CLIMATE CHANGE

EXCHANGE CLUB
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Chief

Illinois State Water Survey

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

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DEFINITION of CLIMATE

- The statistical aggregate of weather conditions over a period of time: temperature; precipitation; wind; cloudiness; storms; etc.
- Climate “normals” are set over 30 year periods: means; extremes; frequencies of occurrence etc.
- Current “normal” period is 1971-2000.
- This will change to 1981-2010 in 2011.

DEFINITION of CLIMATE CHANGE

- You can’t have climate change over less than a 30-year period.
- Climate change can be a change in the mean, a change in extremes, or change in frequencies.

EXAMPLES OF CLIMATE CHANGE

- Change in the annual mean

- Constant mean with change in extremes

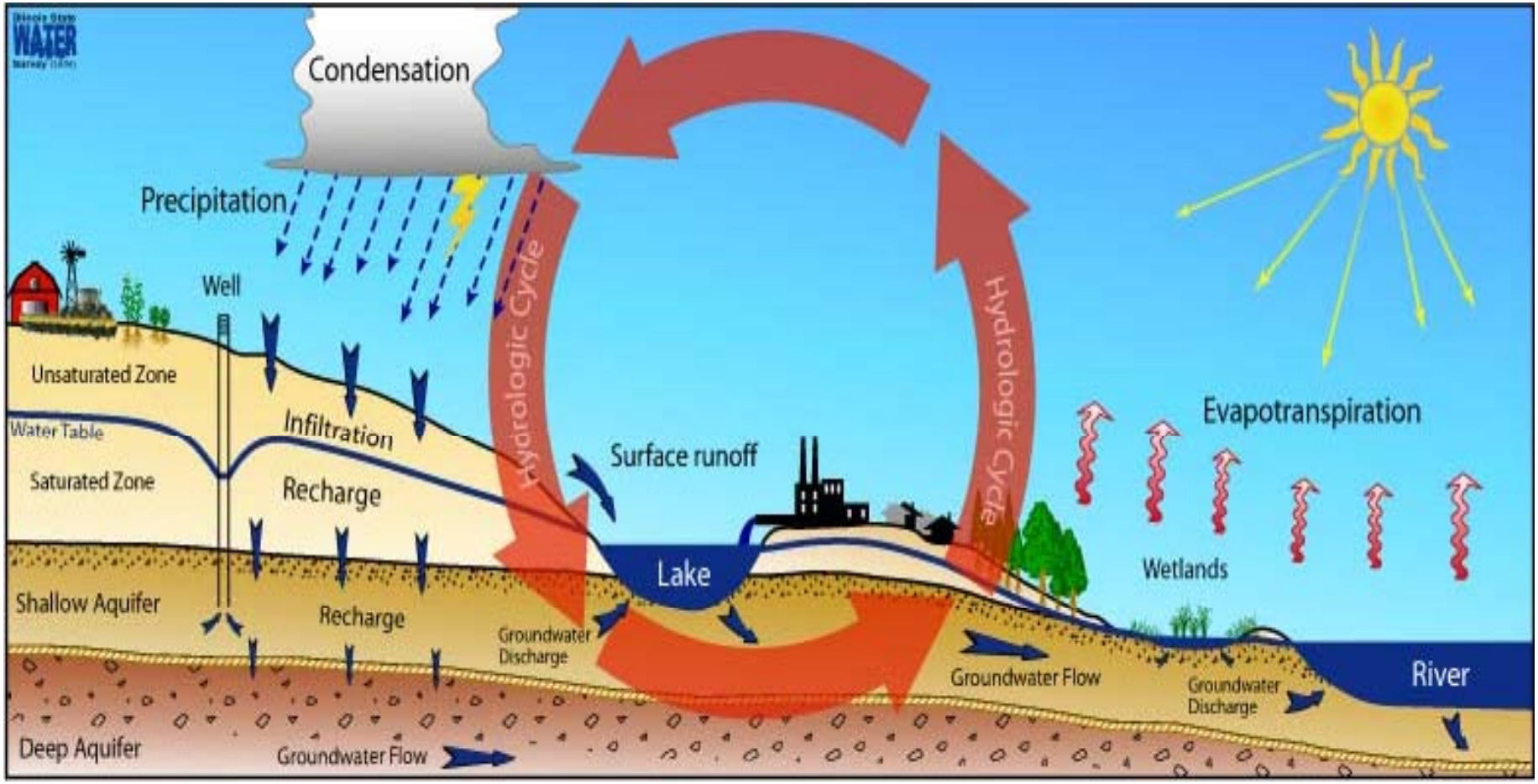
- Constant mean with change in frequency of extremes

Confluence of the Illinois, Mississippi and Missouri Rivers

July 4, 1988

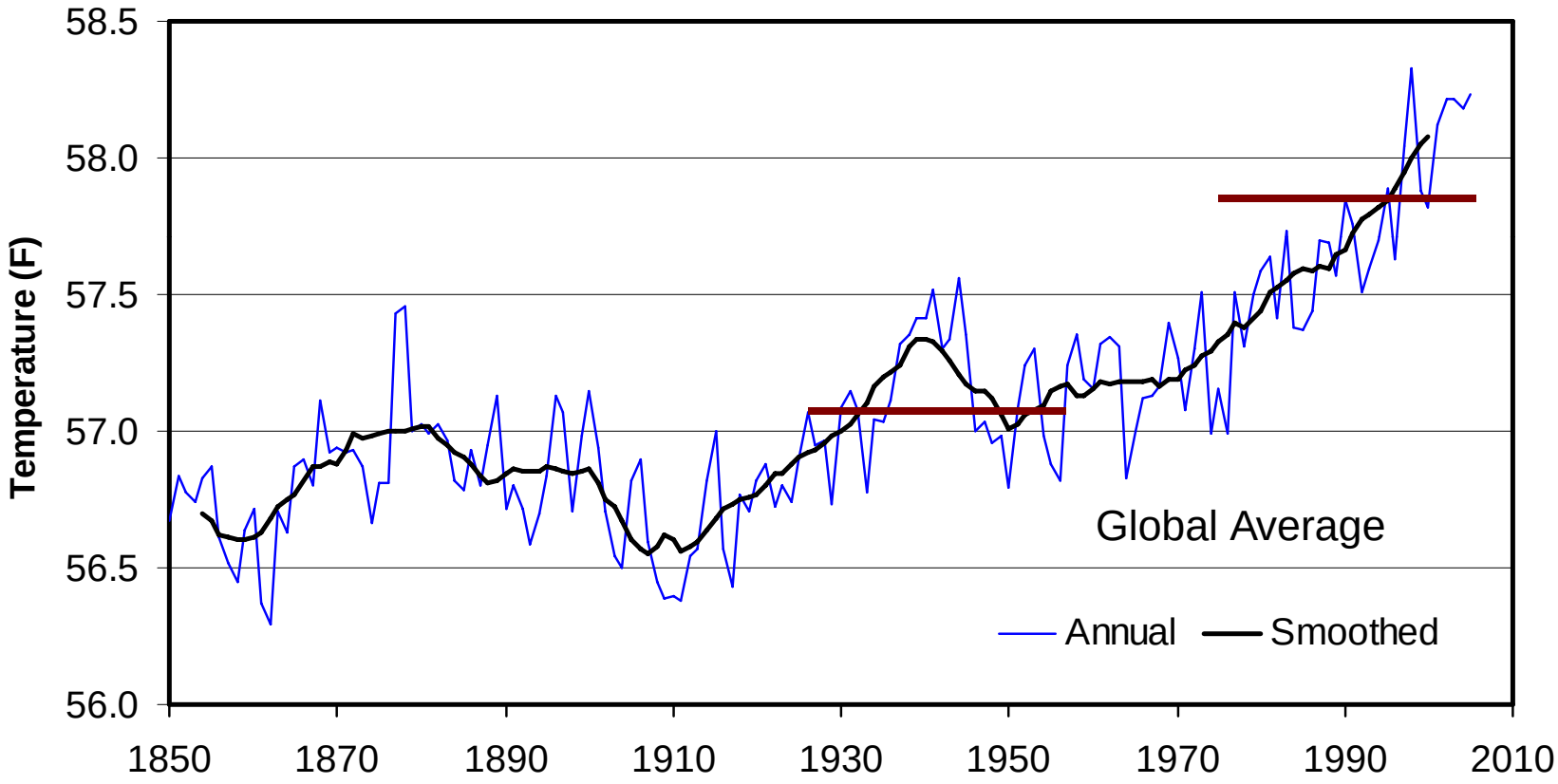
July 18, 1993

THE WATER CYCLE: PRECIPITATION and TEMPERATURE AFFECT SURFACE WATER and GROUNDWATER

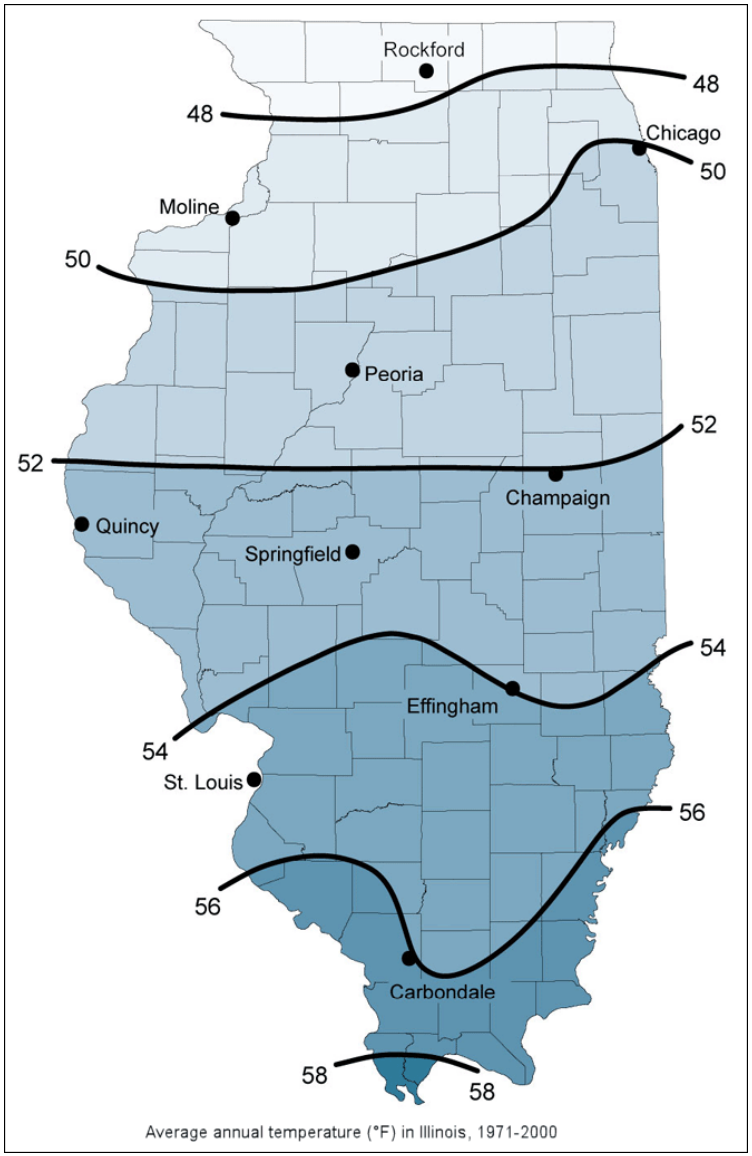


Global Warming

Source: Hadley Centre, UK



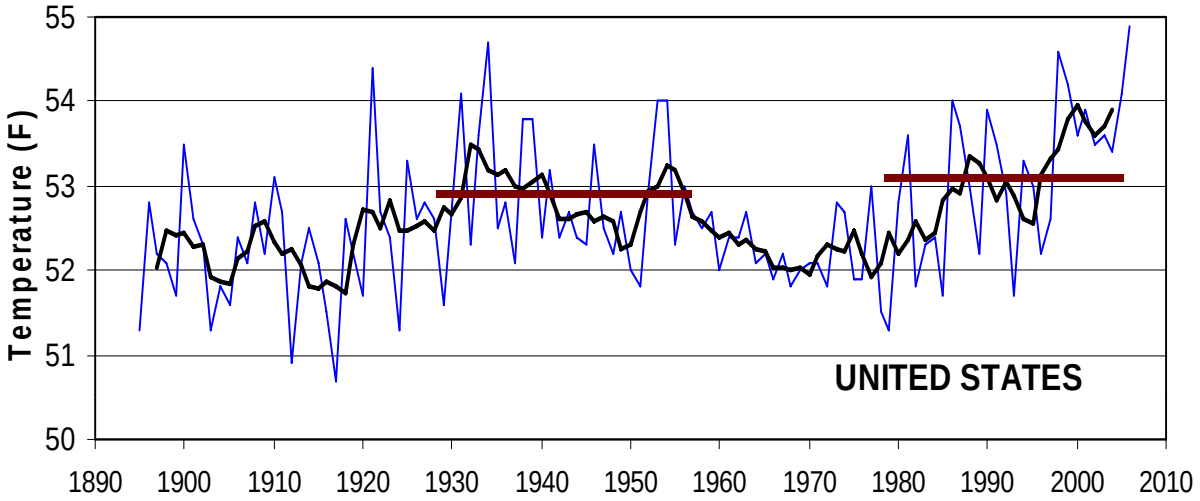
MEAN ANNUAL TEMPERATURE 1971-2000, ILLINOIS

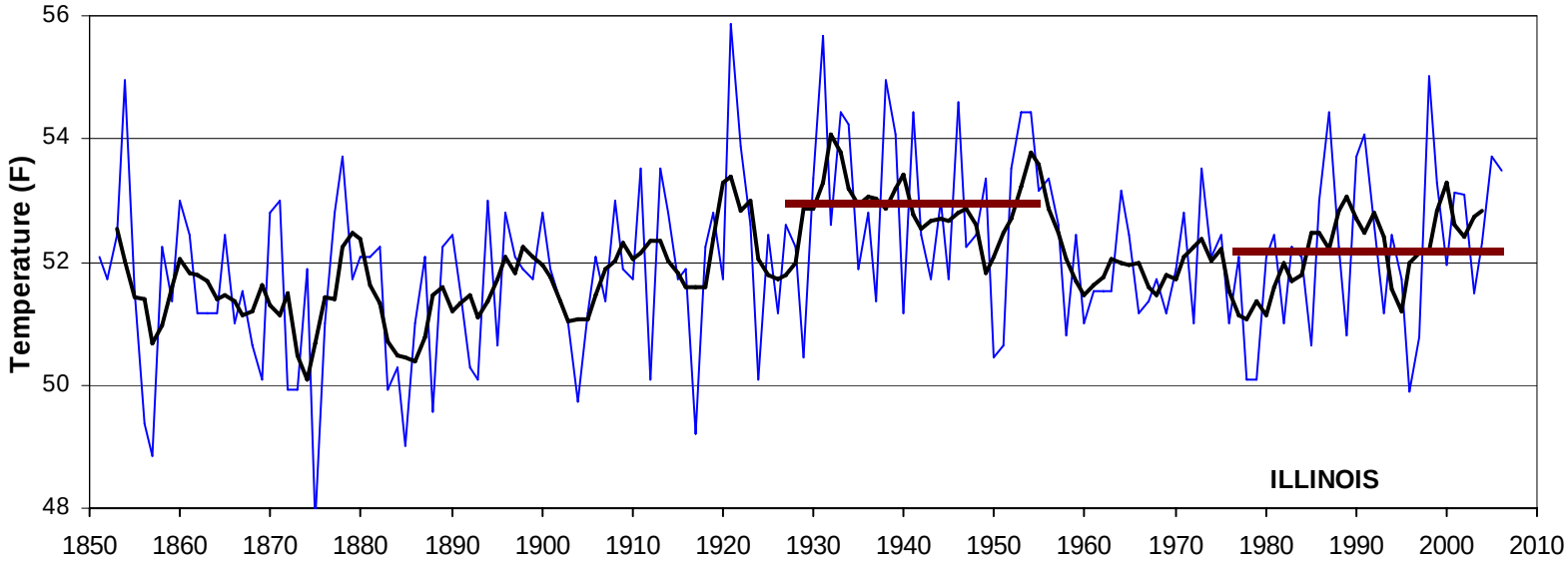


Average annual temperature (°F) in Illinois, 1971-2000

Temperature Annual Smoothed

Source: Jim Angel, Illinois State Water Survey





ANNUAL TEMPERATURE TRENDS
THE "WARMING HOLE"

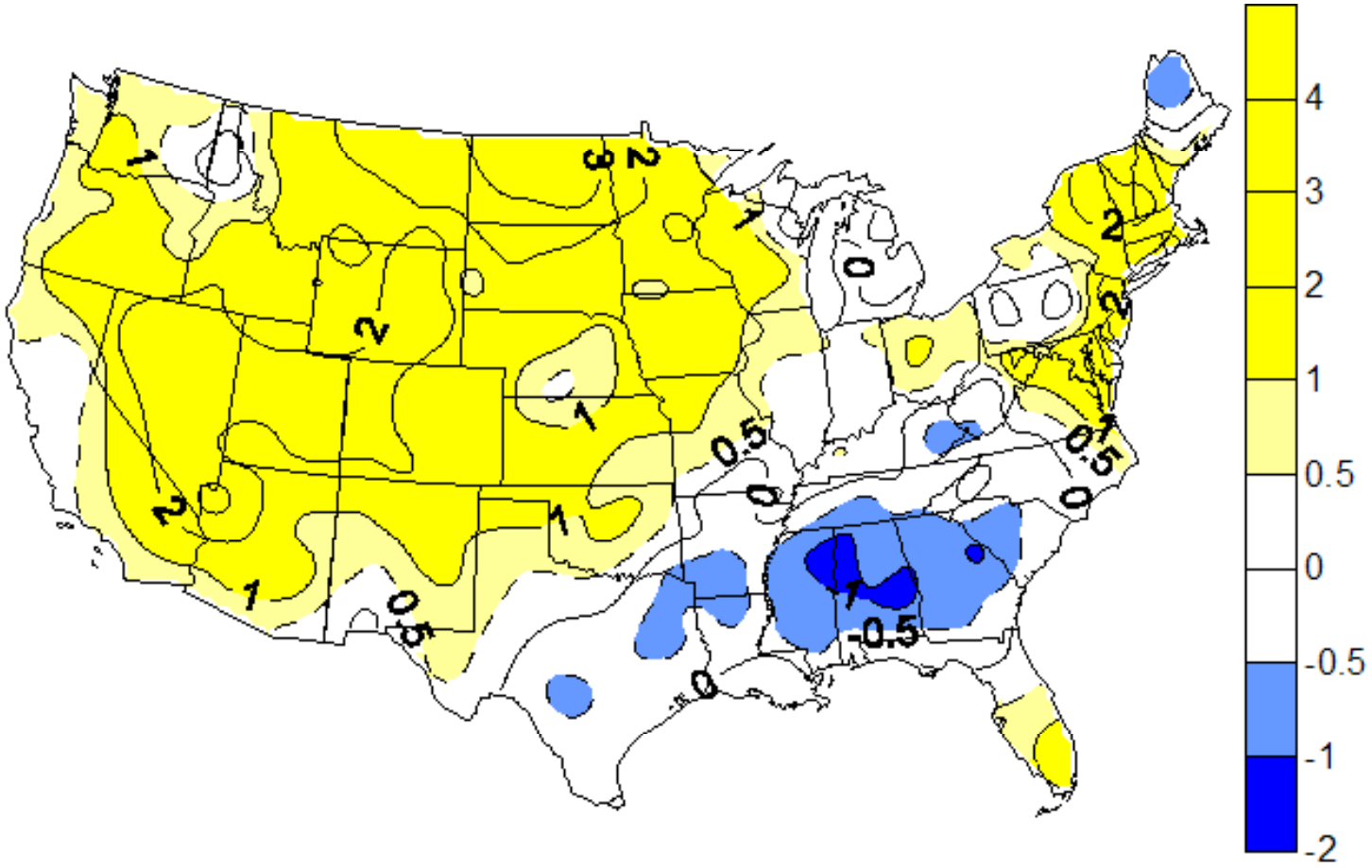
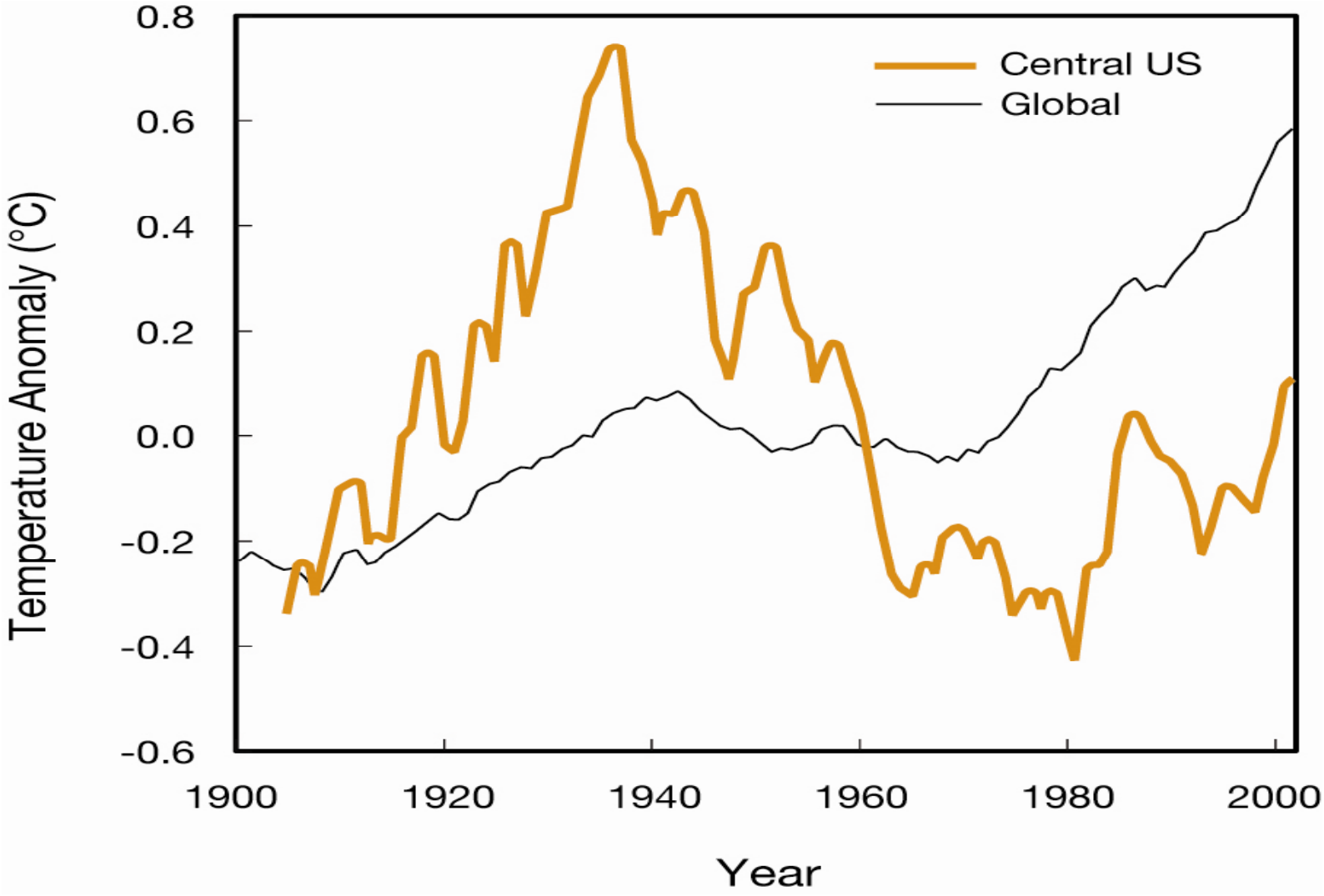
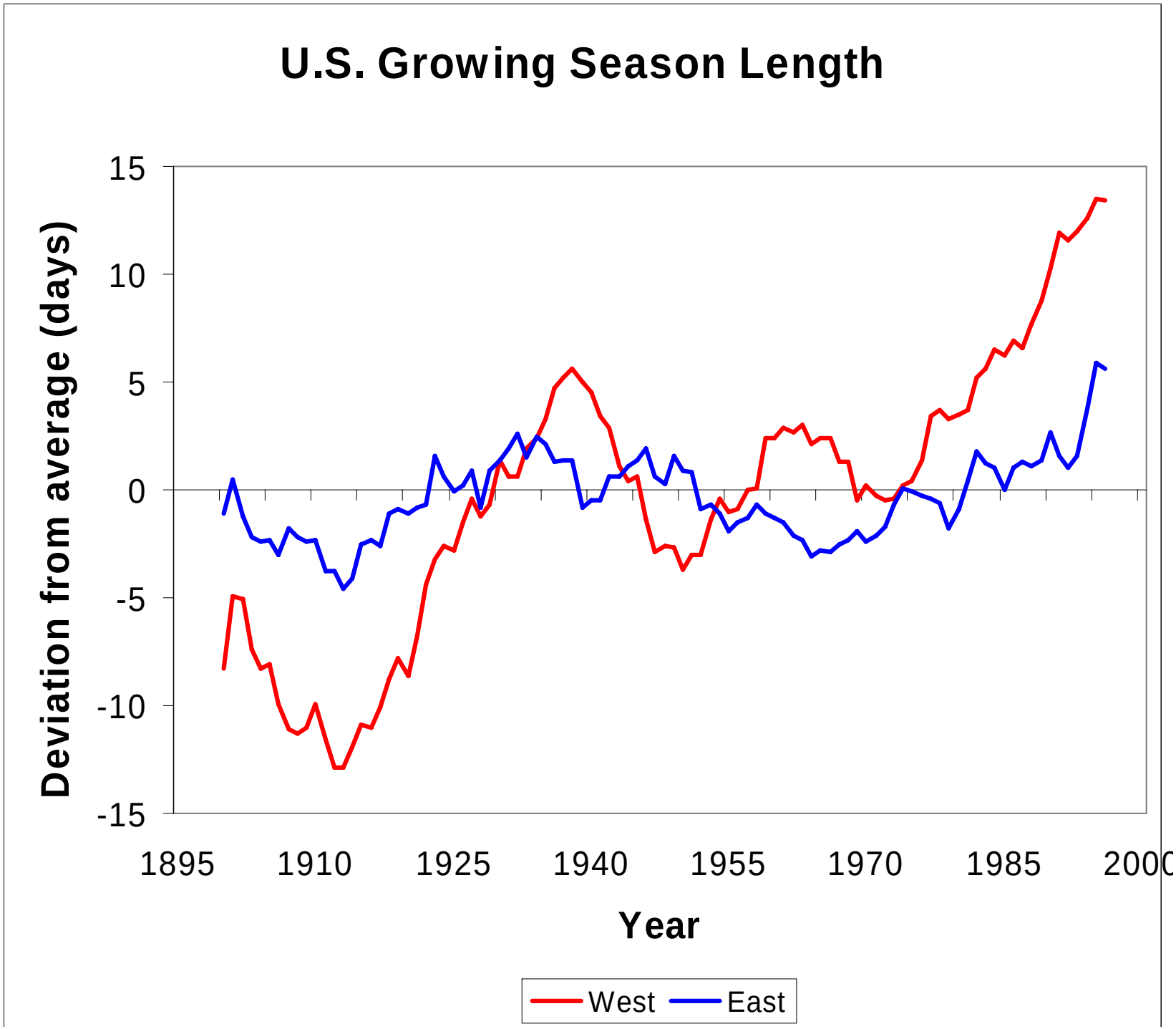


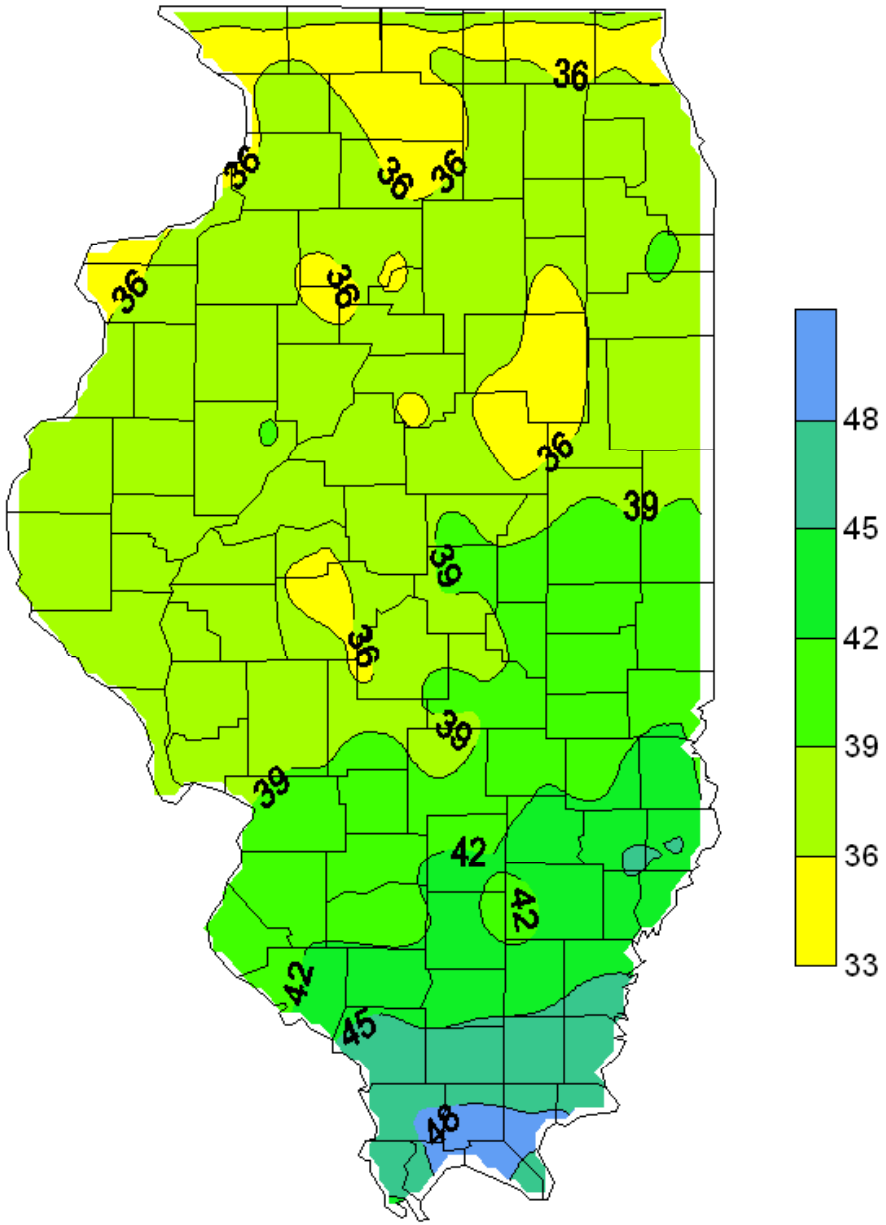
Figure 1. ANNUAL temperature trends in the U.S. expressed as the total change over the period 1895-2006 in degrees F and derived from climate division data. Copyright 2007. Illinois State Water Survey.

TEMPERATURE CHANGES IN ILLINOIS AND CENTRAL USA ARE NOT THE SAME AS GLOBAL AVERAGE TEMPERATURE TRENDS

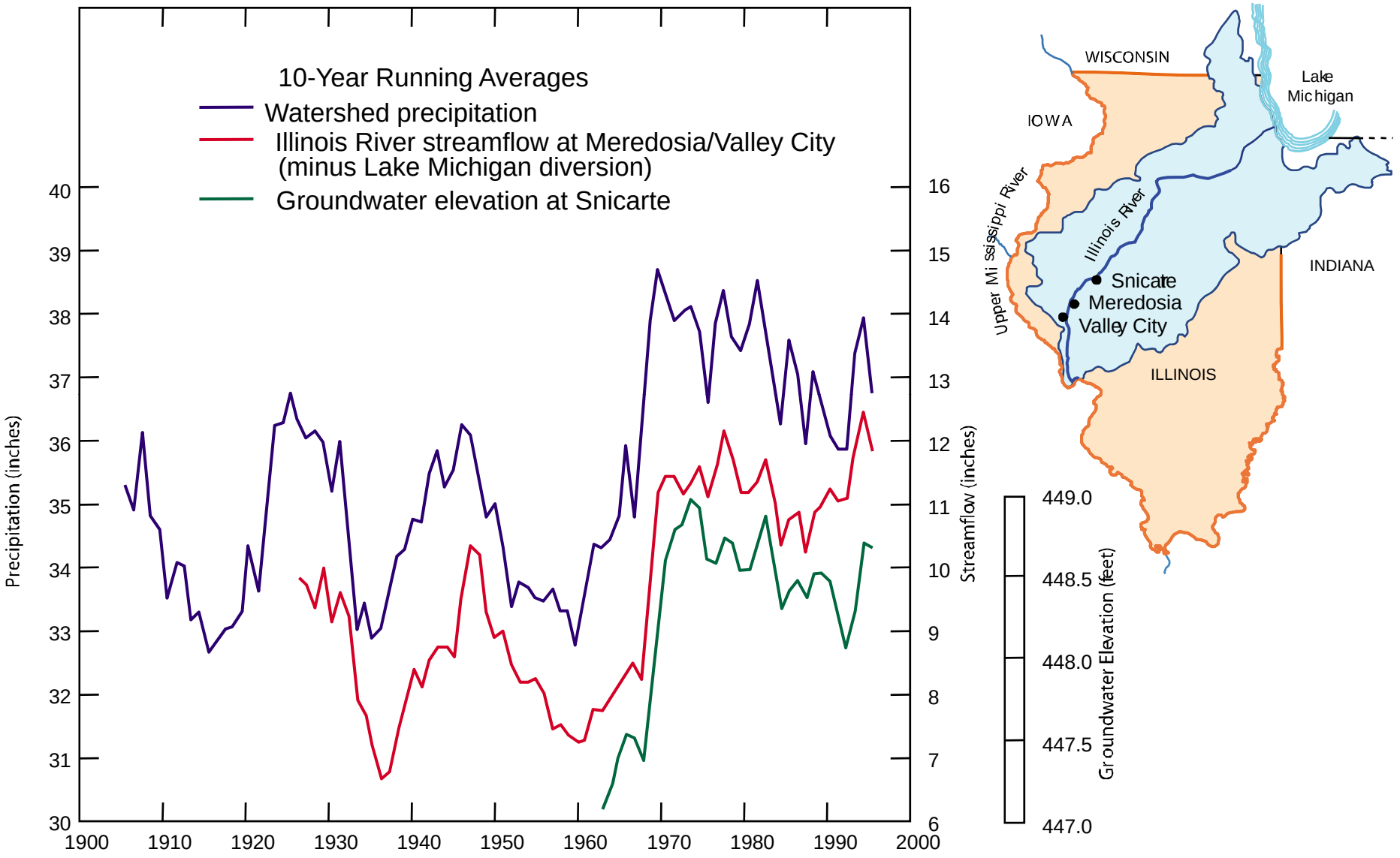



U.S. Growing Season Length
Deviation from average (days)
15
10
5
0
-5
-10
-15
1895
1910
1925
1940
1955
1970
1985
200
Year
West
East

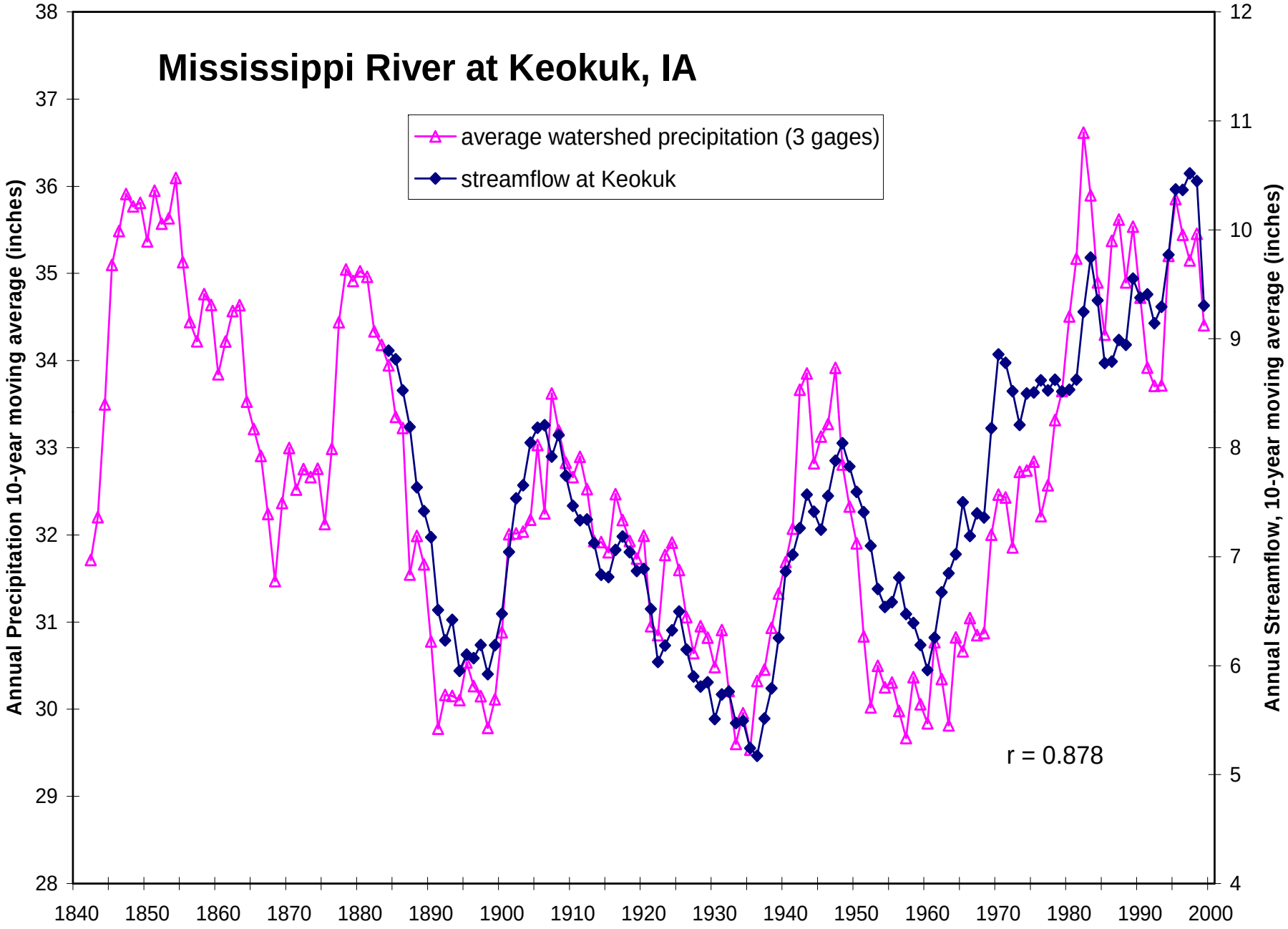
1971-2000 Normal Annual Precipitation (in)



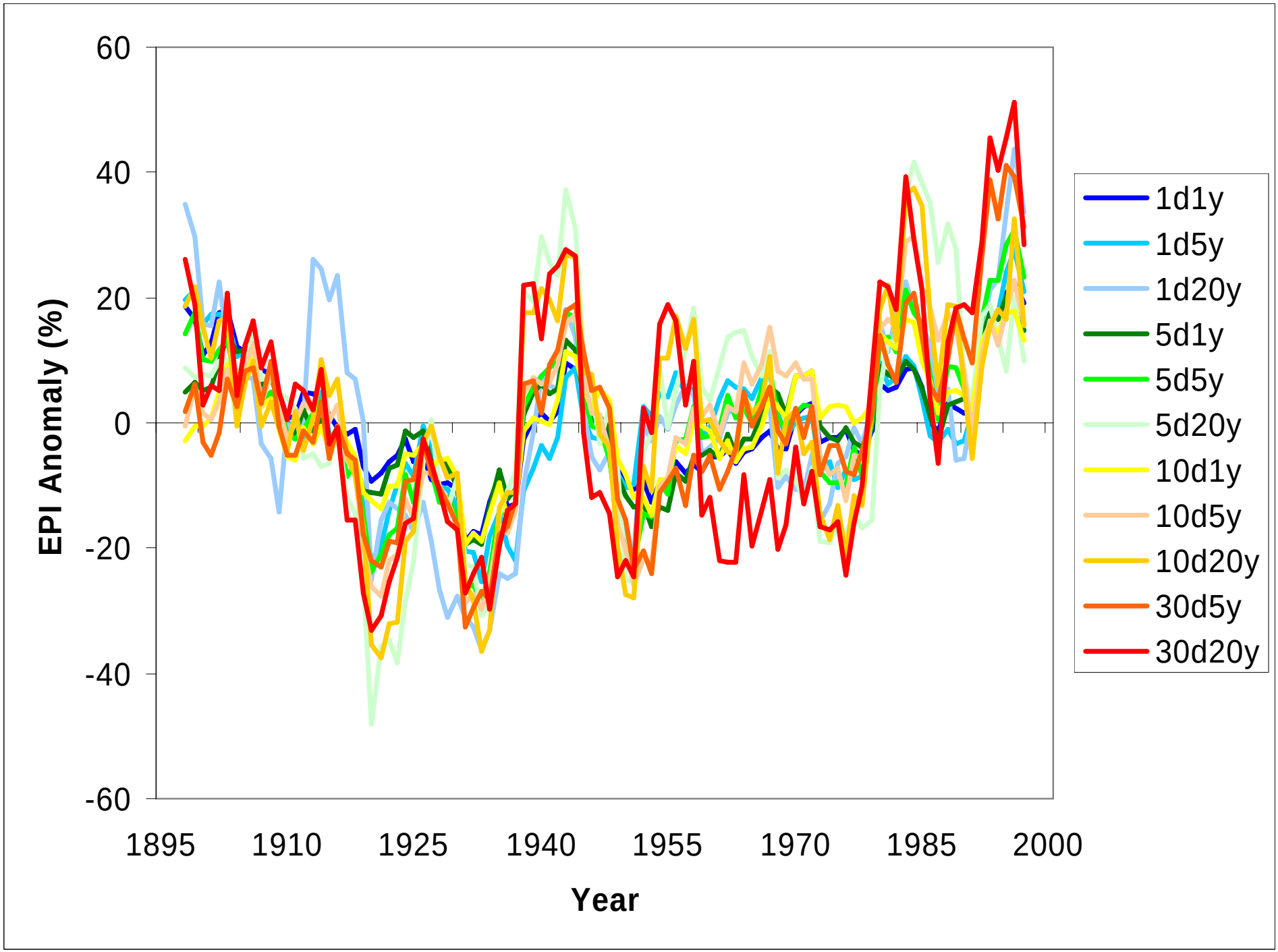
Illinois State Water Survey, Office of the State Climatologist

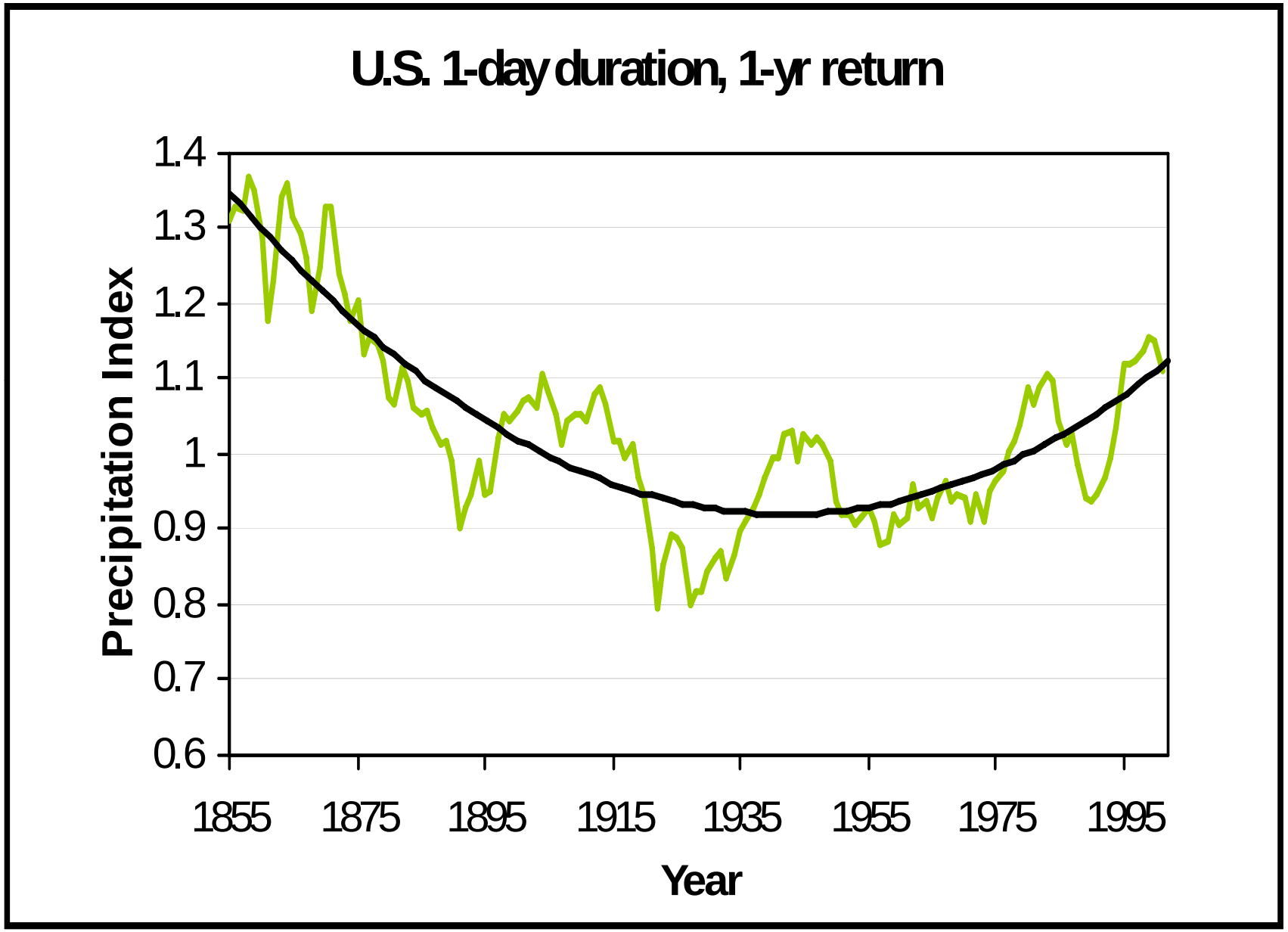


10-year running averages of Illinois River watershed precipitation, streamflow (minus Lake Michigan diversion), and groundwater elevation.

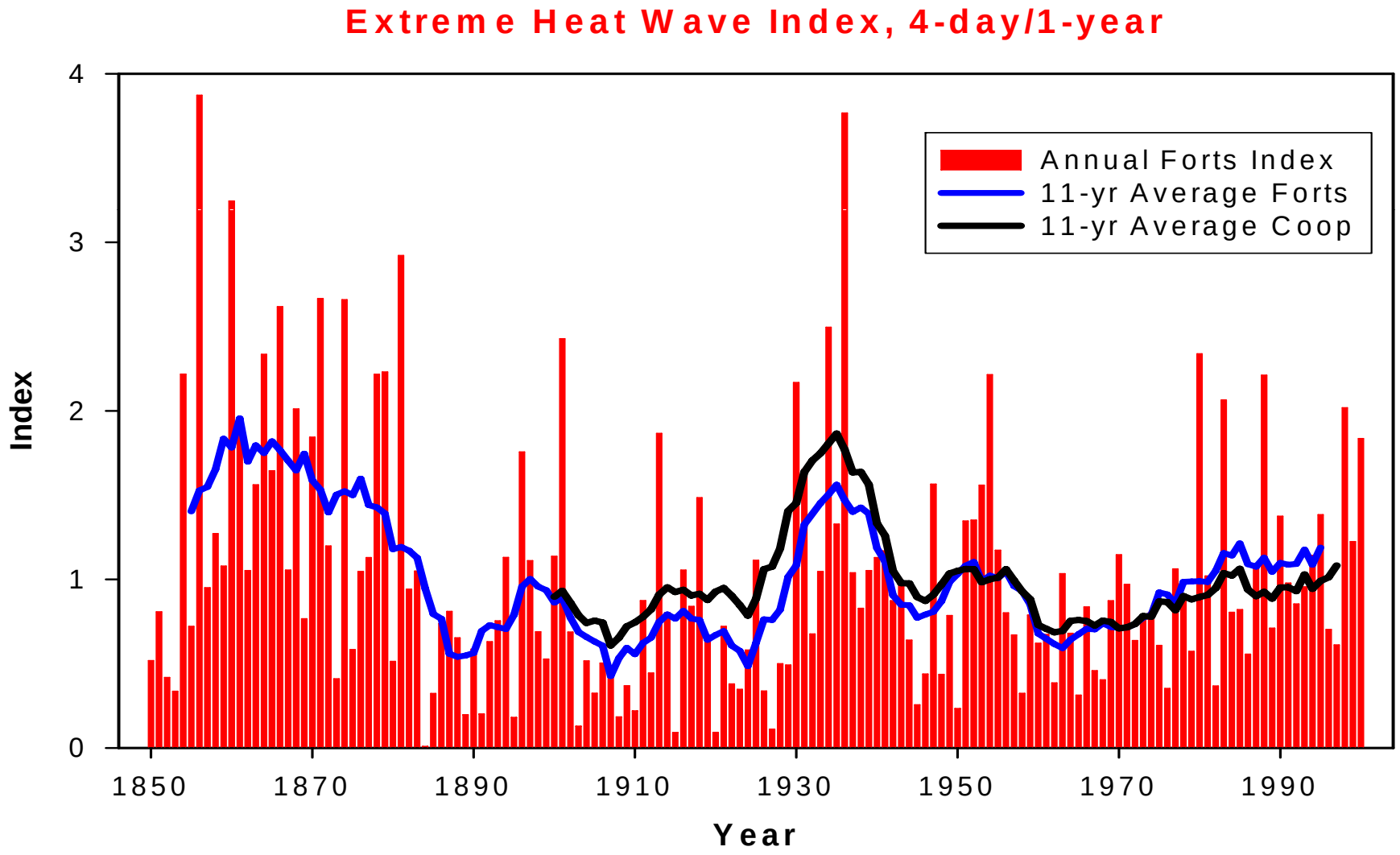


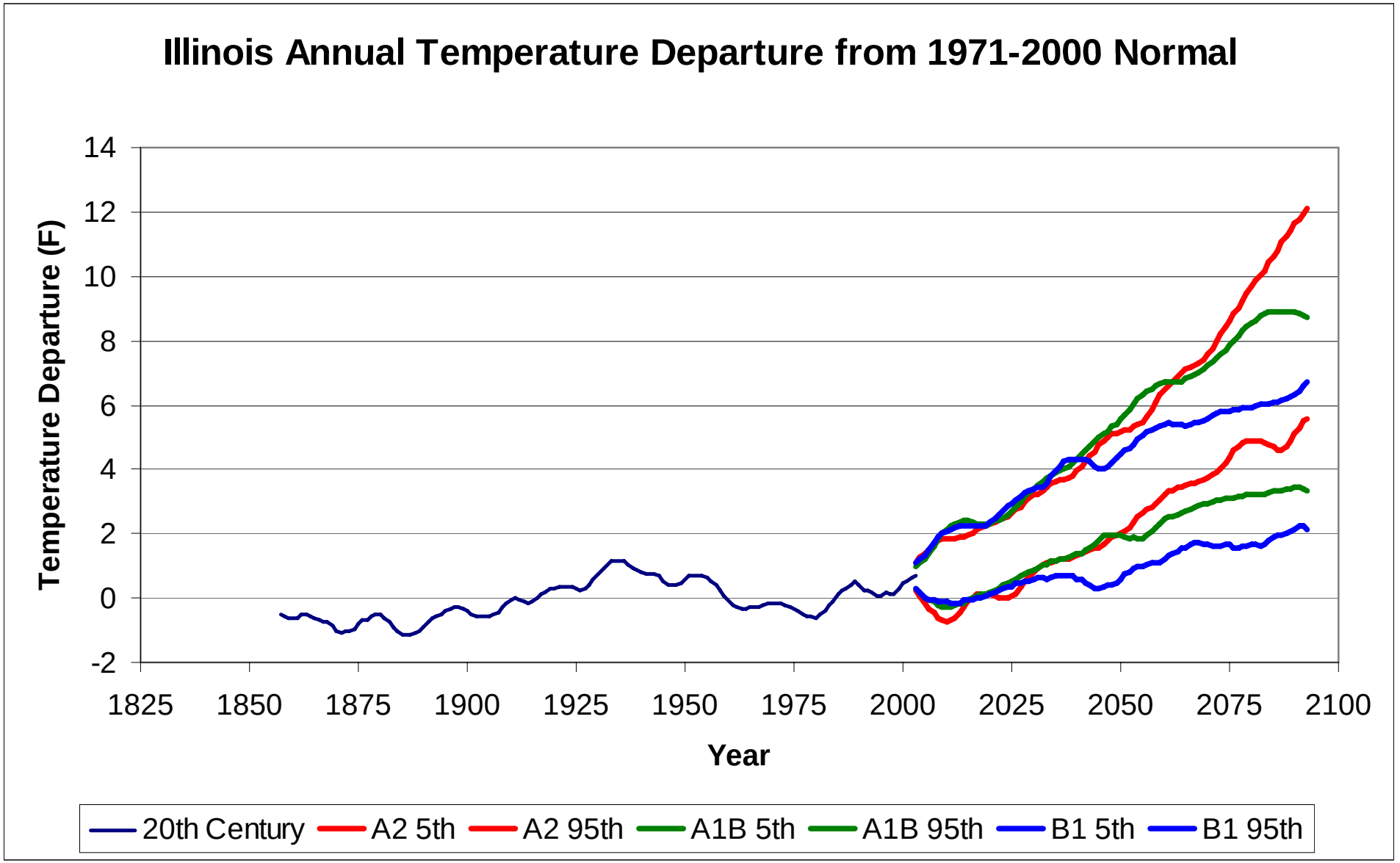
Vern Knapp in Winstanley et al. (2006), ISWS IEM 2006-02

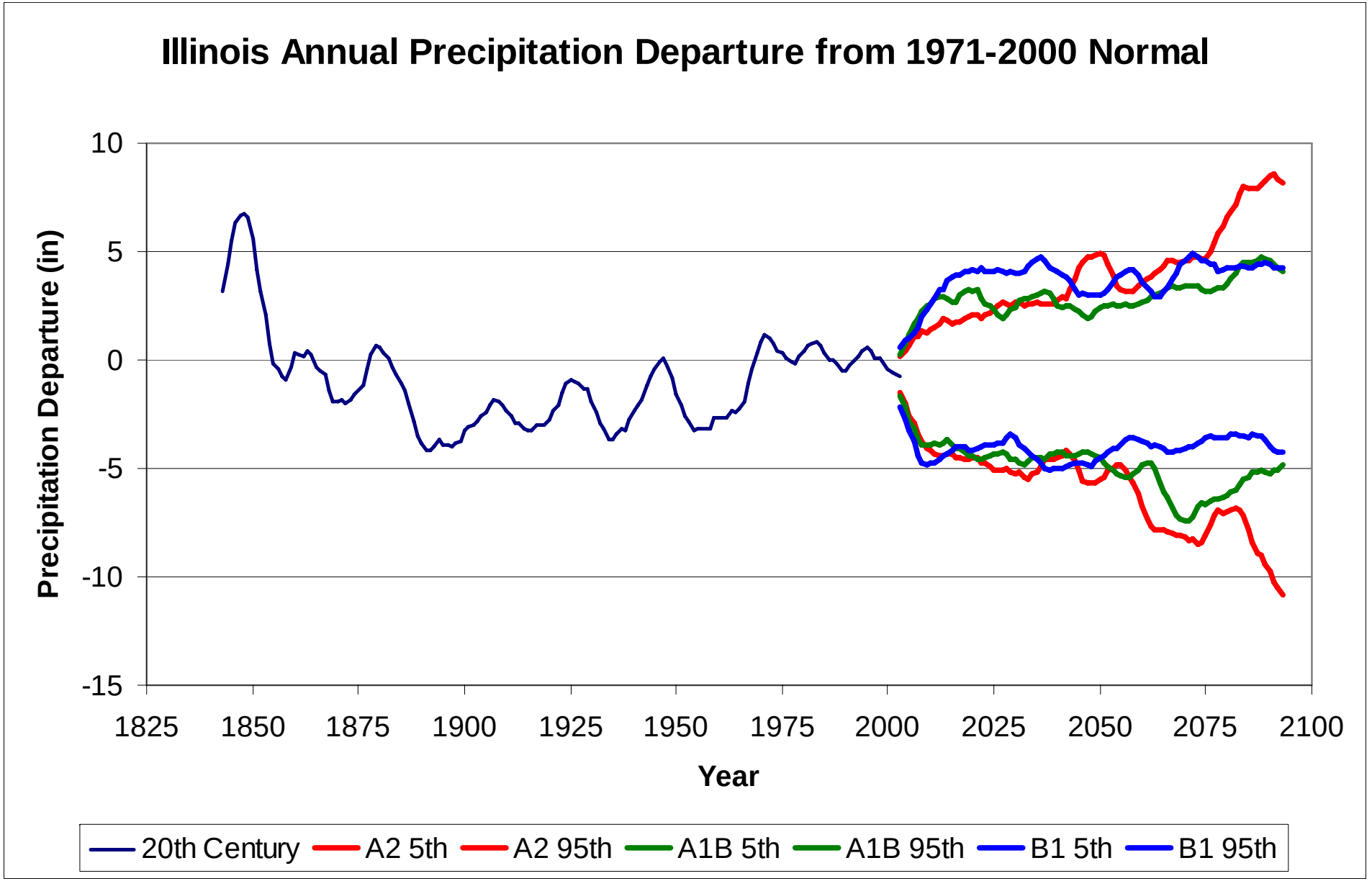

60
40
20
0
-20
-40
-60
EPI Anomaly (%)
1895
1910
1925
1940
1955
1970
1985
2000
Year
1d1y
1d5y
1d20y
5d1y
5d5y
5d20y
10d1y
10d5y
10d20y
30d5y
30d20y


U.S. 1-day duration, 1-yr return
Precipitation Index
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
1855
1875
1895
1915
1935
1955
1975
1995
Year

USA HEATWAVE INDEX (K. Kunkel)




Illinois Annual Temperature Departure from 1971-2000 Normal
Temperature Departure (F)
14
12
10
8
6
4
2
0
-2
1825
1850
1875
1900
1925
1950
1975
2000
2025
2050
2075
2100
Year
20th Century
A2 5th
A2 95th
A1B 5th
A1B 95th
B1 5th
B1 95th


Illinois Annual Precipitation Departure from 1971-2000 Normal
Precipitation Departure (in)
10
5
0
-5
-10
-15
1825
1850
1875
1900
1925
1950
1975
2000
2025
2050
2075
2100
Year
20th Century
A2 5th
A2 95th
A1B 5th
A1B 95th
B1 5th
B1 95th

CONCLUSIONS

- The climate in the Midwest is cooler than it was 70 years ago.
- Precipitation increased over the past century but equally high precipitation occurred in the 19th century.
- High natural variability makes it difficult to detect global warming in the Midwest.
- High uncertainty in projecting future climate

  - probably warmer

  - wetter? drier?

Illinois State WATER Survey (1895)

HAVE A NICE DAY!

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