



International Workshop on Arctic Ocean Observation:
Future Collaboration by Research Vessels and Icebreakers
November 17-18, 2023 @ IINO CONFERENCE CENTER, Tokyo, Japan.



Science Session

Canadian Ocean Observations in the Western Arctic

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Canadian Arctic Ocean Observations:

With support from Canadian Coast Guard icebreakers and via strong international collaborations, research scientists at Fisheries and Oceans Canada have maintained some of the longest ocean time series in the western Arctic.

Our current programs are:

- 1) *Joint Ocean Ice Study/Arctic Observing Network: Beaufort Gyre Observing System* – with the National Science Foundation, Woods Hole Oceanographic Institution, Yale and Japanese Scientists aboard the CCGS *Louis S. St-Laurent* to monitor the Beaufort Gyre.
- 2) *Canada's Three Oceans/Distributed Biological Observatory* – with University of Maryland Center for Environmental Science aboard the CCGS *Sir Wilfrid Laurier* to conduct Distributed Biological Observatory sampling in the Bering and Chukchi Seas.
- 3) *Beaufort Shelf Marine Observatory* – aboard the CCGS *Sir Wilfrid Laurier* to maintain a long-term moored array over the Canadian Beaufort Shelf and the Chukchi Rise.
- 4) *Canadian Beaufort Shelf – Marine Ecosystem Assessment* – a Fisheries and Oceans Canada program aboard the FV *Frosti*, focused on the Canadian Beaufort Shelf and Amundsen Gulf.
- 5) *Kitikmeot Sea Science Study* – Oceanography of Kitikmeot Sea with scientists from USA, Norway and Canada aboard the RV *Martin Bergmann* and the CCGS *Sir Wilfrid Laurier*.
- 6) *Canadian Rangers Ocean Watch* – with Canadian Rangers, wintertime observations in the Northwest Passage during their snowmobile patrols.

Collaboration in Arctic Oceanography:

Oceanography is inherently collaborative, and Arctic Oceanography more so owing to the limited number of platforms available, remoteness and the harsh environment.

The Arctic Ocean is also inherently international, surrounded by Arctic nations and with worldwide interest and attention amplified by climate change and summertime retreat of the sea ice.

Our longest term programs are successful via strong international collaboration and participation from many complementary scientists. In our coastal programs, Inuit participation, leadership, knowledge and experience is essential.

Collaboration between programs, platforms and nations is also key. The Pacific Arctic Group (currently led by Japan), Distributed Biological Observatory and Synoptic Arctic Survey are examples of working-level international collaboration beyond individual programs. With these, our science programs are complementary and better fill gaps in knowledge.

Knowledge Gaps:

With pan-Arctic thinking and synthesis our 'islands' of Arctic knowledge, among regions, nations and northern peoples, are connecting. This integration is necessary as the Arctic changes.



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A recent workshop entitled 'The Arctic Ocean's Changing Beaufort Gyre' was an assessment of our current understanding, open questions and future research directions for the broader Beaufort Gyre Region. Timmermans and Pickart (2023) reported on this workshop. I would like to highlight:

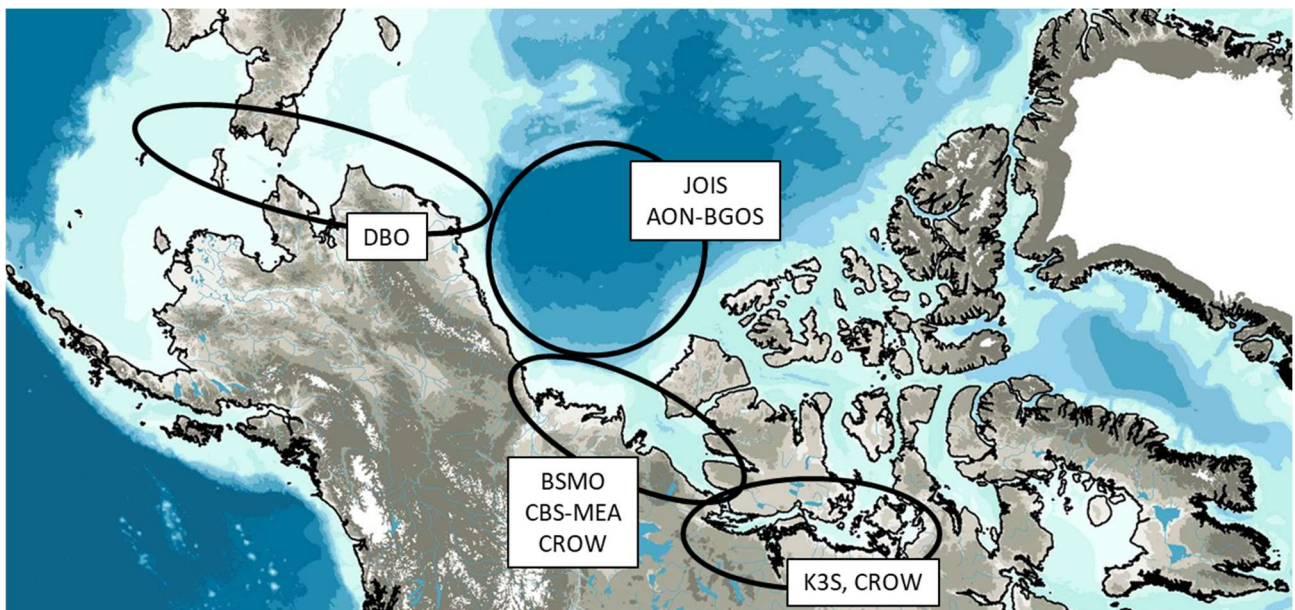
1) the need for intensive sampling in the Beaufort Gyre to measure eddy variability and vertical mixing in the halocline to quantify horizontal and vertical fluxes of heat and freshwater. A multi-year tracer release study is recommended.

2) the poorly sampled northern and eastern edges of the gyre, including the shelf and slope of along the western edge of the Canadian Arctic Archipelago. Shipboard and moored array observations would enhance our understanding of watermass pathways and circulation in these regions.

Japan's new research icebreaker:

With Japan's new research icebreaker I look forward to continued and strengthened collaboration with Japanese colleagues and new understanding of the Arctic ocean and sea-ice.

Map of program locations:



References:

Timmermans M-LE, Pickart RS (2023) The Arctic Ocean's Changing Beaufort Gyre System: An Assessment of Current Understanding, Open Questions and Future Research Directions, Bulletin of the American Meteorological Society, 104:7, E1282-E1289, <https://doi.org/10.1175/BAMS-D-23-0129.1>