

1) CLIMATE CHANGE IN ILLINOIS
2) WATER FOR ETHANOL PLANTS

Champaign West Rotary Club
October 17, 2007

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Chief

Illinois State Water Survey

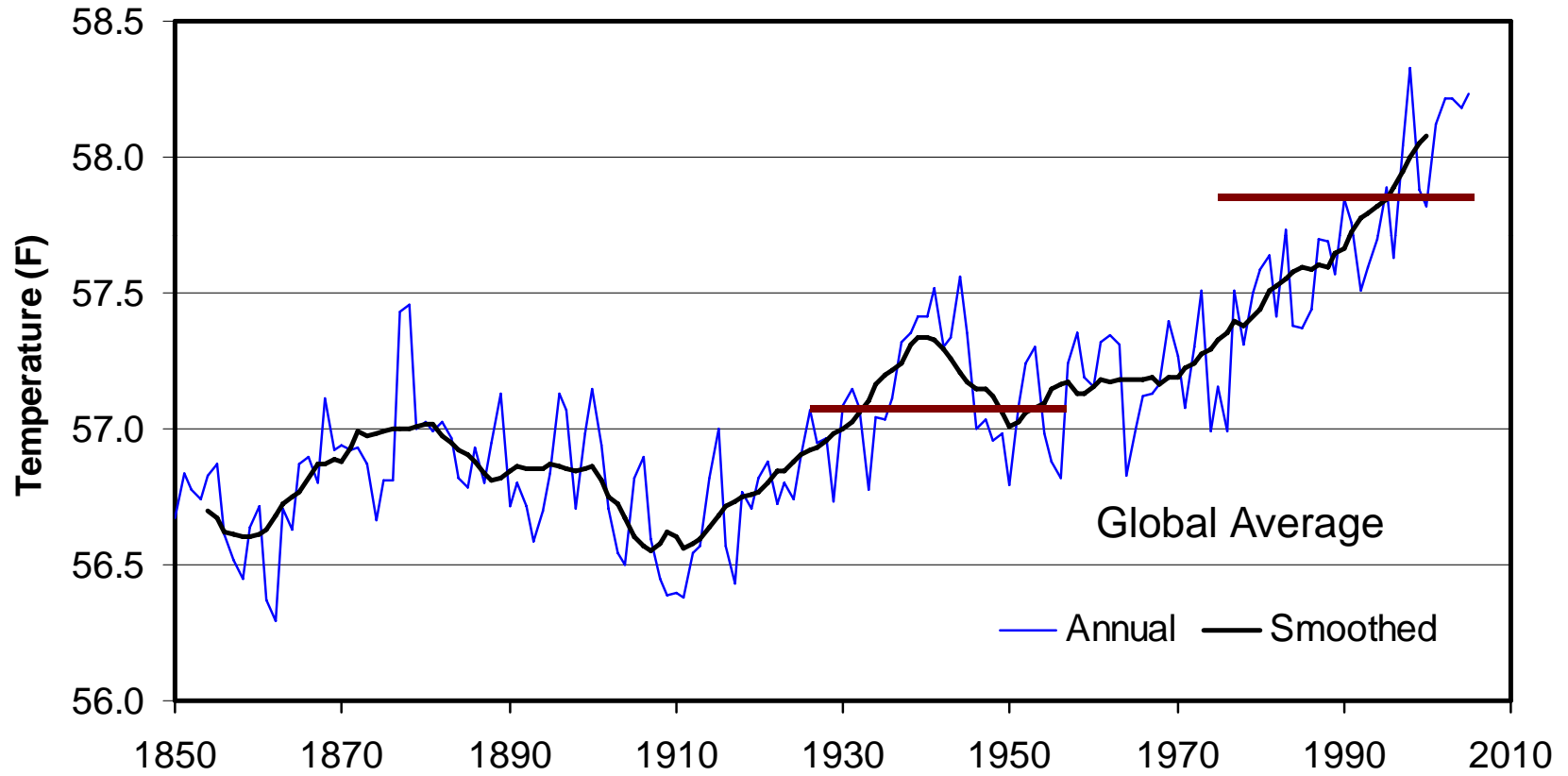


Acknowledgments

- Ken Kunkel
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- Leslie Ensor
- Vern Knapp
- Al Wehrmann
- George Roadcap

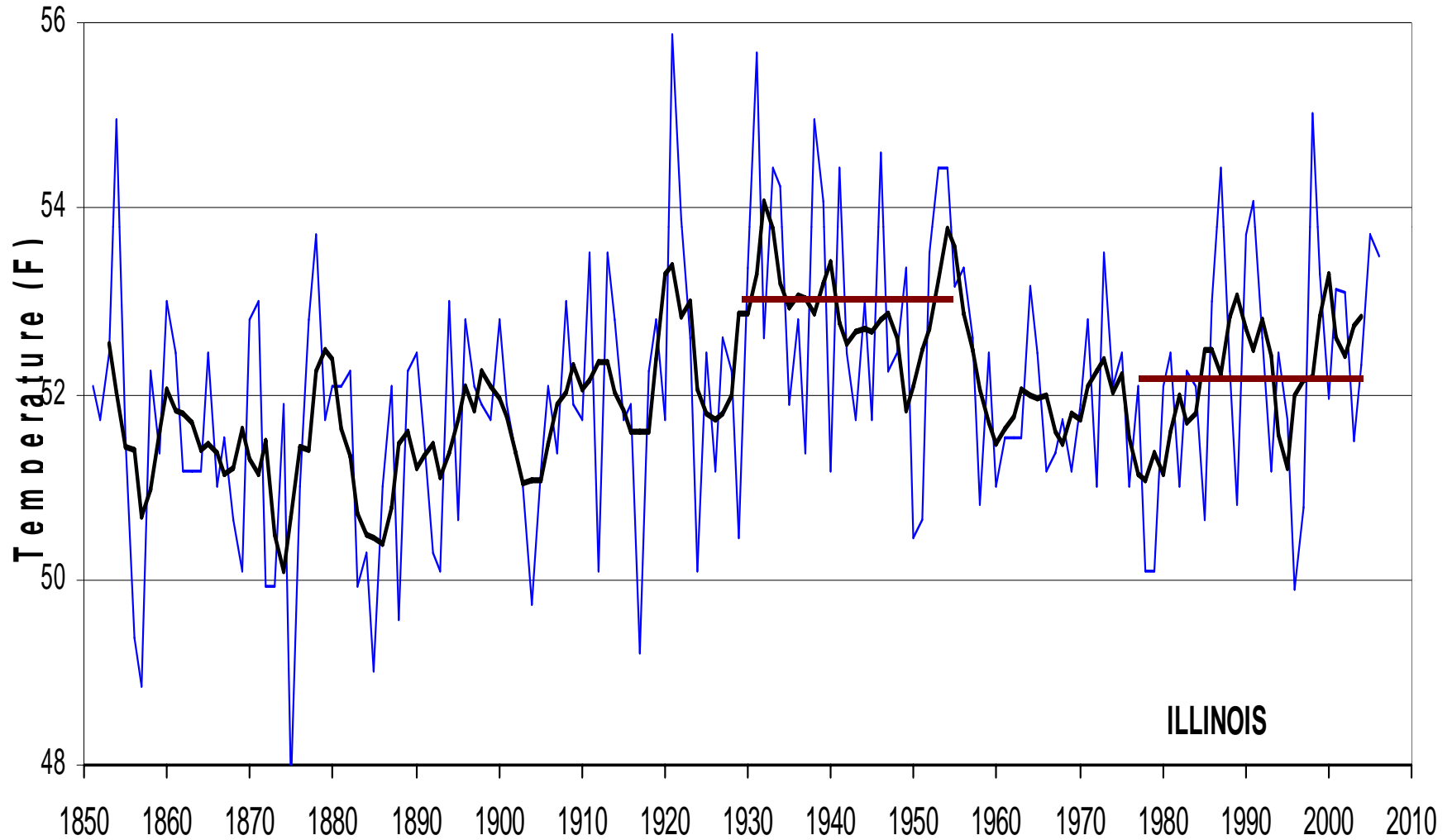
Global Warming

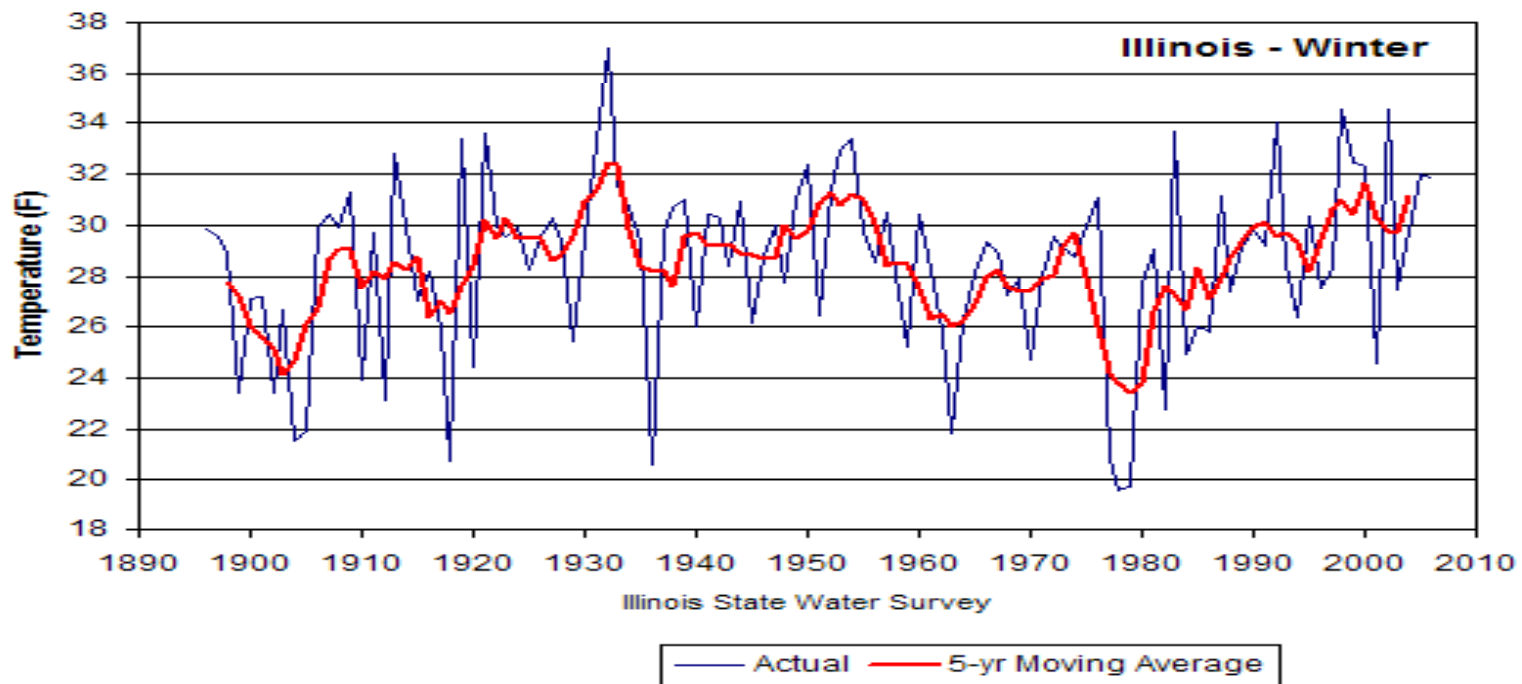
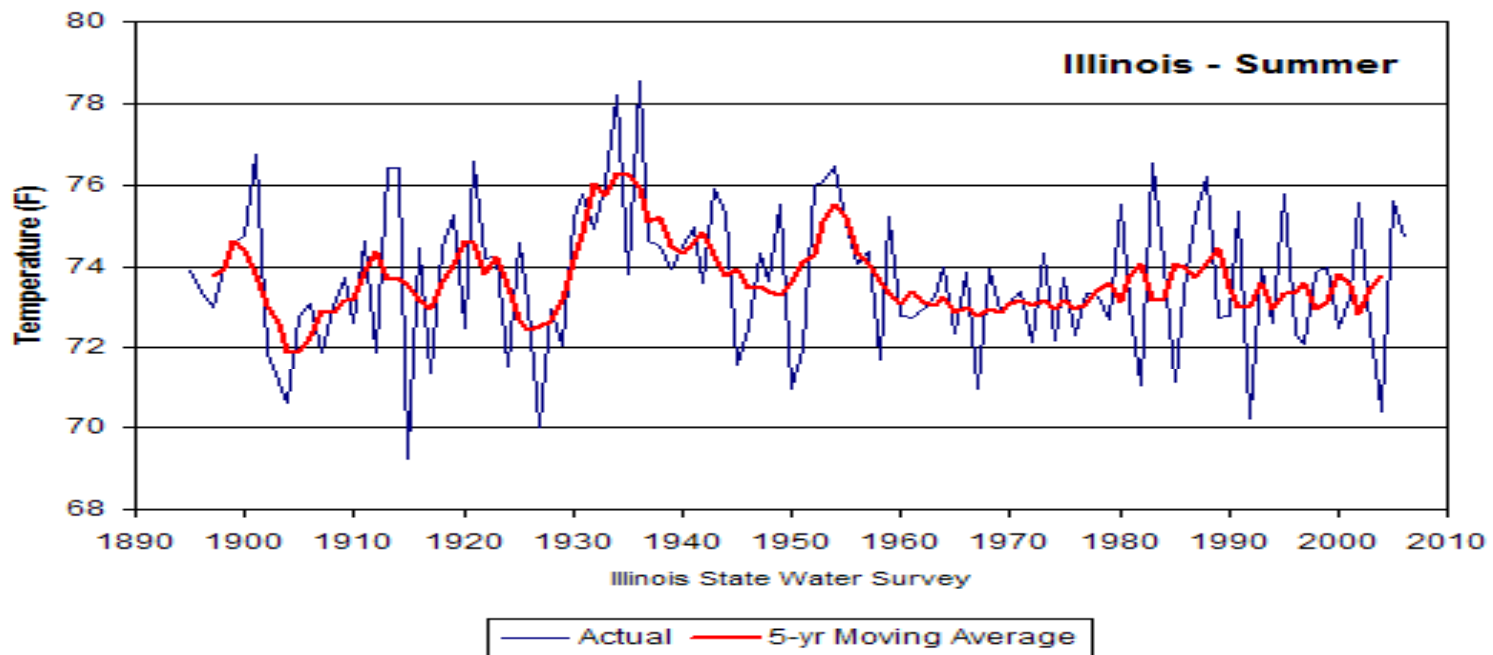
Source: Hadley Centre, UK



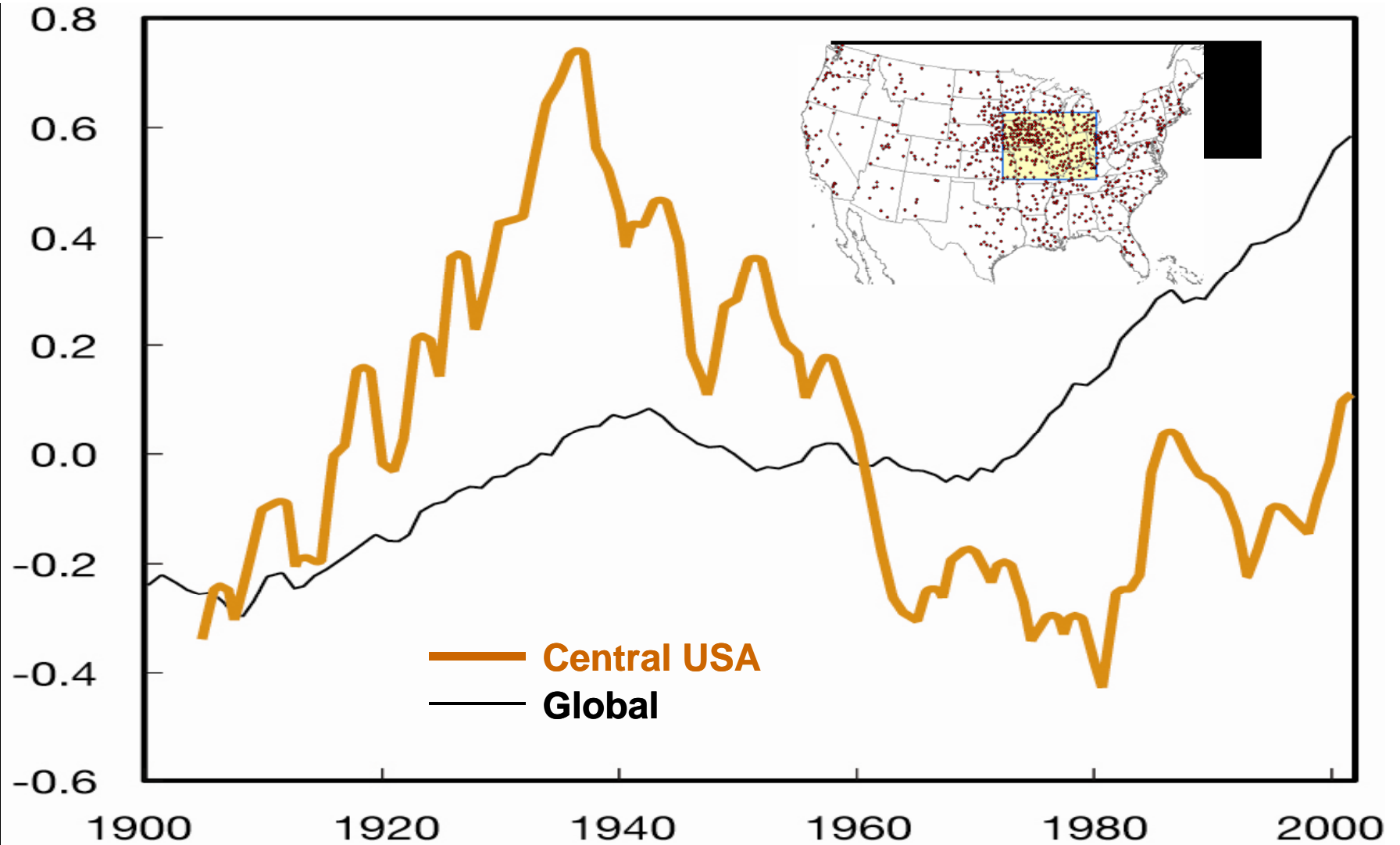
Illinois Temperature: — Annual — Smoothed

Source: Jim Angel, Illinois State Water Survey





Illinois and Central USA Temperature Changes Differ from Global Trends



ANNUAL TEMPERATURE TRENDS

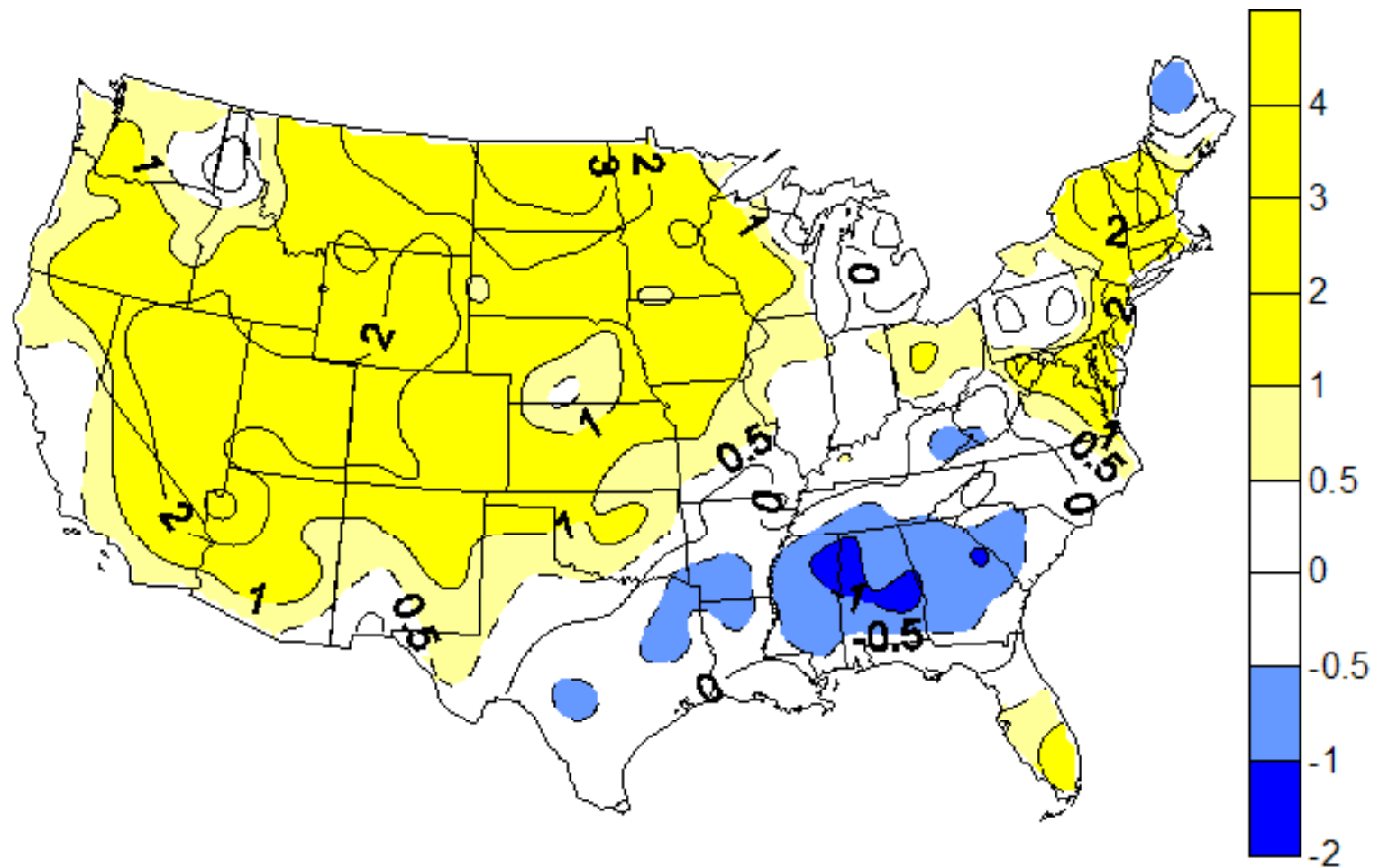
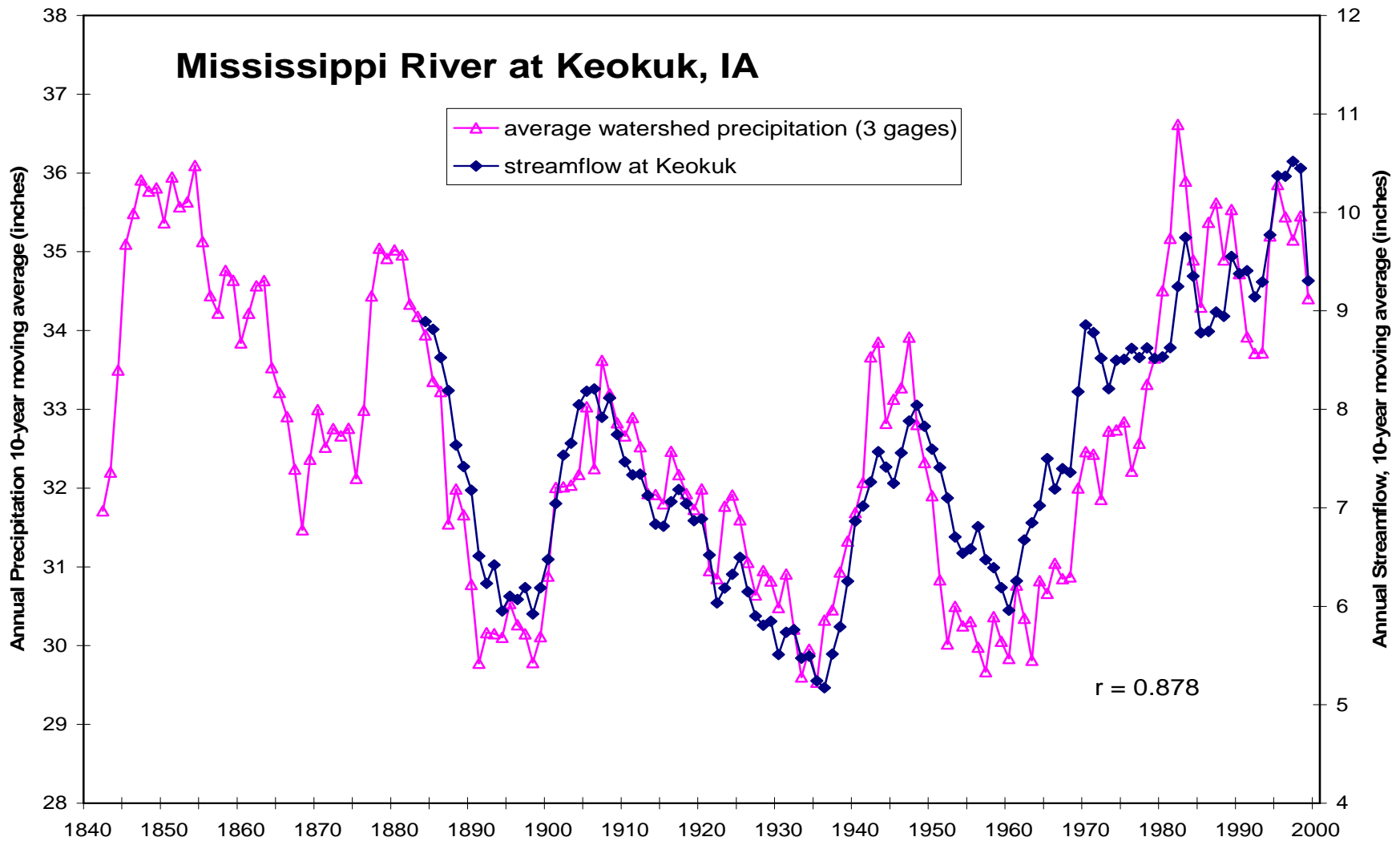
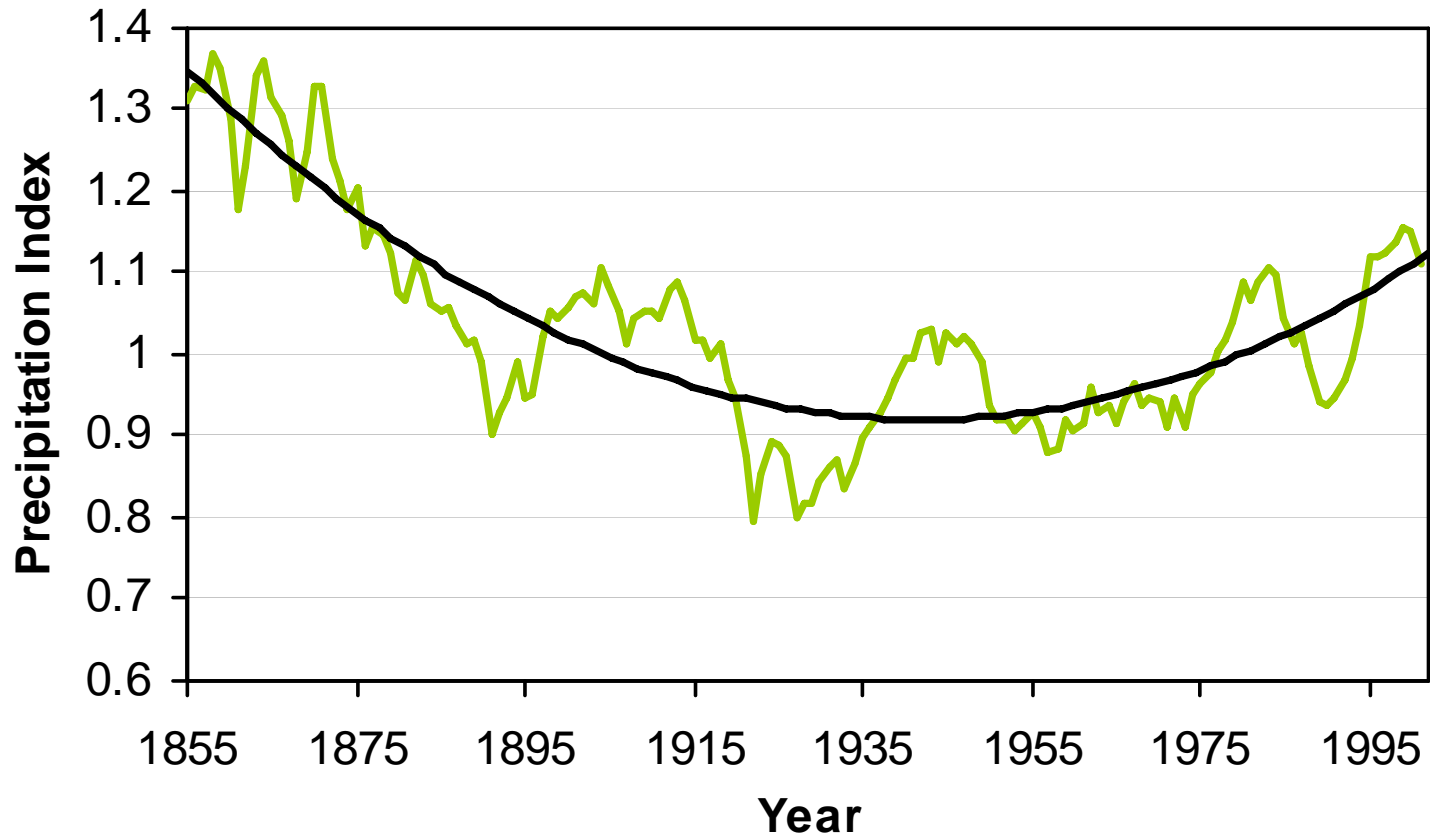


Figure 1. ANNUAL temperature trends in the U.S. expressed as the total change over the period 1895-2006 in degrees F and derived from climate division data. Copyright 2007. Illinois State Water Survey.

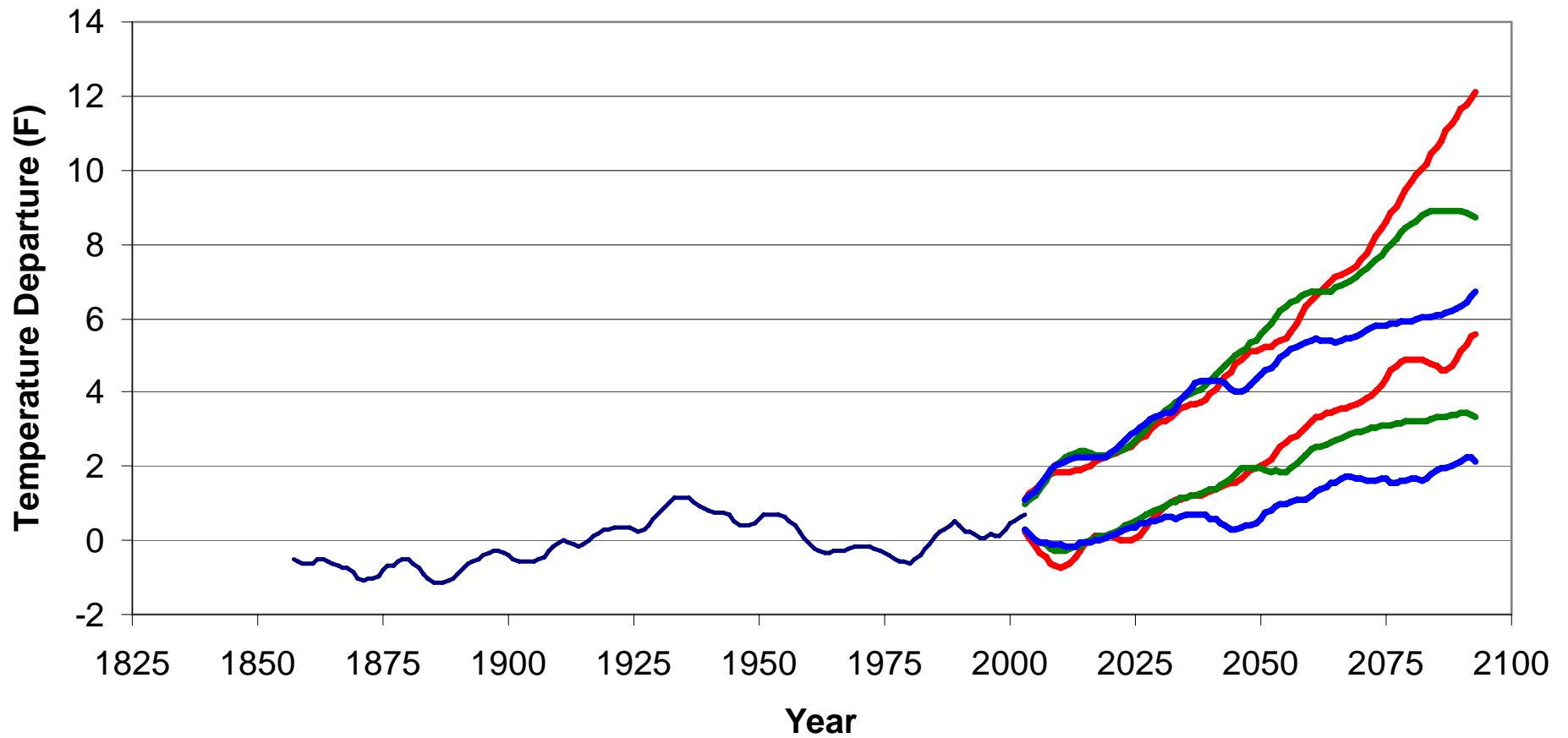
Vern Knapp in Winstanley et al. (2006), ISWS IEM 2006-02



U.S. 1-day duration, 1-yr return

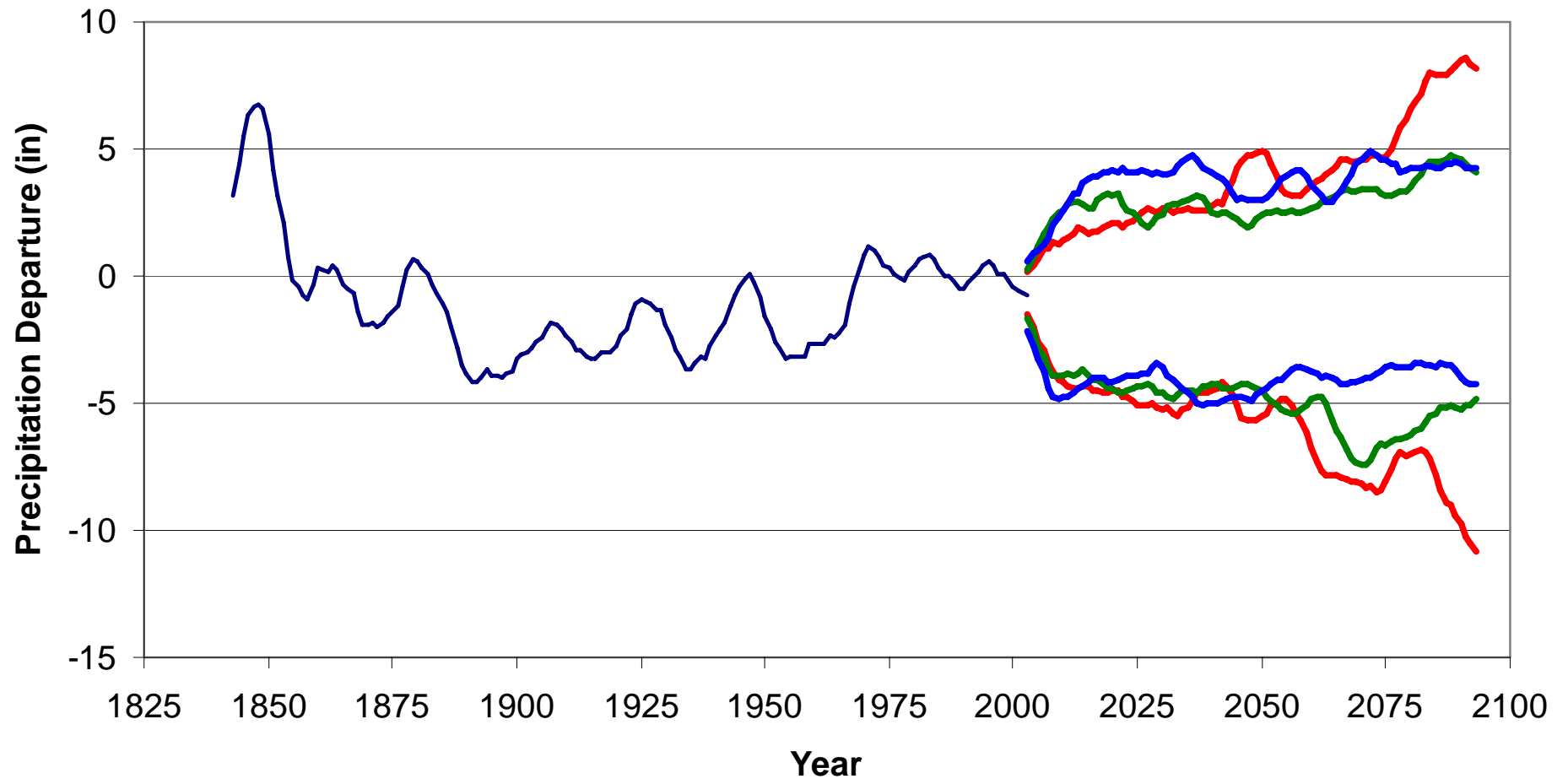


Illinois Annual Temperature Departure from 1971-2000 Normal



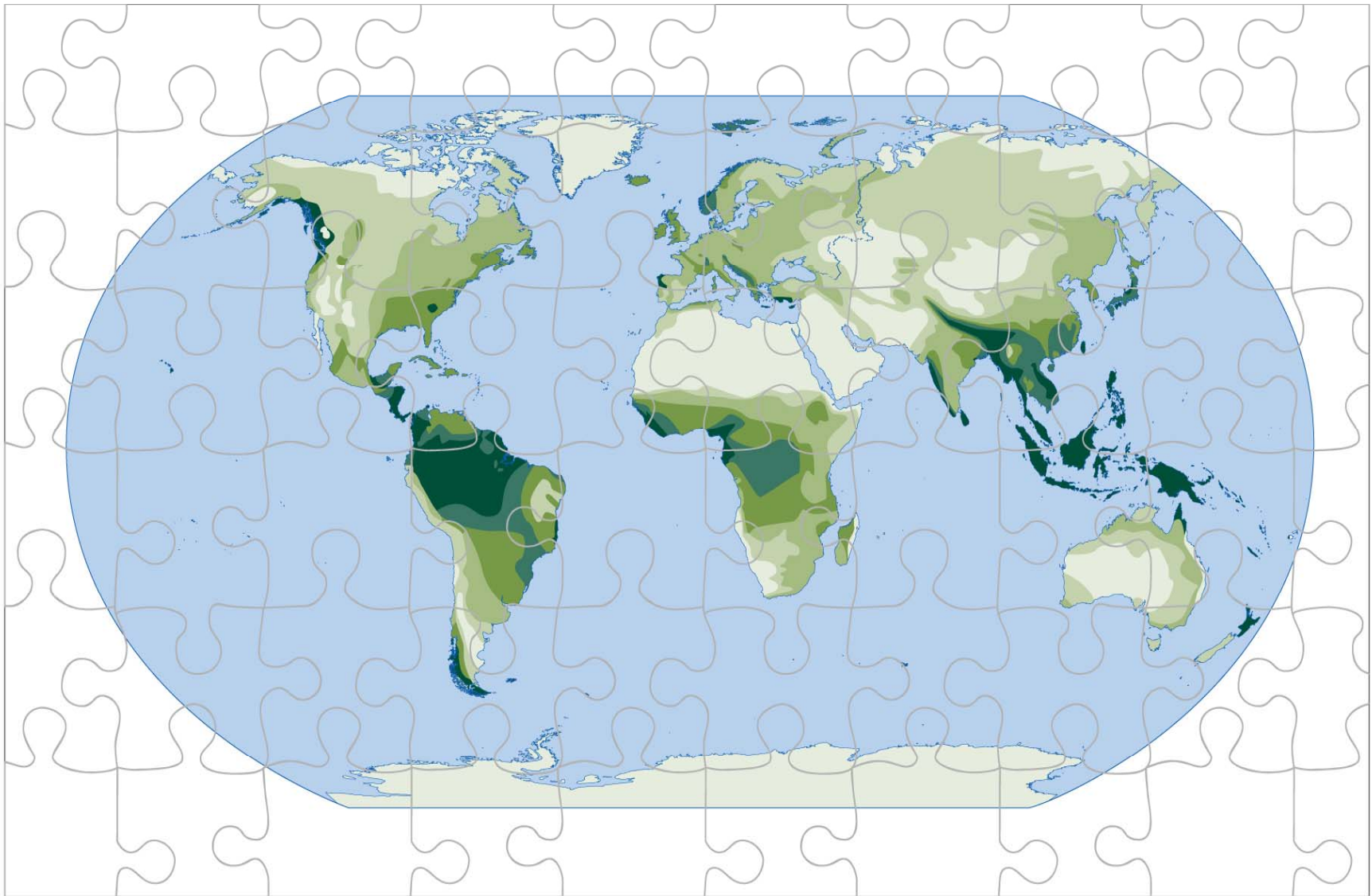
— 20th Century — A2 5th — A2 95th — A1B 5th — A1B 95th — B1 5th — B1 95th

Illinois Annual Precipitation Departure from 1971-2000 Normal

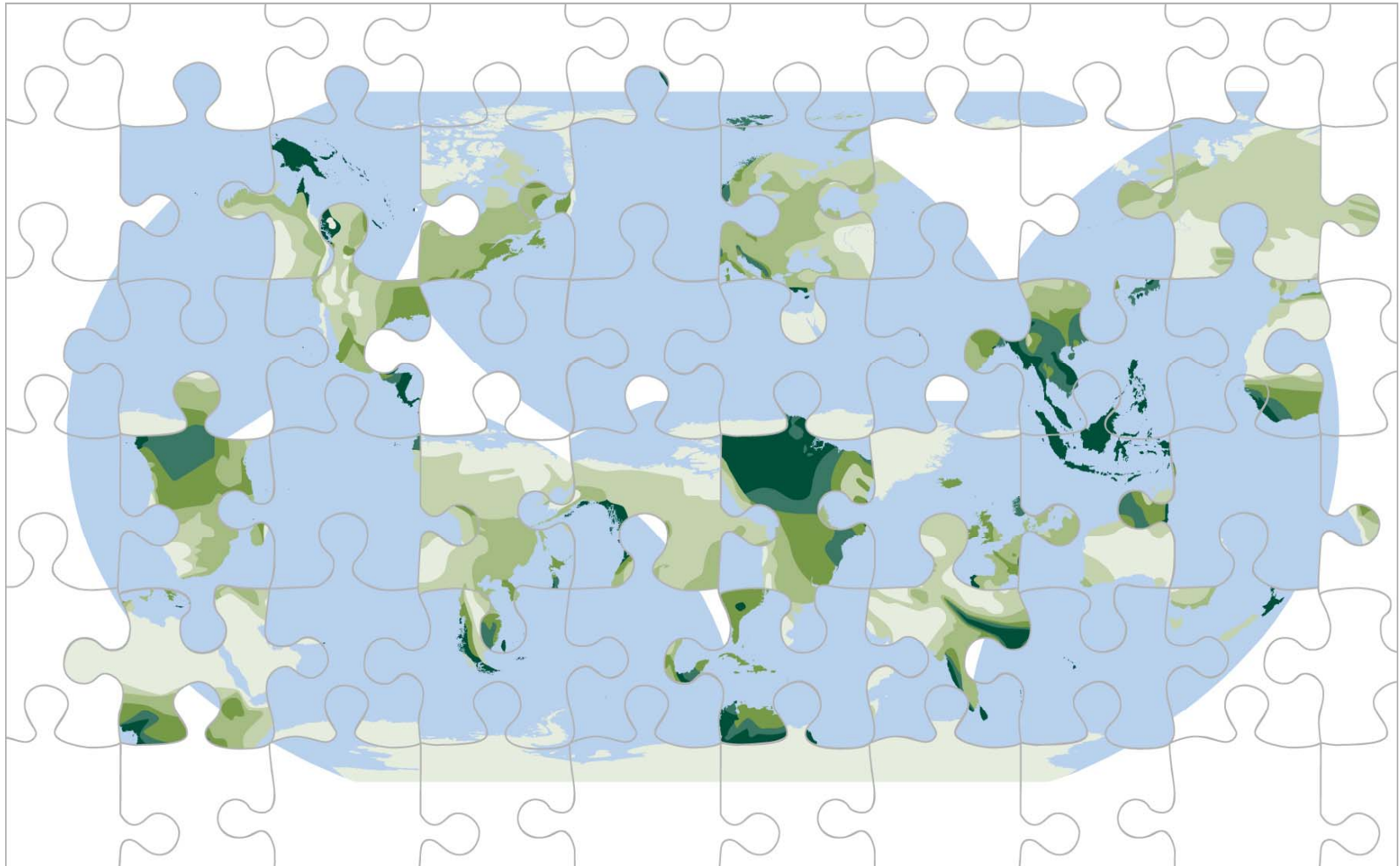


— 20th Century — A2 5th — A2 95th — A1B 5th — A1B 95th — B1 5th — B1 95th

GLOBAL CLIMATE IS A COMPOSITE OF REGIONAL CLIMATES



... BUT GLOBAL CLIMATE MODELS DO NOT DO A GOOD JOB AT SIMULATING REGIONAL CLIMATE CHANGES



CLIMATE CONCLUSIONS

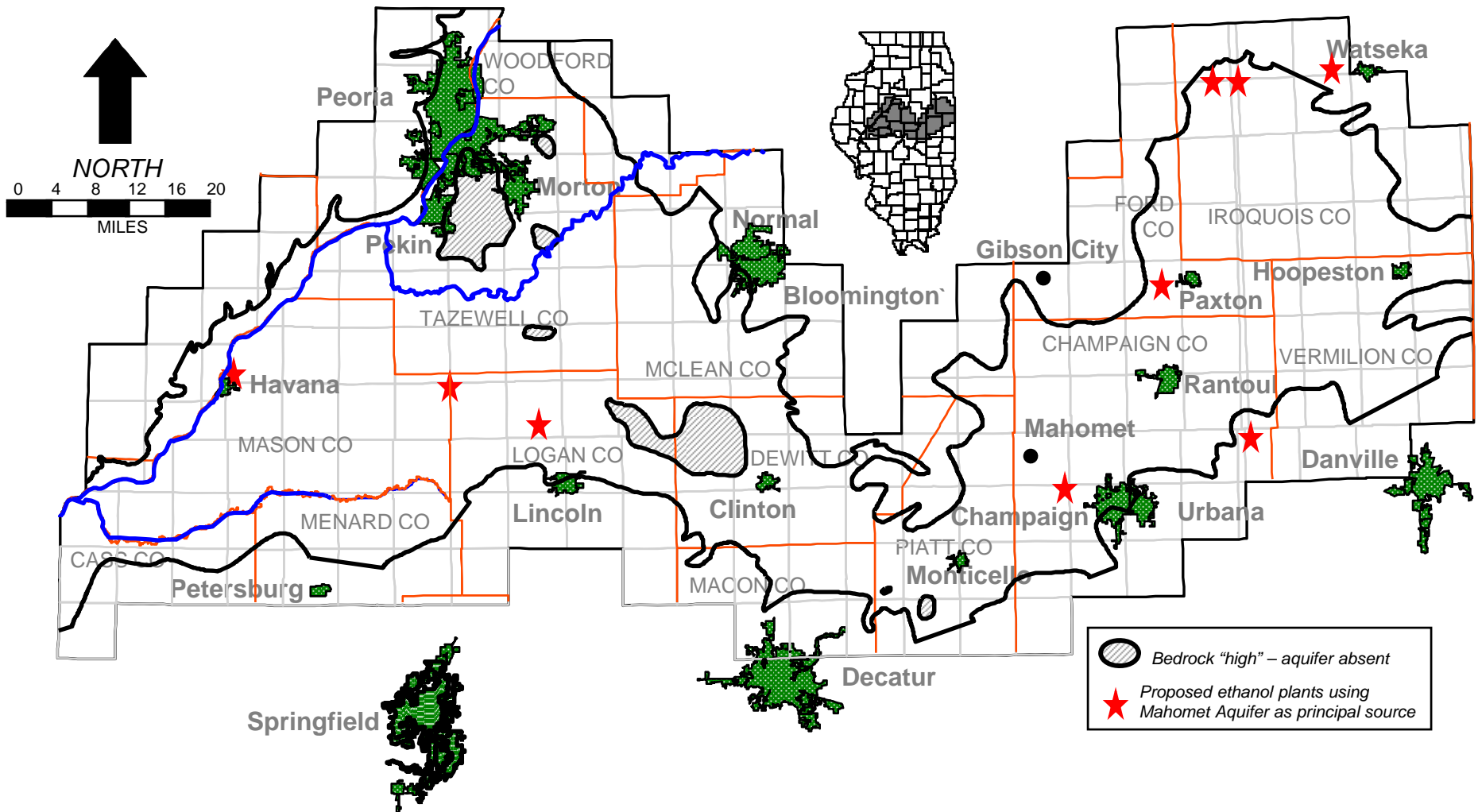
1. Illinois is cooler and wetter than it was 50-70 years ago.
2. High natural variability.
3. Difficult to identify effects of global warming on Illinois climate.
2. Large range of uncertainty in projecting future climatic conditions.
3. Climate to 2050 could be:
 - the same, or
 - warmer, or
 - wetter, or
 - drier

**SWS DEVELOPING A NEW CRYSTAL BALL
– A REGIONAL CLIMATE MODEL**

ETHANOL PLANTS

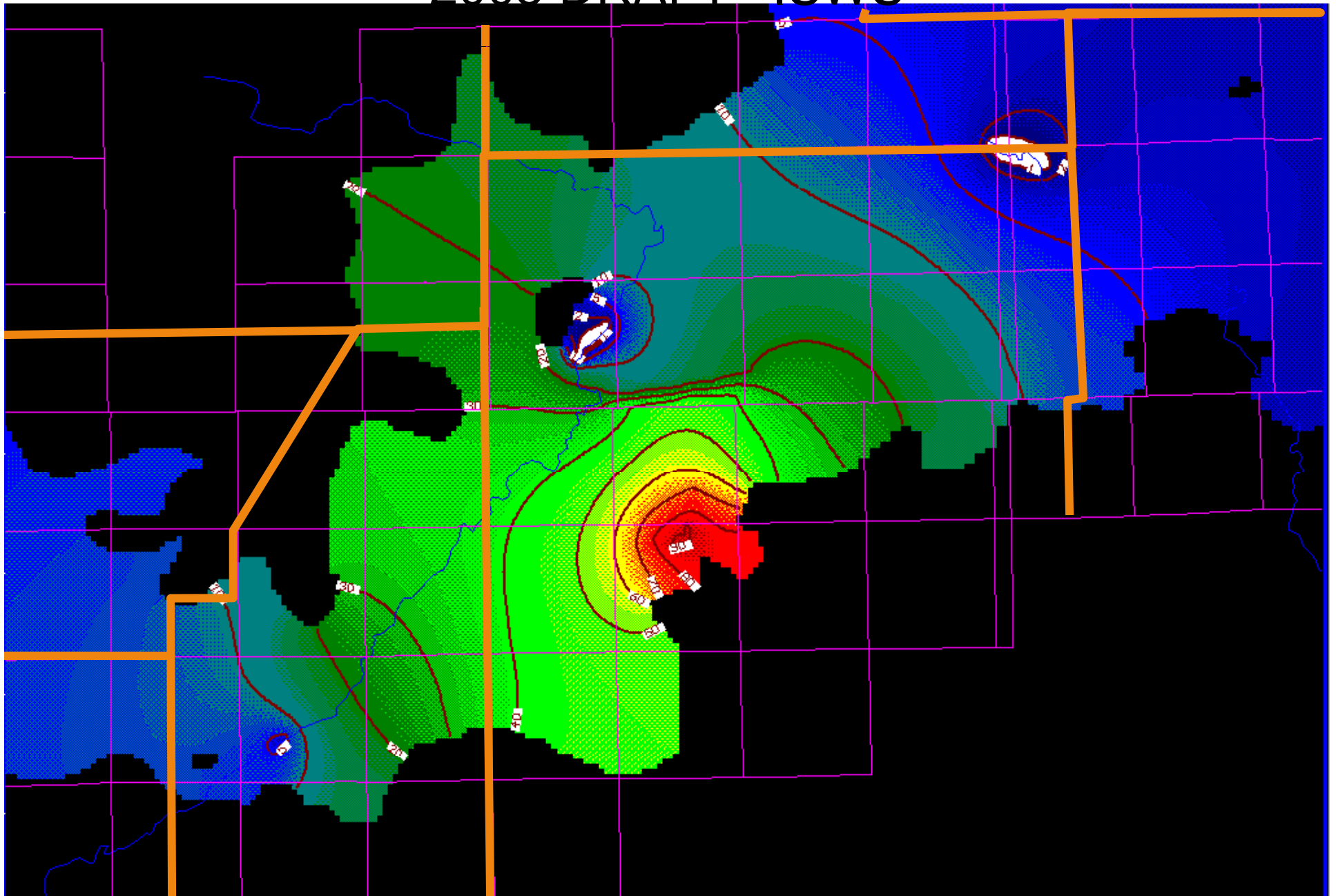
- Over 50 ethanol plants **proposed** in Illinois including Danville (2), Gilman (2), Watseka, Gibson City, Royal, Champaign.
- Assuming 1.5 million gallons of water per day (mgd) per plant gives total water demand of over 75 mgd – enough for a city of 500,000 people.
- The 8 plants in east-central Illinois would use a total of about 12 mgd, **if built**.
- Separate analysis of water supply needed for each plant.

The Mahomet Aquifer Region



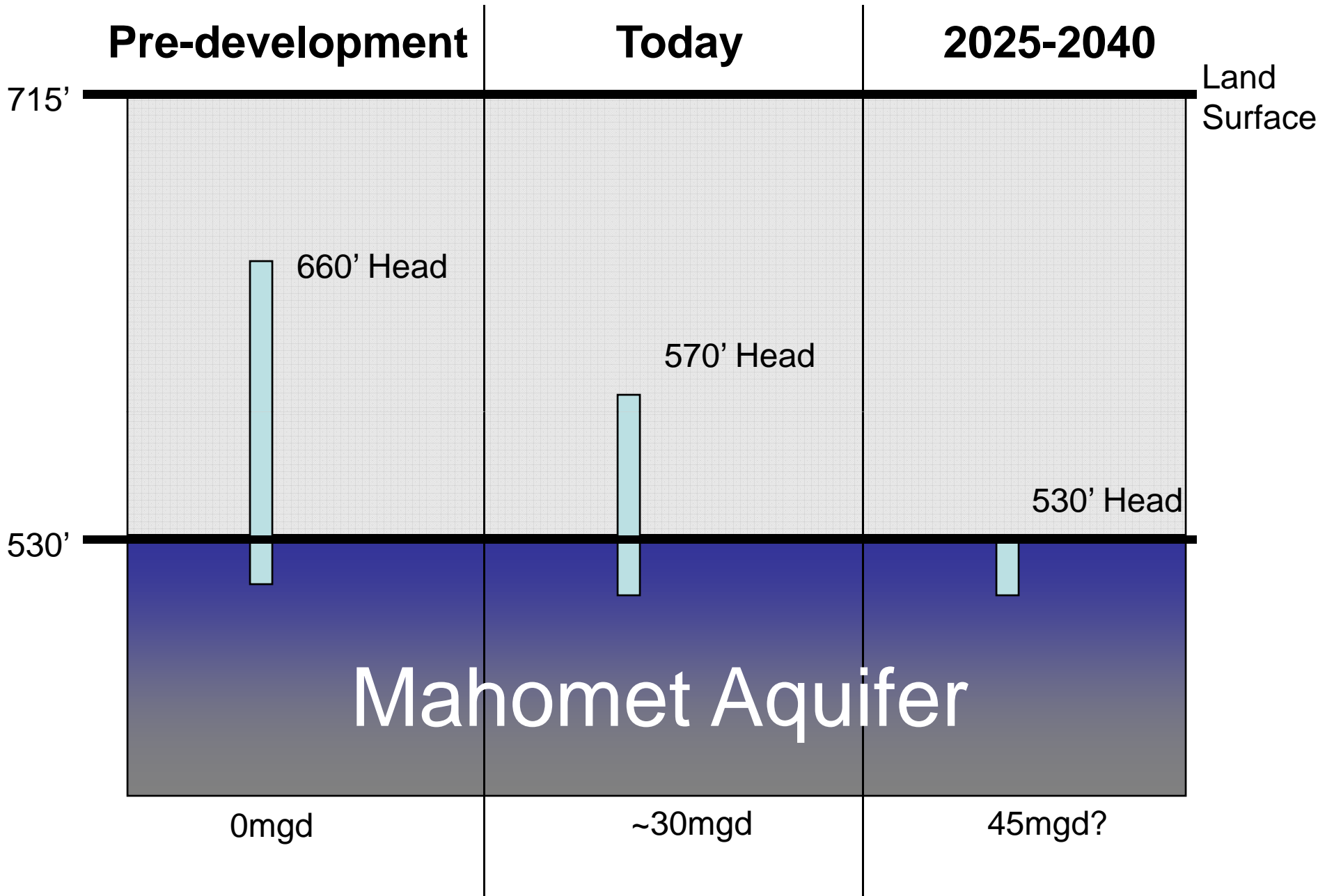
**FIRST PUBLIC VIEWING OF
\$10 MILLION MODEL OF
MAHOMET AQUIFER**

Cone of Depression in the Mahomet Aquifer 2005 DRAFT ISWS



ETHANOL PLANTS IN C/U AREA

- **If** the Andersons and Royal plants are built and take ~ 3 mgd water from the Mahomet Aquifer near Champaign there would be 6-10 feet additional drawdown of “head” in the C/U area.
- Wells in the shallow Glasford Aquifer also would be affected.



Decline in “head” west of Champaign

WATER AVAILABILITY AND USE

- In 19th Century, about 130 feet of “head” in the C/U area.
- About 30 mgd currently pumped in Champaign County has drawn “head” down by about 90 feet.
- About 40 feet of “head” remains.
- The bucket of water in the C/U area is about 70% empty, or 30% full (as measured by “head” above the top of the Mahomet Aquifer).
- 2 ethanol plants would use a total of ~3mgd which is about 15-25% of water still available in C/U area before the Mahomet Aquifer is dewatered locally.
- Withdrawals of water for any purpose will lower “head”:
 - Illinois American plans to pump additional 15 mgd.
 - Equistar pumping about 6 mgd near Bondville.
- **How do you want to use the 30% of water still available in the bucket locally?**

Illinois State
WATER
Survey (1895)

HAVE A NICE DAY!

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