



ACCAP

Alaska Center for Climate
Assessment and Policy

A NOAA RISA TEAM

Arctic Report Card and 2022 Highlights

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International
Arctic Research
Center

Presentation overview

1. Behind the curtain: how do they do that Arctic Report Card thing
2. 2022 Arctic Report Card Highlights
3. John Walsh: new essay on precipitation
4. Robb Kaler: Seabird Die-offs in Alaska



Arctic Report Card Basics

Timely & peer-reviewed source for clear, reliable, and concise information on the current state of environmental components of the Arctic system

Intended for a wide audience including scientists, teachers, students, decision-makers and policymakers

- Annually since 2006
- Supported by NOAA...but NOT focused on NOAA activities
- Evolving content & format

Arctic Report Card 2019
Arctic ecosystems and communities are increasingly at risk due to continued warming and declining sea ice

The Iluqat community of Wales, Alaska—home to the Kivikmiut People

2019 Headlines
Arctic ecosystems and communities are increasingly at risk due to continued warming and declining sea ice

The Arctic marine ecosystem and the communities that depend upon it continue to experience unprecedented changes as a result of warming air temperatures, declining sea ice, and warming waters. Arctic Report Card 2019 draws particular attention to the Bering Sea region, where declining winter sea ice exemplifies the potential for sudden and extreme change. Indigenous Elders from the Bering Sea region offer their experiences of living at the forefront of climate change.

Highlights

- The average annual land surface air temperature north of 60° N for October 2018-August 2019 was the second warmest since 1900. The warming air temperatures are driving changes in the Arctic environment that affect ecosystems and communities on a regional and global scale.
- The Greenland Ice Sheet is losing nearly 267 billion metric tons of ice per year and currently contributing to global average sea-level rise at a rate of about 0.7 mm yr⁻¹.
- North American Arctic snow cover in May 2019 was the fifth lowest in 53 years of record. June snow cover was the third lowest.
- Tundra greening continues to increase in the Arctic, particularly on the North Slope of Alaska, mainland Canada, and the Russian Far East.
- Thawing permafrost throughout the Arctic could be releasing an estimated 300-600 million tons of net carbon per year to the atmosphere.
- Arctic sea ice extent at the end of summer 2019 was tied with 2007 and 2016 as the second lowest since satellite observations began in 1979. The thickness of the sea ice has also decreased, resulting in an ice cover that is more vulnerable to warming air and ocean temperatures.
- August mean sea surface temperatures in 2019 were 1-7°C warmer than the 1982-2010 August mean in the Beaufort and Chukchi Seas, the Laptev Sea, and Baffin Bay.
- Satellite estimates showed ocean primary productivity in the Arctic was higher than the long-term average for seven of nine regions, with the Barents Sea and North Atlantic the only regions showing lower than average values.
- Wildlife populations are showing signs of stress. For example, the breeding population of the Ivory gull in the Canadian Arctic has declined by 70% since the 1980s.
- The winter sea ice extent in 2019 narrowly missed surpassing the record low set in 2018, leading to record-breaking warm ocean temperatures in 2019 on the southern shelf. Bottom temperatures on the northern Bering shelf exceeded 4°C for the first time in November 2018.
- Bering and Barents Seas fisheries have experienced a northerly shift in the distribution of subarctic and Arctic fish species, linked to the loss of sea ice and changes in bottom water temperature.
- Indigenous Elders from Bering Sea communities note that "[i]n a warming Arctic, access to our subsistence foods is shrinking and becoming more hazardous to hunt and fish. At the same time, thawing permafrost and more frequent and higher storm surges increasingly threaten our homes, schools, airports, and utilities."

December 2019
www.arctic.noaa.gov/Report-Card

Citing the complete report:
Richter-Menge, J., M. L. Druckenmiller, and M. Jeffries, Eds., 2019: Arctic Report Card 2019, <https://www.arctic.noaa.gov/Report-Card>.

Citing an essay (for example):
Frey, K. E., J. C. Comiso, L. W. Cooper, J. M. Grebmeier, and L. V. Stock, 2019: Arctic Ocean primary productivity: The response of marine algae to climate warming and sea ice decline. *Arctic Report Card 2019*, J. Richter-Menge, M. L. Druckenmiller, and M. Jeffries, Eds., <http://www.arctic.noaa.gov/Report-Card>.



Arctic Report Card Editorial Team

- Coordinating Editor

- Kelley Uhlig (2019-present)



- General Editors (2021-present)

- Matthew Drukenmiller (NSIDC)
- Twila Moon (NISDC)
- Rick Thoman (UAF)



Arctic Report Card Structure

- Web and Video
 - Integral to today's Arctic Report Card
 - Led by NOAA experts
- NOAA Communications
 - Coordinates AGU Rollout
 - Media
 - Agencies



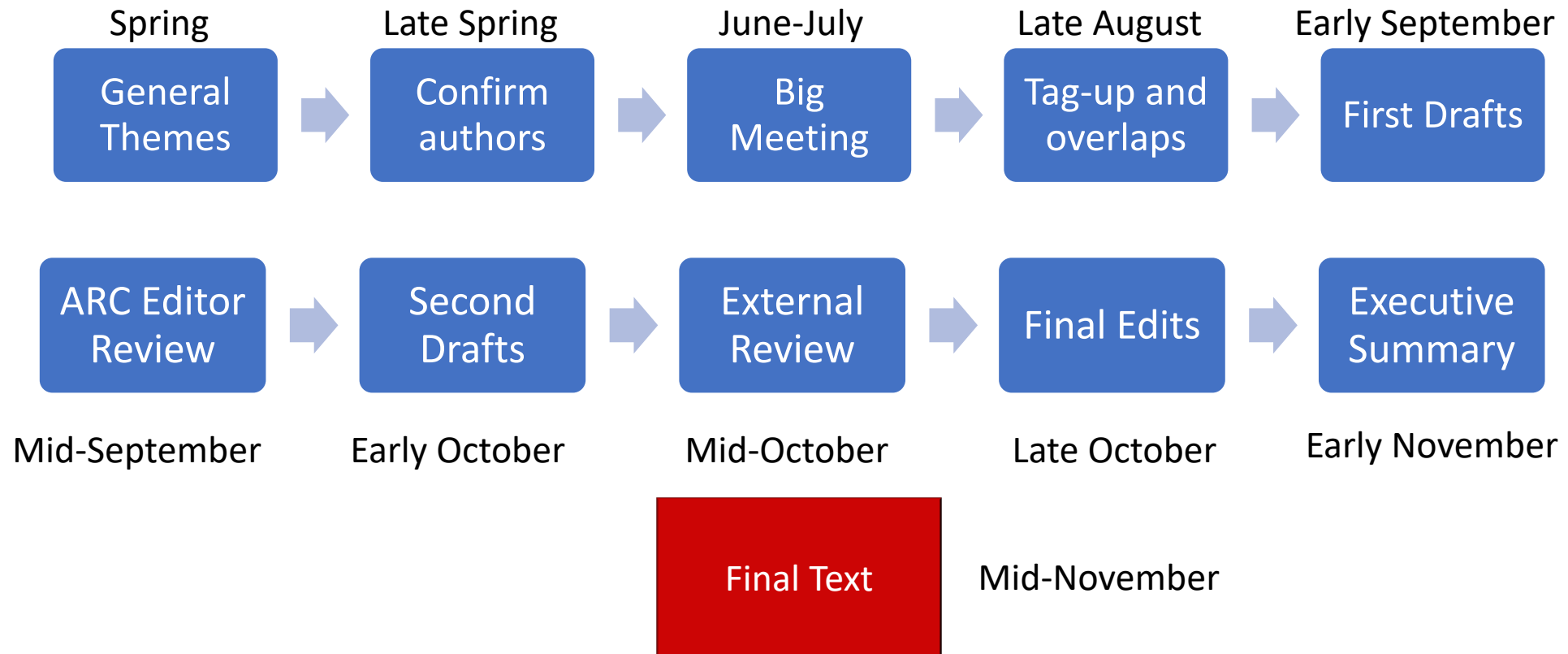
Arctic Report Card Content

- Vital Signs
 - Annual updates on seven (now eight) recurring topics
- Indicators
 - Topics updated every 2-4 years
- Frostbites
 - New and newsworthy items

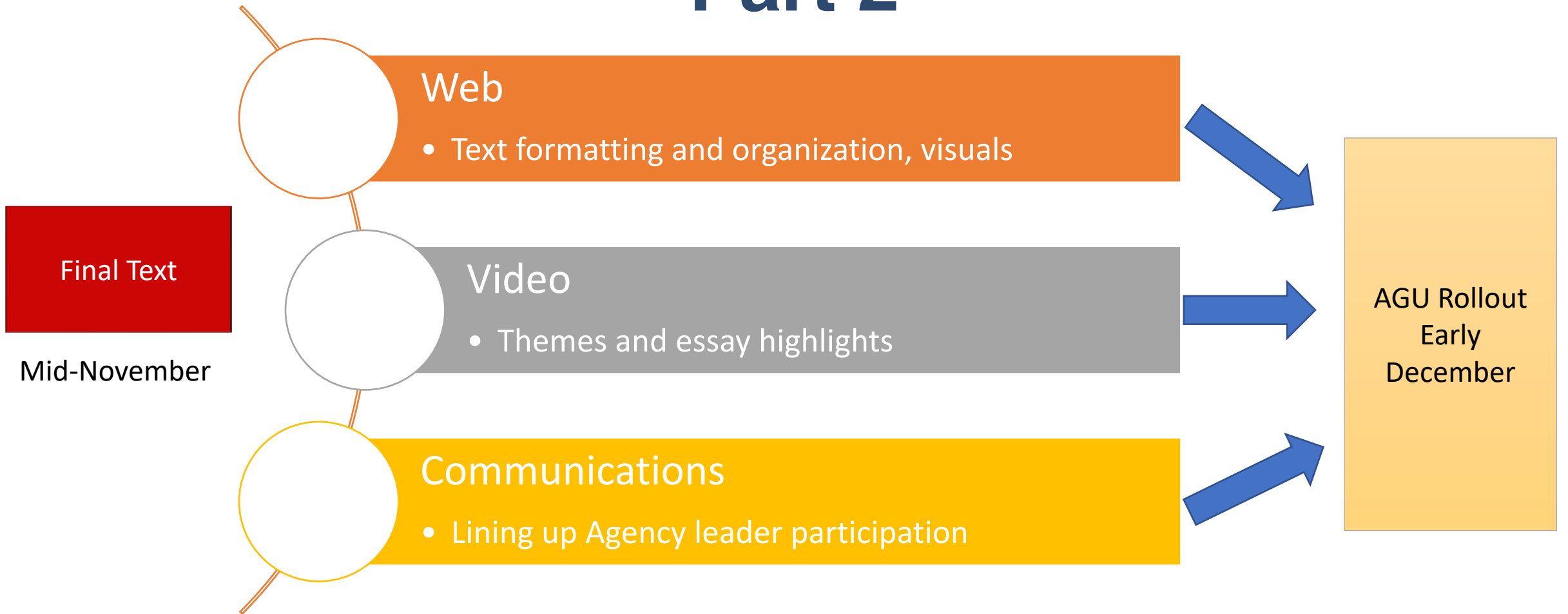
Vital Signs
Surface Air Temperature
Terrestrial Snow Cover
Precipitation
Greenland Ice Sheet
Sea Ice
Sea Surface Temperature
Arctic Ocean Primary Productivity: The Response of Marine Algae to Climate Warming and Sea Ice Decline
Tundra Greenness
Other Indicators
Satellite Record of Pan-Arctic Maritime Ship Traffic
Lake Ice
Arctic Geese of North America
Frostbites
Arctic Pollinators
Lessons From Oceans Melting Greenland, a NASA Airborne Mission
Partnering in Search of Answers: Seabird Die-offs in the Bering and Chukchi Seas



Arctic Report Card Timeline Part 1



Arctic Report Card Timeline Part 2



Arctic Report Card 2022

- Primary focus: October 2021 through September 2022
- 15 essays
- 147 Authors from 11 countries
- Released at AGU December 13, 2022

15 essays, 147 authors from 11 countries



Rick Thoman • Alaska Center for Climate Assessment & Policy
International Arctic Research Center

Arctic Report Card Video



<https://www.youtube.com/watch?v=MDG-moe0tZs>



Rick Thoman • Alaska Center for Climate Assessment & Policy
International Arctic Research Center

2022 NOAA Arctic Report Card

The warming Arctic reveals shifting seasons, widespread disturbances,
and the value of diverse observations

- 147 Authors from 11 countries
- 15 essays, including a highlight on the Impacts of Arctic Change on People

Vital Signs

Surface Air Temperature

Terrestrial Snow Cover

John Walsh will talk about → *Precipitation*

Greenland Ice Sheet

Sea Ice

Sea Surface Temperature

Arctic Ocean Primary Productivity

Tundra Greenness

Indicators

Pan-Arctic Shipping

Lake Ice

Arctic Geese

Frost Bites

Arctic Pollinators

NASA's Oceans Melting Greenland

Seabird Die-offs in the Bering and Chukchi Seas

Consequences of Rapid Environmental Arctic
Change for People



Arctic Report Card Highlights

2022 Arctic-wide headlines

Storms and extreme weather

Wildfires, extreme weather, and other disturbances becoming more frequent.

Sea ice thickness and volume

Rebounded from near-record low levels in 2021; still well-below 1980s-90s conditions.

Arctic warming

Annual surface air temperatures sixth warmest since 1900.

WIDESPREAD DISTURBANCES

Ocean traffic

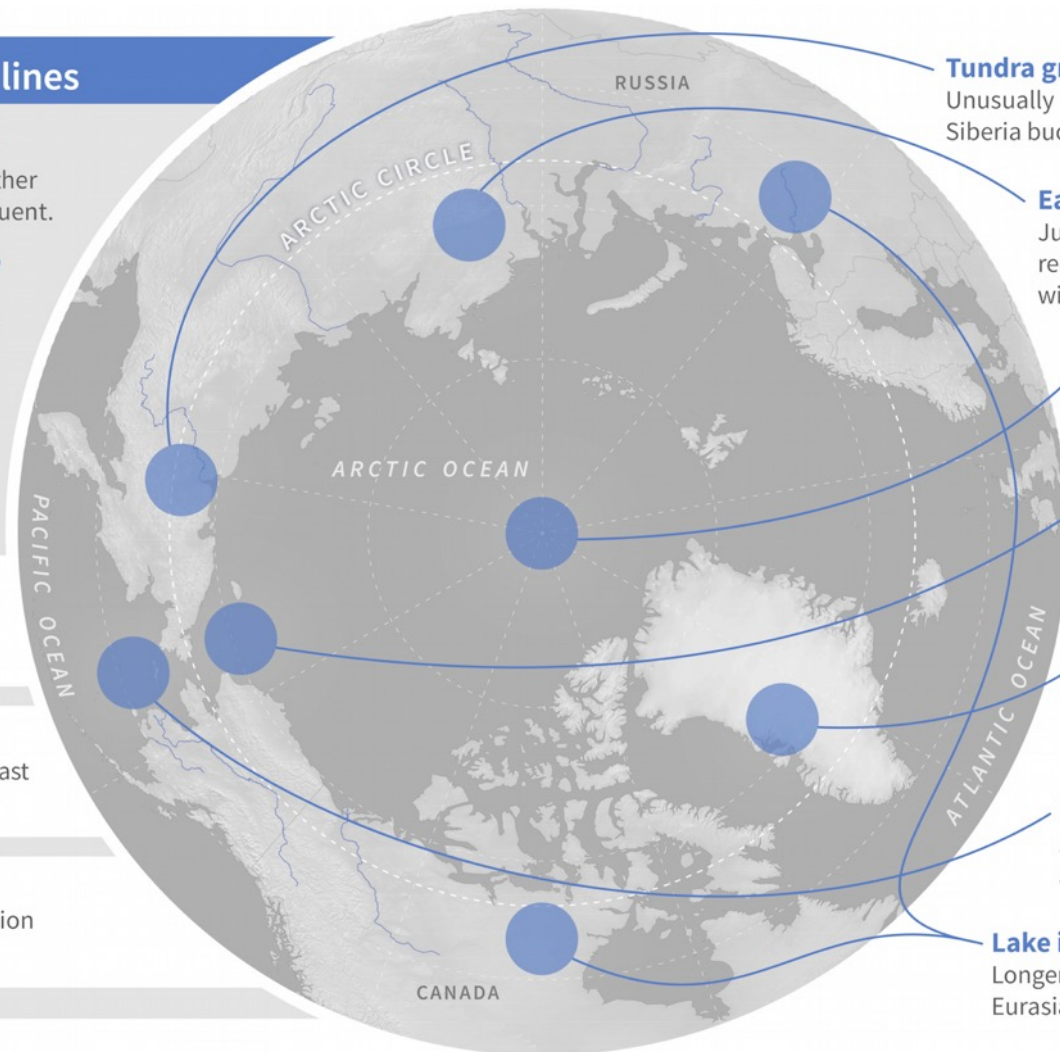
Maritime ship traffic increasing as sea ice diminishes.

Seabird die-offs

Sixth consecutive year of beach-cast seabirds in Bering Strait region.

Increased precipitation

Significant increase in precipitation across all seasons since 1950s.



Tundra greening

Unusually low greening in Northeastern Siberia bucked Arctic-wide trend.

Early snow melt

June snow cover third lowest on record across Eurasia, aligning with Arctic-wide trends.

Open water at North Pole

Waters highly navigable by ice strengthened vessels.

Chukchi Sea

Persistent summer sea ice due to cooler surface waters and north winds.

Greenland melting

Unprecedented September melt-event across 36% of the ice sheet.

Pacific Arctic storms

Storms dominated summer and fall causing disruptions.

Lake ice differences

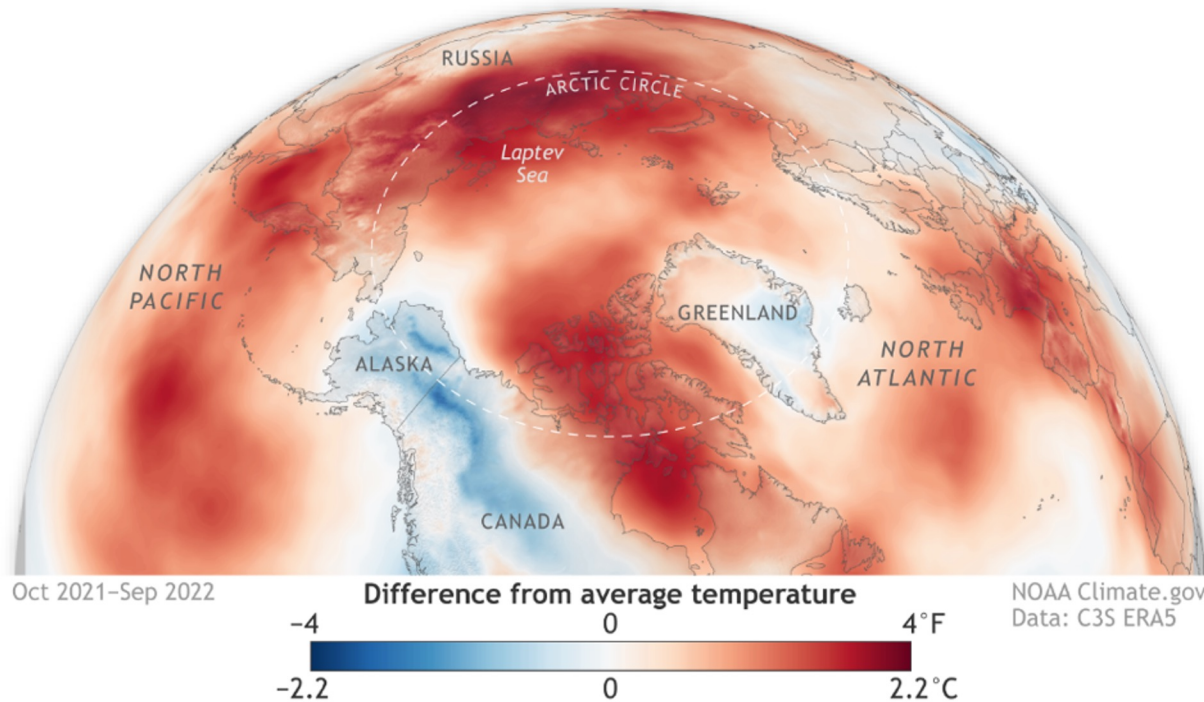
Longer than average ice durations in Eurasia and shorter in North America.



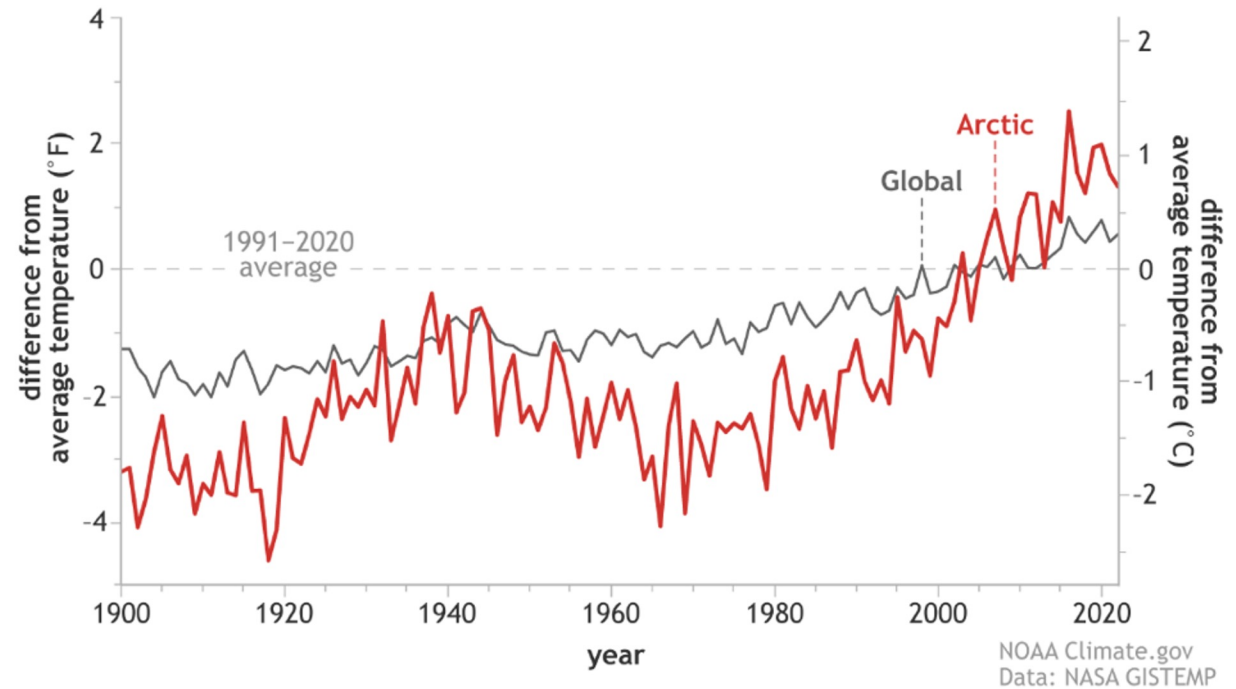
2022 NOAA Arctic Report Card

The warming Arctic reveals shifting seasons, widespread disturbances, and the value of diverse observations

2022 was Arctic's 6th-warmest year on record



Arctic warming outpacing the global average

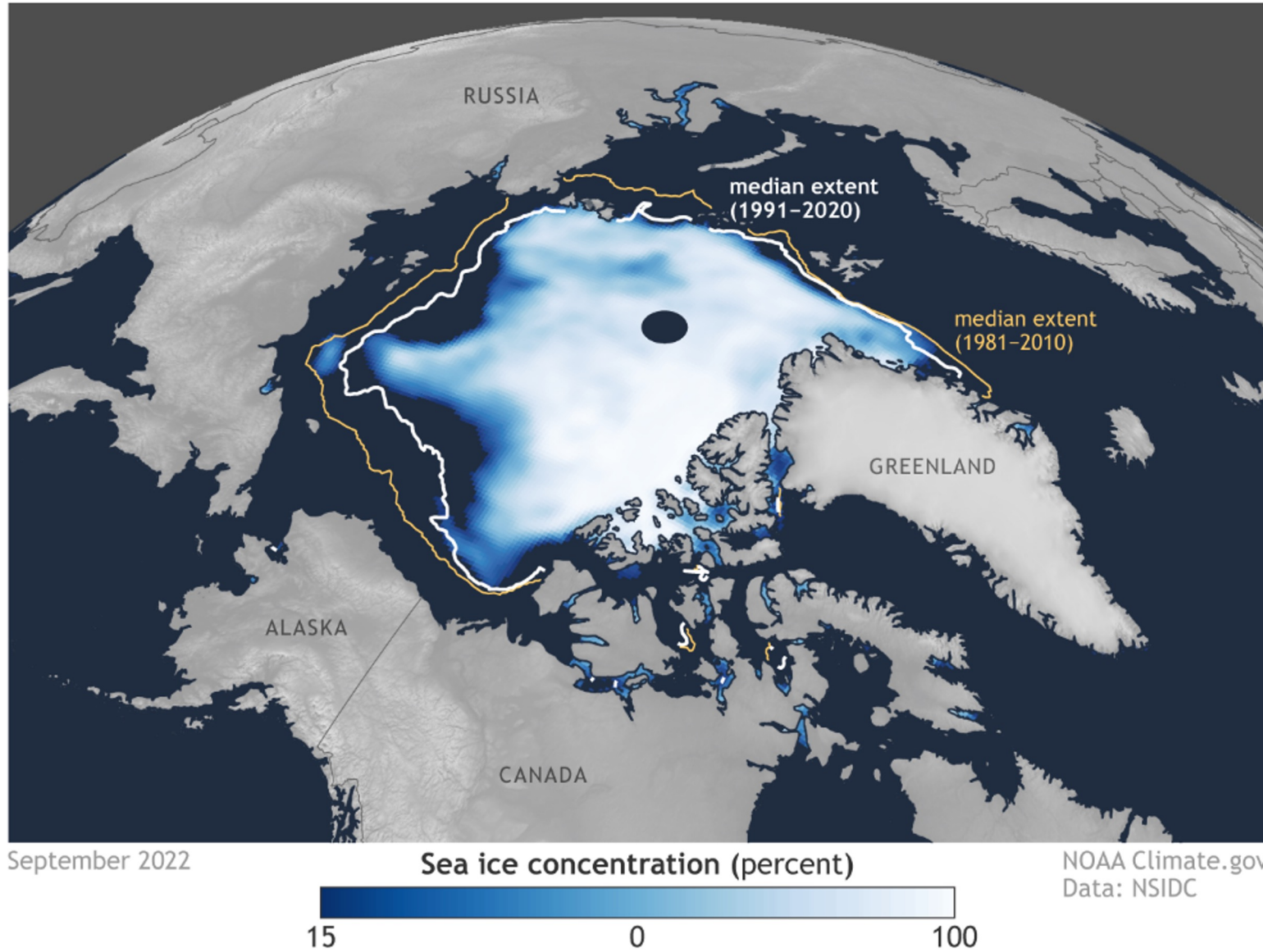


2022 Greenland Ice Sheet surface melt

The Greenland Ice Sheet experienced its **25th straight year of ice loss**

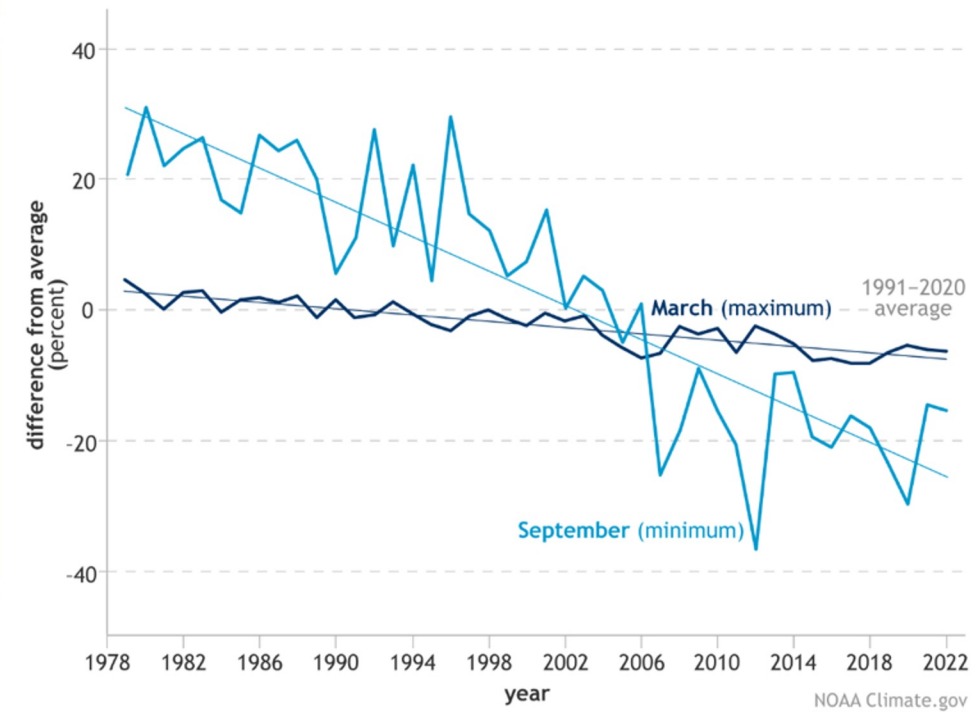


2022 summer minimum



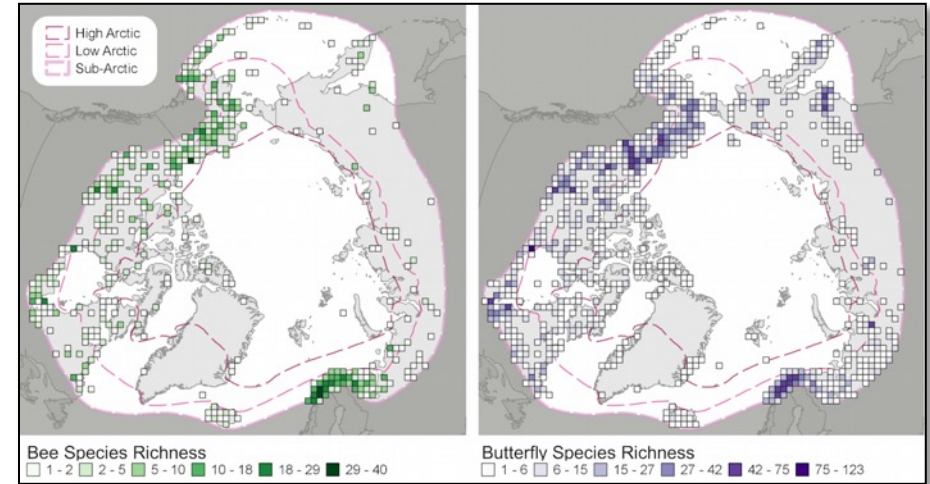
2022 Arctic **sea ice extent** was similar to 2021 and **well-below** the long-term average

Arctic sea ice extent, 1979-2022



Arctic Report Card 2022 Frostbites

- Seabird Die-offs (Robb will talk about this)
- Arctic Pollinators
 - The wide scope of the Arctic Report Card
- Oceans Melting Greenland
 - Important project summary
- Consequences of Rapid Environmental Arctic Change for People
 - Why these changes matters



Addressing unprecedented Arctic environmental changes requires **hearing one another, aligning values, and collaborating across knowledge systems, disciplines, and sectors of society**

<https://arctic.noaa.gov/Report-Card/Report-Card-2022>



Photos by ANTHC