

Climate Variability and Change: Temporal Perspectives

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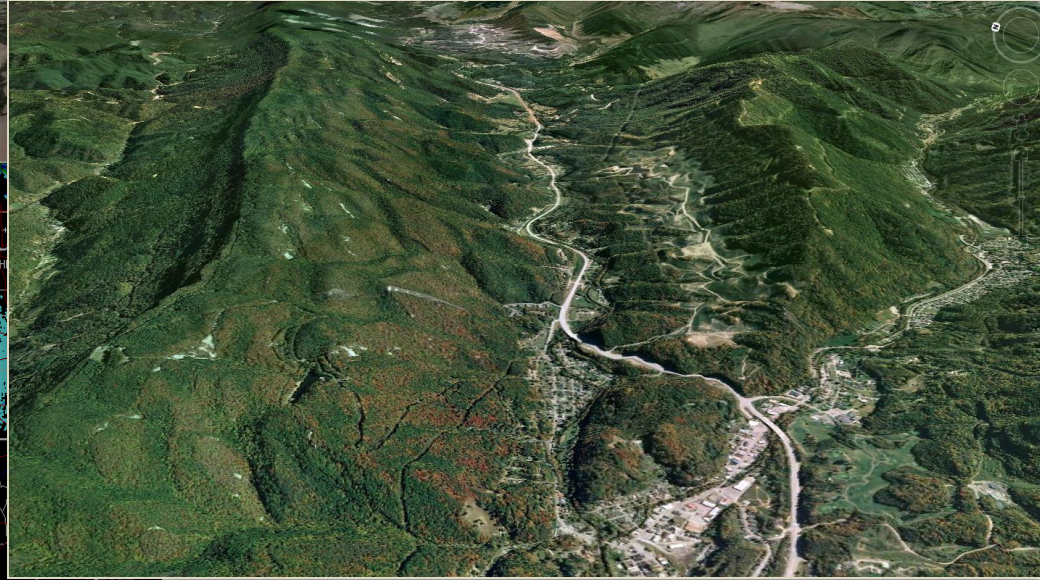
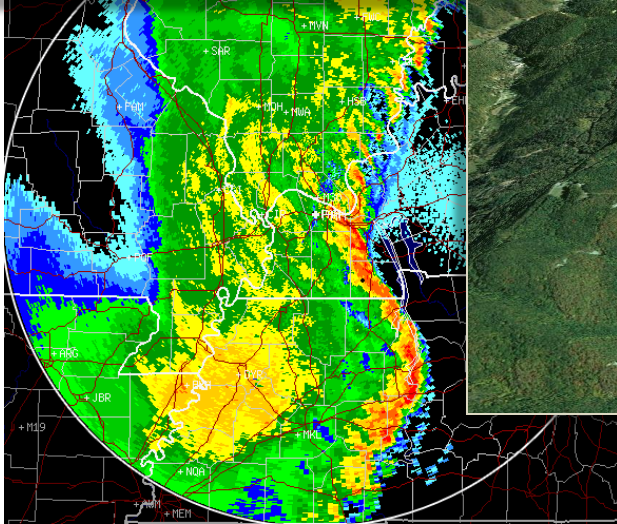
Nature's Call to Action III
Kentucky Transportation Cabinet
Frankfort, Kentucky

April 14, 2016

Topics



- The geography of changing vulnerability
- Historical climate variability and trends
- Climate projections
- Extremes of weather and climate
- Takeaways



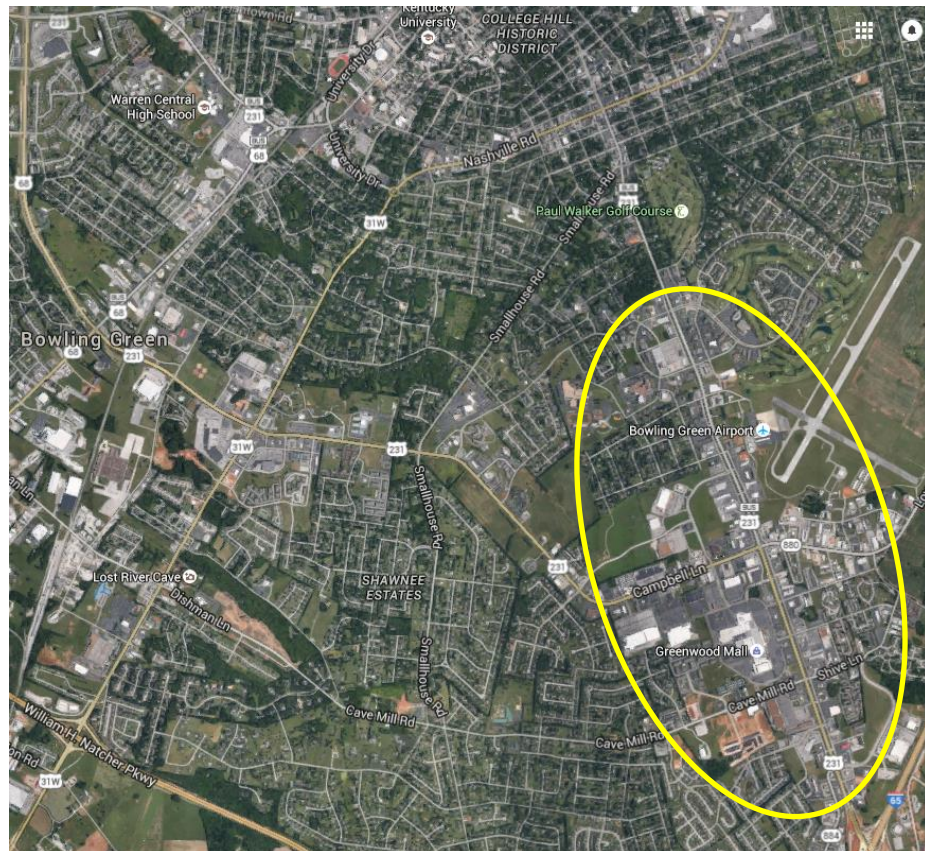
Kentucky's diverse topography creates distinct local vulnerabilities to weather and climate extremes.

Urban Expansion of Bowling Green, KY

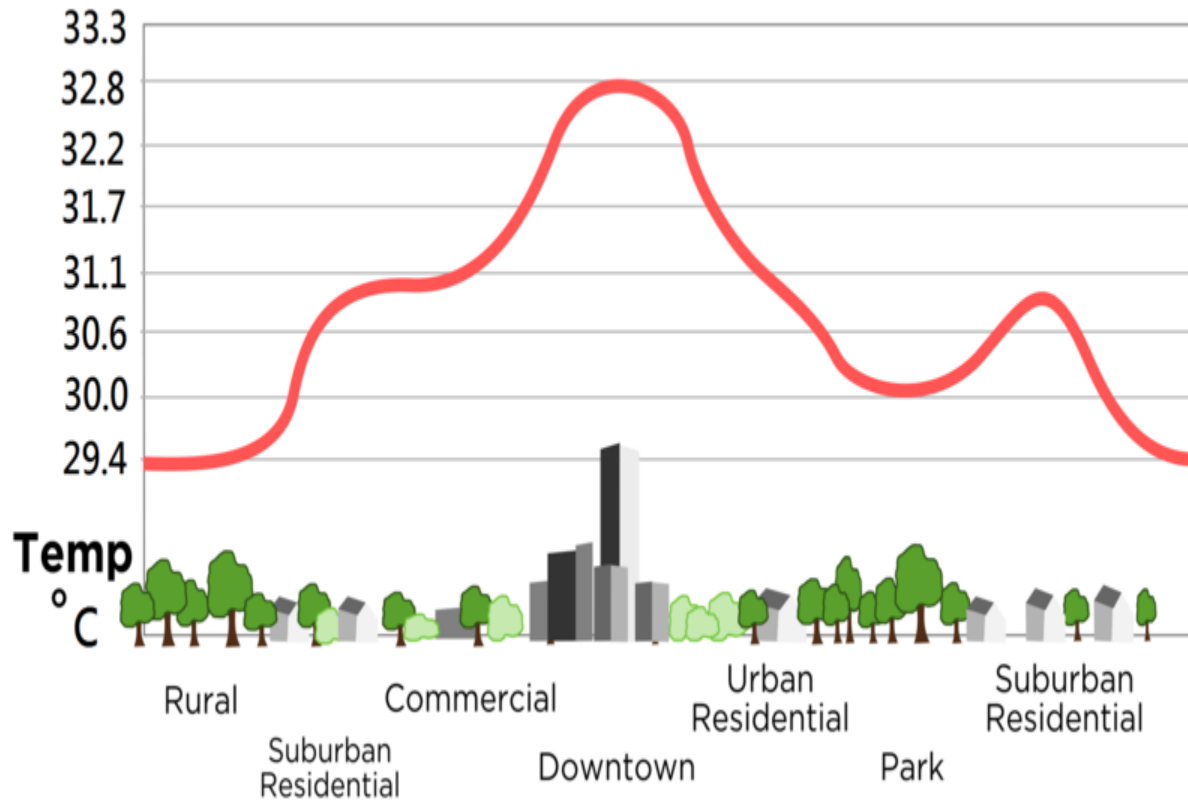
1958



Current



URBAN HEAT ISLAND PROFILE

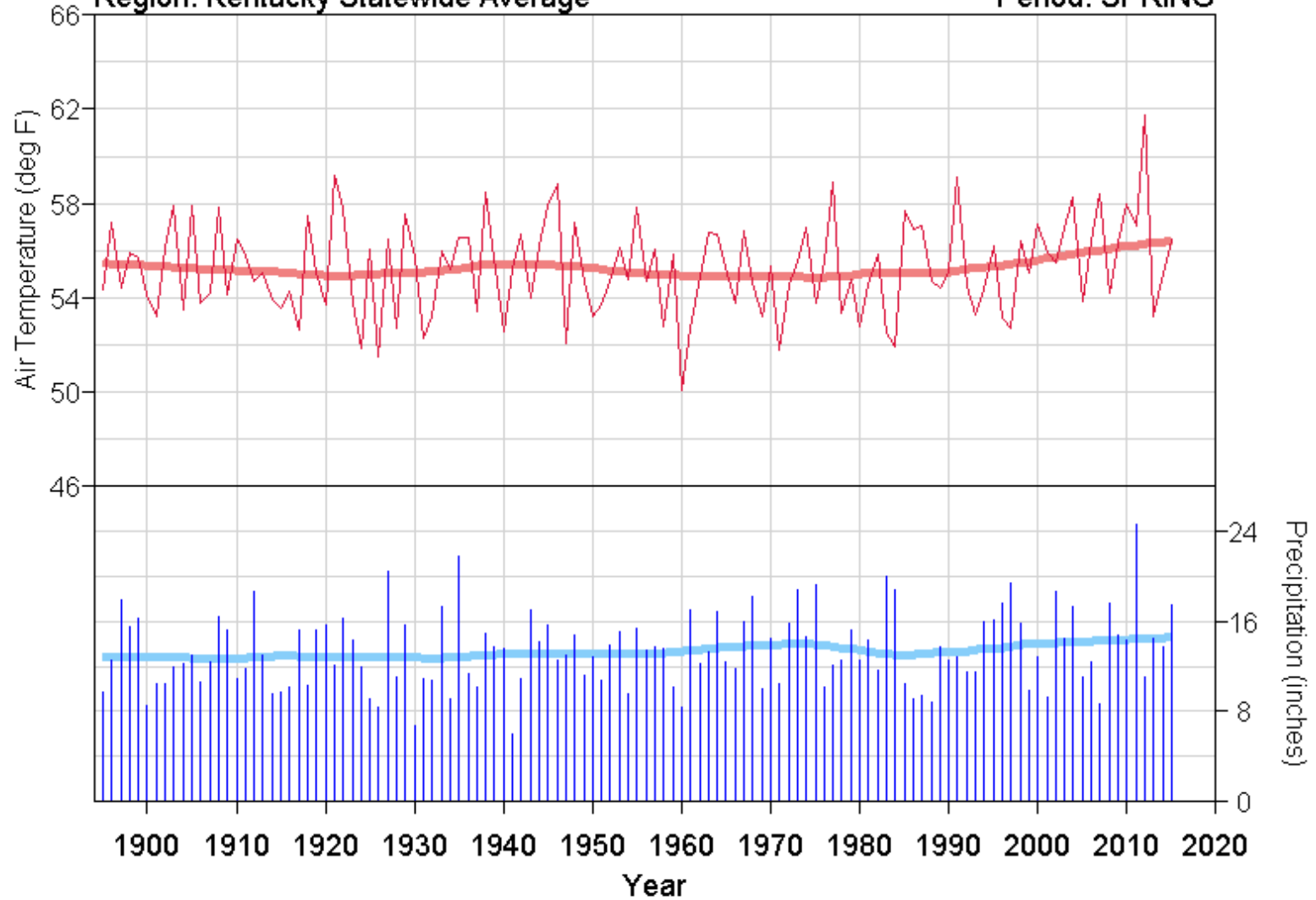


Source: commons.wikipedia.org

CLIMATE TRENDS

Region: Kentucky Statewide Average

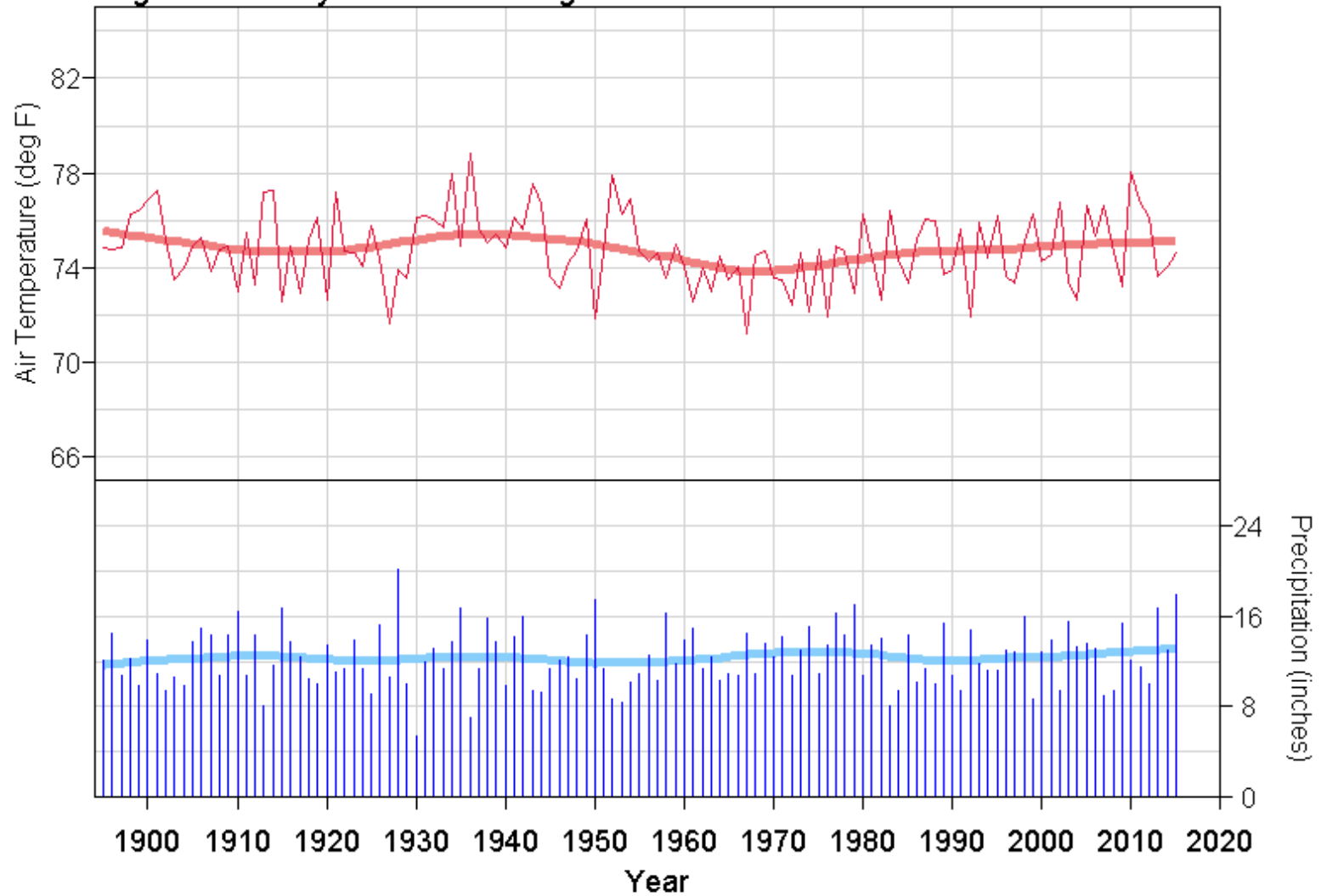
Period: SPRING



CLIMATE TRENDS

Region: Kentucky Statewide Average

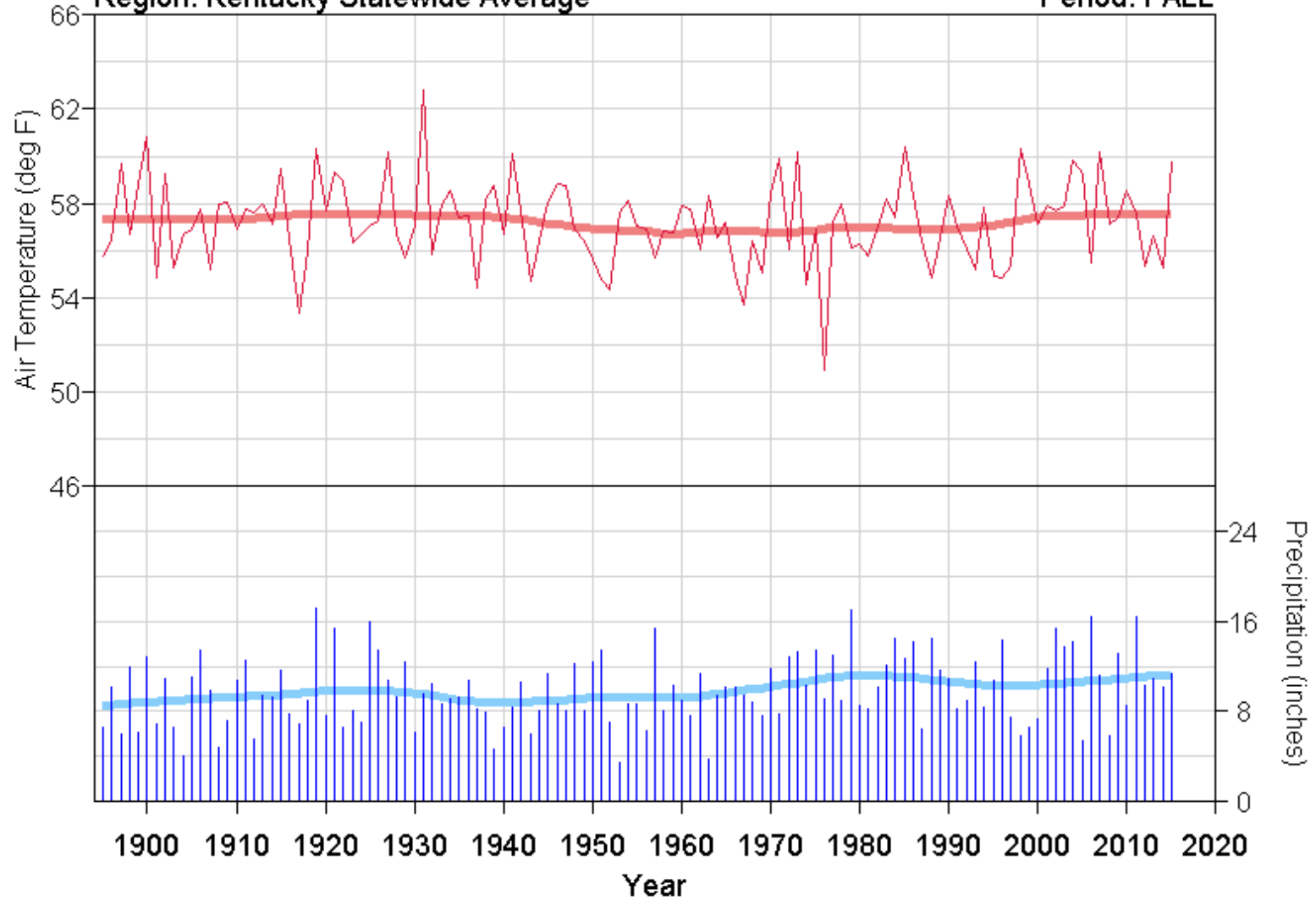
Period: SUMMER



CLIMATE TRENDS

Region: Kentucky Statewide Average

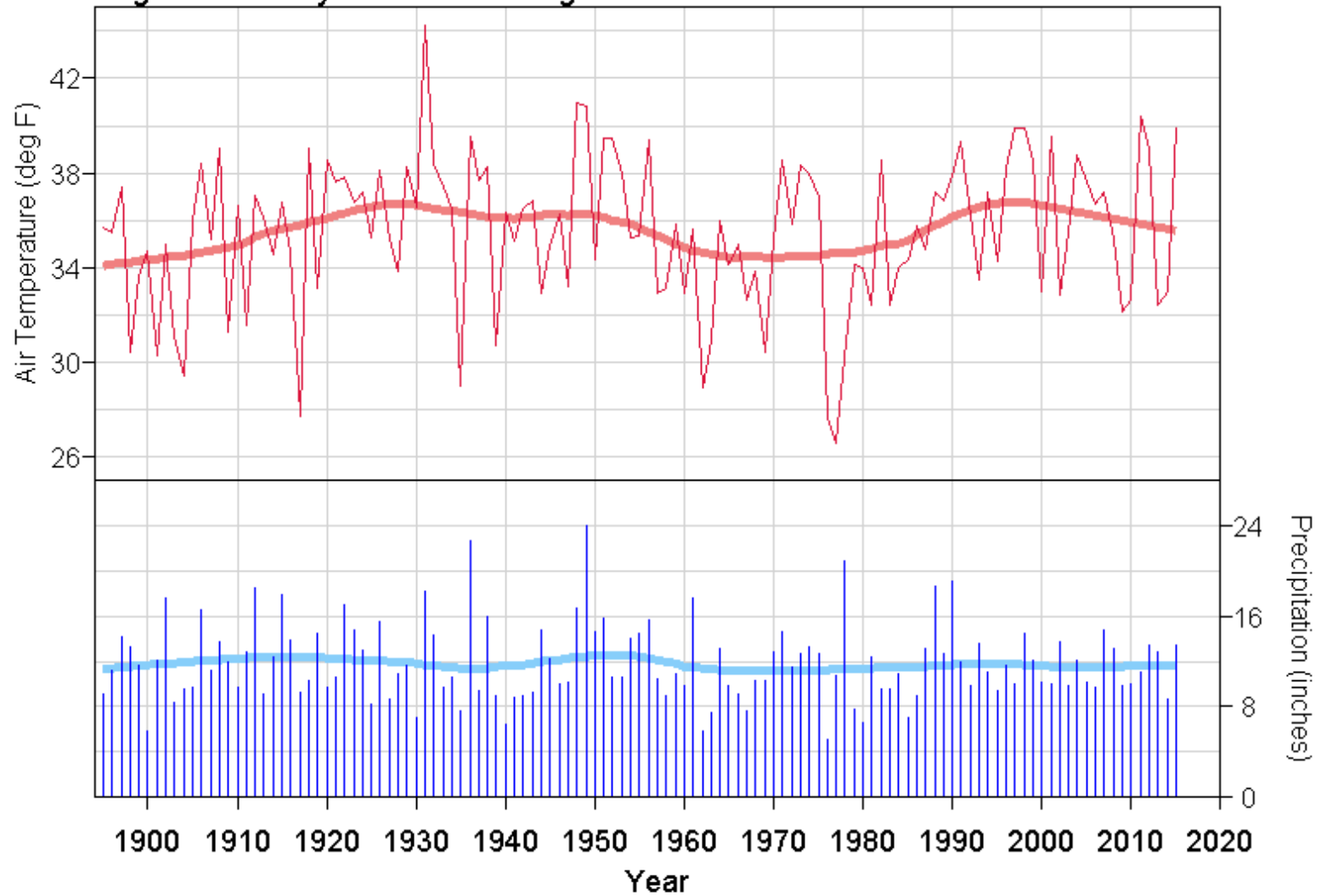
Period: FALL



CLIMATE TRENDS

Region: Kentucky Statewide Average

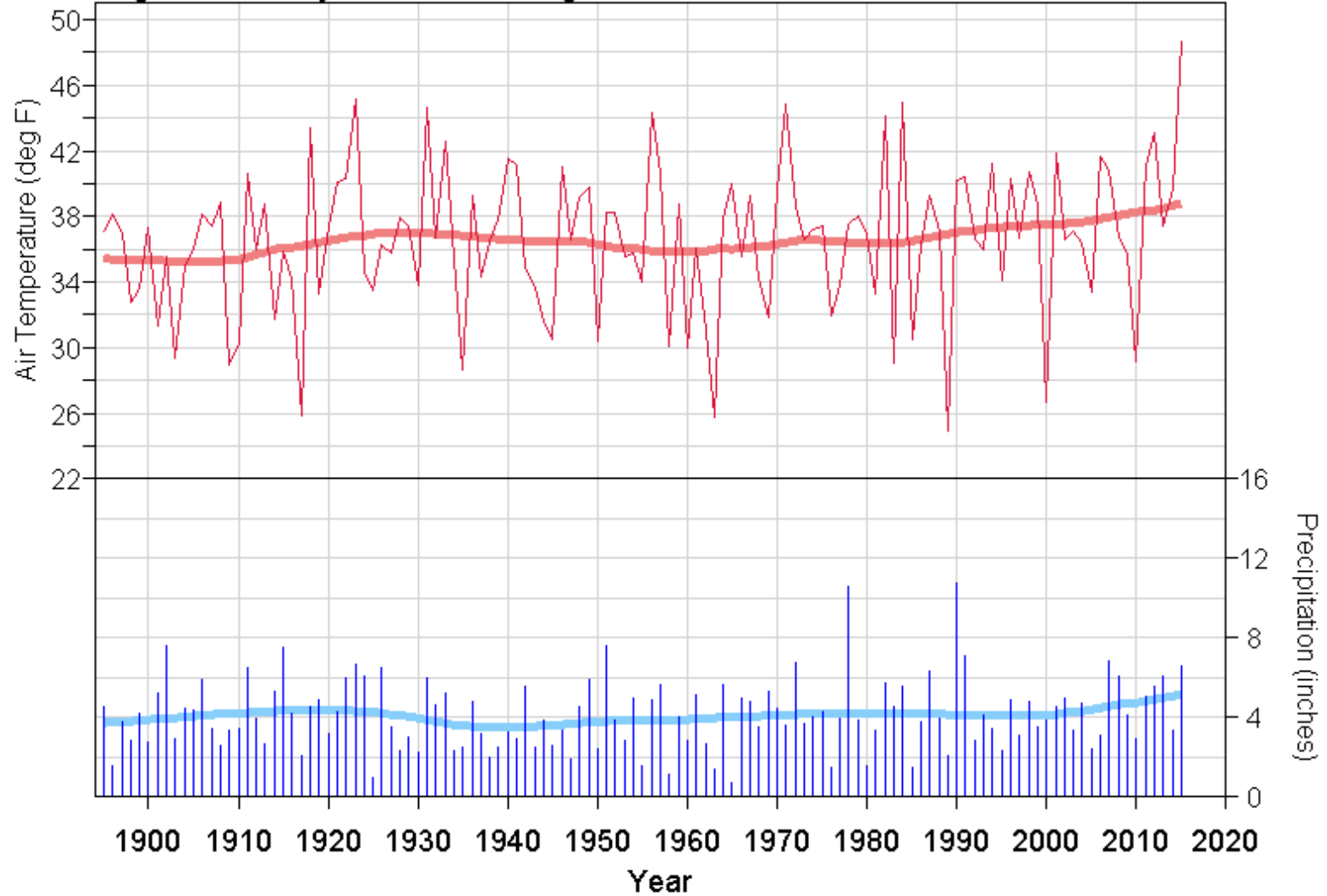
Period: WINTER



CLIMATE TRENDS

Region: Kentucky Statewide Average

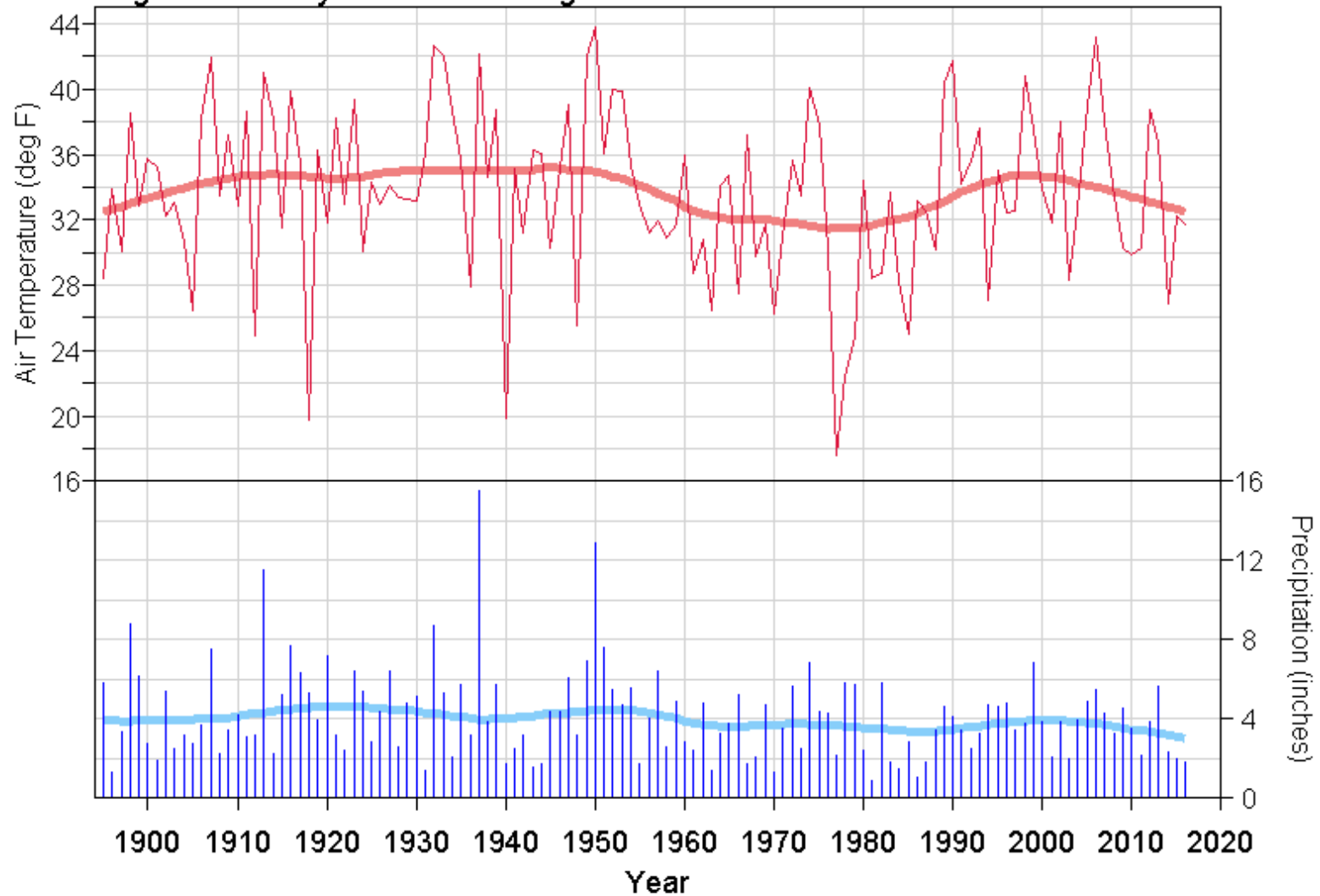
Period: DECEMBER



CLIMATE TRENDS

Region: Kentucky Statewide Average

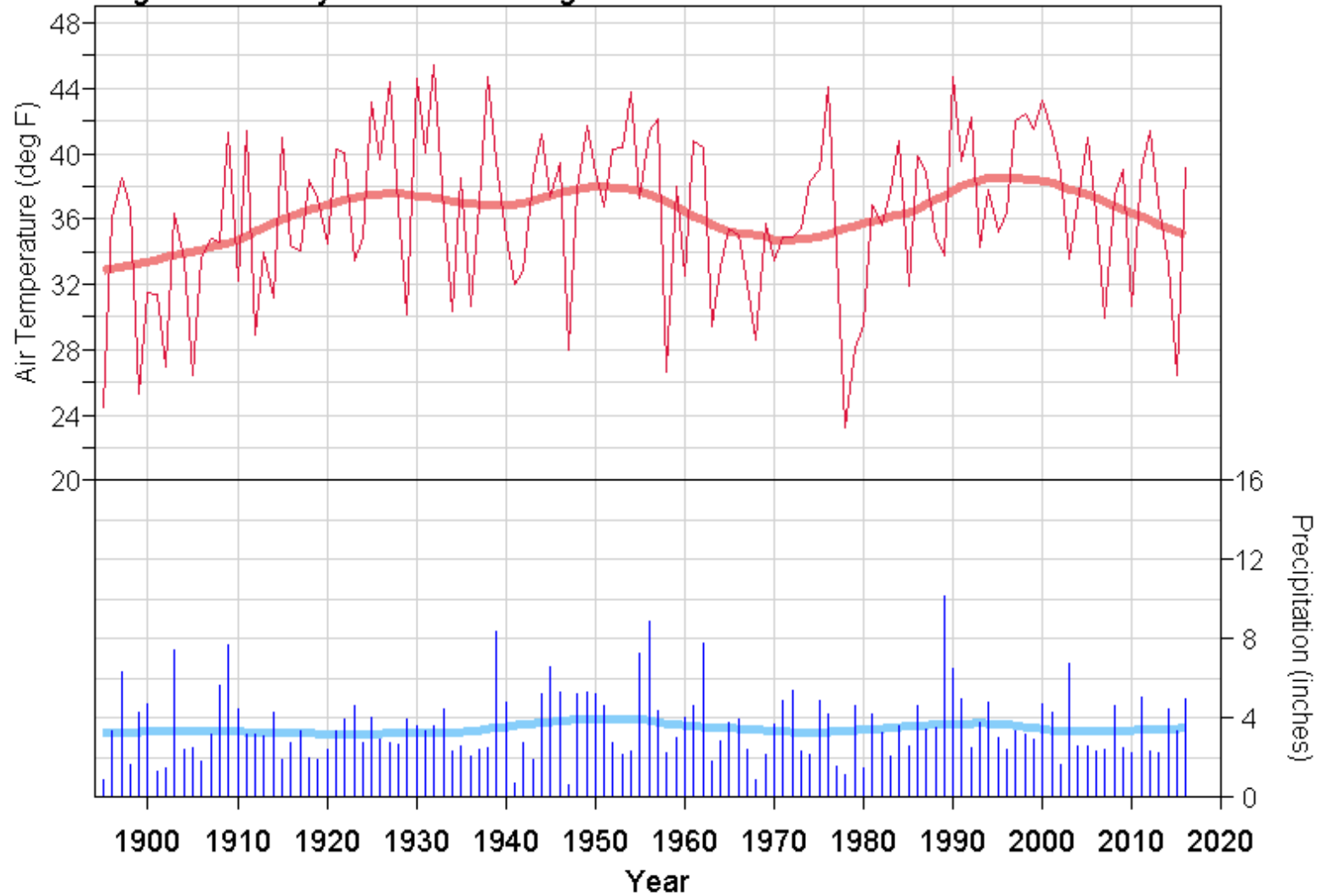
Period: JANUARY



CLIMATE TRENDS

Region: Kentucky Statewide Average

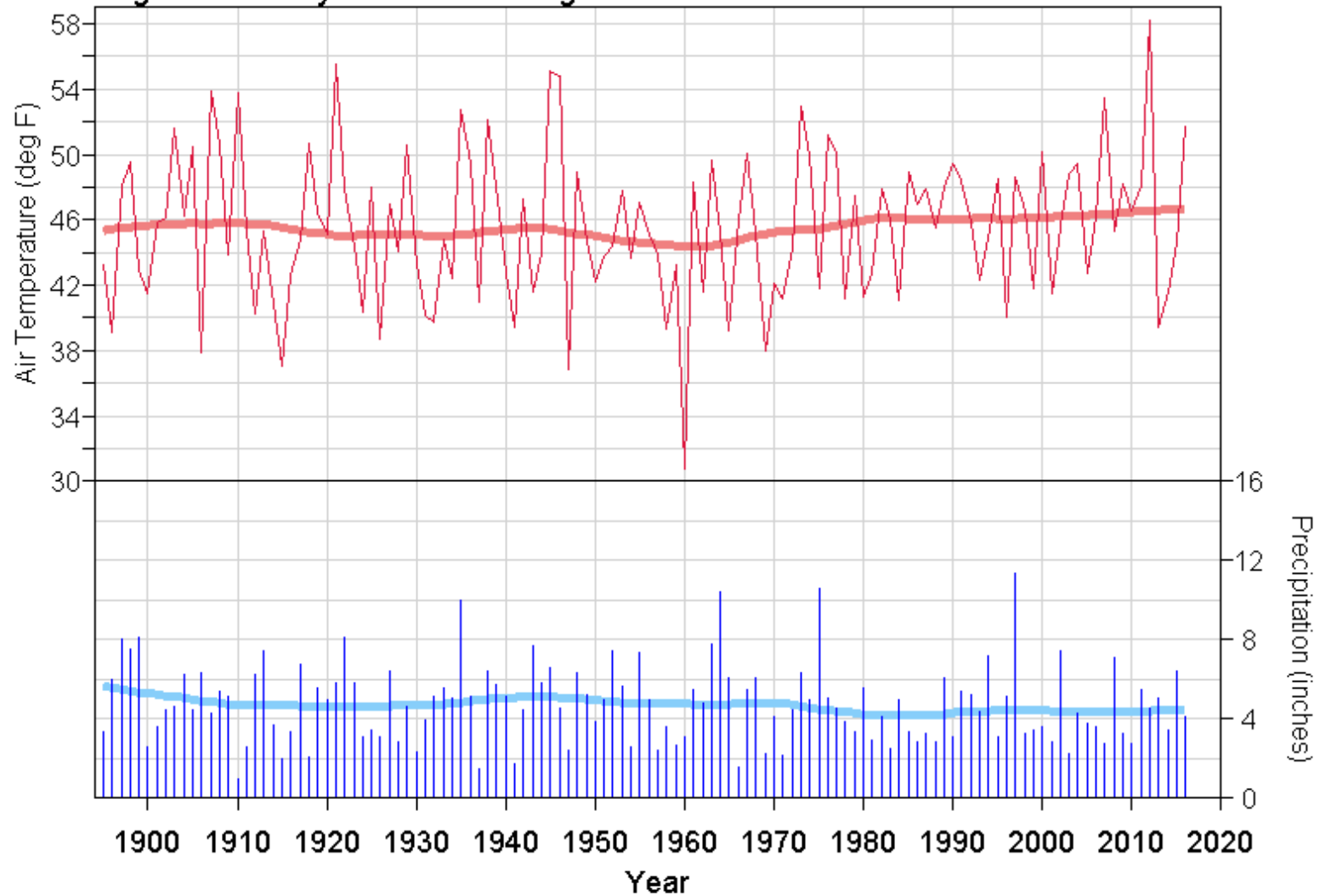
Period: FEBRUARY



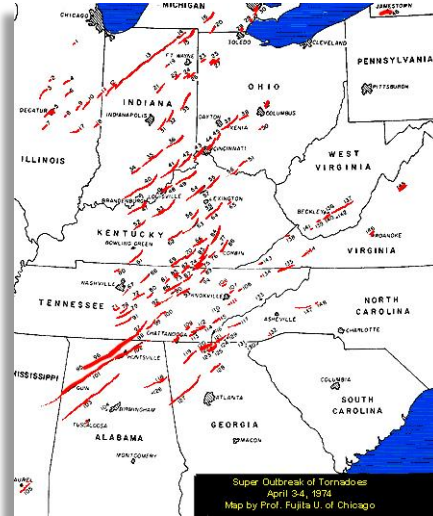
CLIMATE TRENDS

Region: Kentucky Statewide Average

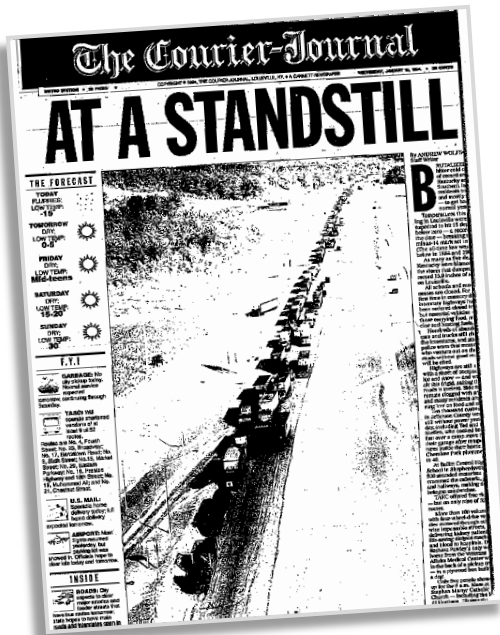
Period: MARCH



Weather and Climate Extremes

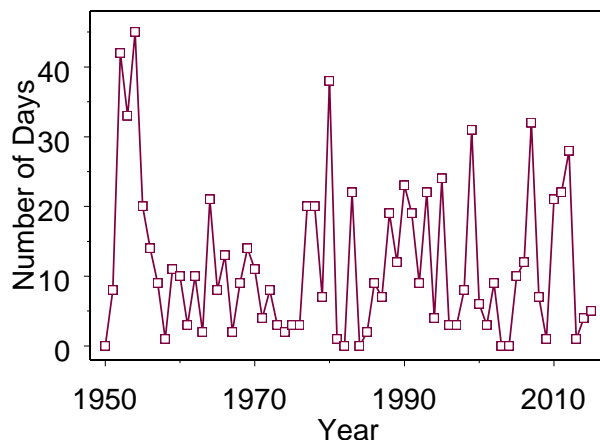


- Floods and Droughts
- Heat and Cold Waves
- Tornadoes, hail, wind, lightning
- Snow and ice

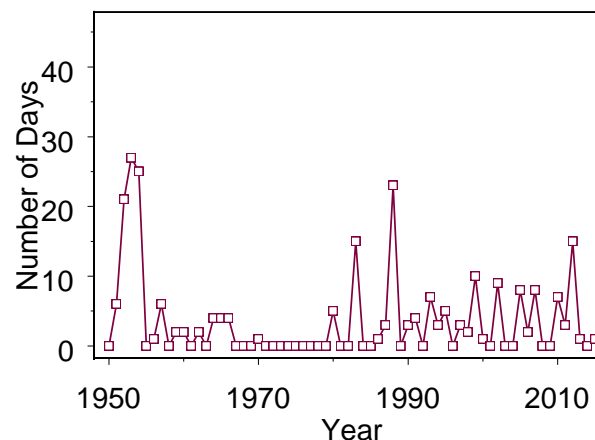


Frequency of Days with Maximum Temperature of 95° F or Higher

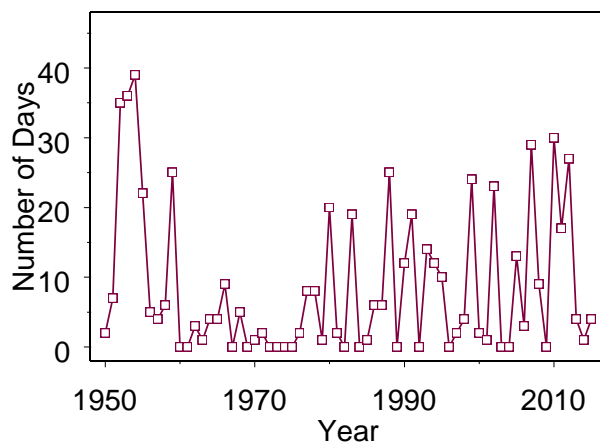
Bowling Green (150909)



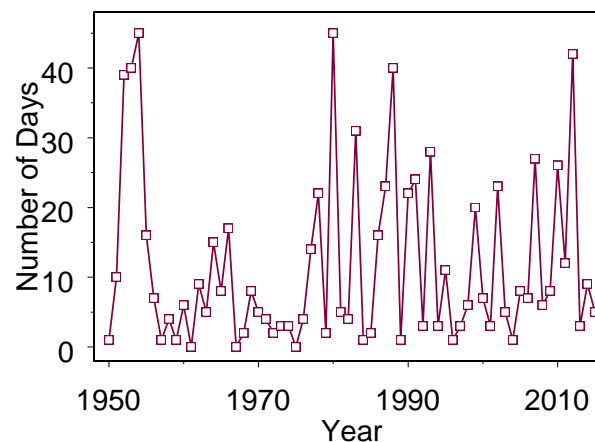
Lexington (154746)



Louisville (154954)

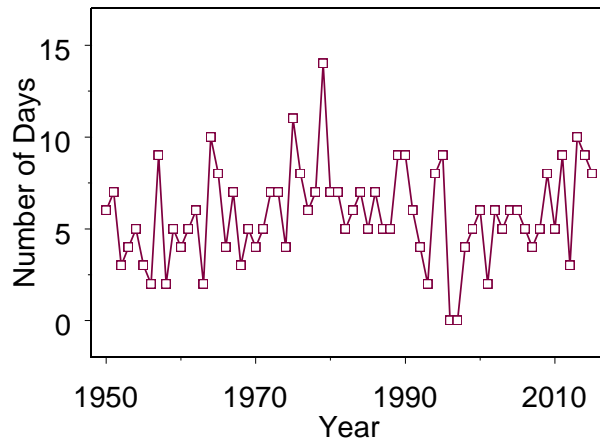


Paducah (156110)

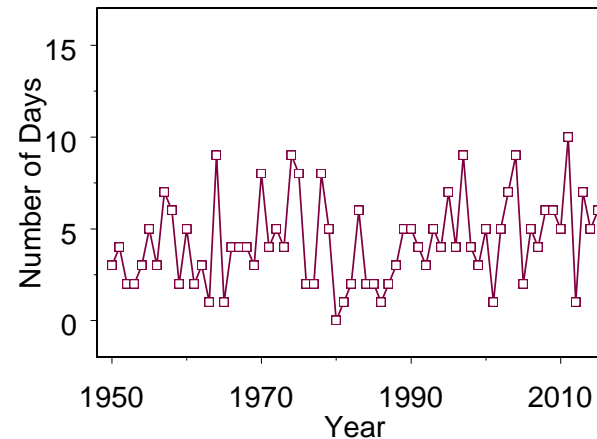


Frequency of Days with Precipitation of 1.5" or More

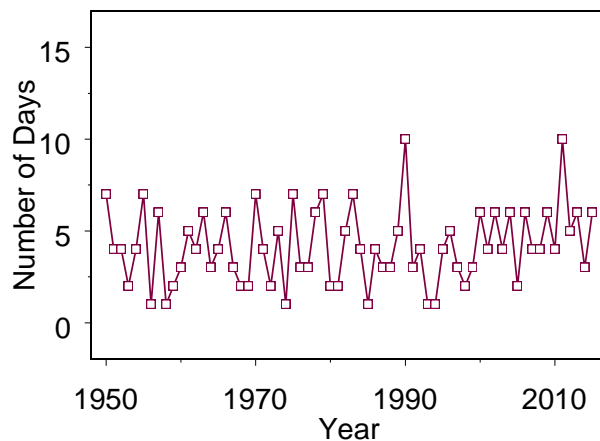
Bowling Green (150909)



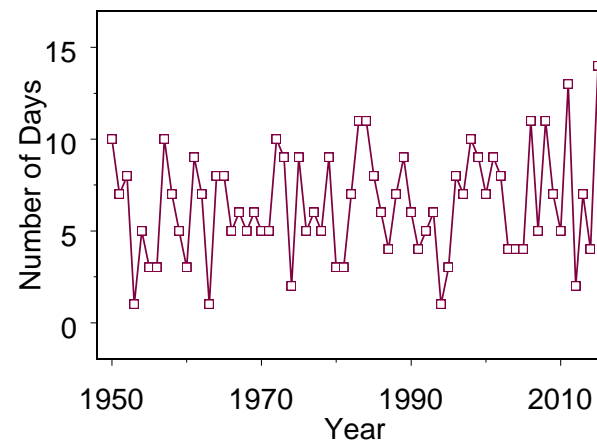
Lexington (154746)



Louisville (154954)

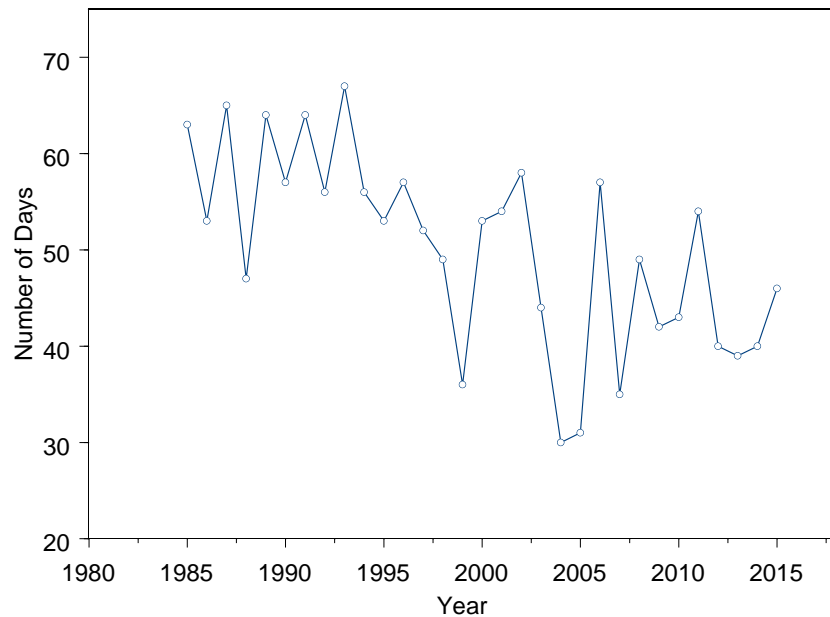


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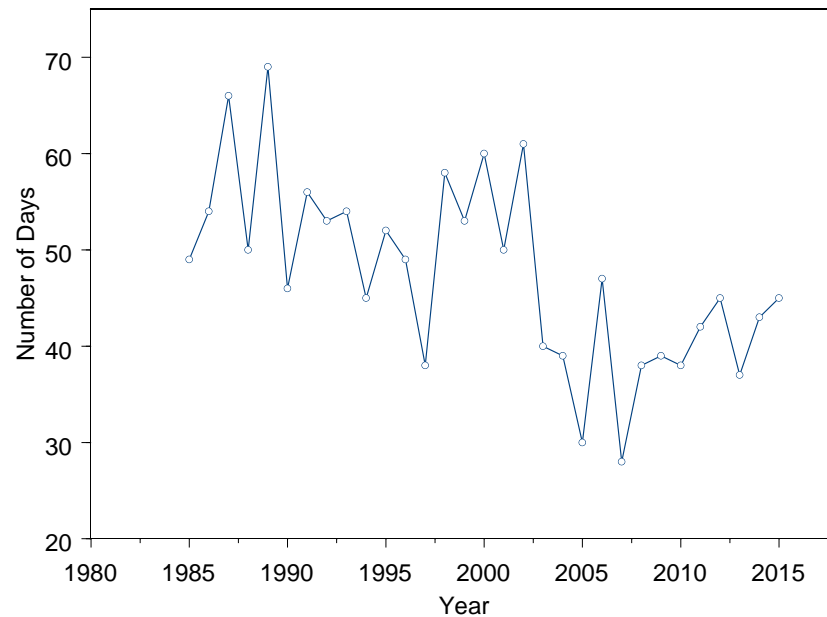


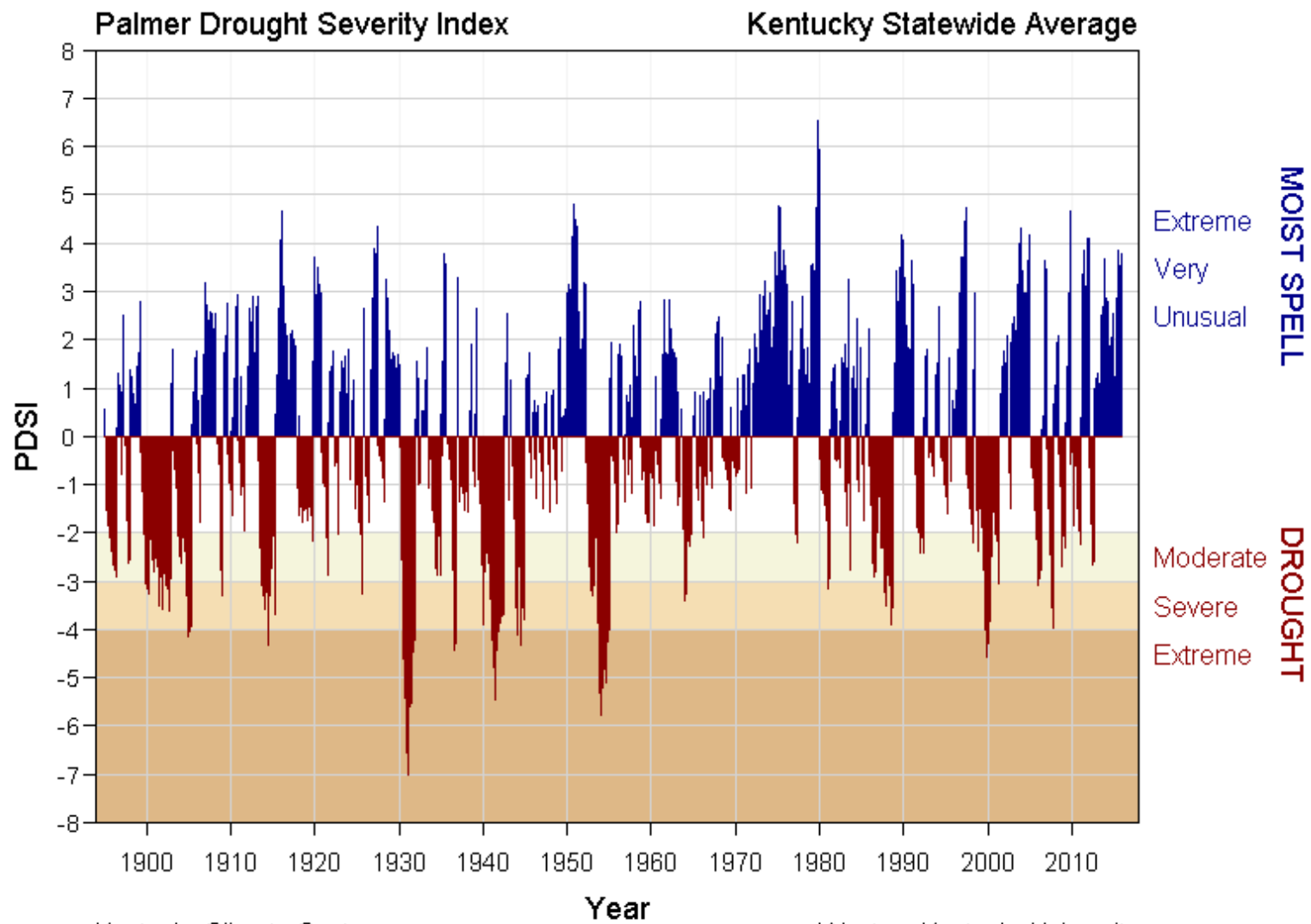
Thunderstorm Days

Paducah, KY



Jackson, KY



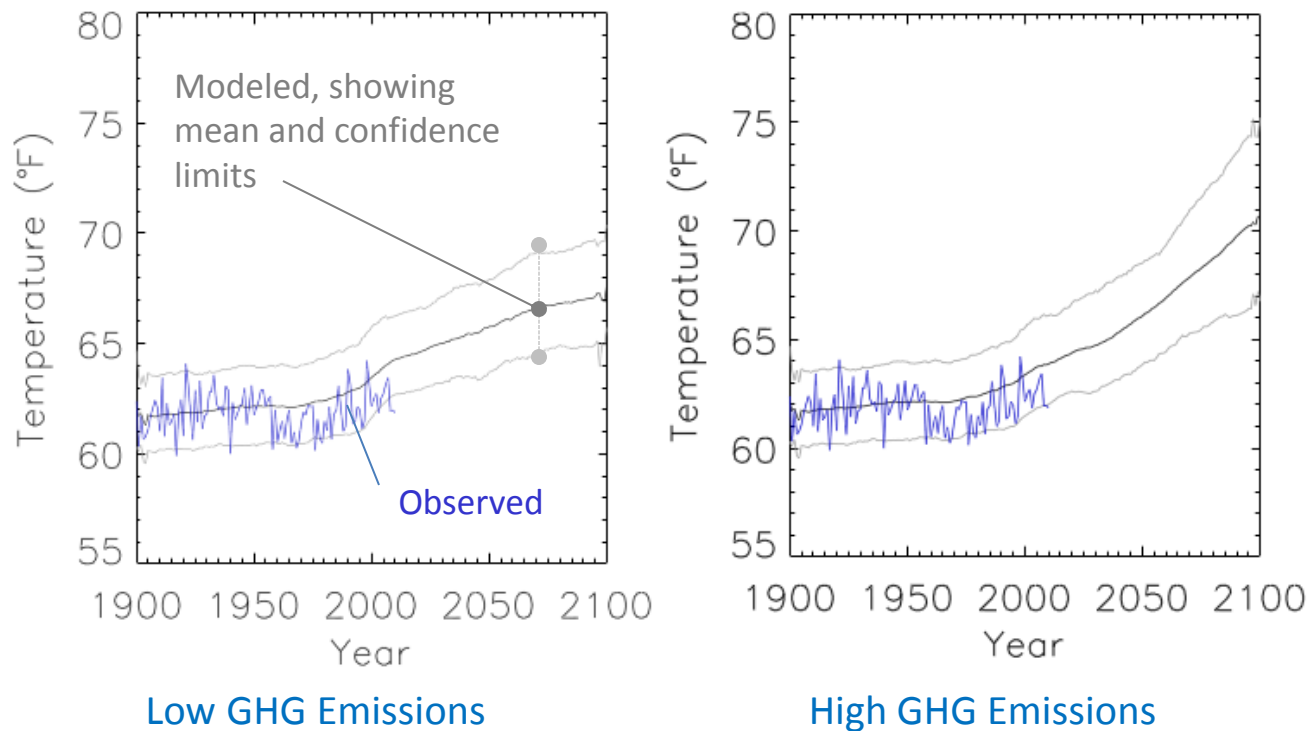


Kentucky Climate Center

Western Kentucky University

Climate Change Scenarios for the U.S. Southeast

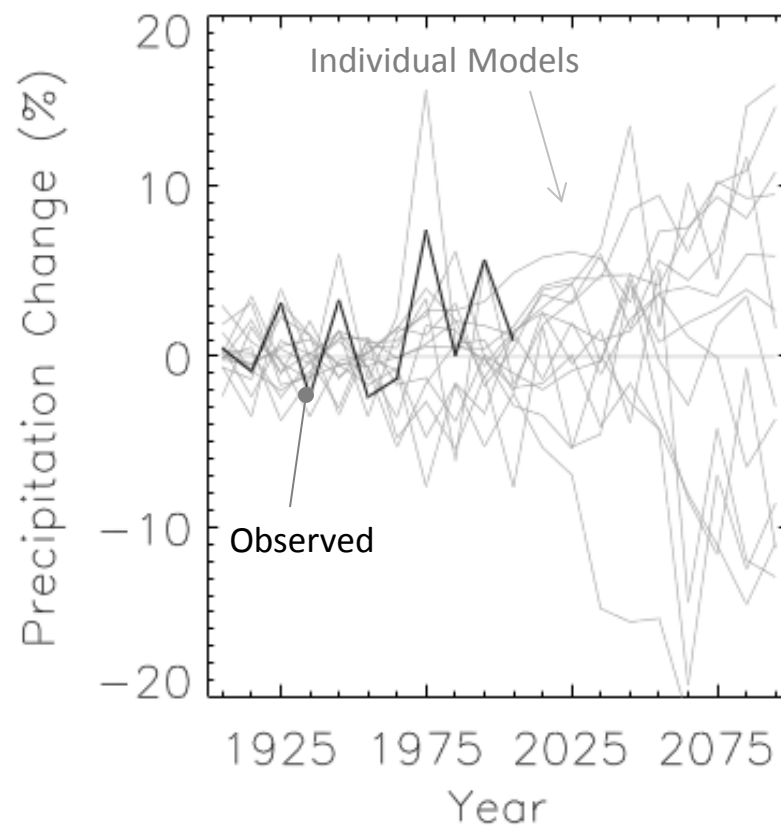
Future Temperature Scenarios



http://www.nesdis.noaa.gov/technical_reports/NOAA_NESDIS_Tech_Report_142-2-Climate_of_the_Southeast_U.S.pdf

Climate Change Scenarios for the U.S. Southeast

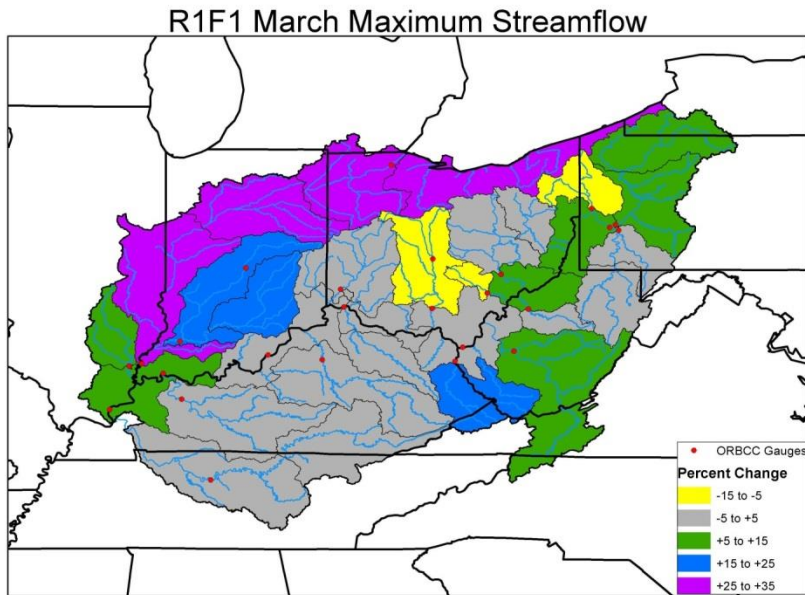
Future Precipitation Scenarios



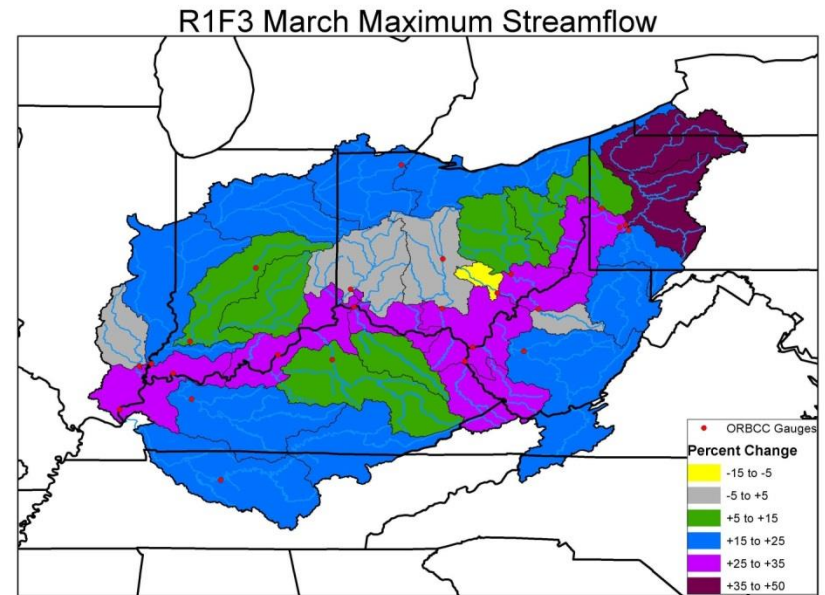
High GHG Emissions

Model Projection for Percent Change in Maximum March Stream Flow

Averaged for Period 2011-2040



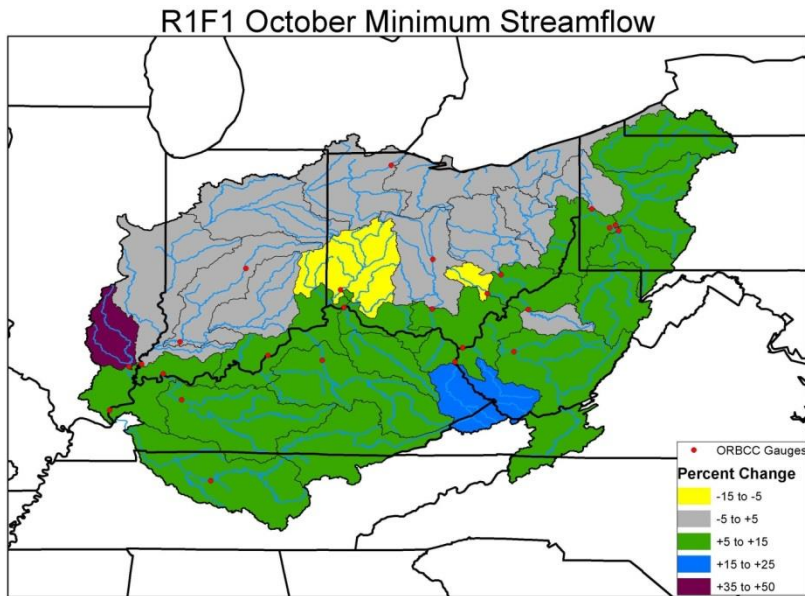
Averaged for Period 2071-2099



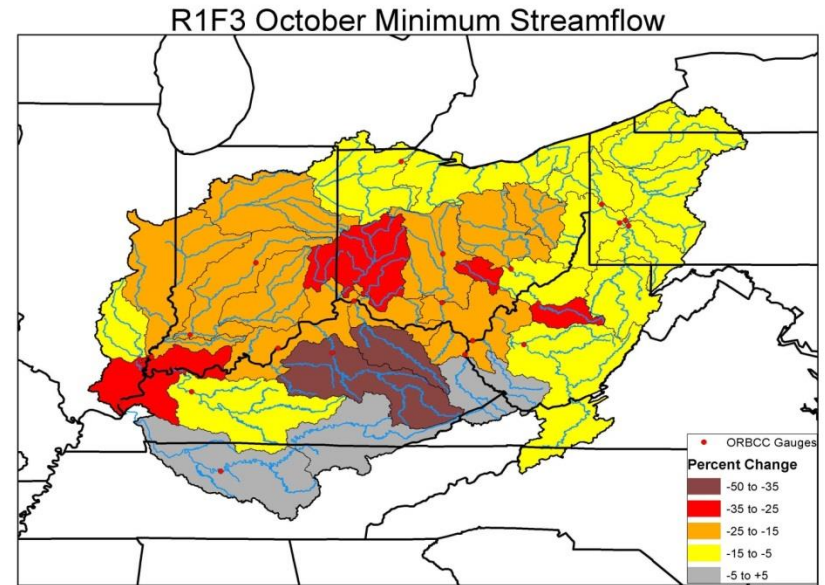
Source: NOAA/NWS Ohio River Forecast Center, Ohio River Basin Climate Change Project. Images provided by Jim Noel.

Model Projection for Percent Change in Minimum October Stream Flow

Averaged for Period 2011-2040



Averaged for Period 2071-2099



Source: NOAA/NWS Ohio River Forecast Center, Ohio River Basin Climate Change Project. Images provided by Jim Noel.

Key Themes of Climate

- 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
- Even small changes in climate can lead comparatively large changes in the frequency of extreme weather and climate events

The Challenge and Opportunity for Transportation



- An evolving landscape of intensifying economic competition on both the national and global scales
- The necessity of moving people, materials, and products safely and efficiently
- Reliability and resilience in the face of extreme weather and climate events