

A full-page background image of an Arctic landscape. In the foreground, numerous large, translucent blue icebergs float in dark water. The middle ground shows a vast, flat expanse of ice or snow leading to distant, snow-covered mountains under a pale, hazy sky.

ACS3

Arctic Challenge for Sustainability III



And yet, the Arctic Moves.

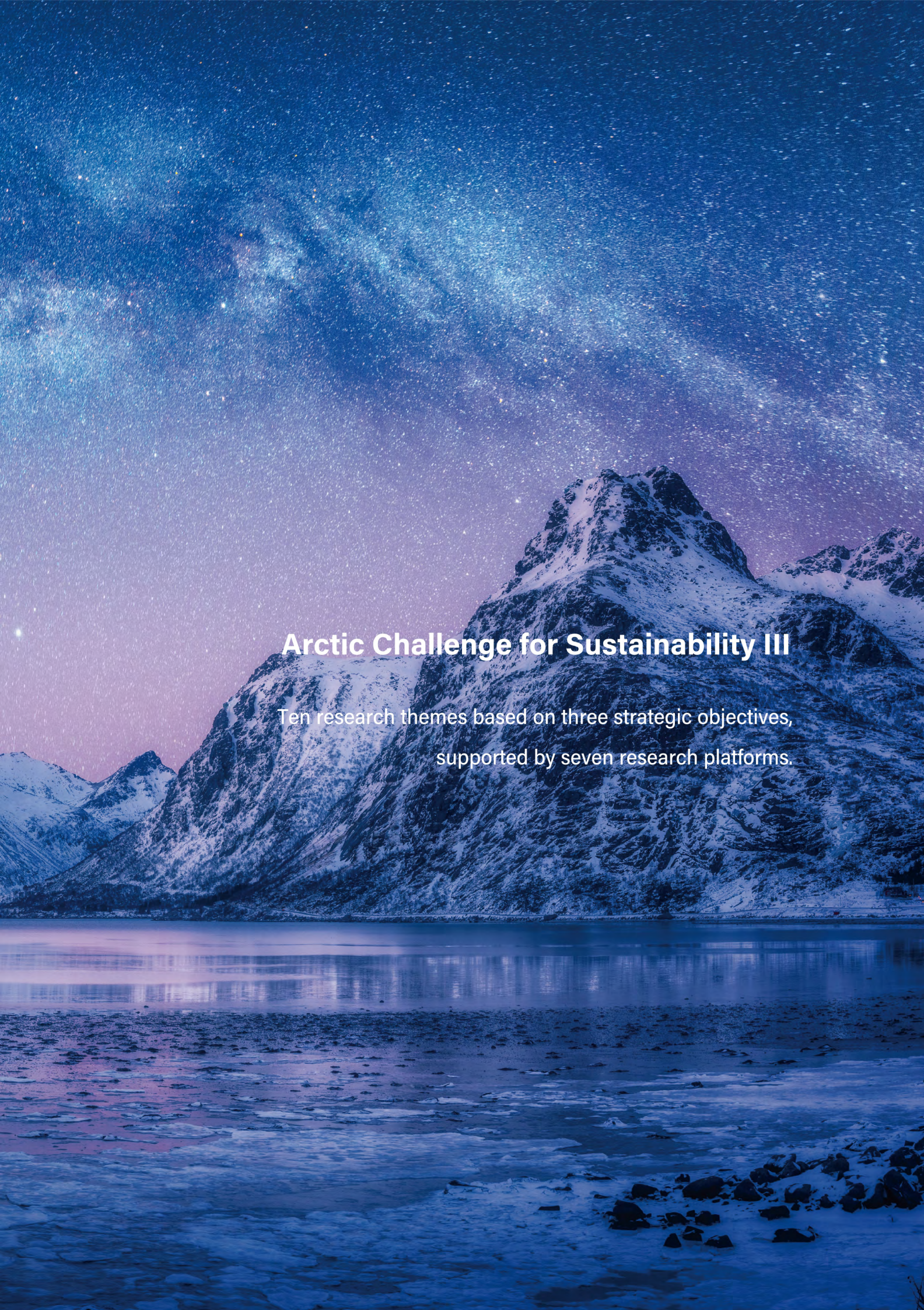
Beneath the image of a silent, frozen world,
the Arctic is in constant, dynamic change.

Sea ice melts, environments shift, ecosystems transform
and these changes ripple through societies, economies,
histories, and cultures around the globe.

Observing and recording these transformations, turning them into knowledge.

Understanding the Arctic — glimpsing the future of Japan and the world.

The Arctic Challenge for Sustainability III (ArCS III) takes on this challenge.



Arctic Challenge for Sustainability III

Ten research themes based on three strategic objectives,
supported by seven research platforms.

Project Director



Hiroyasu Hasumi
(NIPR)

The Arctic is the region of the world where the effects of global warming are most visible. These changes, caused by human activity, are happening faster and more dramatically here than anywhere else on Earth. The consequences are not limited to the daily lives of those living in the Arctic; they also affect countries far away, including Japan, in the form of extreme weather events and disasters. Such changes impact many aspects of society, from farming and fisheries to infrastructure, health and medicine. They shake communities and nations in the Arctic while creating challenges for the whole world. Finding ways to adapt to these changes, as well as reducing and preventing the causes of global warming, is a shared concern for all of humanity.

At the same time, the Arctic is also undergoing changes that are not directly related to nature. Russia's invasion of Ukraine, for example, has created new uncertainties for Arctic societies. It is also important to understand how such political and social changes will affect the Arctic and the wider world. To address these issues, we need to examine politics, economics and human behavior through the lens of the social sciences and humanities, bearing in mind their close interaction with changes in the natural environment. Through ArCS III, we aim to generate new knowledge to help solve these challenges. We are bringing together research from a variety of fields, including the natural sciences, engineering, the social sciences and the humanities, to improve our understanding of the changes occurring in the Arctic and develop solutions that will benefit both the region and the world.

Sub-Project Director



Jun Inoue
(NIPR)



Takashi Kikuchi
(JAMSTEC)



Shin Sugiyama
(Hokkaido University)



More Details on ArCS III

Lead Institution



Co-lead Institutions



Project Goal

Creating integrated knowledge that contributes to solving the social challenges arising from environmental and societal changes in the Arctic

Strategic Objective 1

Generating Information on Arctic Environmental Change through Interdisciplinary Observation and Advanced Simulation



Aerosols

Aerosols related to Arctic environmental change and their impact on climate

Naga Oshima

(Meteorological Research Institute)



Green House Gases

Tracking greenhouse gases accompanied with climate and ecosystem changes

Eiji Watanabe

(JAMSTEC)



Climate Disasters

Attribution and predictability of climate disasters linked to Arctic environmental changes

Tomonori Sato

(Hokkaido University)



Biodiversities

Establishing a scientific basis for future prediction and conservation of Arctic biodiversity

Hiromichi Ueno

(Hokkaido University)

Strategic Objective

2

Contributing to Societies Adapting
to Arctic Environmental Change



Conservation and Development of the Arctic Ocean

Monitoring and predicting the
change and variability of
ice-covered seas for
environmentally friendly
development of the
Arctic Ocean

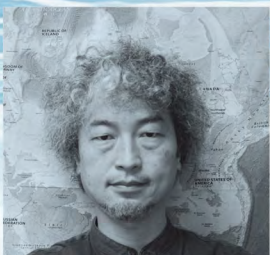
Takuji Waseda
(The University of Tokyo)



Coastal Community

Changes in snow, ice, oceans,
and ecosystems in the Arctic
coastal region and sustainable
environment-society systems

Yoko Mitani
(Kyoto University)



Land Life Environment

Broad-scale visualization of the
changing land life environment
and its application for the
future of the anthroposphere

Yoshihiro Iijima
(Tokyo Metropolitan University)

Strategic Objective

3

Understanding the Emergence and
Transformation of Indigenous
Cultures and Arctic Governance



History

Dynamics of the
formation and geopolitical
transformation of
circumpolar world

Jun Akamine
(Hitotsubashi University)



Indigenous Peoples

Co-producing knowledge
for indigenous well-being
amid global arctic change

Yuka Oishi
(Kobe University)



Governance

Understanding the
changing landscape of
Arctic governance and
exploring its future
pathways

Hajime Kimura
(JAMSTEC)

Research Platforms Supporting the Creation of Research Outcomes



International Collaboration Sites

Jun Inoue (NIPR)

This platform provides access to key observation and research facilities in the Arctic. Operated by lead and co-lead institutions in collaboration with research organizations in Arctic countries, these sites support international joint research and serve as important training grounds for early-career researchers.



Ny-Ålesund NIPR Observatory



Research Vessels

Takashi Kikuchi (JAMSTEC)

To better understand the ongoing changes in the Arctic Ocean and the processes behind them, observation cruises are conducted using the oceanographic research vessel Mirai, the Hokkaido University training vessel Oshoro Maru, and the Arctic research vessel Mirai II. The collected data are made publicly available.



ARV Mirai II



Arctic Regional Simulation System (AReSS)

We conduct numerical experiments tailored to Arctic research using advanced climate and other simulation models. The results are shared across project teams and also used to communicate scientific insights to the wider public.



Yoshiaki Komuro
(JAMSTEC)



Career Development

Shin Sugiyama (Hokkaido University)

Sustained research activities are essential for advancing Arctic studies and contributing their benefits to society. To foster the next generation of researchers, we employ and train young scientists, support international exchanges, and provide a variety of training opportunities.



Arctic Data System (ADS)

ADS stores, manages, and publishes research data generated through the project, providing a web platform for data visualization and analysis. It also produces and shares information related to Arctic sea ice, including forecasts and observations.

Hironori Yabuki
(NIPR)



Earth Observation Satellite

Earth observation satellites are essential for understanding the Arctic environment. Using satellite-derived data on the Arctic, land, ecosystems, and snow cover, we continuously monitor the vast and remote Arctic region.

Rigen Shimada
(JAXA)



Outreach and Communication

We lead the project's outreach and communication efforts, sharing up-to-date information on the rapidly changing Arctic, the importance of international collaboration, Japan's role in Arctic research, and the achievements of our research teams. A science communicator leads these efforts.

Tetsuo Sueyoshi
(NIPR)





Connecting Knowledge, Opening New Frontiers in the Arctic

The Arctic is the frontline of global warming. Rapid climate change is causing a loss of sea ice, more extreme weather, and shifts in ecosystems—changes that affect not only the Arctic but the entire planet. New economic opportunities such as Arctic shipping and resource development are emerging, while local and Indigenous communities face growing challenges to their sustainability. The Arctic Challenge for Sustainability III (ArCS III) project responds to these complex issues through integrated knowledge that bridges natural sciences, engineering, the humanities, and social sciences. It aims to go beyond traditional, natural science-centered Arctic research and focus on how environmental changes affect people—and how human activities, in turn, influence nature.

A distinctive feature of ArCS III is its collaborative environment, where researchers from diverse fields share the same sites and speak a common language. Anthropologists, meteorologists, legal scholars, and marine biologists work side by side, building interdisciplinary insights grounded in real Arctic challenges. The project's three pillars—Environmental Change, Adaptation of Society, and Governance—provide a comprehensive framework to address climate-related phenomena and their global implications. By fostering close, cross-disciplinary collaboration, ArCS III advances an approach to Arctic research that is uniquely Japanese—one that connects diverse expertise and opens new pathways of knowledge for a sustainable global future.



<https://www.arcs3.nipr.ac.jp/en/>



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