Climate, Climate Variability and Climate Change

Interior Arctic Alaska National Parks Climate Change Scenario Workshop March 27, 2012

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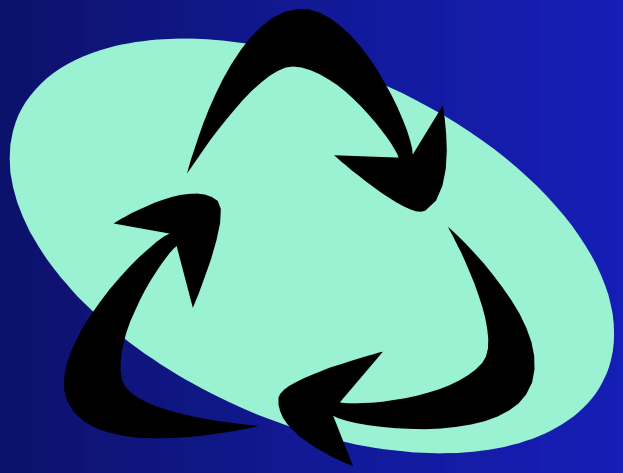
Today

- Weather vs. climate
- Northern Interior NPS units and climate
- Climate variability
- Climate change

Climate or Weather?

"Climate is what you expect…

weather is what you get"



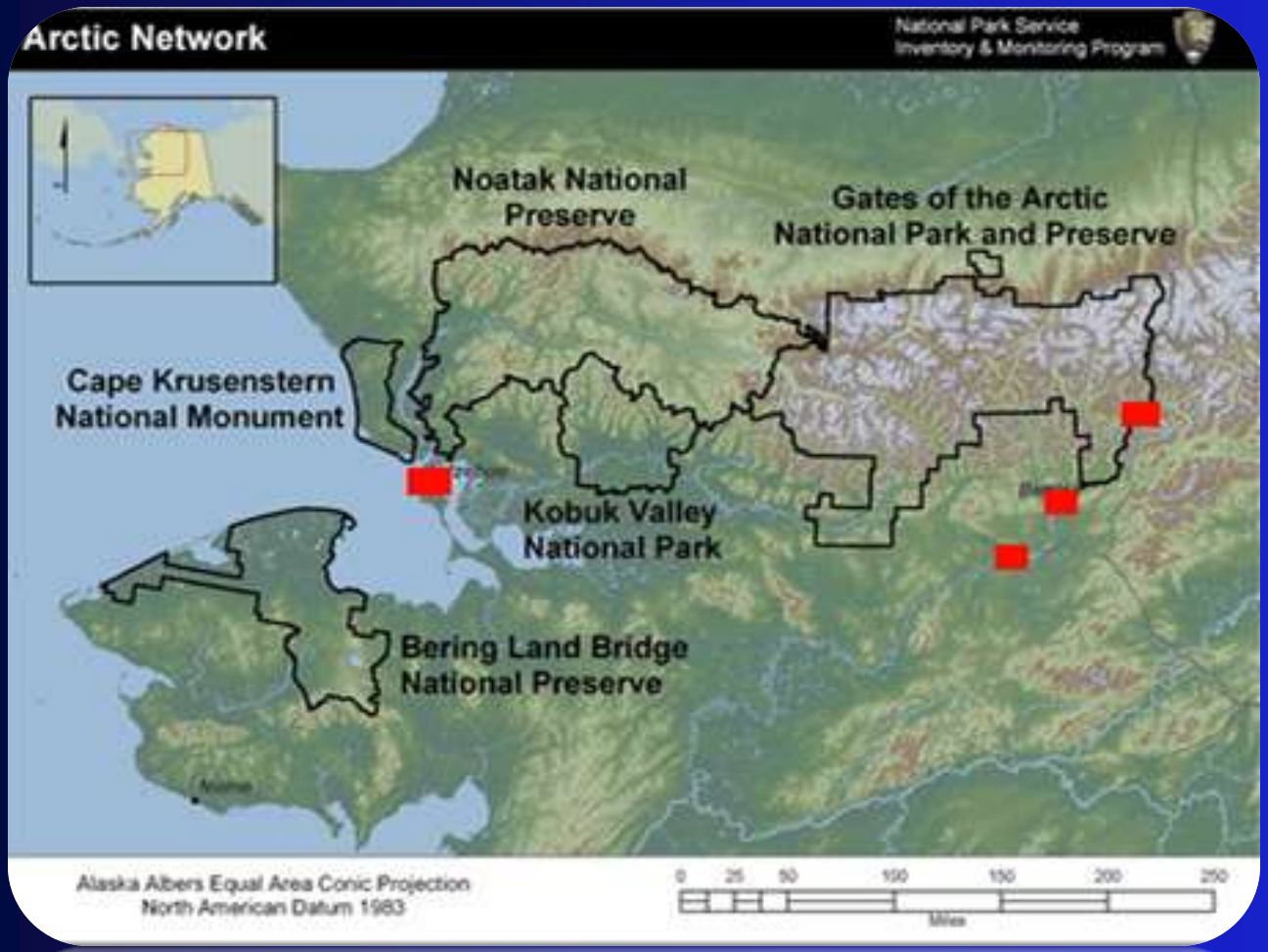
Climate is a baseball player's batting average…

Weather is what happens each at-bat

Weather vs. Climate

- Weather: short term state of the atmosphere
  - Instantaneous to few days
- Seasons: weeks to months
- Climate: “statistics of weather”
  - Long term (decadal scale) averages, frequency of specific events and extremes—generally 3 to 5 decades needed

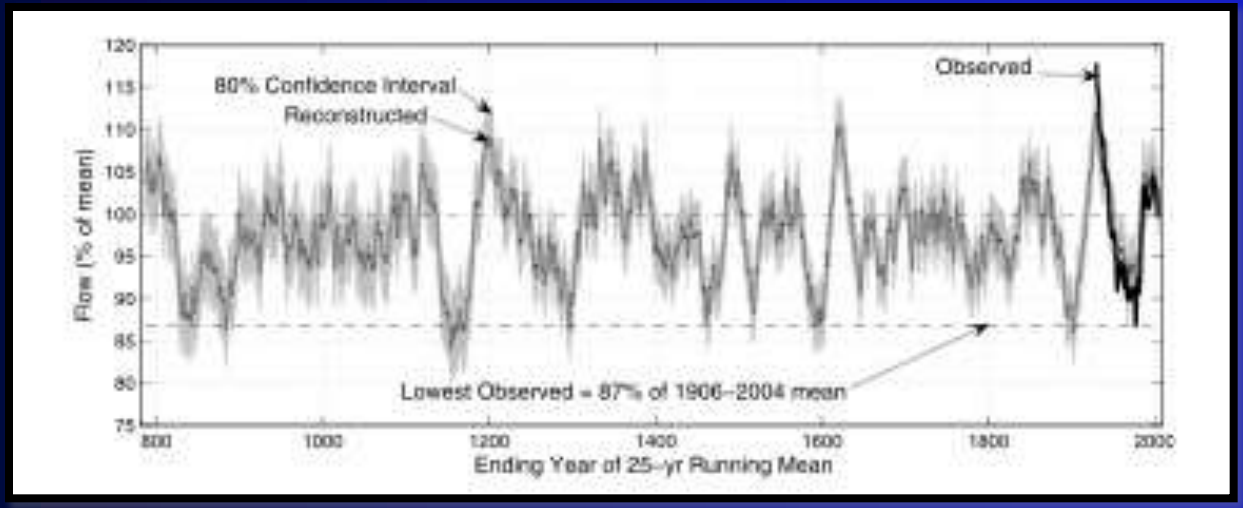
Climate Scale Instrumental Data is Sparse



Physical Drivers of Northern Interior Alaska Climate

Climate Variability vs. Change

- Difference between climate variability & change depends on scale of interest
  - Variability—years to decades
  - Change—decadal to millennial scale "baseline"

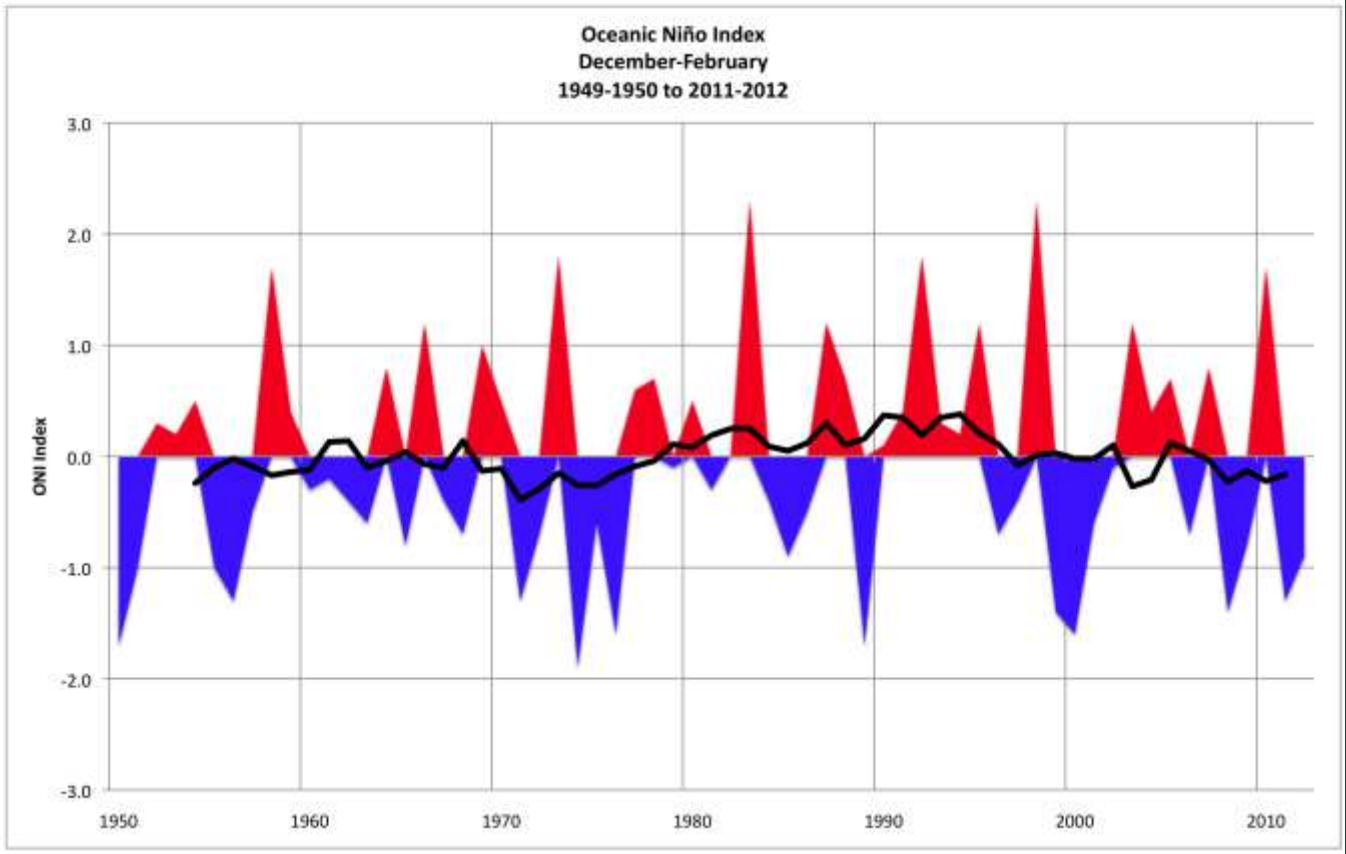


Meko et. al. 2007

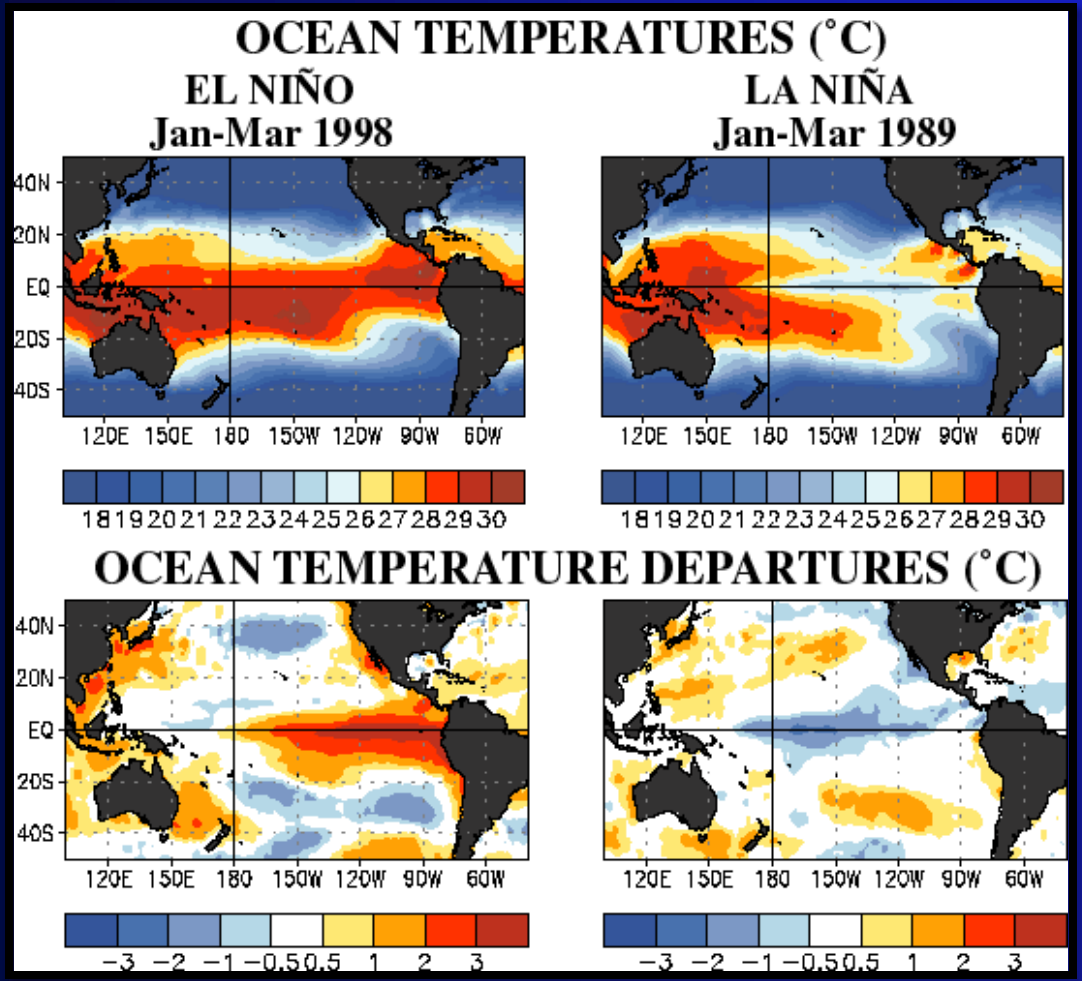
Influences on Climate Variability in Alaska

- El-Niño Southern Oscillation
  - 2 to 5 year semi-cyclical variation in equatorial Pacific sea surface temperatures
  - Limited correlation with Interior winter temperature
- Pacific Decadal Oscillation
  - Multi-decade variation in non-equatorial Pacific sea surface temperatures
  - Strong correlation with Interior Alaska climate

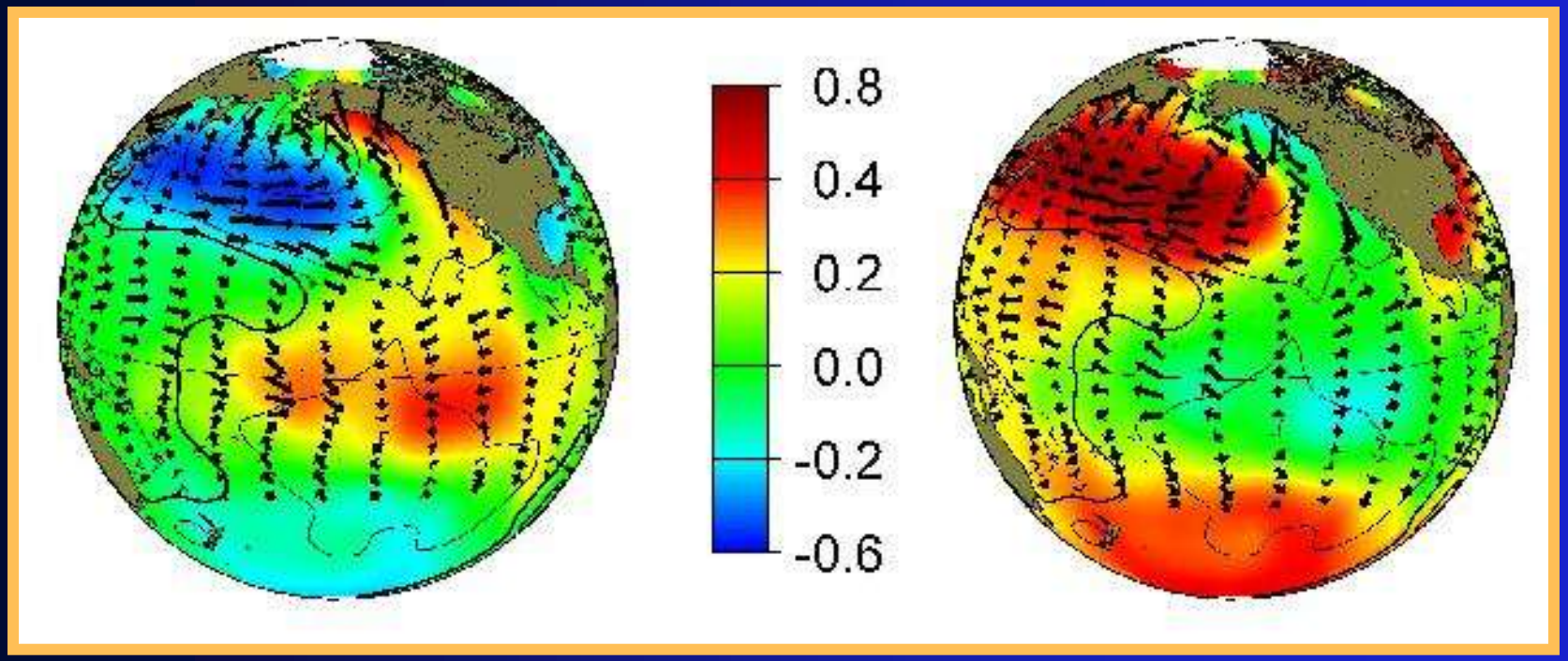
ENSO: El Niño + La Niña



Typical ENSO Sea Surface Temperatures



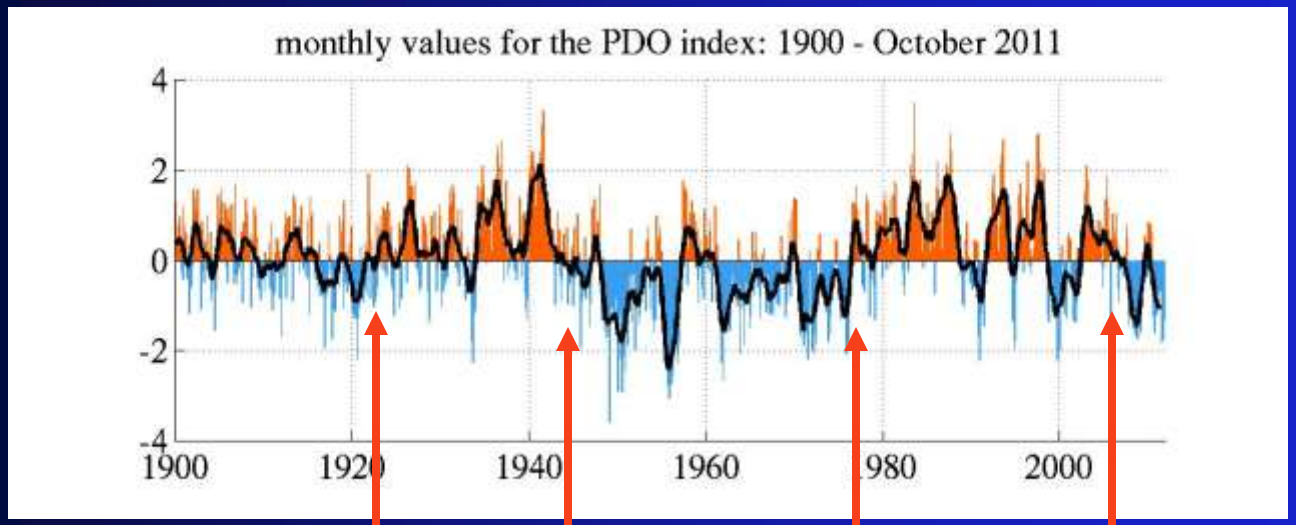
Pacific Decadal Oscillation



Warm for Alaska

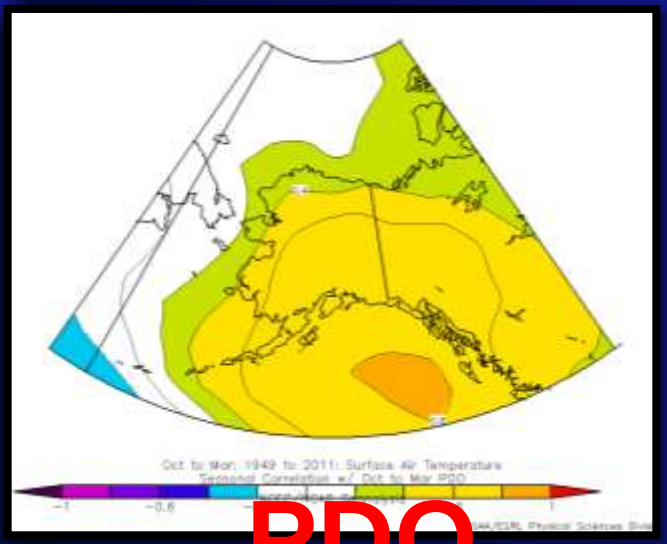
Cool for Alaska

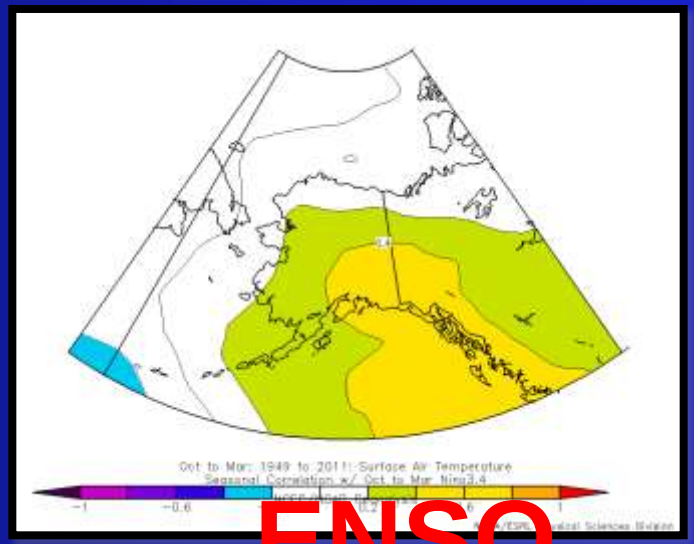
Pacific Decadal Oscillation



Courtesy of U. Washington

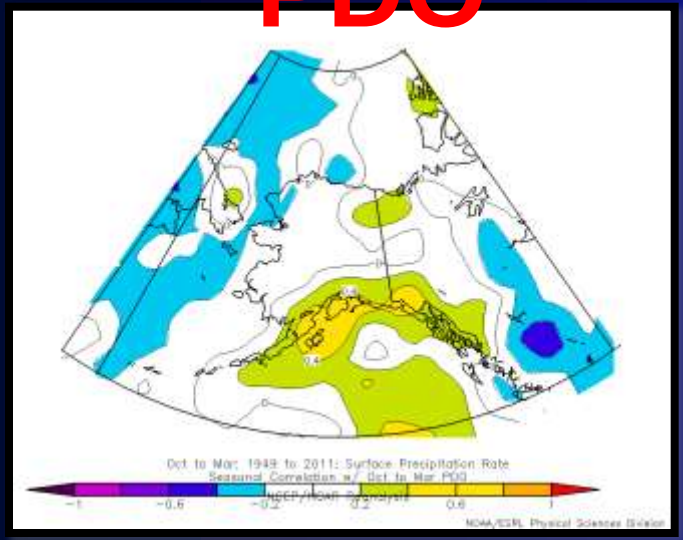
Cold Season Correlations

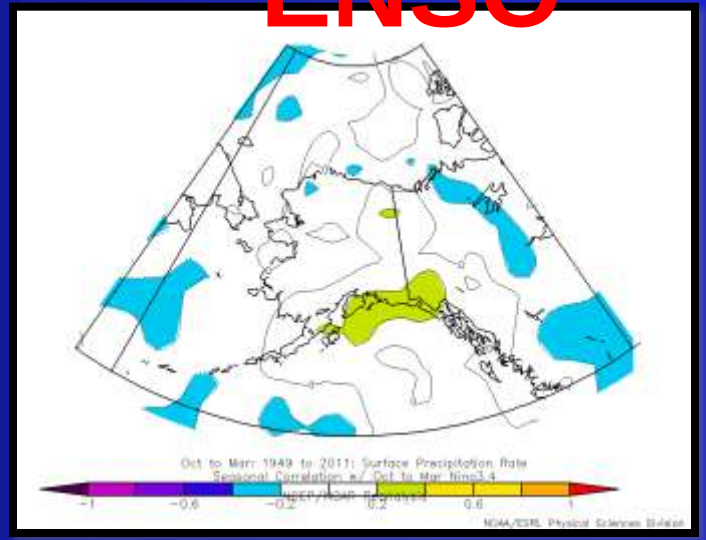




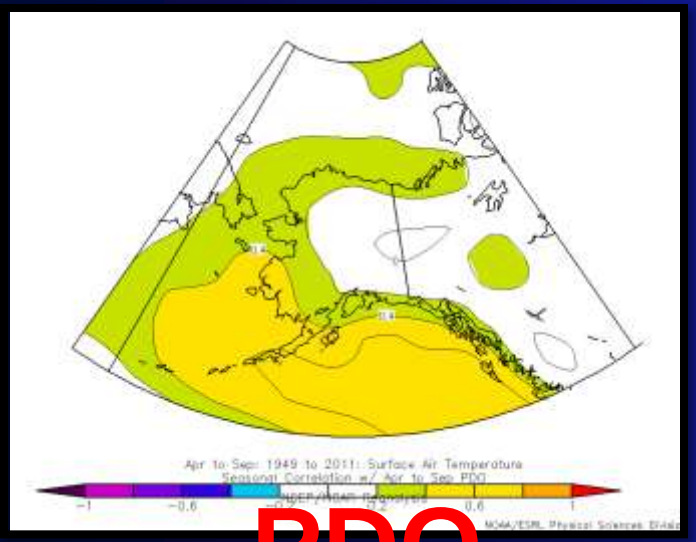
PDO

ENSO

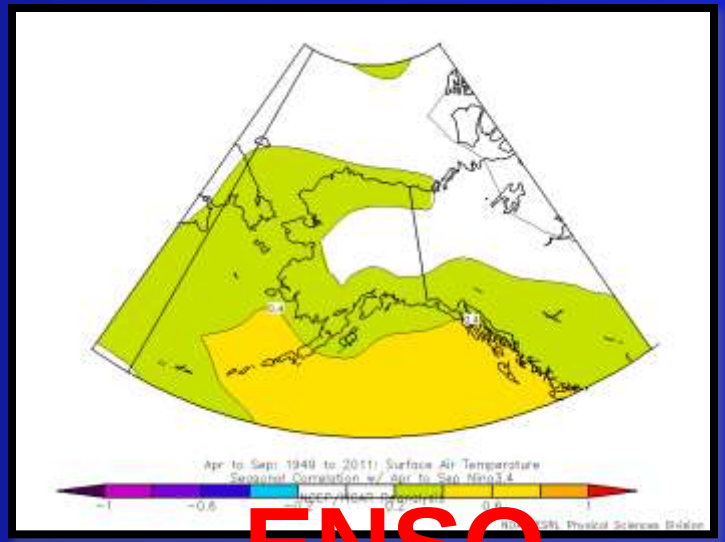




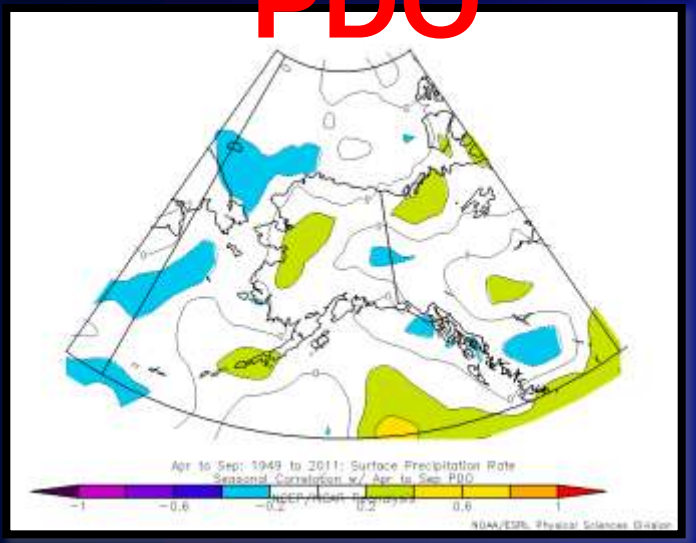
Warm Season Correlations

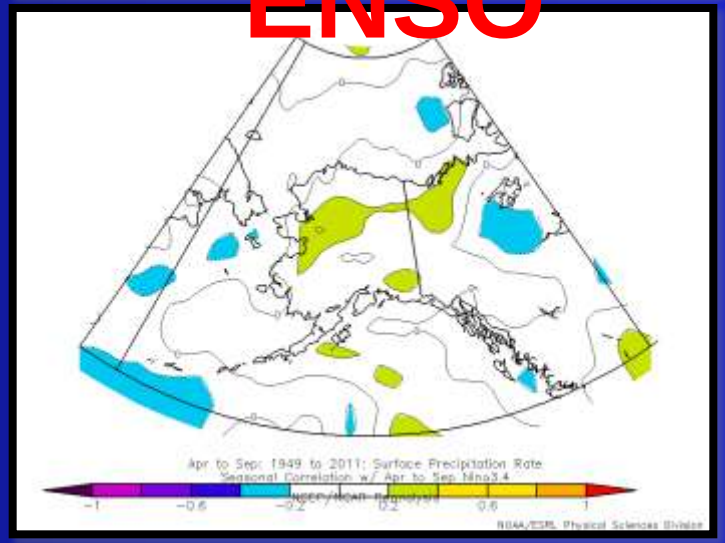


PDO



ENSO



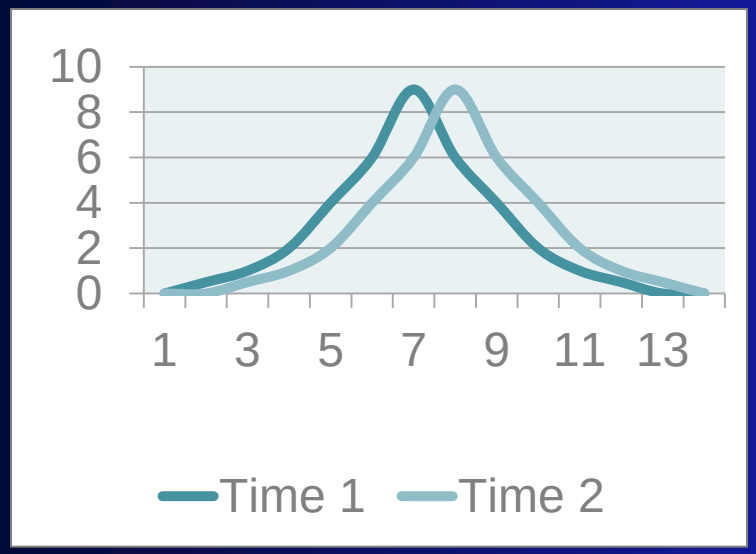


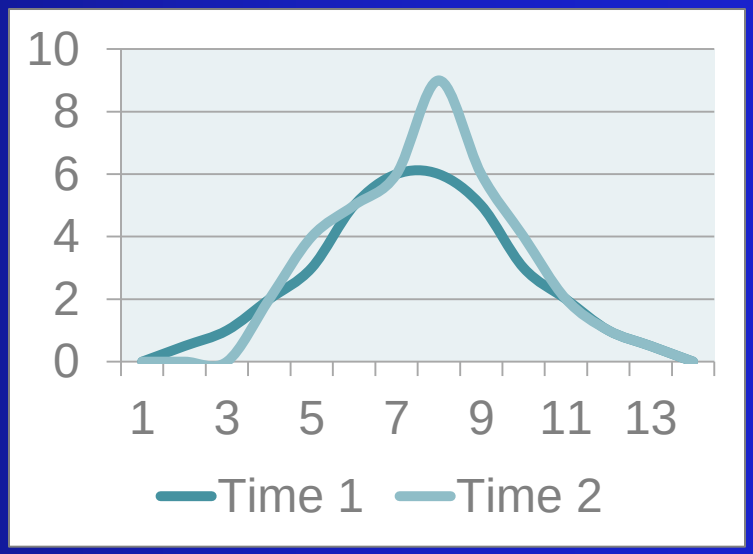
What Does Climate Change Mean?

- What does it mean to say that the average temperature will be warmer/colder?
- What does it mean to say that storms will be more/less frequent?

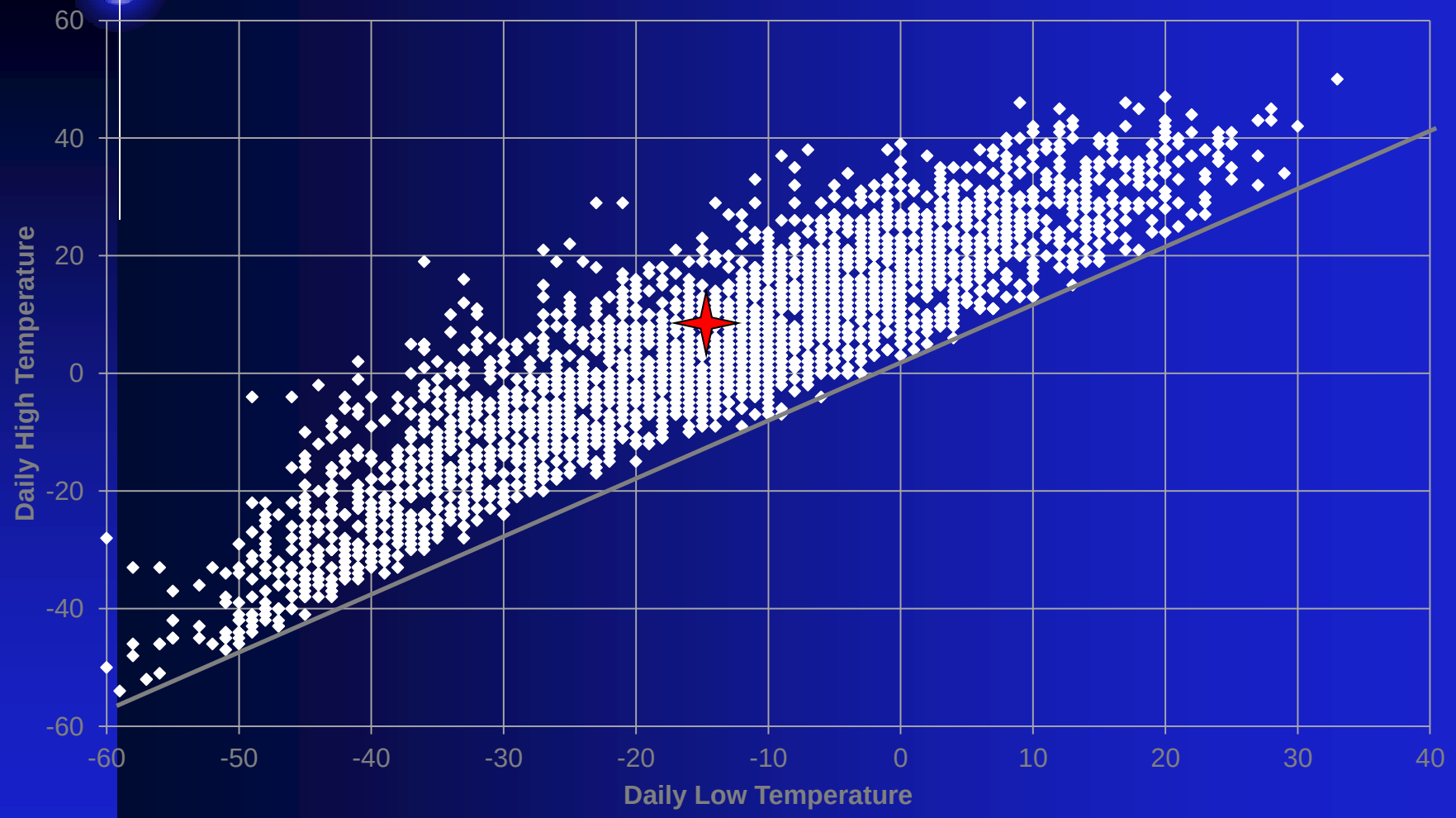
What Is Climate Change?

- Climate change = changes in the probability distribution function of some climatically relevant quantity over climatically relevant time scales

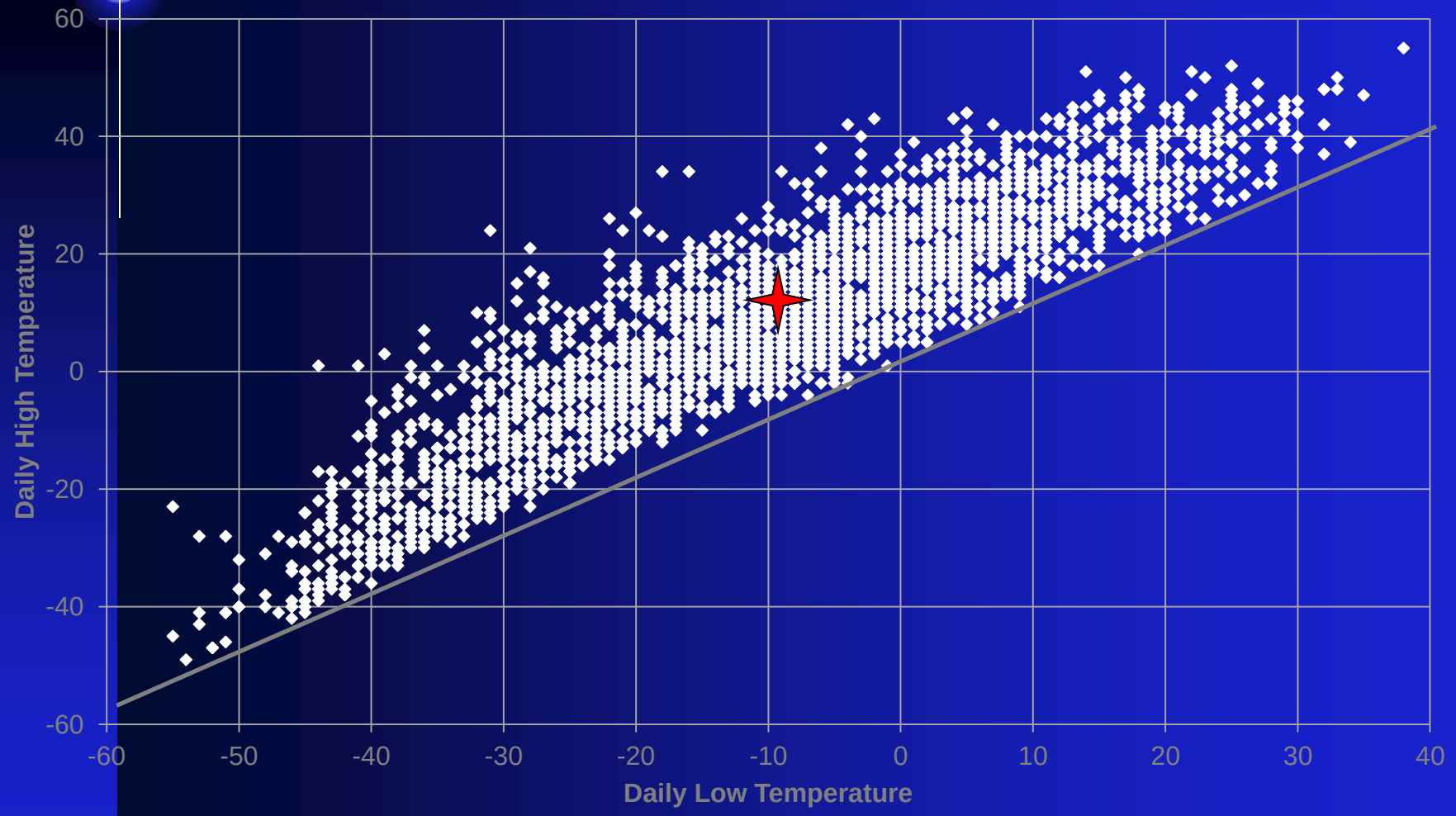




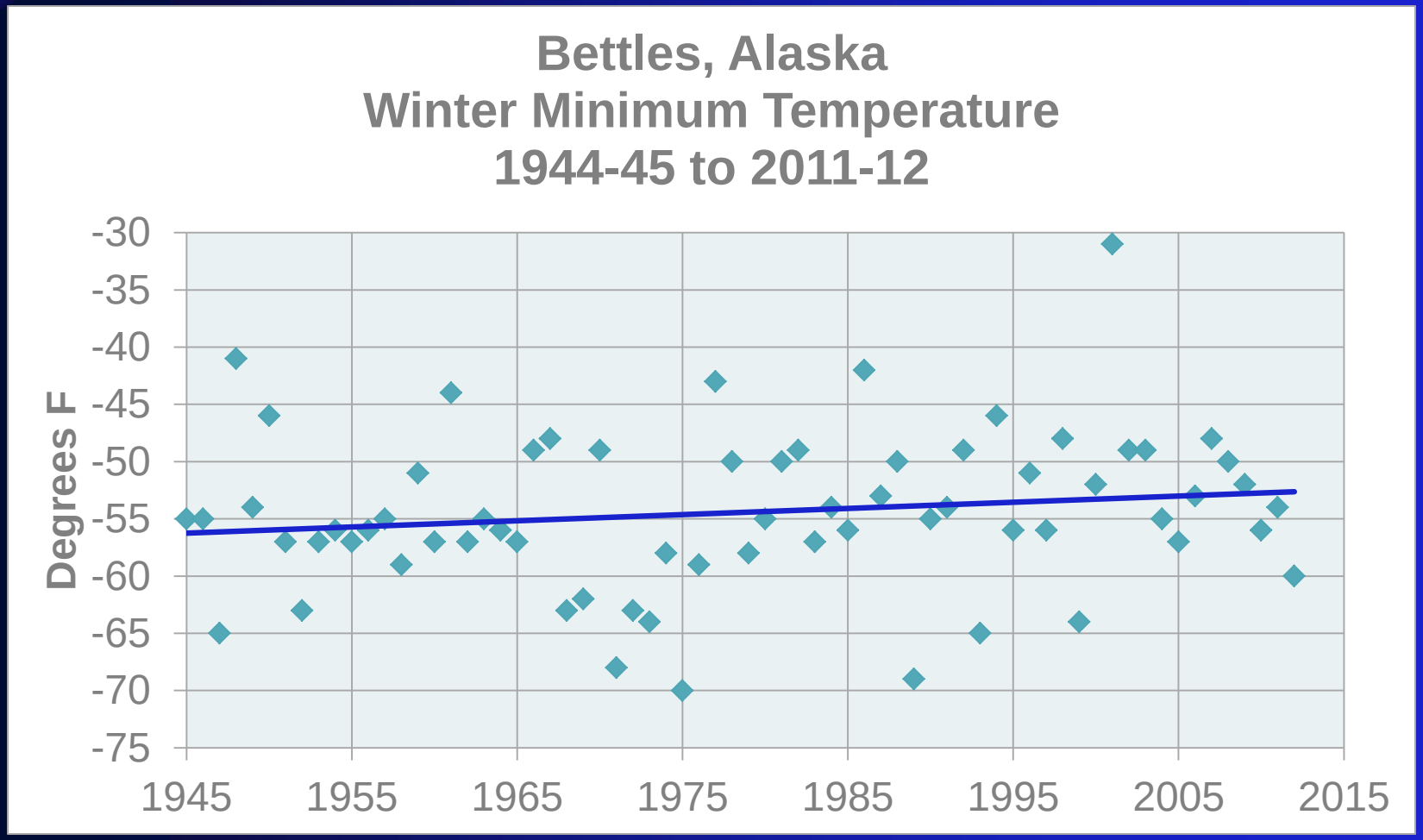
Fairbanks, Alaska
Daily Dec-Feb Temperatures
1971-2000



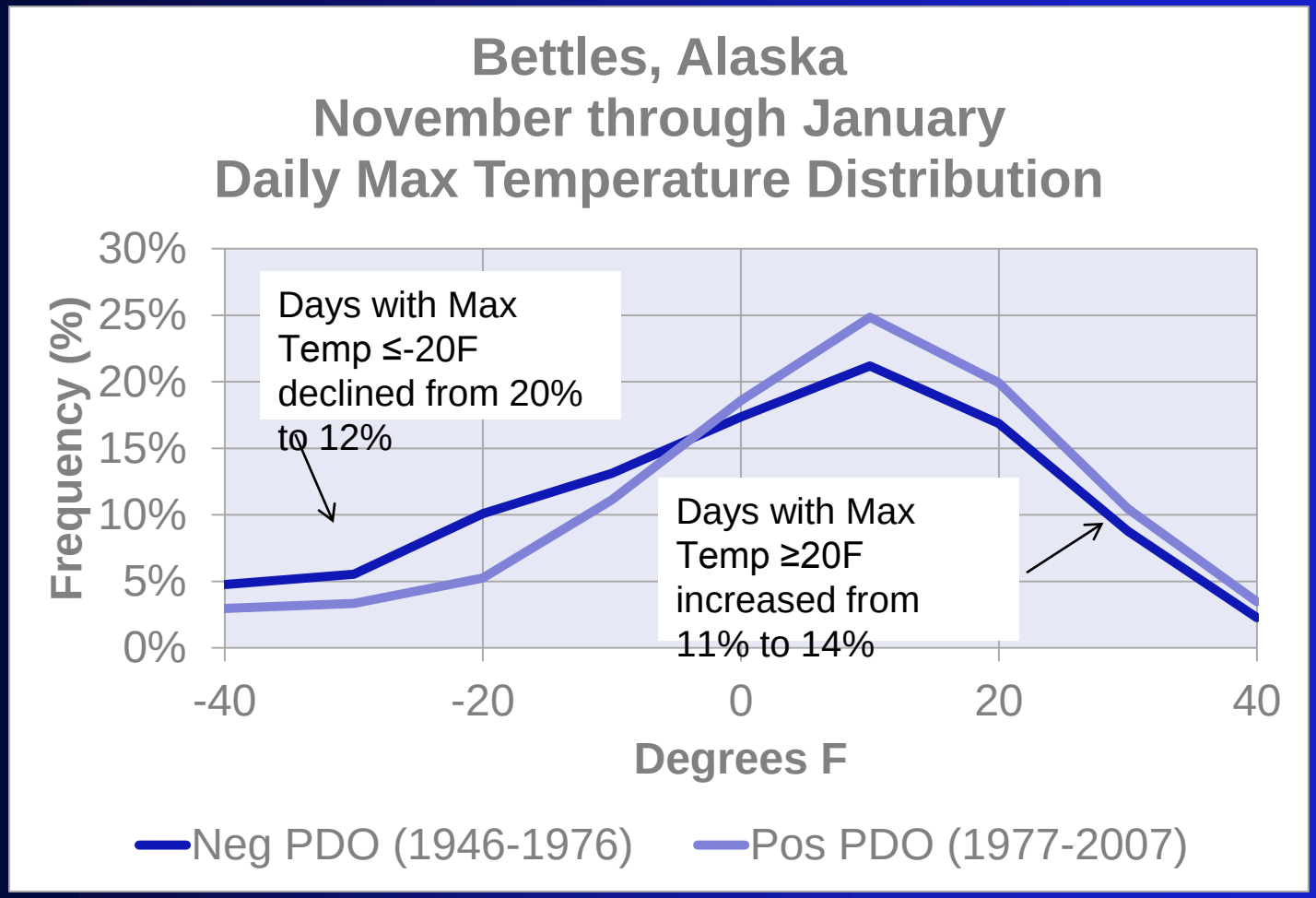
Fairbanks, Alaska
Daily Dec-Feb Temperatures
1971-2000 BUT warmed by 5° F



Don’t be fooled by suspect analysis



Actual Real-World Example



Conclusions

- Barely any long instrumental climate record vicinity Arctic Interior NPs
- Climate Variability=changes in statistics over seasonal to decadal time scales
- Climate Change=changes in statistics over decadal or longer time scales

Questions/Comments?

Thank You!