

# NOAA 2020 Arctic Report Card

*Observing 15 Years of Arctic Change*

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Jackie Richter-Menge

**Panelists:** Rick Thoman, Alison York, Craig George,  
Matthew Shupe, and Jackie Richter-Menge



15  
ARCTIC REPORT CARD  
FIFTEEN  
YEARS





# NOAA 2020 Arctic Report Card

*Observing 15 Years of Arctic Change*

**133 authors from 15 countries**

**16 essays including 2 special essays & data portal**

- 15 year Retrospective of the Arctic Report Card
- Observational Foundation of the ARC - the Arctic Observing Network
- **New** Arctic Data Center Portal

## Vital Signs

Surface Air Temperature

Terrestrial Snow Cover

Greenland Ice Sheet

Sea Ice

Sea Surface Temperature

Arctic Ocean Primary  
Productivity

Tundra Greenness

## Indicators

Glaciers & Ice Caps outside  
of Greenland

Permafrost Coastal Erosion

**Bowhead Whales**

**Wildland Fires**

## Frost Bites

**MOSAiC Expedition**

Modeling & Projections of  
Arctic Sea Ice Cover

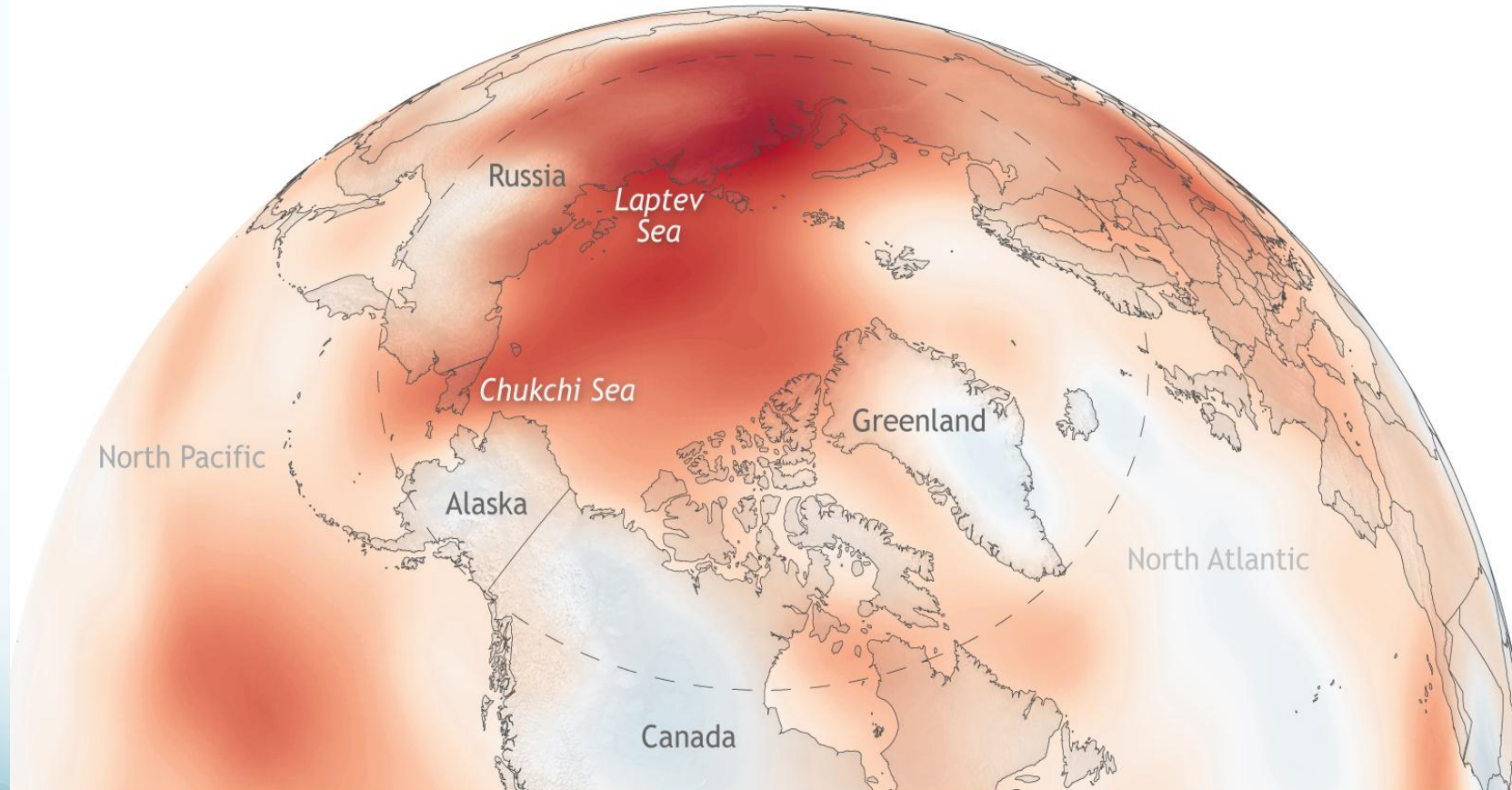
Barrow Observatory



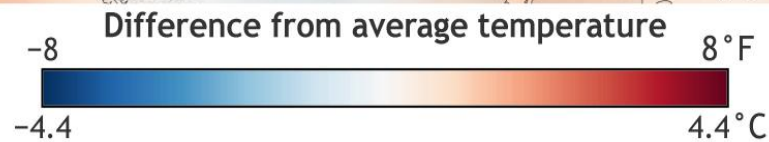
ARCTIC REPORT CARD  
**FIFTEEN**  
YEARS



# 2020 WAS ARCTIC'S SECOND-WARMEST YEAR ON RECORD

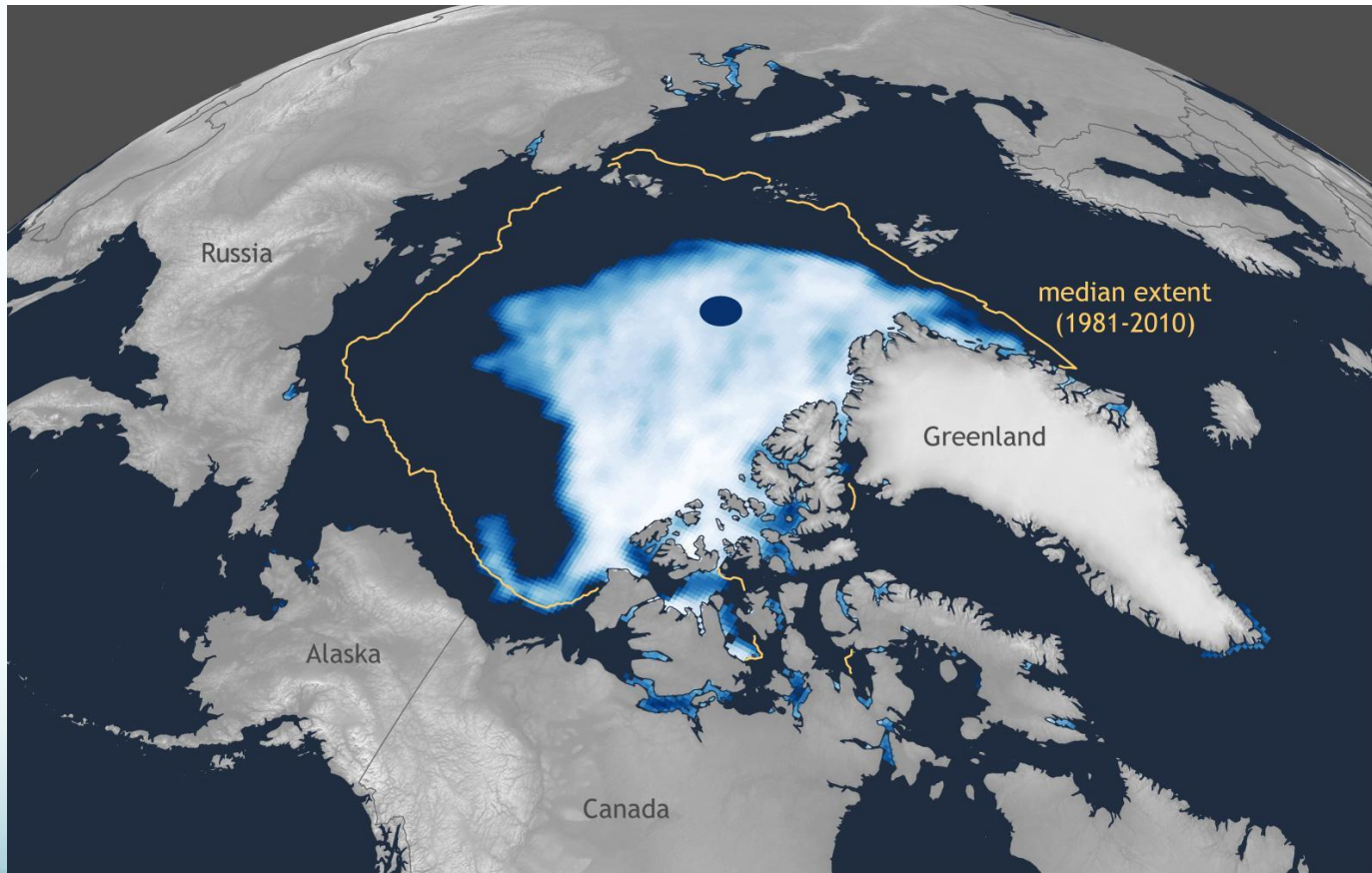


Oct 2019–Sep 2020



NOAA Climate.gov  
from ARC 2020

# 2020 ARCTIC SEA ICE SUMMER MINIMUM SECOND LOWEST ON RECORD



September 15, 2020

Sea ice concentration (percent)

Data: NSIDC

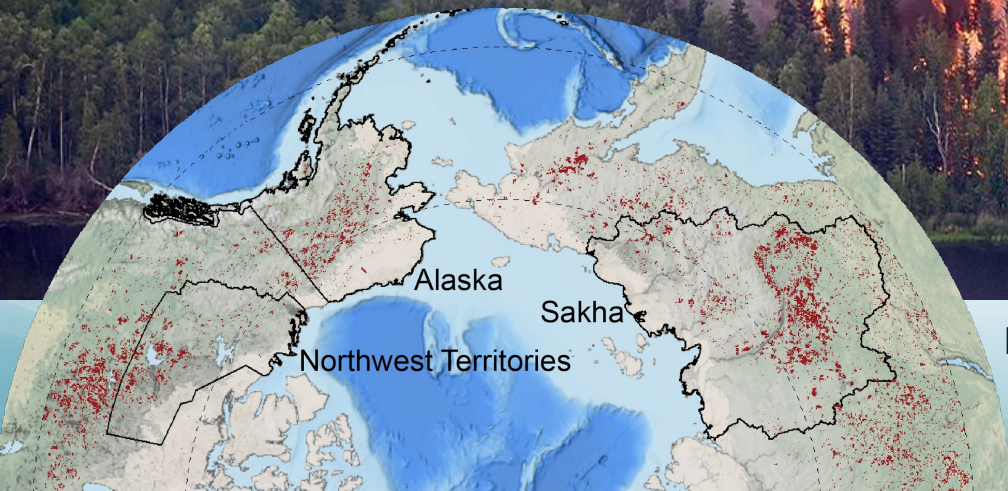


# Wildland Fire in High Northern Latitudes

A. York, U. Bhatt, E. Gargulinski, Z. Grabinski, P. Jain, A. Soja, R. Thoman, R. Ziel

Frozen Calf Fire  
near Chalkyitsik,  
Alaska (66.4°N)  
July 2019

*Photo by S. Harrel*



Burned area (55°-70°N)  
2001- June 2020  
*Figure by Z. Grabinski*



# BURNED AREA IN ALASKA 1980-2020

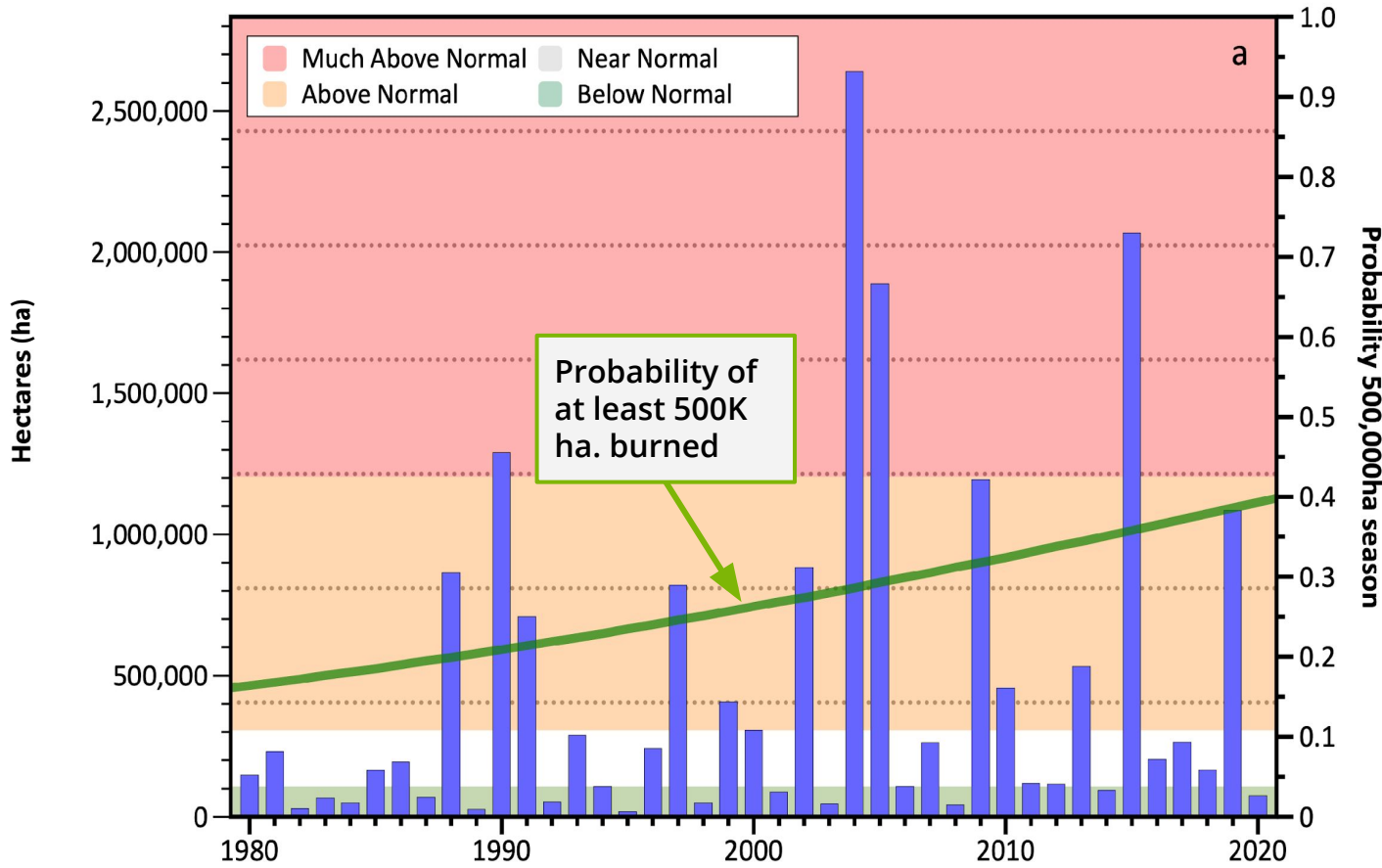


Figure by R. Thoman, data from Alaska Interagency Coordination Center

Large fire seasons or unusual fire activity since 2000

**Alaska:** 2004, 2005, 2007, 2009, 2015, 2019

**Northern Canada:** 2014 and 2016

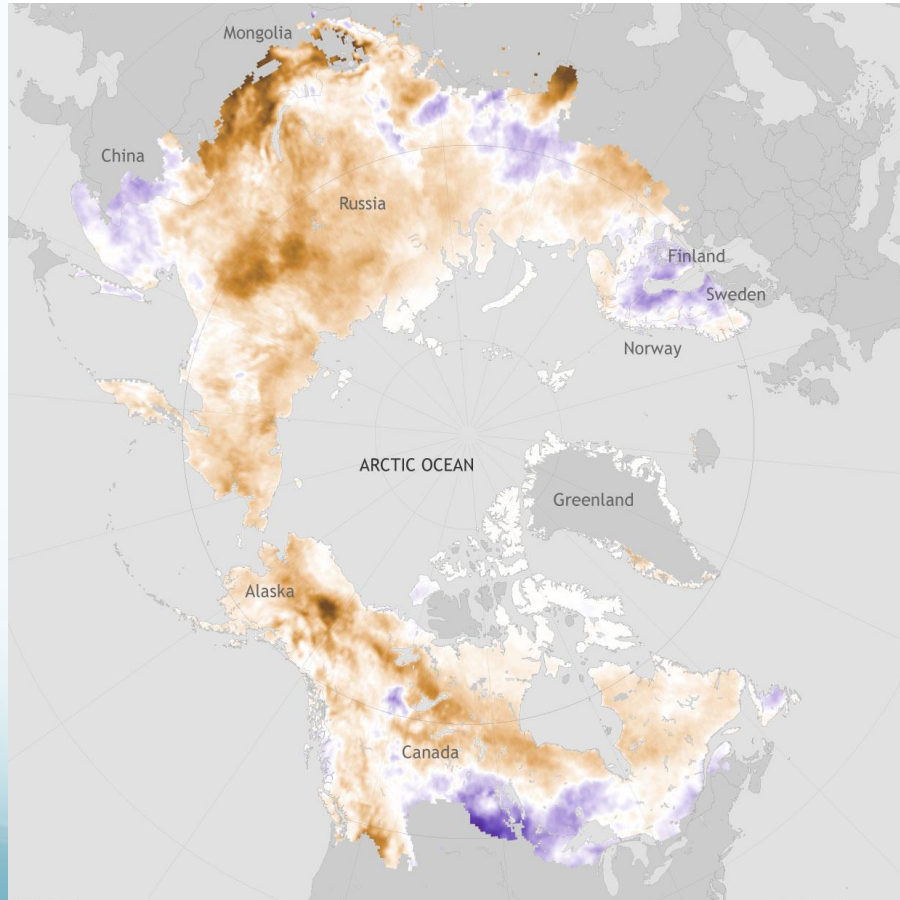
**Greenland:** 2017

**Fennoscandia:** 2018

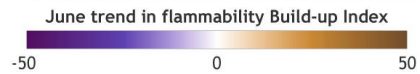
**Northern Russia:** 2002, 2012, 2018, 2019, 2020



# FIRE FUELS ARE INCREASINGLY FLAMMABLE IN THE NORTHERN HIGH LATITUDES



1979-2019



NOAA Climate.gov  
Data: U. Bhatt/ARC 2020

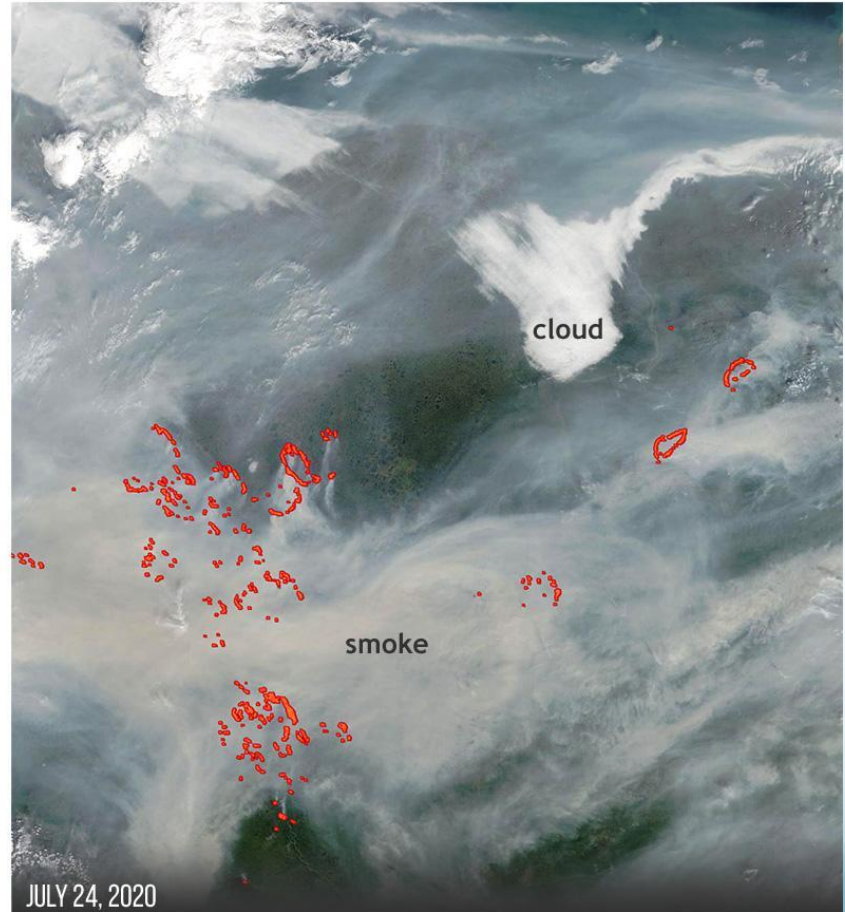
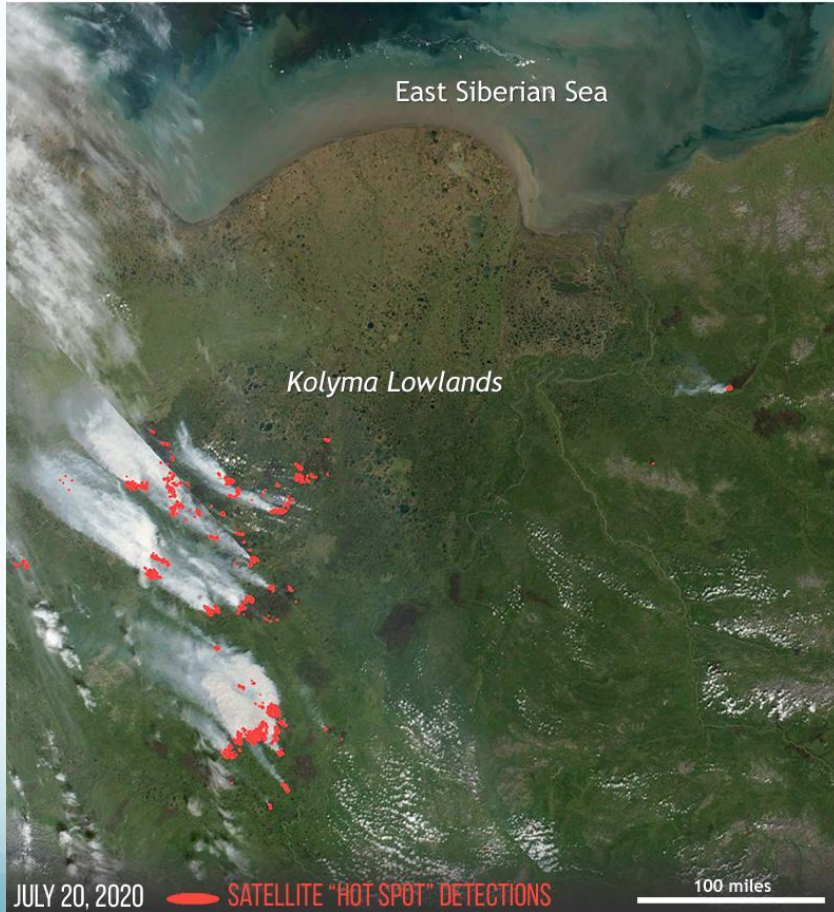
# DUFF FUELS



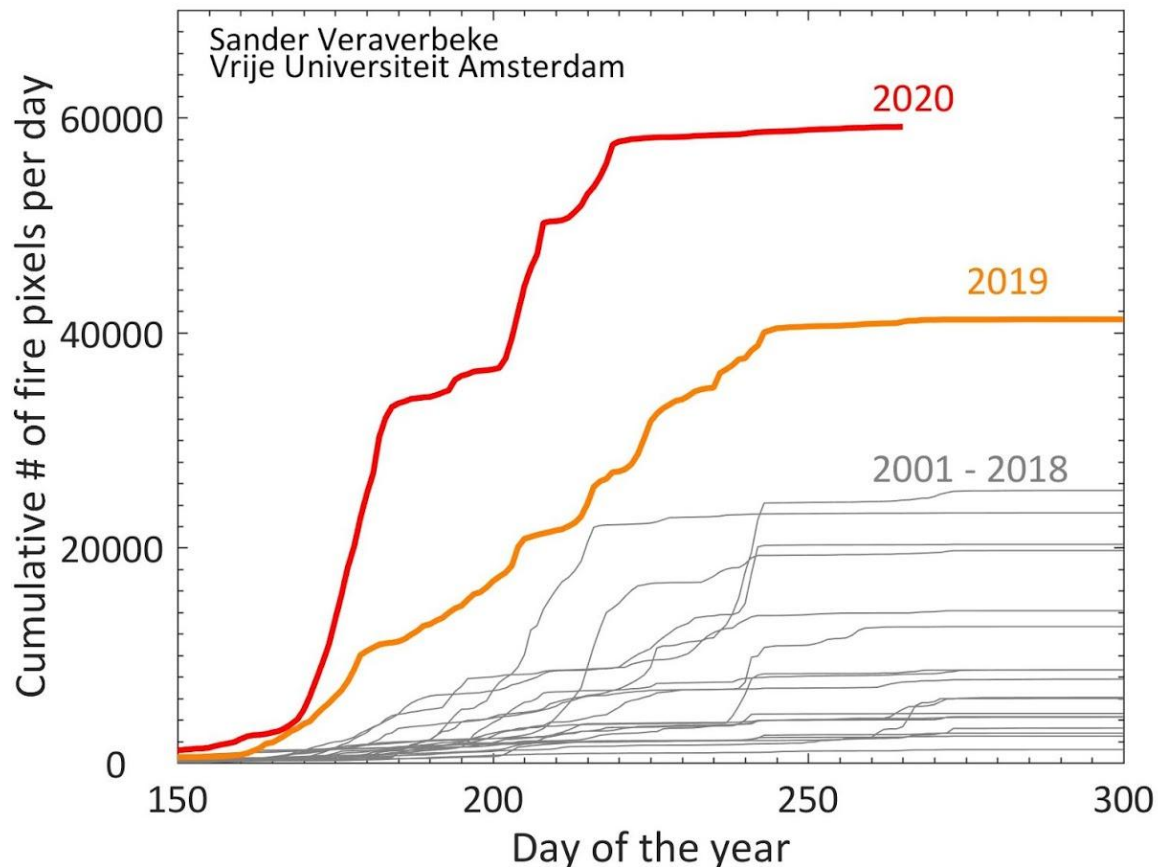
Photo courtesy R. Jandt



# EXTREME FIRE SEASON IN SAKHA REPUBLIC OF NORTHEASTERN RUSSIA



# DAILY CUMULATIVE NUMBER OF ACTIVE FIRE PIXELS DETECTED WITHIN THE ARCTIC CIRCLE (NASA MODIS)



Source: <https://sites.google.com/view/sanderveraverbeke/2020-arctic-fire-season>

2020 is the record fire year within the Arctic Circle, **mostly due to fires in Sakha, Russia**



# Bowhead Whales: recent insights into their biology, status, and resilience

J.C. George, S.E. Moore, and J.G.M. Thewissen

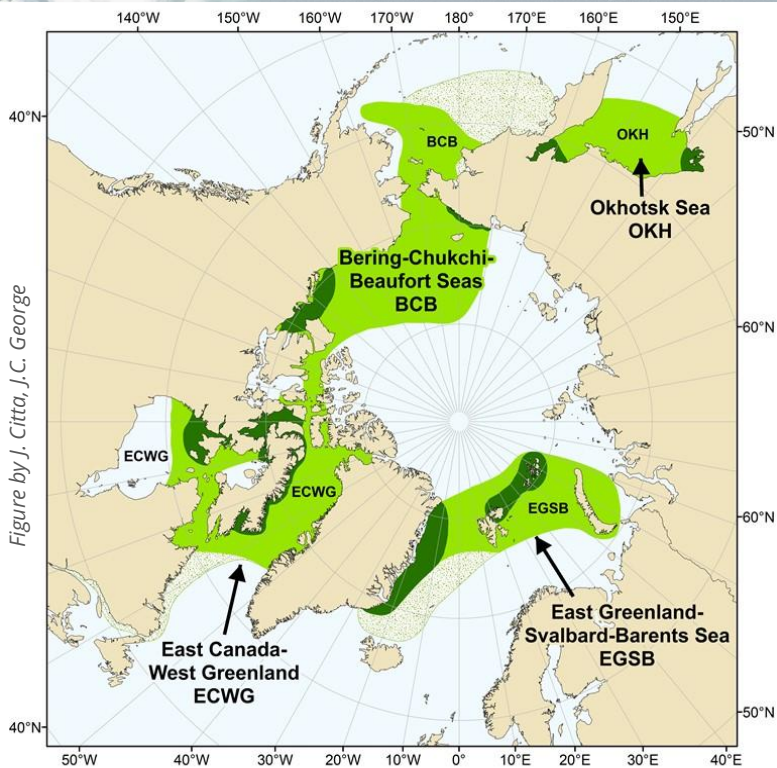


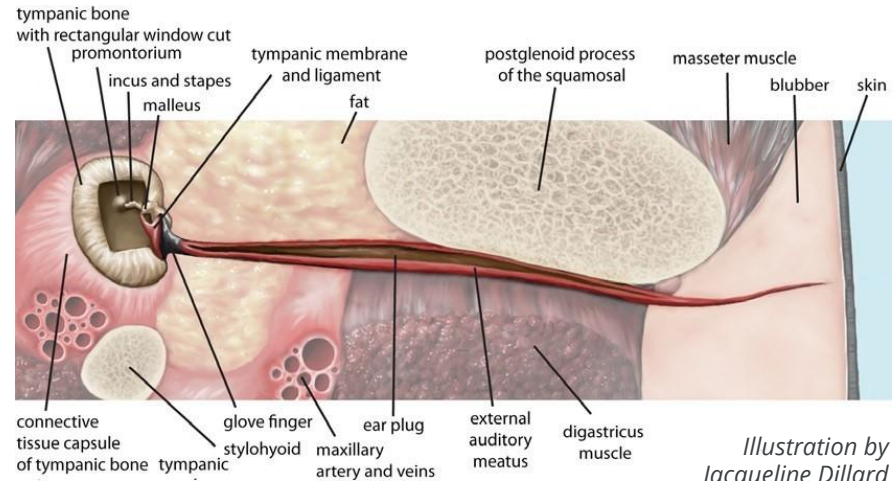
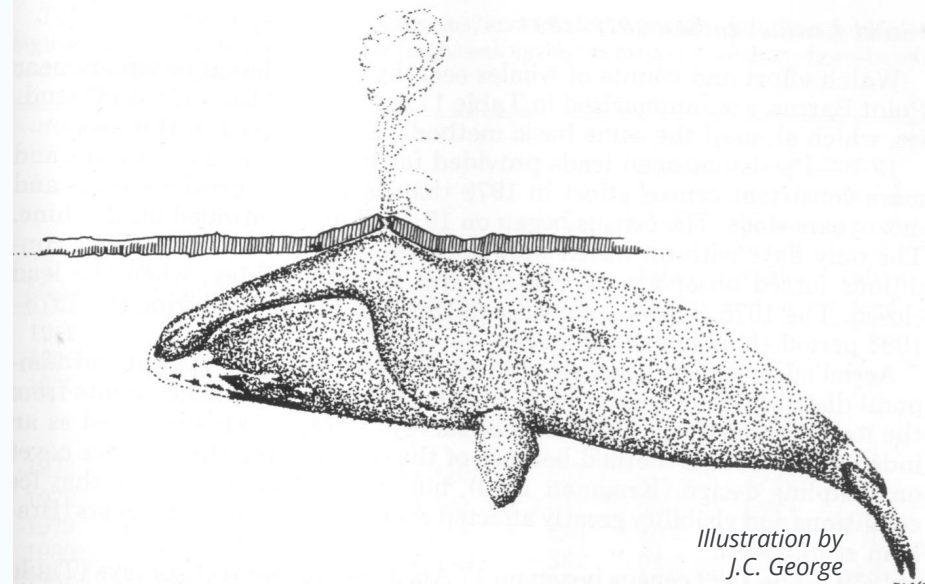
Figure by J. Citta, J.C. George

- Only true arctic baleen whale
- Bering-Chukchi-Beaufort & East Canada-West Greenland healthy growing
- Okhotsk Sea & East Greenland-Svalbard-Barents at risk



# BOWHEAD WHALES HAVE UNIQUE ANATOMICAL & PHYSIOLOGICAL TRAITS

- Thickest blubber, longest baleen, raised rostrum, ice-associated but not dependent
- Can live over 200 years
- Their sequenced genome may advance medical knowledge related to cell senescence, bone biology, fat metabolism, cancer resistance, etc.
- Scientists and Indigenous hunters collaborate on health monitoring



# BOWHEAD WHALES ARE A PRIME INDICATOR OF ARCTIC MARINE ECOSYSTEM HEALTH AND VARIABILITY

- Sea ice loss led to increases in primary production & transport of zooplankton, benefitting bowheads
- Threats include industrial fishing & shipping, entanglement, orca predation, oil and gas activity, baleen whale competitors, climate warming



*Quyanaqpaq!*

*Photo: J. C. George*



# MOSAiC

M. Shupe, M. Rex & Co-Authors

*Photo: Matthew Shupe*



*Photo: Amy Richman*





*Photo: Lianna Nixon*

Leg 1: 19 Sep 2019 – 15 Dec 2019

Leg 2: 15 Dec 2019 – 03 Mar 2020

Leg 3: 03 Mar 2020 – 06 Jun 2020

Leg 4: 06 Jun 2020 – 12 Aug 2020

Leg 5: 12 Aug 2020 – 12 Oct 2020

Passive Drift in Ice 

Vessel in Transit 

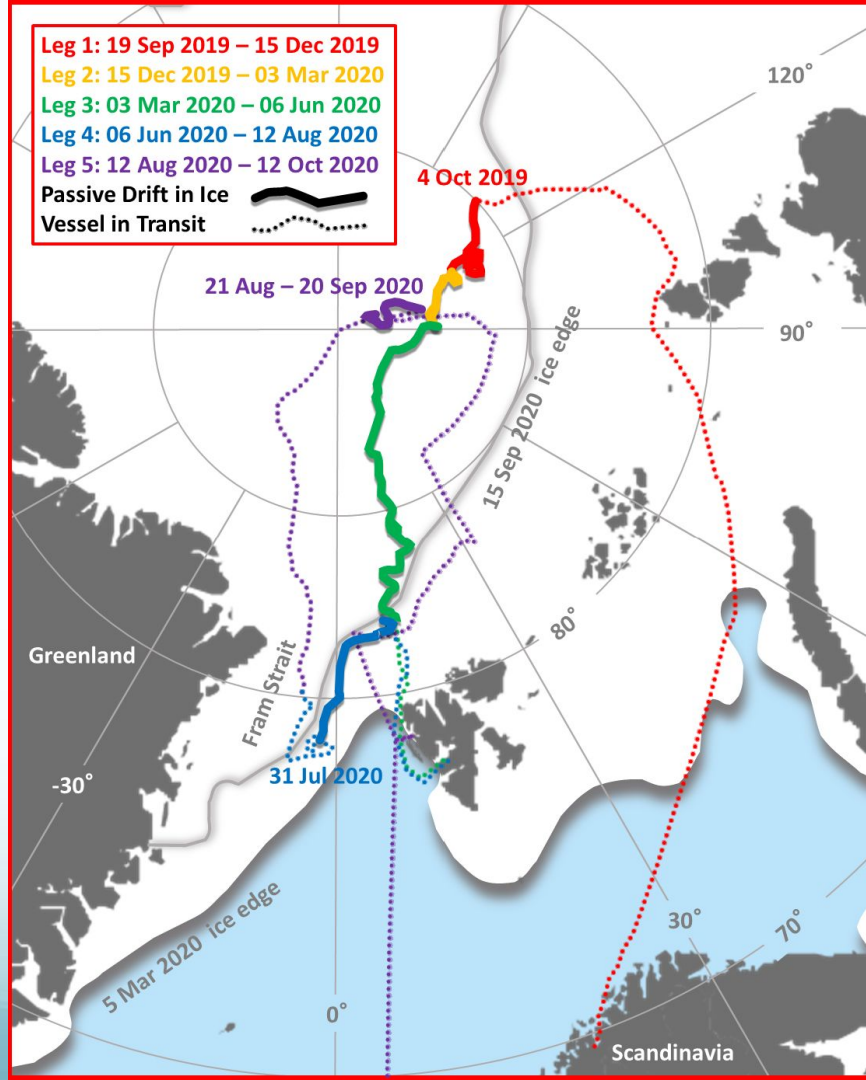




Photo: Marcel Nicolaus



*Photo: Marcel Nicolaus*

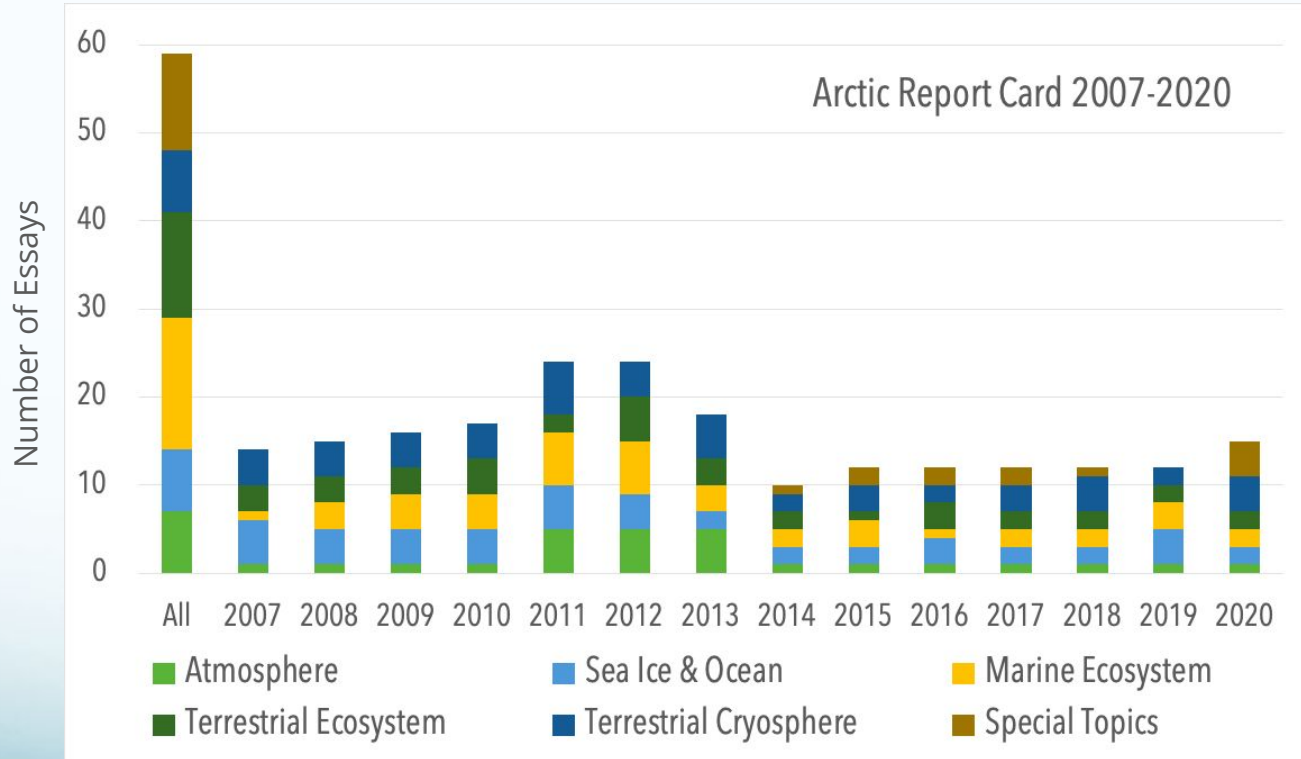
*Photo: Michael Gallagher*





*Photo: Markus Rex*

# Happy 15 Year Anniversary!



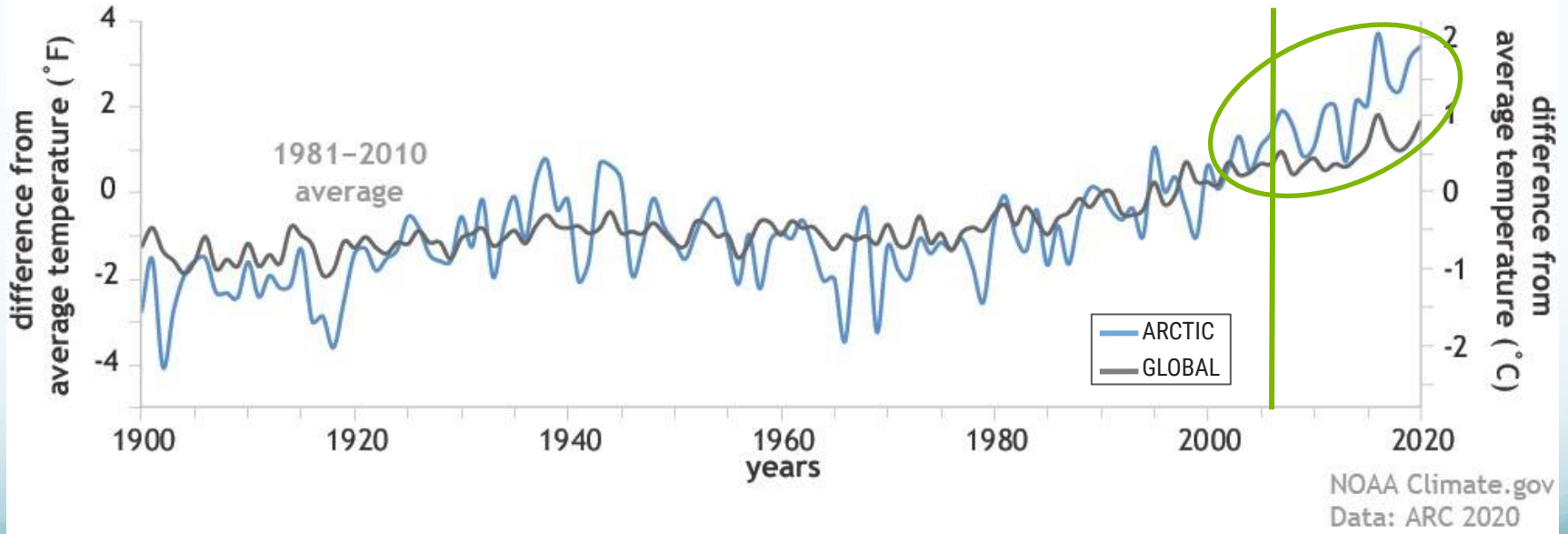
*Timely communication of Arctic change to broad audience*



# 15-Year Retrospective

*Putting things in context*

## ARCTIC WARMING TWICE GLOBAL AVERAGE IN RECENT DECADES

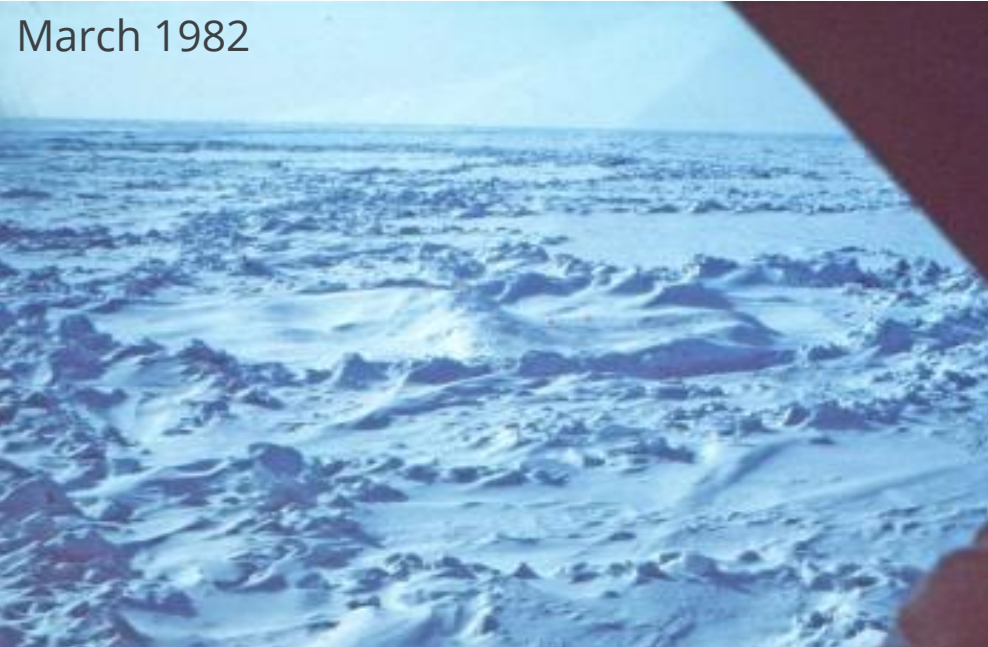


*Accelerated Arctic warming drives unprecedented ice loss*



# Eye Witness to Arctic Change

March 1982



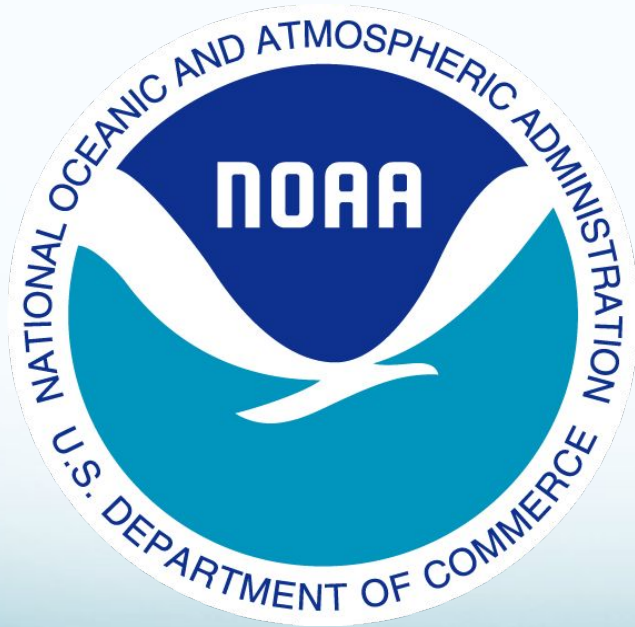
February 2018



Alaskan Beaufort Sea, North of Prudhoe Bay, AK



# *Thank You!*



ARCTIC REPORT CARD  
**FIFTEEN**  
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# EXTRA SLIDES



# Arctic Sea Ice Minimum 2020



# Summer 2020 Arctic Snow and Ice Melt

