

Unlocking the secrets of the evolving Central Arctic Ocean Ecosystem: A foundation for successful conservation and management

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Synopsis

- The Central Arctic Ocean is arguably changing faster in response to climate change than any other ecosystem on Earth, but understanding of the ecosystem is inadequate for effective protection, conservation, and management.
- A comprehensive expeditionary and autonomous approach will help quantify uncertain biological characteristics and rates over pan-Arctic spatial and temporal scales. The international Synoptic Arctic Survey (SAS) program provides a model for approaches that will promote fundamental knowledge and further understanding of the Central Arctic ecosystem.
- This need is particularly timely given the ratification in June 2021 of the “International Agreement to Prevent Unregulated Fishing in the High Seas of the Central Arctic Ocean” and the need to develop effective ecosystem based management of potential Arctic fisheries.
- Meeting the challenges of the Agreement will require multiple nations and diverse stakeholders, including Indigenous coastal communities, to work together.

*Promoting
fundamental
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further
understanding
of the Central
Arctic
ecosystem*

SYNOPSIS

APPROACH

CHALLENGES

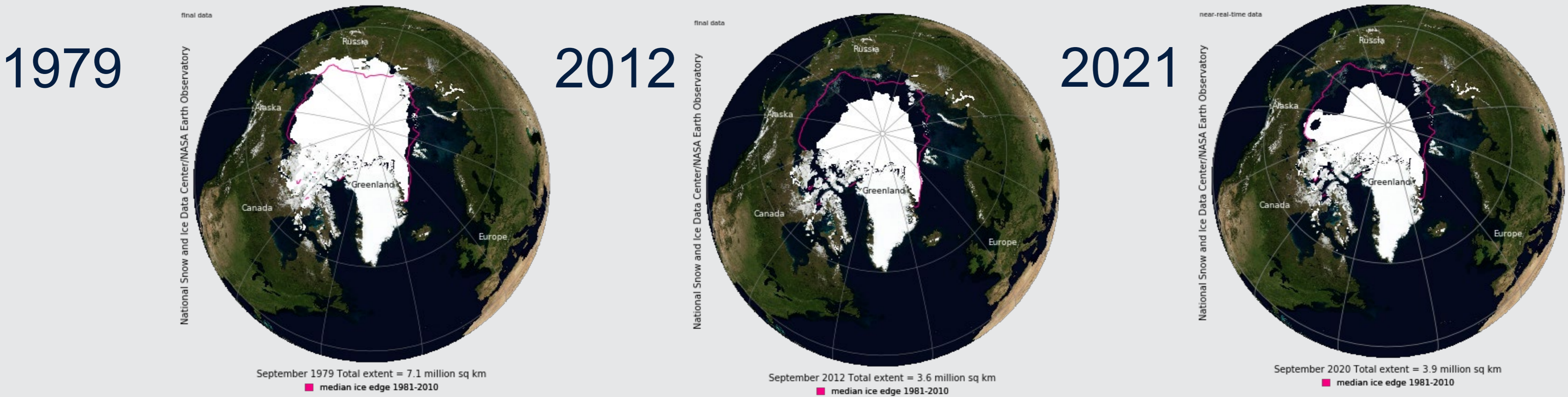
VISION & IMPACT

ENGAGEMENT

COLLABORATIONS

Decreasing summer sea ice extent will impact the ecosystem

Images from National Snow and Ice Data Center, September of each year (nsidc.org)



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Approach

- Describe the current and evolving state of the ecosystem using the coordinated, international, ship-based expeditions model of the International Synoptic Arctic Survey (SAS).
- Generate a more robust Central Arctic observing system and provide new understanding needed to ensure a sustainable future for the Arctic Ocean through internationally coordinated expeditionary and autonomous approaches, including development of improved biological and sensing capabilities.
- Be bold in spatial scale (pan-Arctic), in time (decadal, seasonal), and in scientific scope.
- Develop a participatory approach that coordinates among multiple national and international partners, including engaging Indigenous communities and traditional knowledge holders, industry, NGOs, and other stake holders, with ambitions beyond the scope of primarily academic collaborations.
- Invest in the development of a diverse next generation of ocean scientists.



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UN Decade Challenges Addressed

- Obtain fundamental knowledge to promote understanding of the Central Arctic ecosystem through bold expeditionary and autonomous observation and quantification (Challenges 2, 7)
- Inform conservation biology and ecosystem-based management at high latitudes necessary for potential expansion of commercial fisheries northward into the High Arctic (Challenge 3)
- Nurture the development of a new generation of biological sensing capabilities (Challenges 2, 3, 7)
- Generate new understanding needed for a sustainable future of the Arctic Ocean (Challenges 2, 3, 7)

Challenge 2: *Effects of stressors on ocean ecosystems; solutions to monitor, protect, and manage ecosystems*

Challenge 3: *Develop solutions to optimize role of oceans in sustainably feeding the world's populations*

Challenge 7: *Ensure a sustainable ocean observing system (in the Arctic Ocean)*

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Vision and Transformational Impact

- Generates a decadal Pan-Arctic assessment of the biological, chemical, and associated physical states of the Central Arctic and its connection to the surrounding marginal seas and World Ocean (SAS component).
- Expands approaches from individual, expedition-oriented science and primarily academic collaborations to:
 - ❖ Extend temporally to include all seasons using continuous autonomous sampling coupled to periodic ship-based and decadal SAS assessments.
 - ❖ Integrate expeditionary measurements and autonomous sensing to achieve bold temporal, spatial, and disciplinary scopes of observation.
 - ❖ Coordinate among multiple national and international partners, NGOs, Indigenous communities and traditional knowledge holders, and industry.
- Achieves transformational and foundational knowledge that advances understanding of the impact of climate change on this vulnerable ecosystem, provide approaches to conservation of the ecosystem and biodiversity, and promotes effective ecosystem-based management of potential fisheries.

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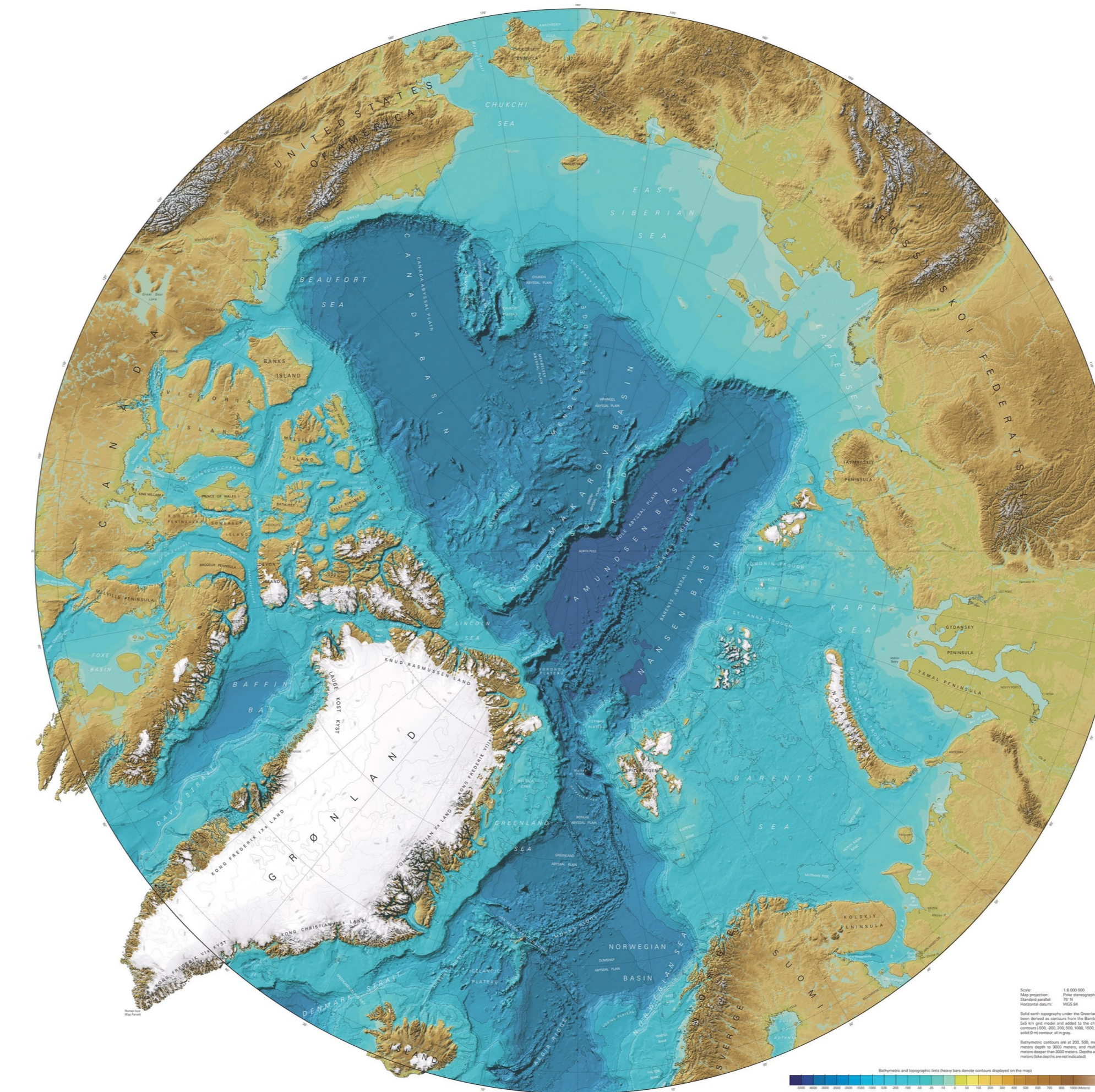
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Potential national and international connections and engagement outside academia

- Improved partnerships among multiple US funding agencies, non-governmental organizations (NGOs), industry, academia, and philanthropic organizations.
- Enhanced role for industry, including non-traditional industries (e.g., medical technology), for the technological evolution of improved biological sensing technologies for use on autonomous platforms
- Involvement of local and state agencies, coastal communities, and Indigenous experts
- Better understanding of the Arctic ecosystem, successful conservation of Arctic biodiversity, and the development of sustainable Arctic fisheries are essential goals to Arctic coordination bodies including the International Arctic Science Committee and the Arctic Council



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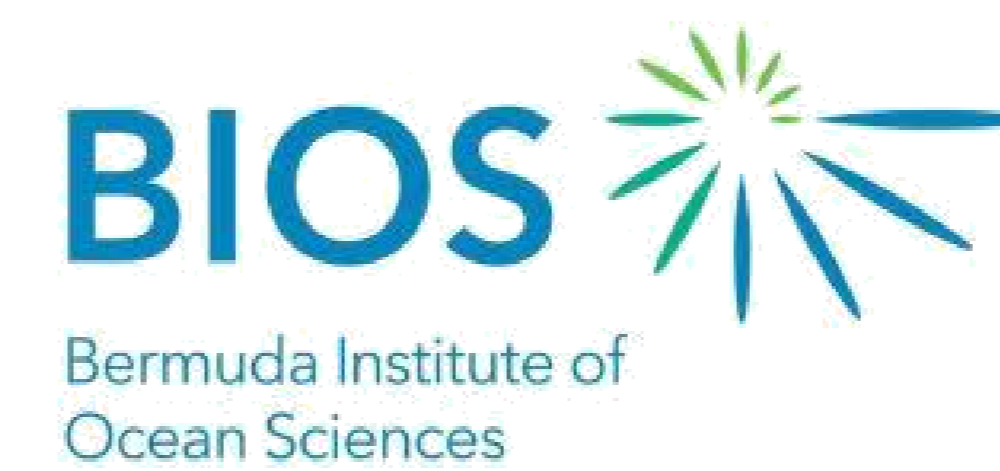
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Collaborations

US SAS:



International SAS:



<https://synopticarcticsurvey.w.uib.no/>

YOU?

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