Chukchi Ecosystem Observatory: insights into the variability and drivers of an Arctic shelf inorganic carbon system

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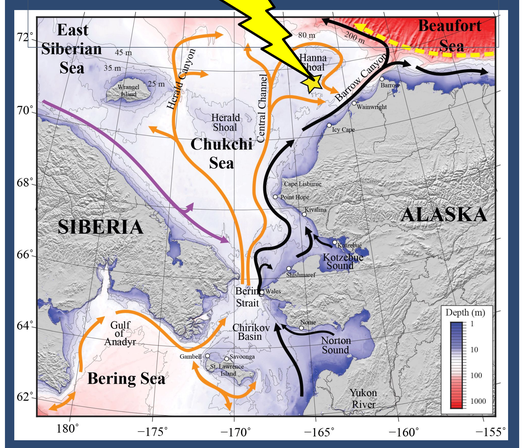
Chukchi Ecosystem Observatory 71.6°N, 161.5°W



Inorganic carbonate system

Drivers

- remineralization & respiration
- sea ice melt & formation
- ikaite dissolution & precipitation
- primary production
- riverine input with DIC & TA
- storm induced mixing
- lateral transport

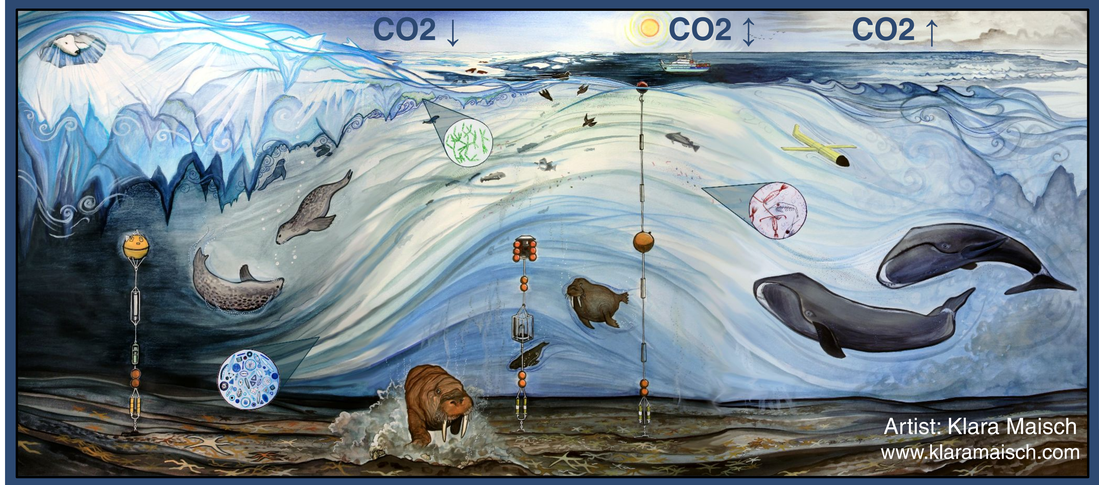
Methods

- Physical, biological, and biogeochemical measurements available at 33 m
- pH^{est} (pCO_2, T, S) allows for a multiyear investigation of the inorganic carbon system ★

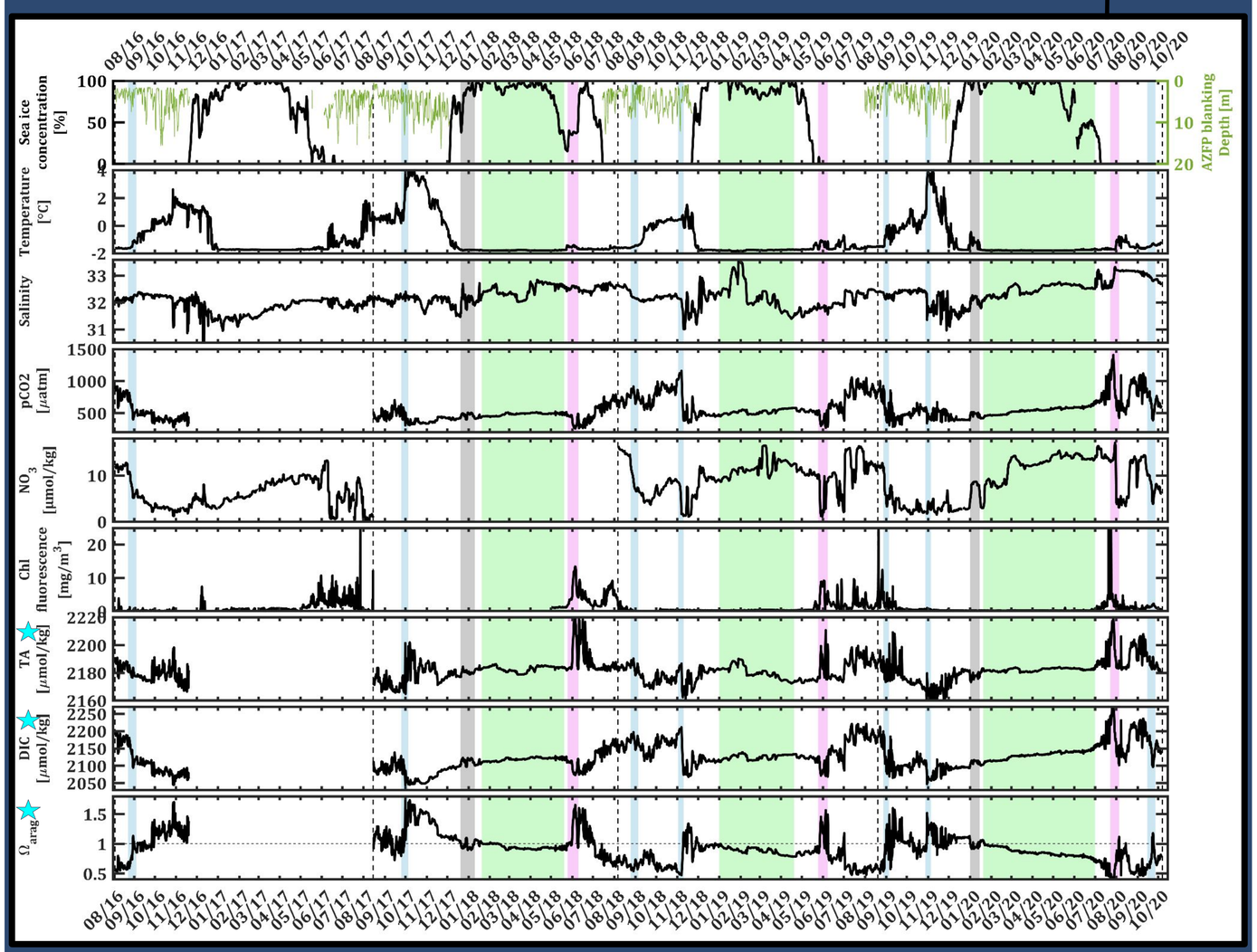
Results

- 2020 was a departure from the expected seasonal cycle

Seasonal cycle & interannual variability



See table for info on highlighted sections



★ Parameters calculated with CO2SYS(pCO_2, pH^{est}) using Lueker et al. (2000) dissociation constants

Behavior	Drivers & Implications
pCO_2 ↑	remineralization → sustained Ω_{arag} undersaturation
pCO_2 ↓ and/or Ω_{arag} ↑	ikaite dissolution ice algae productivity phytoplankton blooms
pCO_2 ↓ Ω_{arag} ↑	storm induced mixing remineralized NO_3 & CO_2 from bottom waters brought to the surface layer → supports fall phytoplankton blooms (given adequate light)
pCO_2 ↑	sea ice formation brine rejection ikaite precipitation surface waters settle to depth

Next steps

- quantify ikaite related events and wind events
- **lookout for our forthcoming paper!**

Scan to learn more!

AOOS Alaska Ocean Observing System

North Pacific Research Board

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