

Taking the Pulse of the Arctic Ocean System, from the Shelves to the Pole – A US Contribution to the International Synoptic Arctic Survey (SAS) Program



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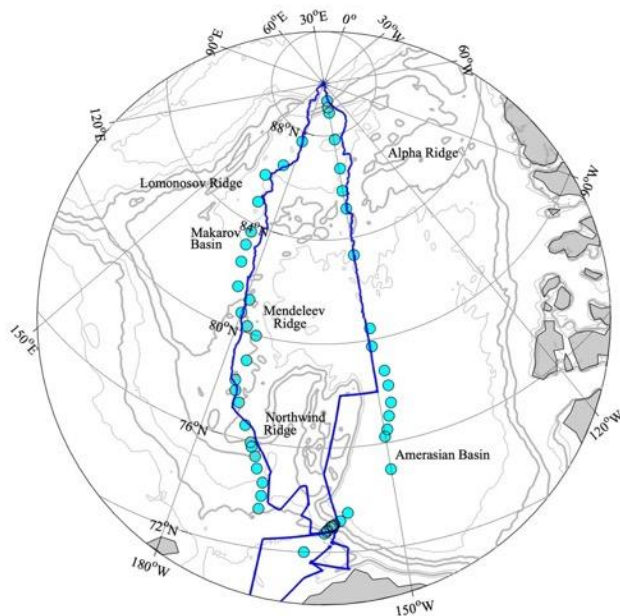


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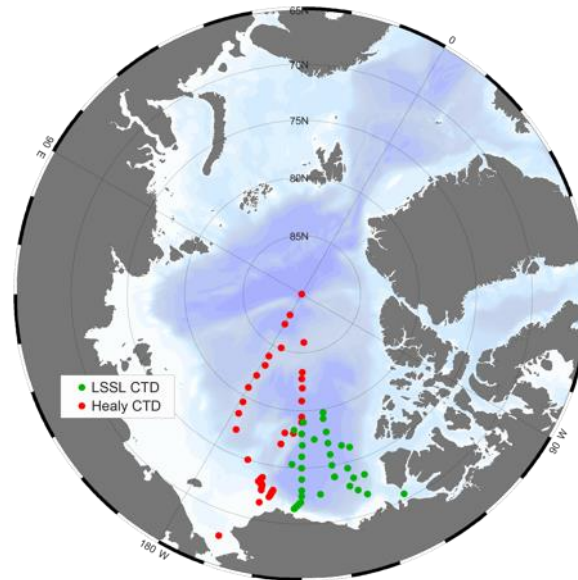


Spatial and temporal overlap with other cruises will permit comparison and greater spatial coverage

2015 GEOTRACES Cruise – Changes between 2015 and 2022



2022 Beaufort Gyre Cruise on Louis-St-Laurent – Greater spatial coverage



What parameters were measured on your cruise (those not in matrix in red)?

Parameters	Responsible Team
Pressure, temperature, salinity, velocity, transmissivity, met measurements, seafloor bathymetry, CEO ecosystem observatory (moorings)	Danielson, Timmermans
Nutrients (NO ₂ /NO ₃ , PO ₄ , SiO ₂), water and sed. Chl, DOC, δ ¹⁸ O of H ₂ O	Cooper
Dissolved oxygen, triple oxygen isotope GPP, NPP from O ₂ /Ar., community respiration	Juranek
Dissolved inorganic carbon (DIC), TA, pH, underway alkalinity	Bates
Sediment respiration, bivalve respiration, benthic macro-, meio-, and micro- fauna biomass and composition, sediment characteristics (grain size, C/N, C ¹³ , N ¹⁵ isotopes)	Grebmeier, Cooper, Goethel, Silberberg
POC, PON, δ ₁₃ POC, δ ₁₅ PON, PIC by large vol. pumping/filtration	Pilskaln
Mesozooplankton abundance, biomass, composition, population structure, condition, respiration for dominant taxa, and pop. genetics of <i>Calanus</i> spp.	Ashjian, Campbell
Carbon export	Ashjian, Pilskaln
Marine Mammal Distributions	Moore
Seabird Distributions	Reedy, Labunski
Stable isotopes of methane in water and air	Magen
Optical measurements in upper water column	Frey
Amospheric aerosols, water column chlorophyll and phaeophytin	Gaffey and Frey
Underway DNA/RNA, EDA, large volume particulate OM (POC, PON, POP, PCOD)	Fagan and Martiny

What papers do you see coming out of your cruise (no doubt incomplete)?

- Pilskaln et al., Particulate organic and inorganic carbon concentration distributions from the shelf to Pole on HLY 2022-02 Arctic cruise.
- Pilskaln et al., Stable C and N isotopic signatures across the Canada Basin
- Ashjian, Campbell, et al. Zooplankton species and life stage abundances, biomass and vertical distributions from the shelf to the Pole (stable isotopes?).
- Campbell, Gelfman, Ashjian et al. Population genetics of *Calanus glacialis/marshallae* and *C. finmarchicus* in the western Arctic
- Campbell, Ashjian, et al. Seasonal and latitudinal variations in body size, condition, activity (respiration rate) for dominant zooplankton species. Include data collected on earlier expeditions including SHEBA, MOSAiC, SBI, BEST, and others
- Pilskaln, Ashjian, et al. Particle and plankton vertical distribution from a Video Plankton Recorder
- Magen, Lapham, Sun, Fluxes and transport of submarine methane in the Chukchi and Beaufort Seas. To be submitted to JGR - Oceans.
- Timmermans, Danielson, et al. Distribution of freshwater and heat in the Canadian Basin sector
- Margevich, Timmermans, Danielson, et al. Analysis of the transport through Bering Strait as it relates to the large-scale circulation in the Pacific Arctic region
- Zhang, Timmermans, Danielson, et al., Structure and evolution of the deep Canada Basin related to ventilation timescales and circulation
- Bates et al., Ocean carbon distribution, ocean acidification and air-sea CO₂ gas exchange (since we got to the North Pole and have the entire suite of CO₂ parameters).
- Bates et al., Anthropogenic CO₂ changes over time in the western Arctic.
- Alvarez, Juranek, et al., Dissolved oxygen changes in the western Arctic relative to 2015 (GEOTRACES) and 1994 (Trans Arctic Section)
- Frey et al., Late-season bloom progression/stage observed by pheophytin/chlorophyll-a proportions and blooms contribution to in situ water column heating calculated through optical measurements
- Juranek et al. Trends in surface O₂/Ar and triple oxygen isotopes and Gross primary / Net Community Production for SAS.

What synthesis papers do you see coming out of your cruise (suggesters in parentheses)?

Synthesis on Arctic ocean carbon cycling and budget (PilskaIn, Campbell, Bates)

Northward expansion of Chukchi/Bering Sea copepods and elevated zooplankton biomass in the Western Arctic (Ashjian, Campbell)

Methane with PO, carbon system (Magen)

Structure and evolution of the deep Canada Basin related to ventilation timescales and circulation (Timmermans)

Pan-Arctic assessment of potential reduction in dissolved oxygen under warming (Timmermans)

Quantify the magnitude of change in temperature and salinity across the surveyed basins, looking for detectable changes in halocline properties or in the distribution or character of double-diffusive stair-steps (Danielson)

Identify and possibly track shelf-sourced water mass distributions across the basin using T/S and BGC tracers and relevance to advection and ecosystem processes (Danielson)

Synthesis of bloom stage progression from observational, modeled, and remotely sensed data (Frey)

Hydrographic comparison between the Makarov and Canada Basins (Cooper and Grebmeier)

Benthic carbon cycling and sediment parameters from the outer shelf of the Chukchi Sea to the North Pole (Grebmeier et al.)

Temperature and food supply as drivers for bivalve growth in the Pacific Arctic (Goethel et al.)

Benthic faunal populations from the shelf to the deep sea from field sampling and video imagery (Grebmeier et al.)

Whole basin-scale changes in dissolved O₂ (Juranek)

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