A satellite image of Northern Alaska, showing a vast expanse of snow and ice cover. The terrain is rugged, with mountains and valleys visible. The colors range from white and light blue to dark green and brown, indicating different types of vegetation and land cover. The text "Observed Climate Change in Northern Alaska" is overlaid in large, bold, black letters.

# Observed Climate Change in Northern Alaska

**Martha Shulski**

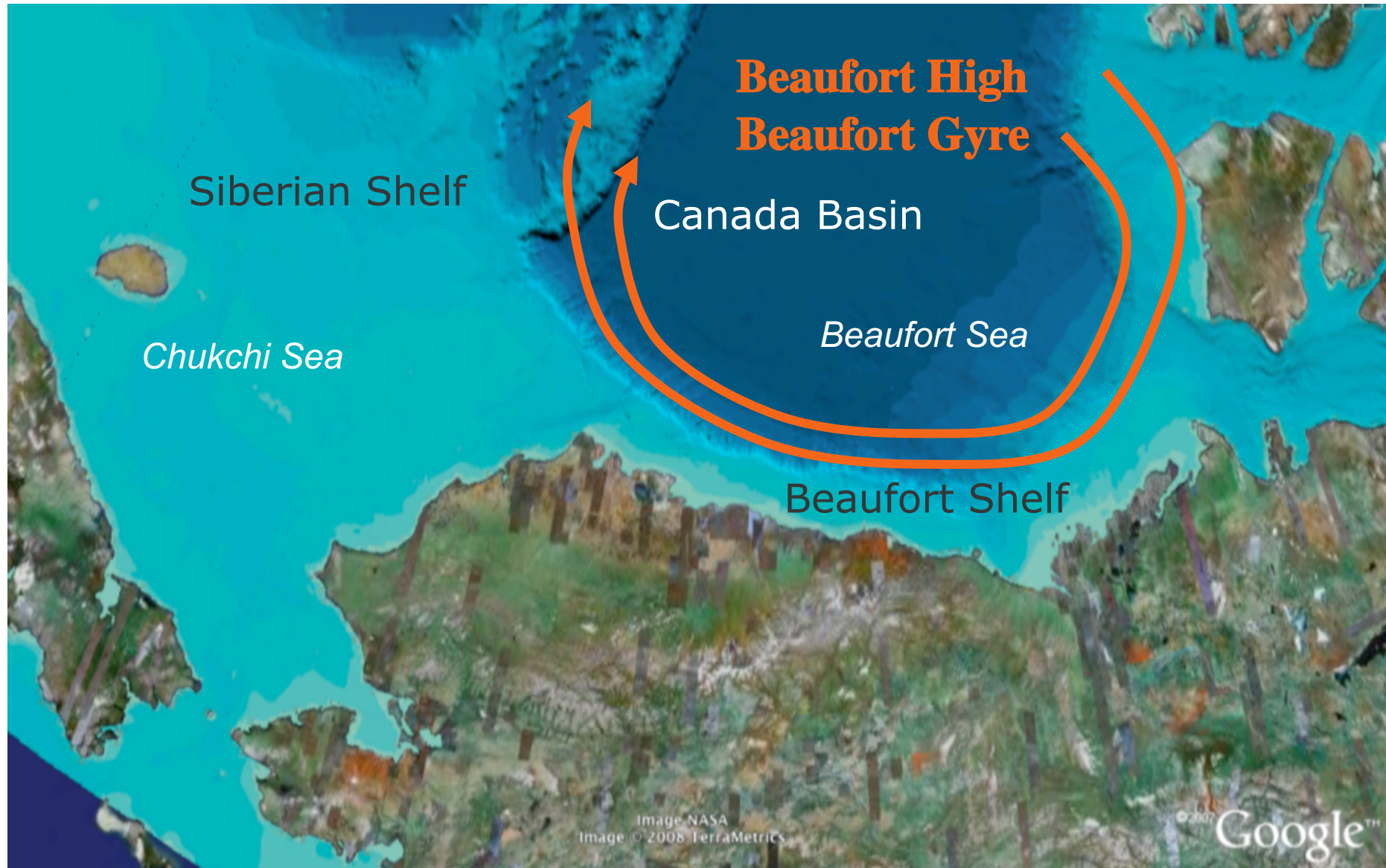
Alaska Climate Research Center

Geophysical Institute, UAF

<http://climate.gi.alaska.edu>



# Alaska's Arctic: Features of the Region



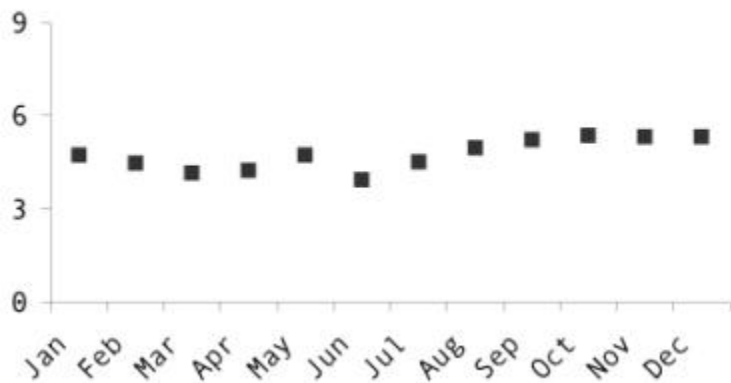
# Alaska's Arctic: Features of the Region

Siberian Shelf

Beaufort High  
Beaufort Gyre

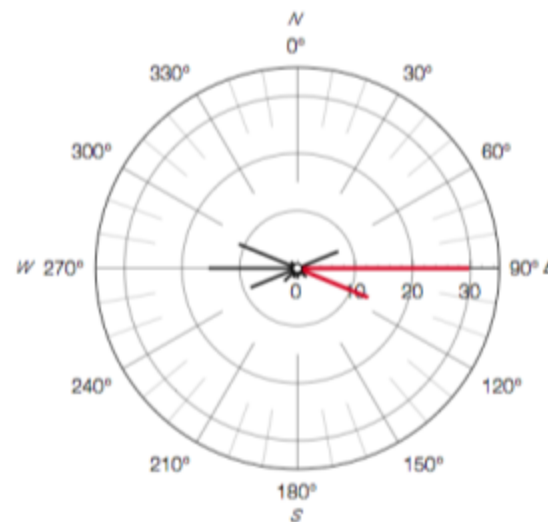
Canada Basin

Barter Island Wind Speed (m/s)

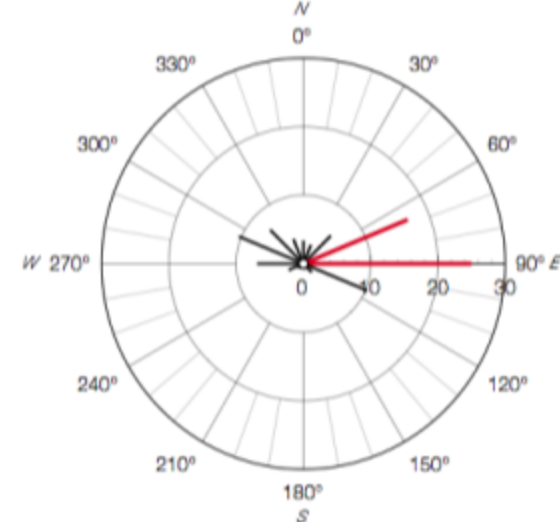


Calm: <2%  
Speed: 5 m/s

Jan



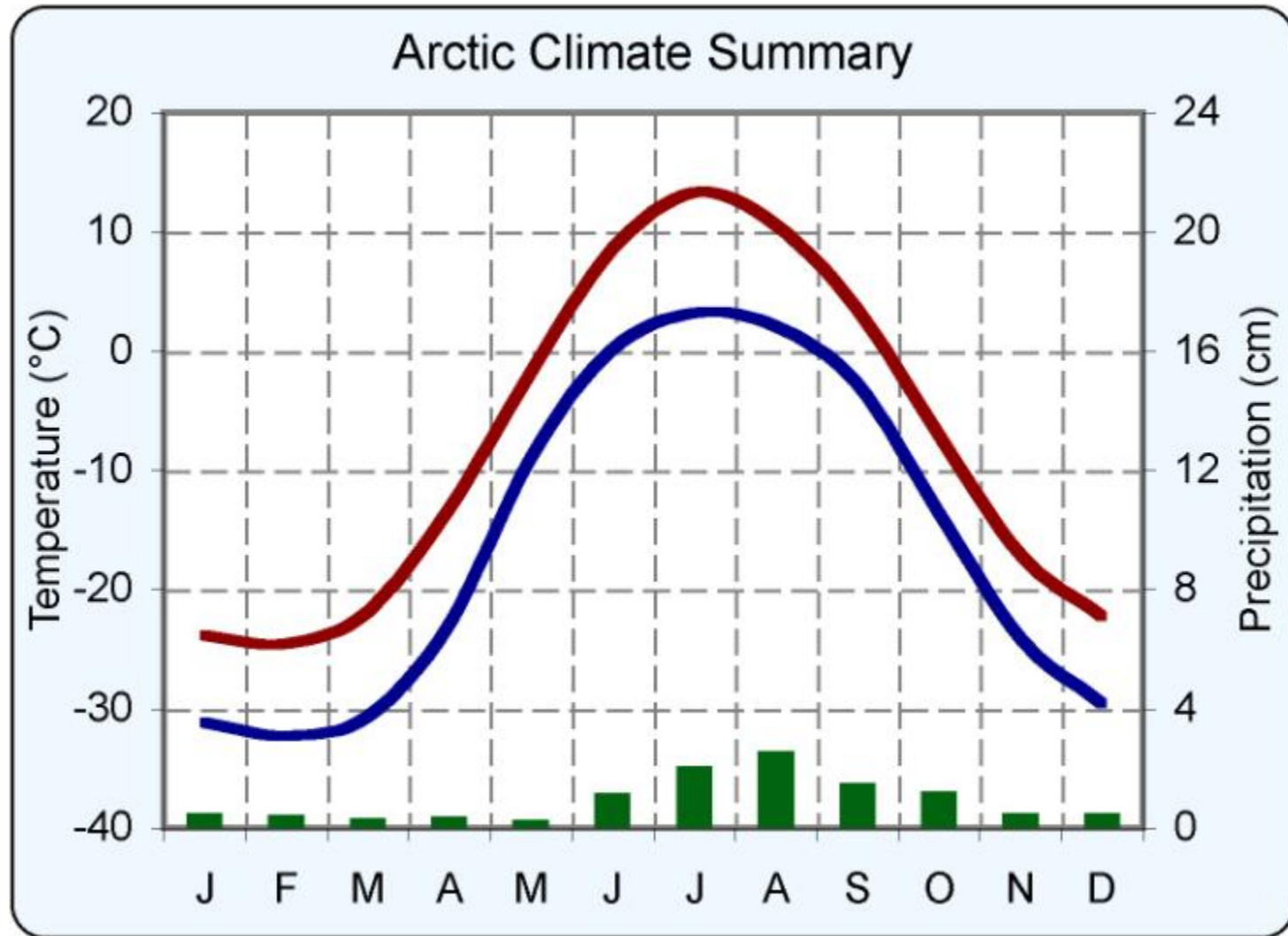
Jul



Prevailing winds

# Alaska's Arctic: Features of the Region

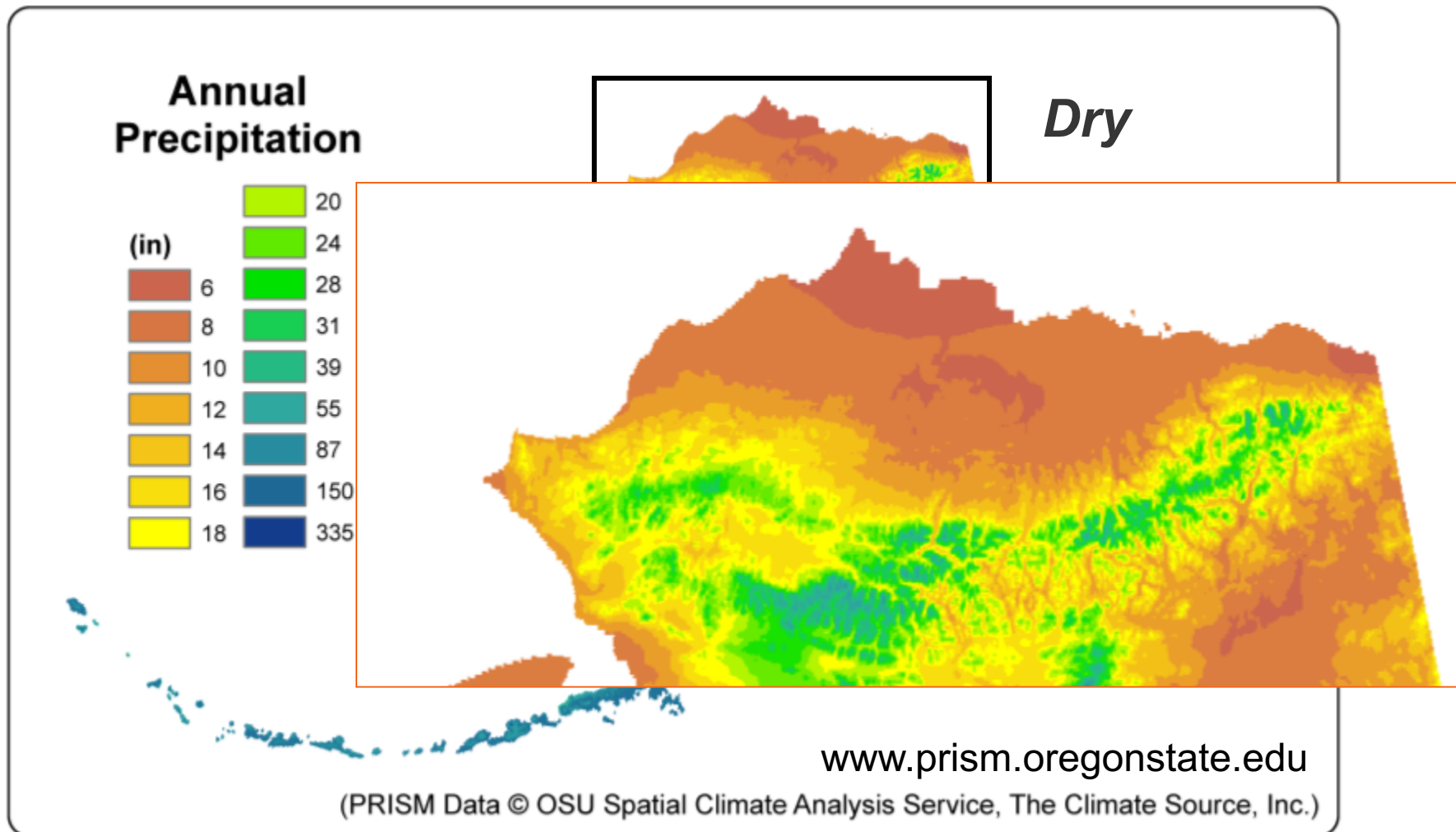
T = -12° C  
P = 10 cm  
S = 86 cm  
Snowcover  
Sept - June



*Barrow, Kuparuk  
Prudhoe Bay, Umiat*

# Alaska's Arctic: Features of the Region

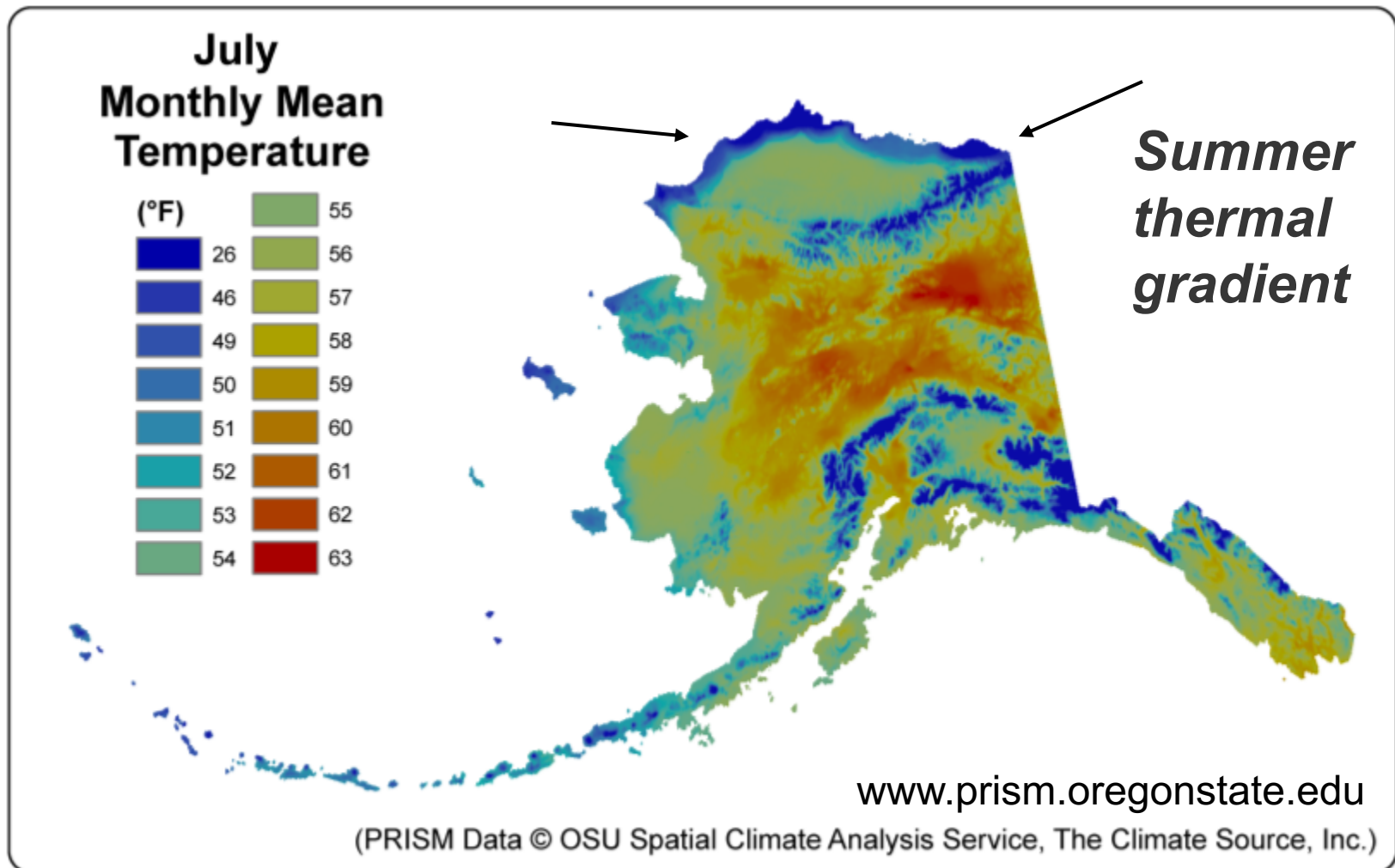
## Comparison to rest of Alaska





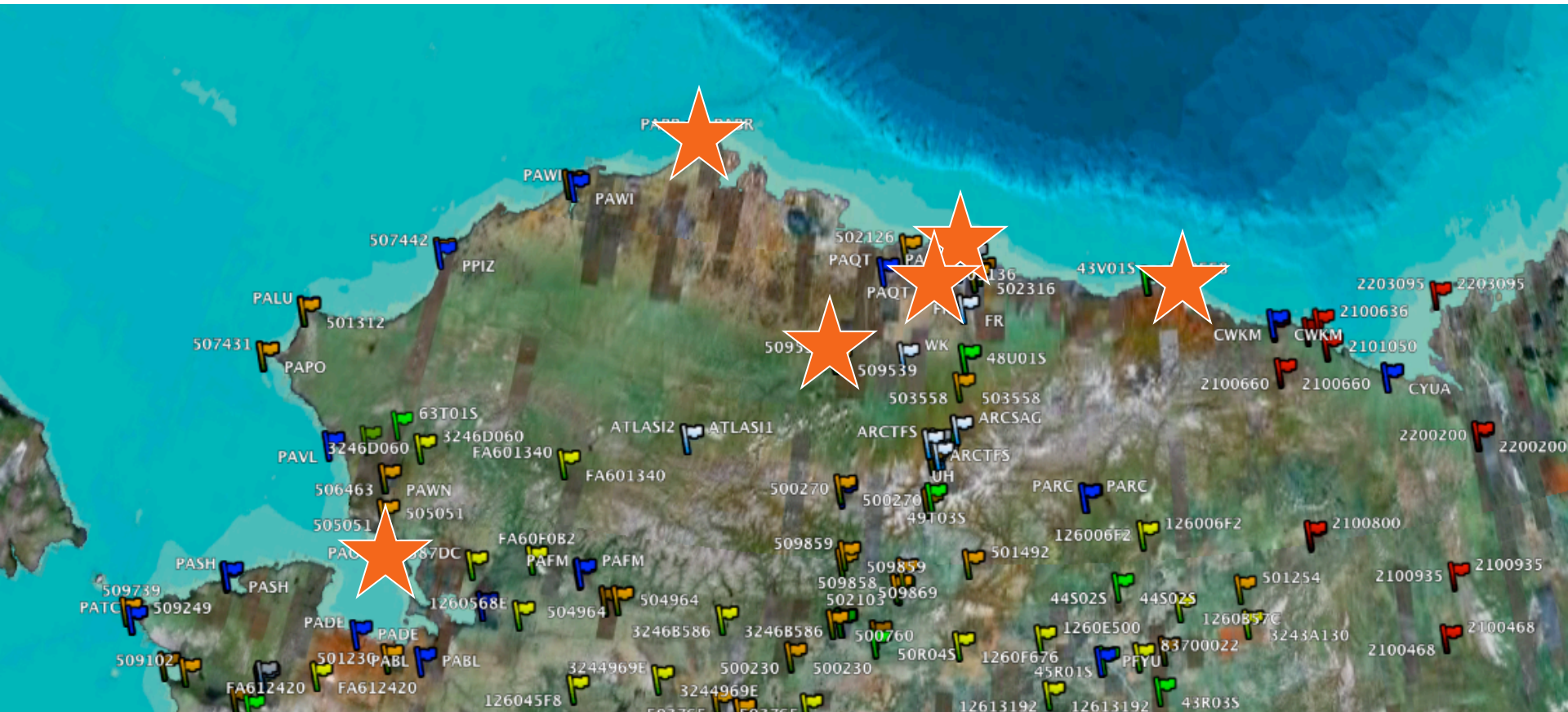
# Alaska's Arctic: Features of the Region

## Comparison to rest of Alaska



# Alaska's Arctic: Features of the Region

## Meteorological observing stations







**Lack of spatial detail!!**

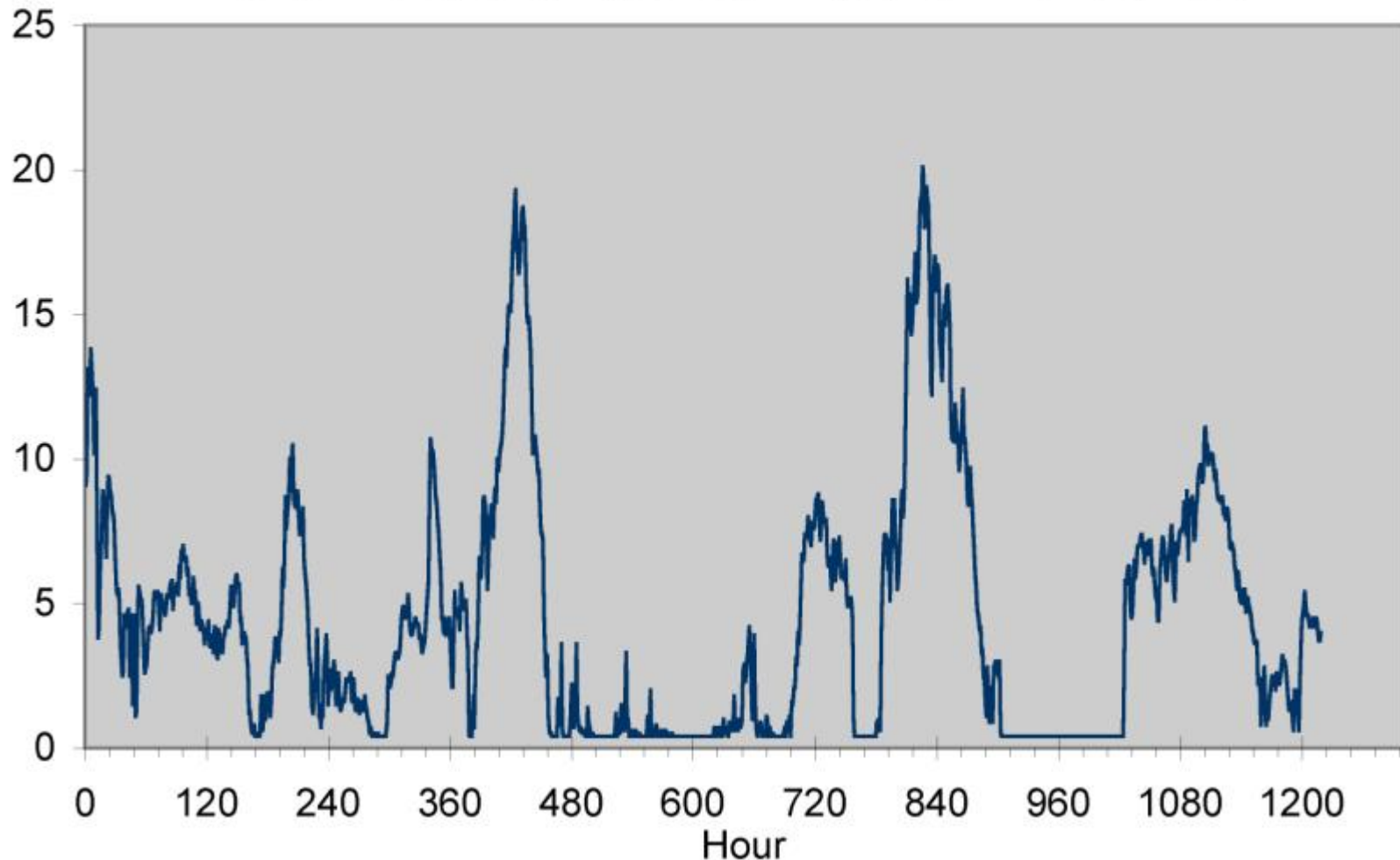
- inland
- high elevation



# Alaska's Arctic: Features of the Region

## Data Problems    anemometer icing

Hourly Wind Speed (m/s) at Petty Pingo (1 Jan - 20 Feb, 2002)



# Alaska's Arctic: Features of the Region

## Data Problems

measuring precipitation accurately



US NWS 8" non-recording gauge  
Photo by S. Berezovskaya (UAF)



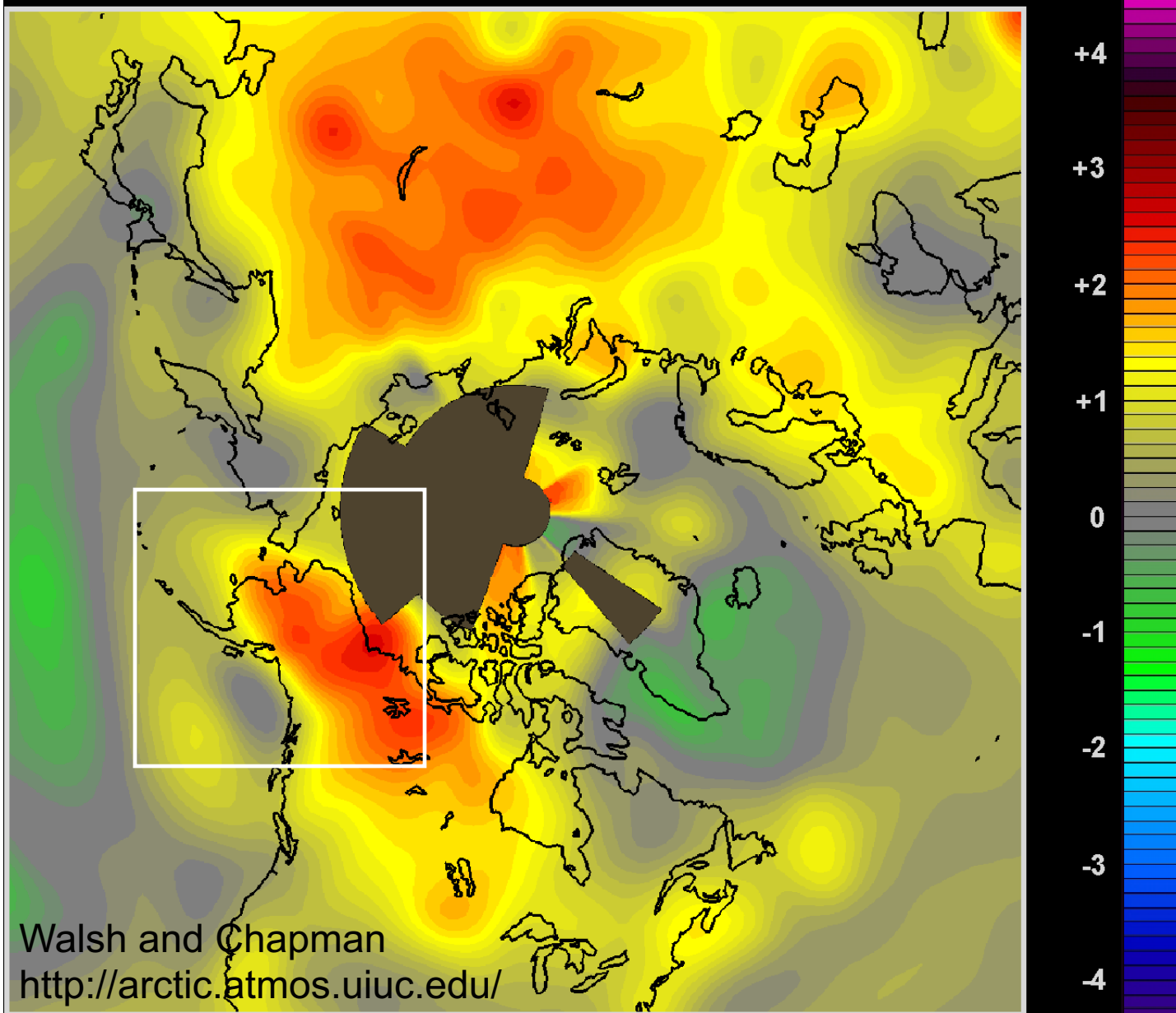
Double Fence Intercomparison  
Reference (DFIR)  
Photo by D. Yang (UAF)





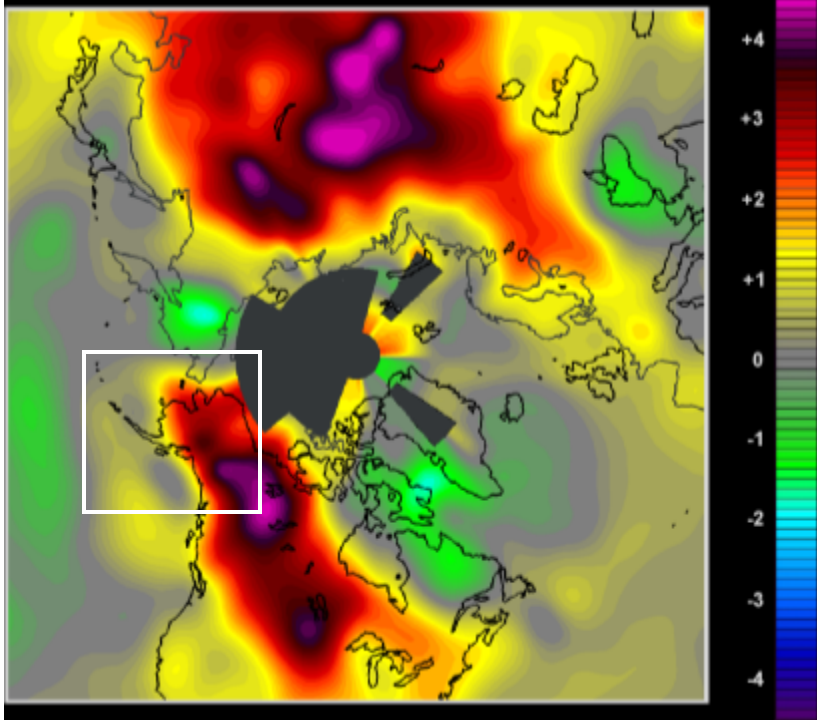
# Surface air temperature change : 1954 - 2003

annual - °C

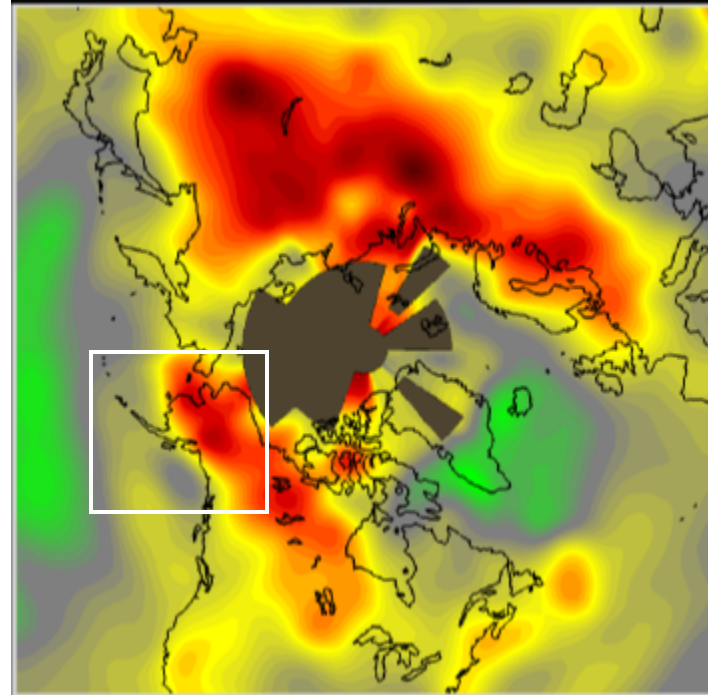




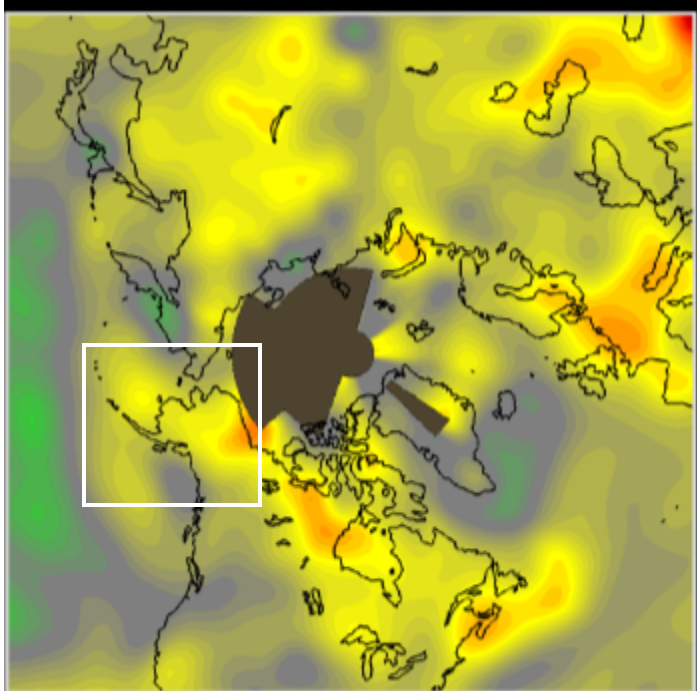
winter



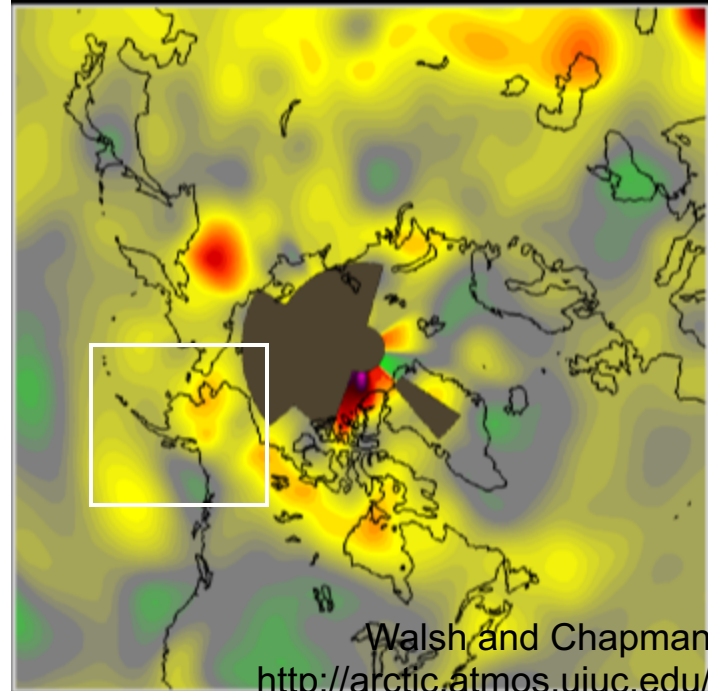
spring



summer

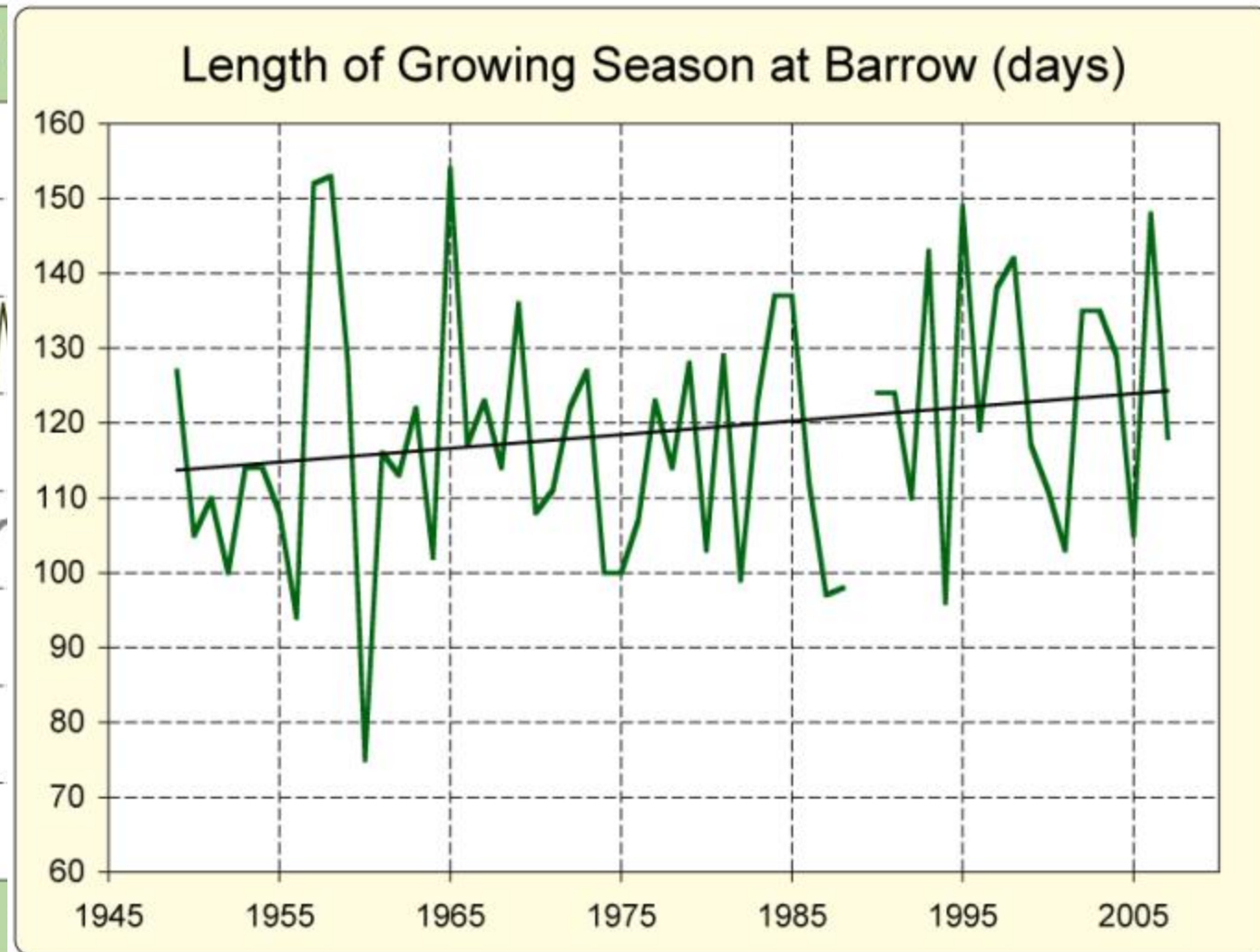


autumn



# Alaska's Arctic: Changes in the Region

## Growing season increase

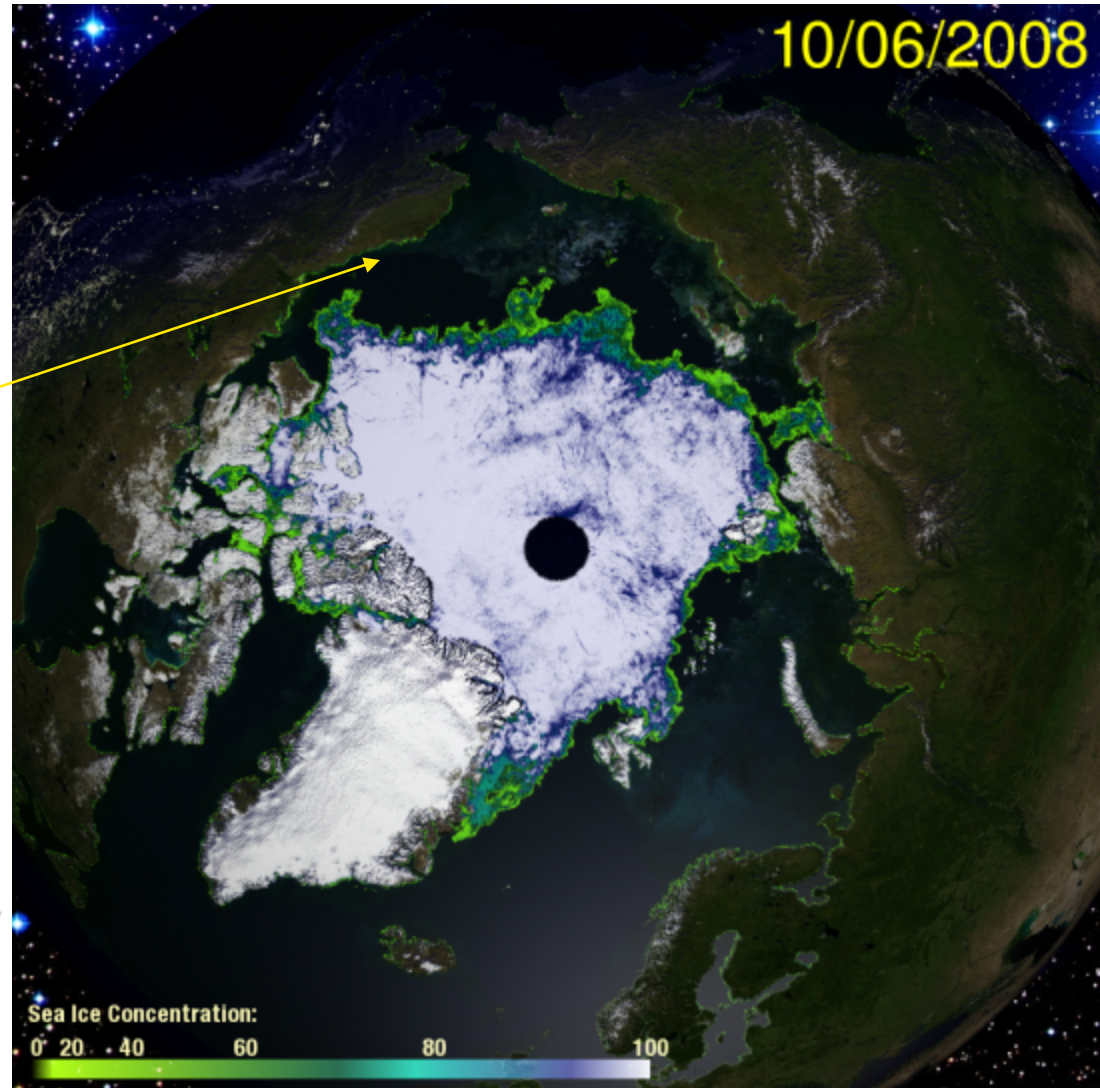
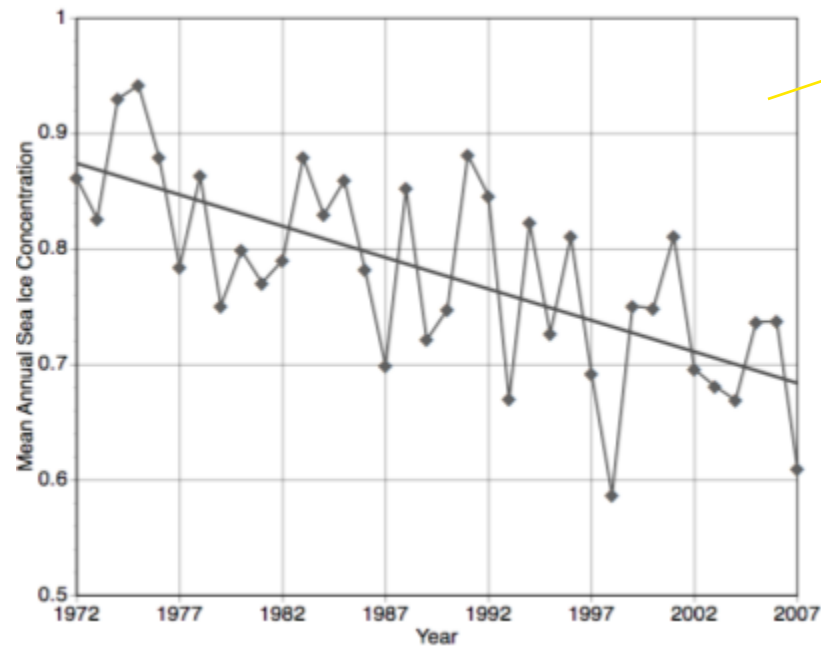




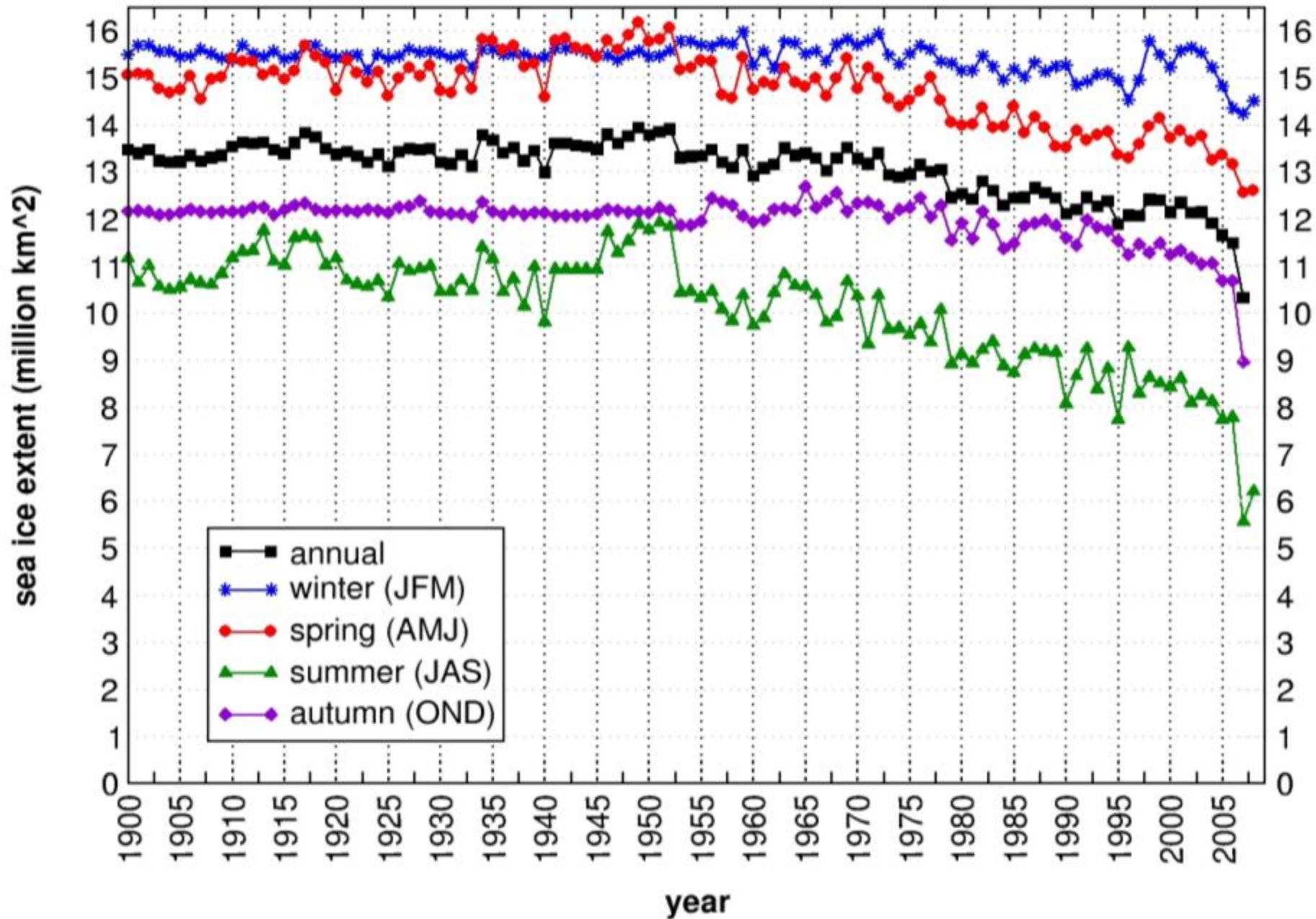
# Alaska's Arctic: Changes in the Region

## Sea ice decrease

### Beaufort Sea



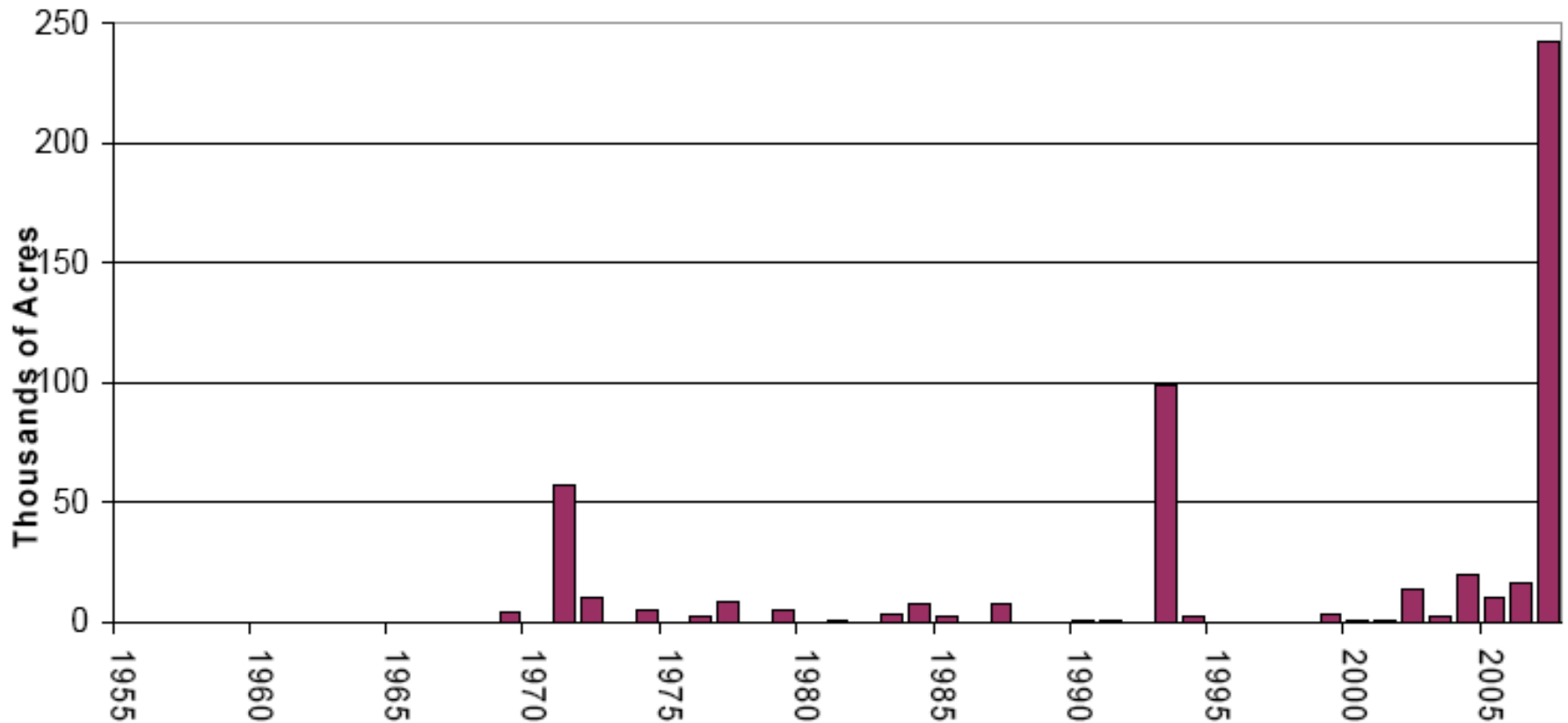
# Northern Hemisphere Sea Ice Extent



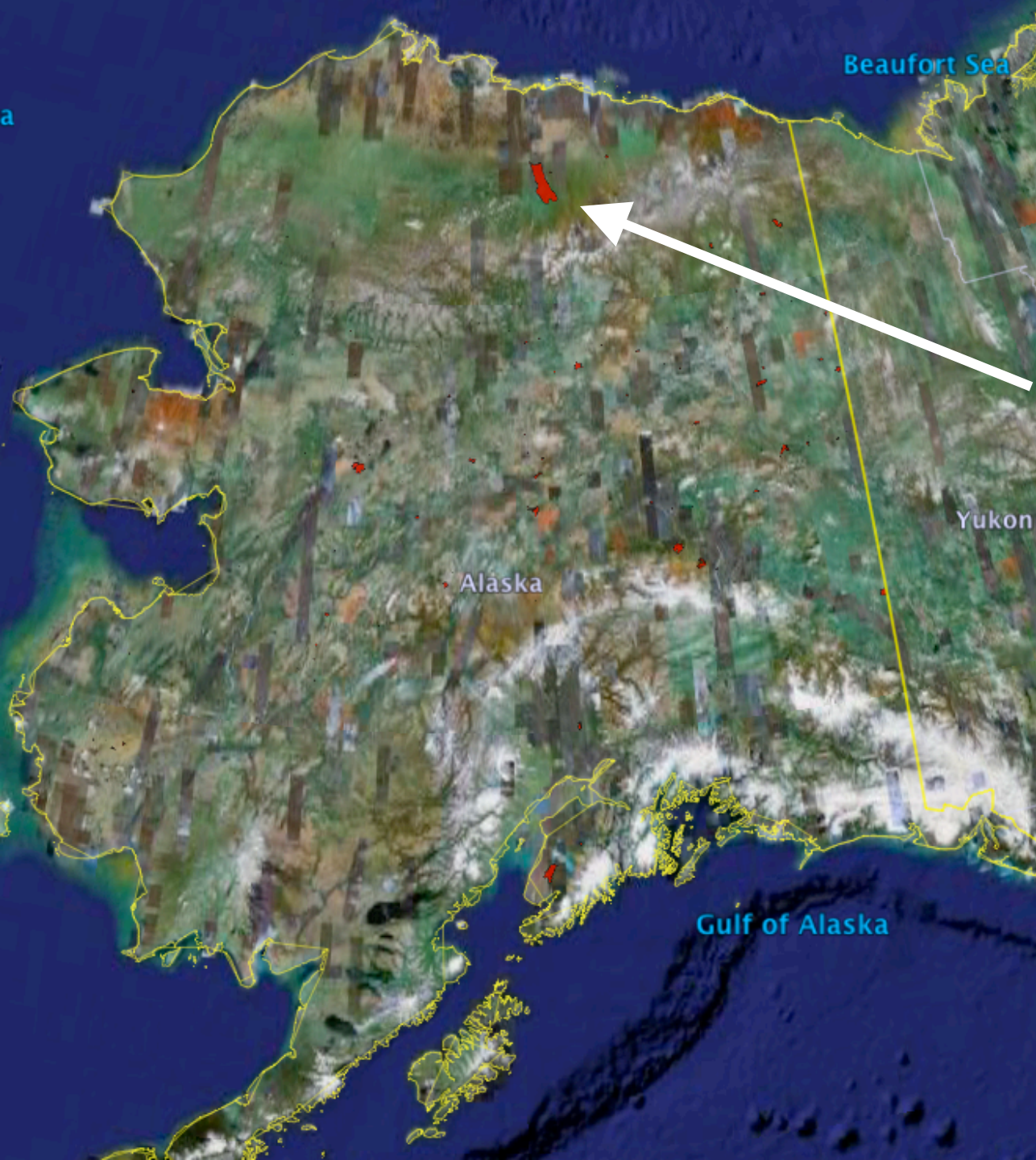
# Alaska's Arctic: Changes in the Region

## Wildfire increase

Total Tundra Fire Area (Acres) Burned North of 68 deg. North Lat 1956-2007\*







# in the Region

## Anaktuvuk Fire Statistics

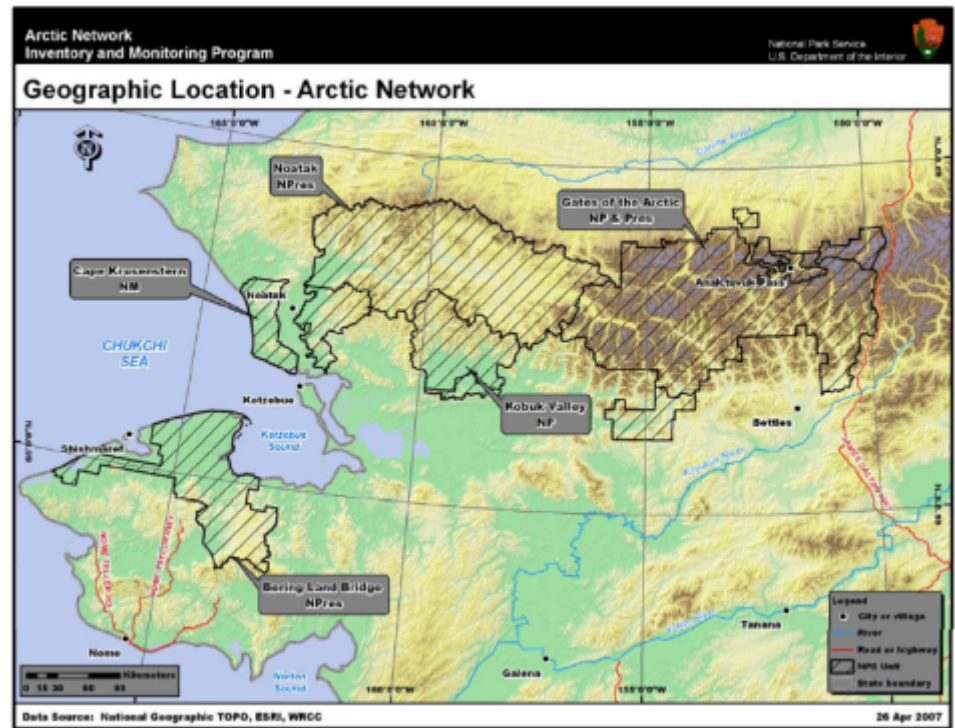
- tundra
- limited protection
- 40% of total area
- > 200,000 acres
- > all historical fires north of 68°

# Alaska's Arctic: Upcoming products

>> New PRISM data (1971 - 2000)

>> Environmental data for the Arctic Network parks

>> New plant hardiness maps (USDA)



[http://www.wrcc.dri.edu/nps/reports/2007\\_04\\_23\\_arcinventory\\_final.pdf](http://www.wrcc.dri.edu/nps/reports/2007_04_23_arcinventory_final.pdf)

# Climate Change in Northern Alaska

- **Temperature Increase:** Warming most pronounced in winter and spring
- **GGD increase,** lengthening of growing season
- **Precipitation decrease** seen in observations
- **Sea ice extent decrease**
- **Wildfire increase**