Research Expedition Details - CCGS Sir Wilfrid Laurier, Canada and USA

Dates: July 6-25, 2022
Departs from: Victoria, BC, Canada
Returns to: Utqiaġvik, Alaska, USA
Research Area Location: Northern Bering and Chukchi Seas
Vessel: CCGS Sir Wilfrid Laurier
Research website: https://dbo.cbl.umces.edu/
Project supported by: NSF and DFO Canada
Contact information: Jackie Grebmeier, jgrebmei@umces.edu

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Key Scientific Questions & Motivations

Goal and Scientific Questions

- Seasonal and annual DBO time series sampling, moorings, and satellite observations serve as change detection array to help identify and track biophysical responses to environmental drivers in the Pacific Arctic

- What is the status and change of key environmental factors impacting ecosystem structure in the Pacific Arctic?

- What are the key food security topics relevant to subsistence food availability and potential northward movement of commercial fisheries that can be evaluated through time series observations?

Motivation:

- Sea ice decline and change in habitat
- Warming seawater influences plant and animal types
- Observed changes in current flow and freshwater content of seawater
- Changes in both water column and sediment-dwelling animals provide variable food to marine mammals and seabirds
- Northward contraction of dominant prey (food) for marine mammals and seabirds
- Observing changes in physical drivers and biological response

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Key Activities & Data to be collected

- **Core Ship-based sampling:**
  - Temperature, salinity, and currents, chlorophyll (plants), nutrients, carbon products
  - Water column plankton (composition, size, biomass)
  - Animals living in sediments (composition, size, biomass)
  - 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**

- **Shared international interest to leverage field programs for time series data collections**, seasonally and interannually; development underway for Davis Strait and Atlantic DBO programs

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Implications & Broader Impacts

- Seasonal and annual DBO time series sampling, moorings, and satellite observations are helping to identify and track environmental and ecosystem changes in the Pacific Arctic.

- Changes to the marine ecosystem have the potential for restructuring trophic components and carbon cycling that can have regional and global climate, carbon cycling, and food web impacts.

- Restructuring dominant prey food (water column and in sediments) has direct impact on marine mammal and seabird populations.

- Studies are providing information relevant to concerns for increased commercial vessel for both baleen whale and seabird ship strikes in the Bering Strait region.

- National and international cooperation with data sharing.

- Share results with scientists, resource managers, and the public.

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Potential Areas of Collaboration

Is there available berth space? Limited as at capacity for upcoming 2022 cruise on Sir Wilfrid Laurier, required Canadian security clearance in advance, and space limited due to COVID; for other cruises can contact Chief Scientists for potential opportunities in 2022 and beyond

Is there space for other equipment and/or to collect data for other teams? Contact lead PI and/or Chief Scientist

Can you make your data available for other teams to collaborate on? And how? Yes, the DBO data from the Sir Wilfrid Laurier and many other DBO cruises available at the Arctic Data Center https://arcticdata.io/catalog/portals/DBO; National Centers for Environmental Information (NCEI) https://www.ncdc.noaa.gov/data-access, data link NASA https://earth.gsfc.nasa.gov/cryo/data/distributed-biological-observatory, and via other DBO participants through distributed data archives

Opportunities to work with Indigenous and local communities? Community visits were regularly done before COVID pandemic; continued science presentations virtually via Strait Science talks out of Nome and presentations to the AEWC; plans for continued community interactions virtually and in person meetings in the future

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