



2023 Update from the Pacific Arctic Group (PAG)

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Forum of Arctic Research Operators (FARO) Meeting, ASSW 23

4. Updates from other organizations and projects, 5 minutes each (30 minutes)

17 February, 14:30 - 1430 GMT+1 (local time Vienna): Hybrid meeting





Pacific Arctic Group

Overview: PAG is a group of organizations and individuals with a Pacific perspective on Arctic science; it is an affiliate of the IASC and has as its mission to serve as a Pacific Arctic regional partnership to plan, coordinate and collaborate on science activities of mutual interest.

PAG has established five objectives:

- To identify gaps in knowledge and priority research needs across the Pacific Arctic Region (PAR) and seek means to implement programs and activities that address them.
- To facilitate and coordinate science operations among PAG member countries.
- To promote and facilitate data accessibility and integrated data bases for the region.
- To serve as a forum for information exchange on PAR science programs.
- To establish and maintain a direct link between PAG and other relevant science organizations.

Organization

- **PAG Executive committee:** Chair, Vice-Chairs, & lead-scientists from PAG synthesis activities.
- **PAG spring meeting** held during Arctic Science Summit Week and focused on “business” issues and an update on research plans for the coming field season [**Feb 18:1400, ASSW23**]
- **PAG fall meeting** hosted in alternating PAG countries and focused on accomplishments outlooks for the future, including preliminary plans for the upcoming field season



PAG endorsed projects

● PAG continues to develop and implement long-term monitoring activities such as

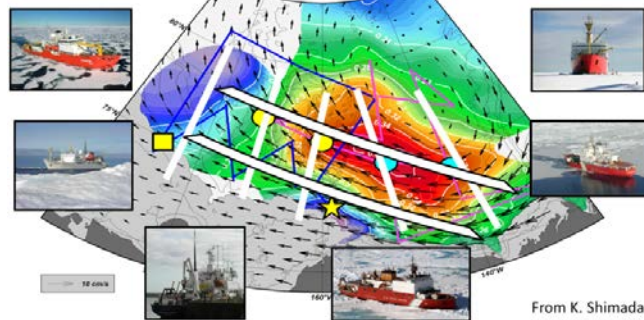
- ✓ **Distributed Biological Observatory (DBO)**
- ✓ **Pacific Arctic Climate Ecosystem Observatory (PACEO)**
- ✓ **Central Arctic Ocean (CAO)**

DBO



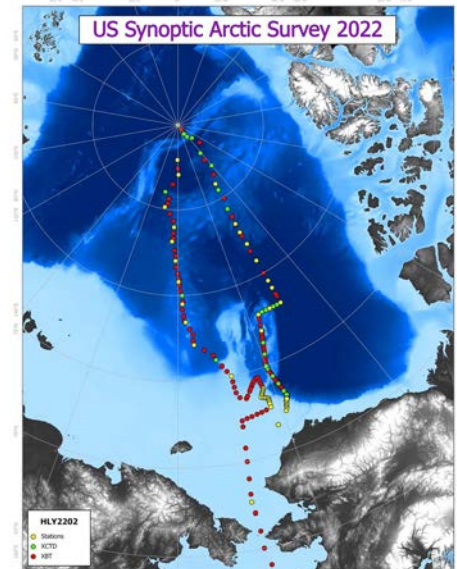
PACEO

Proposed international Pacific Arctic climate monitoring sections



Background color: dynamic height at 100dbar relative to 800dbar from Mirai and Louis S. St-Laurent 2008 cruises (Oceanic Beaufort Gyre)
 Black vectors: average sea ice motion vectors for Nov. 2007- Apr. 2008 (Sea Ice Beaufort Gyre)
 Symbols: Mooring array in 2012-2013 (TUMSAT/KOPRI/NIPR & WHOI)

CAO *US Synoptic Arctic Survey



Examples: July 2023-CCGS Sir Wilfrid Laurier, Canada and USA

Dates: Estimated July 6-25, 2023

Departs from: Victoria, BC, Canada

Returns to: Utqiagvik, Alaska, USA

Location: Northern Bering and Chukchi Seas

Vessel: CCGS Sir Wilfrid Laurier (SWL)

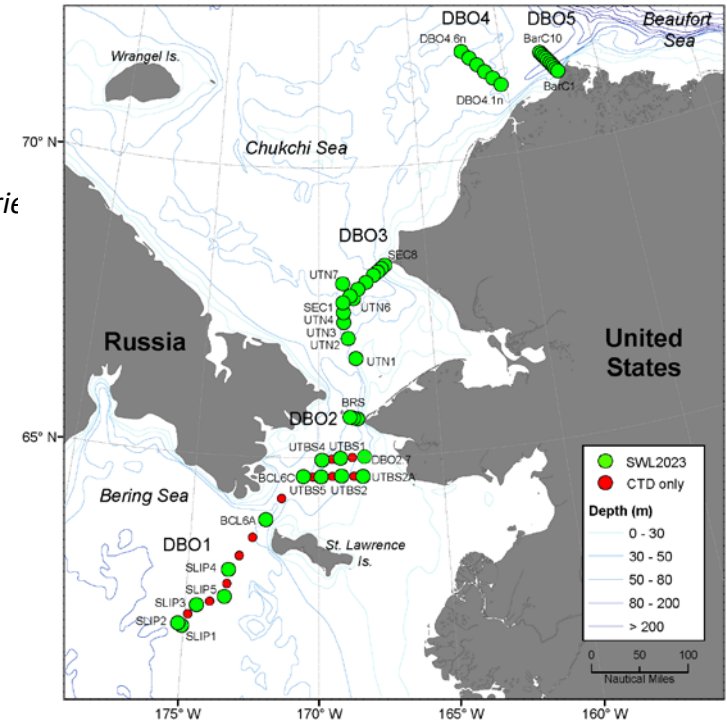
Joint Program: DBO and C30 (Canada's Three Oceans)

Research website: <https://dbo.cbl.umces.edu/>

Project supported by: NSF and DFO Canada



CCGS Sir Wilfrid Laurier



➤ Core Ship-based sampling:

- Temperature, salinity, and currents, chlorophyll, nutrients, carbon products
- Water column plankton (composition, size, biomass)
- Macrofauna in sediments (composition, size, biomass)
- Sediment grain size and carbon components
- Seabird and marine mammal surveys
- Fishery acoustics (variable)
- Bottom trawling (variable)

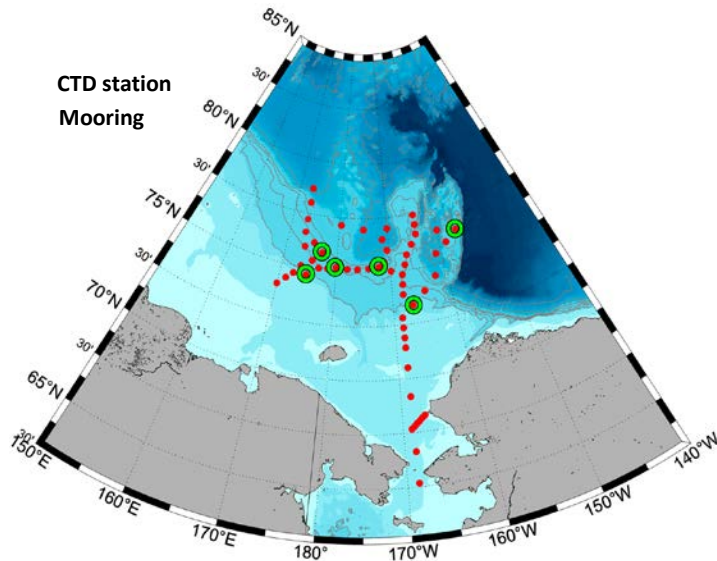
➤ Autonomous sensor sampling via collaborative programs with the DBO

- Gliders, moorings, saildrone
- Satellite observations

- DBO lines sampled as own cruise as well as embedded in process cruises
- Time series data collections, seasonally and interannually; developing Atlantic, Davis Strait/Baffin Bay and East Siberian Sea DBO programs
- **Mon. Feb 20, 10:30-18:00 CET: DBO Community meeting ASSW23**

August 2023 KOPRI Arctic Ocean Expedition Plan-RV ARAON

Project : Korea-Arctic Ocean WArming & Response of Ecosystem (K-AWARE) (from 2021 to 2026)



- North of Bering strait
- Chukchi shelf
- Chukchi Borderland to East Siberian Sea
- DBO line 3 & PACEO line
- 1 Ice camp
- 60 CTD stations
- 6 Ocean mooring stations

❖ **Period: 2023. 7.6 - 10.1 (from Korea to Korea)**

❖ **Working time: 2023. 7.25-8.17 (Dutch Harbor to Barrow)**

❖ **Chief Scientist : Eun-Jin Yang <ejyang@kopri.re.kr>**

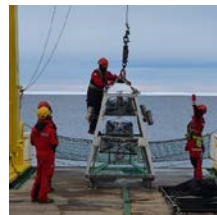
Physical Oceanography

- Equipment: CTD, XCTD, Lowered ADCP, moorings with microCAT, temperature, sediment trap, AZFP, nitrate sensor (SUNA V2), Fluorescence & PAR sensors

Biological Oceanography

- Equipment: CTD/rosette, plankton nets, box corer, dredge, cameras

- $p\text{CO}_2$ & dissolved inorganic carbon (DIC)
- Net community production (NCP)
- Nutrients (NH_4 , NO_2+NO_3 , PO_4 and SiO_2)
- Dissolved and particulate organic matters (DOC & POC)
- Distributions of river water and ice melt water
- Sinking particle flux (Sediment trap)
- Bacterial community structure
- Phytoplankton community structure & production
- Micro and meso-zooplankton community structure
- Ichthyoplankton & Fish sampling
- Deep scattering layer distribution invertebrates & fish
- Planktonic food web structure





R/V *Sikuliaq*

Planned 2023 Arctic cruise



Distributed Biological Observatory (DBO)-
Ecosystems & Fisheries Oceanography Investigations (EcoFOCI)

September 10-October 4, 2023

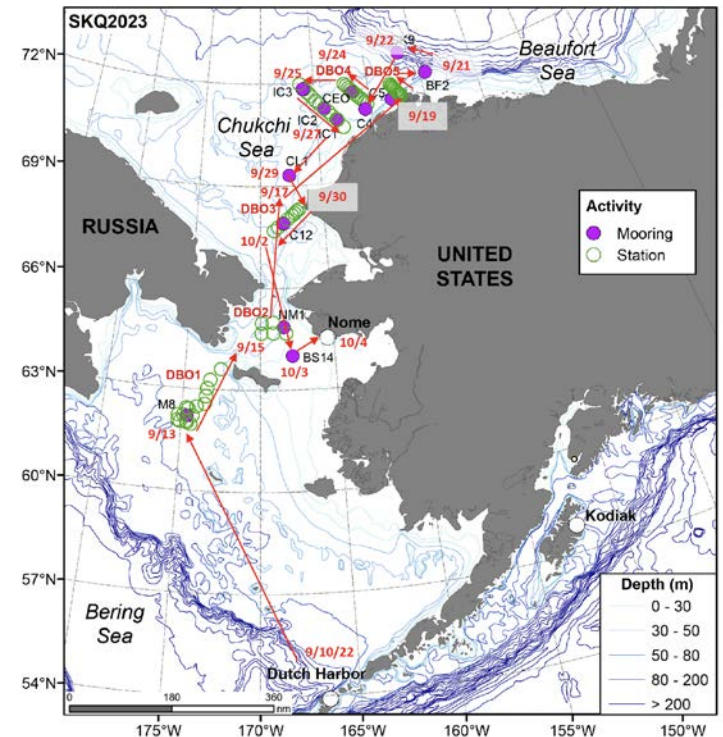
[collaborative with Arctic Marine Biodiversity Observing Network (AMBON) and
Chukchi Ecosystem Observatory (CEO)]



The NOAA annual research cruise, collaborative with AMBON and CEO, will occupy five DBO and EcoFOCI time series stations, along with turning multiple moorings.

Shipboard measurements will include:

- Seawater temperature and salinity, currents
- Water column measurements: chlorophyll, nutrients, eDNA, phytoplankton type, organic carbon
- Zooplankton and larval fish type
- Harmful algal bloom collections
- Bottom sediments and animals living on and in the sediments
- Seabird and Marine mammal surveys



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September: R/V Mirai Cruise plan for 2023

Tentative Cruise schedule and observation sites

Aug 25 Depart Shimizu, Japan

Sep 3 Call Dutch Harbor Sep 5 Depart Dutch Harbor

Sep 8 Bering Strait

The Pacific Arctic Region (high seas & US water)

- Chukchi shelf
- Canada Basin
- East Siberian Sea

Oct 1 Bering Strait

Oct 4 Call Dutch Harbor

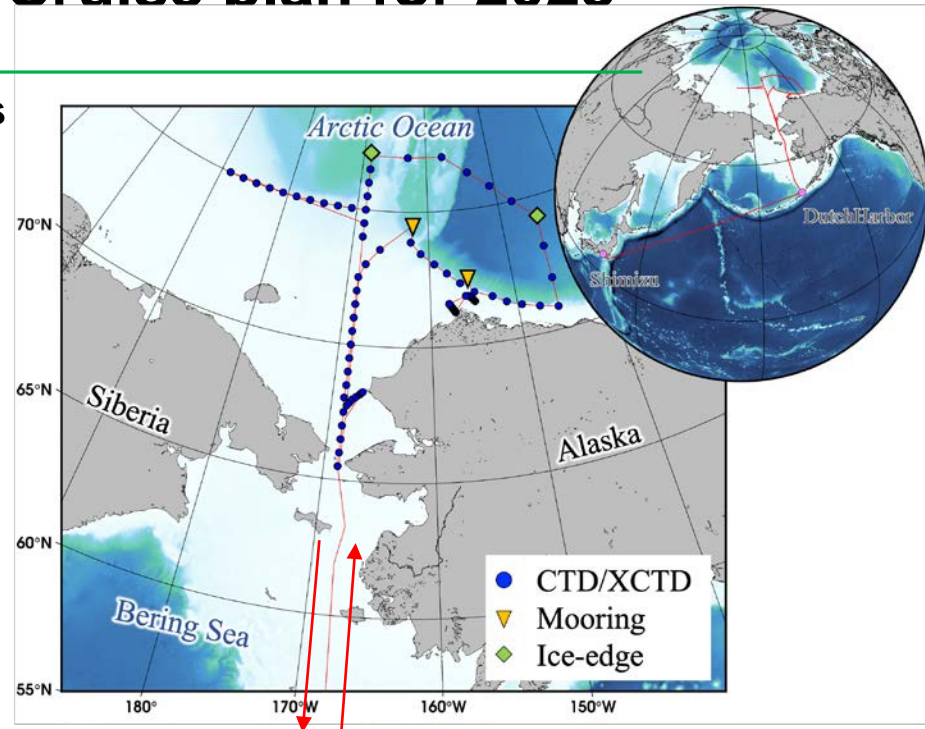
Activities

~24 days in the Arctic

- CTD (up to 70 casts) and hydrography
- Biogeochemical observation
- Recovery/Redeployment of Mooring
- Meteorological observation
- Field trials of in-water drone
- Net samplings & acoustic survey for zooplankton
- Plastic pollution survey
- Sediment sampling
- eDNA
- Ice-wave interaction



Chief Scientist: Amane Fujiwara
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Boarding research themes

- Atmospheric measurements
- air-sea-wave-ice interaction
- biogeochemical transport, mixing and marine ecosystem
- physical and ecophysiological basis of fall phytoplankton blooms
- climate-driven changes of biogeochemical dynamics
- Quantification of the microplastic inventory
- distribution in plankton and fishes associated with sea ice reduction
- sinking organic matter
- turbulence on marine aggregate formation

Thank you for your attention.

Questions and comments?

Thank you to all Pacific Arctic Region science colleagues and DBO collaborators, field and laboratory technicians over the years for the time series efforts. Financial support for the science provided by the US NOAA, NSF, BOEM, NASA, NPRB, and ongoing national and international science partners in the Pacific Arctic Group.

<http://pag.arcticportal.org>, <https://dbo.cbl.umces.edu/>,

<https://arcticdata.io/catalog/portals/DBO>

<https://earth.gsfc.nasa.gov/cryo/data/distributed-biological-observatory>

<http://ambon-us.org/>, <http://www.ChukchiEcosystemObservatory>

<https://www.ncdc.noaa.gov/data-access>

