

NOAA 2020 Arctic Report Card

Observing 15 Years of Arctic Change

RDML Tim Gallaudet, Ph.D., USN Ret.

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Matthew Shupe, and Jackie Richter -Menge



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

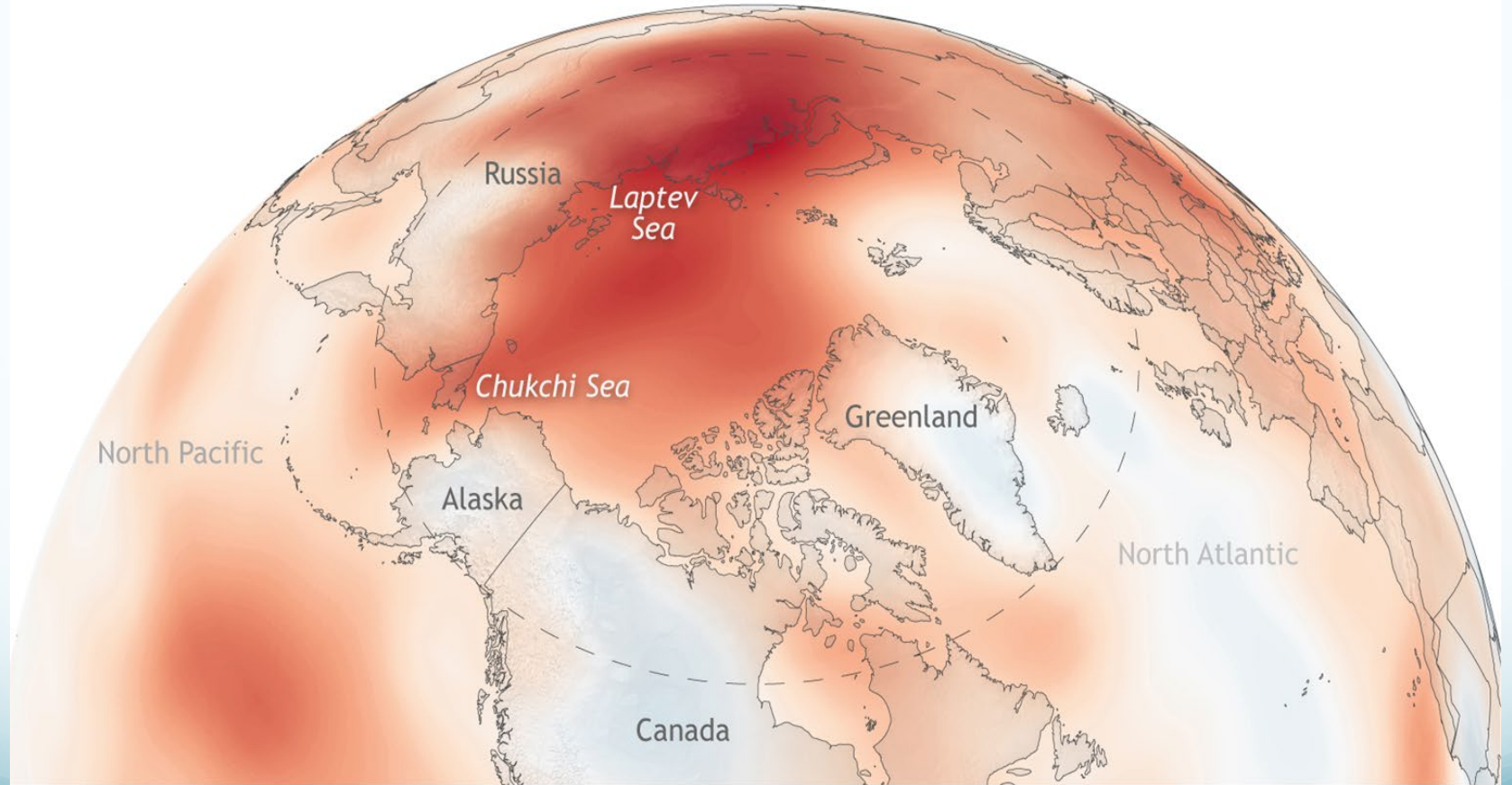
Glaciers & Ice Caps outside of Greenland
Permafrost Coastal Erosion
Bowhead Whales
Wildland Fires
Frost Bites
MOSAIC Expedition
Modeling & Projections of Arctic Sea Ice Cover
Barrow Observatory



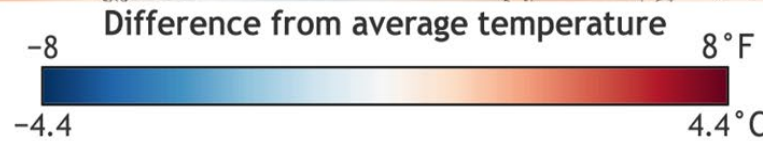
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2020 WAS ARCTIC'S SECOND-WARMEST YEAR ON RECORD

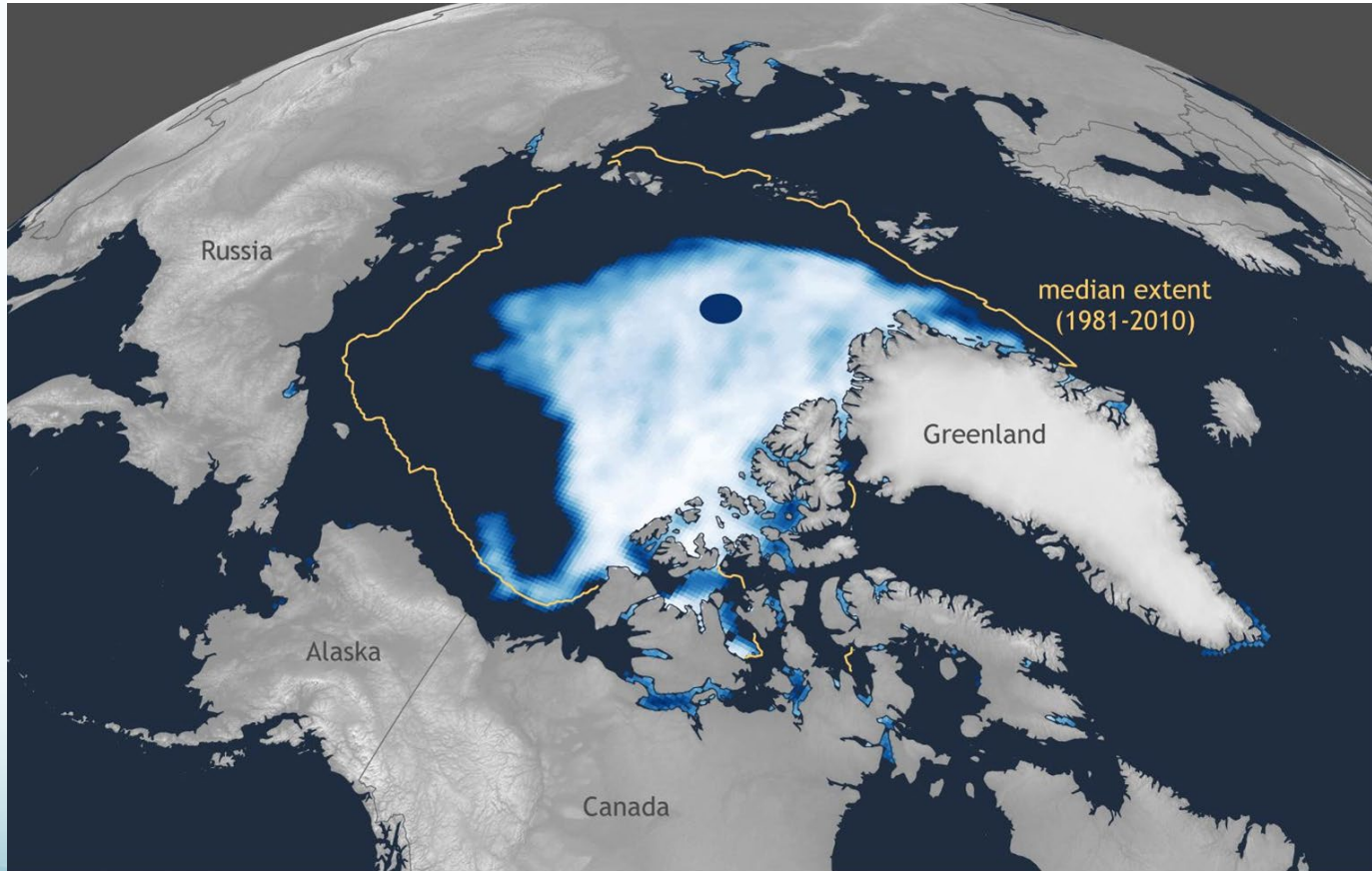


Oct 2019–Sep 2020



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

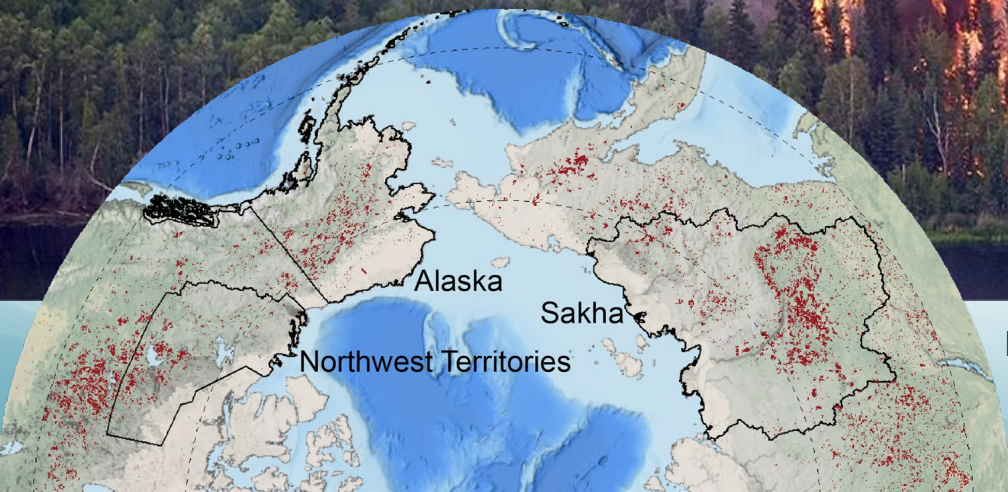


Wildland Fire in High Northern Latitudes

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

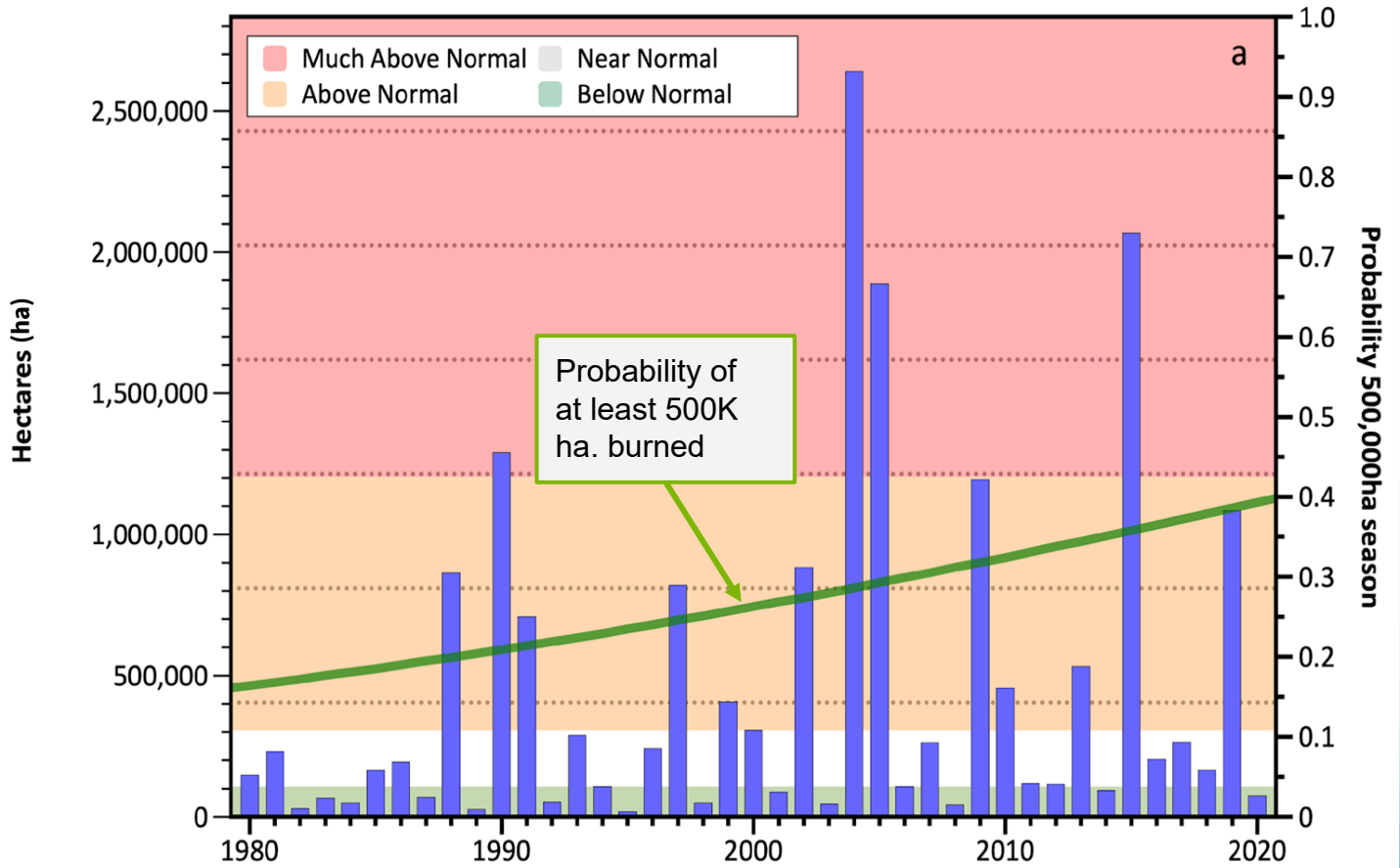


Figure by R. Thoman, data from Alaska Interagency Coordination Center

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 THE NORTHERN HIGH LATITUDES

DUFF FUELS

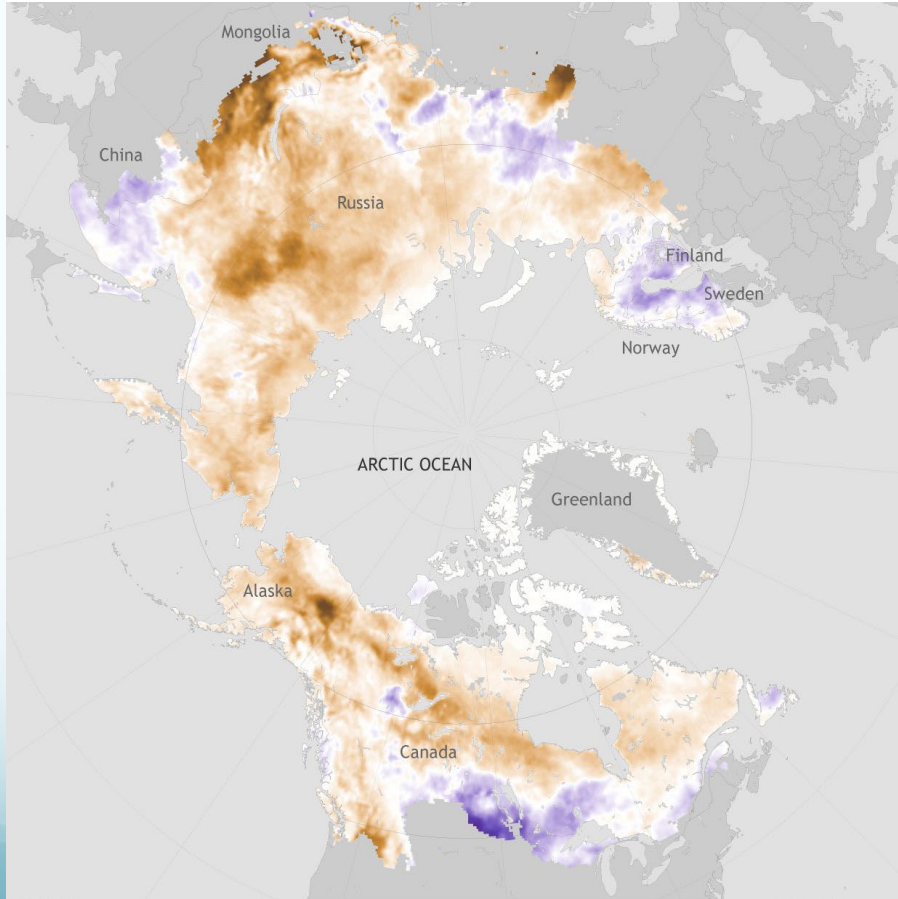
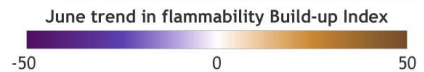


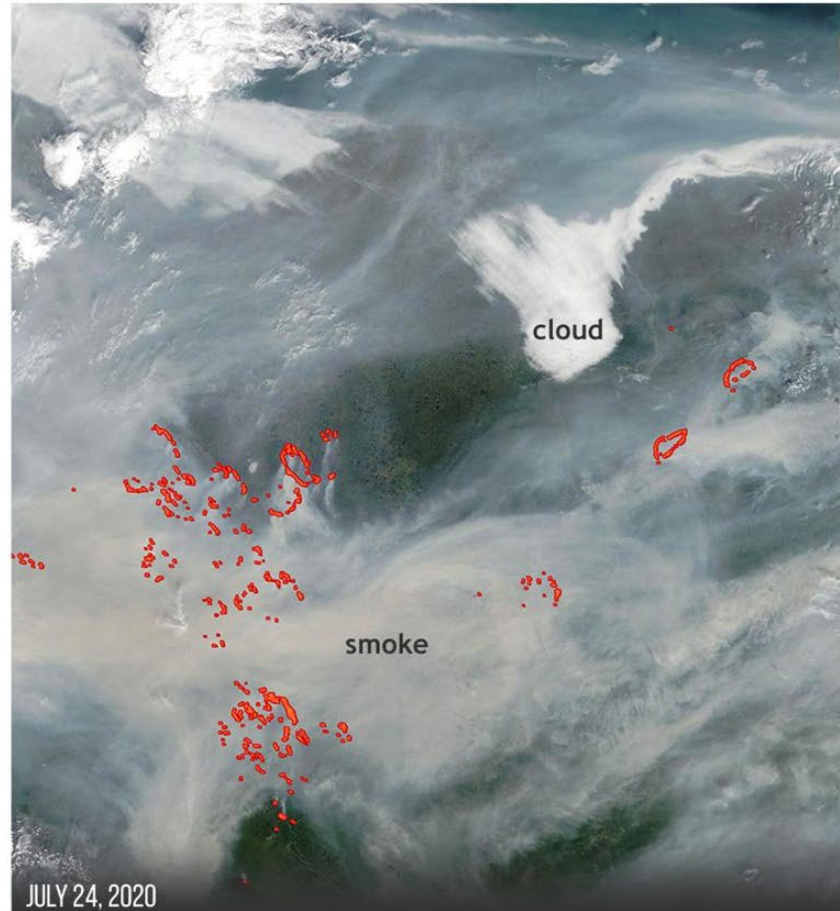
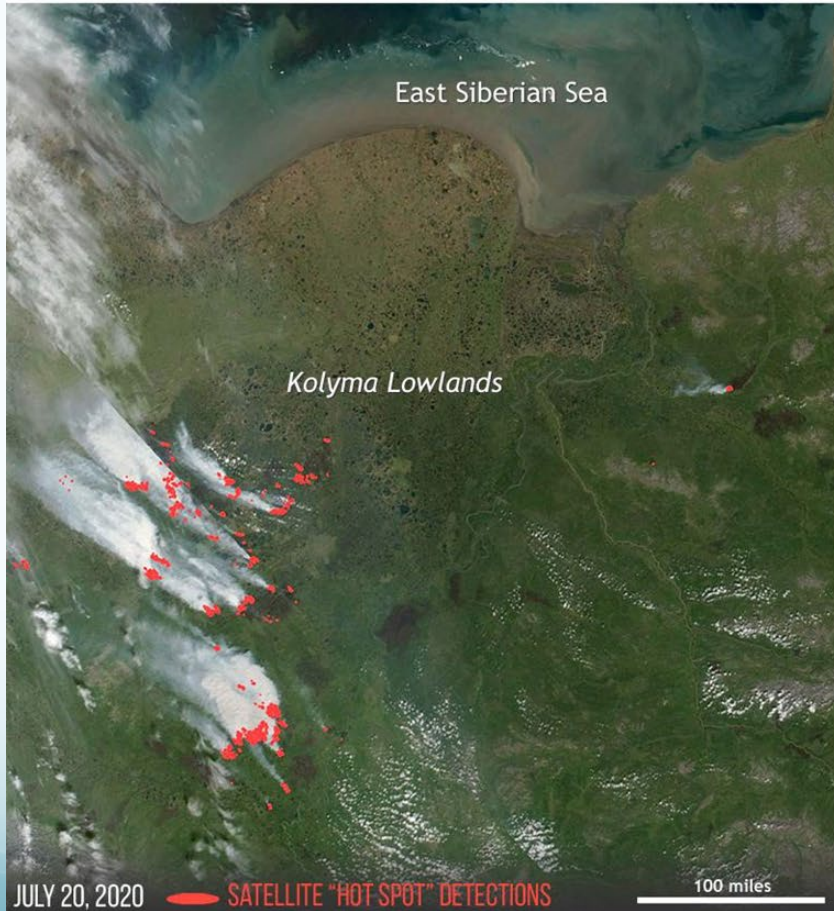
Photo courtesy R. Jandt

1979-2019

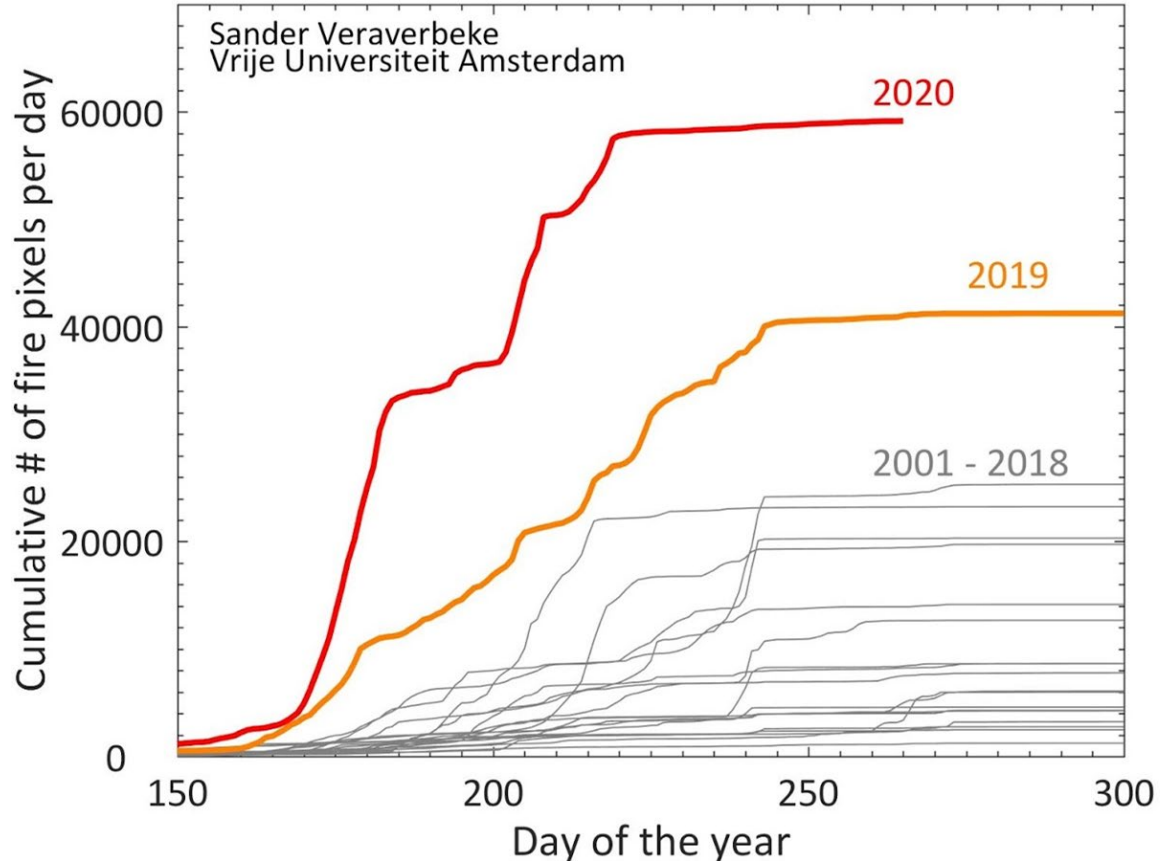


NOAA Climate.gov
Data: U. Bhatt/ARC 2020

EXTREME FIRE SEASON IN SAKHA REPUBLIC OF NORTHEASTERN RUSSIA



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



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

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



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

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

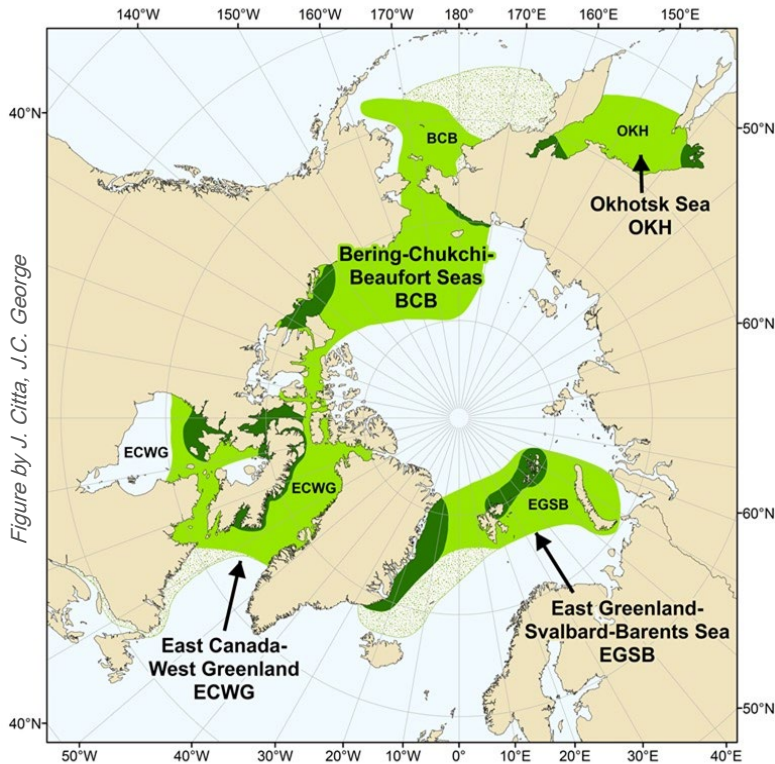


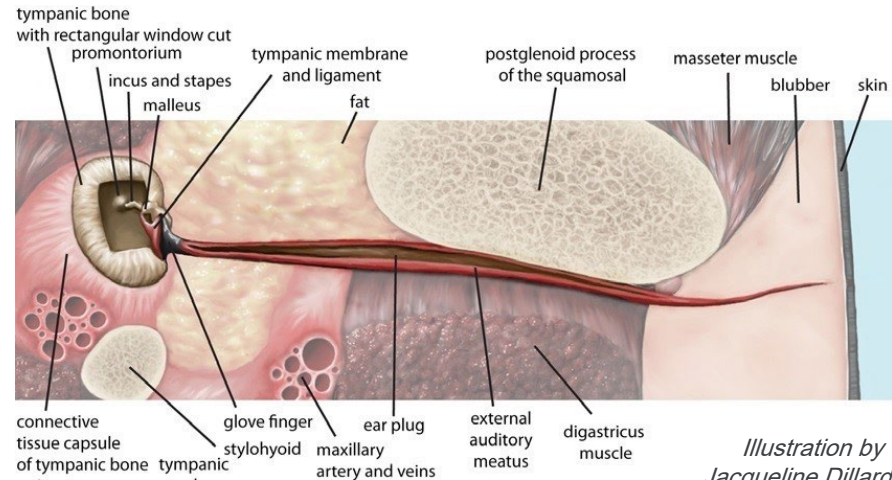
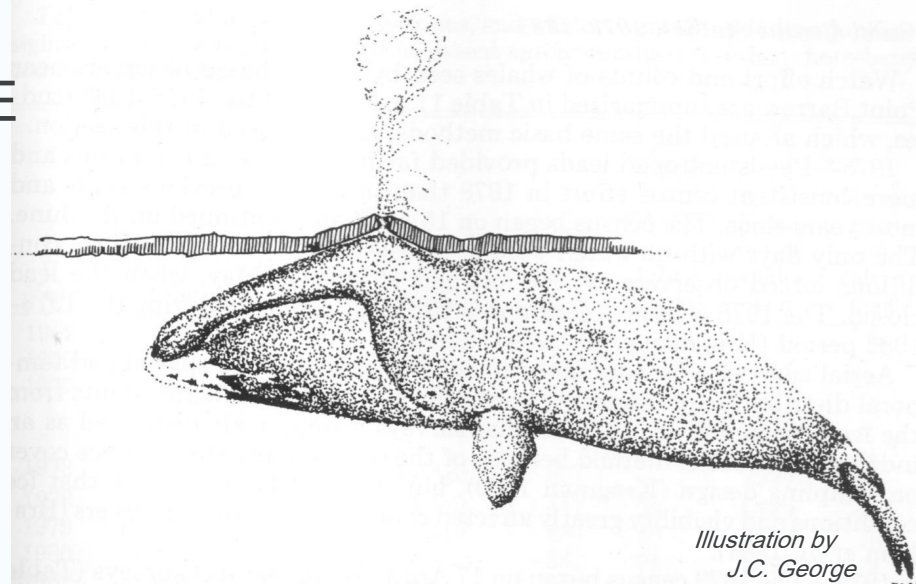
Figure by J. Citta, J.C. George

- 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



Quyanaqpak!

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 

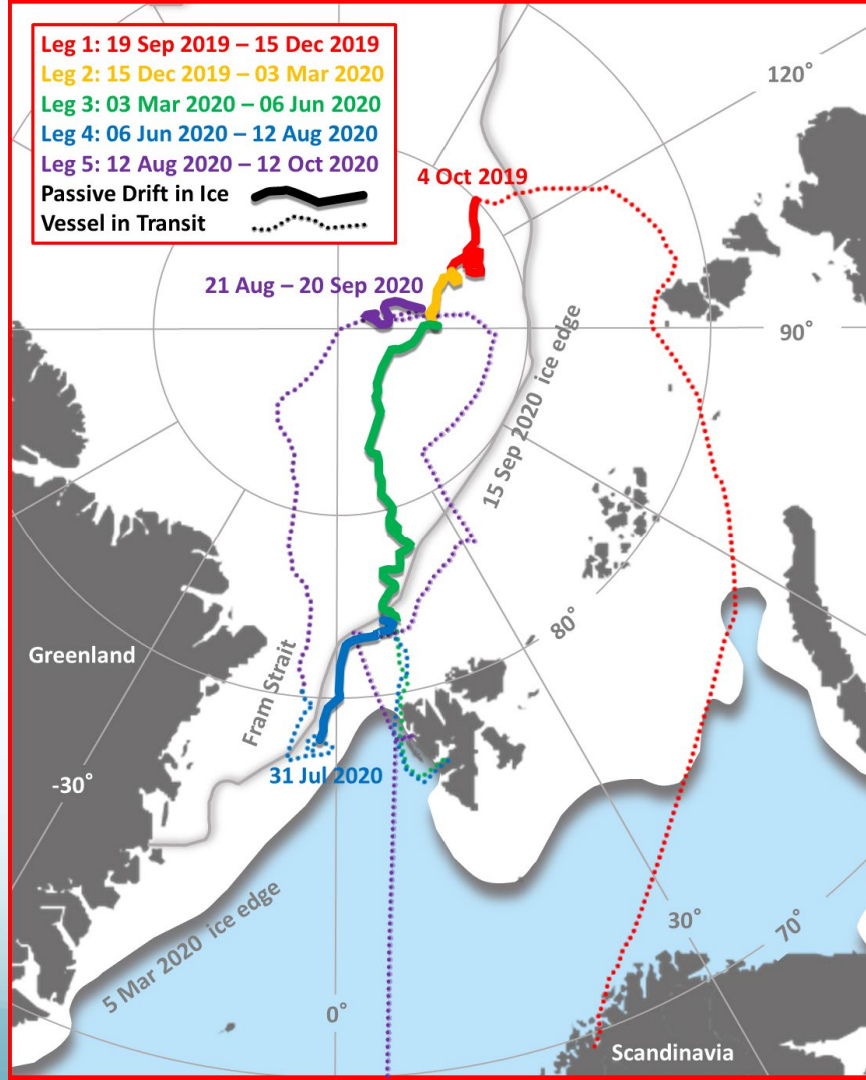




Photo: Marcel Nicolaus



Photo: Marcel Nicolaus

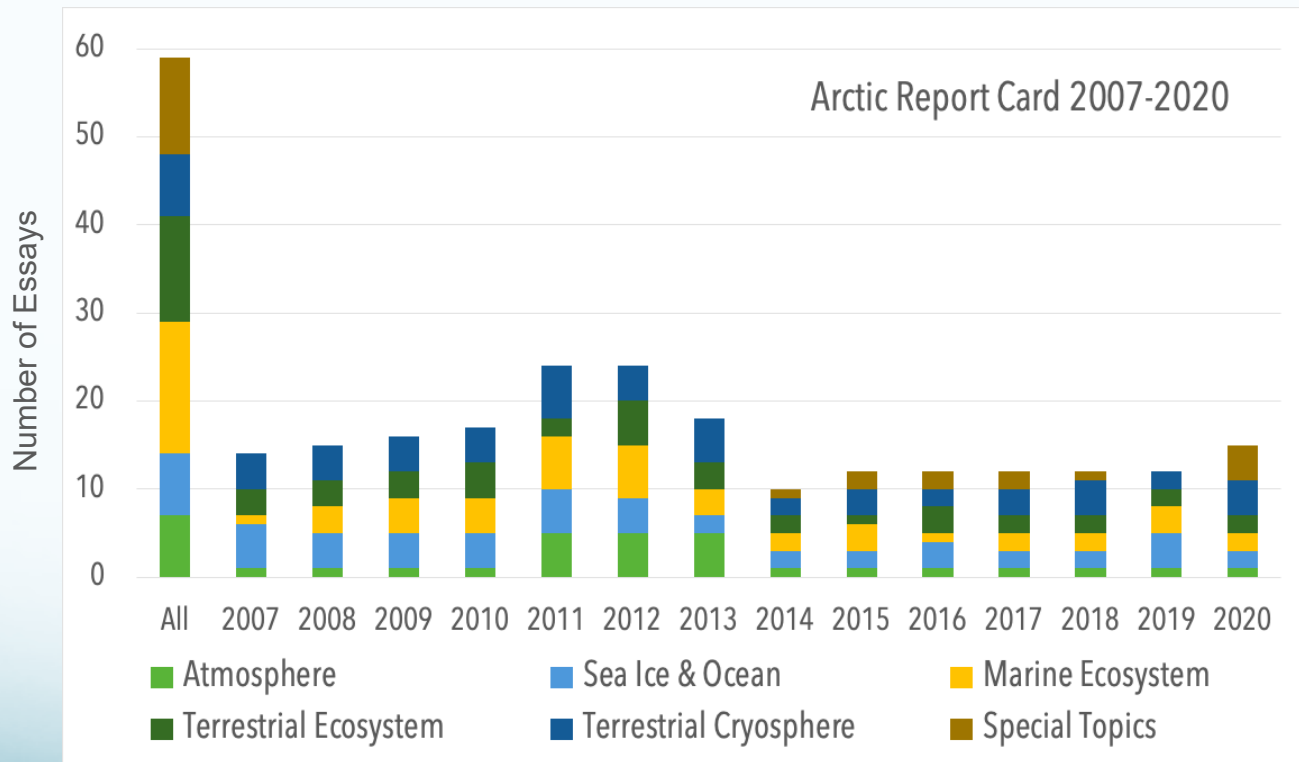
Photo: Michael Gallagher





Photo: Markus Rex

Happy 15 Year Anniversary!



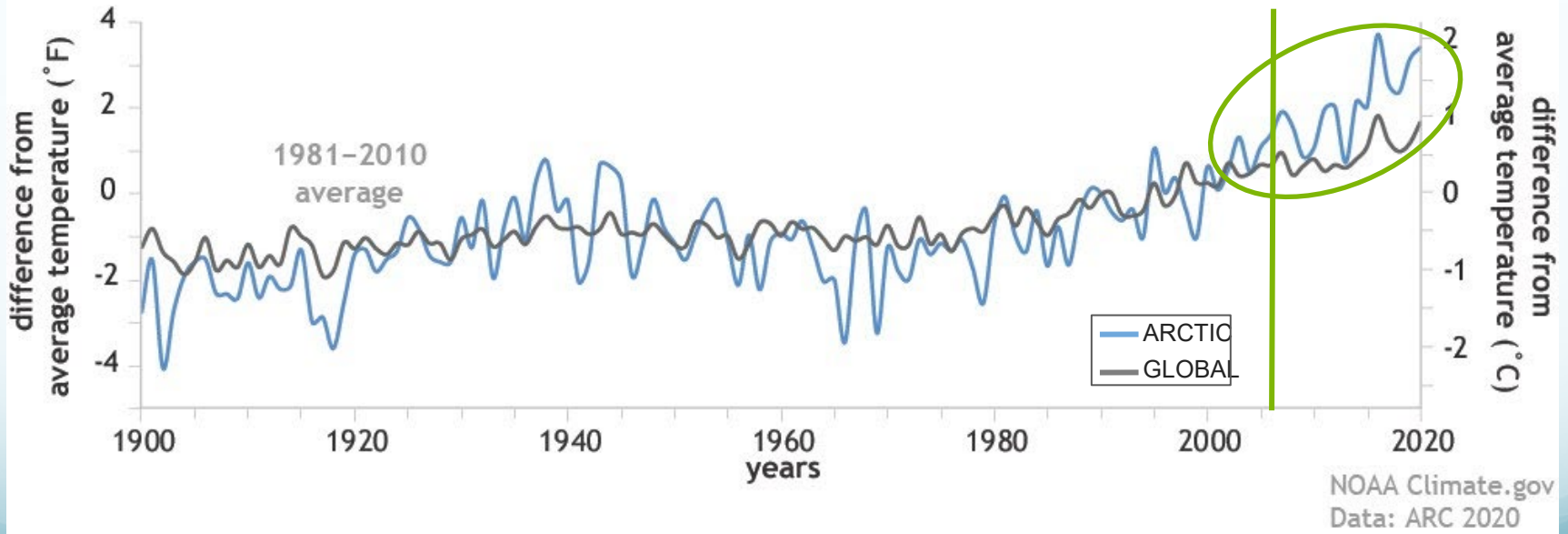
Timely communication of Arctic change to broad audience



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



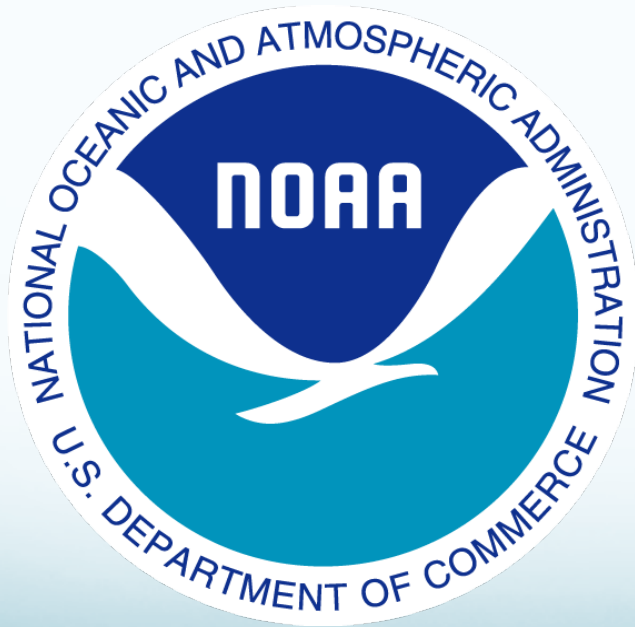
February 2018



Alaskan Beaufort Sea, North of Prudhoe Bay, AK



Thank You!



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EXTRA SLIDES



Arctic Sea Ice Minimum 2020



Summer 2020 Arctic Snow and Ice Melt

