one could imagine, there are a multitude of technical challenges to overcome when conducting research in the polar region. For example, it is very important to use limited fuel, food and material effectively because the means of transportation is hampered in the polar zone. We must also reduce our impact on the local environment.

Study of logistical problems for future inland operations

To carry out inland operations in the Antarctic, we need to solve several logistical issues, such as transporting large quantities of goods, ensuring safe transport routes, minimizing the physical vibration in transportation of precision equipment, and building and construction on the ice sheet. To address these issues, information collection and test development through the introduction of new policies and technology are essential along with taking advantage of accumulated data and experience.

Investigation for on-site energy production

The fuel consumption at Syowa Station increases yearly due to expansion of the station and scientific observations conducted at the station. As there is a limit on the amount of fuel transportable by ship, it is vital to maintain an ever shrinking fuel reserve at the station. In order to improve this situation, we are working to increase production of renewable energy, such as wind and solar power to reduce our dependency on fossil fuels. As part of the study, investigations like effective array and surface deterioration of PV panels are carried out.

Solar panels for room heating installed on the wall of a building at Syowa Station

Study on interconnected power systems between diesel and renewable energy

Power generated via wind turbines and PV are dependent on wind speed and insolation condition. Since wind speed and insolation conditions fluctuate, technologies of interconnected power systems between diesel and renewable energy are of great interest, and we are exploring solutions suitable for polar regions.

Study on storage and utilization system of surplus power

Currently, surplus power generated through renewable energy systems is often lost. To combat this loss, we are collaborating with university researchers and private companies to develop effective and efficient storage systems. The use of organic hydride is one such method of storing hydrogen and is an appropriate technology for polar regions because the substance is stored as an antifreeze liquid. Heat storage technologies of sustainable energy are close to practical use.

Study on making water

Drinking water at the Syowa Station is sourced from local snowmelt. This method of creating drinking water requires an enormous amount of energy. A less energy hungry system is available: the reverse osmosis membrane method. By utilizing sea water near Syowa Station, energy consumption decreases and the need to cast snow blocks into water tanks is no longer required. Prior to deploying the reverse osmosis method, studies on temperature control of water pipelines and sea water pumping are required. Research in this is currently being conducted.

Development of unmanned observation system

Unmanned operations reduce CO2 emissions and have reduced energy requirements in comparison with manned operation. As previously stated, we strive to reduce our carbon footprint and energy requirements. To that end, we have developed a high reliability robot observation system based on satellite systems. Next, we will introduce the use of unmanned aerial vehicles and small energy generator systems.

Study on coupling processes in the solar-terrestrial system based on synthetic space and upper/middle atmospheric observations in both polar regions

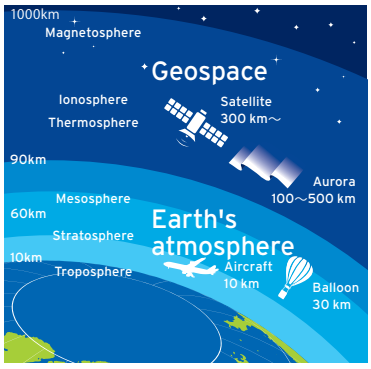
Research Project KP301

Understanding the linkage among the Sun, geospace and Earth's atmosphere

Principal Investigator Masaki TSUTSUMI

Clarifying the mechanism of the solar-terrestrial system variation from both polar regions.

This project aims to clarify the coupling processes among the Sun, geospace and Earth's atmosphere in polar regions. To achieve this objectives, we are strengthening national and international collaborative studies with facilities in both polar regions; Antarctic atmospheric radar (PANSY) at Syowa Station; European Incoherent Scatter (EISCAT) radars in northern Scandinavia and Svalbard; SuperDARN HF radar network, and ; Ground-based networks of optical imagers and magnetometers. We are also developing new observation systems such as optical imagers, lidars, and the next-generation geospace/atmospheric radar called 'EISCAT_3D'. Based on these ground-based remote-sensing together with satellite observations and theoretical/ simulation studies, we will pursue quantitative understanding and future prediction of the coupling processes among the Sun, geospace and Earth's atmosphere.



Earth's atmosphere and geospace studied in this project, with a picture of the EISCAT Svalbard Radar

Behavior of polar climate systems under global warming

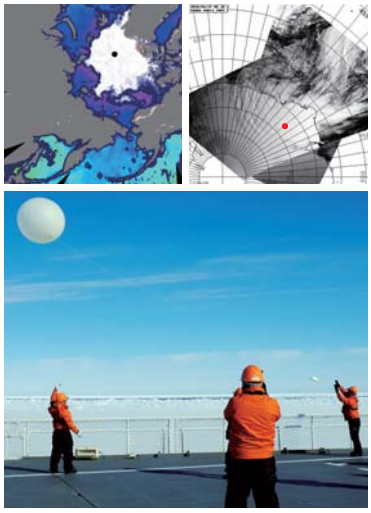
Research Project KP302

Detecting climatic changes in the polar regions and specifying the mechanisms

Principal Investigator Naohiko HIRASAWA

Diagnose the current climatic states of the polar regions to obtain a better future trajectory

The rapid decrease in sea ice and the retreat of the Greenland ice sheet are progressing in the Arctic region, and the West Antarctic warming proceeds at a higher pace than the global average. Concerning East Antarctica, though warming has not been clearly detected, large amounts of snowfall and warming events, which may relate to global warming, were observed in the last decade. This study diagnoses the current climatic states of the polar regions based on synoptic-scale atmospheric systems, meteorological and glaciological surface processes, precipitation and moisture circulation, and radiative processes, involving aerosols, clouds and greenhouse gases, and then offers a view of the future trajectory of the polar climate. To achieve the goal of this study, in situ observation such as comprehensive radiosonde campaigns and long-term employment of automatic weather stations in a wide range of areas are planned in combination with numerical modeling, satellite data analyses, and laboratory experiments.

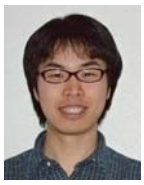


Comprehensive in-situ observation to study the current climatic states of the polar regions.
Upper left photo: ©NIPR/JAXA

Observational study of the Antarctic ice sheet - sea ice - ocean interaction

Research Project KP303

Research of Ocean-ice BOundary InTeraction and Change around Antarctica (ROBOTICA)



Principal Investigator Takeshi TAMURA

For a better understanding of the Antarctic climate system

Antarctica and the surrounding Southern Ocean are changing. Acceleration of ice mass loss and warming of the coastal ocean in West Antarctica are problems that substantially affect the global climate system. In East Antarctica, which has been considered stable and has attracted relatively less attention, regional characteristics of interactions among climate subsystems have been recently revealed, and evidence of variations on different time scales from decades to millennia has been accumulating. Despite the growing awareness on the importance of ice-ocean interaction and long-term variabilities off the East Antarctic Coast, quantitative descriptions and understanding of the mechanisms are still insufficient. Given the global impact of the coastal variability through bottom water export, investigations of the mechanisms and variabilities in East Antarctica are indispensable.

Ocean under the ice:
uninvestigated research area

Promotion of International Collaborative Study on Arctic Environmental Change

Research Project KP304

New approaches to Arctic Environmental Research

Principal Investigator Hiroyuki ENOMOTO

Looking at the Arctic problem from various perspectives

The Arctic has been experiencing rapid environmental changes. Monitoring these changes and more precise forecasting of future changes are strongly requested internationally. The Arctic Environment Research Center (AERC) continuously maintains a presence and involvement in international research planning and cooperative efforts. AERC will continue its atmospheric monitoring and meteorological research, and attempt to establish new Arctic research activities through collaborative efforts with different research groups. Activities include: Atmospheric monitoring at Ny-Ålesund which provides new knowledge on long-term trends and also on seasonal variations; Cloud and aerosols observations at Ny-Ålesund which provide useful information on aerosol conditions and changing cloud properties. The Arctic Data archive System (ADS) will validate the synoptic background conditions of weather, sea ice and ocean by visualizing satellite information. AERC hopes to expand its research collaborations through discussion and the continued sharing of data related to air-ocean- sea ice and marine/terrestrial ecosystems. AERC also seeks new research possibilities through discussion and the continued sharing of data related to the troposphere and middle-upper atmosphere.

View of Ny-Ålesund and New Observation building since 2019

Studies of climatic and environmental variations by bipolar ice-core analyses

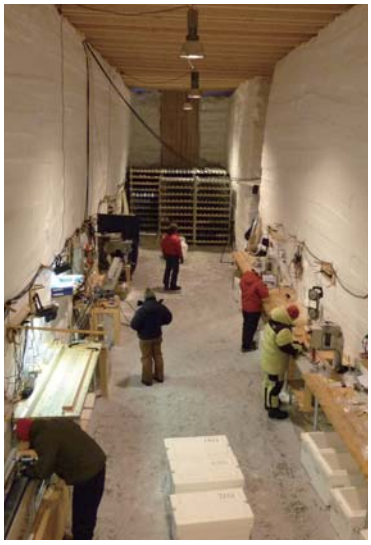
Research Project KP305

Reconstruction of the past climate and environment from Antarctic and Arctic ice cores

Principal Investigator Kumiko GOTO-AZUMA

Uncovering the mechanisms of climatic and environmental changes

Snow deposited onto ice sheets/ice caps in Antarctica and the Arctic endures summers without melting, and accumulates over countless years. By drilling through ice sheets/ice caps, the past snow and atmosphere preserved within the ice cores can be retrieved. To reconstruct climatic and environmental changes that have happened during the past decades to hundreds of thousand years, we plan to analyze the ice cores obtained from different sites, such as Dome Fuji in Antarctica and Greenland in the Arctic. The information retrieved from the ice cores will greatly contribute to improving projections of the future climate and environment. The ice cores will be analyzed with cutting-edge analytical methods developed at the Ice Core Research Center, National Institute of Polar Research. Furthermore, we participate in an international deep ice coring project in Greenland and plan to carry out a new deep ice coring project near Dome Fuji aimed at retrieving the oldest ice core in the world.



Ice-core processing
and analyses in Greenland

Evolution and response of solid earth in polar regions

Research Project KP306

Investigation of changes in solid earth and surface environment from the polar regions

Principal Investigator Yoshifumi NOGI

To elucidate changes in solid earth with various time and space scales from the polar regions

Phenomena in solid earth span various timescales, from the present time to several billions of years, and space scales, as the coupling of the surface environment changes, and amalgamation and fragmentation of continents. In the polar regions, a wide range of solid earth phenomena can be observed, such as the present crustal movement controlled by changes in ice sheet mass, and the formation and dispersion of continents. The polar regions are, therefore, ideal areas for understanding the evolution and response of solid earth based on the integrated research of diverse disciplines related to solid earth science and multidisciplinary studies concerning environmental changes to Earth's surface..

This project aims to investigate: (1) the response of solid earth related to environmental changes to Earth's surface ranging from the present to several million years ago, and (2) the evolution of solid earth over a geological timescale, from several million to billion years, based on the scientific research in polar regions.

Geomorphological and geological surveys
in the central Dronning maud land
to explore changes in solid earth.

Evolution of the early solar system inferred from extraterrestrial materials from Antarctica.

Research Project KP307

Formation and evolution of planetesimals and planets in the early Solar System

Principal Investigator Akira YAMAGUCHI

Petrologic and geochemical study of Antarctic meteorites and micrometeorites

Approximately 70% of meteorites have been recovered from Antarctica. Moreover, micrometeorites (tiny meteorites < 1–2 mm) have been found on snow, ice sheets and moraines. Meteorites and micrometeorites are derived from hundreds of asteroids and comets, which are remnants of planetesimals, the building blocks of planets. Small numbers of meteorites originated from the Moon and Mars. Thus, the study of Antarctic meteorites helps us understand the origin of the solar system and the evolutionary history of planets. We perform mineralogical, petrological, geochemical and experimental studies of meteorites and micrometeorites to better understand the history of the Moon and Mars and the early Solar System.

A meteorite on ice

Ecosystem Research in the Indian Sector of the Southern Ocean

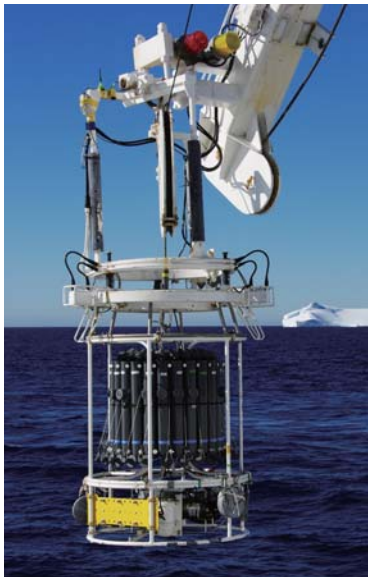
Research Project KP308

Focusing on how the Indian sector of the Southern Ocean is changing and implications for the global system

Principal Investigator Tsuneo ODATE

Process study involving cooperation with several survey ships

Monitoring of the Antarctic Ocean is necessary in order to detect signs of change in the global environment and evaluate the effects of the change on the Antarctic marine ecosystem. Because accessing West Antarctica is easier, most systematic approaches aimed at detecting changes in the environment have been taken in that region, especially in the Antarctic Peninsula region. The results of these studies indicate that the climate is changing rapidly and that the amount of winter sea ice has been decreasing around the Antarctic Peninsula region. However, the Japanese Antarctic Research Expedition has routinely conducted oceanographic and biological surveys on the way to and from Syowa Station of East Antarctica during every austral summer since 1972. It also cooperates with survey ships from Japan and other countries, and carries out process studies concerned with environmental change in the Indian sector of the Antarctic Ocean. The aim of this project is to promote analysis of samples and publication of observational data that were acquired from such observations, with a view to clarifying the features of the Indian sector of the Southern Ocean.



Mysteries of east Antarctica

Responses of polar ecosystems to environmental change

Research Project KP309

Ecological processes of organisms in response to the environmental change in polar regions

Principal Investigator Satoshi IMURA

Intensive field-based research on polar ecosystems

In polar regions, limited numbers of flora and fauna such as mosses, lichens, and tardigrades, live in the harsh terrestrial environment, and some marine animals including seals and penguins breed on land. These simple but unique ecosystems are home to organisms adapted to the extreme environment of the regions with low temperature, desiccation, intense ultraviolet rays, etc. The aim of this project is to understand how the organisms in these regions respond to the changing environment and thus how the ecosystems will be altered. The biodiversity and material cycle in the terrestrial ecosystem, and behavior ecology of marine animals are the principal targets of this project.

Limnological survey on an Antarctic lake

Study on health care and medical care systems in extreme environments

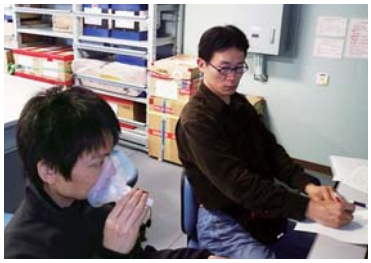
Research Project KZ32

Exploring the improvement of medical care in extreme environments of the Antarctic program

Principal Investigator Shinji OTANI and Satoshi IMURA

Study on measures and medical care system of Syowa

Expedition personnel conduct field surveys and logistics projects in harsh conditions in Antarctica. They endure large seasonal variations of the day-night rhythm, including polar nights and 10-month long physical isolation from society. It is not uncommon that expedition personnel experience abnormalities in their diurnal rhythm and experience physical and mental disorders and stress under these extreme conditions. Because of the relatively high incidence of dental disease seen during overwintering, medical doctors have initiated attempts to improve the oral hygiene of expedition personnel as a part of health management to prevent dental diseases. On the other hand, the medical care system of Syowa Station is quite poor, with a limited supply of materials delivered once a year, a medical staff comprising only two doctors, and no medevac available from March to November. This study aims at improving the medical care system of Syowa Station that will contribute to better health management of expedition personnel, by examining the current medical care system, and exploring ways to improve the health of expedition personnel.



Collection of house dust at Syowa Station (upper image) and investigation of sea-sickness aboard Shirase with exhaust CO2 gas measurement. (lower image)

Resolution of technical issues to support polar observations

Principal Investigator Hideaki MOTOYAMA

Report on research results to the observation sites

To successfully obtain observations of the polar regions, a variety of technical issues attributed to severe cold, strong winds, snowdrift, and polar nights need to be overcome. In addition, because the modes of transport are limited, it is important to use fuel, food, and materials effectively, as well as to evaluate and minimize the impact of human activities on the surrounding environment as much as possible. This study also aims to resolve a variety of specific technical issues related to the polar station and transportation associated with these observations. Furthermore, we provide support for research activities in the polar regions. The general research themes include: 1) polar engineering research on the modernization of Syowa Station, 2) research on various problems related to the construction of, and transportation to and from, the inland station, 3) polar engineering support for inland deep ice core drilling, and 4) research on problems related to unmanned observations in polar regions. To resolve these problems, we aim to collect information, develop tests, conduct research, and report the findings to the groups responsible for observations and logistics in polar regions . We consider this project to be an important mission that requires collaboration among researchers, engineers, and private companies.

20kw wind turbine installed at Syowa Station

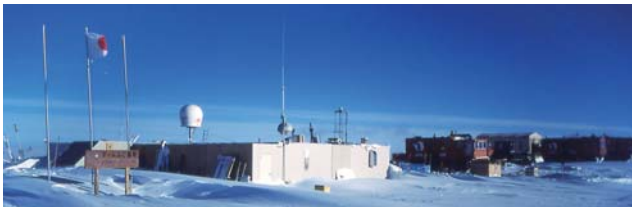
Linking Antarctic observations between Japanese and international communities

Director Yoshifumi NOGI

The Center for Antarctic Programs (CAP) came into being in 2009 by merging the research staff group and the administrative/ technical staff group in order to ensure that operations and all activities of the Japanese Antarctic Research Expedition (JARE) proceed smoothly and efficiently. CAP carries out such tasks as project planning with research communities, maintenance of Antarctic stations, recruitment and nomination of expedition members, preparation of medical examination and training, transportation to Antarctica, and issues of environmental protection.

JARE invites foreign scientists from various countries every year to perform scientific collaboration in Antarctica. Recently, Asian Forum for Polar Science (AFoPS) was established, in which Japan, Korea, China, India, Malaysia and Thailand organize an annual meeting to exchange information among member countries and to encourage other Asian countries' to become involved in polar research. JARE's activities are not limited to planning and community building.

In addition to the sea borne transport by "Shirase", JARE recently installed an air network system DROMLAN to organize chartered flights to Novolazarevskaya Station, and Troll Station from Cape Town, and feeder flights covering other stations and activity areas in Antarctica. DROMLAN is supported by 11 countries working in Dronning Maud Land. In the Southern Ocean, "Shirase" and "Umitaka-maru" of Tokyo University of Marine Science and Technology conduct collaborative observations on marine sciences. Such air and sea operations contribute to expand the activity area of JARE in the Antarctic.



Dome-Fuji Station

Syowa Station

Syowa Station was established in 1957 on January 29 on East Ongul Island, Lützow-Holm Bay by the 1st Japanese Antarctic Research Expedition. At present, it also acts as an observation site for the world meteorological network in addition to various scientific observations. Thirty members spend an entire year conducting observations and maintaining the stations facilities .

Dome-Fuji Station

Dome-Fuji Station was established in January of 1995 to conduct deep ice-core drilling at the highest dome of Dronning Maud Land, some 1000 km away from Syowa Station. After completing 3035 m deep drilling, the station has been closed temporarily.

Mizuho Station

Mizuho Station was established in July of 1970 on the Mizuho Plateau, 270 km south-east of Syowa Station. At present, the station is temporarily closed.

Asuka Station

Asuka Station was established in March of 1985 in Dronning Maud Land, 670 km southwest of Syowa Station. The station has been closed temporarily at present.

Syowa Station

Promoting close collaboration for Arctic studies by Japanese and international researchers

Director Hiroshi MIYAOKA

The Arctic Environment Research Center (AERC) of NIPR was originally established in June 1990 to promote the study of sea ice, oceanography, marine and terrestrial ecology, atmospheric sciences, glaciology, and upper atmospheric sciences in the Arctic. Since April 2015, AERC was reorganized to the present Center to tackle more effectively Arctic issues by enhancing advanced research capability and strategic research planning.

As a core and representative institute for the Arctic research in Japan, NIPR with AERC has been leading the first national Arctic program: 'GRENE Arctic Climate Change Research Project' in FY2011-2015, and its successive program: 'Arctic Challenge for Sustainability (ArCS)' in FY2015-2019. Collaborating with other core institutes, NIPR has launched the new and third national program: 'Arctic Challenge for Sustainability II (ArCS II)' for FY2020-2024 in June 2020 (see right page).

AERC will proceed to conclude arrangements with Arctic institutes for use of their facilities and supports for field observations by Japanese researchers, which bring them a plenty of opportunities for the international collaborative studies.

Facilities for collaborative observation

The Ny-Ålesund Research Station (Ny-Ålesund NIPR Observatory since 2019), the University Centre in Svalbard (UNIS) and the International Arctic Research Center (IARC) of the University of Alaska, Fairbanks are available to use for collaborative studies in the Arctic, along with the following facilities: the Greenland Institute of Natural Resources (GINR), the Spasskaya Pad Scientific Forest Station (Spa), Ice Base Cape Baranov research station (IBCB) both in Russia, the Canadian High Arctic Research Station (CHARS), and so on.

International Collaborative observations

AERC supports a wide range of international joint projects, such as the bipolar aurora conjugate observation in Iceland and Syowa station in the Antarctic, the European incoherent scatter (EISCAT) radar project, and the East Greenland Ice Core Project (EGRIP). Since 2019 we also partially assist the MOSAiC project, the largest international collaborative research program for the comprehensive study of the Arctic sea using R/V Polarstern as a drifting scientific laboratory.

Japan Arctic Research Network Center (J-ARC Net)

AERC is working with the Arctic Research Center at Hokkaido University and the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) as partners of the Japan Arctic Research Network Center, J-ARC Net. Established in April 2016, J-ARC Net has been seeking for interdisciplinary studies on the interaction of environment and human activities, as well as to discover approaches to solving problems through the collaborative efforts of industry, government and academia. In this program AERC provides researchers with facilities for collaborative obseravtions.

Japan Consortium for Arctic Environmental Research (JCAR)

JCAR was established in May 2011 as a nationwide network for promoting Arctic environmental research. The JCAR office is located in the AERC administration. JCAR coordinates future research plans by editing and publishing the 'Long-term Plan for Arctic Environmental Research' (http://www.jcar.org/english/longterm/), as well as collecting and delivering domestic and international meeting information, outreach activities on the Arctic environment and the early career development. JCAR also co-organized the Arctic Science Summit Week (ASSW2015) in April 2015. JCAR has been hosting the International Symposium on Arctic Research (ISAR) since the fifth (ISAR-5).

Ny-Ålesund NIPR Observatory

Located in Ny-Ålesund, Svalbard(79N, 12E), the Ny-Ålesund NIPR Observatory was established after concluding an agreement for cooperation with the Norwegian Polar Institute in 1991. Under the international collaborative research framework in Ny-Ålesund, NIPR Observatory supports a variety of studies such as clouds, aerosols, radiation, green house gases, vegetation and ecologies. In April 2019, the Observatory was relocated to the brand new building which was constructed in the core area of the Ny-Ålesund Station.

Ny-Ålesund NIPR Observatory

Accelerating advanced Arctic research across Japan to address challenges for the sustainable Arctic

The Arctic is a complicatedly balanced geographic region originating from its specific and fragile natural conditions. As the Arctic warming amplification process shows, changes in one domain can trigger compositely other processes as a positive feedback. The limited observation area and data in the Arctic are crucial to assess actual conditions in the entire region and to make future prediction more accurately. Also, the impacts of environmental change are affecting the society and the rights of indigenous peoples and social activities such as resource development and use. Under these circumstances, it is important for Japan to play an active role that contributes to maintaining international legal and political order in the Arctic.

In June 2020, the National Institute of Polar Research (NIPR) has launched the 'Arctic Challenge for Sustainability II (ArCS II)' project, as a main player in Research and Development, International Cooperation, and Sustainable Use in "Japan's Arctic Policy", as well as in the discussion on the Arctic in the "Third Basic Ocean Plan" in order to contribute to the solution for global challenges on a wide range of international cooperation and to provide initiatively essential knowledge toward the realization of a sustainable society based on SDGs. To achieve the project goals, collaborating closely with two organizations; the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) and Hokkaido University, and Arctic researchers in Japan, NIPR will work on dynamic challenges impacting the Arctic. NIPR will construct a research system cooperating with global researches, accelerate research toward the 'desirable Arctic', and provide information to stakeholders in local and global community.

Project Goal:

Toward a sustainable Arctic, ArCS II will promote advanced observation of Arctic environmental change and its process, improve weather and climate prediction, assess an impact Arctic environmental change on society, implement the research achievement in the society, and provide local and global stakeholders with scientific knowledge that is the basis of legal and policy responses for the formation of international rules in the Arctic.

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

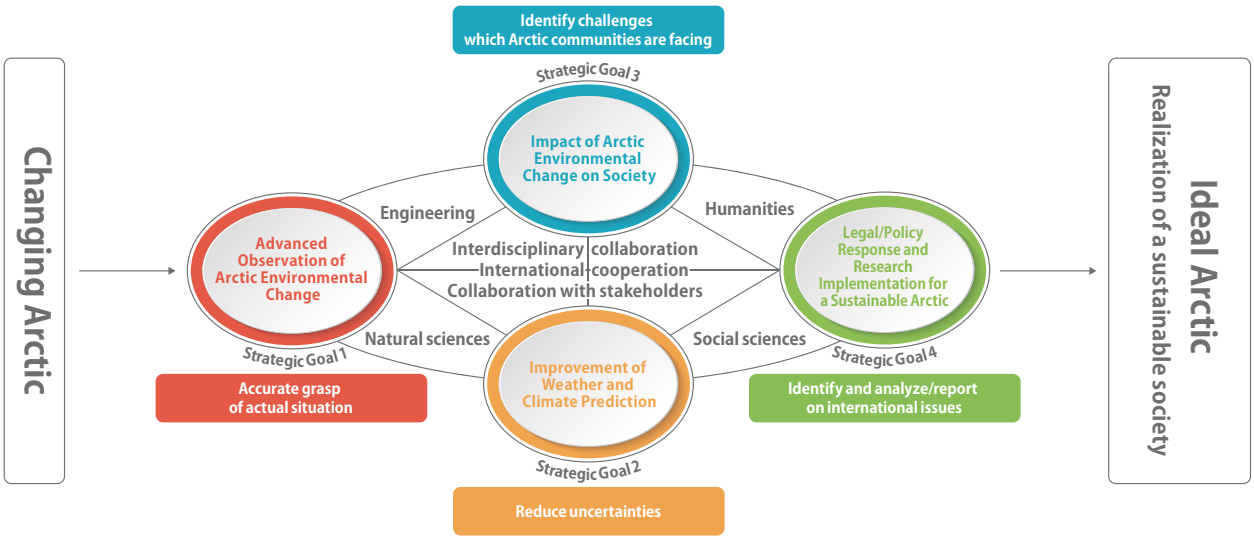
2 Priority Subjects:

Subject1: Capacity Building and Research Promotion
- International Research Exchange Program
- Overseas Fellowship Program
- Call for Complementary Research Projects

Subject2: Strategic Dissemination of Arctic Information
- Arctic Environmental Information Website
- Arctic Sea Ice Information Center
- Education and Outreach
- Expert Participation in International Forums and Information Sharing with Policy-Makers

4 Research Infrastructures:

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



Science information infrastructure and network for the polar sciences

Director Masaki OKADA

Sharing and high-level utilization of the data and information from polar regions

Various observations on a range of research fields are now being carried out in both the Antarctic and Arctic regions. The data obtained by the observations is transferred via a network and stored in digital form. As the observation methods and technologies become more sophisticated and network speed grows faster, the quality and the amount of data continues to increase. The primary task of the Communications and Computing science Center (CCC) in the National Institute of Polar Research (NIPR) is to operate facilities supporting the scientific activities in the polar regions.

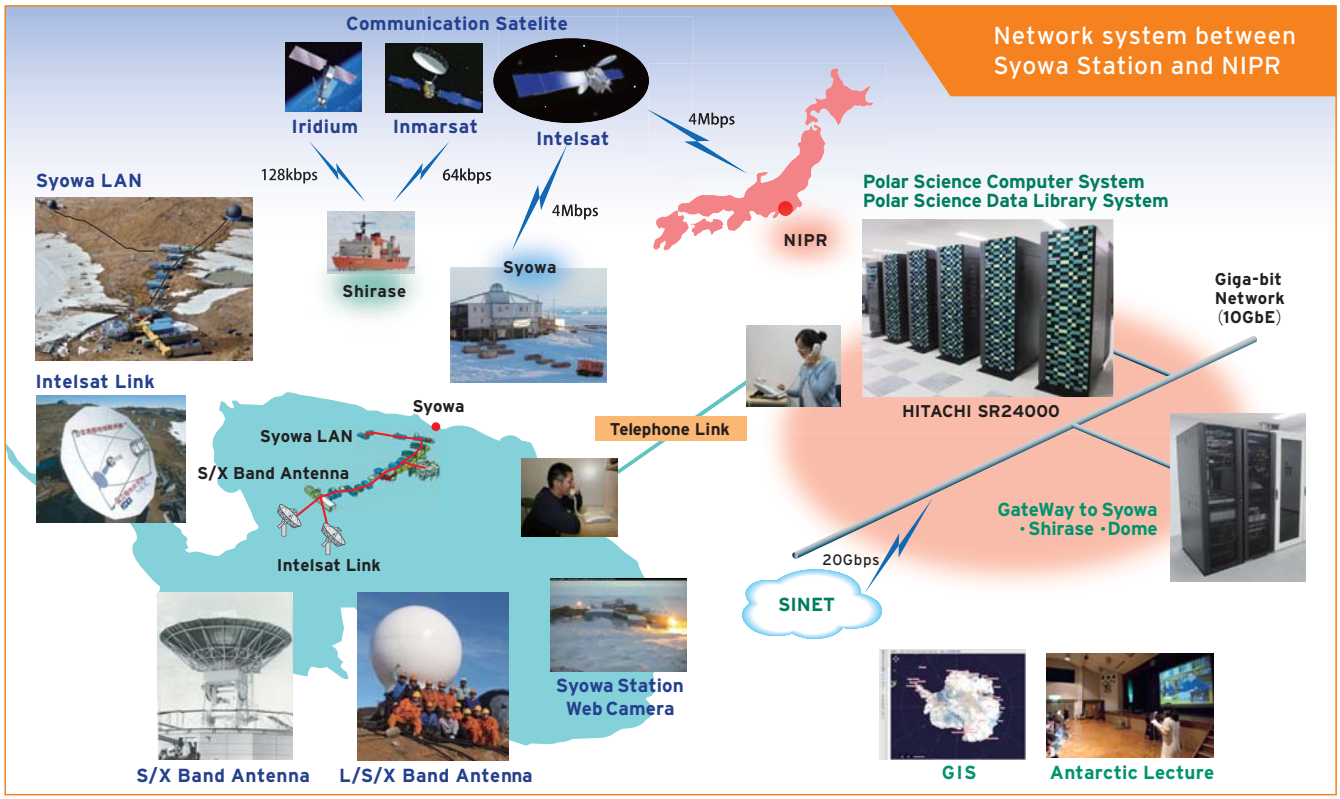
At present, NIPR and Syowa Station in Antarctica have constant internet access via an Intelsat satellite link, and the data from Syowa is directly transferred to NIPR through this high-speed satellite link.

The "Multipurpose Satellite Data Receiving System" at Syowa is operated by CCC, and data from various earth observation satellites is received and transferred to NIPR.

The transferred data from Syowa is archived in the "Polar Science Data Library System (POLARIS)" in NIPR, and transferred to researchers in collaborating universities and institutes via the Science Information Network (SINET). Many of the observation data in the Arctic region is also transferred to NIPR directly via the SINET.

The "Polar Science Computer System" is also operated in CCC to process and analyze observation data and to perform large-scale numerical modeling and simulations for polar sciences.

Other facilities supporting various activities of the Antarctic expedition and NIPR, such as the teleconference system, the telecommunication system between the icebreaker "Shirase" and NIPR, the "Antarctic GIS system" , and the database for research and management information, are also operated by CCC.



Scientific resources from polar regions -Key materials to uncover the global changes and mystery of Earth's evolution

Director Tomokazu HOKADA

Antarctic Meteorite Research Center

The main task of the Antarctic Meteorite Research Center is curation of Antarctic meteorites recovered since 1969, which includes naming and initial classification of meteorites, allocation to researchers, permanent storage, and overall management of Antarctic meteorites. Annually, the center publishes the classification of meteorites in the Meteorite Newsletter.

The Yamato 790448 meteorite classified into LL3, which is one of the unequilibrated ordinary chondrites.

Rock Specimen Archive

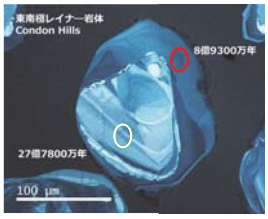
The Rock Specimen Archive has collected and preserved some 20,000 rock and mineral specimens since the first Japanese Antarctic Research Expedition (JARE). The archive stores rocks and minerals not only from Antarctica but also Sri Lanka, India and Africa as part of its international scientific research. Its collection is important for geological correlations and studies of the earth's crust and mantle materials constituting the Gondwana supercontinent. Specimens are organized according to year and region of collection and are updated in a database.

Ruby crystals (red) found around Syowa Station in Antarctica.

SHRIMP Laboratory

The SHRIMP laboratory (sensitive high resolution ion microprobe) maintains and operates 2 SHRIMP units for inter-university collaborative research infrastructure used for isotopic analyses and dating of earth and planetary materials.

Sensitive high resolution ion microprobe (SHRIMP) for age dating of minerals.



Results of age dating on zircon. The white circle at the center yields 2778 million years old, and the red circle at the outer rim yields 893 million years, respectively.

Biological Specimen Archive

NIPR collects and manages biological specimens obtained from scientific studies in polar regions. These specimens are provided for research or exhibitions. Approximately 40,000 plant specimens (mainly moss) and 2,500 animal specimens are archived. Searches for archived specimens can be made through the 'Database of Polar Biodiversity' on the NIPR website.

Biological specimen

Revealing the history of global environmental changes using ice cores

Director Kumiko GOTO-AZUMA

Overview

Polar ice sheets and glaciers are composed of strata of snow that have accumulated over hundreds-of-thousands of years. An ice core, which is a columnar ice sample that has been extracted by drilling, can be used to infer the atmospheric components, temperature and precipitation, marine and terrestrial environmental conditions, and even the extraterrestrial conditions that were present when the snow was originally deposited. Ice cores can cover time scales of more than one million years. Such extensive and detailed information of environmental changes over a period of million years can only be obtained from ice cores. As global warming progresses, the information provided by ice cores has become extremely important for understanding the global climate system and for making future predictions. The Ice Core Research Center was established to comprehensively promote ice core research as the key center of Japan, which conducts joint research in Japan and overseas.

Advanced ice core drilling technology

The National Institute of Polar Research has the world's most advanced deep-ice drilling technology. We have conducted deep drilling twice at the Dome Fuji station, which was built inland from the Antarctic ice sheet and has produced ice cores covering 720,000 years. Furthermore, we have also extracted ice cores at various depths and ages in various parts of the world.

Elucidating past environmental changes

From analyses of ice cores, many of the environmental changes on Earth can be clarified as time series and spatial distribution data. Ice cores include a history of changes in greenhouse gases, such as carbon dioxide and methane, as well as changes in the transport of water and various materials, atmospheric and oceanic circulations, aerosols, biogenic activities, ice sheets, and volcanic eruptions etc.

Ice cores drilled in various places and low-temperature facilities

The Center promotes operations, such as the management and analysis of different ice cores and snow samples extracted from polar ice sheets and glaciers, provision of ice-core and snow samples, and shared use of cold-room facilities. In the cold-room facilities, we have Dome Fuji deep cores that were drilled in Antarctica, shallow cores that were drilled in inland and coastal areas of Antarctica, deep cores drilled in Greenland, shallow cores drilled at different sites in the Arctic, and snow samples collected in polar regions. These samples have been categorized and are stored at low temperatures. By analyzing ice cores with a large spatial coverage, it becomes possible to envisage the spatial distribution and temporal relationships between environmental changes at different spatiotemporal scales.

Development, dissemination, and exchange of analytical techniques

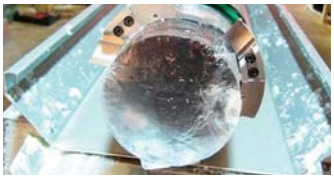
The Center uses a wide range of technologies to analyze ice cores. These include core cutting/processing/pretreatment techniques, melting techniques, various gas analyses, stable water isotope analyses, ion analysis, solid particle analysis, tritium analysis, and physical crystal analysis. Many of these technologies are unique in the world. In recent years, remarkable progress has been made in high-resolution continuous analytical techniques. We strive to develop and apply advanced analytical techniques, and promote the exchange of technical knowledge among domestic and overseas research institutes.

Joint research and graduate education

The Center comprehensively promotes cooperation and collaboration with domestic and overseas research institutions, universities and researchers. We undertake collaborative research initiatives in ice core drilling in harsh polar fields, ice core management and analysis, data analysis, and outputs as publications. We welcome visits by students who are interested in these research activities.

Shallow drilling inland in Antarctica

Comprehensive testing of a deep drilling system in Japan



A deep ice core immediately after extraction

Dome Fuji Station, Antarctica

Intellectual Property Section

Protecting intellectual property rights arising from research results

Head Hiroyuki ENOMOTO

The Intellectual Property Section was established in April of 2008. This section manages Intellectual Property (IP) generated from but not limited to research discoveries research results and collaborative research activities.

The Intellectual Property Section's duties include filing patent and trademark registration applications for claiming and utilizing research results as well as releasing and publicizing intellectual properties and their copyrights.

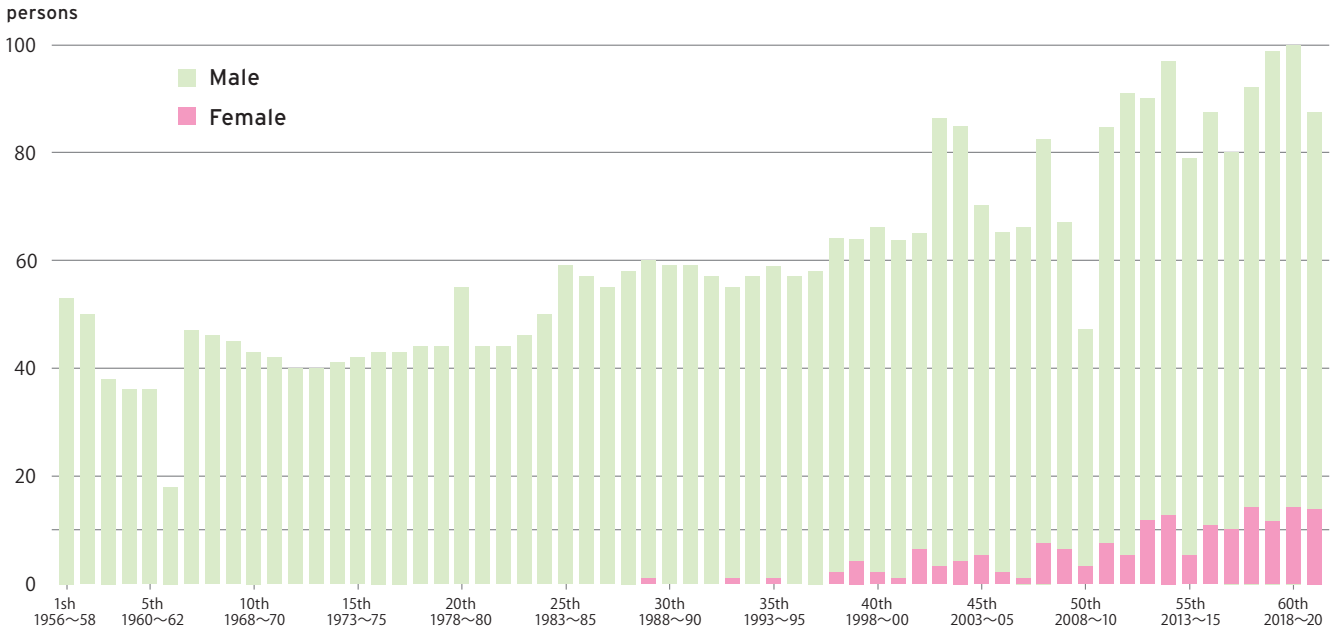
Office for Gender Equality

Promote gender equality together with the ROIS

Head Satoshi IMURA

The Research Organization of Information and Systems (ROIS) had carried out the "ROIS Program of Female Researcher Progress" in order to support life events and research activity of female researchers, with support provided by "Project of Supporting Activities for Female Researchers" of MEXT. As part of this project, ROIS and four underlying institutes established the "Office for Gender Equality(OGE)", and promoted various types of support for female researchers as their participation is vital for the future of our country.

Number of JARE expeditioners



Our Polar Collection is one of the best collections in the world

Head Sakae KUDOH

NIPR Library has one of the best Polar Collections in the world. Our Polar Collection includes expedition records, essays, and research reports that do not exist in any other library in Japan.

The Library also contains many scholarly books and journals written in several languages (Japanese, English, Russian, to name a few). These collections included in the Polar Collection can be searched via the NIPR Online Public Access Catalog (OPAC).

Facilities

The Library is located on the ground floor (first floor) of a six-story building. The floor is composed of four areas and one room: the reading area, book area, bound journal area, current journal area, and rare book room. There are reading tables in each area. Each table is equipped with outlets to power and recharge your digital devices. You can use our networked PCs (for study and research purposes) and our copy machine. For more information, please visit our website: https://www.nipr.ac.jp/library/en/index.html

Collections		Number	Total
Books	Japanese	10,429	28,198
	Other languages	17,769	
Booklet	Japanese	1,947	3,560
	Other languages	1,613	
Bound journals	Japanese	3,562	27,905
	Other languages	24,343	
Digital Data		13,904	13,904
Total			73,567

As of April 1, 2019

Open hours	9:30～17:00(weekday)
Closed day	Saturday,Sunday,national holidays, 29th Dec.-3rd Jan.
Facilities	Seats 32 / PCs 2 / Copying machine 1 / Free Wi-Fi none
E-mail	Library402@nipr.ac.jp

Book shelves in the library

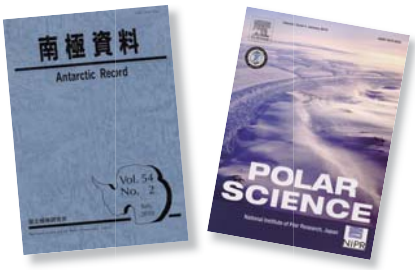
Publications

The Library publishes two scholarly journals, "Antarctic Record" and "Polar Science". Articles to be accepted cover all fields of polar science. These journals have a strong reputation internationally.

The Library also publishes "Polar Data Journal" and "JARE Data Reports", which are obtained from Arctic and Antarctic observation. Our journals are available for download from the following website:

"Antarctic Record" and "JARE Data Reports":
https://nipr.repo.nii.ac.jp/
"Polar Science":
https://www.sciencedirect.com/science/journal/polar-science
"Polar Data Journal": https://pdr.repo.nii.ac.jp/

- Antarctic Record (Japanese and English)
- Polar Science (English) (Distributed for a charge)
- Polar Data Journal (English)
- Memoirs of National Institute of Polar Research
- JARE Data Reports
- Antarctic Geological Map Series
- Special Map Series



Academic Publications

A variety of publications, including but not limited to academic articles, are issued and edited by NIPR on a wide range of research topics are available.

KYOKUCHIKEN Library' series (Only in Japanese)
(See: https://www.nipr.ac.jp/library/NIPR-library/index.html)

Research Support

Archives Section

Documents and records that tell the history of JARE and NIPR

Head Sakae KUDOH

The Archives Section was established in April of 2010 when the National Institute of Polar Research (NIPR) moved to the Tachikawa campus. The materials collected, arranged, and kept in the section's custody publications, photographs, figures, audio materials, films, digital records, instruments, equipment, clothing, and personal items. These records support historical evaluation of institutional activities and help NIPR fulfill its social responsibilities.

- Archives Section's website
http://polaris.nipr.ac.jp/~archives/

Our goal is to develop international research collaborations and research activity and output

Head Satoshi IMURA

Based on the analysis of domestic and international research activities, this office draw up the plan of the international strategies of administration, develop research collaboration, and intensify the research activity and output.

To intensify research activity and output

As an Inter-University Research Institute Corporation, the National Institute of Polar Research is required to intensify research activities in a way similar to that of universities. Created in April of 2018, the International Affairs and Research Development Office has research administrators who work in close cooperation with the head office of the Research Organization of Information and Systems (ROIS). This office aims to reinforce research activities as secretariat of the "Research Strategy Meeting" chaired by the Director General. This office works to strengthen both international research cooperation and publicity, build research strategies, and increase the research budget. NIPR's polar observations and related international collaboration will be used to intensify research and foster the next generation of young scientists.

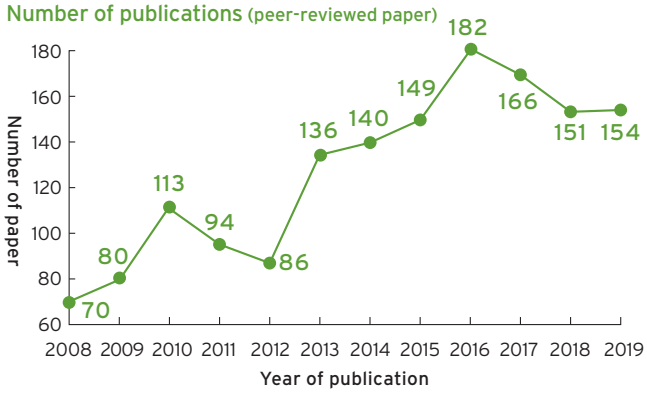
Project for Promoting the Reinforcement of Research Universities and URAs

From FY 2013, the ROIS has participated in the "Project for Promoting the Reinforcement of Research Universities." The aforementioned project aims to enhance the research capabilities of our country through the reinforcement of its research institutions. This project also supports reform of the research environment and the securing of human resources for research management. The ROIS has employed University Research Administrators (URAs) as research management personnel, and has established a URA station at the head office (Figure).

Activities of the Research Development Office (RDO)

This office is a team comprising URAs as well as the teaching and administrative staff and expecting to work closely with researchers. The URAs belong to the URA station and work on reinforcing research activities to fulfill the ROIS's 5- and 10-year targets. This office also cooperates with the Center for Antarctic Programs and the Arctic Environment Research Center to bolster international collaboration, and with the Public Relations Section to strengthen academic public relations. With URAs, this office works to connect administrations and researchers.

Number of publications (peer-reviewed paper)



Support for performance improvement of researchers
Acquisition of external funds, publicity of research results.

Strengthening the international cooperation
Cooperation with the Arctic Environment Research Center, Center for Antarctic Programs.

Strengthening the academic publicity
Cooperation with Public Relations Section.

The goals of the 10th year(2022)

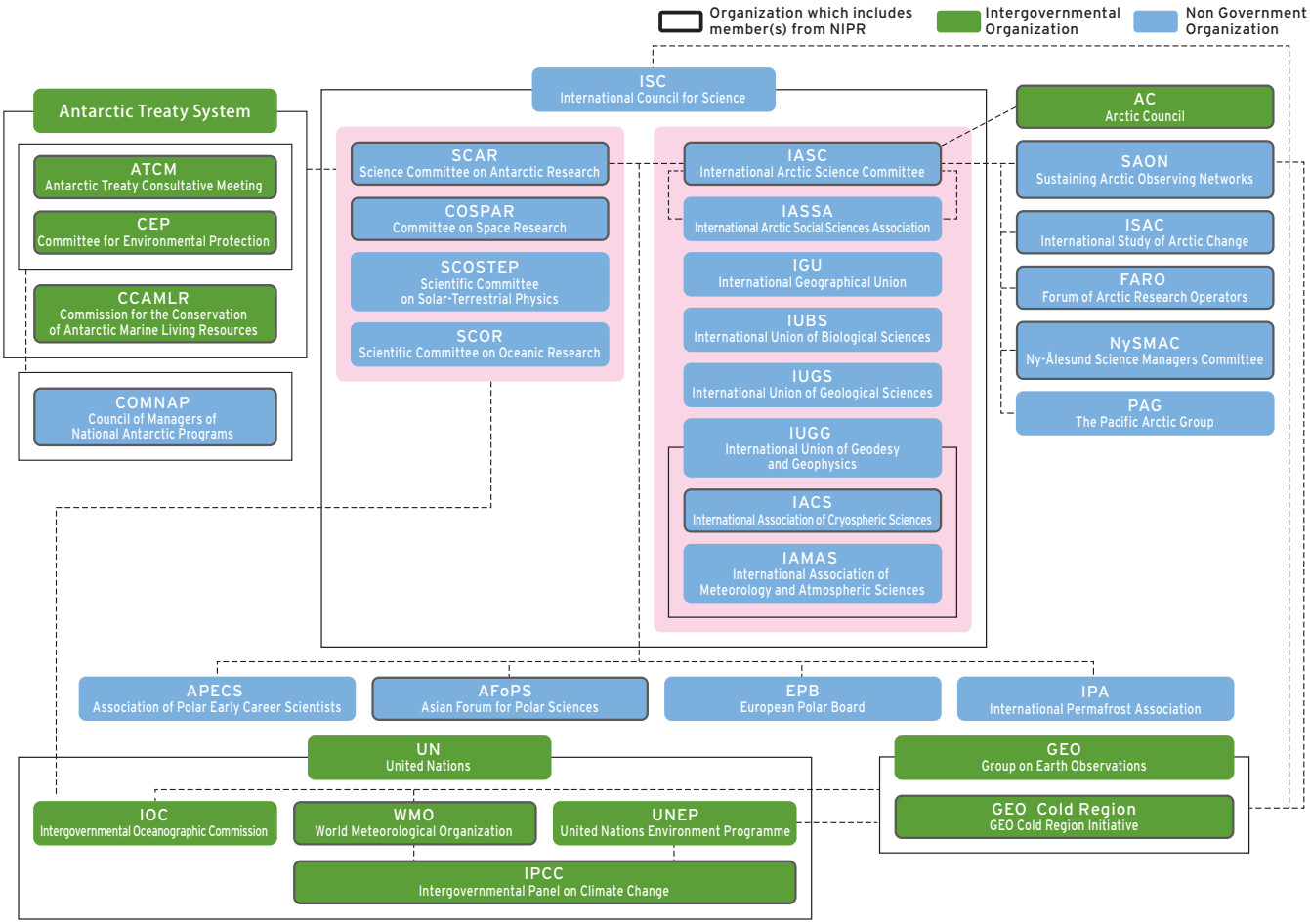
1. Establishment of a new research community, by the acceptance of data-centric research across a wide range of academic disciplines.
2. 30% increase in total number of peer-reviewed papers across the entire organization (Ratio to five years before FY 2012).
3. 30% increase of inter-university use and collaboration projects,increase in (international) Partnership Agreements.
4. 20% or more female faculty, 30% or more younger faculty, 12% or more foreign faculty.

To support the international research collaborations

The office deals specifically with international issues relevant to scientific research in polar regions. Any matters relating to (1) international treaties and conferences, (2) cooperative research and scientific agreements with overseas institutions, and (3) international research exchanges are handled by the office with the assistance of the International Affairs Committee in NIPR. Because polar research is conducted overseas, international frameworks are indispensable. The office prepares reports on the Japanese Antarctic Research Expedition that are required by the Antarctic Treaty in collaboration with governmental bodies and relevant scientists. It also deals with issues and deposits documents relating to CCAMLR as well as various international bodies, such as SCAR, COMNAP, IASC and AFoPS (refer to the figure below for the full names of the acronyms).

Currently, NIPR conducts collaborative projects for polar research and logistics by implementing MOUs with overseas polar research institutes and universities. Today, there is a growing need for international exchange among scientists and activation of research, with greater emphasis placed on the globalization of research institutes. The office offers assistance in these areas by working together with relevant organizations and scientists.

ATCM42(Praha, 2019)



Provide the public with information on polar science and polar research findings

Head Hideki MIURA

The Public Relations Section conducts a wide range of public relations activities and distributes information to the public.

Open House

We host an open house once a year welcoming anyone to visit our facility and enjoy exhibitions and interactive programs offered by all research groups in our institute. Visit our Science Café, and get to know our research activities and outcomes along with the various initiatives that are carried out during observations at the Antarctic and Arctic sites. We also provide consultation concerning entry into the Department of Polar Sciences, SOKENDAI.

Teachers' Antarctic program

School teachers conduct special lectures from Syowa Station to their home schools and local communities via satellite.

Junior High and High School Polar Science Contest & Antarctic and Arctic Junior Forum

The Junior High and High School Polar Science Contest invites research and experimental proposals from junior high and high school students. The most outstanding proposals are carried out by researchers at the appropriate polar site. The results and findings are provided to the students who submitted the proposal(s).

At the Antarctic and Arctic Junior Forum, students receive and the students present their proposal. The Antarctic team reports their research results live from Antarctic via satellite.

This contest and forum are original and unique collaboration among polar researchers, students and instructors.

Antarctic and Arctic Junior Forum

Antarctic Class

The Antarctic Class is a live chat session between Syowa Station and elementary, junior high, and high schools from all parts of Japan. The wintering team introduce the surrounding scenery and nature found at Antarctic sites. We host this event approximately fifteen times a year via satellite communication. It is a part of our Public Relations Section mission to familiarize the public with the Antarctic.

Various questions from students rise in this enthusiastic class

Science Café

Become a Polar Scientist!

"Science Café" & "Become a Polar Scientist!"

The Science Café is a lecture-style event held regularly where our researchers talk about the latest research outcomes in plain language. The "Become a Polar Scientist!" is a fun experiment-filled event for elementary and junior high school students to become familiar with polar research.

National Institute of Polar Research, Polar Science Museum

Our museum has a partnership with many other science and natural history museums throughout Japan. We aim to develop public interests and deeper understanding in polar science and Antarctic observation.

For more details of the museum, see page 32.

Our partner organizations
Wakkanai Youth's and Children's Science Museum
Rikubetsu Space Science Museum
The Shirase Antarctic Expedition Memorial Museum
Tsukuba Expo Center
Nagoya City Science Museum
Uemura Naomi Memorial Museum
Ehime Prefectural Science Museum
Saga Prefectural Space and Science
Tateyama Caldera Sabo Museum
Nishibori Eizaburo Memorial Explorer Museum
Tamarokuto Science Center
Port of Nagoya Public Aquarium / Fuji Antarctic Museum
WNI WxBunka Foundation
Science Hills KOMATSU
Okhotsk Sea Ice Museum of Hokkaido
Izumo Science Center

"Kyoku (Poles)" and "Pre-Kyoku ("Kyoku" for kids)" magazine

"Kyoku" magazine is written for the public. The friendly contents include our research outcomes, an Antarctic research history manga, and essays.

"Pre-kyoku" is the brother magazine to "Kyoku" and is targeted at elementary and junior high school students. It contains the latest research outcomes with simple and fun contents, so young reader will be fascinated with polar research.

Kyoku

Pre-Kyoku

Homepage & SNS

We post regular updates and information about the activities and research undertaken by the NIPR, the Antarctic, and the Arctic on our homepage and social media outlets (Instagram, Twitter, Facebook and YouTube).

◆ Homepage
https://www.nipr.ac.jp/

Homepage of JARE

◆ Instagram

◆ Twitter

◆ Facebook

Photo of Arctic landscape on Instagram

Open Lecture

With the cooperation of Tachikawa city, NIPR hosts "Polar Science Research Series", a series of open lectures.

Providing Polar Data and Materials

We provide expedition video footage and other data and materials upon request for events, exhibitions, and to former Antarctic expedition members for their Off Site lectures.

Off Site Lecture

NIPR Doctors and professors give lectures on polar science and expeditions upon request.

Contact: National Institute of Polar Research, Public Relations Section

E-mail: kofositu@nipr.ac.jp

We have decided to cancel the "NIPR open house" and the "17th Junior High and High School Polar Science Contest". Other events and activities will also be cancelled this year.

Providing the public with information and topics on "Antarctic

Polar Science Museum, National Institute of Polar Research provides information on historical as well as current state-of-the-art research activities and results in an easy-to-understand forum. Here, visitors can touch and experience objects from 4.6 billion years ago to present day objects. Brief descriptions on our more popular exhibits are provided below.

History

Heading for Antarctica

In 1910, Nobu Shirase launched his expedition with the aim of reaching the South Pole. Forty-six years later, the first Japanese Antarctic Research Expedition (JARE) left for Antarctica aboard the research ship Soya and landed on Ongul Islands on January 29, 1957. The expedition named the surrounding area as "Syowa Station". This marked the beginning of JARE.

"KD604 Snow Vehicle", employed for Japanese South Pole travel in 1968, and certified as a Mechanical Engineering Heritage machine in 2014

Atmosphere & Ice

Exploring the earth's environment

Antarctica is covered with ice sheet made of snow. Buried within this ice is a record of the earth's climate and environment of the distant past.

Man's impact is slight in Antarctica, which makes this area an ideal location to study global environments in the past and present.

Drilling into deep layers of the ice sheet

Bronze Statues of Sakhalin Dogs

They worked for the First JARE(1956-1958) and remained at Syowa Station.

TACHIHI Aurora Theater

The theater shows full-color images of auroras filmed in Antarctica and the Arctic on a four-meter-diameter domed screen. Experience the wonder of auroras dynamically dancing across the sky for yourself.Experience our TACHIHI Aurora Theater!

Aurora

Exploring the wonders of mysterious lights

Why does an aurora glow? Are the auroras in the Antarctic and the Arctic the same? Where can we see auroras? Auroras are not only beautiful, but full of wonder and mystery. Plenty of information about the universe is contained in their colors, shapes and movements.

and Arctic Research Today"

Syowa Station

Established in 1957 on East Ongul Island, Syowa Station started with 11 expedition members overwintering in four buildings that were little more than mountain lodges. A half-century later, Syowa Station has become a world-leading scientific station made up of more about 70 buildings with internet connections, floor heating, private bedrooms, bathrooms, and flush toilets.

Syowa Station Live Cam

Rocks & Meteorites

Exploring the solar system's 4.6 billion-year history

Meteorites are rocks fallen to earth from outer space. Meteorites can be discovered in Antarctica and many have been collected by JARE. Rocks, unlike meteorites, are formed here on earth. Studying rocks can tell us how the continents were formed and provide information about environmental changes in the past.

Martian meteorite

Wildlife

Exploring life and ecology in extremely low temperatures

Polar marine ecosystems are very rich. In addition to ice algae growing in sea ice, there are krill, fish, birds, and mammals living in Antarctic waters. The environments on land are much harsher than those in the sea. Plants such as moss and lichen, as well as tardigrada and other microorganisms, live in special habitats where liquid water can be obtained. Let's explore this mysterious life surviving in such harsh environments.

The Arctic

The images of the Ny-Ålesund NIPR Observatory in the international research village, and representative specimens of Arctic fox and moss etc. are on display. Visitors can see various research results on the Arctic with commentary panels and videos.

There are also exhibits for children such as "Become a Polar Researcher!" as well as "Science Café" and special exhibition and live chat from Antarctic Syowa Station.

Become a Polar Researcher!

Special exhibition

Museum hours : 10:00-17:00 (no entry after 16:30)
Closed : Sun/ Mon/ National holidays/
New Year's / Every month third Tuesday
Admission : Free
http: //www.nipr.ac.jp/science-museum/

Developing field scientists for the next generation of polar research

Graduate Education

NIPR accepts students for 5-year full-term and 3-year second-term doctoral courses through the Department of Polar Science in the School of Multidisciplinary Sciences of SOKENDAI (The Graduate University for Advanced Studies.) twenty students are currently enrolled in the course. The objective of the Department of Polar Science is to identify the primary causes of individual environmental changes within Earth's overall system and the interactions between them. The department fosters researchers who have the ability to carry out a broad range of earth science studies in a flexible and creative way, especially as field scientists.

SOKENDAI was established in October of 1988 as Japan's first national graduate school to exclusively offer doctoral courses. Juxtaposed 5-year doctoral courses were added in 2006. The university currently consists of six schools that receive the assistance of eighteen parent institutes.

Special Collaborative Research Fellows

In accordance with Article 29-1-3 of the National University Corporation Act, the Inter-University Research Institute Corporation accepts graduate students at the request of universities and cooperates with university education.

Every year since 1981, NIPR has accepted graduate students in polar science and related fields as special collaborative research fellows. In 2018, NIPR accepted 10 students.

Joint Graduate School

In 2006, NIPR and Kyushu University entered into the Agreement on Partnership and Cooperation in Education and Research. The two institutes have joined hands in offering graduate education in the field of polar environment studies.

Sampling of zooplankton in the Antarctic Ocean

Collecting rock sample in Brattnipene,
Sør Rondane Mountains, Antarctica

Organization

Organization(As of July, 1, 2020)

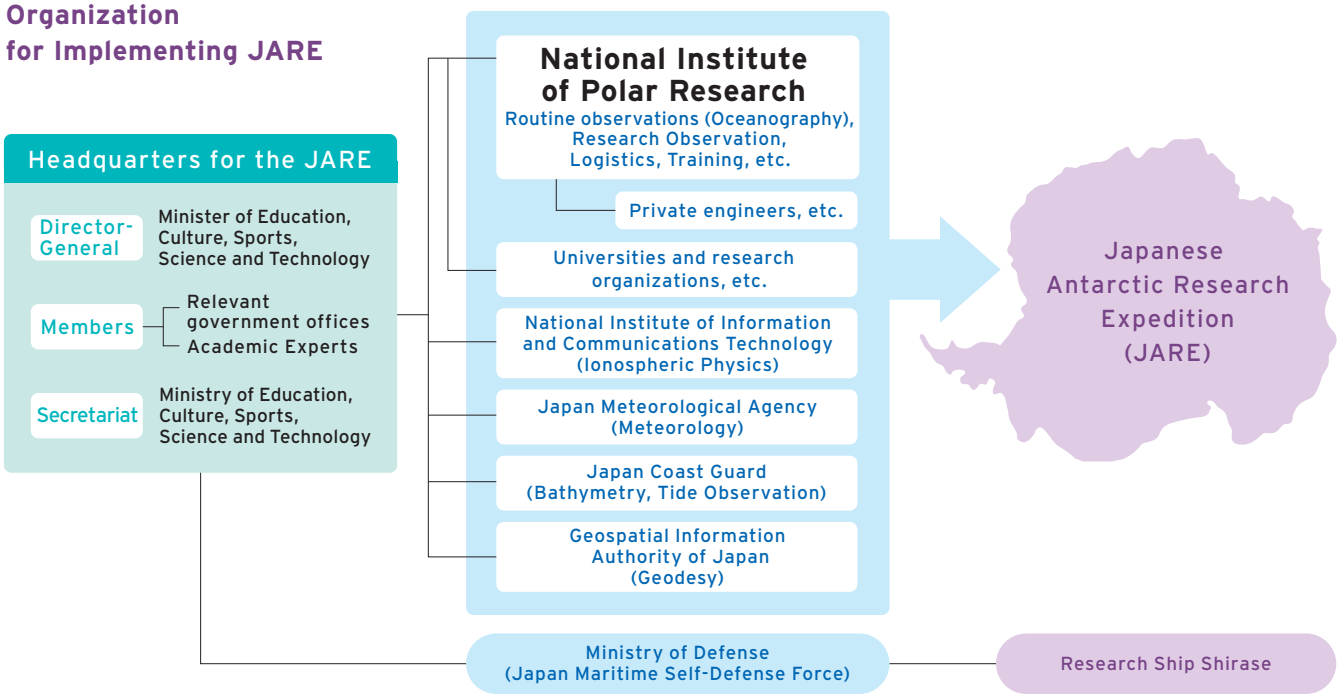
Director-General		Takuji NAKAMURA
Vice Director-General		Yoshifumi NOGI
		Hiroyuki ENOMOTO
		Satoshi IMURA
Assistant Director-General		Kumiko GOTO-AZUMA
		Akinori TAKAHASHI
Division for Research and Education	Space and Upper Atmospheric Sciences Group Leader	Masaki TSUTSUMI
	Meteorology and Glaciology Group Leader	Shuji FUJITA
	Geoscience Group Leader	Yoshifumi NOGI
	Bioscience Group Leader	Sakae KUDOH
	Polar Engineering Group Leader	Hideaki MOTOYAMA
Center for Antarctic Programs	Director	Yoshifumi NOGI
	Deputy Director (for Research)	Gen HASHIDA
	Deputy Director (for Business)	Kenji MORITA
	Manager of Planning Unit	Hitomi MIYAMOTO
	Manager of Logistics Unit	Kazuo HIGUCHI
Arctic Environment Research Center	Director	Hiroshi MIYAOKA

	Deputy Director	Teruo AOKI
	Deputy Director (for Supporting research)	Kenji MORITA
	Manager	Kojiro KAKIMOTO
Polar Science Resources Center	Director	Tomokazu HOKADA
Ice core Research Center	Director	Kumiko GOTO-AZUMA
Communications and Computing science Center	Director	Masaki OKADA
Public Relations Section	Head	Hideki MIURA
Library	Head	Sakae KUDOH
International Affairs and Research Development Office	Head	Satoshi IMURA
Intellectual Property Section	Head	Hiroyuki ENOMOTO
Archives Section	Head	Sakae KUDOH
Office for Gender Equality	Head	Satoshi IMURA
Central Administration Department Tachikawa Administration office	General Manager	Isao OSHIRO
	Head of General Affairs Division	Mitsuo HAMADA
	Head of Financial Division	Katsuhiro OZAKI
	Head of Accounting Division	Koji SAKAMOTO
	Head of Research Promotion Division	Kumiko TANSHO

Advisers

Takao HOSHIAI	Prof. emeritus, NIPR	Zenkichi HIRAYAMA	Prof. emeritus, Nihon University
Atumu OHMURA	Prof. emeritus, Swiss Federal Institute of Technology Zurich	Takeo HIRASAWA	Prof. emeritus, NIPR

Organization for Implementing JARE



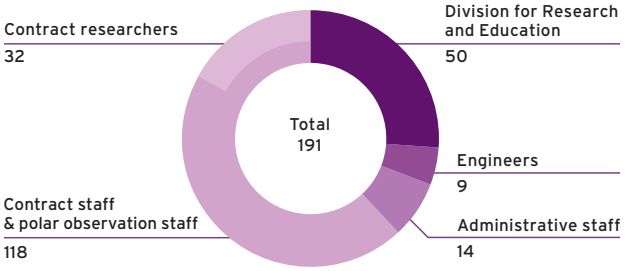
Organization

Research Organization of Information and Systems, National Institute of Polar Research. Administrative Council member. (As of April 1, 2020)

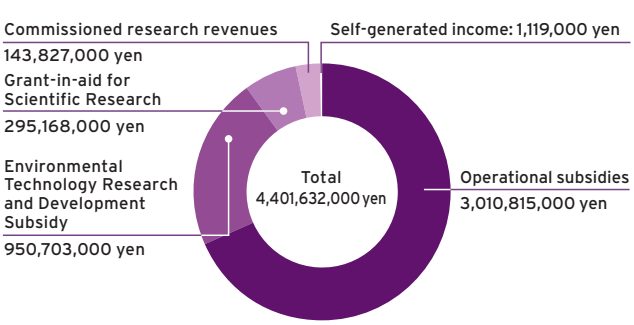
Name	Institution	Title
Ayako ABE	Atmosphere and Ocean Research Institute, The University of Tokyo	Professor
Minoru IKEHARA	Center for Advanced Marine Core Research, Kochi University	Professor
Yasuhito OSANAI	School of Interdisciplinary Science and Innovation, Kyushu University	Professor
Kazuo SHIOKAWA	Institute for Space-Earth Environmental Research, Nagoya University	Professor
Toshio TAKEUCHI	Tokyo University of Marine Science and Technology	President
Atsushi TUDA	The Atmosphere and Ocean Research Institute The University of Tokyo	Professor
Tetsuo HASEGAWA	National Astronomical Observatory of Japan	Specially Appointed professor
Manabu FUKUI	The Institute of Low Temperature Science Hokkaido University	Professor
Ken FURUYA	Soka University Graduate School of Enginnering	Professor
Shinji MORIMOTO	Graduate School of Science and Faculty of Science, Tohoku University	Professor
Mamoru YAMAMOTO	Kyoto University Laboratory of Radar Atmospheric Science	Professor
Yoshifumi NOGI	National Institute of Polar Research	Professor / Vice Director-General / Director of Center for Antarctic Programs / Head of Geoscience Group
Hiroyuki ENOMOTO	National Institute of Polar Research	Professor / Vice Director-General / Head of Intellectual Property Section / Head of Office for Gender Equality
Satoshi IMURA	National Institute of Polar Research	Professor / Vice Director-General / Head of International Affairs and Research Development Office / Head of Office for Gender Equality
Hideaki MOTOYAMA	National Institute of Polar Research	Professor / Vice Dean of School of Multidisciplinary Sciences, SOKENDAI
Hiroshi MIYAOKA	National Institute of Polar Research	Project Professor/ Director of Arctic Enviromental
Kumiko GOTO-AZUMA	National Institute of Polar Research	Professor / Assistant Director General / Director of Ice core Research Center
Tomokazu HOKADA	National Institute of Polar Research	Professor / Director of Polar Science Resources Center
Tsuneo ODATE	Research Organization of Information and Systems	Professor
Akira KADOKURA	Research Organization of Information and Systems	Professor / Head of Communications and Computing science Center, Joint Support-centor for Data Science Research / Dean of School of Multidisciplinary Sciences, SOKENDAI

Institute Data

Number of employees
(as of April 1, 2020; including prospective polar observation staff)



Funding for operations (as of April 1, 2020)



Research Staff (As of August, 2020)

Director-General

	Takuji NAKAMURA	Upper Atmosphere Physics, Remote-sensing of Earth's Atmosphere

Division for Research and Education Space and Upper Atmospheric Sciences Group

Professor	Masaki TSUTSUMI	Atmospheric Physics
Professor	Akira KADOKURA	Magnetospheric Physics
Associate Prof.	Akira Sessai YUKIMATU	Space physics, Aeronomy
Associate Prof.	Masaki OKADA	Plasma Physics
Associate Prof.	Ryuho KATAOKA	Space Physics, Solar Terrestrial Physics
Associate Prof.	Yoshihiro TOMIKAWA	Middle Atmosphere Science
Associate Prof.	Yasunobu OGAWA	Ionospheric Physics
Assistant Prof.	Mitsumu EJIRI	Upper Atmosphere Physics
Assistant Prof.	Takanori NISHIYAMA	Upper Atmosphere Physics
Assistant Prof.	Taishi HASHIMOTO	Instrumentation Engineering
Project Associate Prof.	Koji NISHIMURA	Instrumentation Engineering
Project Associate Prof.	Yoshimasa TANAKA	Upper Atmosphere Physics
Project Assistant	Takashi YAMAMOTO	Radio Communication System

Division for Research and Education Meteorology and Glaciology Group

Professor	Kumiko GOTO-AZUMA	Glaciology
Professor	Shuji FUJITA	Glaciology, Ice Core Studies, Remote Sensing, Applied Physics
Professor	Hiroyuki ENOMOTO	Glaciology, Climatology, Remote Sensing Engineering
Professor	Hideaki MOTOYAMA	Snow Hydrology, Glaciology
Professor	Shuki USHIO	Polar Oceanography
Professor	Gen HASHIDA	Polar Marine Biogeochemistry
Professor	Shuki USHIO	Polar Oceanography
Professor	Gen HASHIDA	Polar Marine Biogeochemistry
Associate Prof.	Kenji KAWAMURA	Paleoclimatology
Associate Prof.	Takeshi TAMURA	Polar Oceanography
Associate Prof.	Masataka SHIOBARA	Atmospheric Physics
Associate Prof.	Jun INOUE	Polar Meteorology
Assistant Prof.	Naohiko HIRASAWA	Climatology
Assistant Prof.	Teruo FURUKAWA	Glaciology
Assistant Prof.	Daisuke GOTO	Atmospheric Physics
Assistant Prof.	Yutaka TOBO	Atmospheric Physics and Chemistry
Assistant Prof.	Fumio NAKAZAWA	Glaciology
Project Researcher	Haruhiko KASHIWASE	Polar Oceanography, Sea Ice
Project Researcher	Nuerasimuguli ALIMASI	Glaciology
	Naoko NAGATSUKA	Glaciology
Project Researcher	Tomotaka SARUYA	Glaciology
Project Researcher	Shun TSUTAKI	Glaciology
Project Researcher	Yuki KOMURO	Glaciology
Project Researcher	Ikumi OYABU	Glaciology

Division for Research and Education Geoscience Group

Professor	Yoshifumi NOGI	Solid Earth Geophysics
Professor	Tomokazu HOKADA	Geology
Associate Prof.	Koichiro DOI	Geodesy
Associate Prof.	Keiji MISAWA	Cosmochemistry
Associate Prof.	Hideki MIURA	Geomorphology, Quaternary Research, Geography
Associate Prof.	Akira YAMAGUCHI	Meteoritics
Associate Prof.	Yusuke SUGANUMA	Quaternary Geology, Paleomagnetism, Rock magnetism
Associate Prof.	Yuichi AOYAMA	Geodesy
Associate Prof.	Masaki KANAO	Seismology, Solid Earth Geophysics
Assistant Prof.	Naoya IMAE	Meteoritics
Assistant Prof.	Hiroshi KAIDEN	Mineralogy, Meteoritics
Assistant Prof.	Kenji HORIE	Isotopic Geochemistry
Assistant Prof.	Jun'ichi OKUNO	Geophysics
Assistant Prof.	Masakazu FUJII	Marine Geology and Geophysics, Rock Magnetism
Project Prof.	Yoichi FUKUDA	Geodesy
Project Researcher	Mami TAKEHARA	Isotope Geology
Project Researcher	Xiangyu ZHAO	Geophysics (Paleomagnetism)
Project Researcher	Takeshige ISHIWA	Geophysics, Paleoclimatology
Project Researcher	Yoshiya IRIE	Geophysics

Division for Research and Education Bioscience Group

Professor	Satoshi IMURA	Plant Ecology
Professor	Sakae KUDOH	Aquatic Ecology
Professor	Tsuneo ODATE	Biological Oceanography
Associate Prof.	Akinori TAKAHASHI	Animal Ecology
Associate Prof.	Yuuki WATANABE	Marine Zoology
Associate Prof.	Masaki UCHIDA	Microbial Ecology
Associate Prof.	Masato MOTEKI	Ichthyology
Assistant Prof.	Kunio TAKAHASHI	Marine Ecology

Research Staff (As of August, 2020)

Assistant Prof.	Nobuo KOKUBUN	Marine Ecology
Assistant Prof.	Ryosuke MAKABE	Biological Oceanography, Marine Ecology
Project Researcher	Jean Baptiste Pierre Marie Dominique THIEBOT	Marine Ecology
Project Researcher	Masayoshi SANO	Marine Ecology

Division for Research and Education Polar Engineering Group

Professor	Hideaki MOTOYAMA	Snow Hydrology, Glaciology
Assistant Prof.	Masayuki KIKUCHI	Plasma Physics

Center for Antarctic Programs

Professor	Shuki USHIO	Polar Oceanography
Professor	Gen HASHIDA	Polar Marine Biogeochemistry
Professor	Yoshifumi NOGI	Solid Earth Geophysics
Associate Prof.	Yuichi AOYAMA	Geodesy
Associate Prof.	Koichiro DOI	Geodesy
Associate Prof.	Akira Sessai YUKIMATU	Space physics, Aeronomy
Associate Prof.	Akinori TAKAHASHI	Animal Ecology
Project Assistant	Yuichi MINAMIHARA	Atmospheric Dynamics, Middle Atmosphere Sciences
Project Assistant	Daisuke SHIMIZU	Polar Oceanography

Arctic Environment Research Center

Professor	Hiroyuki ENOMOTO	Glaciology, Climatology, Remote Sensing Engineering
Professor	Kentaro NISHIMOTO	International Law
Professor	Satoshi IMURA	Plant Ecology
Associate Prof.	Yasunobu OGAWA	Ionospheric Physics
Associate Prof.	Jun INOUE	Polar Meteorology
Associate Prof.	Masaki UCHIDA	Microbial Ecology
Assistant Prof.	Daisuke GOTO	Atmospheric Physics
Assistant Prof.	Yutaka TOBO	Atmospheric and Environmental Sciences
Assistant Prof.	Taishi HASHIMOTO	Instrumentation Engineering
Project Prof.	Teruo AOKI	Atmospheric and Cryospheric Radiation
Project Prof.	Hiroshi MIYAOKA	Plasma Physics
Project Prof.	Yuji KODAMA	Glaciology
Project Prof.	Yutaka KONDO	Global Atmospheric
Project Associate Prof.	Hironori YABUKI	Glaciology
Project Associate Prof.	Koji NISHIMURA	Instrumentation Engineering
Project Associate Prof.	Takeshi TERUI	Marine Ecosystem
Project Prof.	Yuji KODAMA	Glaciology
Project Prof.	Yutaka KONDO	Global Atmospheric

Polar Science Resources Center

Professor	Satoshi IMURA	Plant Ecology
Professor	Tomokazu HOKADA	Geology
Associate Prof.	Akinori TAKAHASHI	Animal Ecology
Associate Prof.	Akira YAMAGUCHI	Meteoritics
Assistant Prof.	Naoya IMAE	Meteoritics
Assistant Prof.	Kenji HORIE	Isotopic Geochemistry
Assistant Prof.	Kunio TAKAHASHI	Marine Ecology
Project Prof.	Makoto KIMURA	Environmental Science Meteoritics, Mineralogy

Communications and Computing Science Center

Associate Prof.	Masaki OKADA	Plasma Physics
Assistant Prof.	Yuichi AOYAMA	Geodesy
Assistant Prof.	Masayuki KIKUCHI	Plasma Physics
Assistant Prof.	Naohiko HIRASAWA	Climatology

Ice Core Research Center

Professor	Kumiko GOTO-AZUMA	Glaciology
Professor	Hideaki MOTOYAMA	Snow Hydrology, Glaciology
Professor	Shuji FUJITA	Glaciology, Ice Core Studies, Remote Sensing, Applied Physics
Associate Prof.	Kenji KAWAMURA	Paleoclimatology
Assistant Prof.	Fumio NAKAZAWA	Glaciology
Project Assistant	Motohiro HIRABAYASHI	Analytical Chemistry

Public Relations Section

Associate Prof.	Hideki MIURA	Geomorphology, Quaternary Research, Geography
Project Prof.	Yoichi MOTOYOSHI	Geology

Library

Professor	Sakae KUDOH	Aquatic Ecology
Project Prof.	Takashi YAMANOUCHI	Atmospheric Science

International Affairs and Research Development Office

Project	Satoshi IMURA	Plant Ecology
Professor	Gen HASHIDA	Polar Marine Biogeochemistry
Professor	Kumiko GOTO-AZUMA	Glaciology

Project Associate Prof.	Tetsuo SUEYOSHI	Glaciology, Paleoclimatology
URA	Mihoko IIZUKA	Research support, Environmental microbiology
Project Prof.	Kentaro WATANABE	Marine Ecology

Intellectual Property Section

Professor	Hiroyuki ENOMOTO	Glaciology, Climatology, Remote Sensing Engineering

Archives Section

Professor	Sakae KUDOH	Aquatic Ecology
Project Prof.	Takashi YAMANOUCHI	Atmospheric Science

Office for Gender Equality

Professor	Satoshi IMURA	Plant Ecology
Assistant Prof.	Mitsumu EJIRI	Upper Atmosphere Physics

Visiting Staff

Visiting Prof.	Tetsuo IWAMI	Ichthyology, Marine Ecology
Visiting Prof.	Jouta KANDA	Marine Biochemistry
Visiting Prof.	Hiroyuki KONISHI	Precipitation Physics
Visiting Prof.	Takayuki NAKATSUBO	Plant ecology, Ecosystem ecology
Visiting Prof.	Masahiko HAYASHI	Meteorology
Visiting Prof.	Hajime YAMAGUCHI	Naval Architecture and Ocean Engineering
Visiting Prof.	Yutaka WATANUKI	Marine Ecology
Visiting Prof.	Ayako ABE	Paleoclimatology, Climate and Ice Sheet Modeling
Visiting Prof.	Makoto ABO	Laser Remote Sensing
Visiting Prof.	Dapeng ZHAO	Seismology
Visiting Prof.	Seiji TSUBOI	Seismology
Visiting Prof.	Naomasa NAKAI	Astronomy
Visiting Prof.	Shogo NISHIKAWA	Power and Energy
Visiting Prof.	Takaaki NOGUCHI	Mineralogy, Petrology, Meteoritics
Visiting Prof.	Hitoshi FUJIWARA	Upper Atmosphere Physics
Visiting Prof.	Masayuki YAMAMOTO	Upper Atmosphere Physics, Ionospheric Physics
Visiting Prof.	Shinya OBARA	Energy System, Microgrid, Cold Region Energy
Visiting Prof.	Kaoru SATO	Atmospheric Dynamics, Middle Atmosphere Sciences
Visiting Prof.	Makoto TAGUCHI	Planetary Atmosphere Physics
Visiting Prof.	Takashi OSONO	Ecology, Biodiversity Science
Visiting Prof.	Hidetoshi SHIBUYA	Paleomagnetism, Planetary magnetism
Visiting Prof.	Hiroyuki KAGAWA	Mechanical Engineering, Polar Engineering
Visiting Prof.	Masayuki KATSURAGAWA	Quantum Electronics, Nonlinear Optics, Qunatum Optics, Laser Spectroscopy
Visiting Prof.	Kentaro NISHIMOTO	International Law
Visiting Prof.	Shigeru FUJITA	Space Physics
Visiting Prof.	Yoshihiro HIRAMATSU	Seismology
Visiting Associate Prof.	Shigeru AOKI	Polar Oceanography
Visiting Associate Prof.	Toru HIRAWAKE	Satellite Oceanography, Marine Optics
Visiting Associate Prof.	Shin-ichiro OYAMA	Upper Atmospheric Physics; Space Physics, Solar Terrestrial Physics
Visiting Associate Prof.	Satonori NOZAWA	Upper Atmosphere Physics
Visiting Associate Prof.	Takanobu SAWAGAKI	Physical Geography, Glacial Geology
Visiting Associate Prof.	Tomoyuki HOMMA	Diffraction Physics, Physical Metallurgy,Strength in Materials Science,Light Metals
Visiting Associate Prof.	Yasunobu MIYOSHI	Middle-Upper Atmosphere Physics, Upper Atmosphere Physics
Visiting Associate Prof.	Nozomu NISHITANI	Ionospheric and Magnetospheric physics

Joint Support-Center for Data Sceince Research

Professor	Akira KADOKURA	Magnetospheric Physics
Associate Prof.	Masaki KANAO	Seismology, Solid Earth Geophysics
Project Associate Prof.	Yoshimasa TANAKA	Upper Atmosphere Physics
Project Associate Prof.	Koji NISHIMURA	Instrumentation Engineering
Project Associate Prof.	Hironori YABUKI	Glaciology

Research Organization of Information and Systems

Professor	Tsuneo ODATE	Biological Oceanography

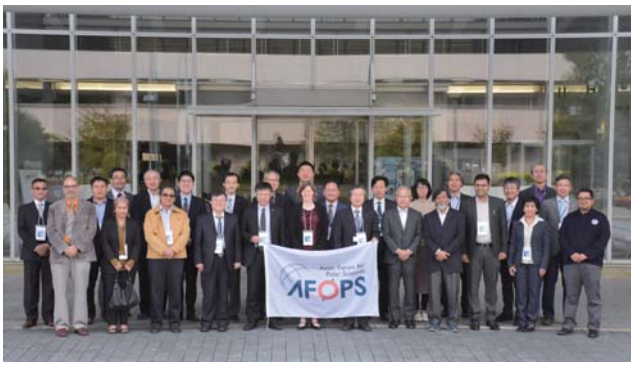
JSPS Postdoctoral Fellow

	Mindaugas MITKUS	Visual Ecology
	Naoto JIMI	Taxonomy, Phylogenetics
	Sakiko ISHINO	Atmospheric Chemistry, Isotope Geochemistry
	Atsushi TAKENOUCHI	Meteoritics
	Bungo NISHIZAWA	Marine ecology
	Junichi TAKAGI	Ethology

Partnership Agreements

NIPR concludes research agreements and memoranda of understanding with foreign universities and research institutes for the sake of promoting collaboration projects, academic exchange and graduate university education.

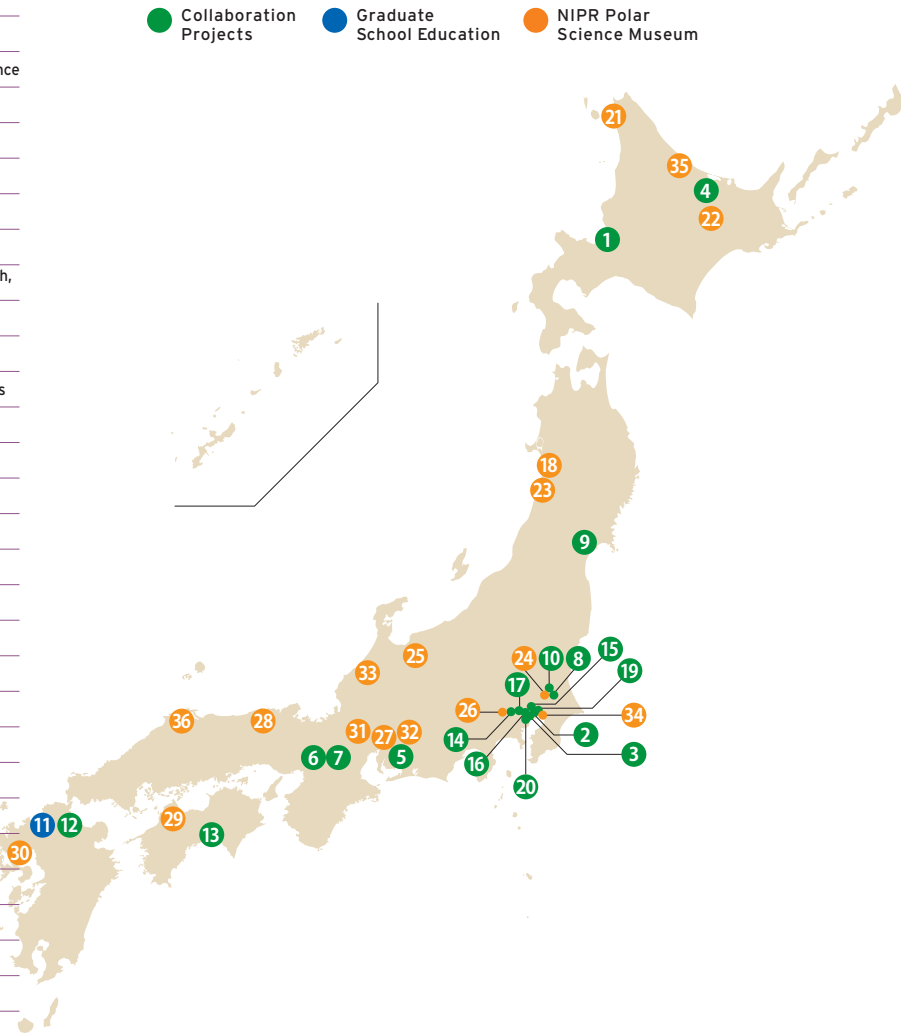
Signing ceremony of polar research collaboration agreement with The Ministry of Science, Innovation and Universities of the Kingdom of Spain, in September, 2019.



The 24th Annual General Meeting of Asian Forum for Polar Sciences (A-FoPS) was held in NIPR in October, 2019.

Domestic partner institutions

1	Collaboration Projects	Institute of Low Temperature Science, Hokkaido University
2	Collaboration Projects	National Museum of Emerging Science and Innovation (Miraikan)
3	Collaboration Projects	Tokyo University of Marine Science and Technology
4	Collaboration Projects	Kitami Institute of Technology
5	Collaboration Projects	Solar-Terrestrial Environment Laboratory, Nagoya University
6	Collaboration Projects	Research Institute for Sustainable Humanosphere, Kyoto University
7	Collaboration Projects	Kyoto University Graduate School of Science
8	Collaboration Projects	Faculty of Pure and Applied Sciences, Tsukuba University
9	Collaboration Projects	Graduate School of Science and Faculty of Science, Tohoku University
10	Collaboration Projects	Japan Aerospace Exploration Agency
11	Graduate School Education	Kyushu University Graduate School of Integrated Sciences for Global Society
12	Collaboration Projects	International Center for Space Weather Science and Education Kyusyu University
13	Collaboration Projects	Center for advanced Marine Core Research, Kochi Univercity
14	Collaboration Projects	National Institute of Japanese Literature
15	Collaboration Projects	Tokyo Zoological Park Society
16	Collaboration Projects	The University of Electro-Communications
17	Collaboration Projects	Seikei Gakuen
18	Collaboration Projects	Nikaho city
19	Collaboration Projects	Misawa Homes Co., Ltd
20	Collaboration Projects	Misawa Homes Institute of Research and Development Co.,Ltd.
21	NIPR Polar Science Museum	Wakkanai Youth's and Children's Science Museum
22	NIPR Polar Science Museum	Rikubetsu Space Science Museum
23	NIPR Polar Science Museum	The Shirase Antarctic Expedition Memorial Museum
24	NIPR Polar Science Museum	Tsukuba Expo Center
25	NIPR Polar Science Museum	Tateyama CalderaSabo Museum
26	NIPR Polar Science Museum	Tamarokuto Science Center
27	NIPR Polar Science Museum	Nagoya City Science Museum
28	NIPR Polar Science Museum	Uemura Naomi Memorial Museum
29	NIPR Polar Science Museum	Ehime Prefectural Science Museum
30	NIPR Polar Science Museum	Saga Prefectural Space and Science Museum
31	NIPR Polar Science Museum	Nishibori Eizaburo Memorial Explorer Museum
32	NIPR Polar Science Museum	Port of Nagoya Public Aquarium / Fuji Antarctic Museum
33	NIPR Polar Science Museum	Science Hills Komatsu
34	NIPR Polar Science Museum	WNI WxBunka Foundation
35	NIPR Polar Science Museum	Okhotsk Sea Ice Museum of Hokkaido
36	NIPR Polar Science Museum	Izumo Science Center



International exchange agreements

1	Argentine	The National Directorate for Antarctica of the Argentine Republic
2	Australia	Australian Antarctic Division
3	Australia	Bureau of Meteorology
4	Australia	Geoscience Australia-Geochronology Laboratory
5	Australia	Geoscience Australia
6	Australia	Macquarie University
7	Australia	The Research School of Earth Sciences, Australian National University
8	Belgium	Vrije Universiteit Brussel
9	Belgium	Université Libre de Bruxelles
10	Belgium	Royal Belgian Institute of Natural Sciences
11	Canada	Canadian High Arctic Research Station
12	Canada	Centre for Northern Studies, Laval University
13	Chile	Chilean Antarctic Institute
14	China	Polar Research Institute of China
15	China	China Research Institute of Radiowave Propagation
16	Czech	University of South Bohemia
17	Denmark	Greenland Institute of Natural Resources
18	Denmark	Niels Bohr Institute, University of Copenhagen
19	Finland	Suomen Akatemia
20	Finland	Finnish Meteorological Institute
21	Finland	University of Helsnki
22	France	Centre national d'études spatiales
23	France	Institut national de l'information géographique et forestière
24	France	Institut Paul-Emile Victor
25	Germany	Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research
26	Iceland	Science Institute, University of Iceland
27	India	National Cenre for Polar and Ocean Research, Ministry of Earth Sciences on Cooperation in Polar Research
28	India	The Indian Institute of Geomagnetism, Department of Science and Technology of India
29	Italy	Consiglio Nazionale delle Recherche
30	Korea	Korea Polar Research Institute
31	Korea	Korea Institute of Construction Technology
32	Malaysia	Universiti Kebangsaan Malaysia
33	Norway	Norwegian Polar Institute
34	Norway	University Centre in Svalbard
35	Norway	Norwegian Meteorological Institute
36	Norway	UiT The Arctic University of Norway
37	Norway	Norges forskingsråd
38	Norway	Bjerknes Centre for Climate Research
39	Norway	Nansen Environmental and Remote Sensing Center
40	Poland	Institute of Geophysics, Polish Academy of Sciences
41	Russia	Institute for Biological Problems of Cryolithozone, Russian Academy of Sciences
42	Russia	The Melnikov Permafrost Institute, Russian Academy of Sciences
43	Russia	Arctic and Antarctic Research Institute of Roshydromet
44	Spain	Basque Centre for Climate Change-Klima Aldaketa Ikergai
45	Spain	The Ministry of Science, Innovation and Universities of the Kingdom of Spain
46	Sweden	Vetenskapsrådet
47	Sweden	University of Stockholm
48	UK	British Antarctic Survey
49	UK	Natural Environment Research Council
50	USA	International Arctic Research Center, University of Alaska
51	USA	SETI Institute

The National Institute
of Polar Research established

September 29, 1973

At 1-9-10 Kaga Itabashi-ward Tokyo

Number of employees **191**

Faculty / researcher	82
Administers / engineers	109

(As of April 1, 2020)

SOKENDAI has become base research organization

April, 1993

Department of Polar Science in the the School of Multidisciplinary Science of the Graduate University for Advanced Studies(SOKENDAI)

Number of enrolled students **20** (As of April 1, 2020)

Number of degree recipients **73**

Polar Science Museum

Opened on

July 24, 2010

Total number of the visitors **311,648** (As of March, 2020)

Open house of NIPR 2019

It was held on

August 3, 2019

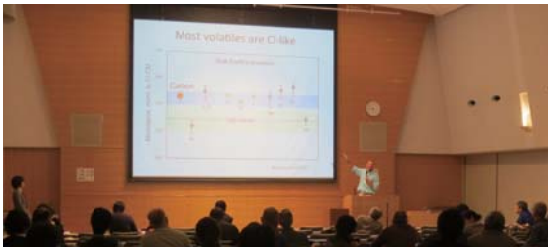
Number of the visitors **1,893**

The 10th Polar Science Symposium

Dec 3-Dec 5, 2019

Participants

448 (includes oversea 77 participants [19 countries])



"observation base・Antarctic research Expedition" "Research facility・resource" "Research activities・Achievements" "Funding information" / visit at http://www.nipr.ac.jp/outline/numeral/index.html

History of the National Institute of Polar Research

December 1959	Japan joined the Antarctic Treaty
May 1961	The Science Council of Japan advised the creation of the "Institute of Polar Research" (tentative) to the government
(April 1962)	("Polar Department" of the National Science Museum established)
(April 1970)	("Polar Department" reorganized as "Polar Research Center")
September 29, 1973	The National Institute of Polar Research (NIPR) established
April 1993	NIPR became an infrastructure institute of the Graduate University for Advanced Studies (SOKENDAI)
July 1998	Antarctic Environmental Protection Law became effective
April 2004	NIPR was reorganized as part of Research Organization of Information and Systems (ROIS)
May 2009	NIPR relocated to new campus in Tachikawa-shi, Tokyo
August 2009	NIPR "Open house" launched
July 2010	NIPR Polar Science Museum opened
September 2013	40th anniversary of the NIPR
February 2014	Over 100,000 visitors recorded at Polar Science Museum
July 2017	Over 200,000 visitors recorded at Polar Science Museum
September 2019	Over 300,000 visitors recorded at Polar Science Museum
July 2020	10th anniversary of the Polar Science Museum

History of Antarctic Expeditions

1910	
January 1912	Nobu Shirase Antarctic Expedition team reached lat. 80°
1950	
November 1956	First Antarctic expedition team departed upon the icebreaker ship "Soya"
January 1957	"Syowa Station" established
1960	
February 1962	"Syowa Station" closed temporarily
November 1965	Research vessel "Fuji" launched
January 1966	"Syowa Station" reopened
February 1969	Round-trip to the South Pole achieved
December 1969	First Antarctic meteorite discovered
1970	
February 1970	Observation by rocket
June 1970	"Mizuho Station" (observation base) established
October 1979	Large number of Antarctic meteorites collected
1980	
October 1982	"Ozone hole" observed
November 1983	Research vessel "Shirase" launched
March 1985	"Asuka Station" established
February 1989	Multifunctional antenna installed
1990	
February 1995	"Dome Fuji Station" established
December 1996	Ice cove drilled to a depth of 2,503 m
January 1999	Large number of Antarctic meteorites collected
2000	
January 2001	Large number of Antarctic meteorites collected
February 2002	Specialized ship was added for South Pacific expedition
February 2004	Intelsat satellite communication system activated
January 2005	Aircraft observation base established on the continent of Antarctica
2006-2007	50th anniversary of Antarctic research project
January 2007	Ice cove drilled to a depth of 3,035 m
November 2009	New "Shirase" launched
2010	Tokyo University of Marine Science and Technology's training ship "Umitaka-Maru" joined Antarctic research project
2010	
February 2010	Over 17,000 Antarctic meteorites collected
March 2011	"PANSY" large-scale atmospheric radar began recording data
August 2014	Snow Vehicles Type-KD60 certified as Mechanical Engineering Heritage
2016	Japanese Antarctic Research Project Phase IX started
January 2017	60th anniversary of "Syowa Station"
2020	

History of Arctic Researchers

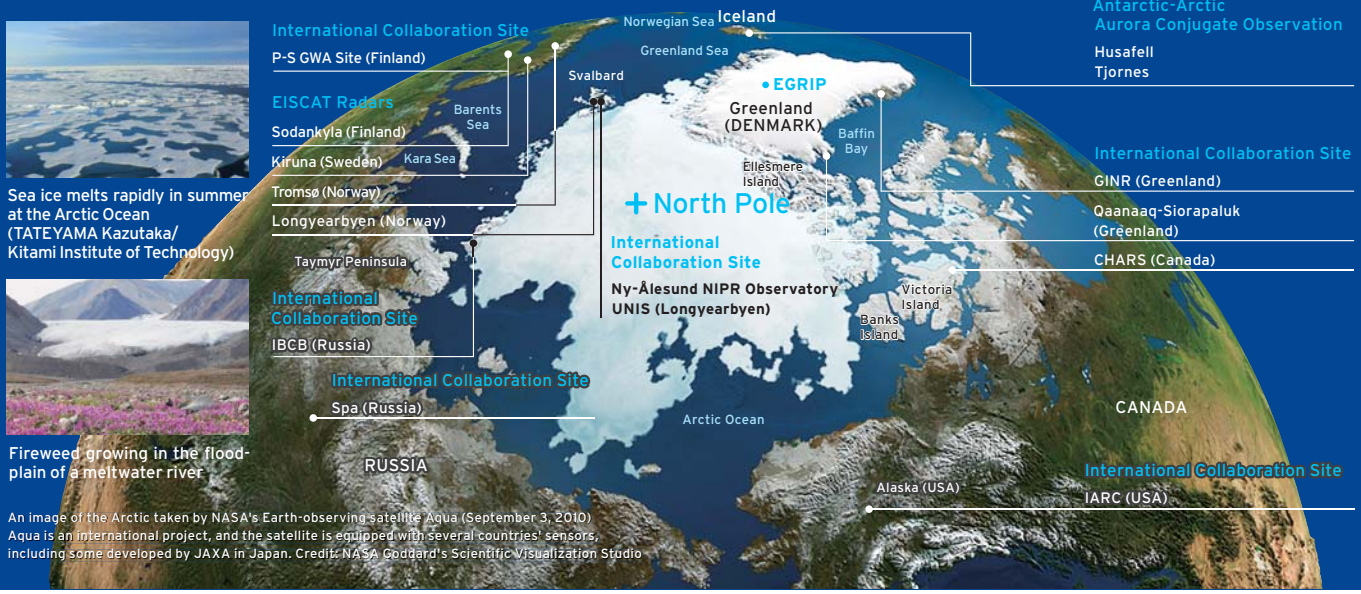
August 1976	Japan-France International Joint Observation in Norway
August 1977	Geomagnetic Conjugate Point Observation in Iceland
August 1984	Bipolar Aurora Conjugate Observation in Iceland started (up to now)
June 1990	Arctic Environment Research Center established
January 1991	Ny-Ålesund Research Station established
	Joins International Arctic Science Committee (IASC)
April 1996	Joins European Incoherent Scatter Scientific Association (EISCAT)
March 1998	Japanese-German airborne Arctic expedition
April 2004	Arctic Environment Research Center reorganized
April 2008	North Greenland Eemian Ice Drilling (NEEM) began
July 2011	GRENE - Arctic Project started (finished on March 2016)
April 2015	Arctic Environment Research Center reorganized to enhance international collaboration
	"Arctic Science Summit Week" was held in Toyama
September 2015	ArCS (Arctic Challenge for Sustainability) Project started (finished on March 2020)
April 2016	J-ARCNet started
September 2016	25th anniversary of Ny-Ålesund Research Station
April 2019	Relocation of Ny-Ålesund NIPR Observatory
September 2019	Opening Ceremony of Ny-Ålesund NIPR Observatory
June 2020	ArCS II (Arctic Challenge for Sustainability II) Project started

Arctic

The North Pole refers to a point at 90 degrees north, and the region above 66.5 degrees north latitude is called the Arctic Region. There is no land at the North Pole. The Arctic Ocean and marginal sea area is surrounded by the Eurasian, North American continents and Greenland. The Arctic region covers an area of about 12 million km^2. Within the Arctic Circle, there are multiple inhabited settlements. The region has more vegetation than Antarctica. The Arctic is easily affected by global warming.

Sea ice melts rapidly in summer at the Arctic Ocean (TATEYAMA Kazutaka/ Kitami Institute of Technology)

Fireweed growing in the flood-plain of a meltwater river



An image of the Arctic taken by NASA's Earth-observing satellite Aqua (September 3, 2010) Aqua is an international project, and the satellite is equipped with several countries' sensors, including some developed by JAXA in Japan. Credit: NASA Goddard's Scientific Visualization Studio

NiPR
National Institute of Polar Research

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Research Organization of Information and Systems
National Institute of Polar Research
10-3 Midori-cho, Tachikawa-shi, Tokyo 190-8518, Japan
Telephone: +81-42-512-0655 Facsimile: +81-42-528-3105
http: //www.nipr.ac.jp E-mail: kofositu@nipr.ac.jp
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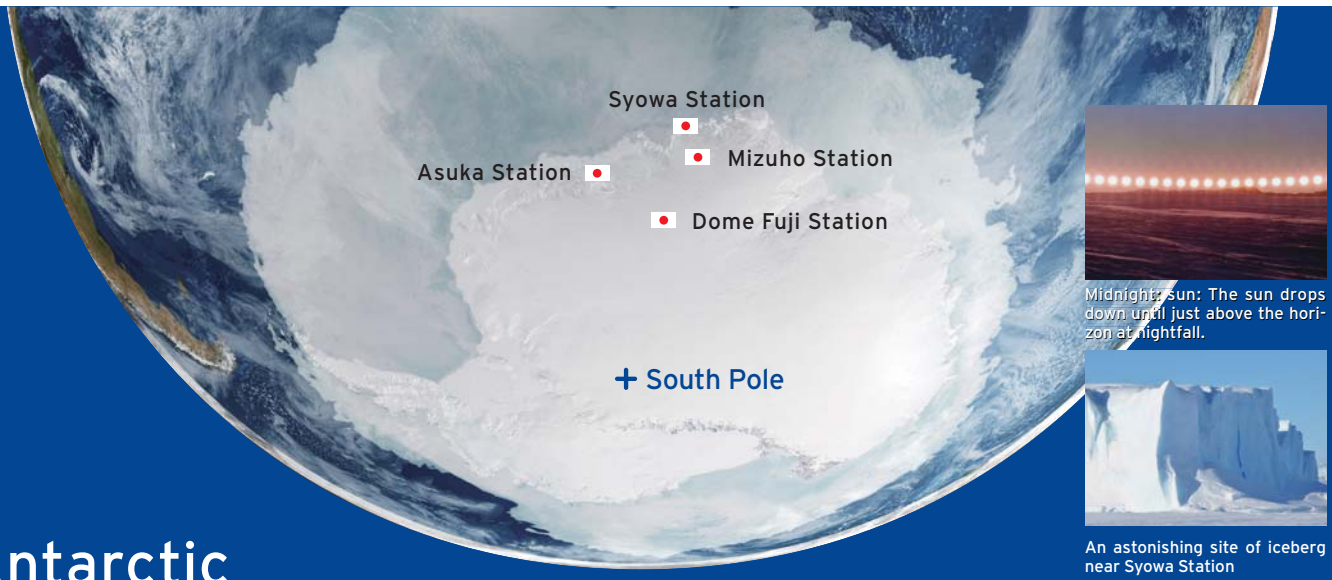

Midnight sun: The sun drops down until just above the horizon at nightfall.

An astonishing site of iceberg near Syowa Station

Antarctic

Antarctica is an isolated continent surrounded by the Antarctic Ocean. Instead of melting, snow which falls in the Antarctica becomes compressed ice covering the continent. The Antarctic ice cap, a massive sheet of ice, has an average thickness of approximately 1937m. Combined, the continent and ice shelves are approximately 37 times that of Japan. Located far from civilization, Antarctica functions as both an environmental monitoring center that allows us to assess the impact of human activity on the planet, and a time capsule that gives us a glimpse into the global environment of the past.