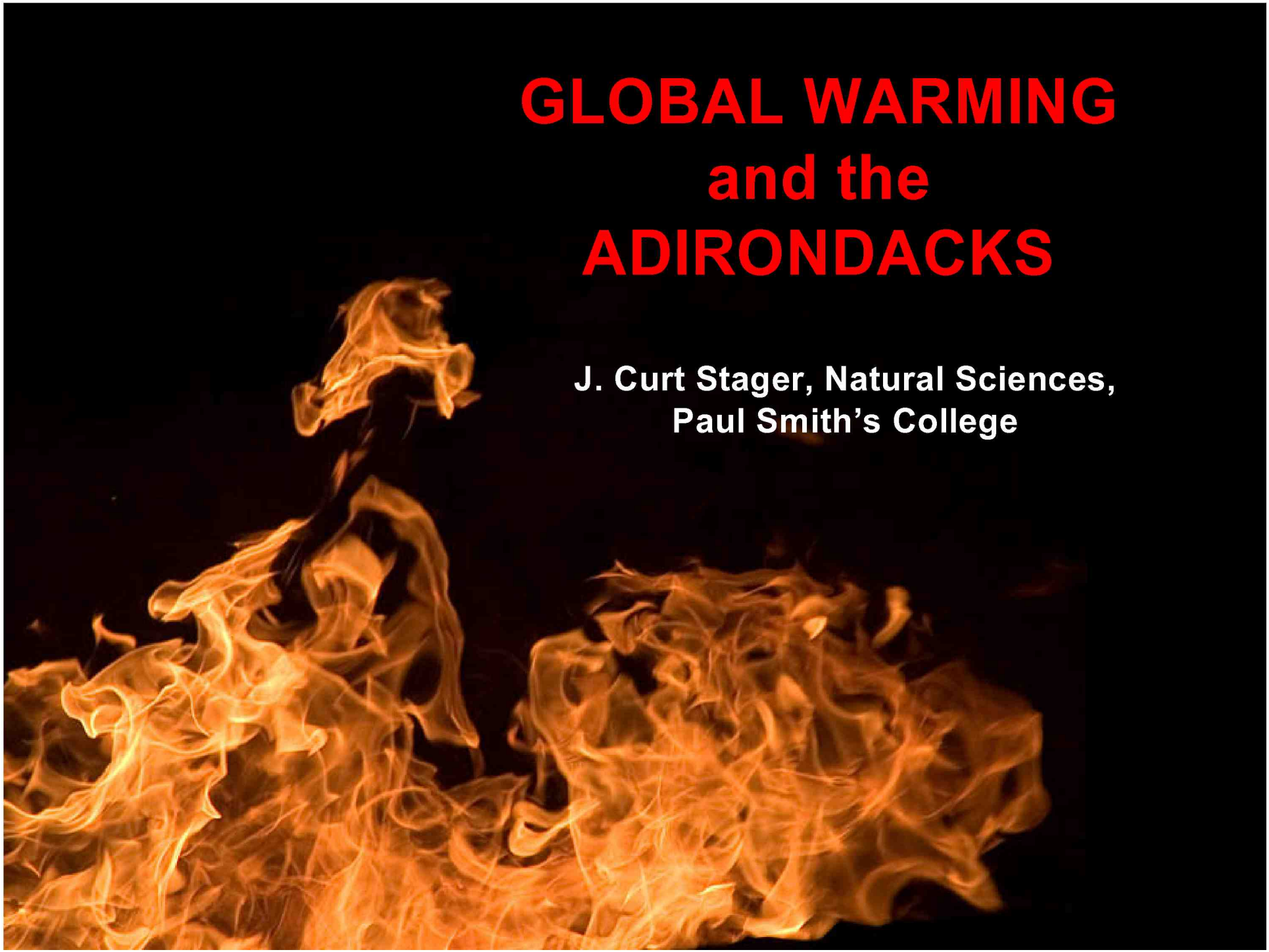
GLOBAL WARMING and the ADIRONDACKS

J. Curt Stager, Natural Sciences,
Paul Smith's College



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DOWN-SCALING FROM GLOBAL TRENDS

ESTABLISH WHAT'S HAPPENING HERE

We can then ask "WHY?"
and
"How helpful are the climate models?"
and
"What's next?"

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Possible sources of error to avoid

1. Choice of stations

2. Length of record

3. "Uncorrected" datasets

...time of day

...# of readings per day

...equipment/station changes

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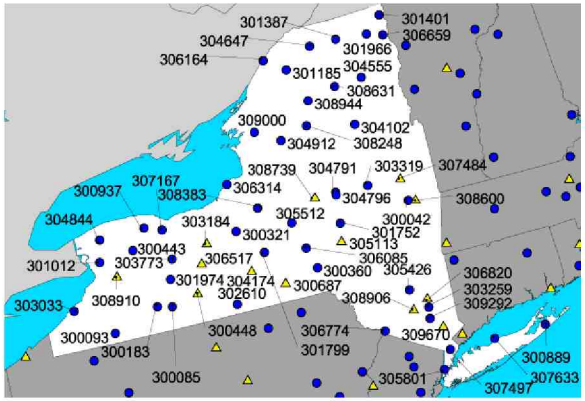
UNITED STATES HISTORICAL CLIMATOLOGY NETWORK

http://cdiac.ornl.gov/epubs/ndp/ushcn/monthly.html



FILNET (Fill Missing Original Data in the Network)

...calculates missing data based on a network of the best correlated nearby stations.

Urban (Urban Warming Adjustment)

The final adjustment is for an urban warming bias which uses the regression approach outlined in Karl et al. (1988).

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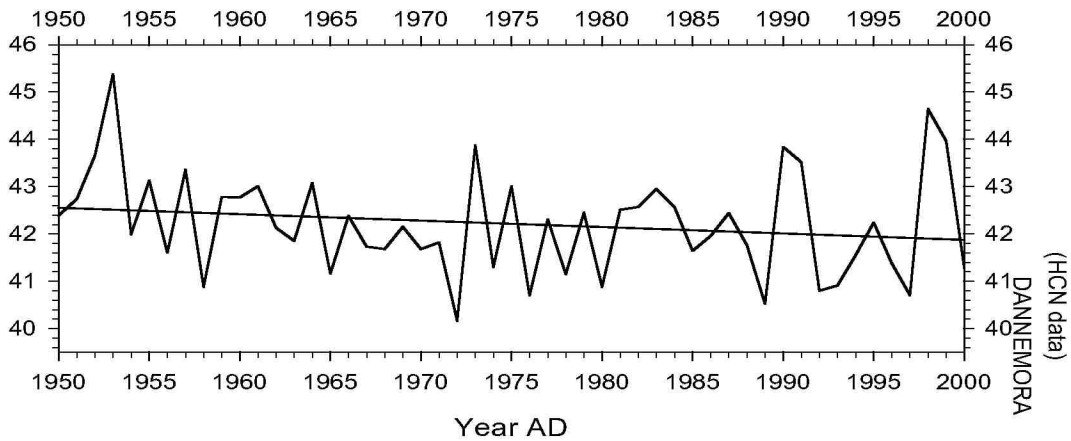
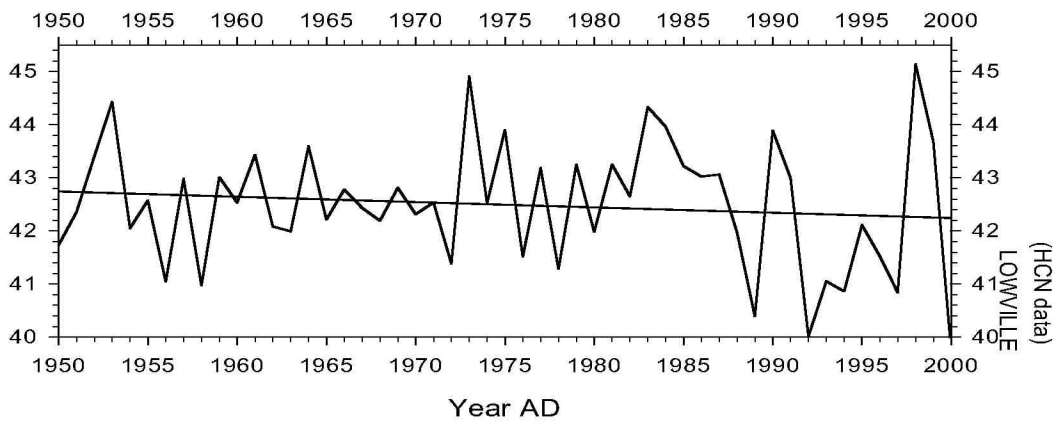
CHOICE OF STATIONS AFFECTS OUTCOMES:





FOUR show *cooling* 1950-2000 AD:

Chasm Falls (-2.5F)****

Lowville (-0.2F)

Dannemora (-0.6F)

Ogdensburg (-0.3F)

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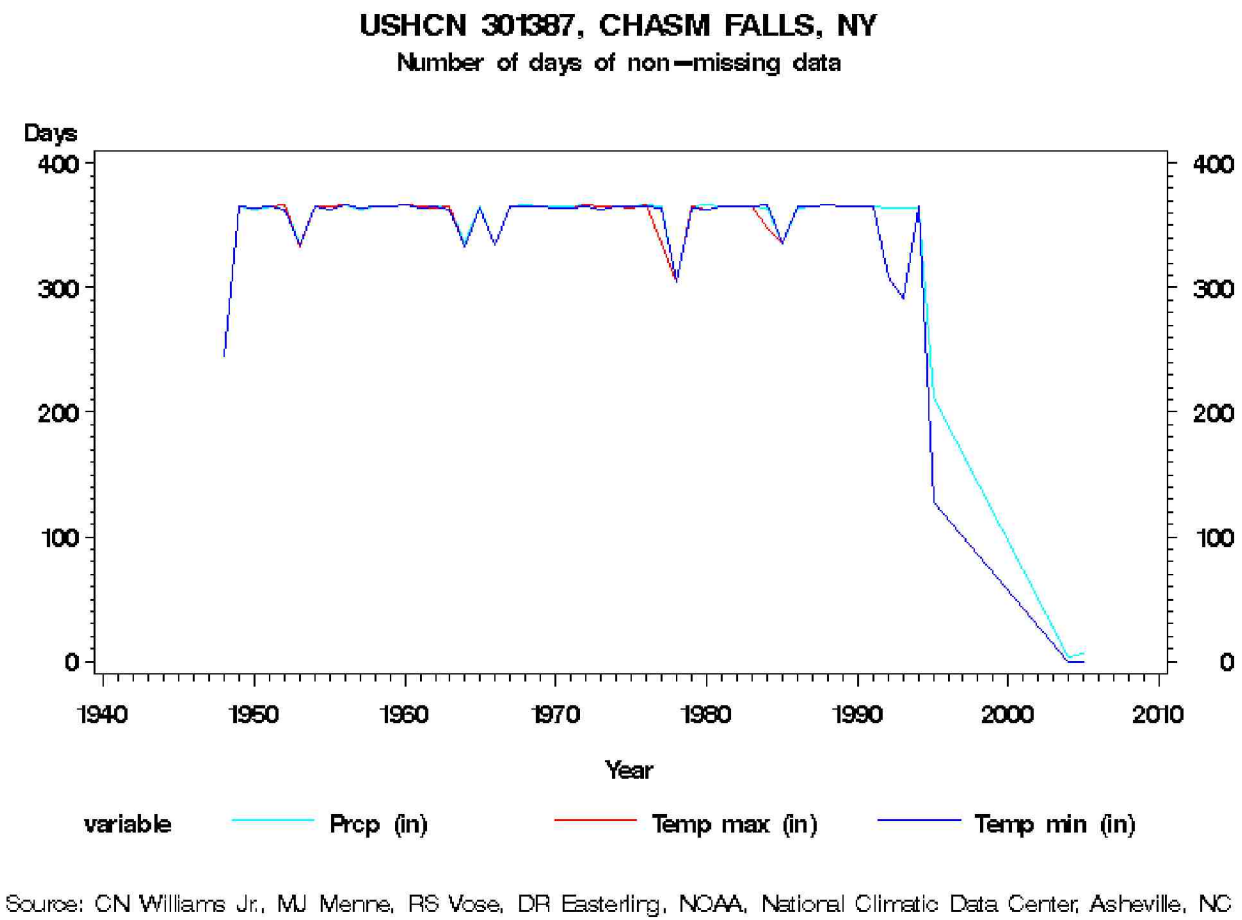
PERHAPS THIS IS WHY CHASM FALLS SHOWS SUCH AN UNUSUALLY STRONG *COOLING...*



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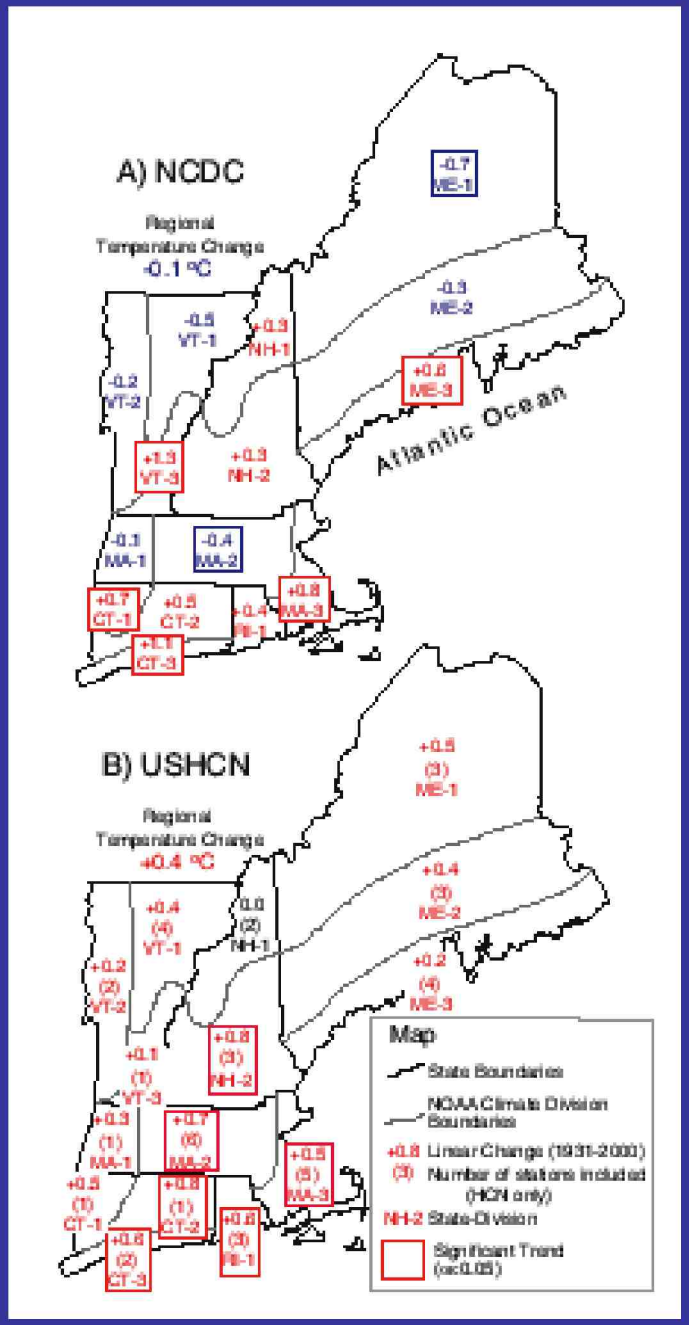

SPURIOUS RESULTS IN REGIONAL ASSESSMENTS from not using *USHCN DATA*:

1. Keim *et al.*, 2003 (*Geophys. Res. Lett.* 30)

2. *Trombulak & Wolfson, 2004* (*Geophys. Res. Lett.* 31)

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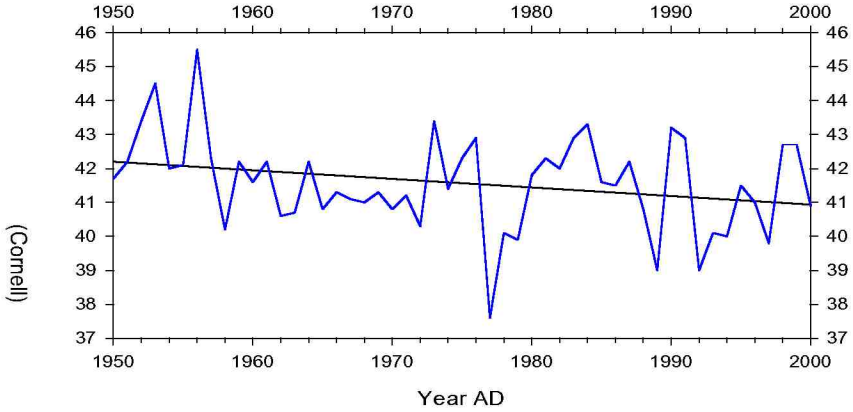
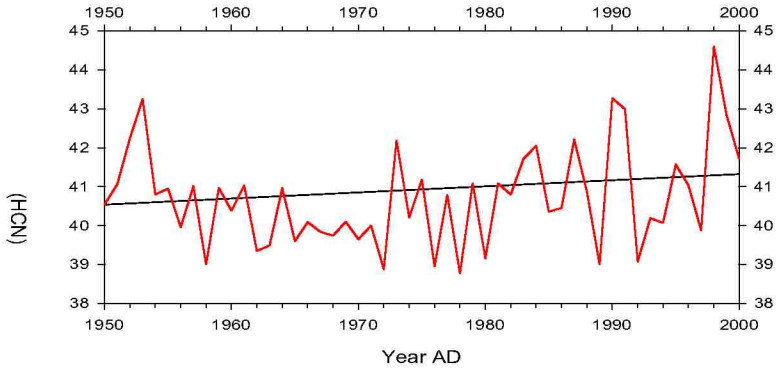
WANAKENA station shows slight COOLING since 1950… unless you use the adjusted USHCN data.



RAW DATA

(after Stager & Martin, 2002)



USHCN DATA

(Stager et al., in review)

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ANOTHER ISSUE:

To find TRENDS, we examine data over long periods.

But choosing different lengths of record can yield different trends...from the *same* datasets.

HOW DO YOU DECIDE WHICH TIME SCALE TO USE?

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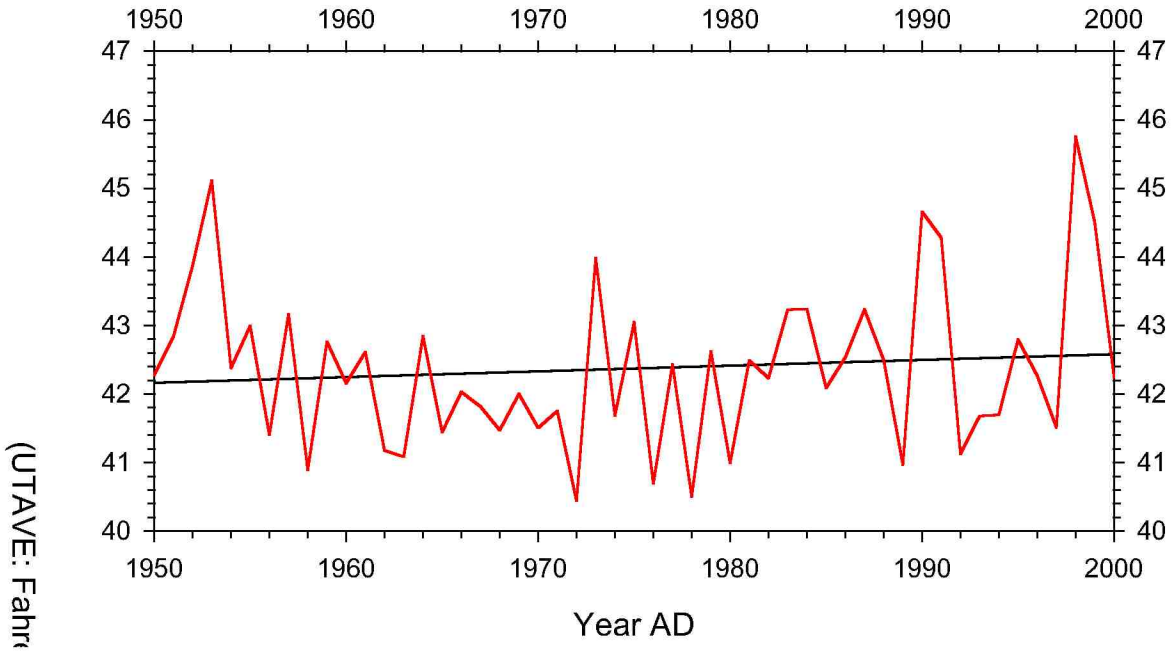
ADK COMPOSITE 1950-2000 AD



NOT MUCH WARMING: 0.08 degrees F/decade

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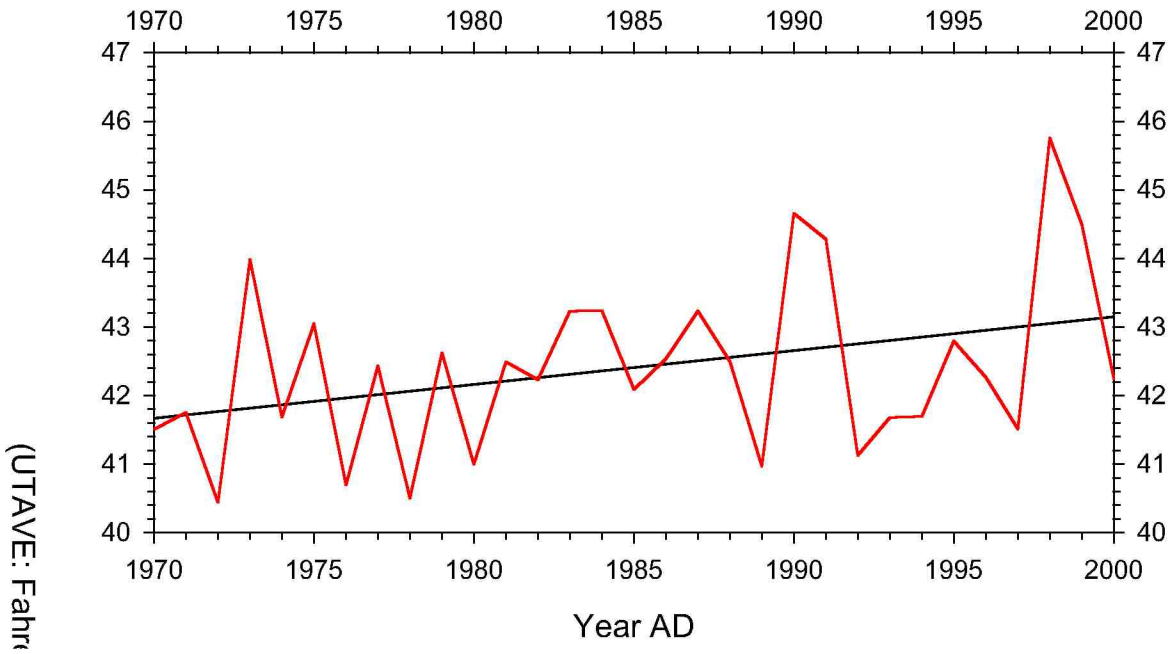
USING A SHORTER 30-YEAR INTERVAL

ACCELERATED WARMING: 1970-2000 AD



ca. 0.5 degrees F/decade

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WE NEED TO SHOW

WHY

A PARTICULAR TIME PERIOD IS MOST RELEVANT TO OUR QUESTIONS.

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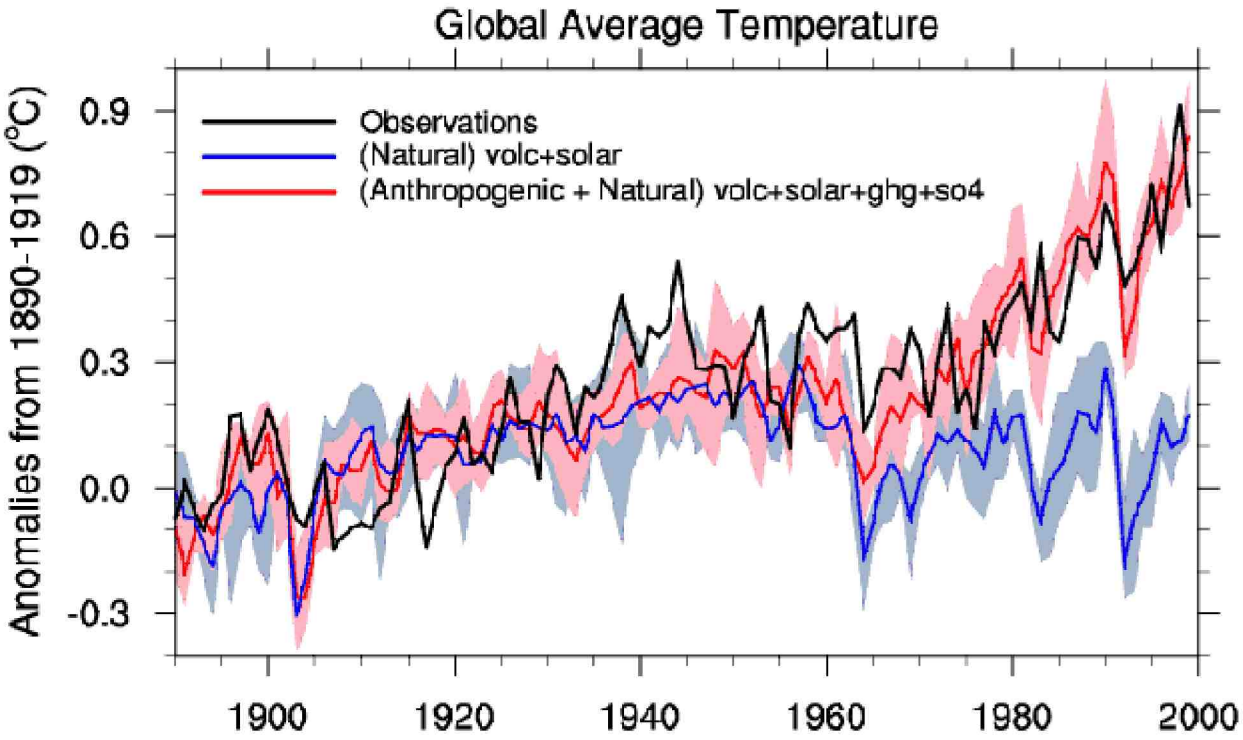
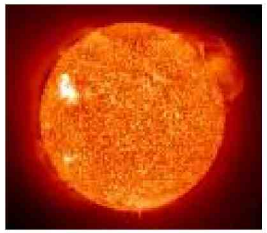
Until RECENTLY, much of the global warming was natural.





Courtesy of NCAR (*http://www.cgd.ucar.edu/research/climate/attribution.html*)

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TWO good reasons to focus on the last 3 decades

1. Warming since the 1970's is largely due to the GREENHOUSE EFFECT. As greenhouse gas emissions continue, this condition is likely to continue well into the future.

2. Thirty years is also the standard sliding time window used by climatologists to determine mean climate.

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LATEST USHCN COMPOSITE (to 2005)

Dannemora

Indian Lake

Lake Placid

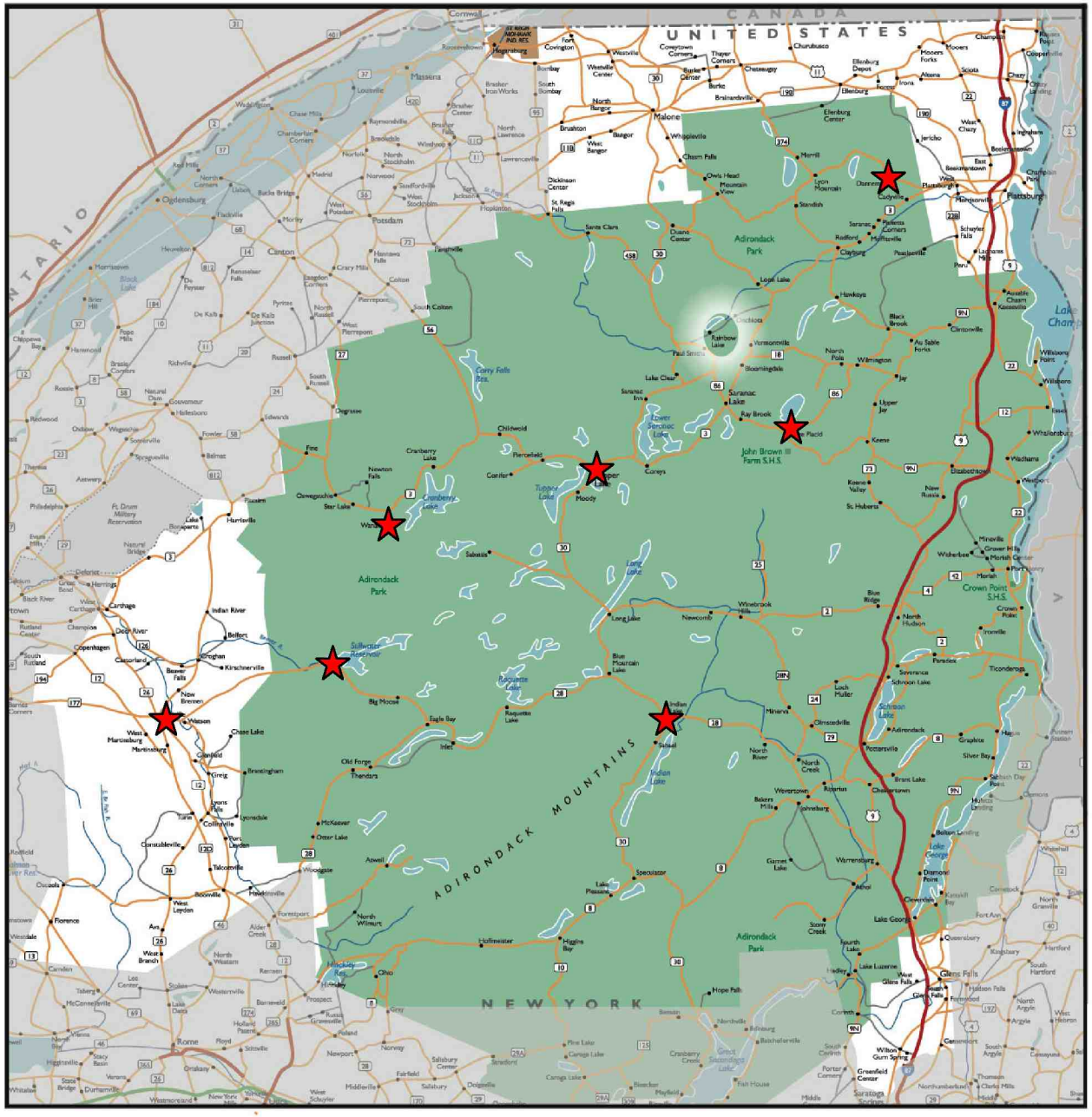
Lowville

Stillwater

Tupper Lake

Wanakena

The Adirondacks Region



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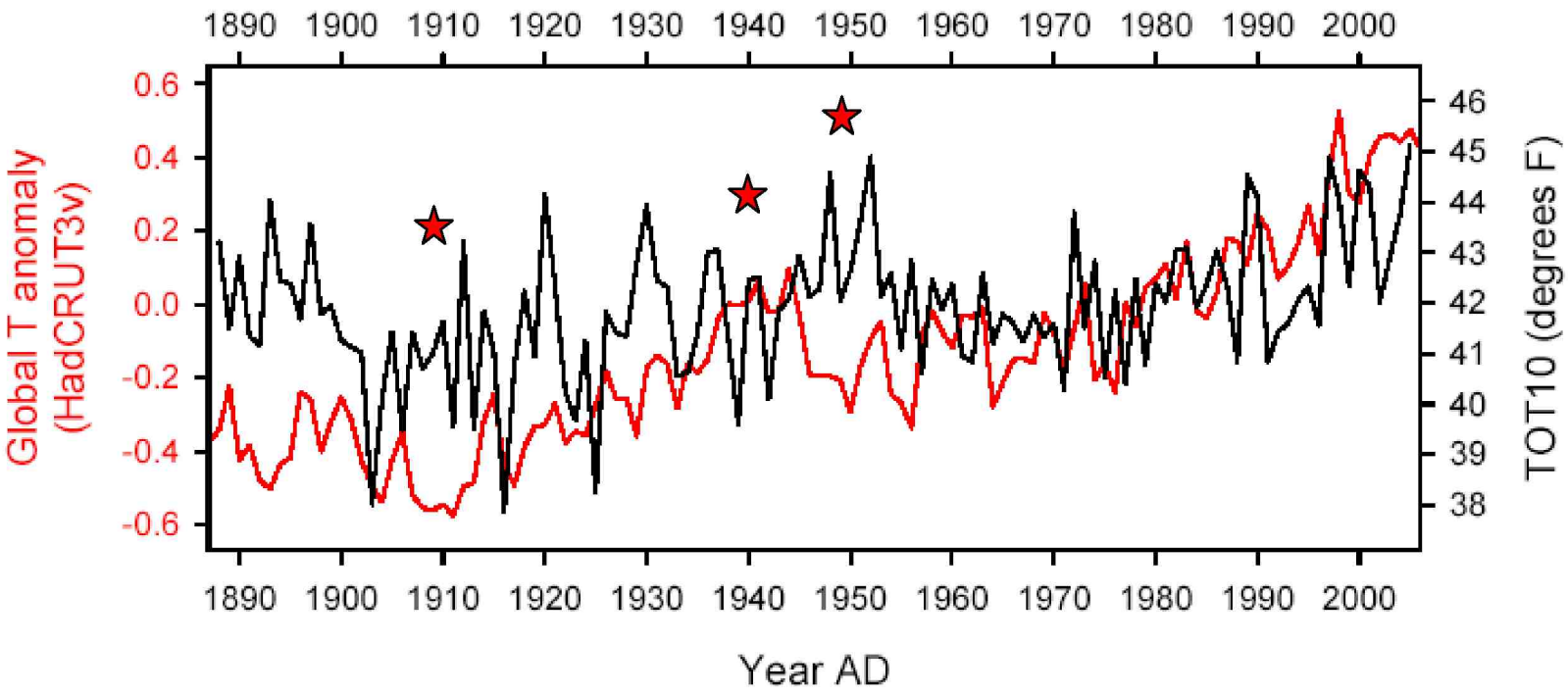
ADK temperatures did <u>not</u> follow global patterns in lockstep through the 20th century; as expected from *<u>local-scale</u>* variability.



CORR. COEFF: = 0.4

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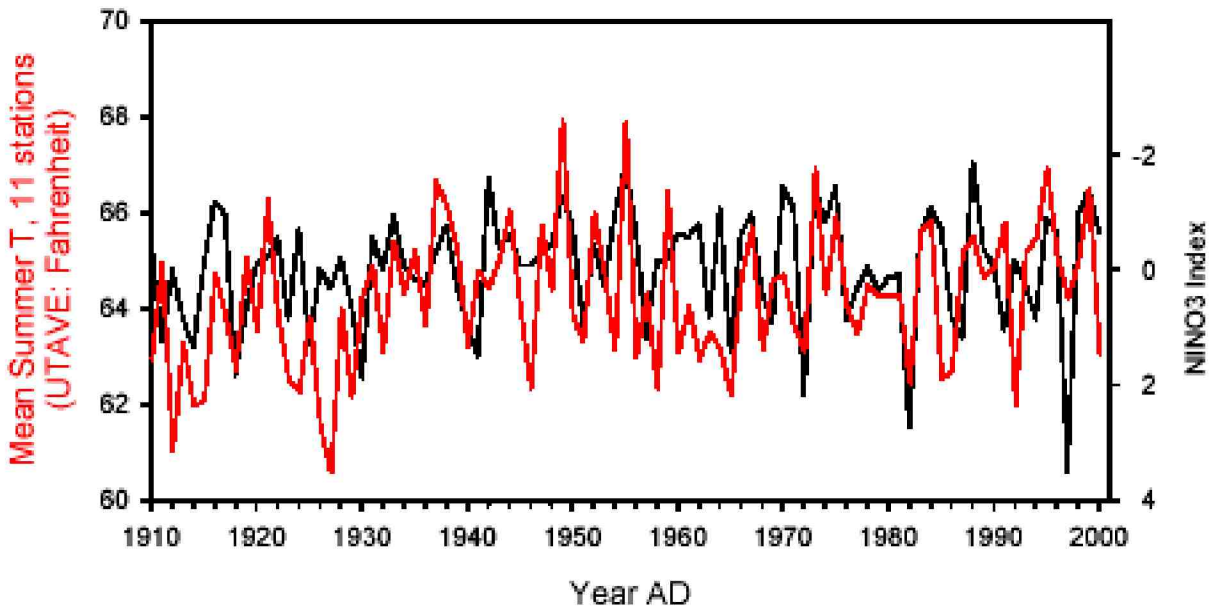
Why do we DIFFER from the global mean?

LOCAL INFLUENCES OTHER THAN CO2 such as the Arctic Oscillation, North Atlantic Oscillation, etc.

COOLER ADK SUMMERS tend to be linked to incipient El Nino events!?



Correlation = 0.32; Rsqr = 0.12, P = 0.007

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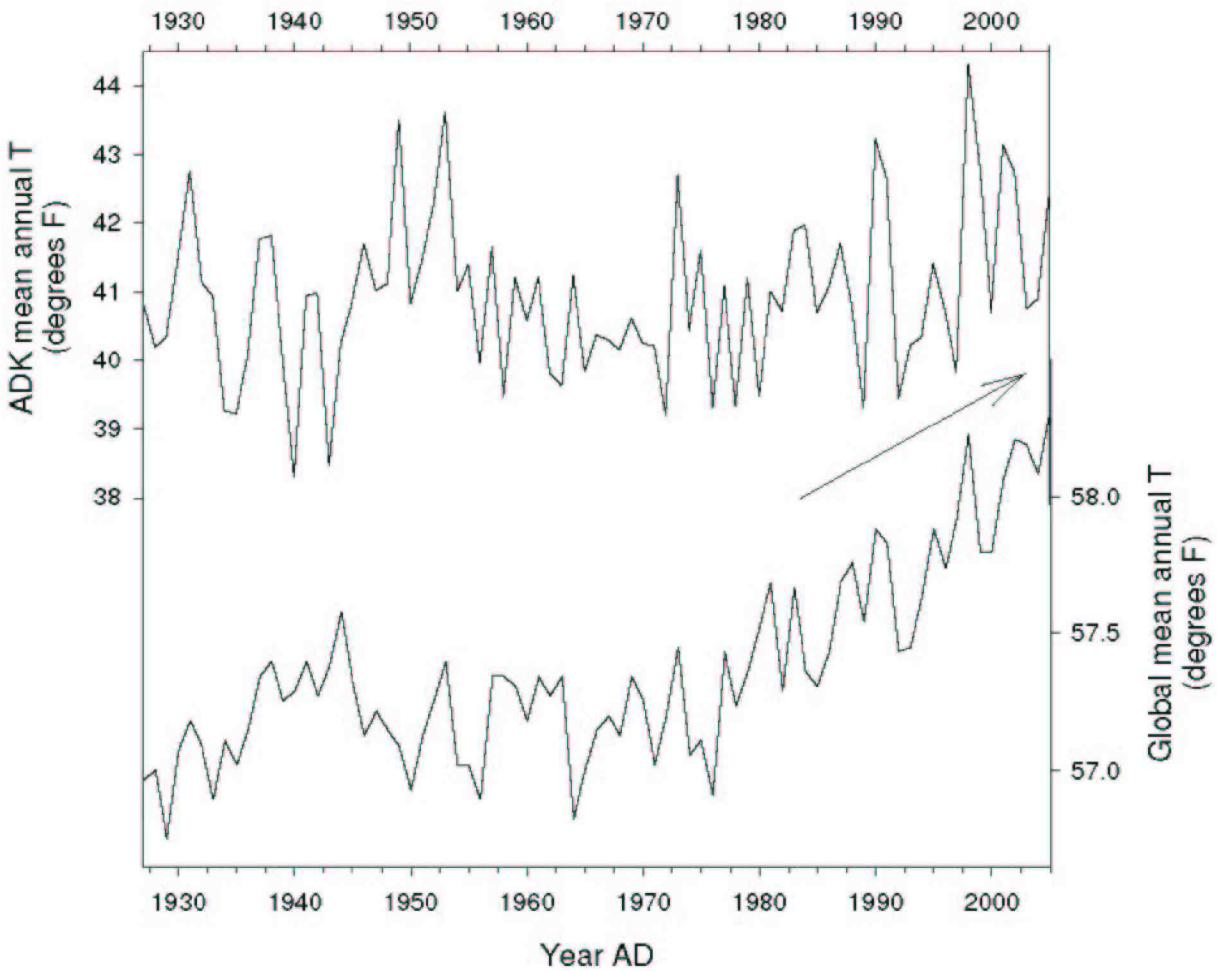
However, the last 2-3 decades do seem to indicate closer synchrony between global and local trends.



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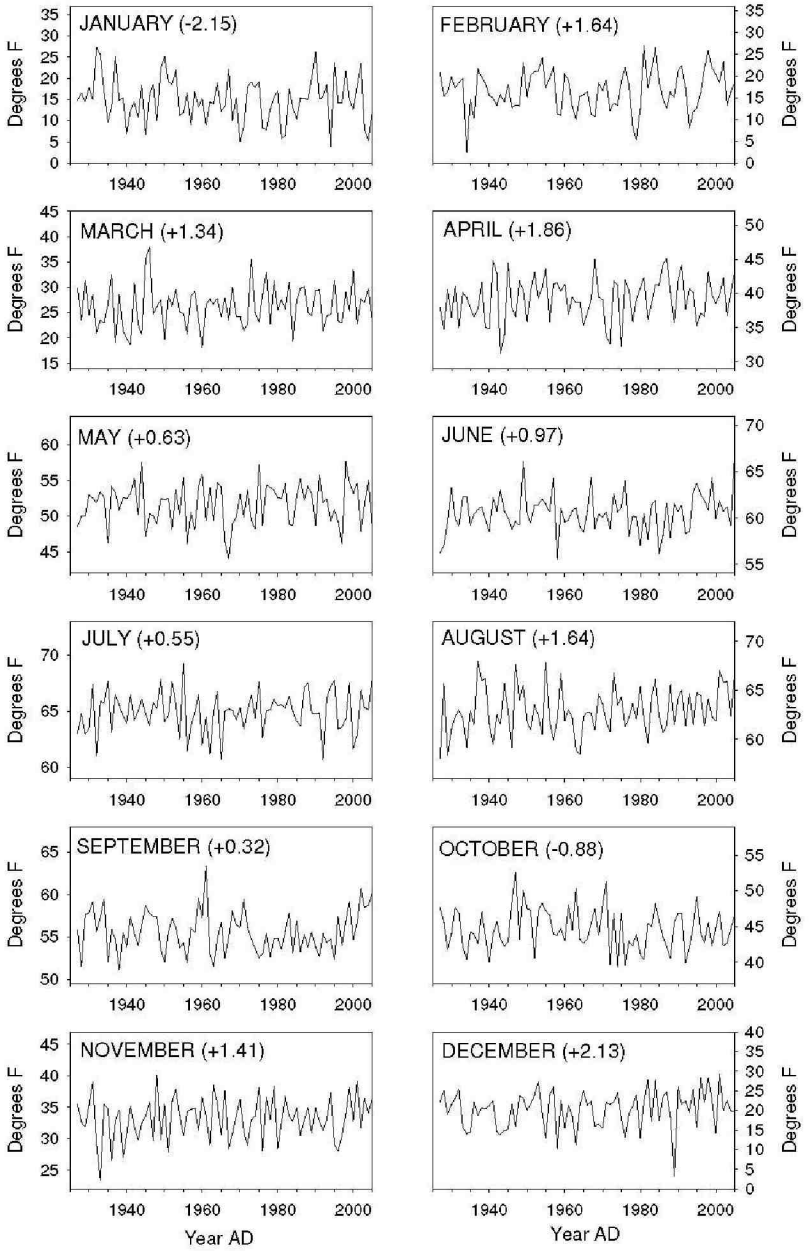
Combining SEVEN USHCN stations, the 1927-2005 interval shows NO SIGNIFICANT CHANGES in mean monthly temperatures.

(95% confidence level)



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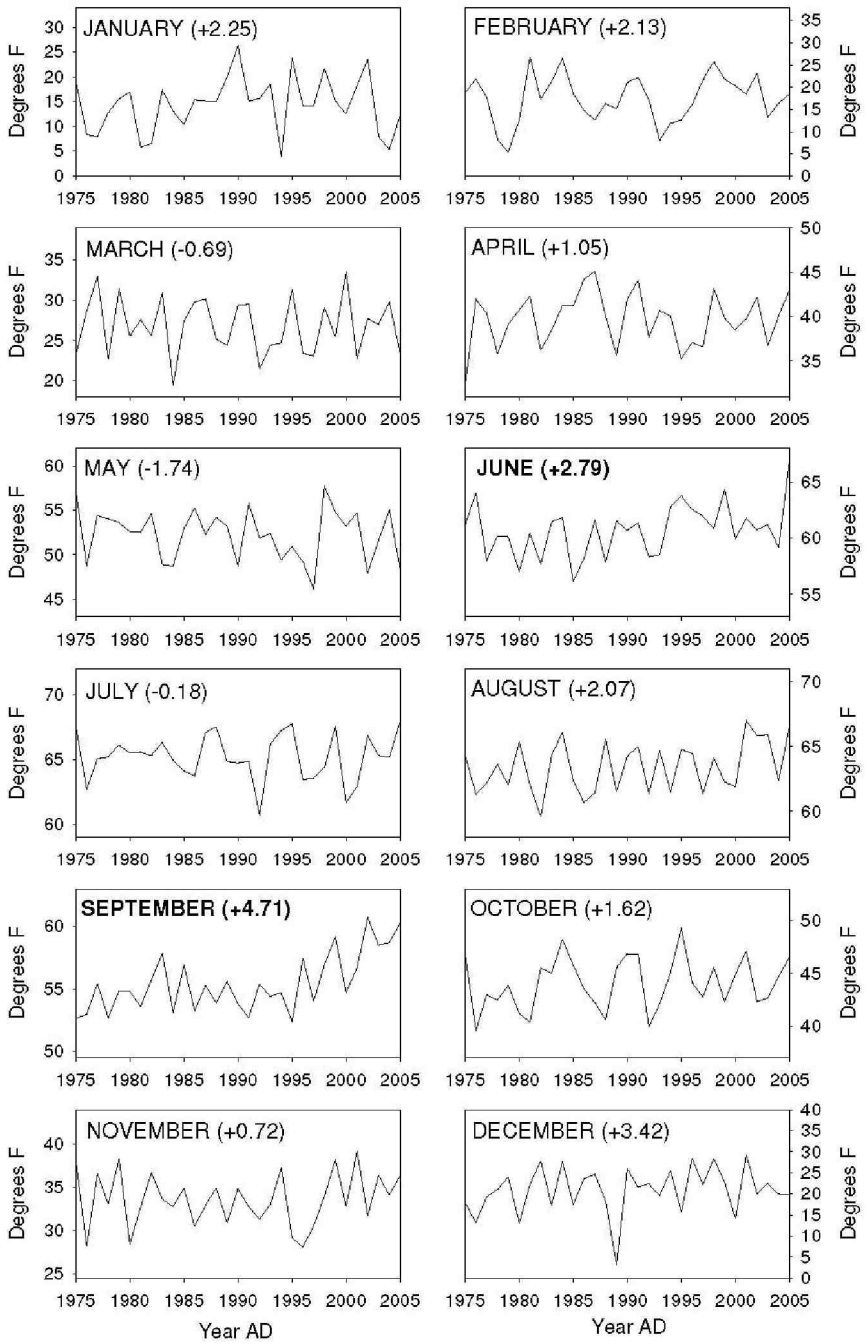
For the 1975-2005 interval, TWO months are warming significantly.

JUNE

SEPT.



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PRECIPITATION PATTERNS

ARE HARDER TO DOCUMENT

(and to predict)

Storm precipitation varies minute to minute,

and

is much patchier geographically

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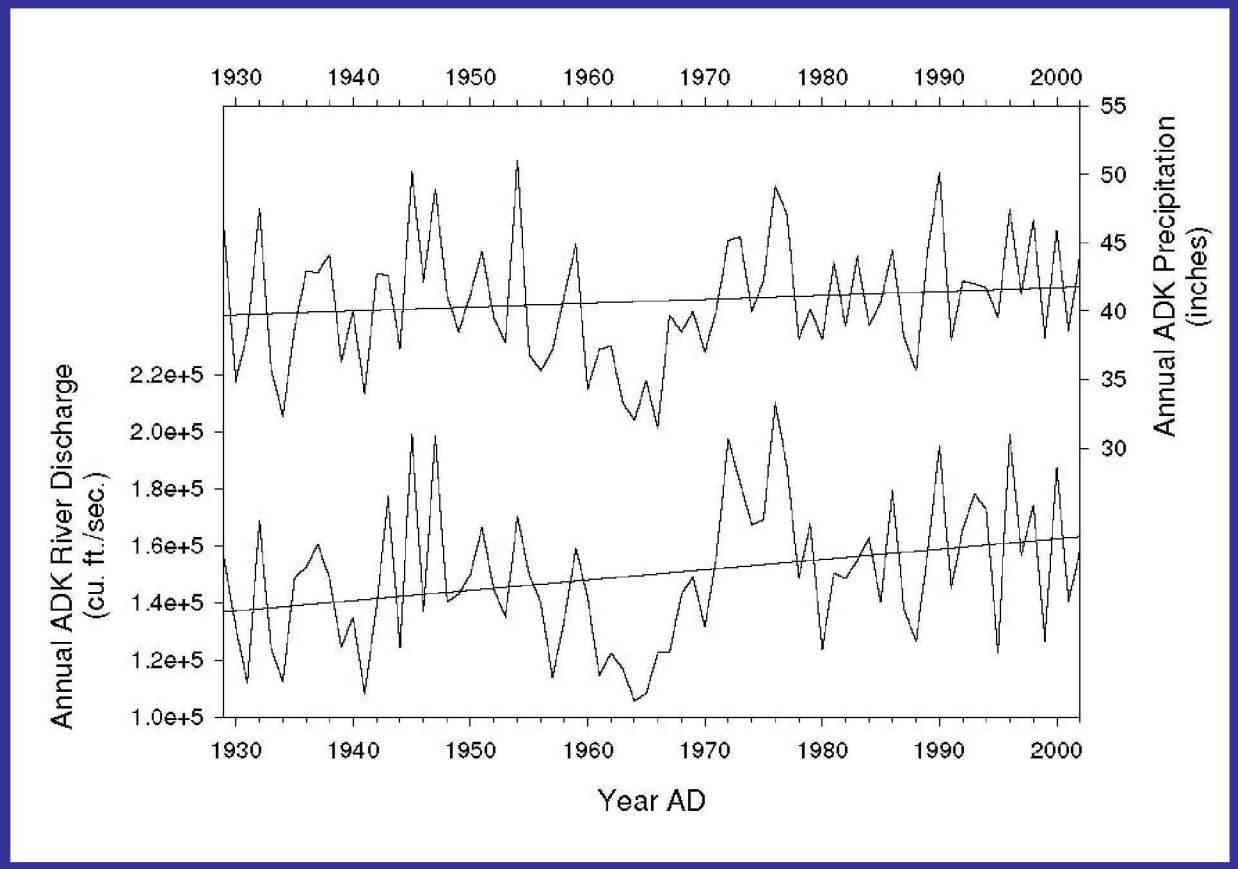
Using 7 USHCN stations, 1929-2005 AD

Getting slightly wetter overall, but FLAT NOW.
(same for river discharge: c/o Jeff Chiarenzelli)



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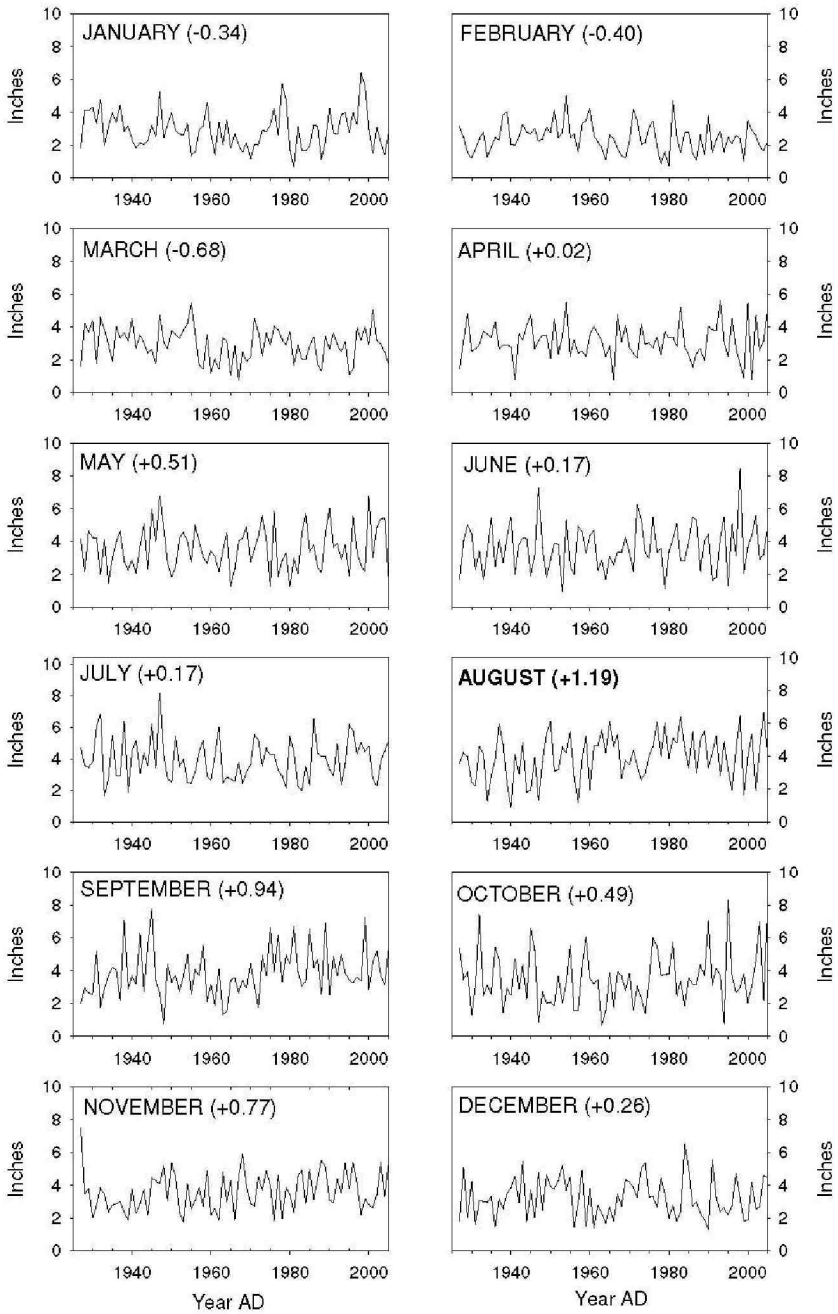

Since 1928, only AUGUST has changed significantly (wetter).

Since 1975, NO SIGNIFICANT CHANGES in monthly total precipitation.

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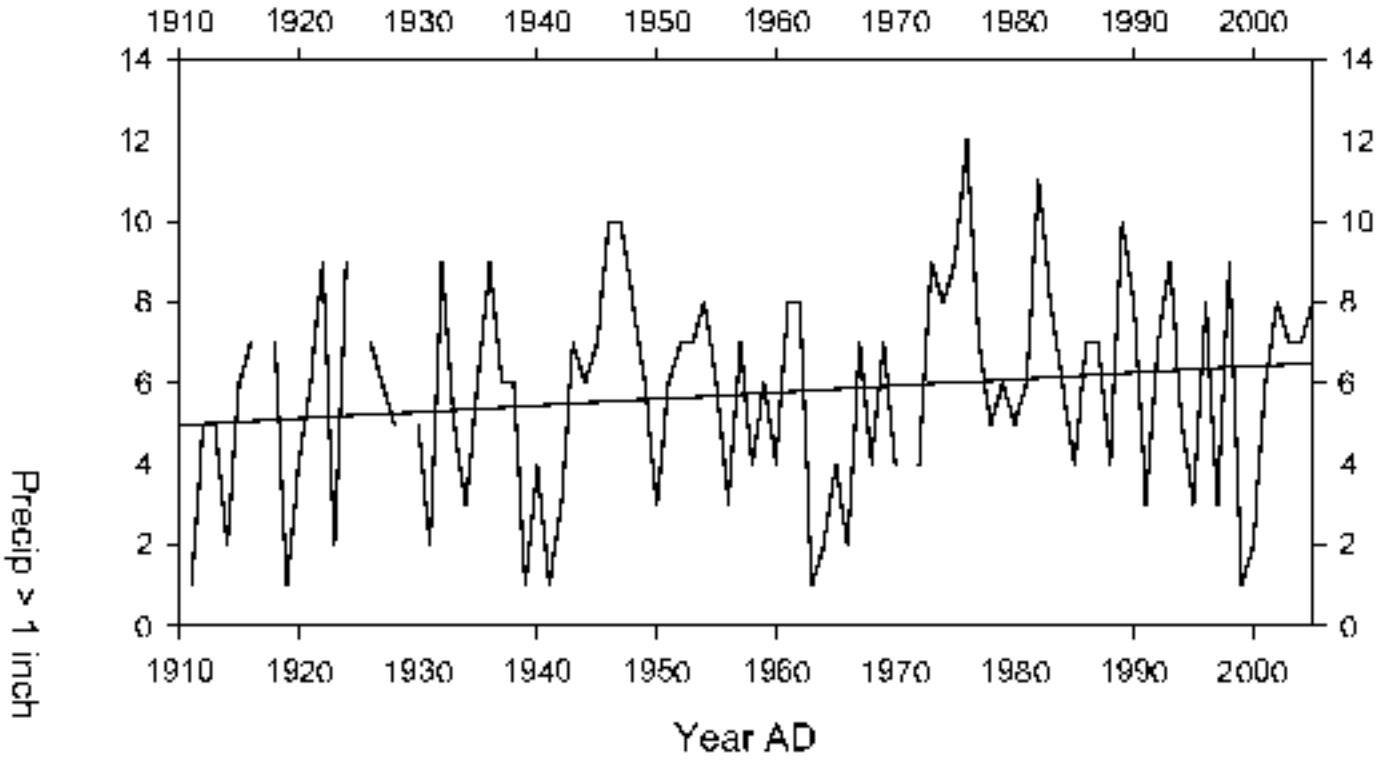
EXTREME PRECIP EVENTS/YEAR (>1")

weak trend, not significant



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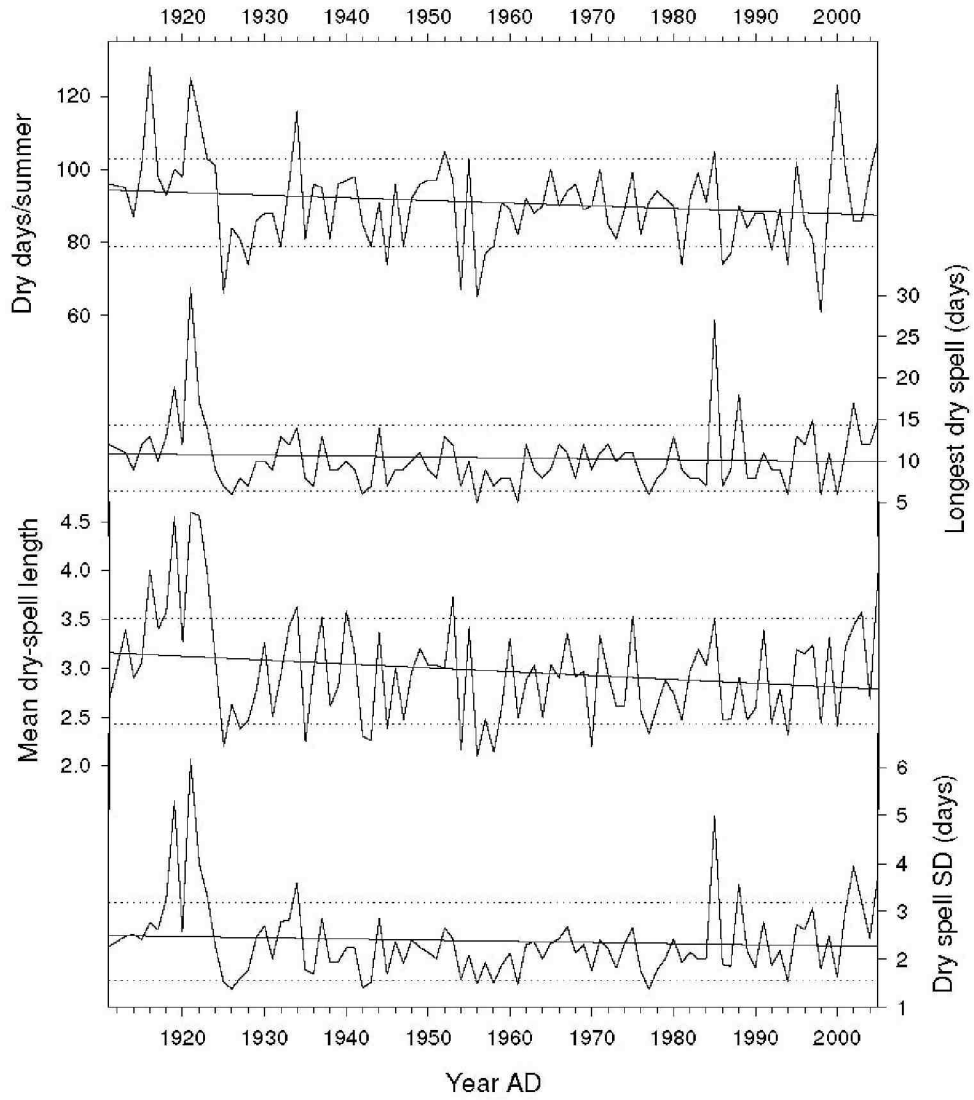
ADK SUMMER DROUGHTS
no significant trends



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