

# An Analysis of Kentucky's Climate: Recent Trends & Historical Perspectives

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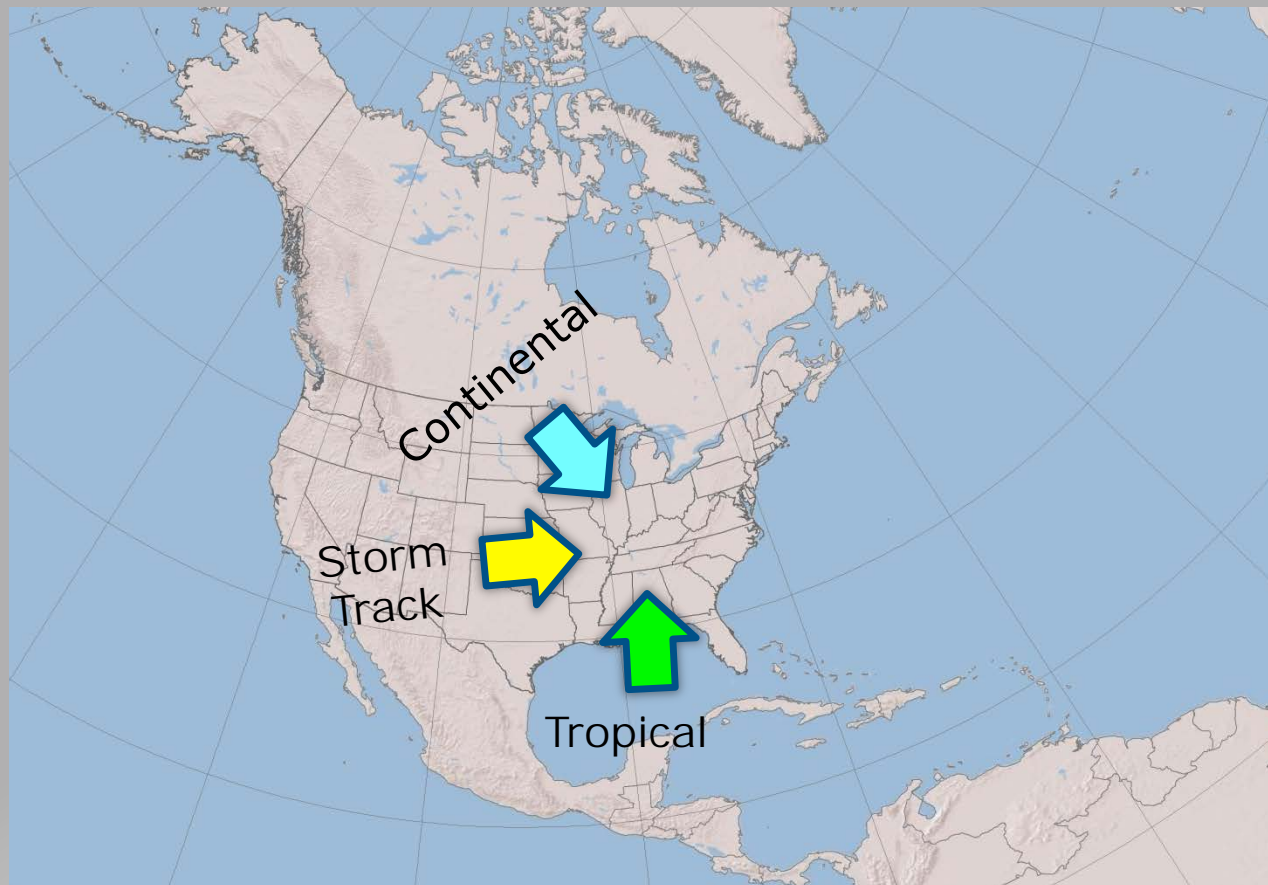
February 20, 2012

# The Issue of Climate in Perspective

- Kentucky's climate is a valuable resource, yet an ever present threat
- Annual variability and long-term change create uncertainty
- Managing uncertainty is vital for both operational and strategic decision making



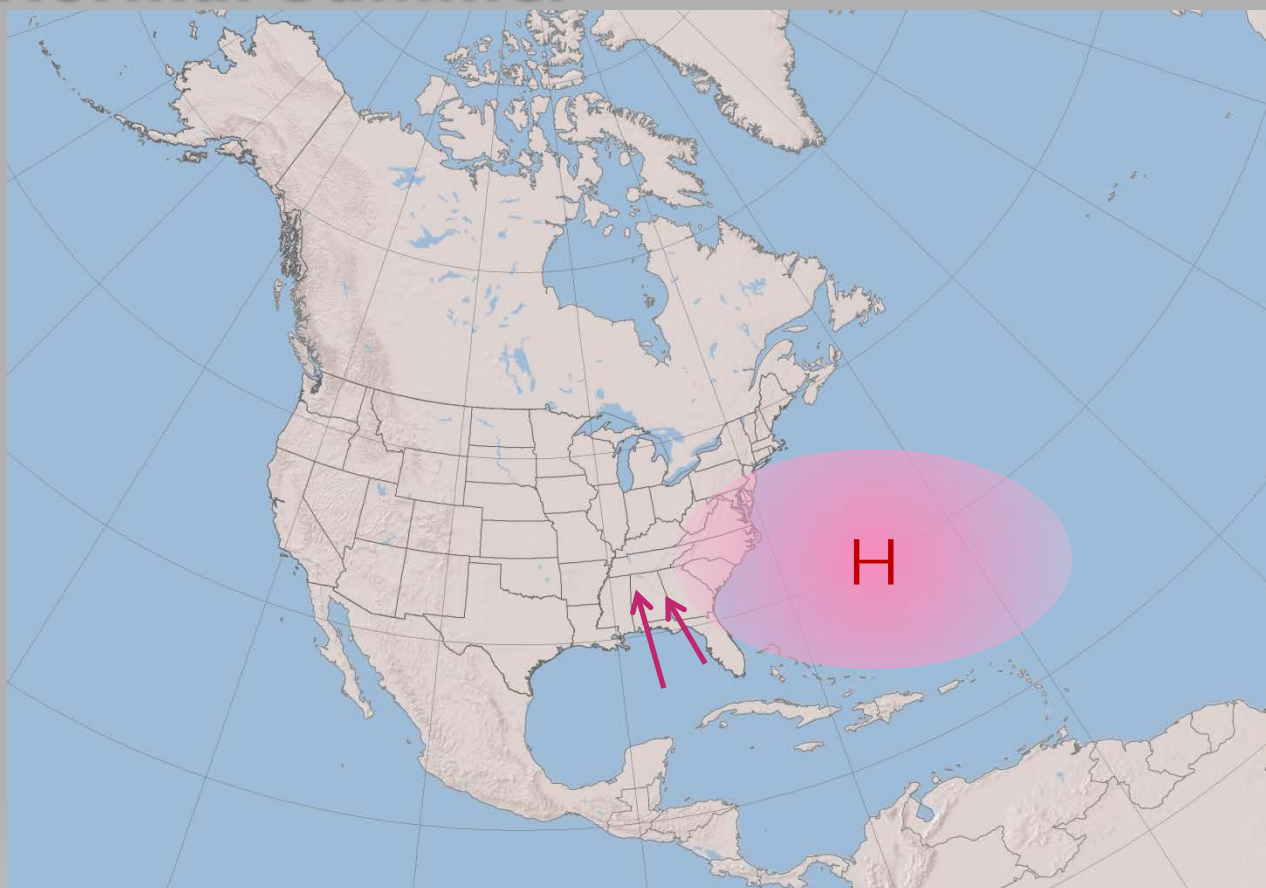
# Key Climate Influences





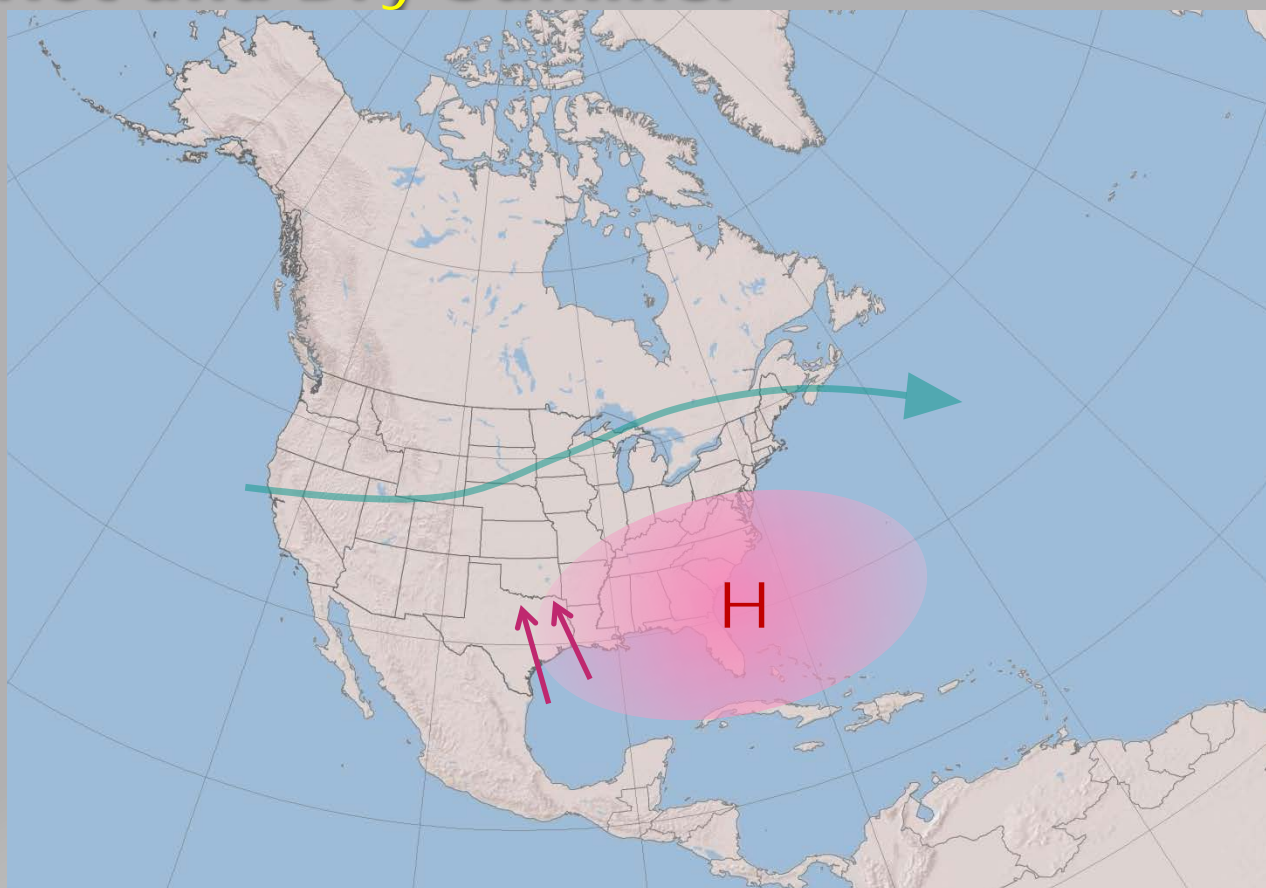
# Bermuda High

## Normal Summer

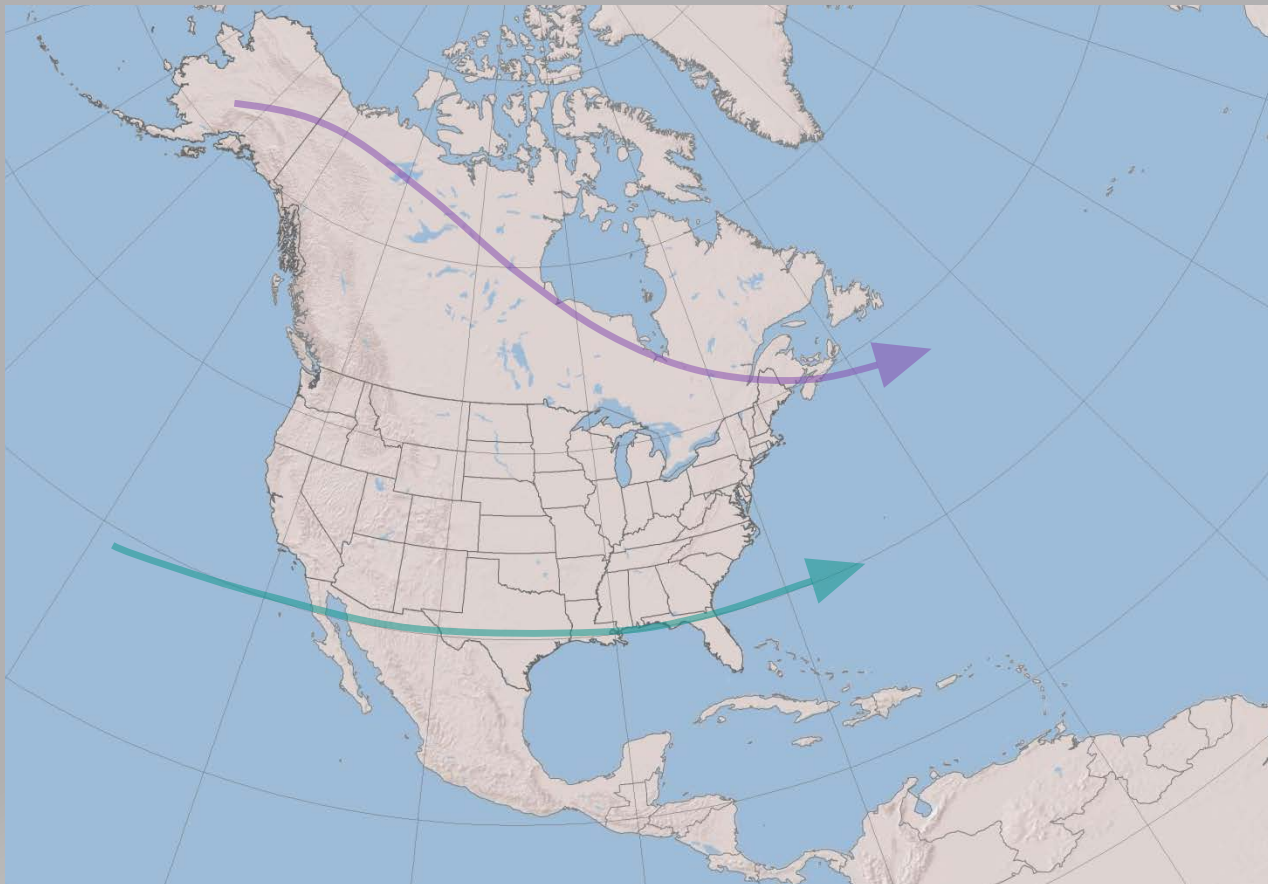


# Bermuda High

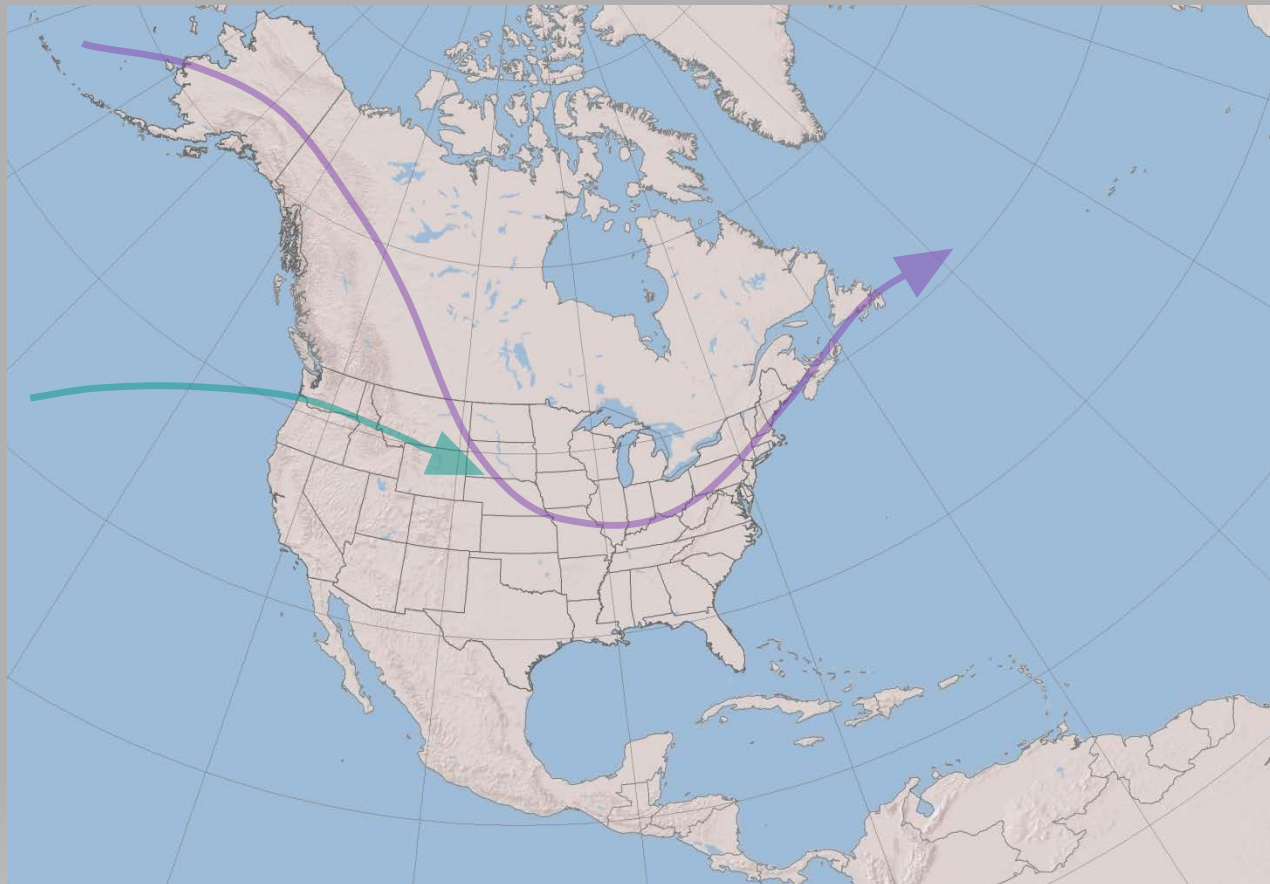
Hot and Dry Summer



# Generalized El Niño Pattern

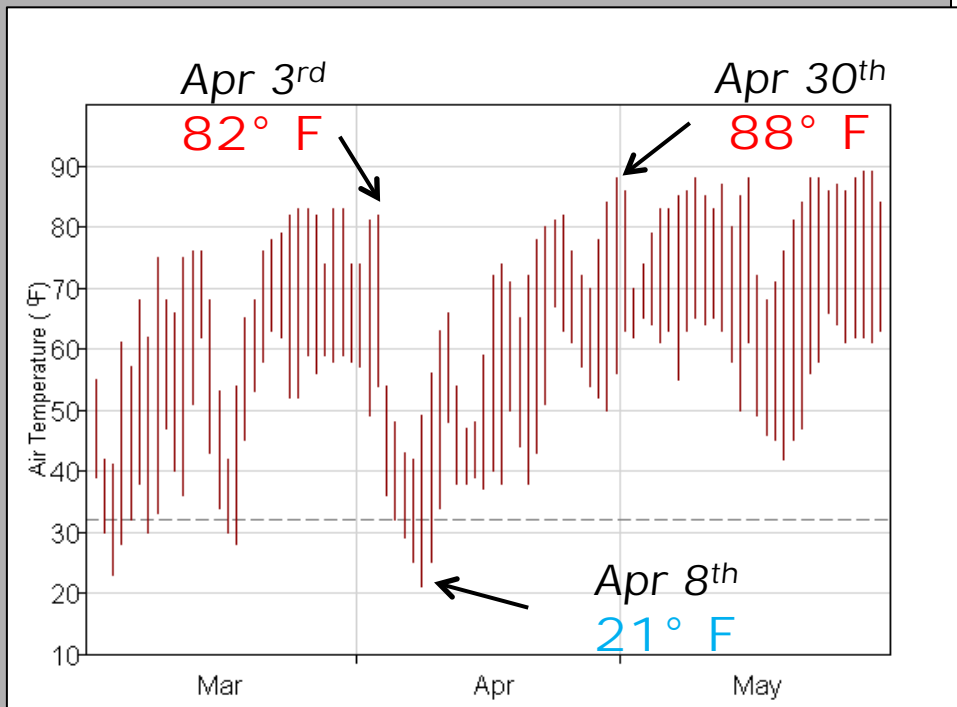


# Generalized La Niña Circulation

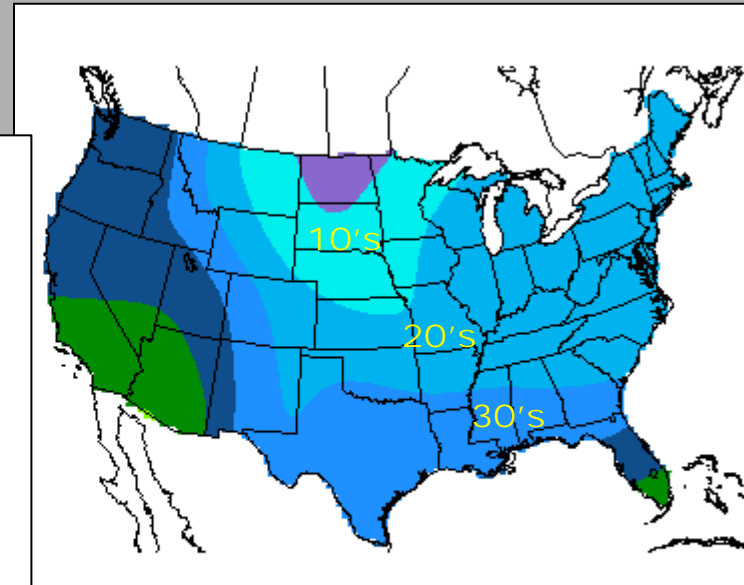


# Late Spring Freeze of 2007

Daily High and Low Temperatures  
Paducah, Kentucky



Minimum Temperature (°F)





# Floods

- 2011
  - Over 20" in some areas from early April through early May
- 2010
  - As much as 10" within 36 hours on May 1<sup>st</sup> and 2<sup>nd</sup>
- 1937
  - Record flooding in Ohio River Valley
  - As much as 22" of precipitation during January



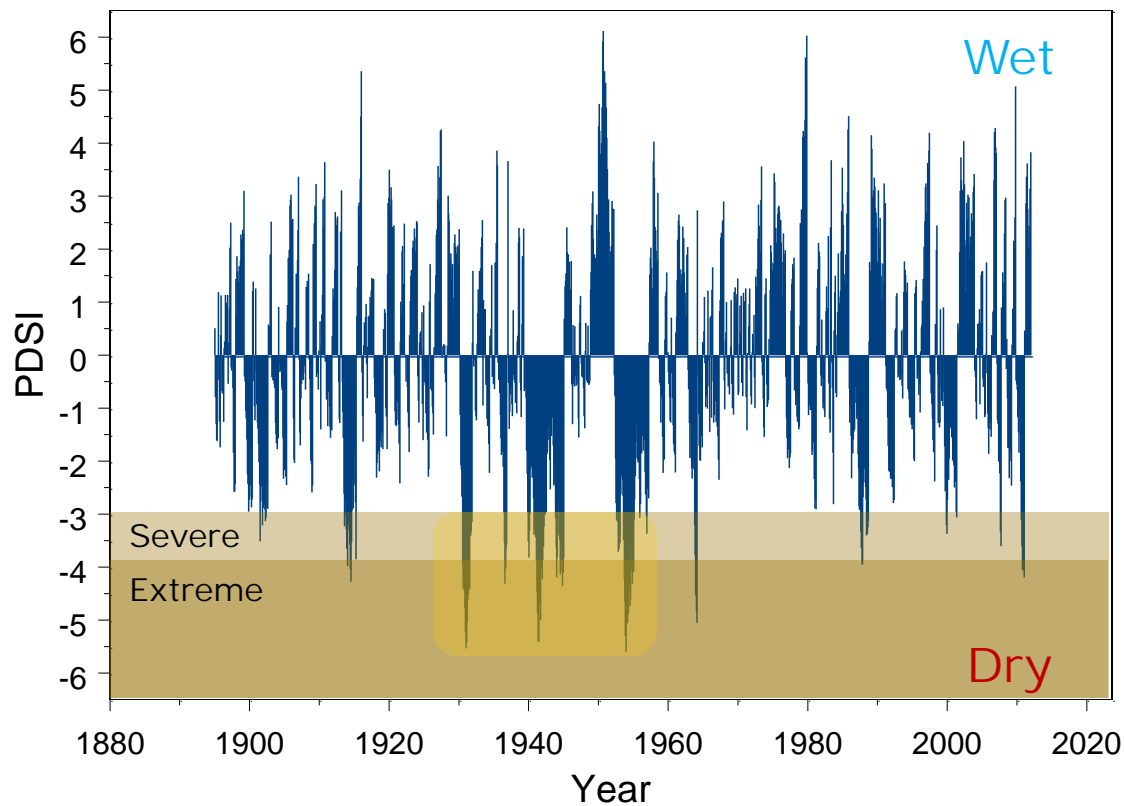
# Drought



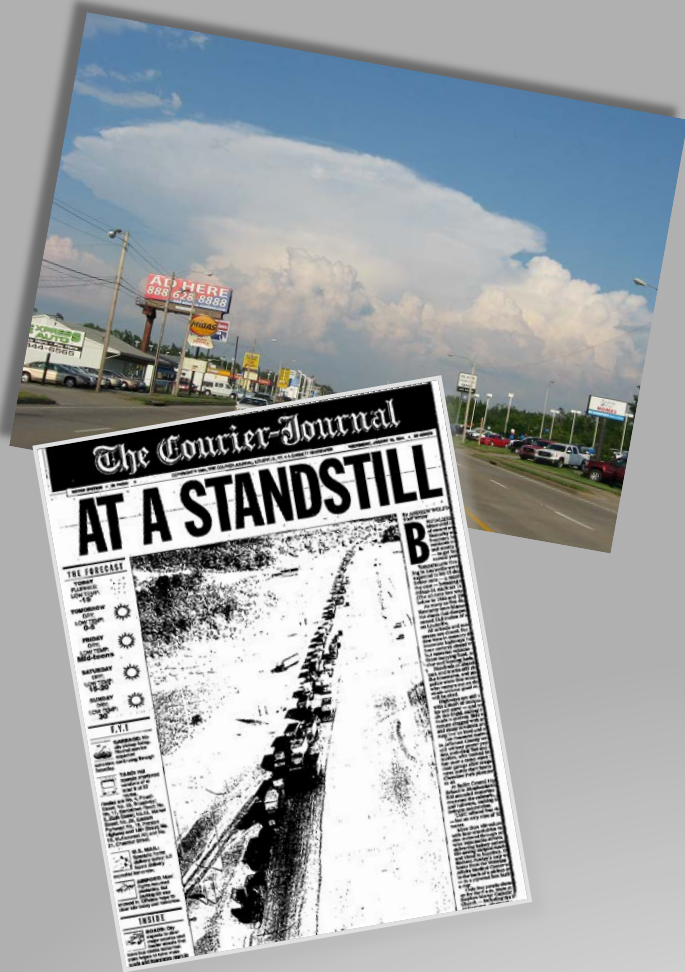
- 2010
  - Record flooding in May
  - Extreme dry spell in late summer and fall
- 2007
  - Dry spring followed by record heat in August
  - Unexpected relief in October
- 1930
  - Growing season precipitation about half of normal
  - Record high temperature of 114° F

# Palmer Drought Severity Index

## Western Climate Division



# Natural Hazards

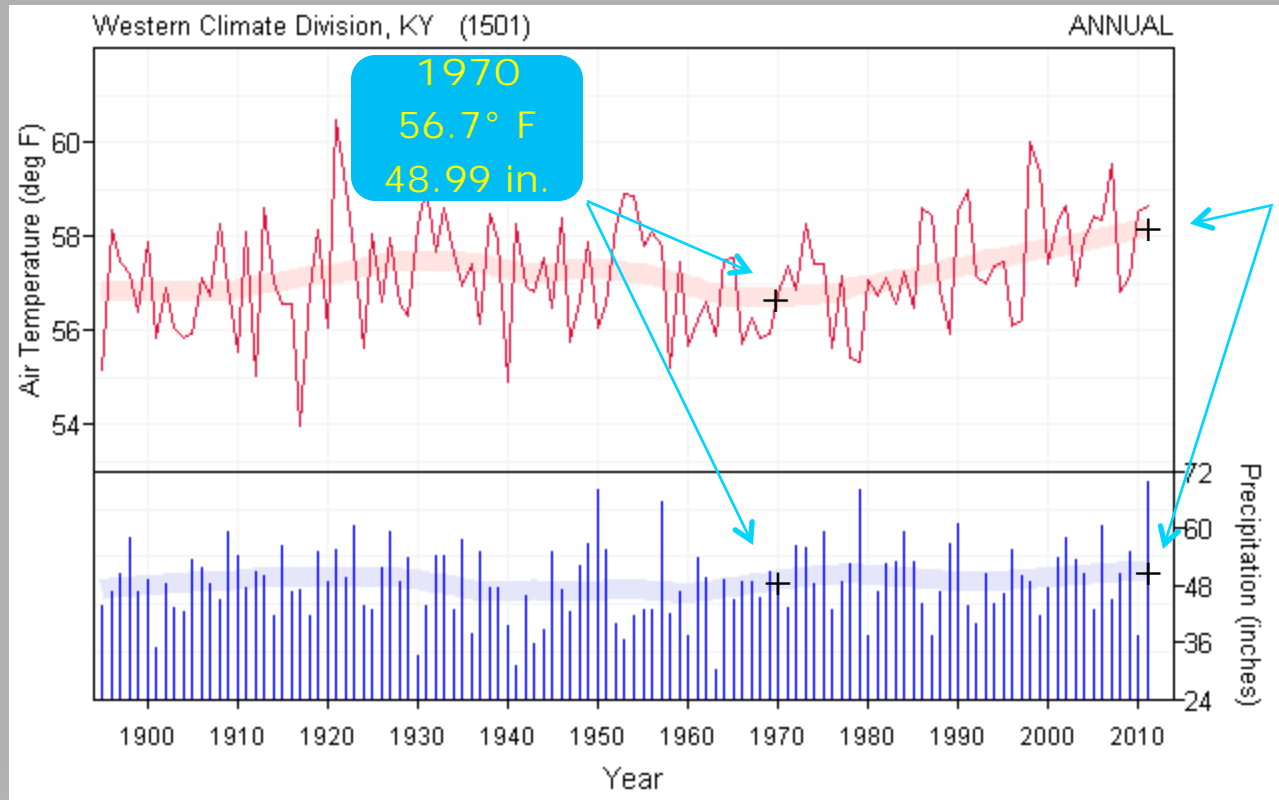


- Heat Waves
- Cold Waves
- Drought
- Ice and Snow
- Damaging Wind
- Lightning
- Hail
- Tornadoes
- Floods and Flash Floods



# Climate Trends: Annual Averages

## Western Climate Division



# Climate Trends – Annual Scale

## Average Annual Temperature (°F)

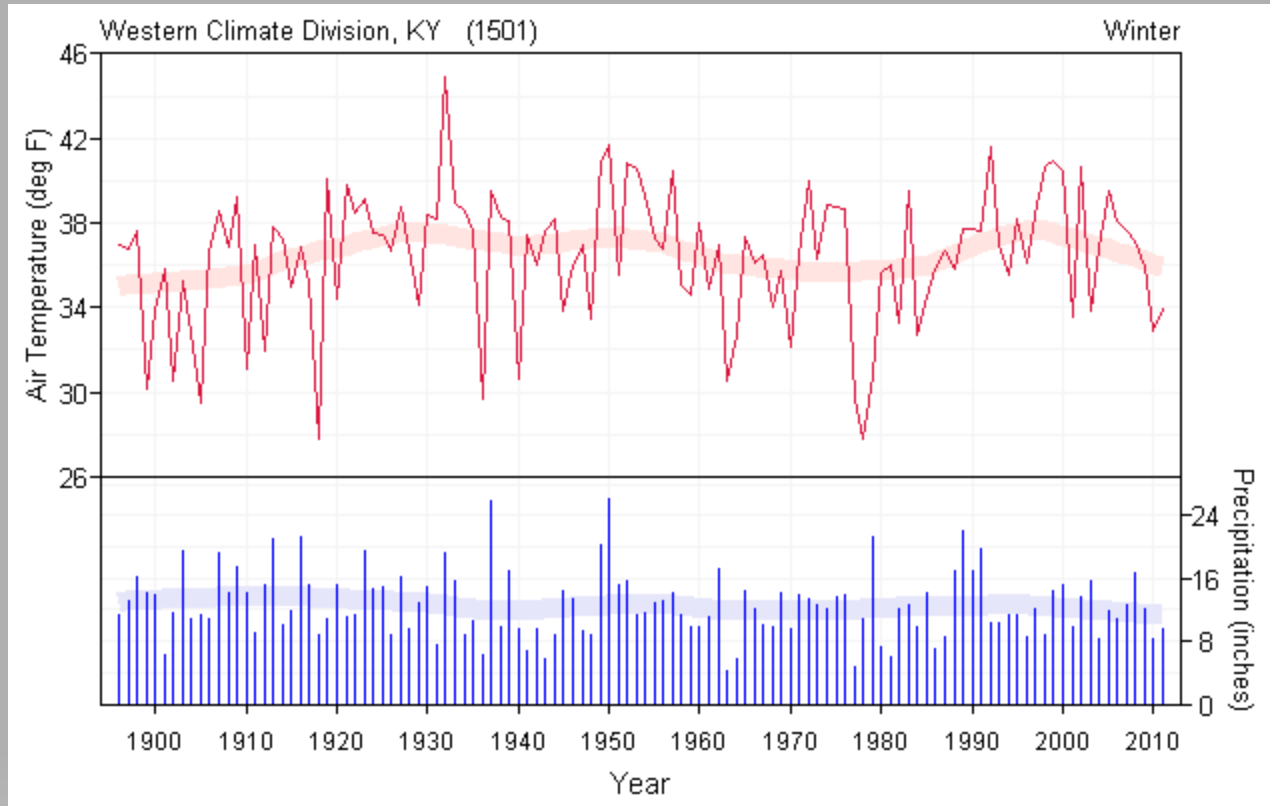
Climate Division	1970	1980	1990	2000	2010
Western	56.7	57.0	57.3	57.7	58.2
Central	55.6	55.8	56.2	56.5	56.8
Bluegrass	54.1	54.3	54.8	55.2	55.5

## Average Annual Precipitation (in.)

Climate Division	1970	1980	1990	2000	2010
Western	48.99	50.14	48.77	49.51	50.98
Central	50.18	51.16	49.36	50.54	52.51
Bluegrass	45.42	45.63	45.22	46.54	47.15

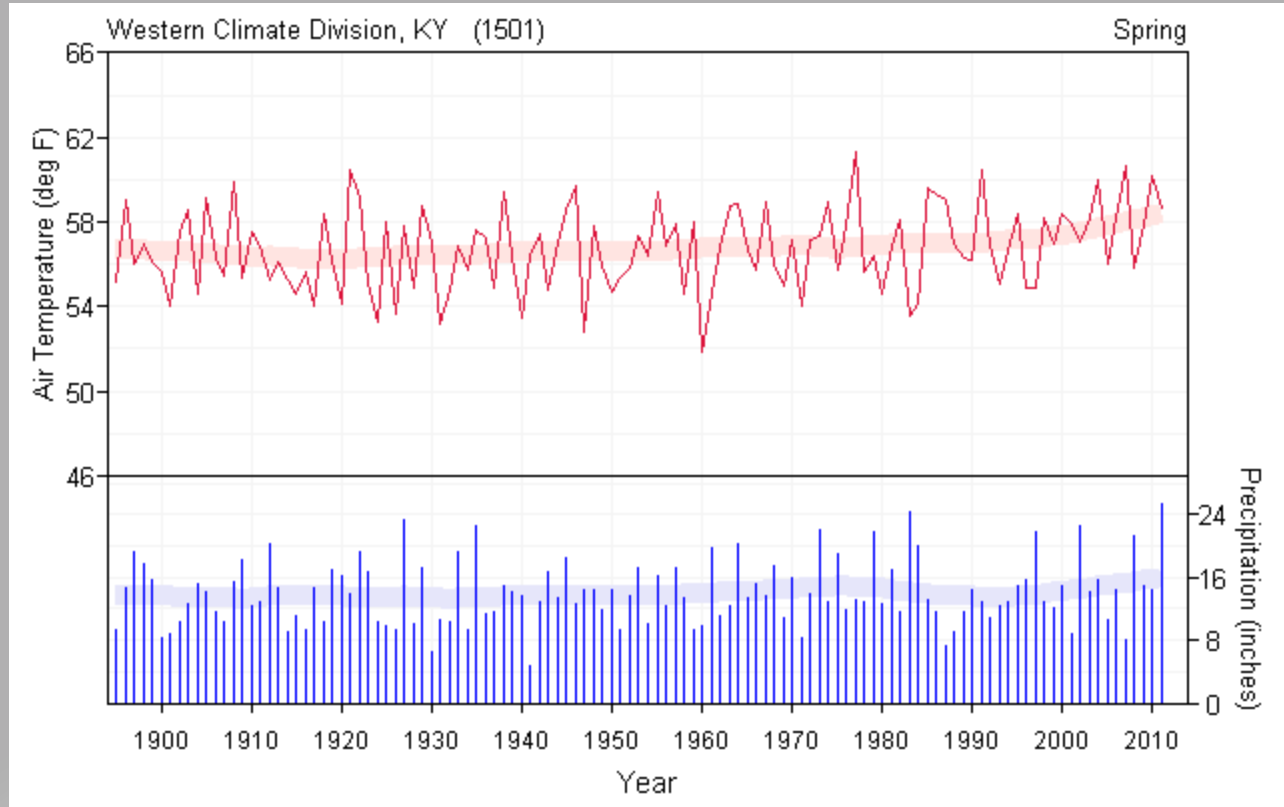
# Climate Trends: Winter Averages

## Western Climate Division



# Climate Trends: Spring Averages

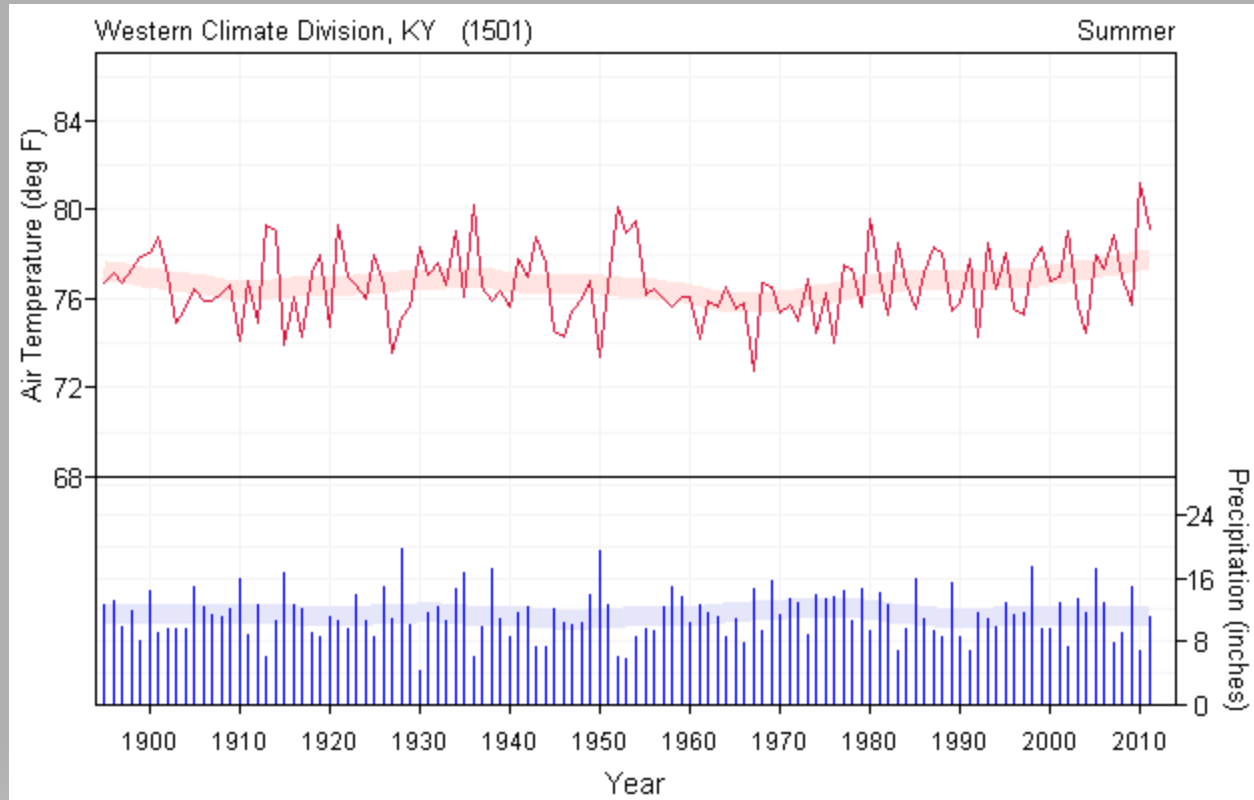
## Western Climate Division





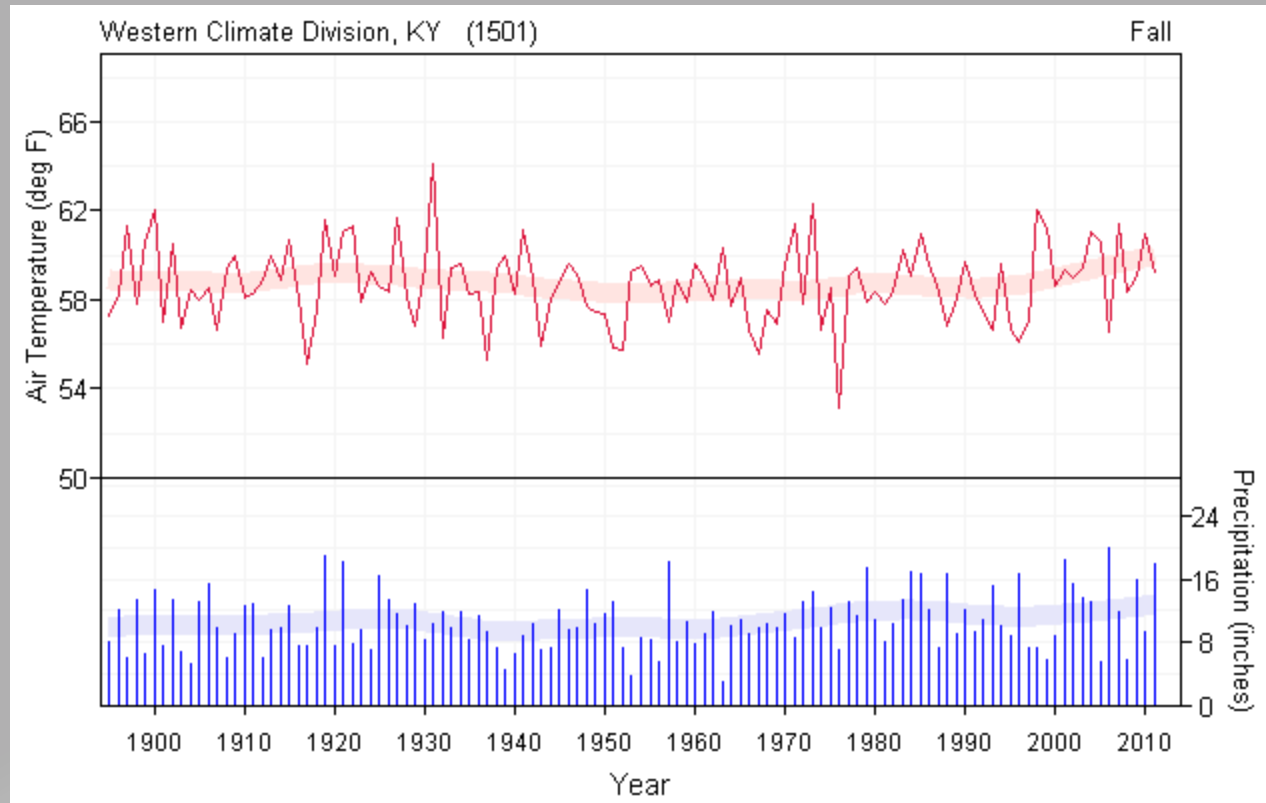
# Climate Trends: Summer Averages

## Western Climate Division



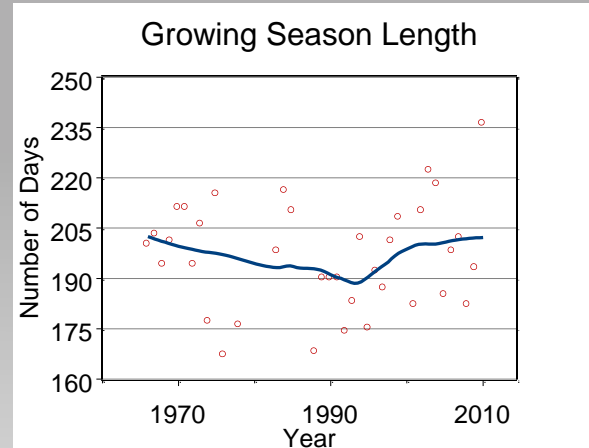
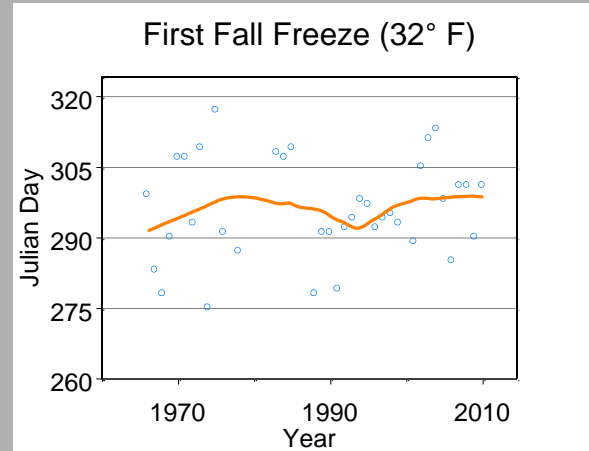
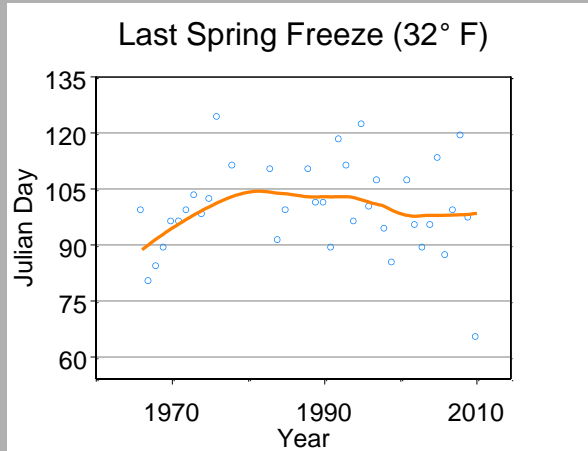
# Climate Trends: Fall Averages

## Western Climate Division



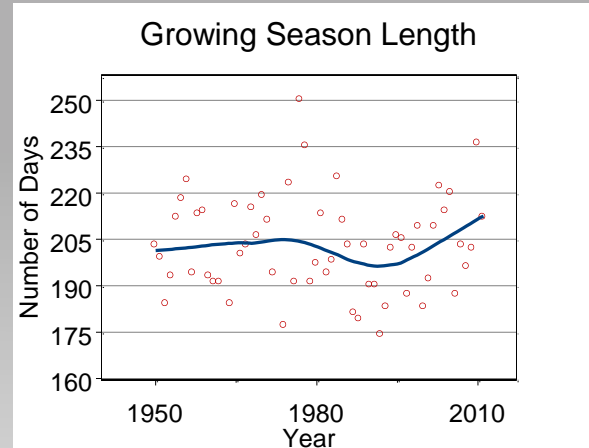
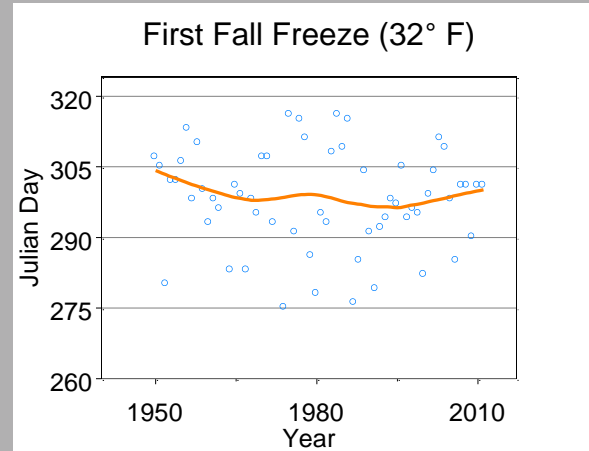
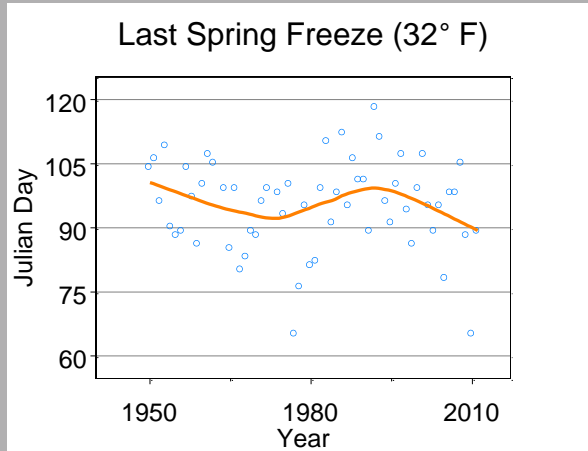
<http://kyclimate.org/graphlets/climatechange.html>

# Growing Season – Princeton, KY

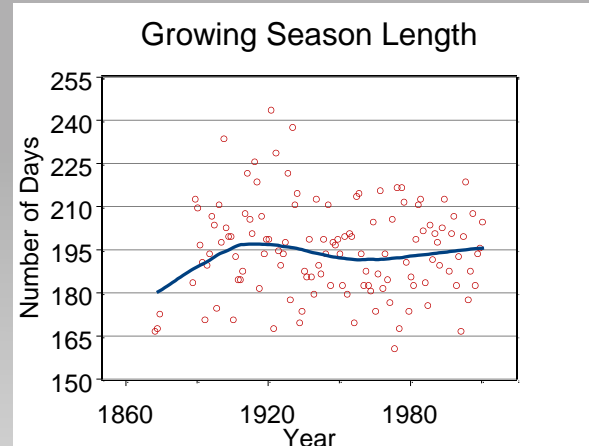
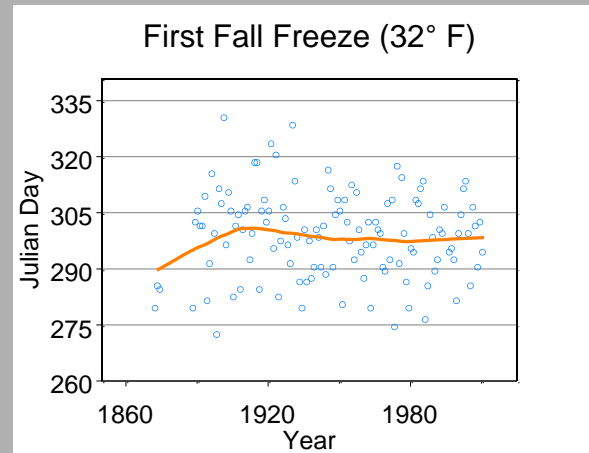
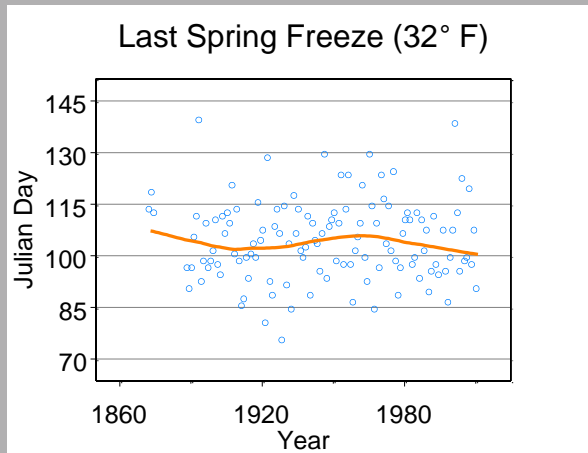




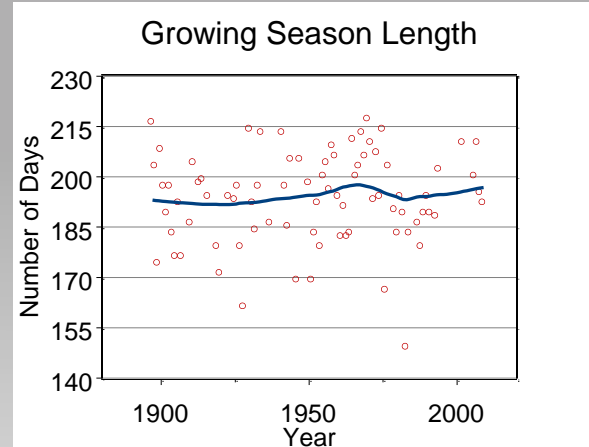
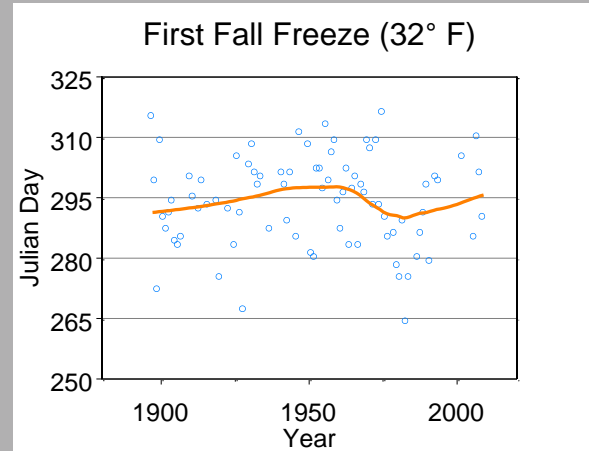
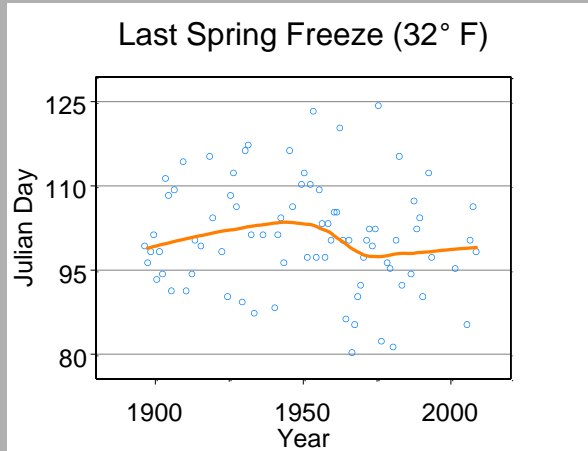
# Growing Season – Paducah, KY



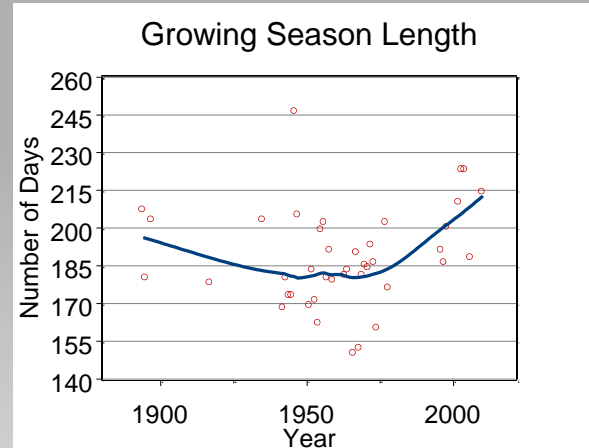
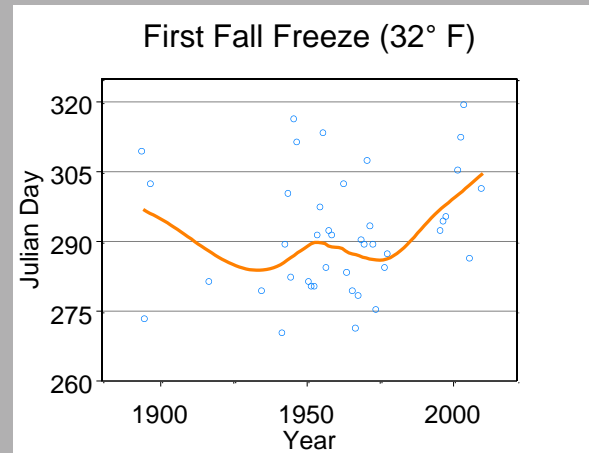
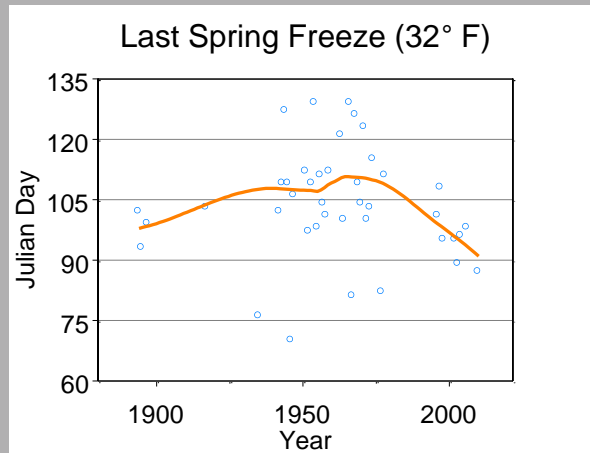
# Growing Season – Lexington, KY



# Growing Season – Hopkinsville, KY



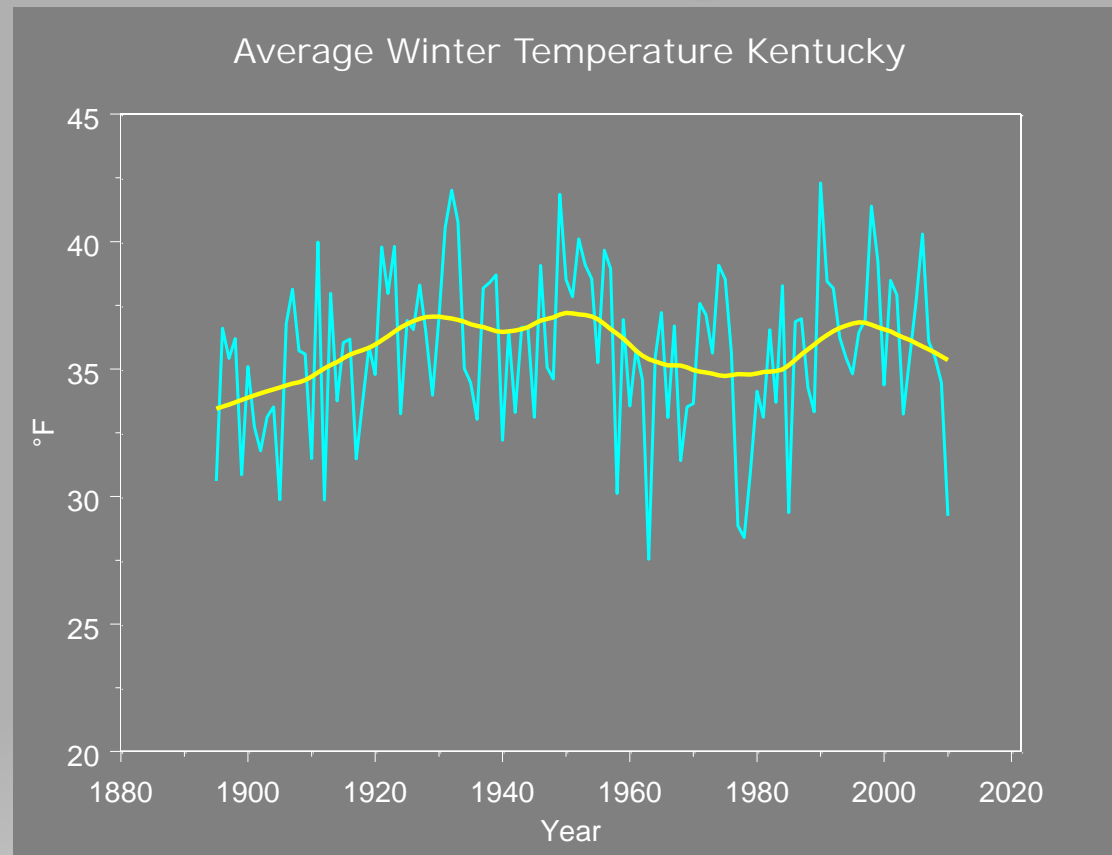
# Growing Season – Russellville, KY





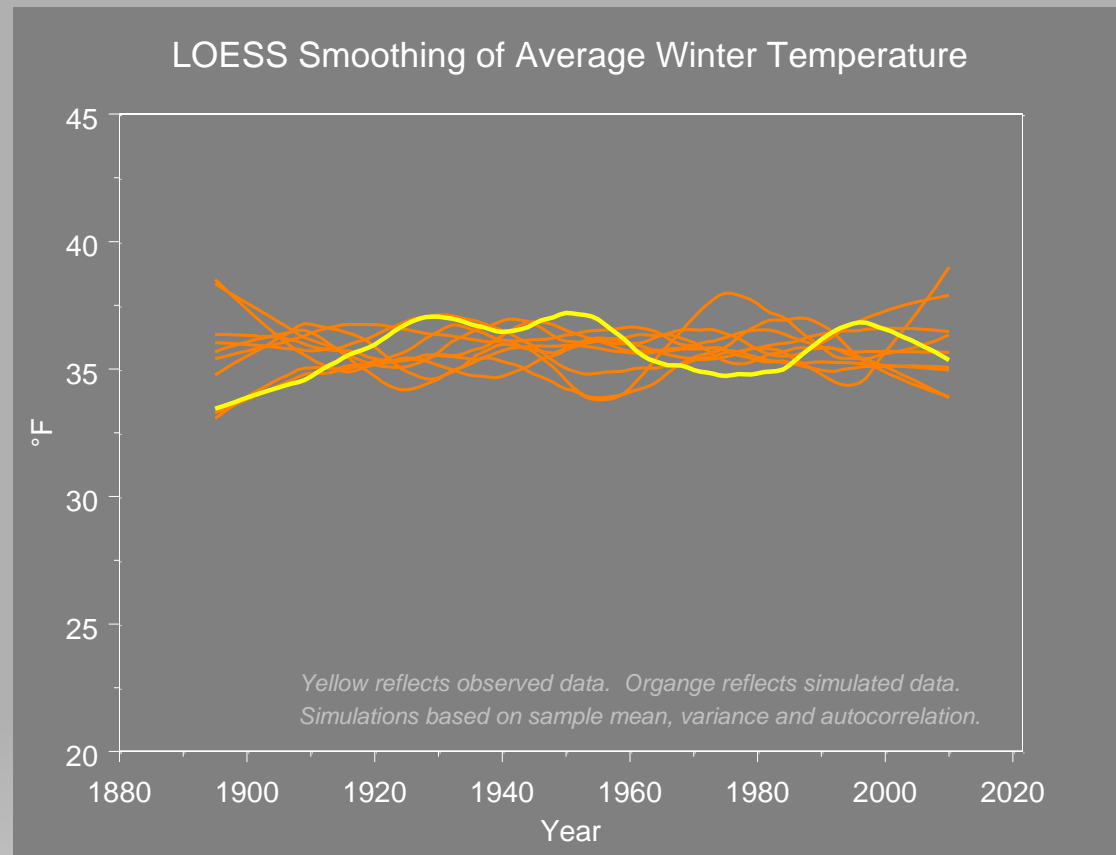
# Kentucky Winter Temperature

## *Time Series with Smoothing Curve*



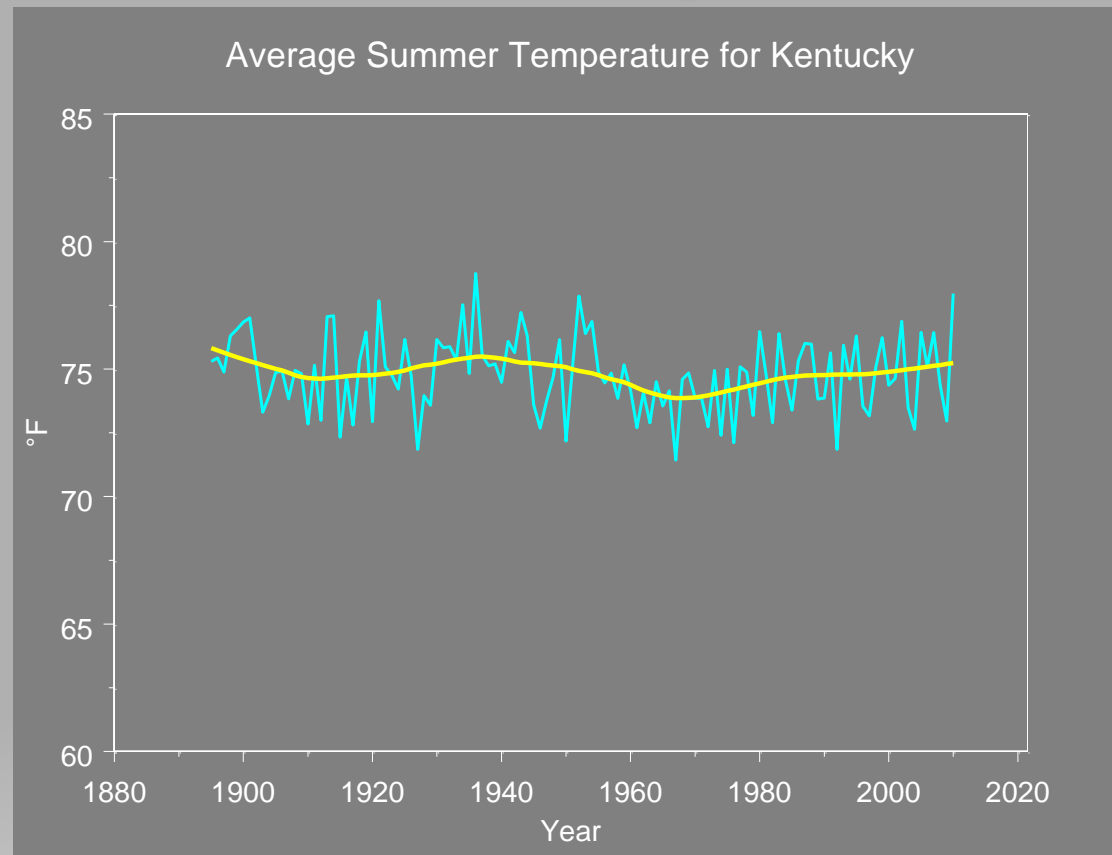
# Variability or Change?

## Winter



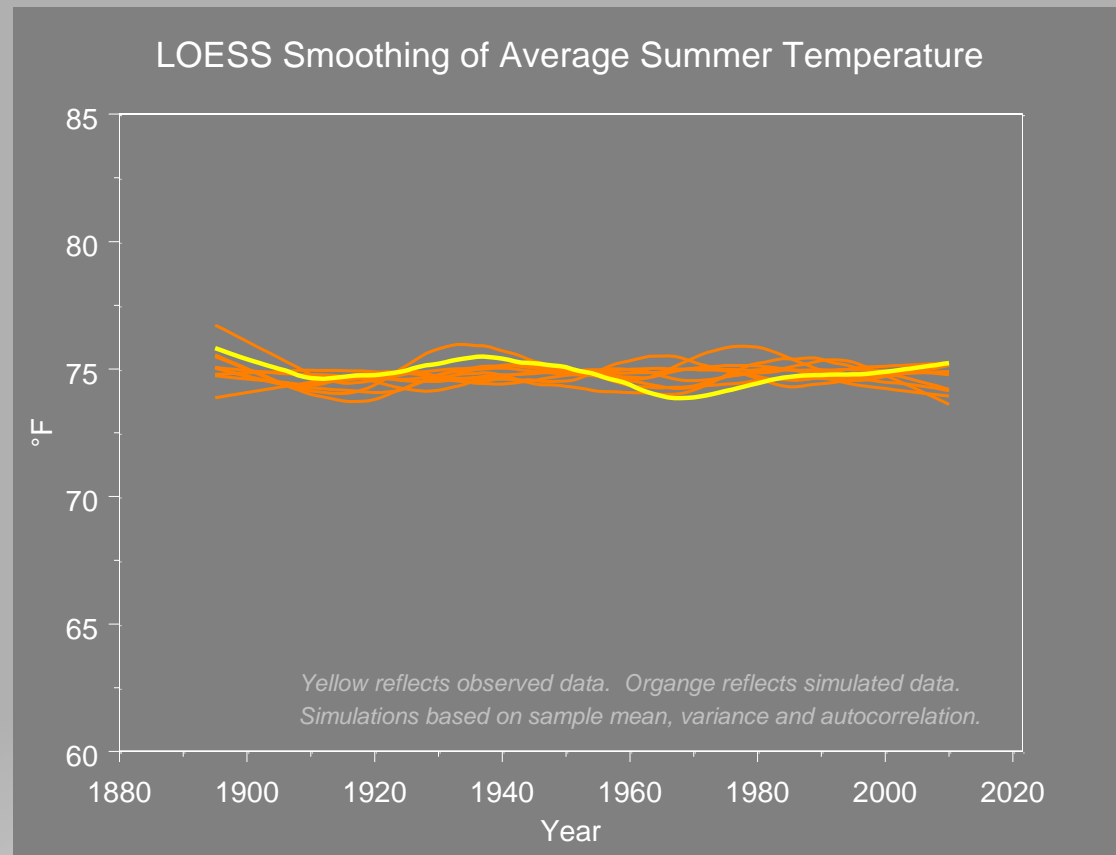
# Kentucky Summer Temperature

## *Time Series with Smoothing Curve*



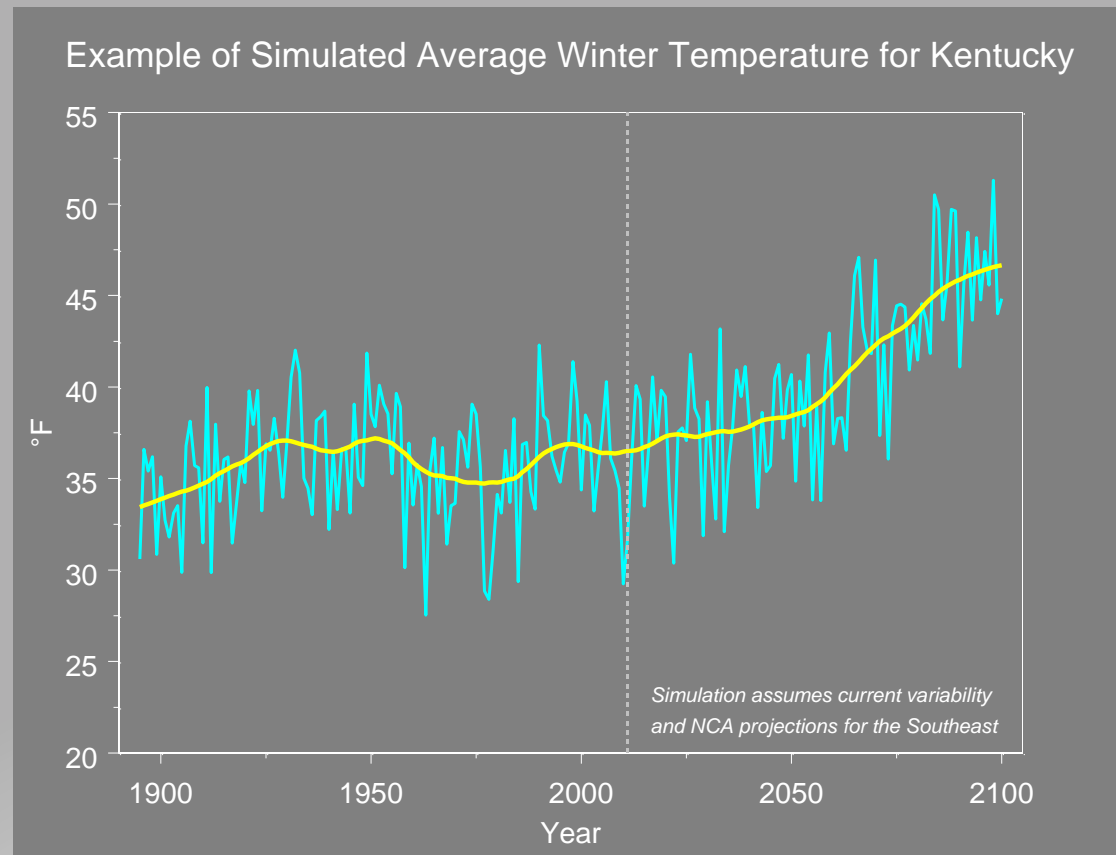
# Variability of Change?

## Summer



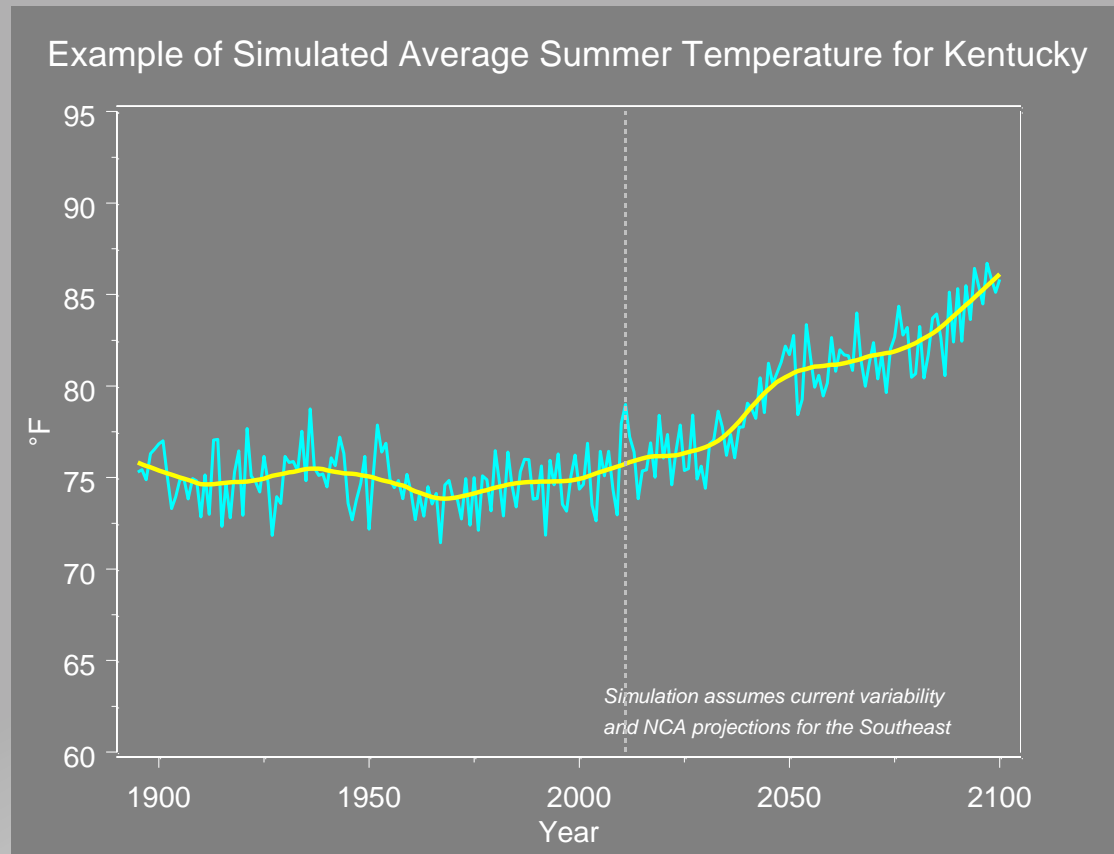
# Example Future Scenario

## Winter Temperature



# Example Future Scenario

## Summer Temperature





# In a nutshell ...



- Recent trends and historical context highlight variability with only minimal change
- Models project that Kentucky's future climate will lie beyond the range of recent historical variability



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