



CLIVAR Observing, Modeling, and Understanding the Circulation of the Arctic Ocean and Sub-Arctic Seas Workshop

June 27-30, 2022

**Center for Urban Horticulture
University of Washington
Seattle, Washington**

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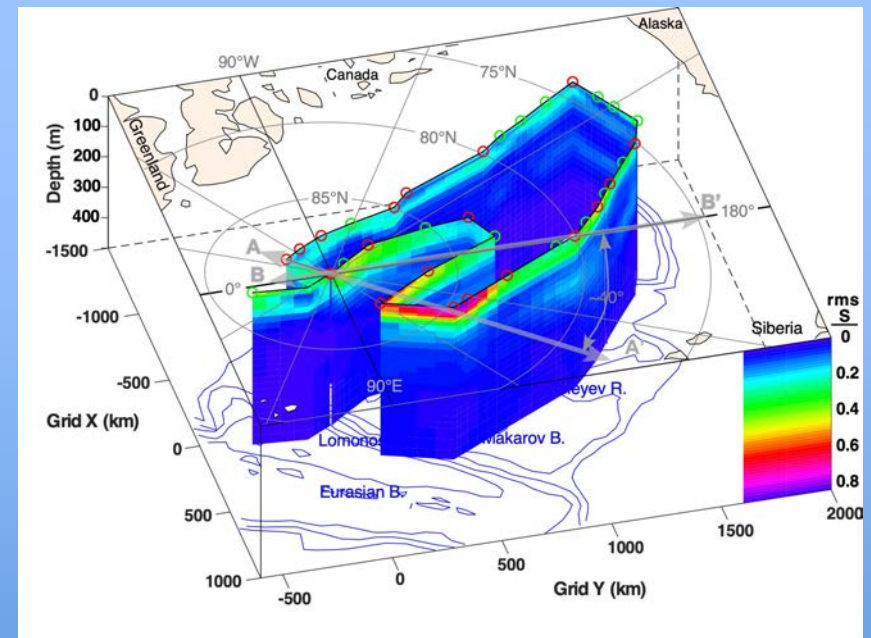
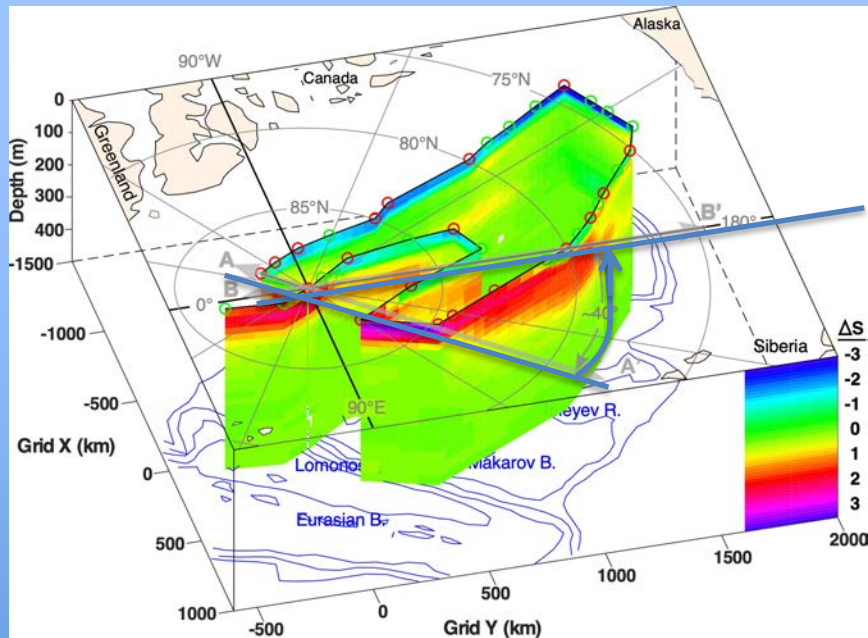
**Alison Macdonald, Woods Hole
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**Mary Louise Timmermans, Yale
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**Patrick Heimbach, University of
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Background and Motivation

- The Arctic Ocean began to change profoundly in the early 1990's with an increase in the Arctic Oscillation (AO), a shift in frontal locations and currents, and flushing of old ice from the basin in favor of more seasonal ice.
- Results from the SCICEX'93 cruise of the USS Pargo are an early example.

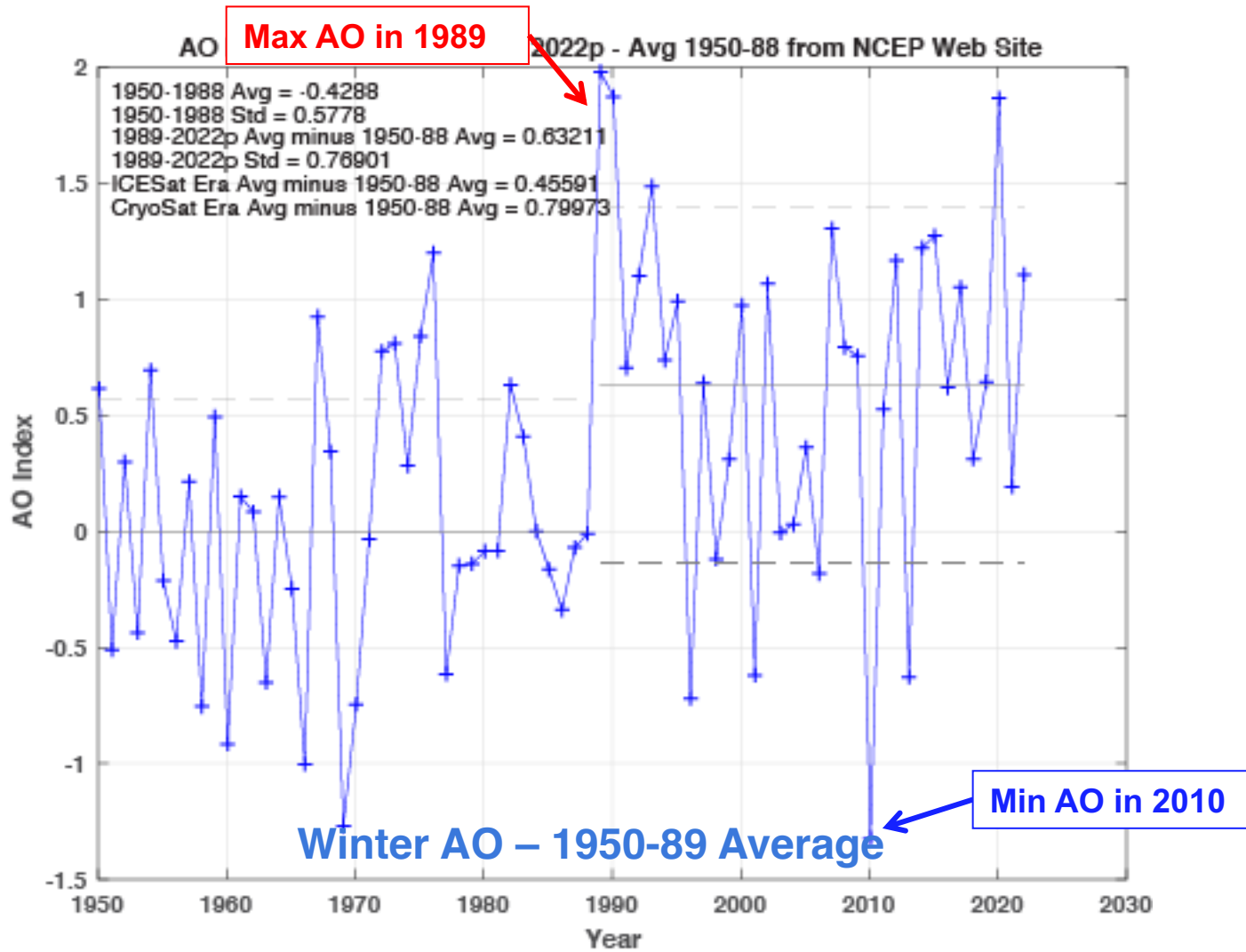


Pargo '93 Salinity – Summer Climatology shows a +2 increase in salinity in the central Arctic Ocean and Makarov Basin => a cyclonic shift in the Transpolar Front between Atlantic and Pacific waters.

The pattern of 1970s RMS salinity variation from US-Russian climatology => this is a fundamental mode of variability

Background and Motivation

- The Pargo shift was arguably forced by the 1989 record increase in winter AO



Background and Motivation

- But the observations of the **Pargo** would have been meaningless without the extensive hydrographic record compiled by the **Soviet Union** and its release in the *Joint U.S.-Russian Atlas of the Arctic Ocean* made possible by the **Gore-Chernomyrdin Agreement**.
- Seeing similarly dramatic changes in most parts of the **Arctic** and recognizing the need for ongoing observations were the impetus for the interagency **Study of Environmental Arctic Change (SEARCH)**, the **NSF Arctic Observing Network (AON)**, and numerous other observation and modeling efforts.
- After 20-years of vastly improved observations and modeling it is time to assess what we have learned about the changing circulation of the **Arctic Ocean** and **Sub-Arctic Seas** and determine what is needed to make progress in the future.

Workshop Objectives

- a) **Assess the state of understanding of the changes in the circulation of Arctic Ocean and sub-Arctic seas and their relation to climate.** (*Emphasis Monday, Breakout 1 Issue*)
- b) **Identify needs for sustained ocean observations to measure variability and change in Arctic Ocean circulation and approaches for supporting them.** (*Emphasis Tuesday, Breakout 2 Issue*)
- c) **Assess advancements in modeling that improve representation of the ongoing changes in circulation and identify improvements needed to predict future changes.** (*Emphasis Wednesday, Breakout 3 Issue*)

Thank You
We hope you enjoy the
workshop.