



Hokkaido University

Arctic Research Center



Message



Director

Shin SUGIYAMA

After graduating from Osaka University and Hokkaido University, he worked for Shin-Etsu Chemical, the Japan Overseas Cooperation Volunteers, the Swiss Federal Institute of Technology, and the Institute of Low Temperature Science at Hokkaido University, before taking his current position as the Director of the Arctic Research Center in April 2025. He is conducting research on glaciers and ice sheets in Greenland, Antarctica, and Patagonia. Since 2007, he has been running a graduate school educational program on polar science and is in charge of field and lecture programs in Hokkaido and Switzerland. In 2025, he was awarded the European Geosciences Union (EGU) Julia & Johannes Weertman Medal. He is the President of the International Glaciological Society (IGS).

Contributing to the future of the Arctic through interdisciplinary research and education

The Arctic is the region where the most rapid warming is observed on the earth. Sea ice, glaciers, and permafrost are melting due to rising temperatures, causing changes in marine and terrestrial ecosystems. Societies in the Arctic are also changing rapidly under the influence of globalization and modernization, giving rise to complex social problems related to economic development and international politics. The changes occurring in the Arctic are also global issues. Melting glaciers cause sea levels rise, and changes in ocean circulation accelerate climate change. Warming in the Arctic is also the cause of the heavy snowfall and extreme heat frequently occurring in Japan. Furthermore, due to the disappearance of ice, interest is growing in the operation of Arctic shipping routes and the use of mineral resources.

With these rapid changes in the Arctic as the background, the Arctic Research Center was established in Hokkaido University in 2015. Researchers from various fields, including geosciences, social sciences, and engineering, are conducting research and education to contribute to a sustainable future of the Arctic. The activities are performed in collaboration with universities and research institutions both in Japan and overseas, as well as various departments within Hokkaido University.

Our missions are **1) to promote Arctic research, 2) to foster the next generation of Arctic researchers, and 3) to develop international networks.** In terms of research activities, we lead the Japanese flagship project, Arctic Challenge for Sustainability (ArCS-3) Project. The Arctic's changing climate and environment are investigated with a variety of approaches, including field surveys, satellite data analysis, and numerical modeling. We also promote engineering research on Arctic shipping routes, living environments in cold regions, and waste disposal. In addition, we study international politics and legal developments surrounding the Arctic region. Our goal is to contribute to the societies in the Arctic, Japan and all over the world, including Arctic indigenous communities.

In the ArCS-3 project, we are responsible for offering educational programs to foster the next generation of researchers. Taking advantage of our experience in polar science and education, we offer a comprehensive curriculum of the Arctic and Antarctic science, which includes field courses in Japan and overseas, training cruise of Osyoro Maru, and special lectures and seminars by overseas researchers. As the only Japanese university participating in the University of the Arctic (UArctic), an international framework for Arctic education, our programs keep the international standard of polar science education.

In order to contribute to a sustainable future of the Arctic, we are working to establish and strengthen international networks in cooperation with overseas research and educational institutions, the Arctic Council (AC), the International Arctic Science Committee (IASC), and foreign embassies. In particular, we are deepening relationships among Asian countries, which are increasingly involved in the Arctic issues. We have established and are running the Asia-Arctic Network for Research and Education (AANRE) for collaborations in research and education.

To achieve the contribution to the future of the Arctic, collaboration with a wide variety of people and the involvement of young researchers are essential. Please contact us if you are looking for a partner or an opportunity of studying the Arctic. We look forward to working with you.



Organization



Arctic Research Center
Hokkaido University



June 30, 2025

Research and Education

General Strategy Office

The unit conducts new research that crosses over disciplines and aims to build an academic system and solve social issues.

Management of taskforces in collaboration with university departments, worldwide institutions, and stakeholders

Building the academic foundation of the Arctic study

Implementation of the university vision and coordination of international networking

○ Professor/Director	SUGIYAMA Shin
● Professor/Vice Director	FUKAMACHI Yasushi
○ Advisor to the Director	OGI Masayo
○ Associate Professor	PODOLSKIY Evgeny
○ Associate Professor	SAUNAVAARA Juha
○ Specially Appointed Associate Professor	OHNISHI Fujio
○ Specially Appointed Associate Professor	HIRATA Takafumi

●: Office Leader

Arctic Research Unit

Elucidate environmental changes in ocean physics, sea ice environment, cryosphere, and climate in the Arctic region.

○ Professor/Director	SUGIYAMA Shin	
○ Professor	FUKAMACHI Yasushi	
● Associate Professor	PODOLSKIY Evgeny	
○ Professor	UENO Hiromichi	Graduate School of Fisheries Sciences
○ Professor	FURUYA Masato	Graduate School of Science
○ Professor	GREVE Ralf	Institute of Low Temperature Science
○ Professor	NOMURA Daiki	Graduate School of Fisheries Sciences
○ Professor	IIZUKA Yoshinori	Institute of Low Temperature Science
○ Associate Professor	UETAKE Jun	Field Science Center for Northern Biosphere
○ Associate Professor	YAMAGUCHI Atsushi	Graduate School of Fisheries Sciences
○ Associate Professor	SHIRAIWA Takayuki	Institute of Low Temperature Science
○ Assistant Professor	THIEBOT Jean-Baptiste	Graduate School of Fisheries Sciences
○ Assistant Professor	MATOKA Sumito	Institute of Low Temperature Science

●: Unit Leader

Cross-regional Research Unit

The interaction between the Arctic and mid-latitude regions will be elucidated from the natural environment, politics, and economy.

○ Associate Professor	GALCIA MOLINOS Jorge	
● Specially Appointed Associate Professor	HIRATA Takafumi	
○ Professor	YAMAMOTO Masanobu	Faculty of Environment Earth Science
○ Professor	TSUYUZAKI Shiro	Faculty of Environment Earth Science
○ Professor	UEDA Kayo	Graduate School of Medicine
○ Professor	NISHIOKA Jun	Institute of Low Temperature Science
○ Professor	OOKI Atsushi	Graduate School of Fisheries Sciences
○ Professor	YAMADA Tomohito	Graduate School of Engineering
○ Professor	CHI Hyunjo Naomi	Graduate School of Engineering
○ Professor	SATO Tomonori	Faculty of Environment Earth Science
○ Specially Appointed Professor	OHSHIMA Keiichi	Institute of Low Temperature Science
○ Specially Appointed Professor	MASUDA Ryuichi	Graduate School of Science
○ Specially Appointed Professor	IWAHANA Go	University of Alaska
○ Associate Professor	ISHIKAWA Mamoru	Faculty of Environment Earth Science

●: Unit Leader

Collaborative and Integrative Research Unit

The unit conducts interdisciplinary research that seeds task forces and aims for breakthroughs in Arctic research, focusing on new academic foundations that support problem-solving.

● Associate Professor	SAUNAVAARA Juha	
○ Specially Appointed Associate Professor	OHNISHI Fujio	
○ Professor	KASAI Akihide	Graduate School of Fisheries Sciences
○ Professor	MORI Taro	Graduate School of Engineering
○ Professor	MURAI Yuuichi	Graduate School of Engineering
○ Professor	KATO Hirofumi	Center for Ainu and Indigenous Studies
○ Professor	KOYANO Mari	Center for Ainu and Indigenous Studies
○ Professor	HATTORI Michitaka	Slavic-Eurasian Research Center
○ Assistant Professor	WATANABE Norihiro	Graduate School of Engineering
○ Assistant Professor	MATSUNO Kohei	Graduate School of Fisheries Sciences
○ Overseas Researcher	HAYASHI Naotaka	University of Calgary

●: Unit Leader

Japan's first comprehensive Arctic research and education center.

As an Arctic research hub at Hokkaido University, we bring together researchers in the natural sciences, engineering, humanities, and social sciences to foster interdisciplinary and transdisciplinary research and education.

Natural sciences, the humanities and social sciences work closely

The climate and social changes taking place in the Arctic region affect the entire planet, including Japan. At the same time, Arctic natural environments are influenced by the surrounding areas and Arctic society is affected by international politics and economy. For example, sea ice covering the Arctic Ocean is shrinking at an unprecedented rate, and the day is approaching when the ocean becomes ice free during the summer period. What will happen when the sea ice disappears? Greater amount of solar energy is absorbed by the ocean after the loss of sea ice, which has a higher reflectivity than water. This additional heat intake not only enhances global warming, but also brings hot summers and cold winters to Japan by generating the meandering westerly winds. Northward fish migration is observed in warming oceans, affecting Arctic marine ecosystem and the livelihoods of indigenous people who depend on marine resources. Furthermore, the interactions between the Arctic and the surrounding areas are not limited to the natural environment. Once the Arctic Ocean becomes navigable as a result of sea ice loss, active international trade and transportation should affect both of the Arctic region and neighbouring countries. Mineral resources that will become more accessible are drawing attention as well.

The Arctic Research Center promotes a broad range of research and education on the Arctic region using a cross-disciplinary approach that combines natural sciences, humanities and social sciences. As Japan's northernmost university, Hokkaido University has a long history and experience in Arctic research with experts covering a wide range of research fields. Our Center will act as a hub for collaboration among researchers in Japan and from over the world. We tackle a variety of issues such as natural environmental changes in the atmosphere, oceans, glaciers, ice sheets, sea ice and ecosystems; social issues

in security, governance, economic development, international relations and regional development; and engineering issues including icebreakers, waste and living environments.

We take a leading role in ArCS-3 (Arctic Challenge for Sustainability Project: 2025-2030), a comprehensive Japanese Arctic research project, in cooperation with the National Institute of Polar Research and the Japan Agency for Marine-Earth Science and Technology. Researchers in Hokkaido University are expected to lead projects on marine ecosystems and climate hazards, as well as to make significant contributions to social studies on international politics and economics. The University is also making use of its diverse educational programmes to develop a curriculum for students interested in the Arctic. Such a comprehensive educational program in polar science is unique in the world. Fostering Arctic researchers with expertise in both the natural and social sciences is the mission of the Japanese university closest to the Arctic.



A meeting at the Arctic Council





Local wild foods on display during a traditional Bakaldyn in the Evenk settlement of Kharyalakh, Russian Far East (Photo: Varvara Parilova).



Jorge GARCIA MOLINOS

Hokkaido University, Arctic Research Center, Associate Professor

Research 01

Building resilience to species on the move in a changing Arctic

The Arctic is experiencing some of the fastest and most extreme impacts from climate change on Earth. The borealization of Arctic ecosystems represents one of the clearest signatures of climate change in the Arctic across marine and terrestrial environments involving a process by which Arctic ecosystems progressively acquire features characteristic of more southern, boreal ecosystems. Warmer temperatures, reduced sea ice, decreasing snowpacks, changing seasonality... are facilitating the expansion of boreal species into the Arctic causing a profound restructuring of biological communities and altering ecosystem functioning and services. At the ARC, we are working to document and predict these changes better and understand their broader socioecological implications such as the transboundary redistribution of fishery resources or changes in the local availability of wild species comprising the traditional food systems that support the livelihood of indigenous peoples. Better knowledge of the drivers and consequences of the redistribution of species in a rapidly changing Arctic can in turn help to inform more proactive adaptive management approaches and inclusive policy.

Research 02

Uncovering marine mammal ecology and marine ecosystems through collaboration with indigenous community

About 70% of the Earth is covered by oceans, and much of this vast expanse remains a mysterious realm, inaccessible to us. The Arctic Ocean – covered by sea ice for much of the year – is often called “the last frontier” owing to its remoteness and inaccessibility. My research focuses on marine mammals living in these areas. One of the most unique aspects of the Arctic is the presence of Inuit communities who live in close relationship with marine mammals through traditional hunting. For us, they are our most important research collaborators. Having lived in close connection with the ocean for generations, the Inuit hold immense knowledge about their land and ocean. Working with them enables us to access ecological insights across spatial and temporal scales that would otherwise remain beyond the reach of researchers alone. By studying the behavior and feeding ecology of seals and narwhals, we aim to understand how these animals interact with their surrounding environment and ecosystems. The vastness of the Arctic’s nature can be overwhelming at times, reminding me of the enormous scale of our research subjects and inspiring a sense of humility. Together with the Inuit collaborators and researchers from various fields, we will work to uncover these secrets.



Monica OGAWA

*National Institute of Polar Research,
Specially Appointed Assistant Professor*

Tidewater glaciers at our Greenland study sites — hotspots for marine mammals



Research 03

Ecoacoustics: studying animals and ice with sound

To find something in the wild, it is not enough to look carefully, but it is also essential to listen carefully. Ancient and modern people have paid attention to sounds to survive. Many professions still require an experienced ear to identify phenomena or locate the source of a particular sound. Today, we use tools of different complexity and cost for detecting tiny mechanical disturbances in the media, which we can broadly call sounds. With seismometers and microphones deployed underwater and on land, we can make continuous and long-term records of a broad range of frequencies produced by various phenomena related to animals, the environment, and humans. In the Arctic, in its unique cold setting, many sounds are produced by ice and endemic, poorly known animals living in harsh and difficult-to-access environments. Over a decade, our center has collected acoustic data in some of the Earth's most remote and poorly explored habitats, such as Greenland. These data and collaboration with foreign scholars led to many discoveries about glaciers, whales, and birds.



Underwater and airborne sound can tell much about animals and their changing environment. We just need to listen!



Evgeny A. PODOLSKIY

Hokkaido University, Arctic Research Center, Associate Professor



Juha SAUNAVAARA

Hokkaido University, Arctic Research Center, Associate Professor

Proposed submarine cable routes through the Northwest Passage (orange), Central Arctic Ocean (green) and the Northeast Passage (black)



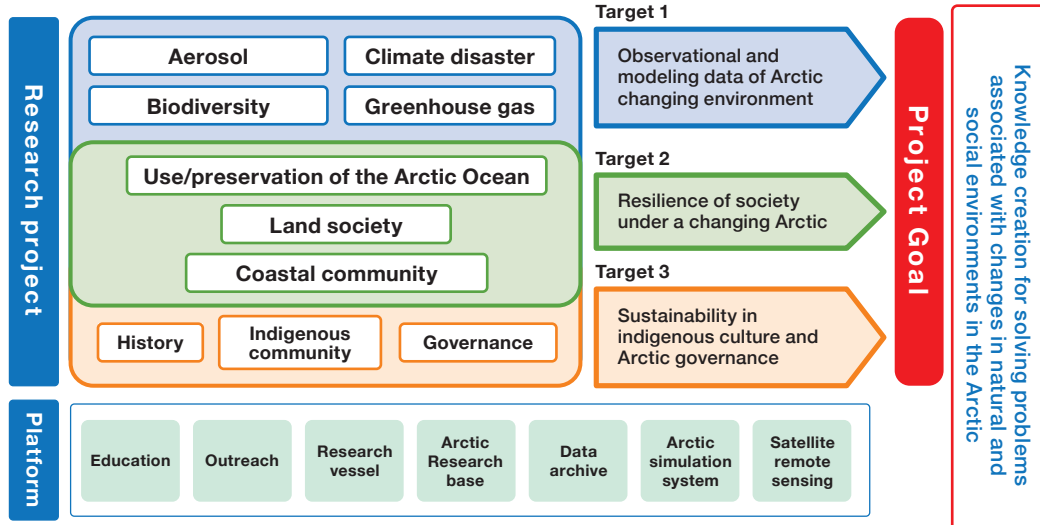
Research 04

Trans-Arctic submarine fiber-optic cable and Hokkaido

Modern societies depend on the flawless functioning of submarine fiber optic cable network. However, this critical infrastructure, suffering from over-concentration, is vulnerable to both natural and human-made disasters. Additionally, there is a growing need for increased cable capacity and faster connections. The idea of addressing these issues through a trans-Arctic submarine cable emerged as early as the 2000s, and since then, several projects have been proposed. Excluding domestic Russian initiatives, all projects have envisioned Japan as the landing point in East Asia. Besides aligning with Japan's key foreign policy doctrines—such as the Data Free Flow with Trust—these international initiatives have also been integrated into discussions about decentralizing Japan's digital infrastructure and developing Hokkaido as a new data hub. While several Japanese companies have invested in Arctic submarine cable projects, recent attention to Public-Private Partnerships has highlighted the roles of public authorities and national governments. In addition to analyzing the diversity of stakeholders and their objectives, this research examines structural and regulatory frameworks that enable or constrain the development of various cable projects.



ArCS-3 Project



Changes in the Arctic Ocean and Sea Ice



Environmental Changes in Greenland



ArCS-3 (2025-2030) is a Japanese flagship Arctic research project. The Arctic Research Center leads this project in cooperation with the National Institute of Polar Research and the Japan Agency for Marine-Earth Science and Technology. In addition to promoting Arctic research, the Center is responsible for fostering early career researchers (ECRs) and offering educational programs.

ArCS-3 Capacity Development and Educational Programs

International Networking by the Exchange of ECRs and students	Overseas Fellowship Program	<ul style="list-style-type: none"> Visit to Arctic research institutions Fieldwork and study visit Summer school, meeting, conference 				
	Foreign ECR Fellowship Program	<ul style="list-style-type: none"> Invite foreign ECRs to Japan Research and study visit Indigenous ECRs and students 				
	Field Course Training program	<ul style="list-style-type: none"> Training cruise by Oshoro Maru International Sea Ice Course in Lake Saroma Swiss Alps Glacier Field Course 				
	Polar Education Program	<ul style="list-style-type: none"> Arctic and Antarctic Curriculum Field programs in Japan and abroad Lectures by foreign researchers 				
Diversity, Equity and Opportunities in the Arctic	Programs for diversity development	<ul style="list-style-type: none"> Gender diversity Fostering foreign ECRs Outreach, school education 				



Hokkaido University
Arctic Research Center

Address
Kita-21 Nishi-11 Kita-ku, Sapporo, Japan 〒001-0021
TEL. 011-706-9074 FAX. 011-706-9623

From New Chitose Airport to Japan Railway (JR) Sapporo Station

Railway (Rapid Airport) : 40 min.
Limousine bus : 70-80 min.

From JR Sapporo Station to Creative Research Institution, Hokkaido University

Taxi : Depart from the JR Sapporo Station north exit and ride 10 min. via Kita 20-jo Higashi Gate.
Chuo Bus (西51,西71) : Ride 16 min. from JR Sapporo station, get off at Kita 21-jo Nishi 15-chome bus stop, and walk 5 min.
Subway : Ride 3 min. from JR Sapporo station on Namboku Subway Line, get off at Kita 18-jo station, and walk 20 min.
Campus bus (free) : Walk 10 min. from JR Sapporo station to the bus stop at the Hokkaido University main gate and ride the bus for 10 min. to the Creative Research Center "Sosei" bus stop.

