Arctic Challenge for Sustainability II

Pacific Arctic Group 2022 Fall Meeting
December 5-6, 2022
Victoria, British Colombia, Canada
and online

Report on a session of the CAO fisheries agreement in the Arctic Circle Assembly

ARCTIC CIRCLE 2022

Shigeto Nishino
(JAMSTEC)

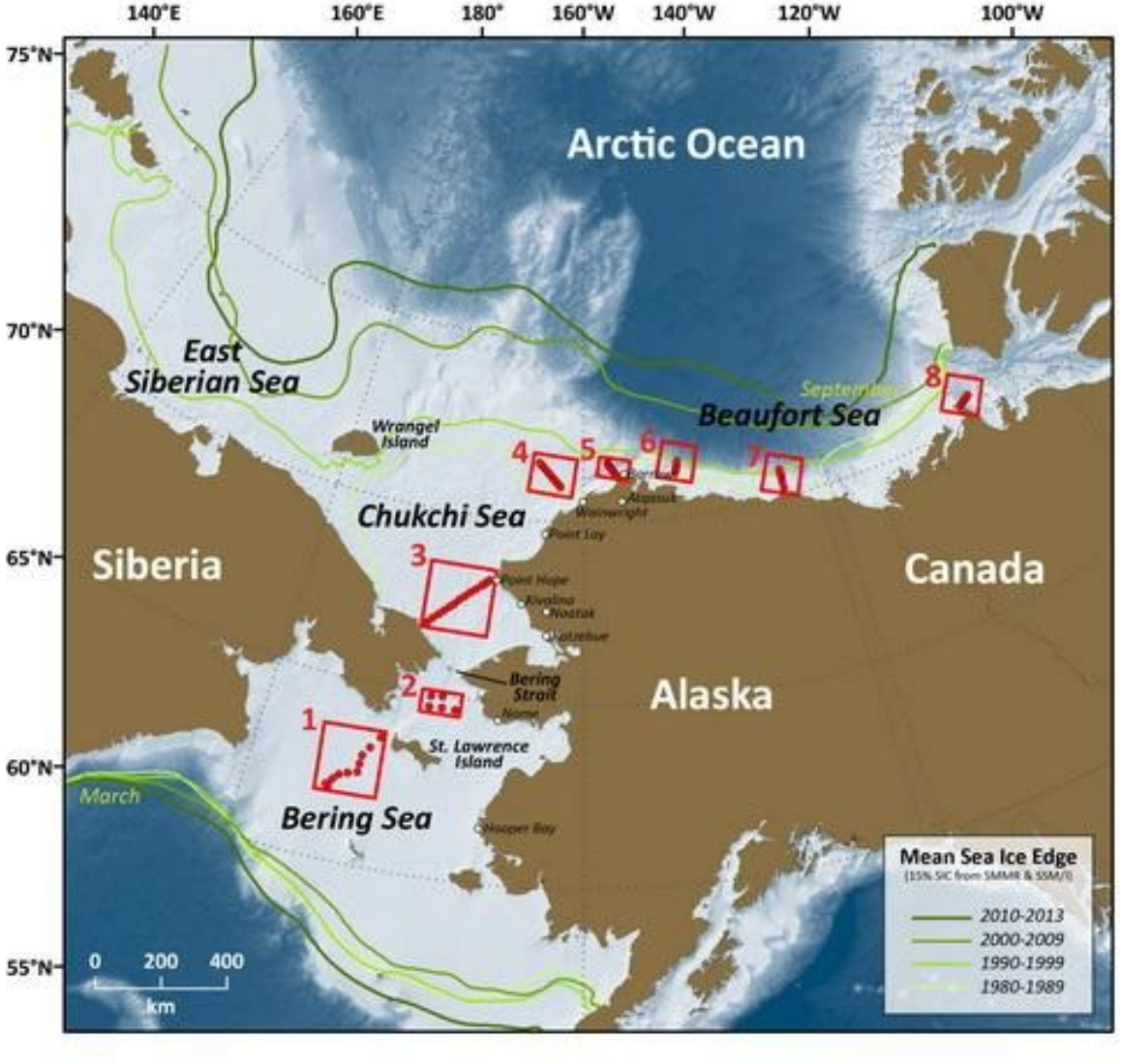
Japan's contribution to the CAO agreement: Science, Indigenous knowledge, Rule of law

Photo provided by Hajime Kimura (JAMSTEC)

Biological hotspots in the Pacific Arctic Region

GRENE & ArCS – Japanese Arctic Projects before ArCS II

DBO (Distributed Biological Observatory) since 2010



[DBO webpage]

Questions to be addressed for
Joint Program of Scientific Research and Monitoring (JPSRM)

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2) What other information is needed to provide advice necessary for future sustainable harvests of commercial fish stocks and maintenance of dependent ecosystem components?

3) What are the likely key ecological linkages between potentially harvestable fish stocks of the CAO and adjacent shelf ecosystem (e.g., Pacific and Atlantic gateways)?

4) Over the next 10-30 years, what changes in fish populations, dependent species, and the supporting ecosystems may occur in the CAO and adjacent shelf ecosystem?

5) How can Traditional Ecological Knowledge inform ecological baselines?

ICES/PICES/PAME Working Group on Integrated Ecosystem Assessment for the Central Arctic Ocean

ICES CIEM

Ecosystem Assessment of the Central Arctic Ocean: Description of the Ecosystem

Volume 355 I July 2022

ICES COOPERATIVE RESEARCH REPORT

RAPPORT DES RECHERCHES COLLECTIVES

ICES INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA
CIEM CONSEIL INTERNATIONAL POUR L'EXPLORATION DE LA MER

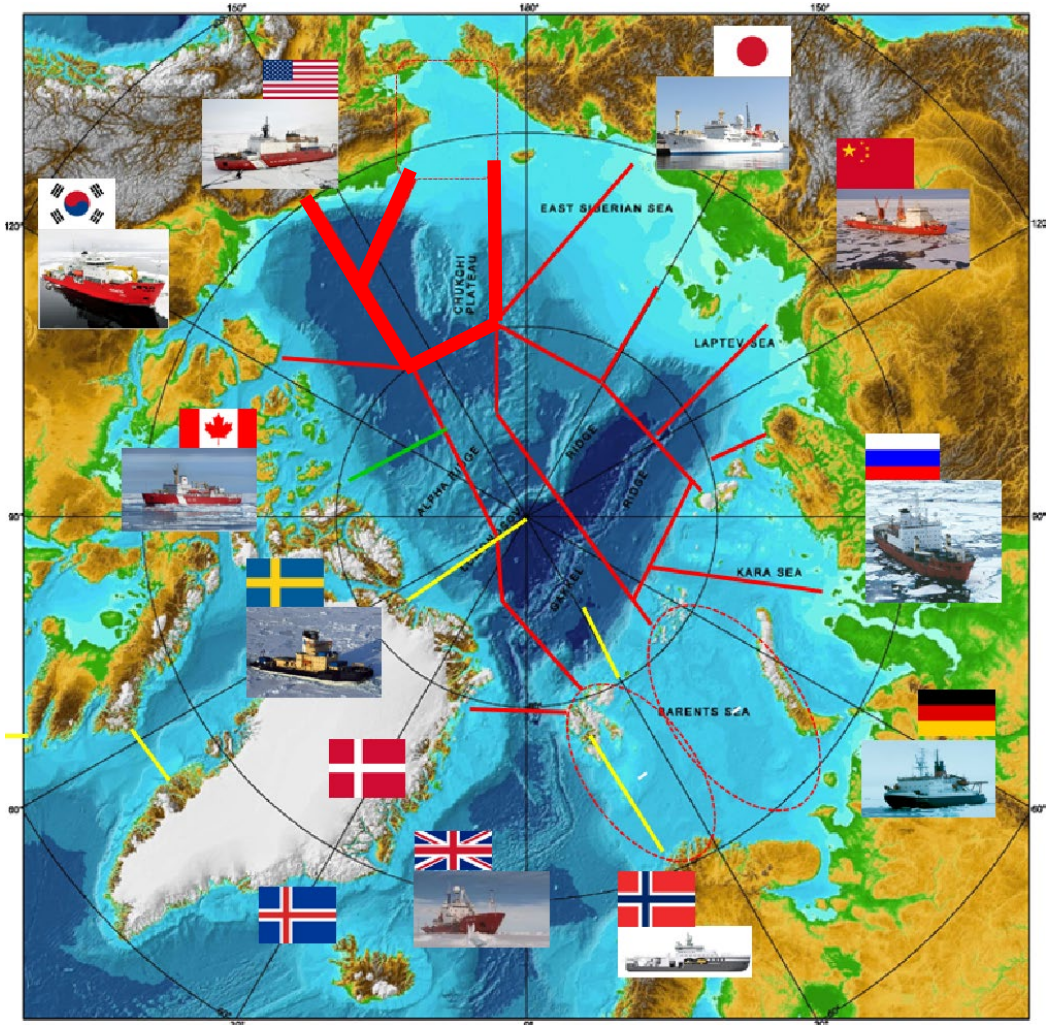
Skjoldal, H. R. (Ed.) [2022]

- Chapter 1 – Introduction
- Chapter 2 – Key characteristics of the CAO ecosystem
- Chapter 3 – The physical setting: topography, oceanography, and sea ice
- Chapter 4 – Algae and primary production
- Chapter 5 – Zooplankton and invertebrate ice fauna
- Chapter 6 – Sympagic and pelagic bacterial communities
- Chapter 7 – Arctic benthos
- Chapter 8 – Fish
- Chapter 9 – Marine birds
- Chapter 10 – Marine mammals

Synoptic Arctic Survey

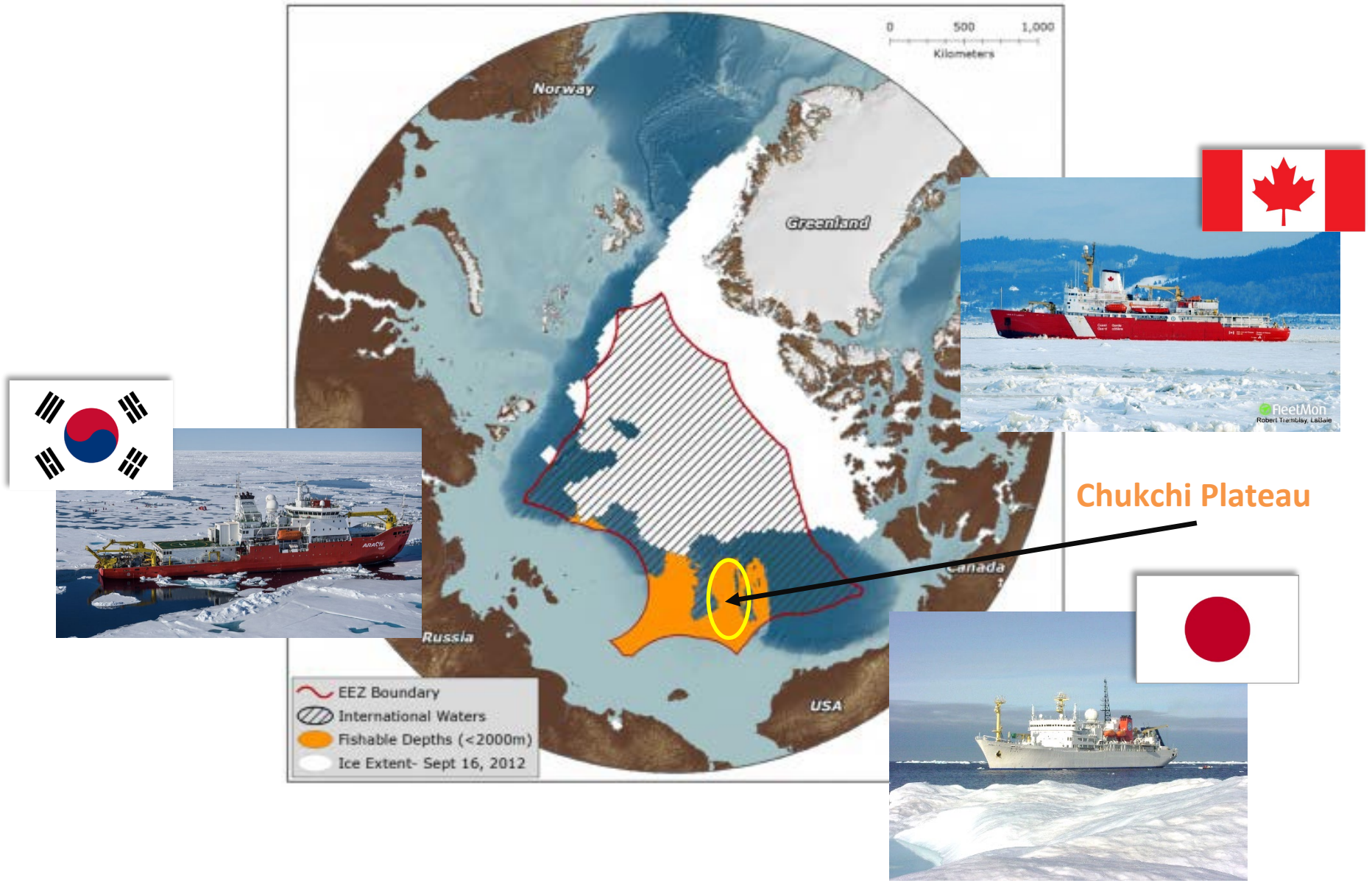
Arctic Challenge for Sustainability II

- **A coordinated multi-ship, multi-nation pan-Arctic ship-based sampling campaign (2020-2022)**
- This could allow for a synoptic view of the totality of hydrographic and ecosystem changes taking place in the Arctic Ocean
- Hydrographic measurements: T, S, Oxygen, Nutrients, Inorganic Carbon Chemistry, Organic Carbon (POC and DOC), age tracers (CFCs), C-isotopes, CH_4
- Ecosystem characteristics: Viruses, Bacteria, Phytoplankton, micro, meso, and macro zooplankton, benthos, acoustics, primary production



(Courtesy of Drs. Are Olsen, Leif Anderson, and Øyvind Paasche)

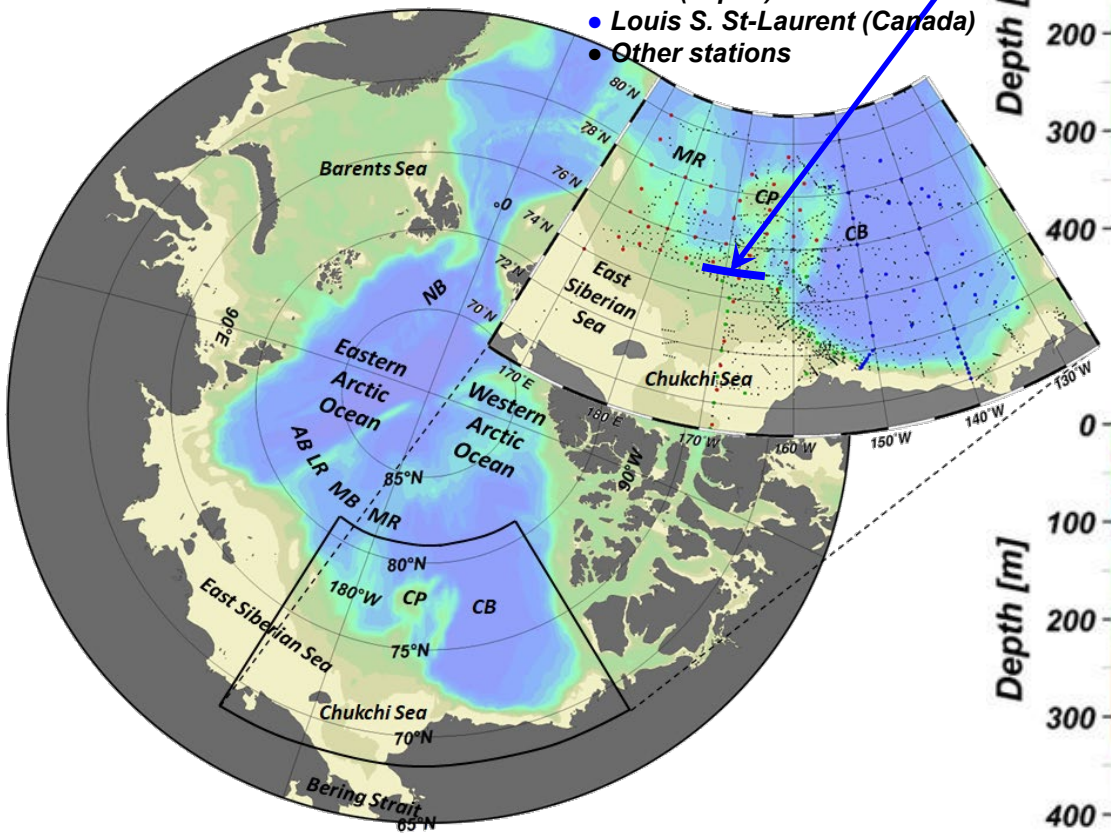
Japanese, Korean, and Canadian SAS cruises in 2020



Low DO and highly acidified water on the Chukchi Plateau

Ocean acidification: Prioritized indicator listed in the final report of FiSCAO.

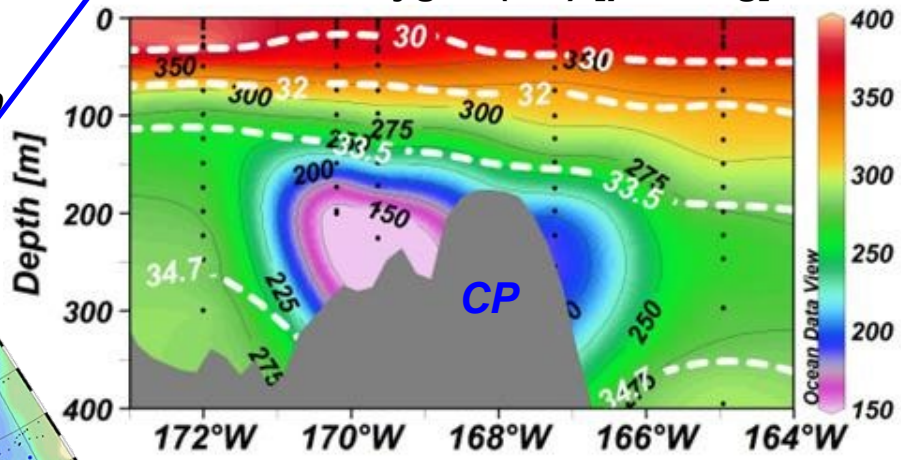
Study area with hydrographic stations



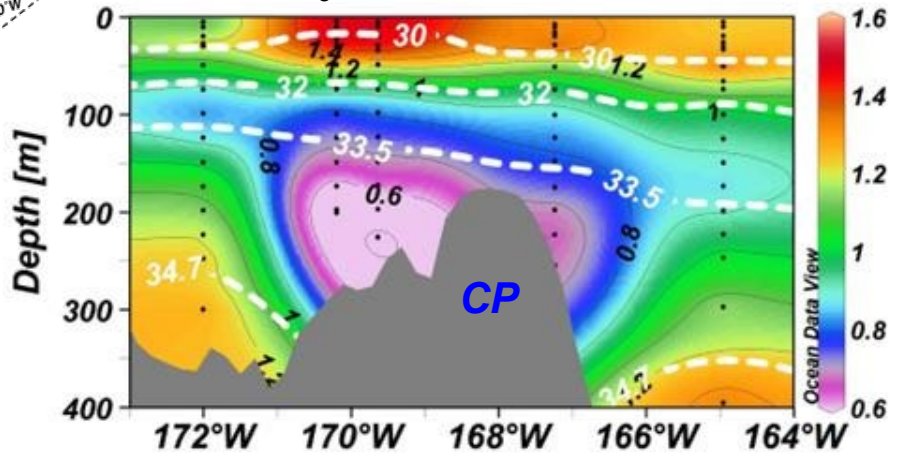
Geographical locations are abbreviated as follows: Canada Basin (CB), Chukchi Plateau (CP), Mendeleyev Ridge (MR), Makarov Basin (MB), Lomonosov Ridge (LR), Amundsen Basin (AB), and Nansen Basin (NB).

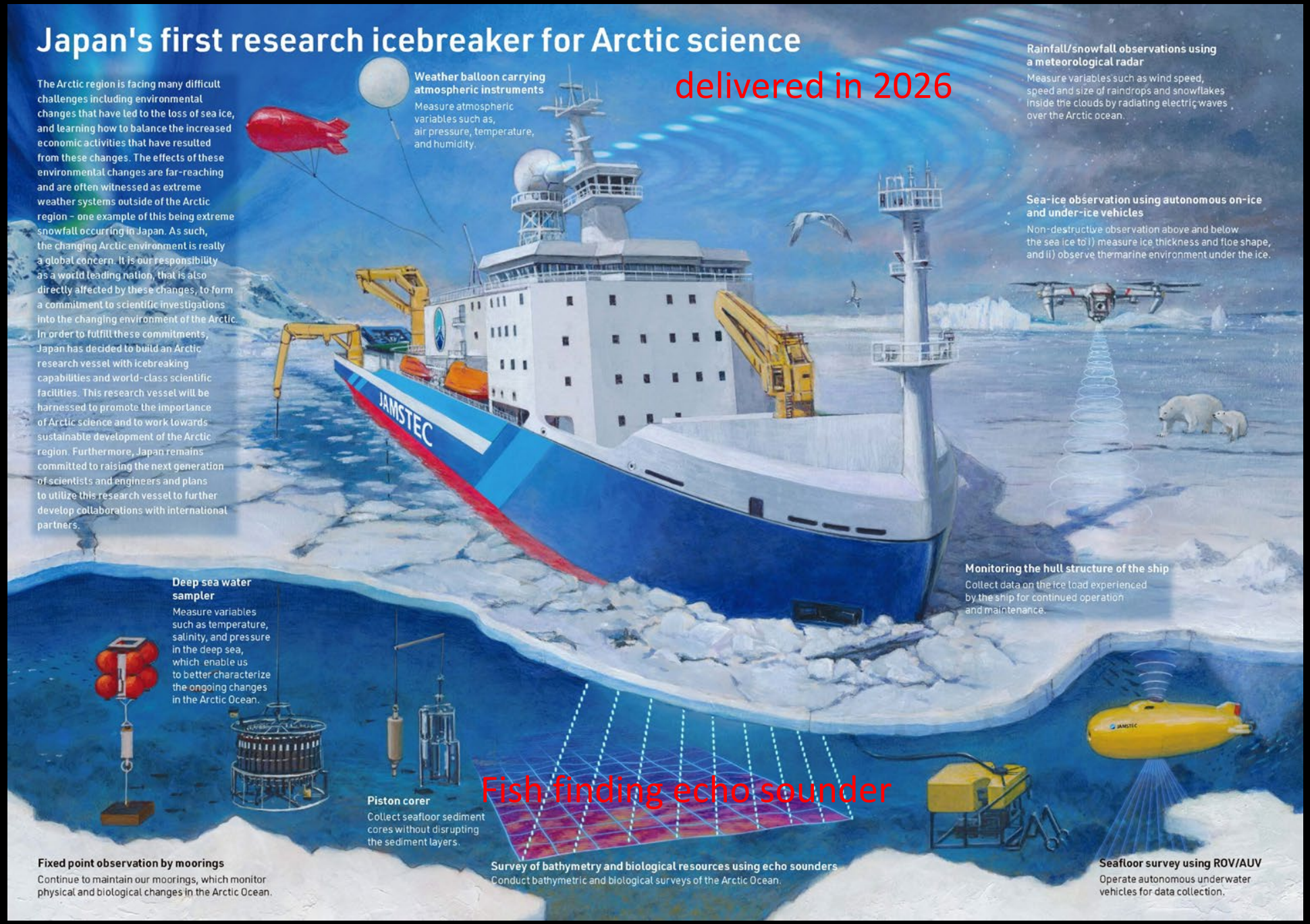
75˚N-line across the Chukchi Plateau (CP)

Dissolved oxygen (DO) [μmol/kg]



$CaCO_3$ saturation state (Ω)




Japan's first research icebreaker for Arctic science
The Arctic region is facing many difficult challenges including environmental changes that have led to the loss of sea ice, and learning how to balance the increased economic activities that have resulted from these changes. The effects of these environmental changes are far-reaching and are often witnessed as extreme weather systems outside of the Arctic region – one example of this being extreme snowfall occurring in Japan. As such, the changing Arctic environment is really a global concern. It is our responsibility as a world leading nation, that is also directly affected by these changes, to form a commitment to scientific investigations into the changing environment of the Arctic. In order to fulfill these commitments, Japan has decided to build an Arctic research vessel with icebreaking capabilities and world-class scientific facilities. This research vessel will be harnessed to promote the importance of Arctic science and to work towards sustainable development of the Arctic region. Furthermore, Japan remains committed to raising the next generation of scientists and engineers and plans to utilize this research vessel to further develop collaborations with international partners.
delivered in 2026
Weather balloon carrying atmospheric instruments
Measure atmospheric variables such as, air pressure, temperature, and humidity.
Rainfall/snowfall observations using a meteorological radar
Measure variables such as wind speed, speed and size of raindrops and snowflakes inside the clouds by radiating electric waves over the Arctic ocean.
Sea-ice observation using autonomous on-ice and under-ice vehicles
Non-destructive observation above and below the sea ice to i) measure ice thickness and floe shape, and ii) observe the marine environment under the ice.
JAMSTEC
Monitoring the hull structure of the ship
Collect data on the ice load experienced by the ship for continued operation and maintenance.
Deep sea water sampler
Measure variables such as temperature, salinity, and pressure in the deep sea, which enable us to better characterize the ongoing changes in the Arctic Ocean.
Piston corer
Collect seafloor sediment cores without disrupting the sediment layers.
Fish finding echo sounder
Survey of bathymetry and biological resources using echo sounders
Conduct bathymetric and biological surveys of the Arctic Ocean.
Fixed point observation by moorings
Continue to maintain our moorings, which monitor physical and biological changes in the Arctic Ocean.
Seafloor survey using ROV/AUV
Operate autonomous underwater vehicles for data collection.

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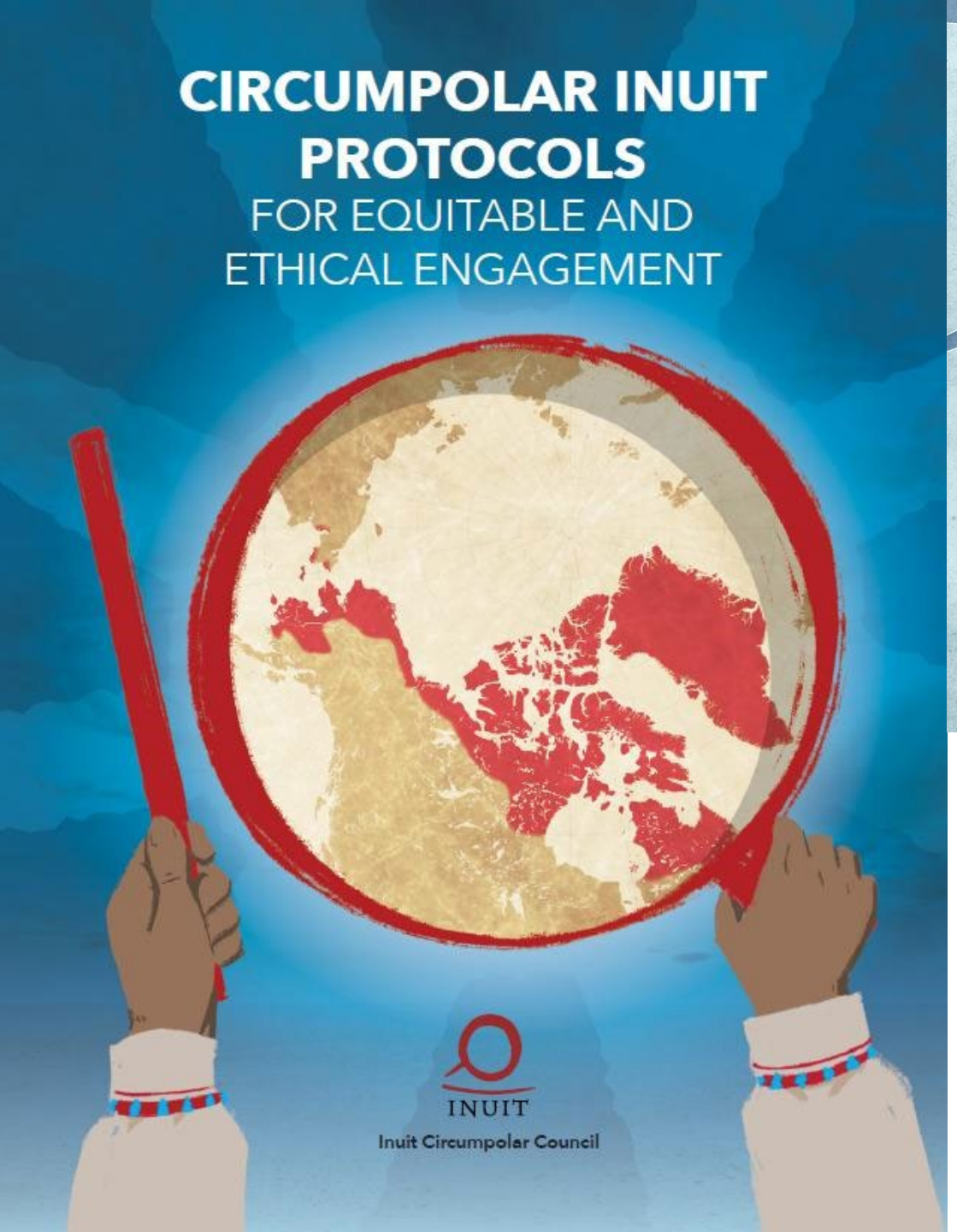

A challenge arises when some look at only one piece of this puzzle and begin to make decisions, policy recommendations and regulations without understanding the interconnecting components, cumulative impacts, our holistic world view – or how the young hunter giving their first catch to an elder is an intricate part of this ecosystem.

FRIDAY, OCTOBER 14

15:05 – 16:00 THE CENTRAL ARCTIC OCEAN: A MODEL FOR COOPERATIVE SUCCESS

Organized by: Korea Polar Research Institute (KOPRI); Ocean Conservancy, USA; Polar Institute - Wilson Center, USA

Location: Akrafjall, Harpa Fourth Level

SPEAKERS

- Henry P. Huntington, Director, Arctic Science, Ocean Conservancy, USA
- Evan T. Bloom, Senior Fellow, Woodrow Wilson International Center for Scholars, USA
- Ambassador David A. Balton, Executive Director, Arctic Executive Steering Committee, White House Office of Science and Technology Policy, USA
- Hyoung Chul Shin, Vice President, Korea Polar Research Institute (KOPRI)