

The Synoptic Arctic Survey (SAS): A Developing Multi-Nation Interdisciplinary Survey of the Arctic Ocean

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What are the present state and major ongoing transformations of the Arctic marine system? (specifically the ecosystem and carbon system)

- Describe the present state of the Arctic Ocean to provide the foundation against which future states can be compared to quantify change.
- Three key foci:
 - 1) Physical drivers of importance to the ecosystem and carbon cycle,
 - 2) Ecosystem response, and
 - 3) Carbon cycle and ocean acidification
- Envisioned to repeat each decade

An international, researcher driven, initiative

Leif Anderson, Are Olsen, Øyvind Paasche, Takashi Kikuchi, Carin Ashjian, Peter Schlosser, Jim Swift, Heidimarie Kassens, Sebastian Gerland, Jeremy Wilkinson, Jackie Grebmeier,, Eddy Carmack, Melissa Chierici, Kumiko Azetsu-Scott, Jeremy Mathis, Jackie Grebmeier, Vidar Lien, Lise Lotte Sørensen, Jens Hölemann, Andrey Novikhin, Kyoung-Ho Cho, Karen Edelvang, Motoyoh Itoh, Oleg Titov, Michio Yamamoto-Kawai, Vladimir Ivanov, Colin Stedmon, Bill Williams (and even more people who helped write or reviewed the science plan)



Synoptic Arctic Survey Observations

The gateways

Full depth stations

The shelf seas

Every 20 nm

The deep basins

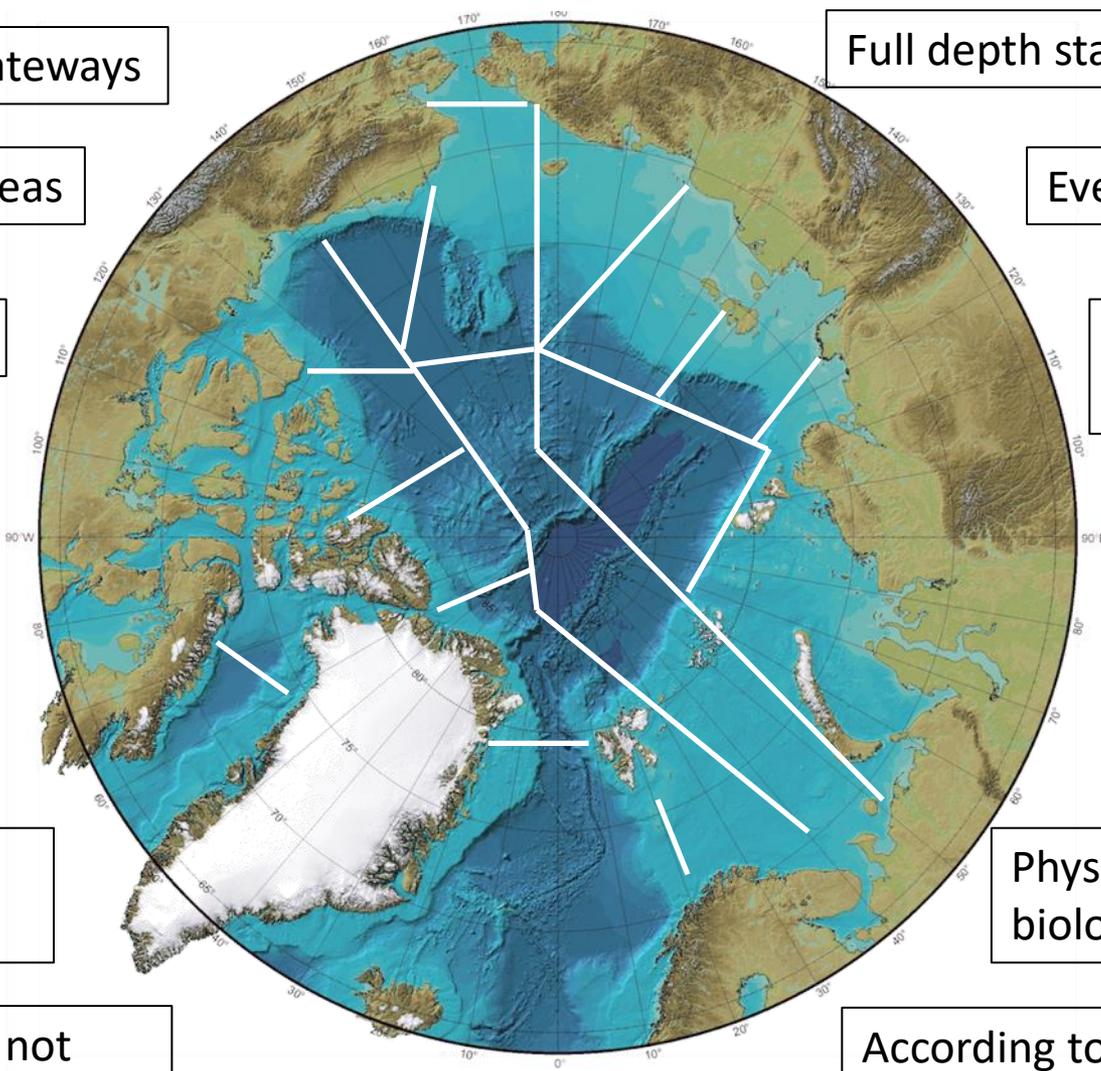
Closer over ridges and shelf slopes

Some previously sampled regions

Physical, chemical and biological measurements

Some regions not previously sampled

According to latest protocols



What are the present state and major ongoing transformations of the Arctic marine system?

How does primary production and associated availability of nutrients vary between Arctic regions?

What are the changes in water mass sources, sinks and transformations?

Does northward range expansion of subarctic species vary regionally and are any of these species likely to establish permanent populations in Arctic regions?

What are the states of, and changes in, heat and freshwater budgets in the Arctic regions?

Ecosystem Response

Physical Response

How does biomass flow vary across regional ecosystems of the Arctic?

How are Arctic Ocean water masses and circulation responding to changes in sea ice properties, and atmospheric, advective and freshwater forcing?

Rq4

Rq3

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Training, education and outreach are integral

What is the contribution of the Arctic Ocean to maintaining the global ocean carbon dioxide reservoir and uptake?

Carbon Cycle & Acidification

Rq9

What are the magnitude, drivers, and impacts of Ocean Acidification in the different regions of the Arctic Ocean?

What are the input and fate of terrestrial and subsea carbon to the Arctic Ocean?

Rq8

Rq4

Rq6

Next steps

- Finalize Science and Implementation Plan – June 2018
- Complete national teams for countries currently involved in this endeavour
Canada, China, Denmark, Germany, Japan, Korea, Norway, Russia, Sweden, USA
- National teams will apply for ship time and be responsible for the practical implementation of each section
- **Leaders of these teams form international SSG, who will do detailed planning, confirmed Oct 30-31, 2018 meeting at Woods Hole, MA**
- Measurement capability needs to be ensured through *exchange* of personnel
- The plan is to conduct the SAS in 2020, although 2021 is being discussed
- **US-led SAS open workshop in Feb 2019 in Woods Hole** to develop a more detailed implementation plan for the program as a whole and for the US effort, identify necessary international agreements, identify knowledge gaps to better refine scientific effort and motivations, and work on international collaborative efforts in education, training, and outreach

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Thank you for your kind attention

Questions?

<http://www.synopticarcticsurvey.info/splan.html>