

Climate Change in Illinois: Past, Present, and Future

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Natural Controls of Climate Change

- Natural processes that produce climate change on Earth
 - Responsible for past climate change thousands to millions of years ago

Variations in solar activity



Slow orbital changes
(Milankovitch Cycles)

Large volcanic
eruptions



Human Influence on the Climate System

Addition of heat trapping gases to the atmosphere



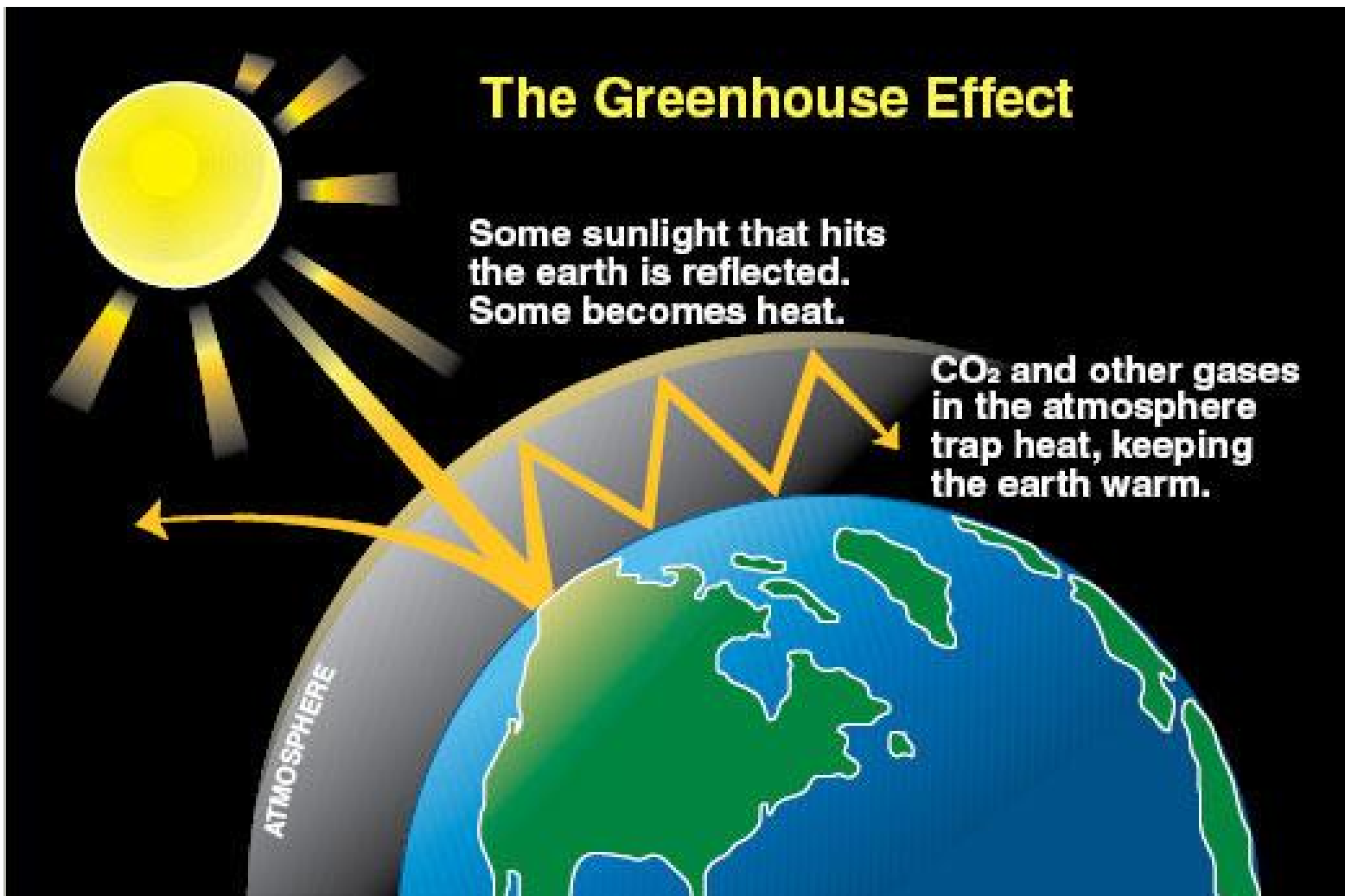
Change in land cover
Urbanization, Deforestation, Desertification



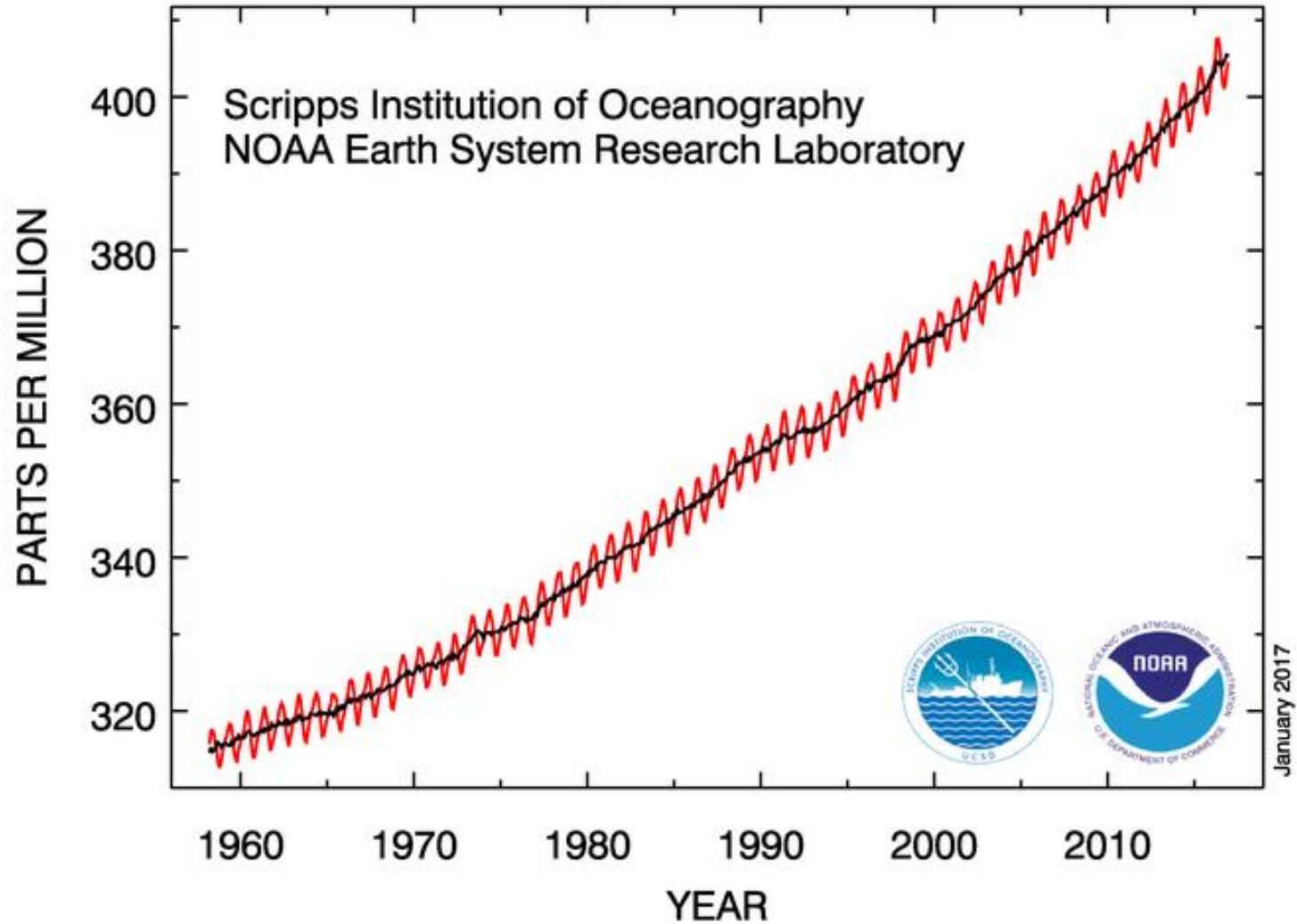
The Greenhouse Effect

Some sunlight that hits the earth is reflected. Some becomes heat.

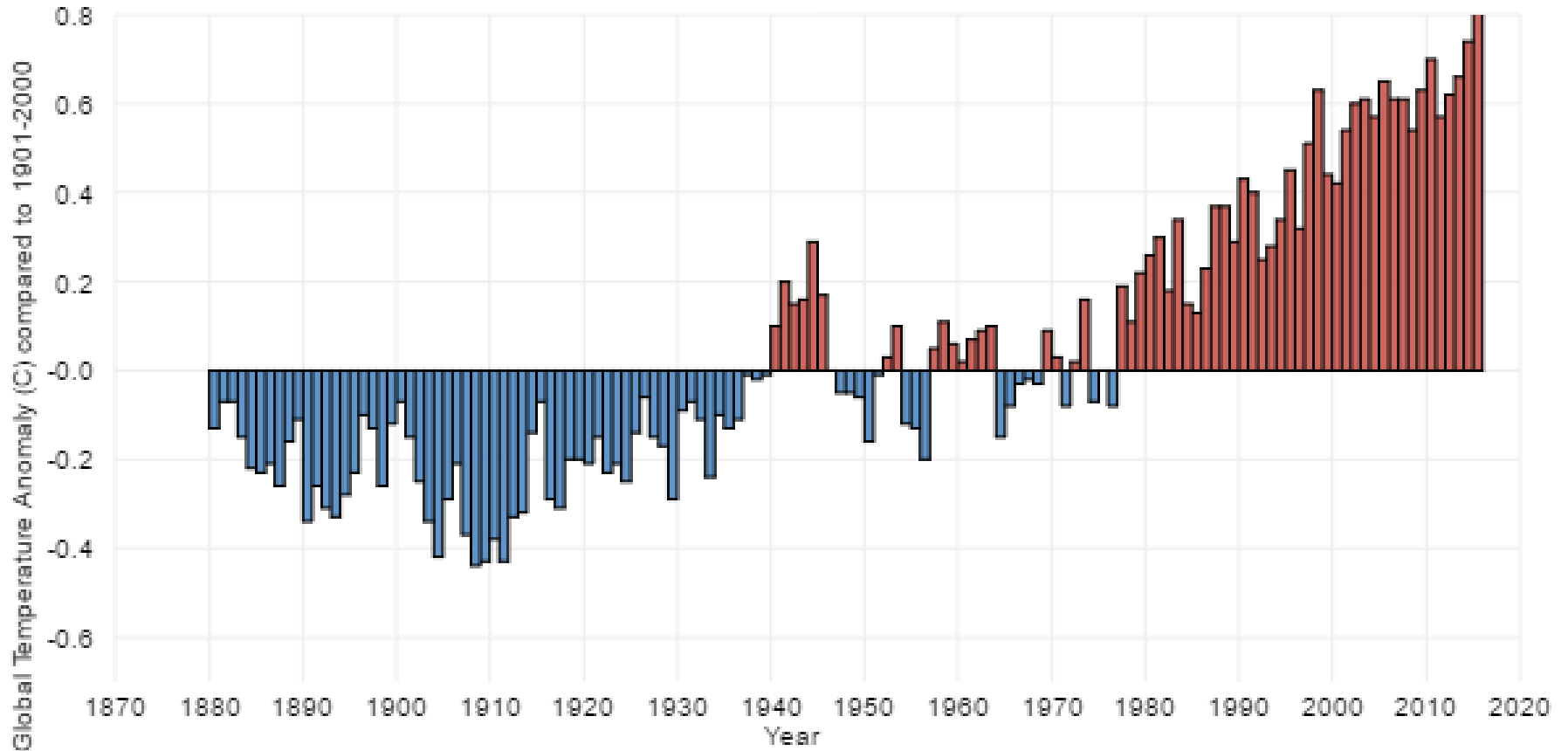
CO₂ and other gases in the atmosphere trap heat, keeping the earth warm.



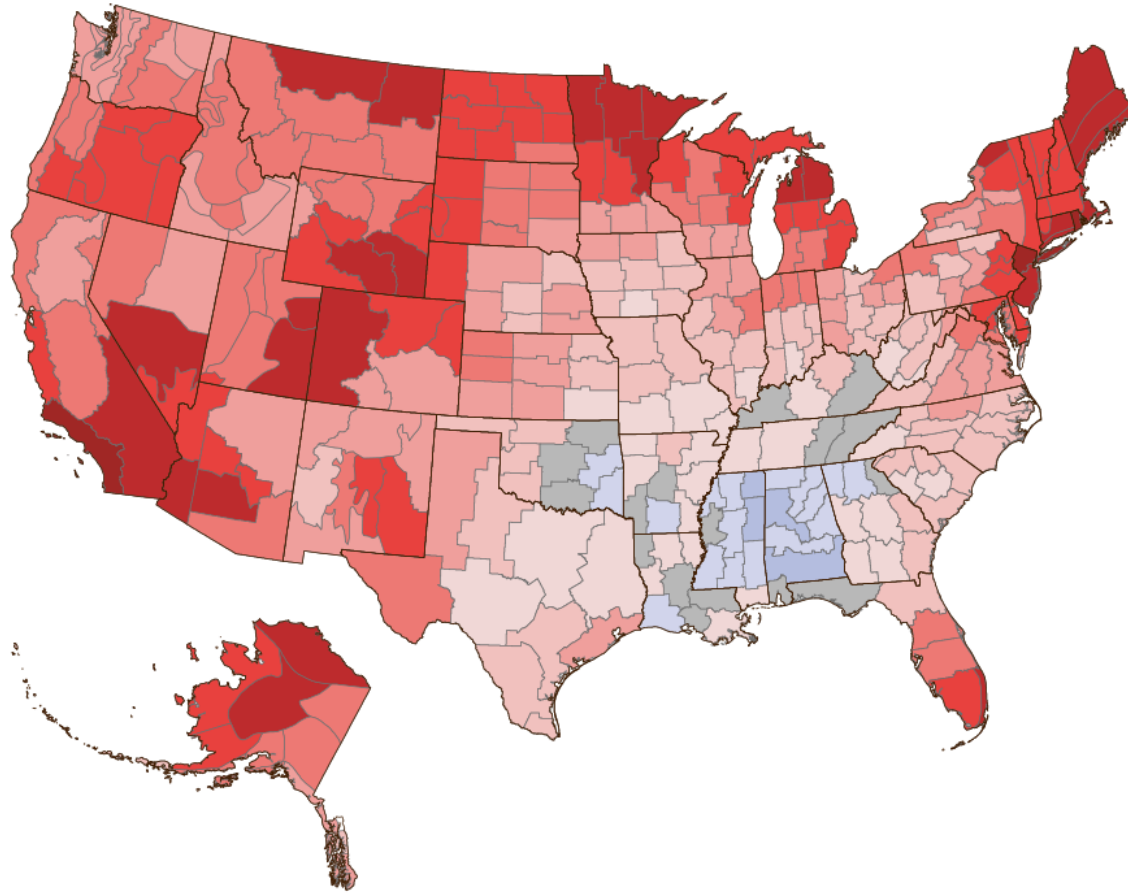
Atmospheric CO₂ at Mauna Loa Observatory



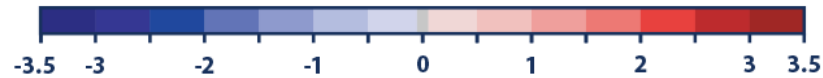
Global Temperatures



Rate of Temperature Change in the United States, 1901–2015



Rate of temperature change (°F per century):



Gray interval: -0.1 to 0.1°F

*Alaska data start in 1925.

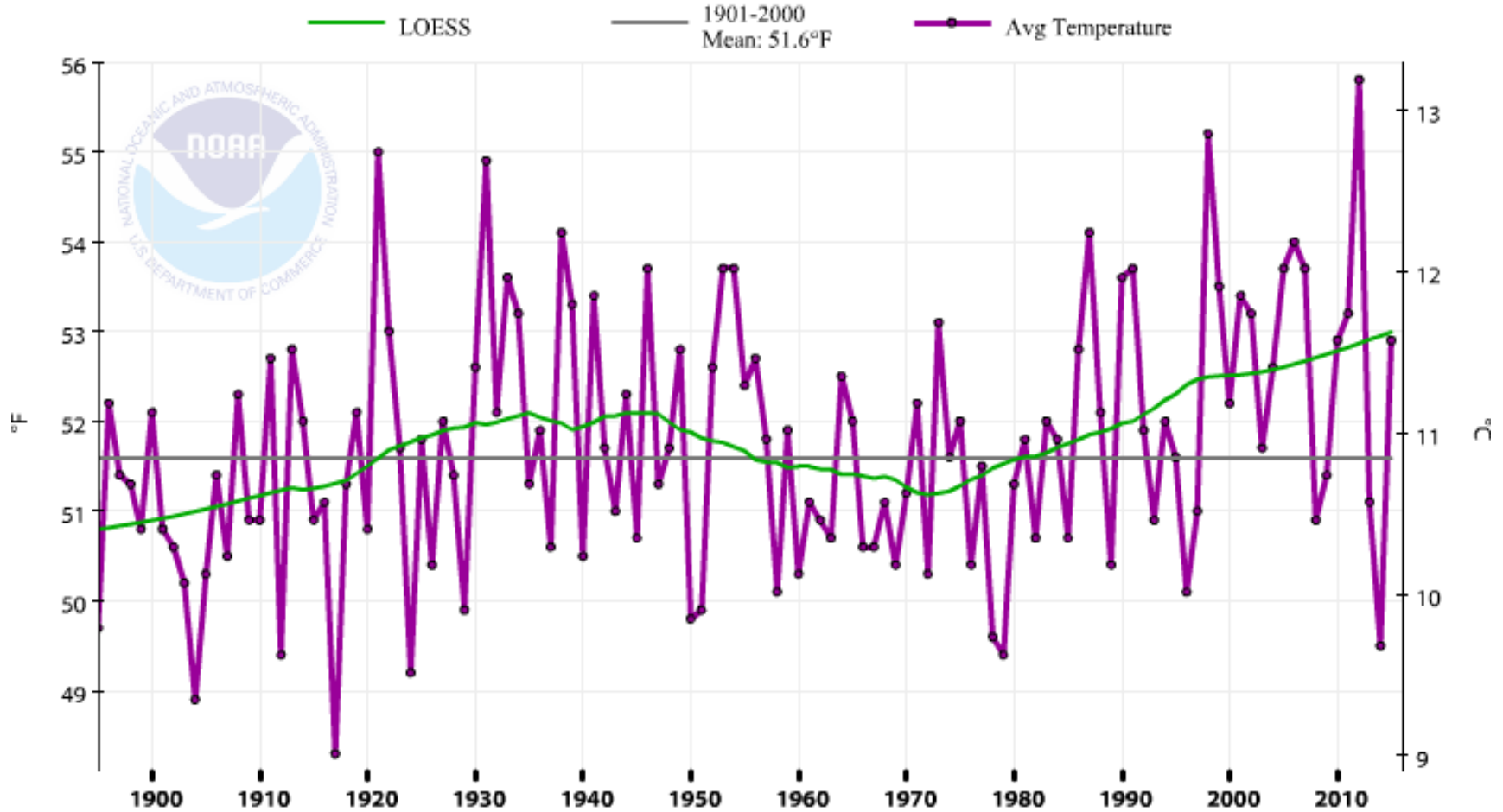
Data source: NOAA (National Oceanic and Atmospheric Administration). 2016. National Centers for Environmental Information. Accessed February 2016. www.ncei.noaa.gov.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climate-indicators.

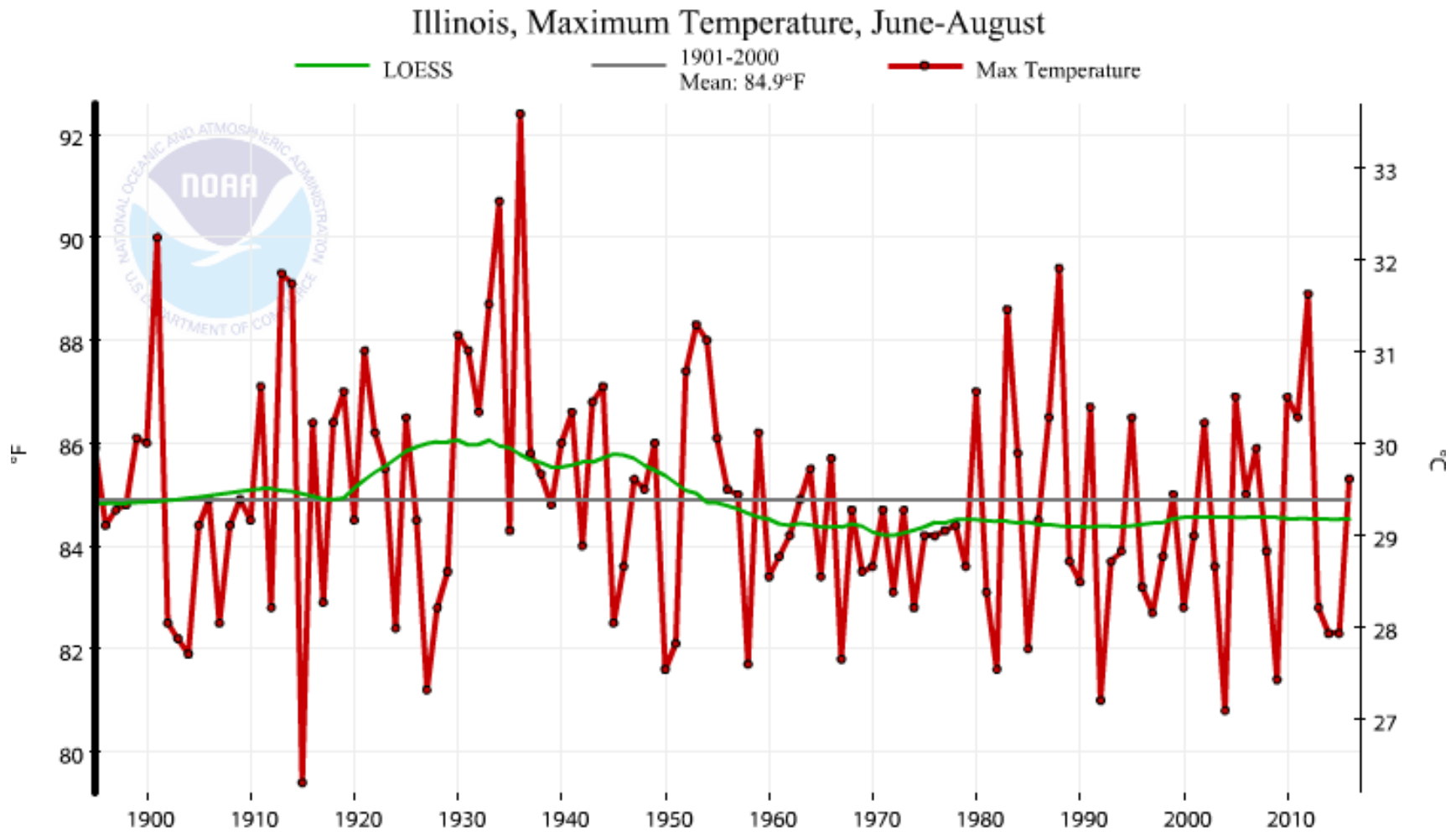


Annual Temperature

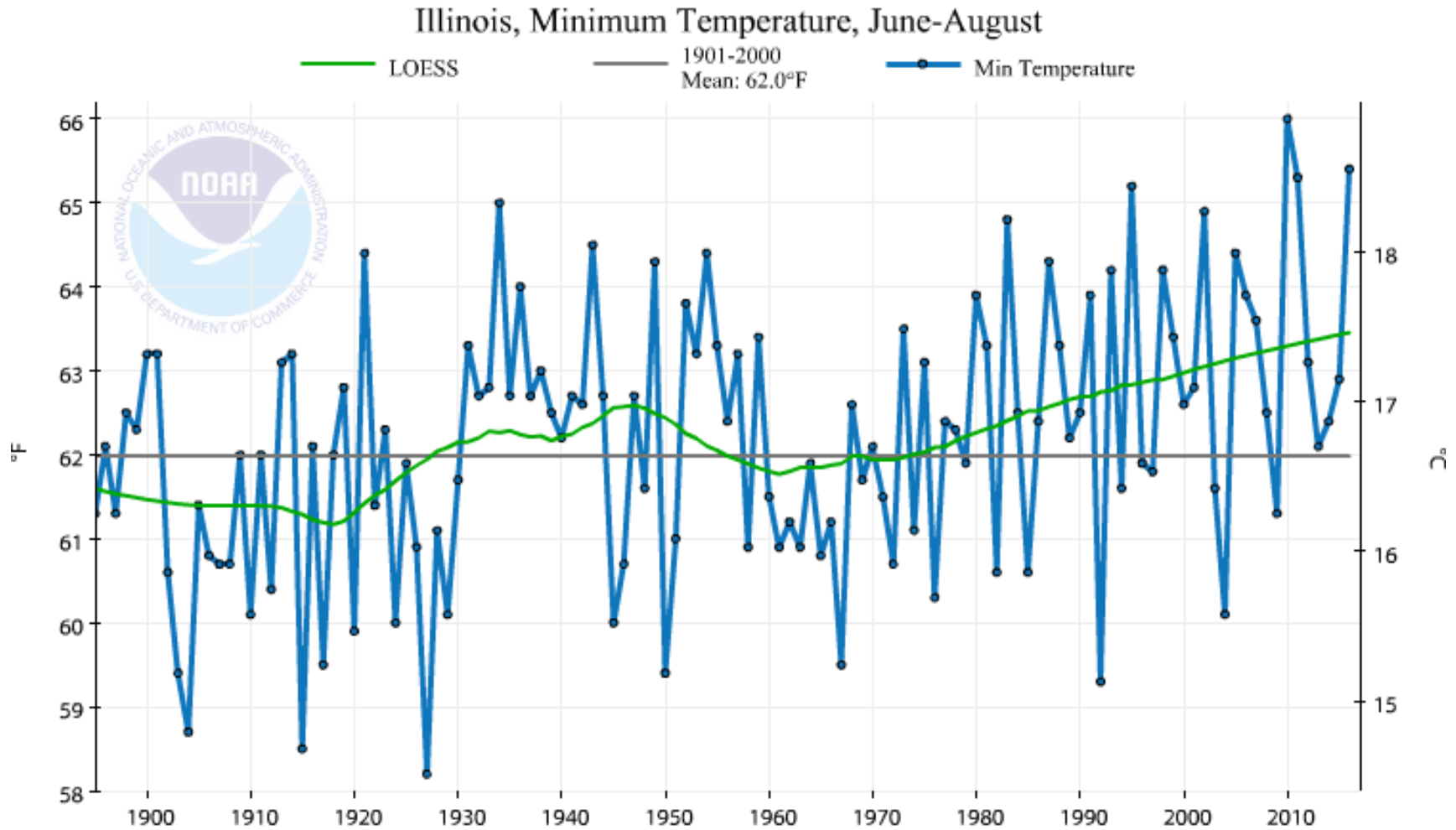
Illinois, Average Temperature, January-December



Summer High Temperatures



Summer Low Temperatures

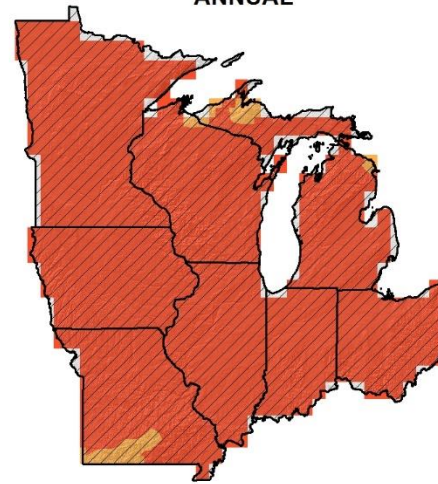


Overall: 4 to 5 degree F
increase by mid-century

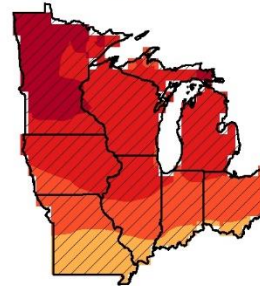
National Climate Assessment
(2014)

NARCCAP, SRES A2, TEMPERATURE CHANGE Multi-Model Mean Simulated Difference - (2041-2070 minus 1971-2000)

ANNUAL



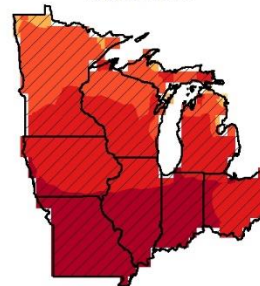
WINTER



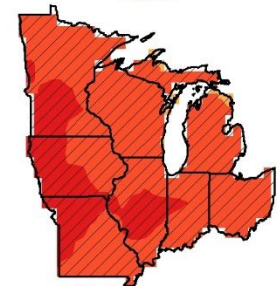
SPRING



SUMMER



FALL



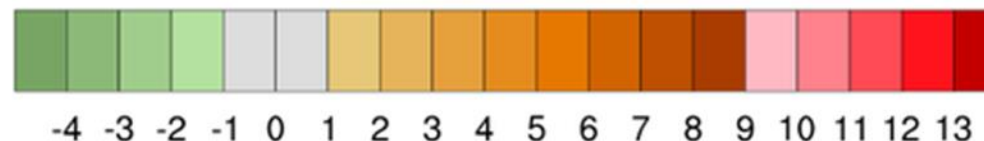
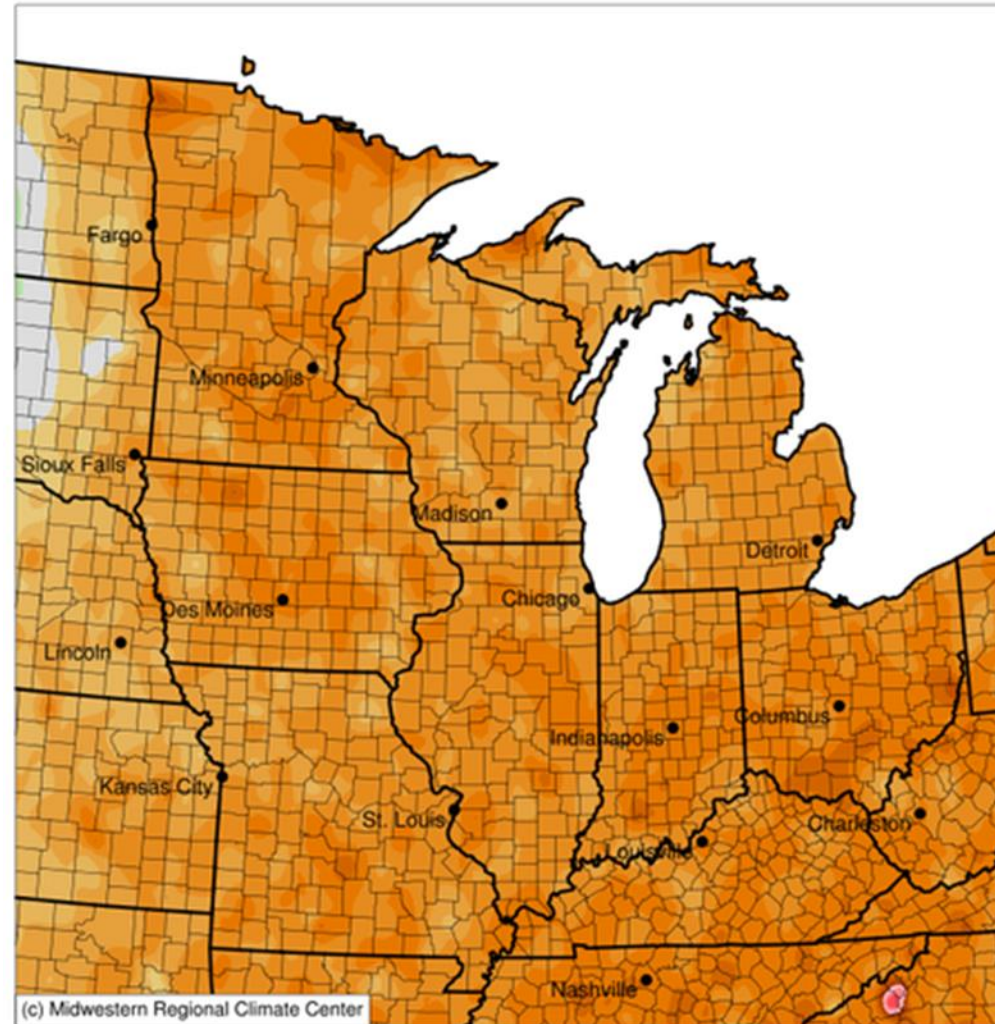
Degrees (F)



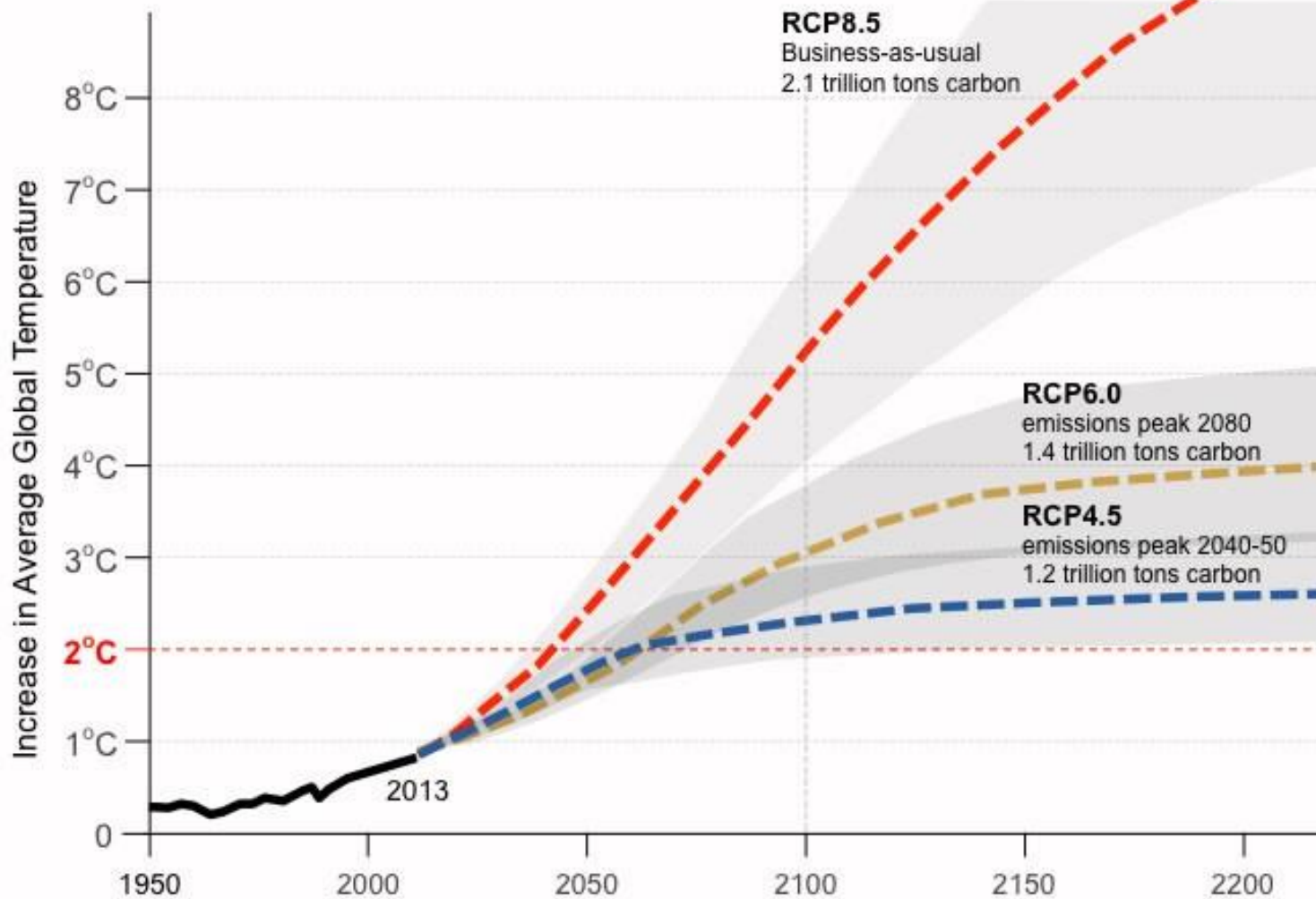
Where Was This Winter?

4 to 5 degrees above normal, comparable to mid-century projections with high emission scenario

Average Temperature (°F): Departure from 1981-2010 Normal
December 01, 2016 to February 27, 2017





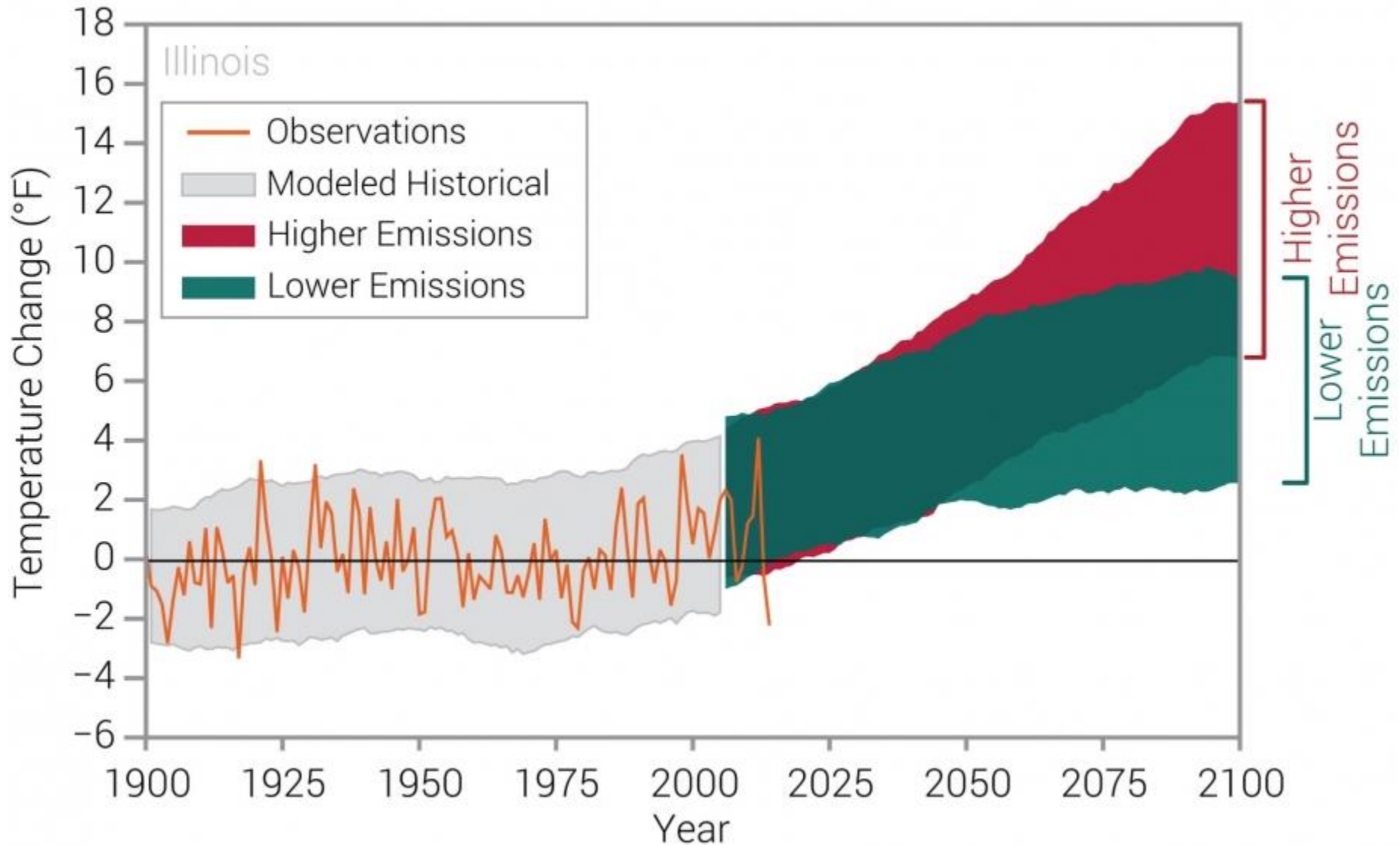


Global Temperature Projections for various RCP Scenarios

Source: Architecture 2030; Adapted from IPCC Fifth Assessment Report, 2013
 Representative Concentration Pathways (RCP), temperature projections for SRES scenarios and the RCPs.



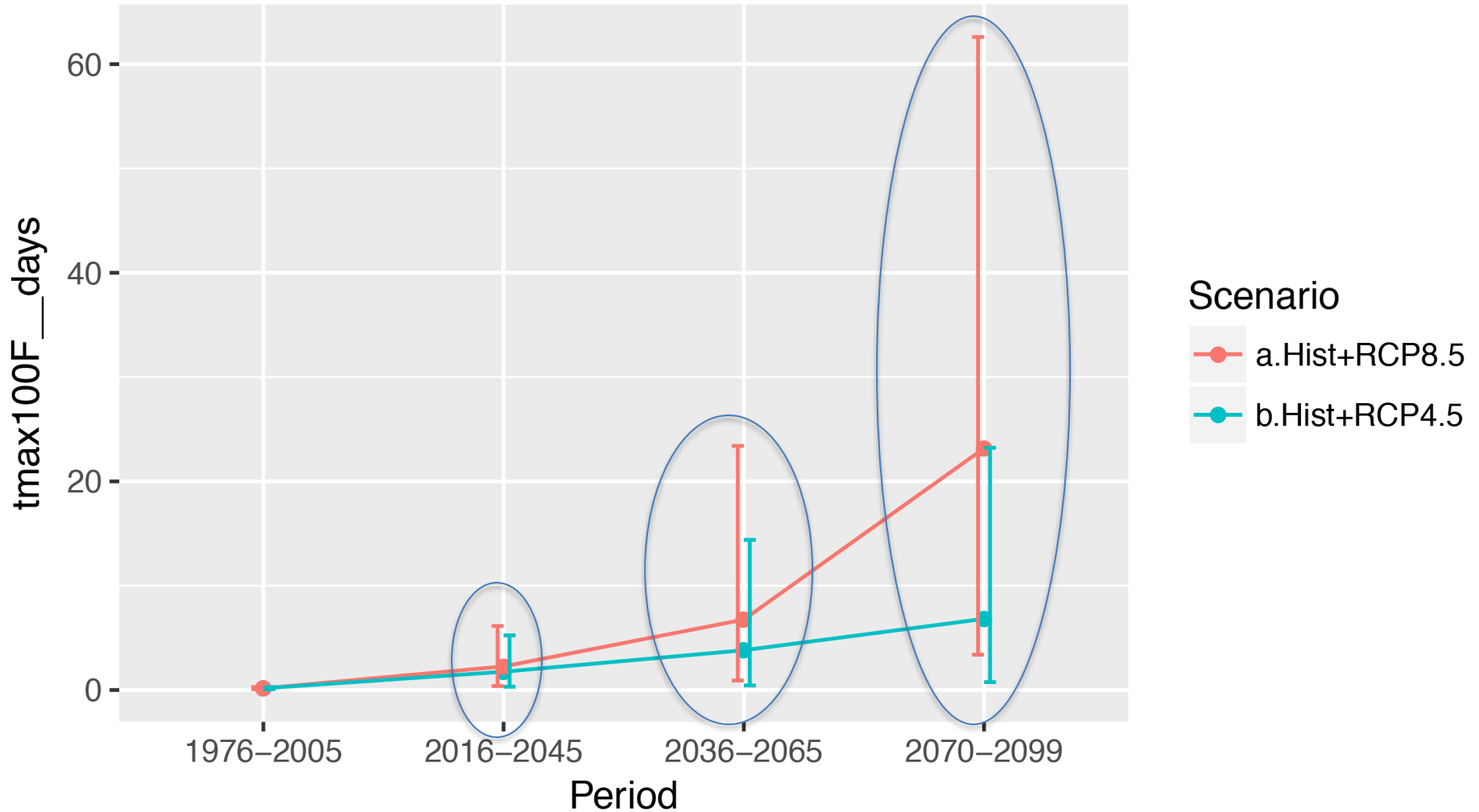
Observed and Projected Temperature Change



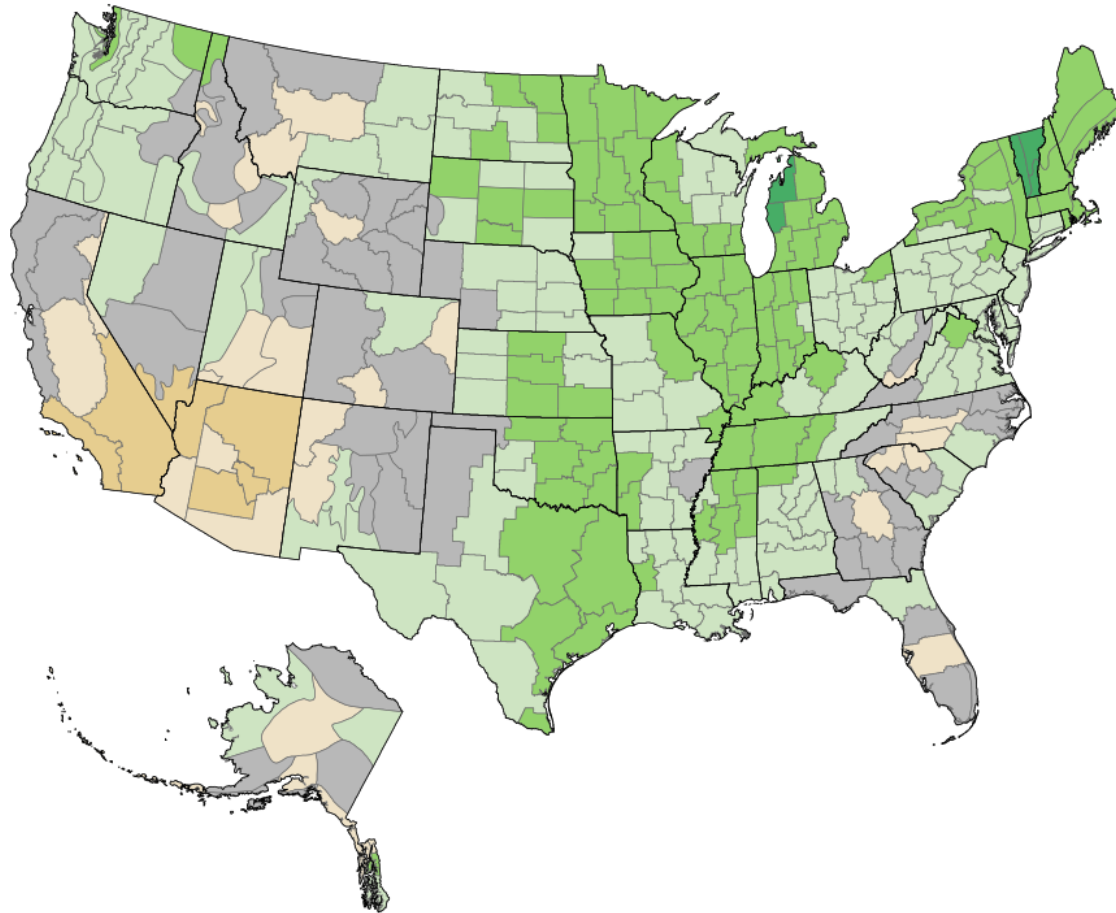
Projections for Illinois: National Climate Assessment (2014)



Chicago Metropolitan Statistical Area Annual number of days > 100F Spatial average of 514 grid locations – 32 models (weighted)



Change in Precipitation in the United States, 1901–2015



Percent change in precipitation:



*Alaska data start in 1925.

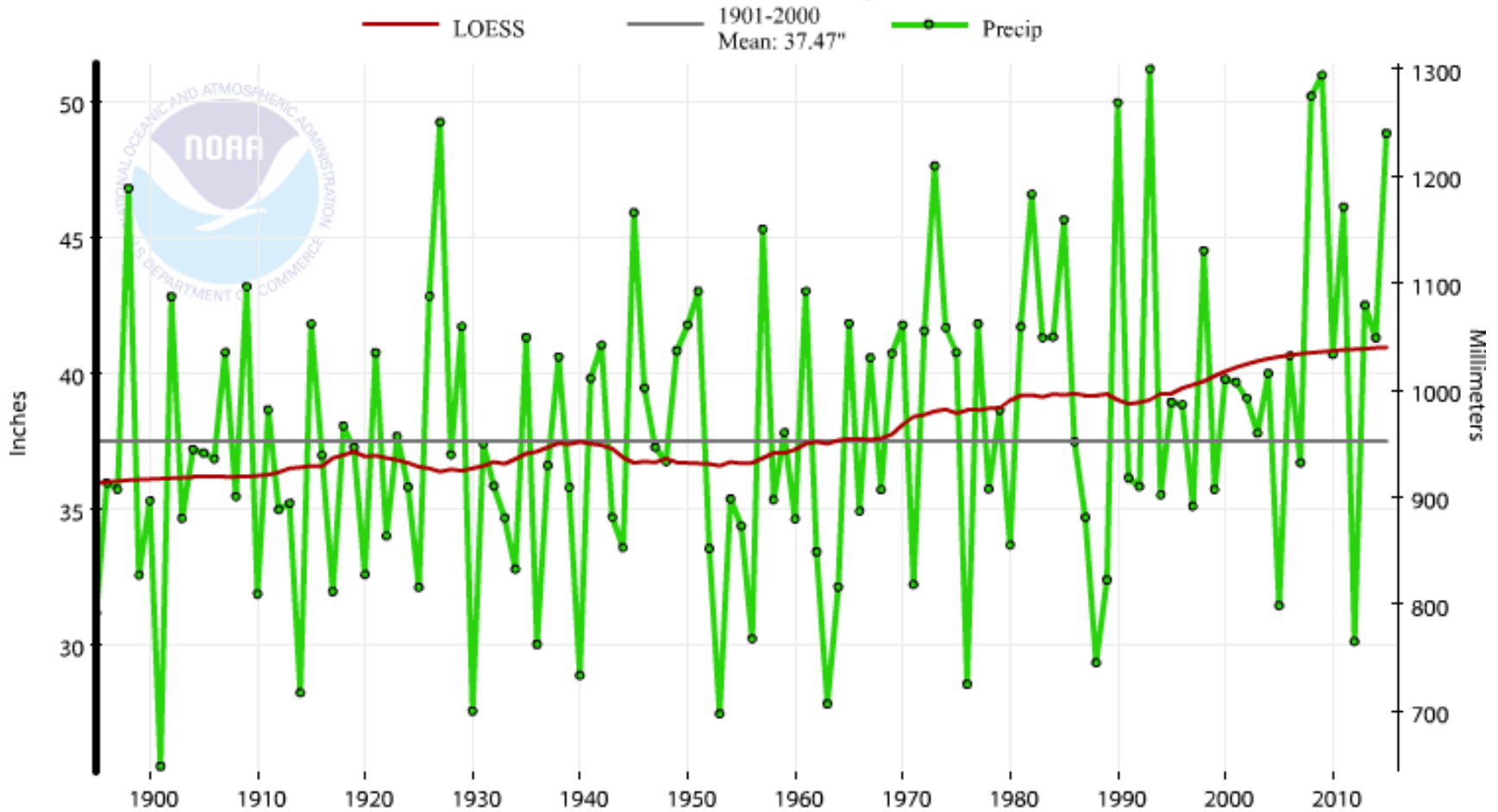
Data source: NOAA (National Oceanic and Atmospheric Administration). 2016. National Centers for Environmental Information. Accessed February 2016. www.ncei.noaa.gov.

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Annual Precipitation

Illinois, Precipitation, January-December



Four Seasons

- Winter
- Spring
- Summer
- Fall



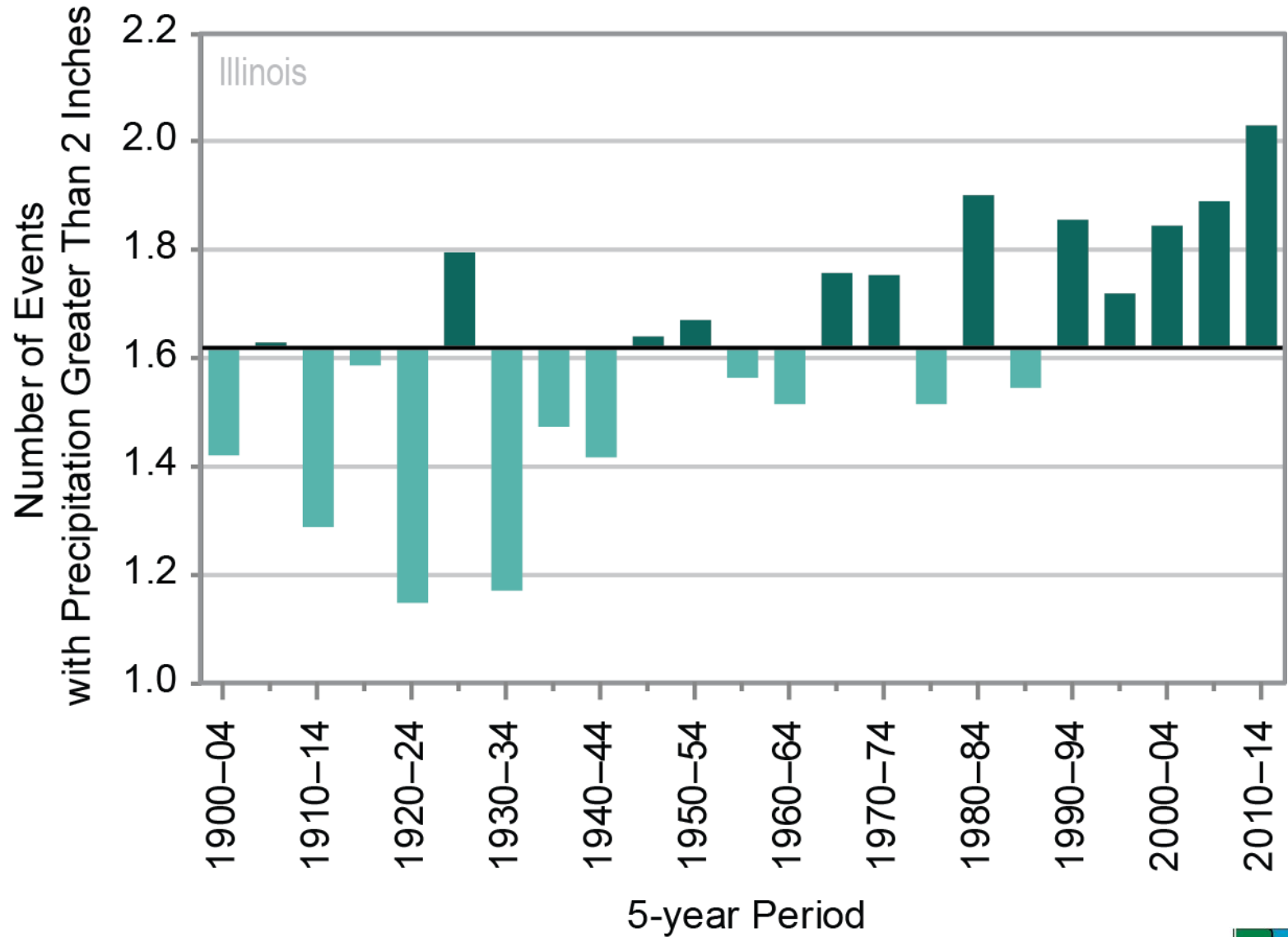
All Getting Wetter Over Time

Increasing Spring Precipitation

- Reduced workable field days
- Planting delays
- Replanting
- Soil compaction
- Drainage
- Nitrogen loss



Observed Number of Extreme Precipitation Events



Projected Change in Spring Precipitation

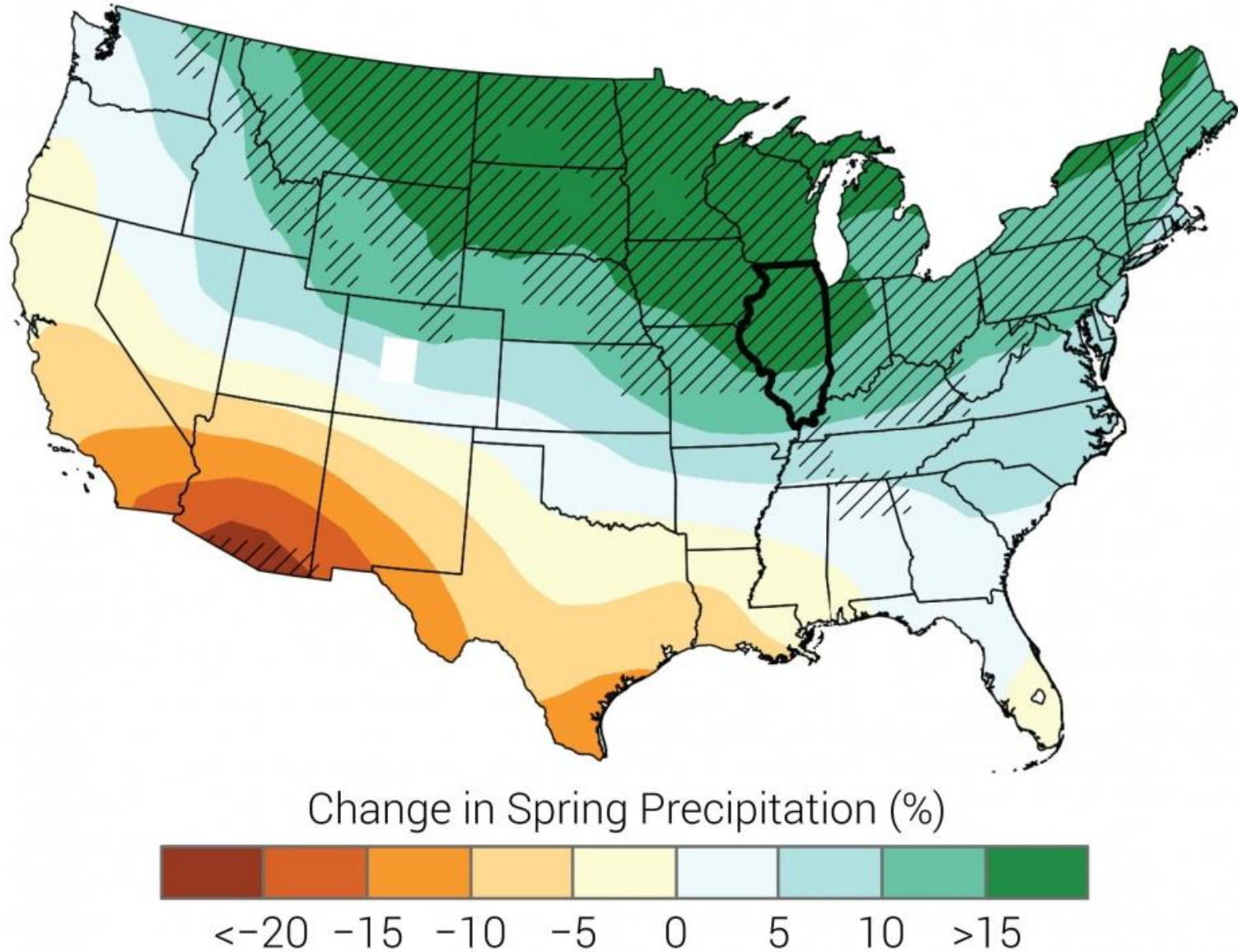


Figure 8: Projected change in spring precipitation (%) for the middle of the 21st century compared to the late 20th century under a higher emissions pathway. Hatching represents areas where the majority of climate models indicate a statistically significant change. Spring precipitation in Illinois is projected to increase in the range of 10–20% by 2050. These increases are part of a large area of projected increases across the northern United States. Source: CICS-NC, NOAA NCEI, and NEMAC.

4th National Climate Assessment

- Assess the current and possible future impacts on climate change on the US.
- **Midwest Focus:**
 - Agriculture
 - Forestry/Ecosystems
 - Health
 - Community
 - Transportation



Key Messages

- Illinois is getting warmer, wetter
- Potential for more flooding, heat waves with associated losses in health and wealth
- More challenges to ag/forest/ecosystems from mild winters, hot summers – disease, pests, flooding, drought ...



Thank You

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