



# Navigating extreme changes in the Bering and Chukchi seas

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# Background: we experience or understand the same stories differently

A key result of my research:

**The Arctic is already in a new climatic state**



## Extremes become routine in an emerging new Arctic

Laura Landrum  and Marika M. Holland 

September, 2020



To learn another's understanding we must  
**LISTEN & LEARN** more than **TALK & TELL**



**Jackie Qataliña Schaeffer**

Alaska Native Tribal Health Consortium

“You have two ears and  
one mouth for a reason”

Guiding questions (motivation):

**What tools (resources, information, etc.) can  
we as climate scientists provide that  
communities find useful?**

**How can community experience and  
knowledge aid our research?**

# Bering-Chukchi Seas



People have thrived in communities near these highly productive marine areas for millennia

Highly productive  
Strong seasonality  
(sea ice, polynyas, leads)  
Migratory routes  
(marine mammals, birds)



Laura L. Landrum, photo

Regional map from Huntington et al., 2021



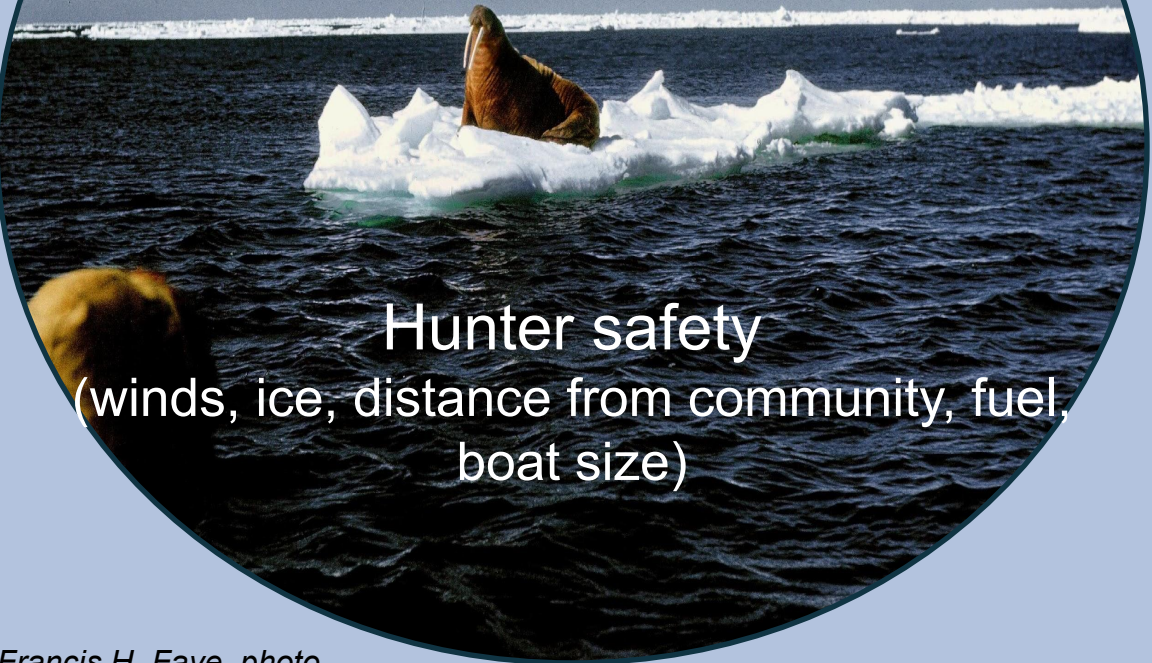
L Landrum

Extreme changes in the Bering & Chukchi Seas

[landrum@ucar.edu](mailto:landrum@ucar.edu)

Hunting success

Prey  
(accessibility, health, haul out)

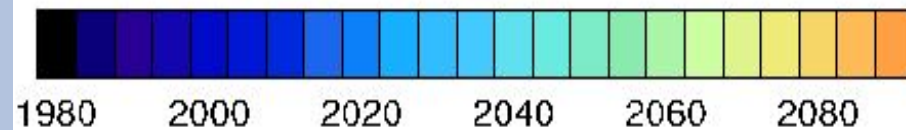
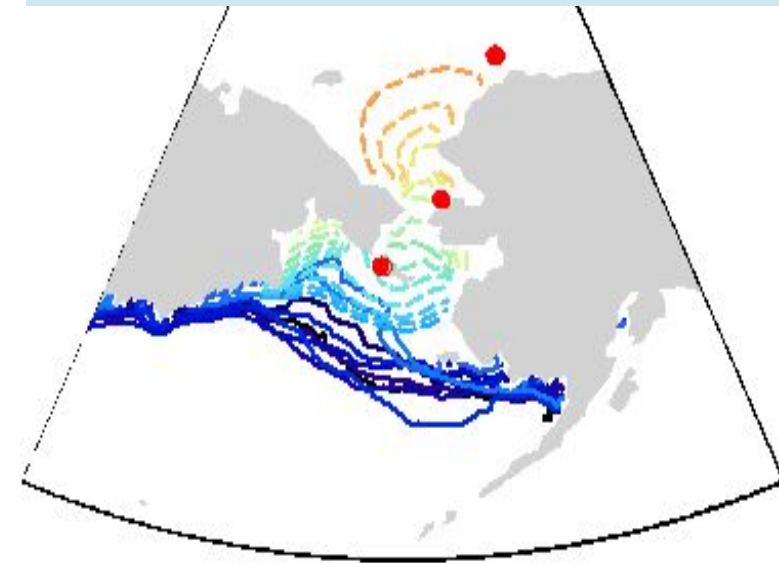


Hunter safety  
(winds, ice, distance from community, fuel, boat size)

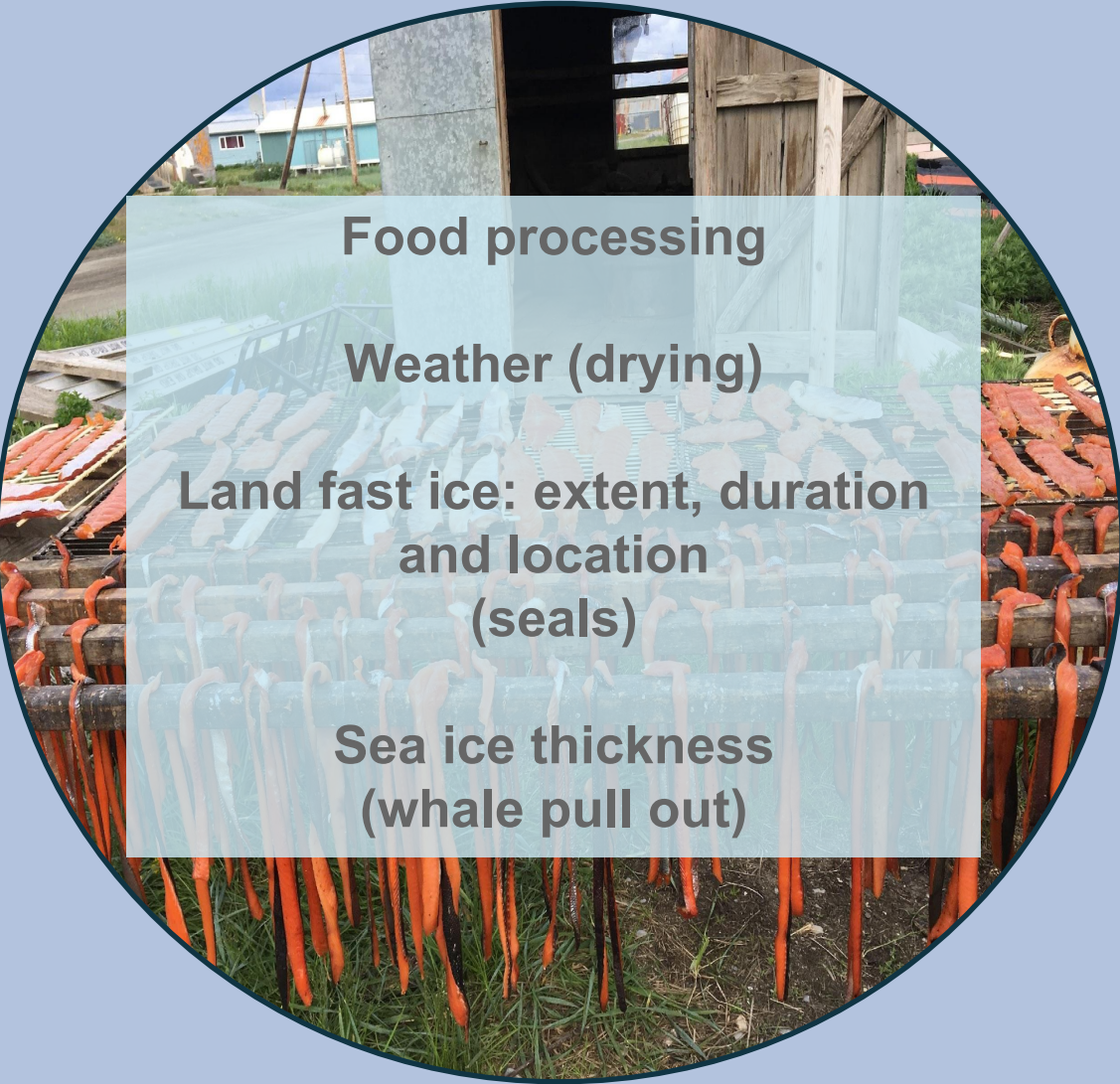
Francis H. Faye, photo

*“Every time we go out now, we’re on the fringes of not coming back to the community” MA*

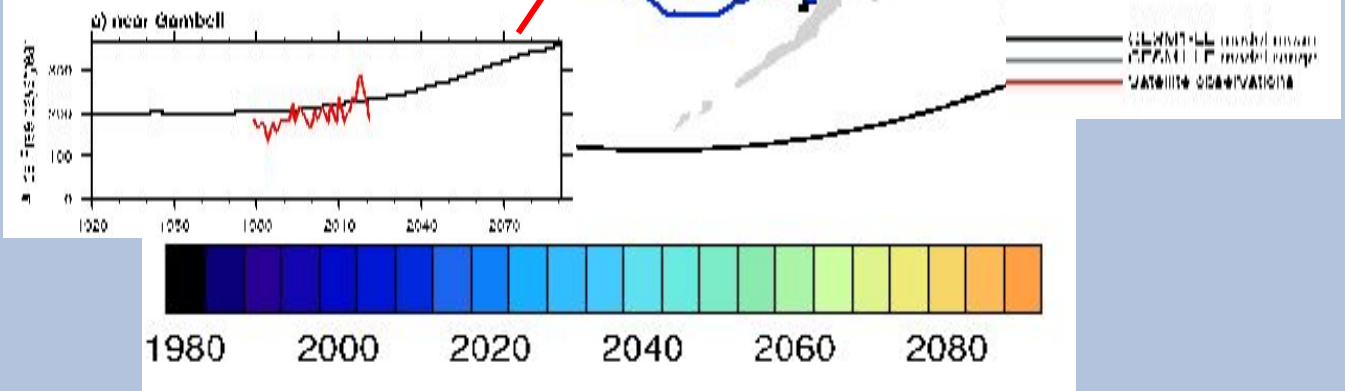
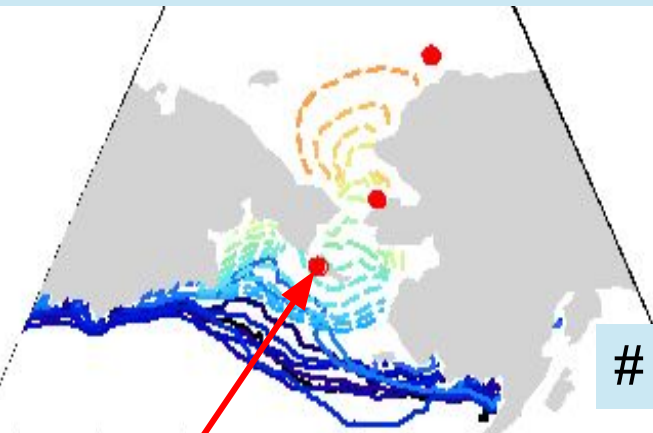
~3 months sea ice



*“Seems like nowadays, it’s like chasing the ice towards the north” BR, Jr.*

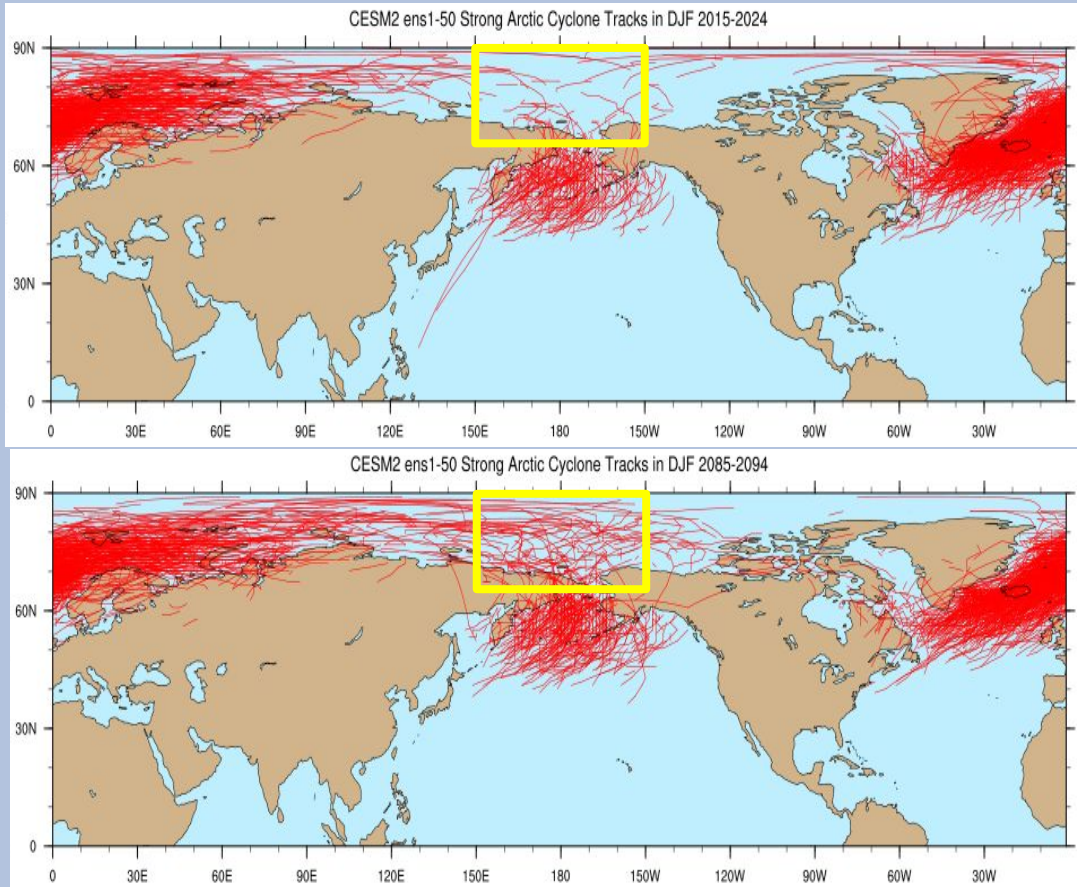


~3 months sea ice



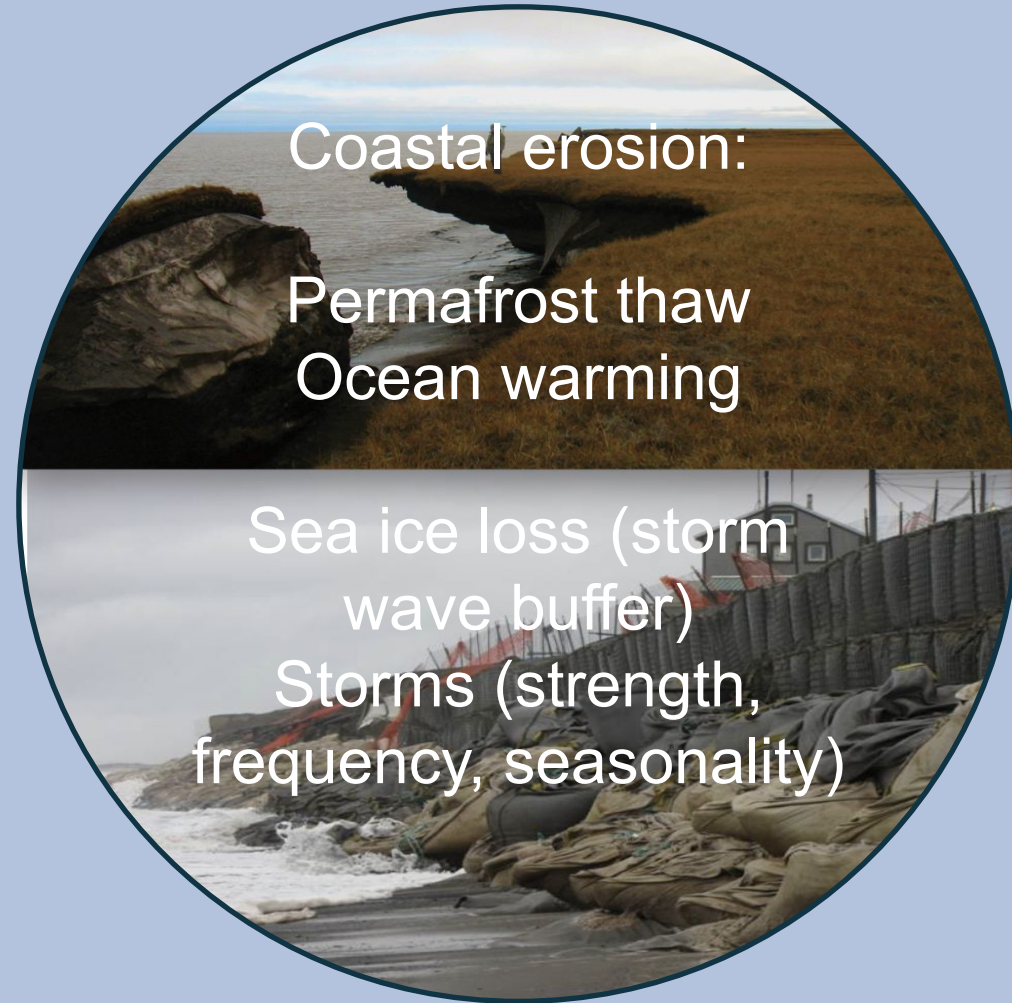
*“Even this year, there are people with no food out there due to marginal conditions” BR, Jr.*

# Projected Changes in Strong Winter Cyclones and Sea Ice



**2015-2024**

**2085-2094**



from the Community Earth System Model 2 Large Ensemble (CESM2-LE) and Tempest Extremes. Figure courtesy of S. Vavrus

Images in the public domain, Christopher Arp, photo:  
<https://d9-wret.s3.us-west-2.amazonaws.com/assets/palladium/production/s3fs-public/thumbnails/image/ShoreProtectionWainwright.jpg>

**“Even this year, There are people with no food out there due to marginal conditions” BR, Jr.**

## August Ocean Temperatures

2020

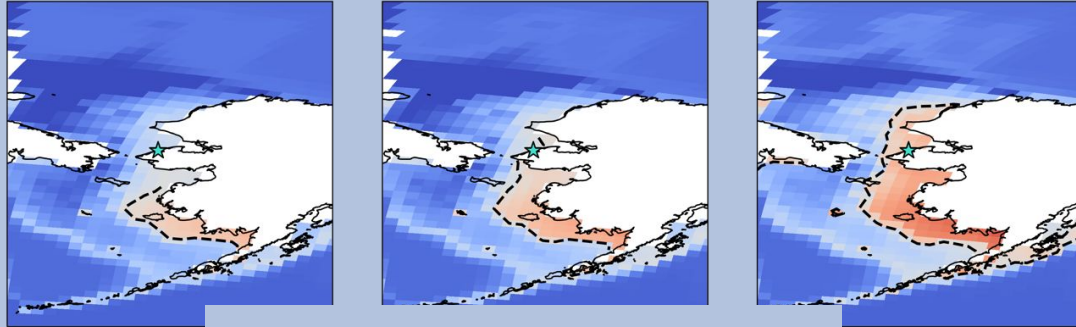
2050

2080

a) August ocean floor temp, 2020

b) August ocean floor temp, 2050

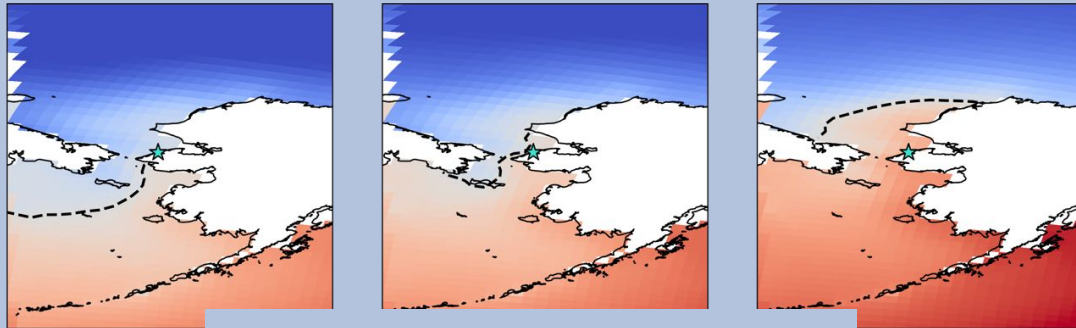
c) August ocean floor temp, 2080



### Ocean floor Temperatures

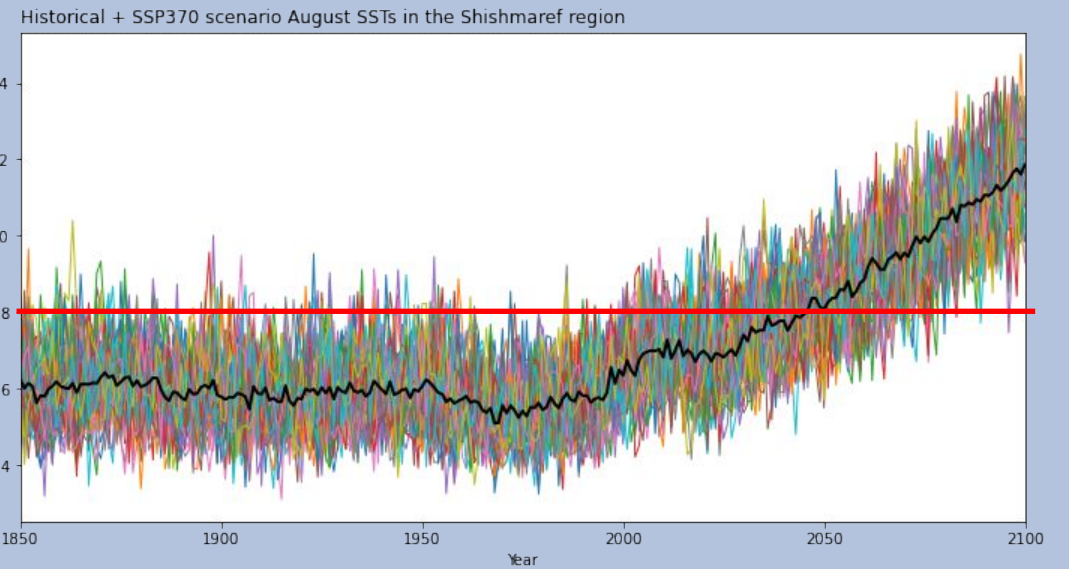
d) August ocean surface

e) August ocean surface temp, 2080



### Sea Surface Temperatures

## August Sea Surface Temperatures near Shishmaref



from the Community Earth System Model 1 Large Ensemble (CESM1-LE; Kay et al., 2016). Figure courtesy of K. Krumhardt

**8°C and warmer: increased HAB (harmful algal bloom) risk**







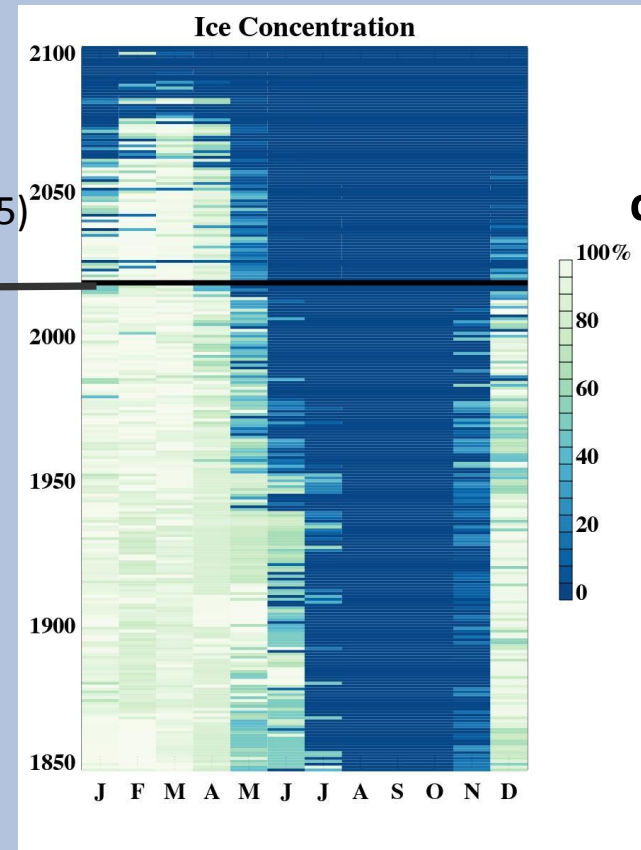
Food Storage  
Earthen Ice cellars  
(permafrost, rain, ice and  
snow for cooling)

Image in the public domain:  
<https://www.usgs.gov/media/images/native-ground-ice-cellar-wainwright-alaska>

*“It used to be that every family had an earthen cellar. Now there are only a couple..... You can’t put Tuugtaq (walrus meatballs) in a refrigerator.” MA*

**Climate model  
2021-2100**  
(CESM1-LE; Kay et al., 2015)

**Observed period  
1850-2020**  
(Walsh et al., 2019)



**Sea Ice  
concentrations  
near Gambell,  
St Lawrence  
Island**

*“On St Lawrence Island, winter is when the sea ice comes. Now sometimes we don’t get winter” MA*



# References

## References:

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