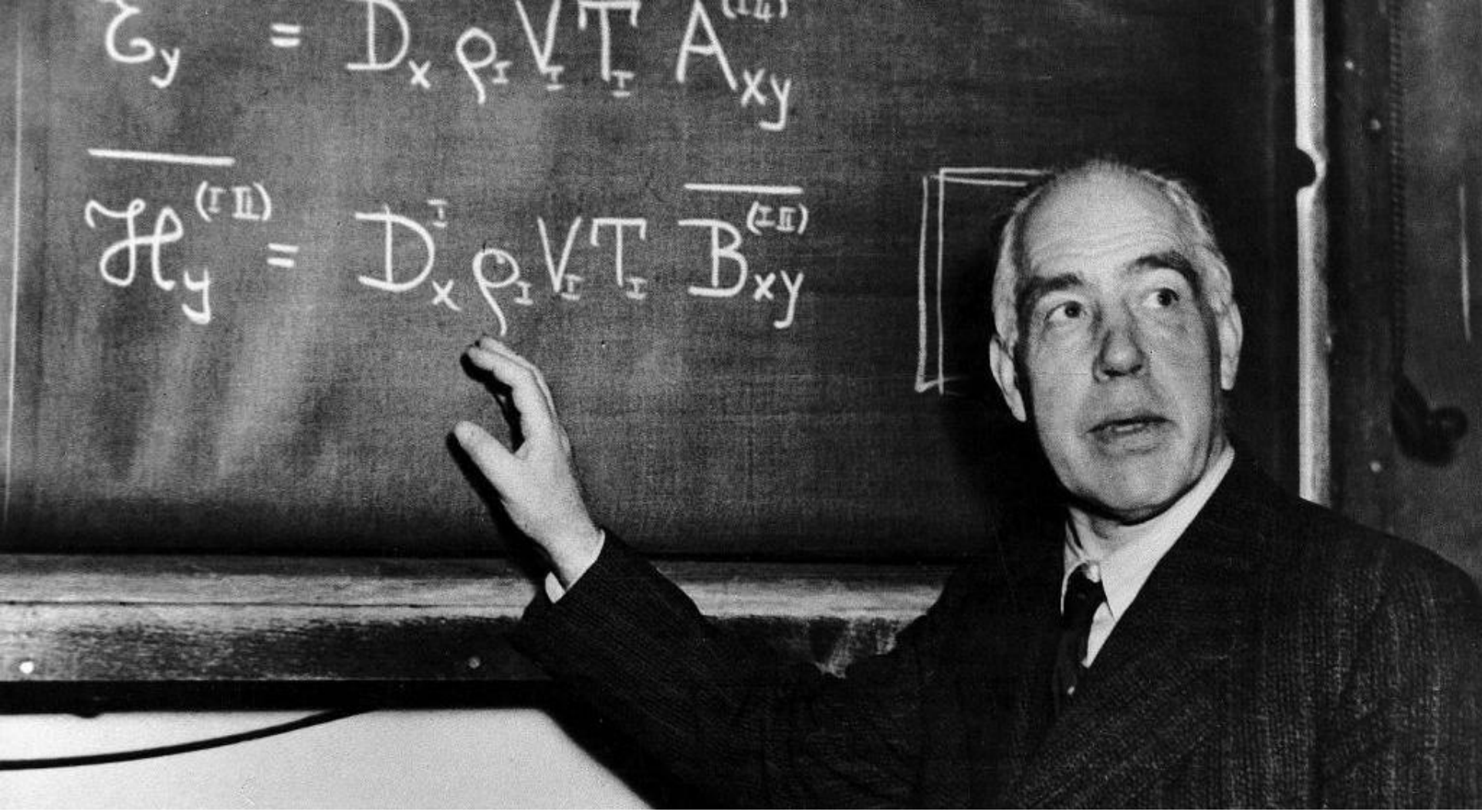
Long-term Rainfall Trends in Texas

John Walker

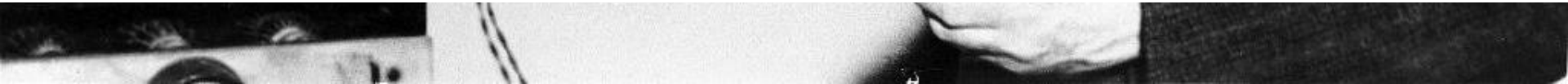
TEXAS A&M AGRILIFE RESEARCH

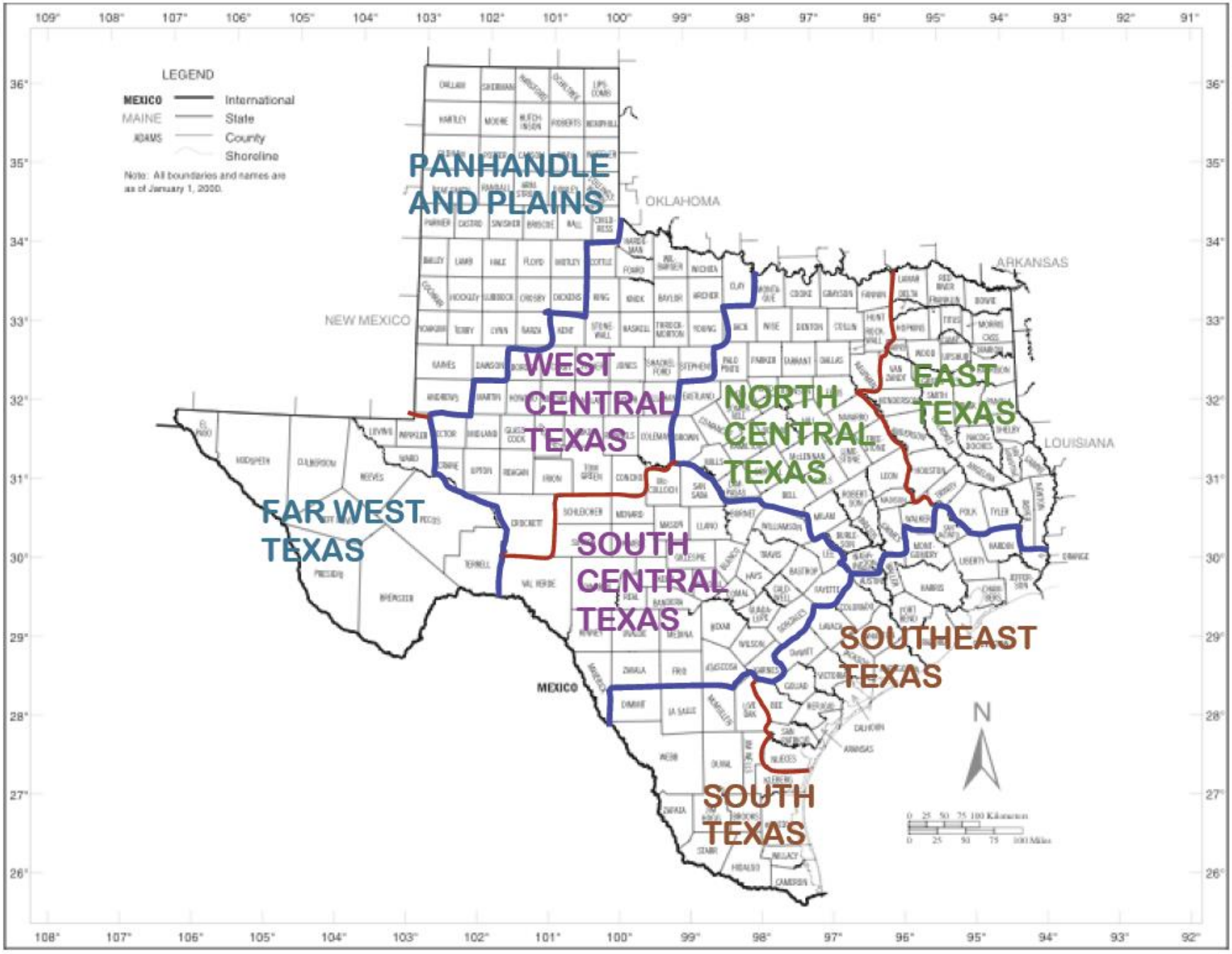


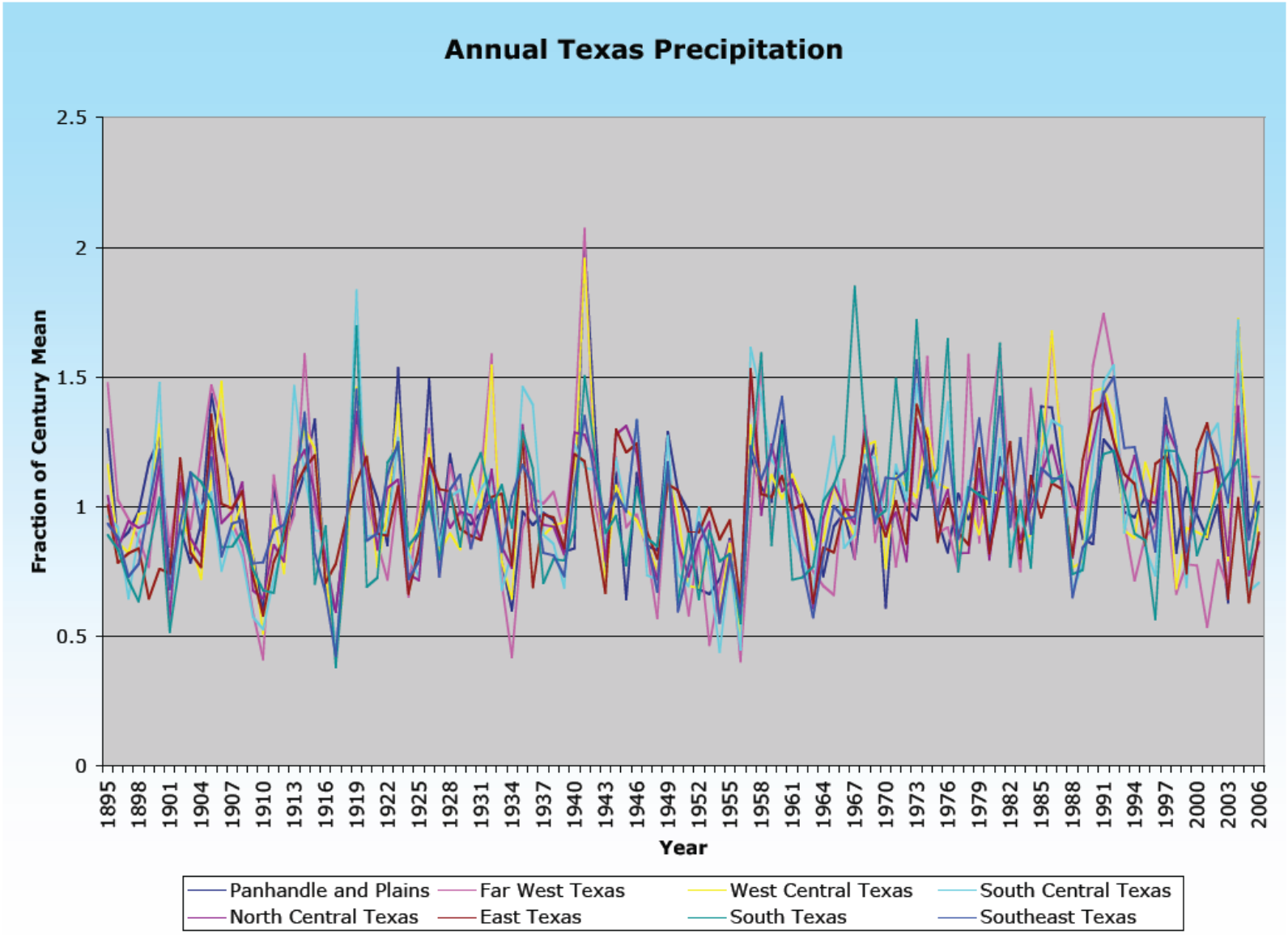
“Prediction is very difficult, especially if it's about the future.”

Niels Bohr

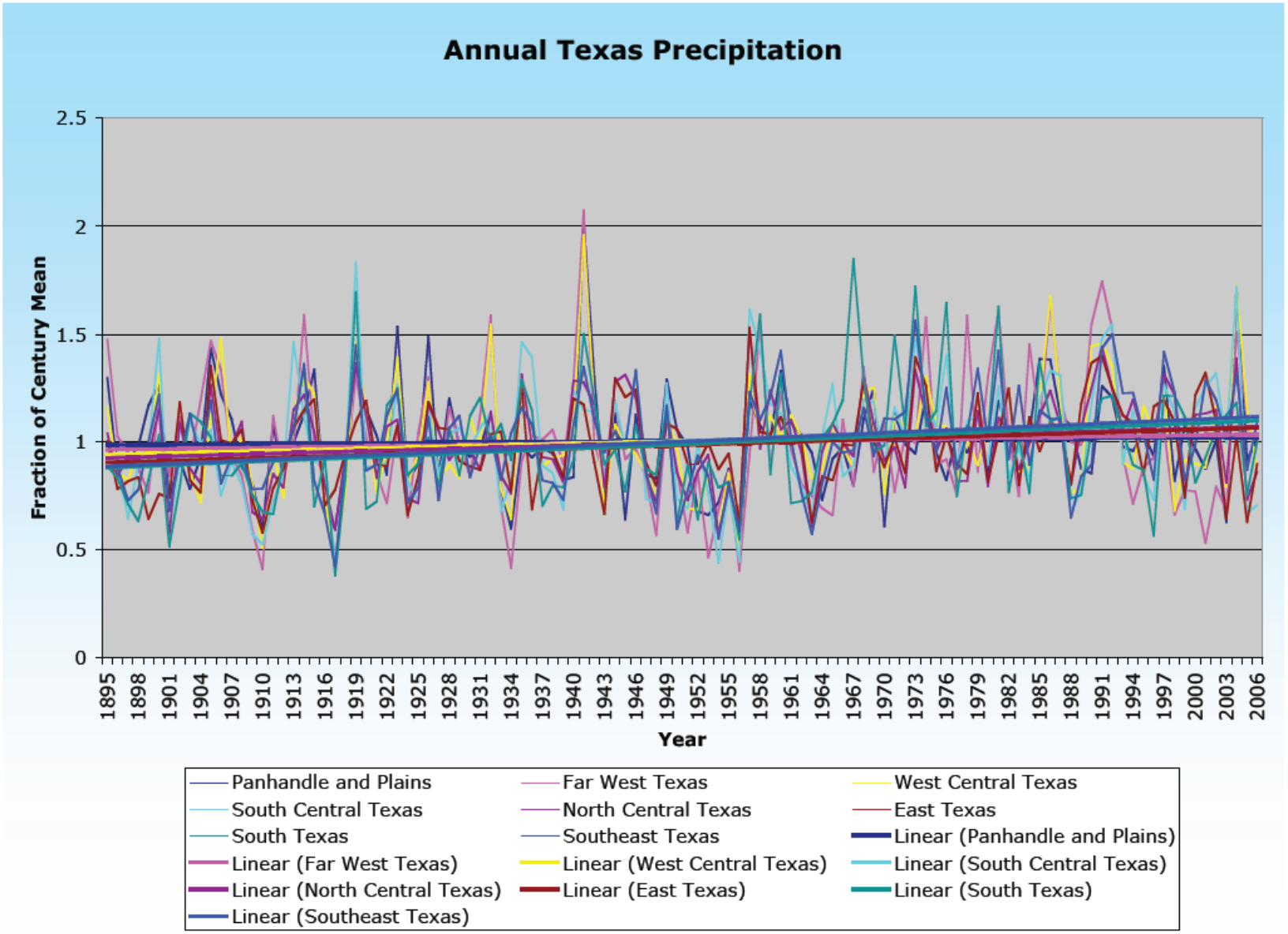
Nobel Laureate




TEXAS - COUNTIES
U.S. Census Bureau, Census 2000
LEGEND
MEXICO International
MAINE State
ADAMS County
Shoreline
Note: All boundaries and names are as of January 1, 2000.
PANHANDLE AND PLAINS
OKLAHOMA
ARKANSAS
NEW MEXICO
WEST CENTRAL TEXAS
NORTH CENTRAL TEXAS
EAST TEXAS
LOUISIANA
FAR WEST TEXAS
SOUTH CENTRAL TEXAS
SOUTHEAST TEXAS
MEXICO
SOUTH TEXAS
N



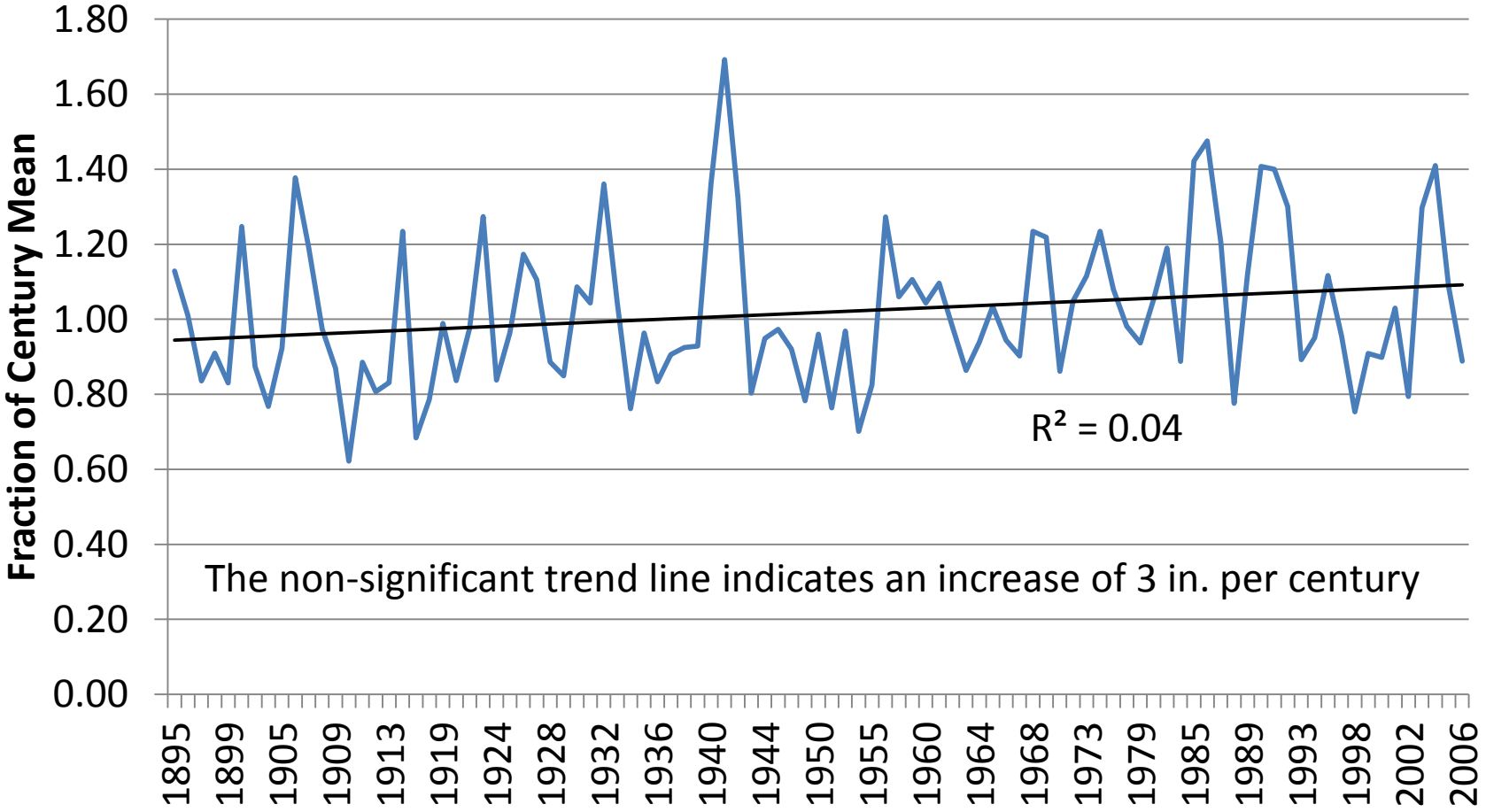
Source: John Nielsen-Gammon
Texas State Climatologist



Source: John Nielsen-Gammon
Texas State Climatologist

Precipitation Trend

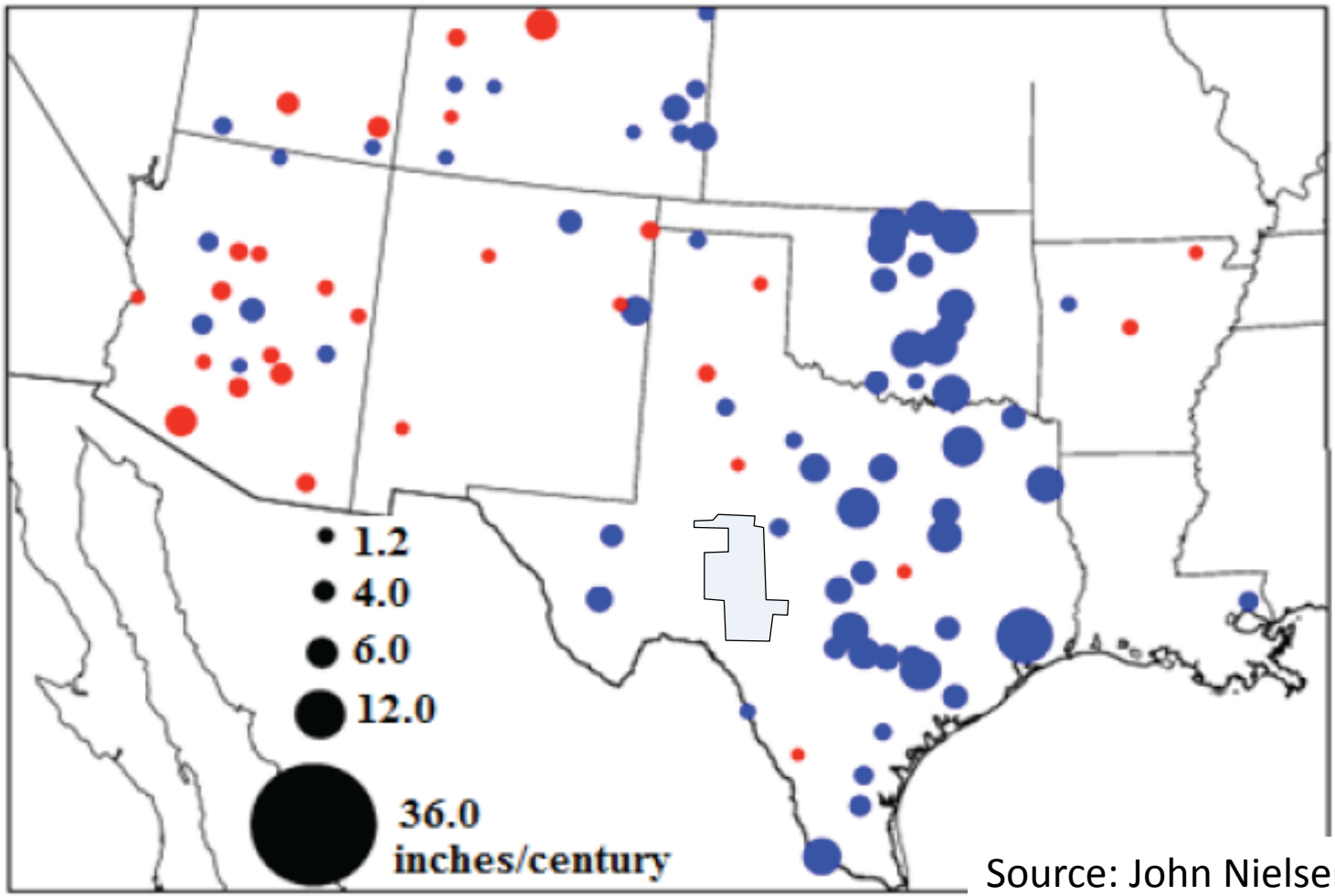
West Central Texas



Precipitation trends at long-term USHCN V2 stations,

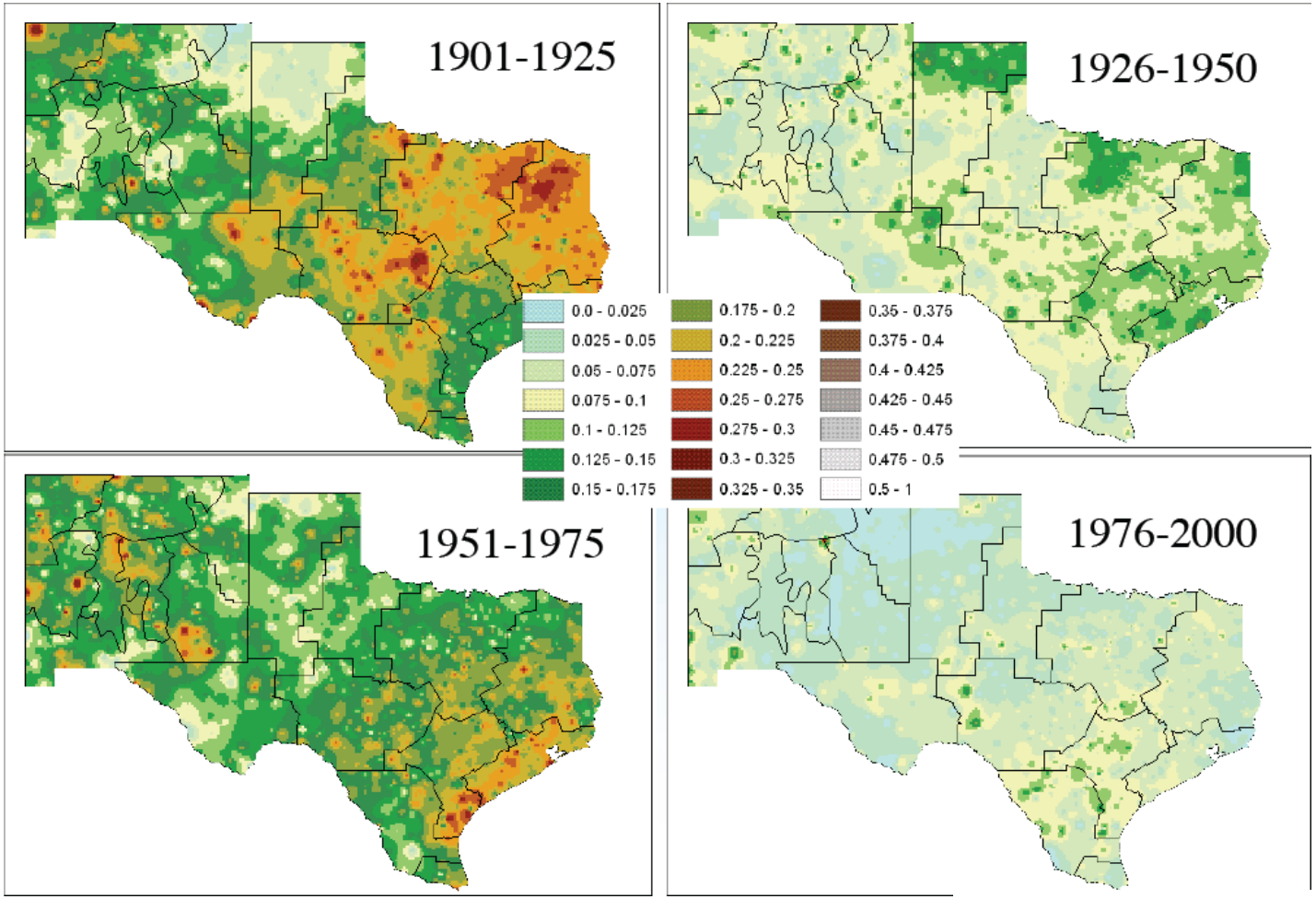
inches per century.

Blue circles represent increases; Red circles represent decreases.



Source: John Nielsen-Gammon
Texas State Climatologist

Fraction of Months in Drought Based on 12 Month Precipitation

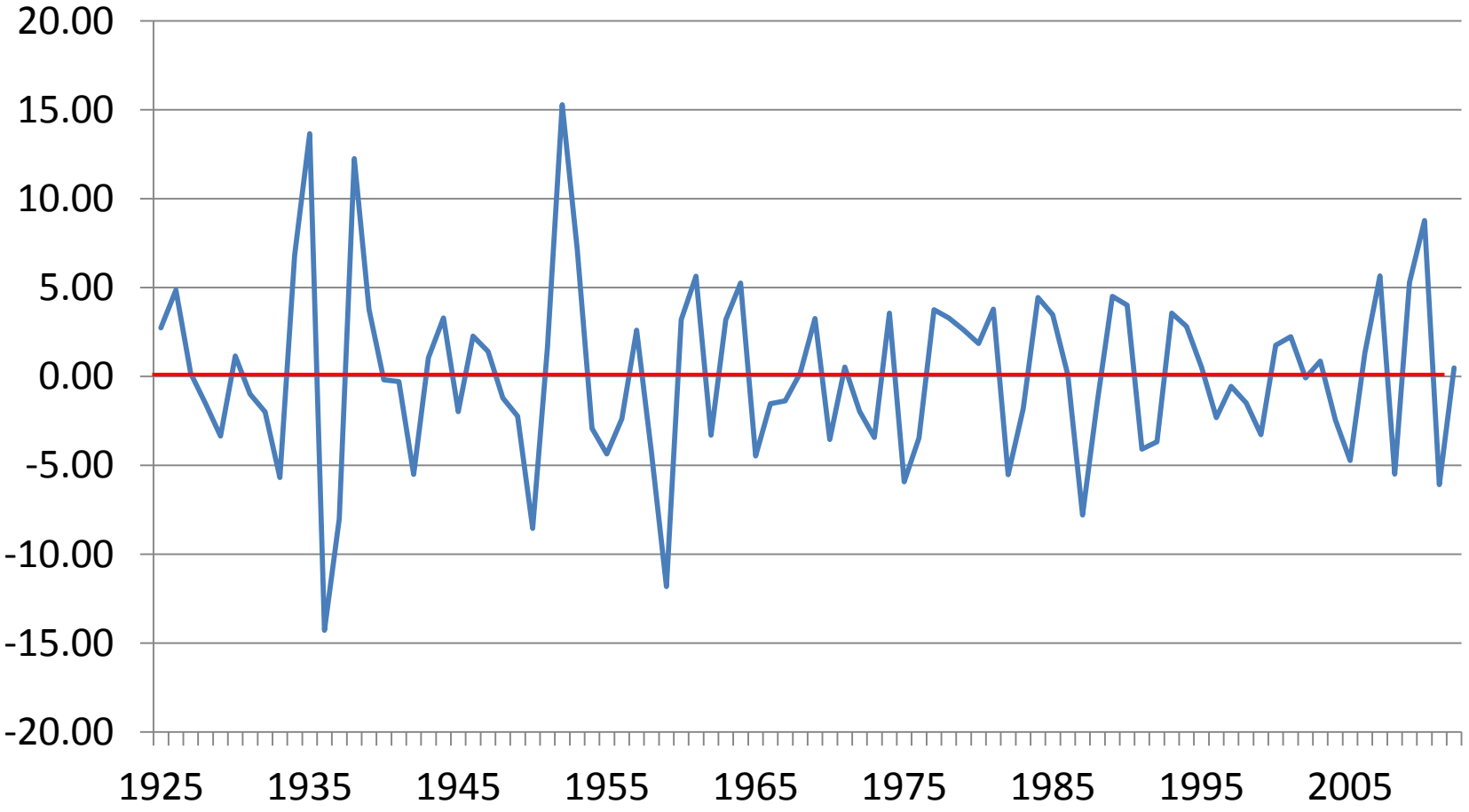


Source: John Nielsen-Gammon
Texas State Climatologist

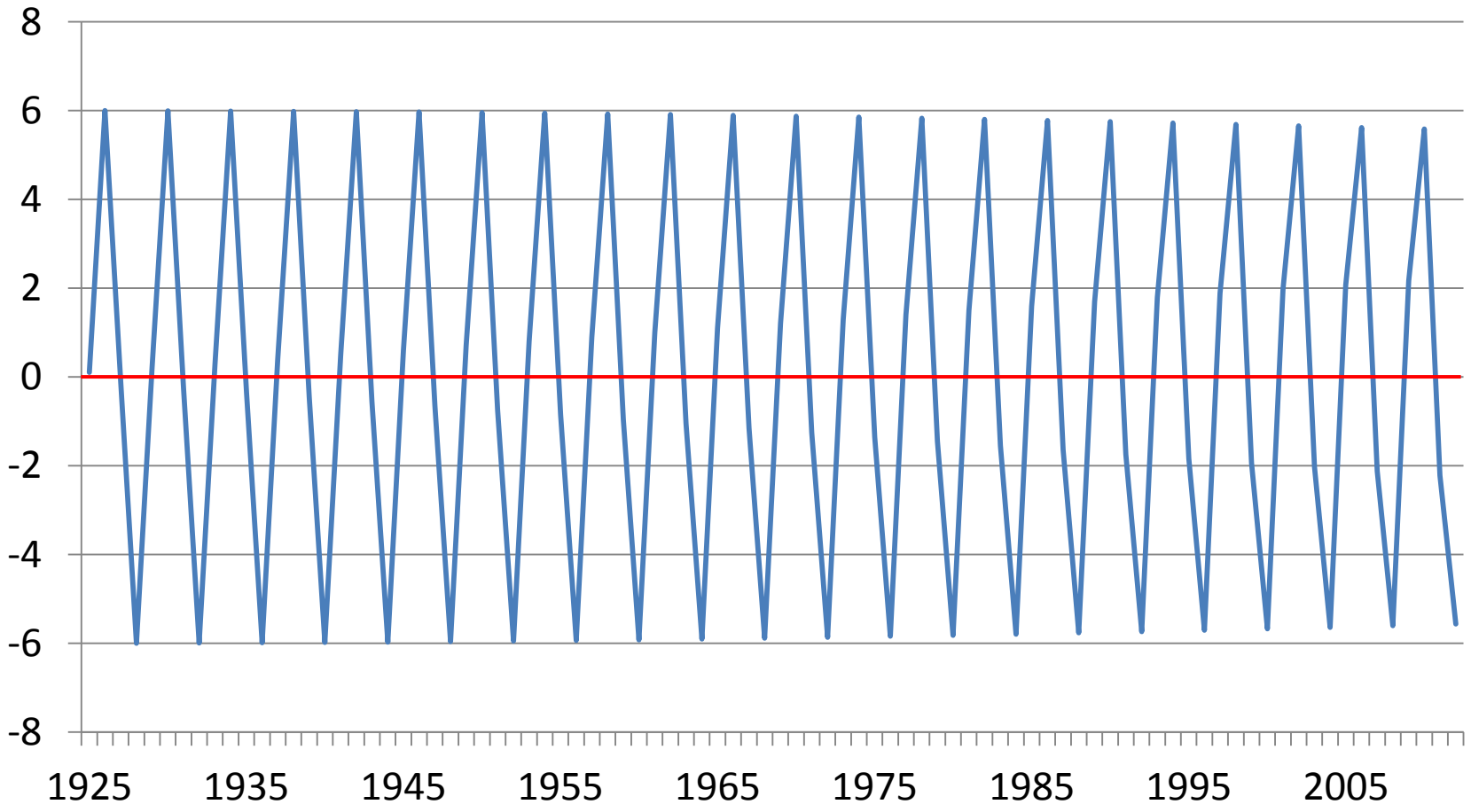
Are There Cyclic Patterns to Rainfall?

2 Year Moving Average Difference in Precipitation Between Years

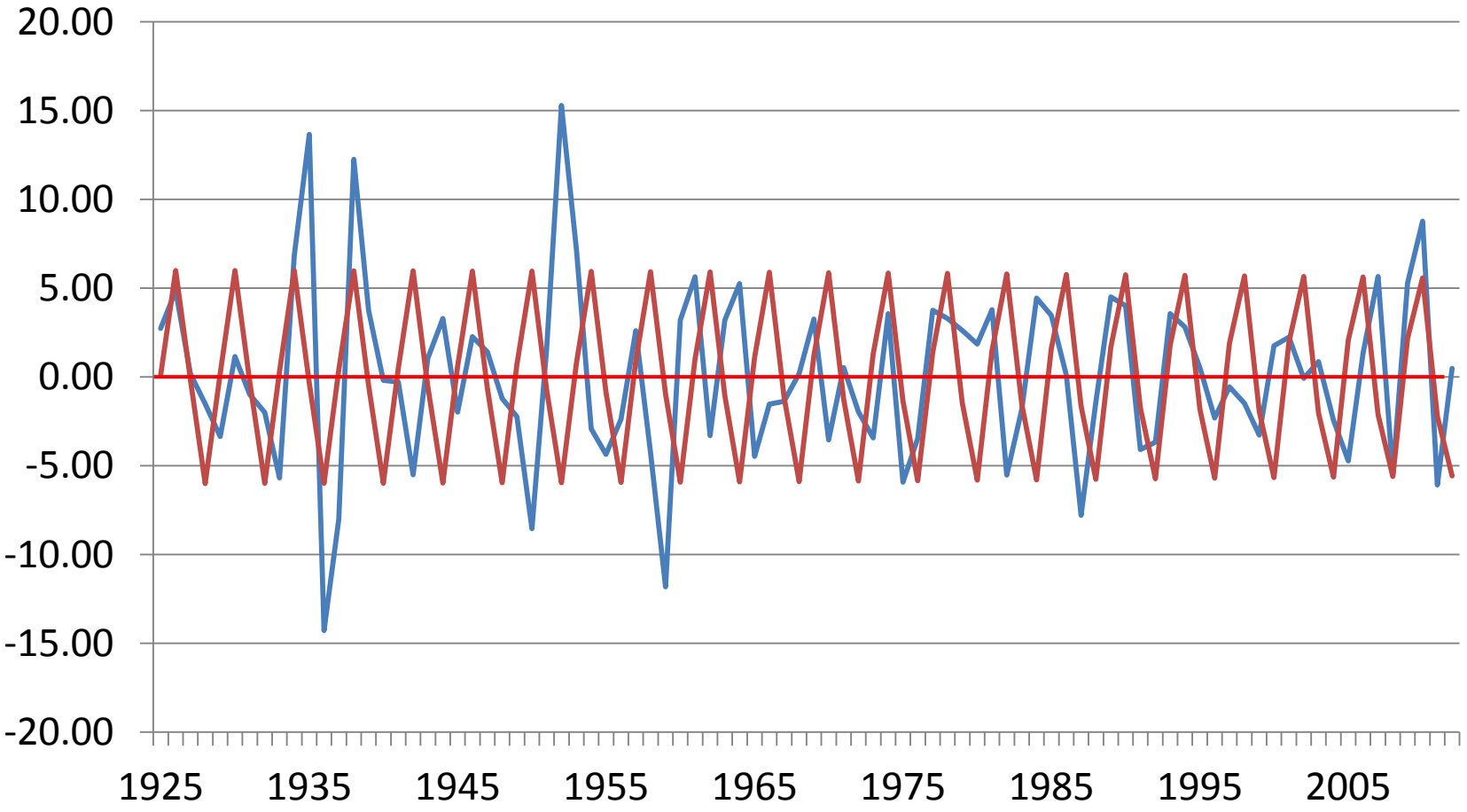
Substation 14



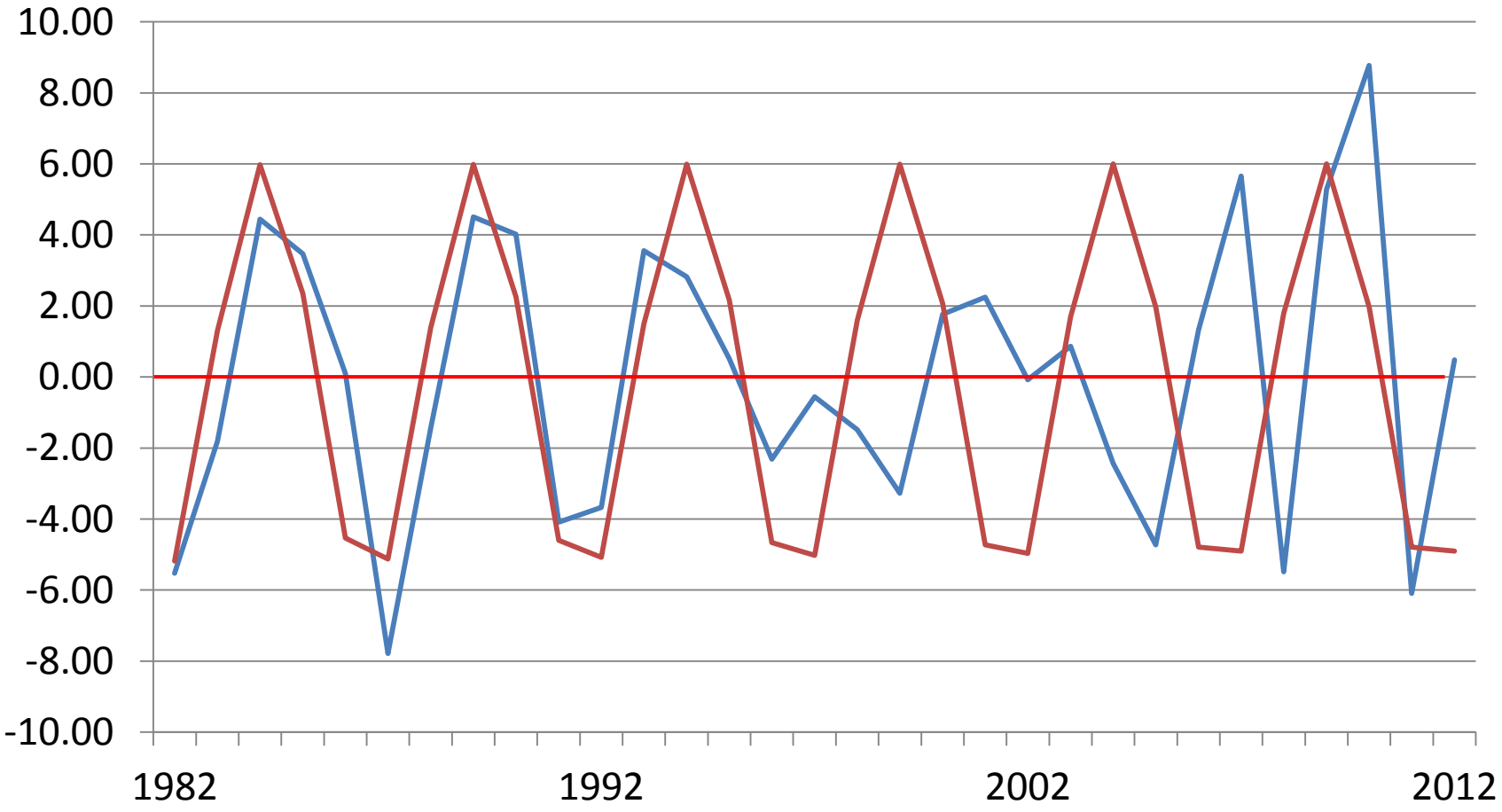
Variation Has a Significant 4 Yr. Cycle



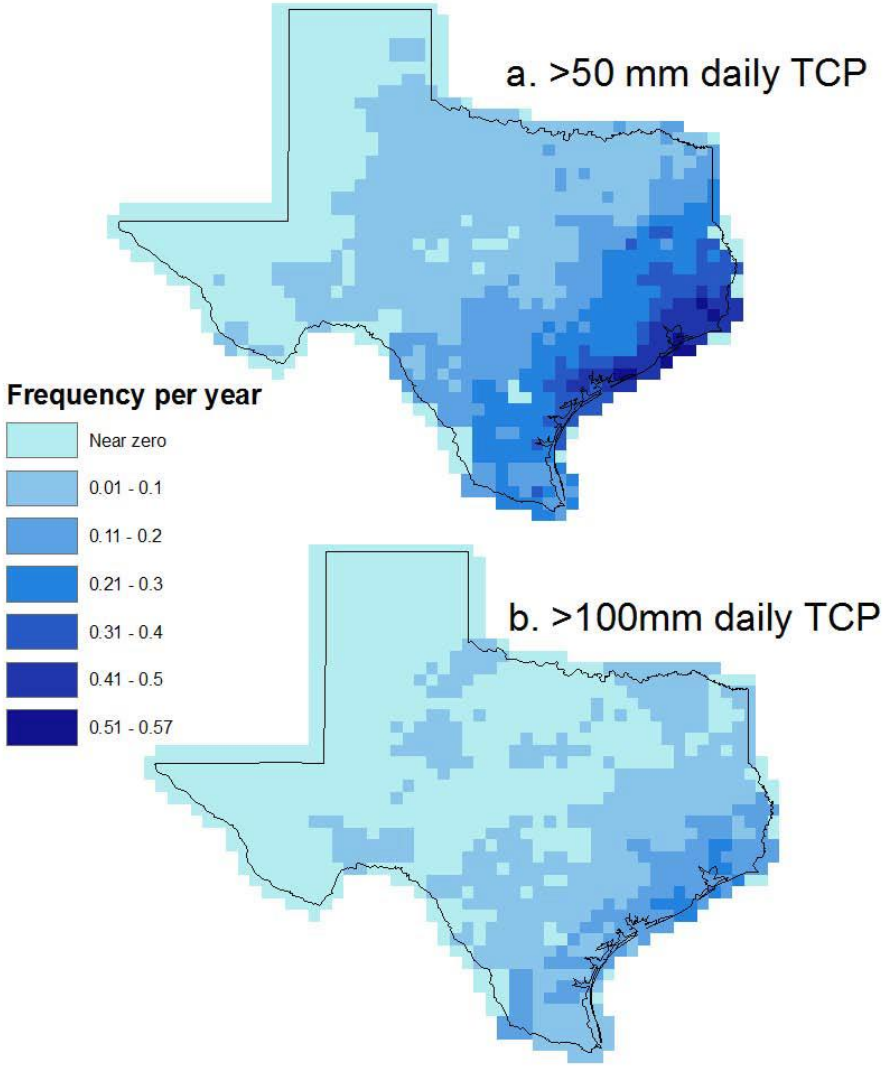
2 Year Moving Average Difference in Precipitation Between Years



Last 30 Yr. About 5 Yr. Cycle

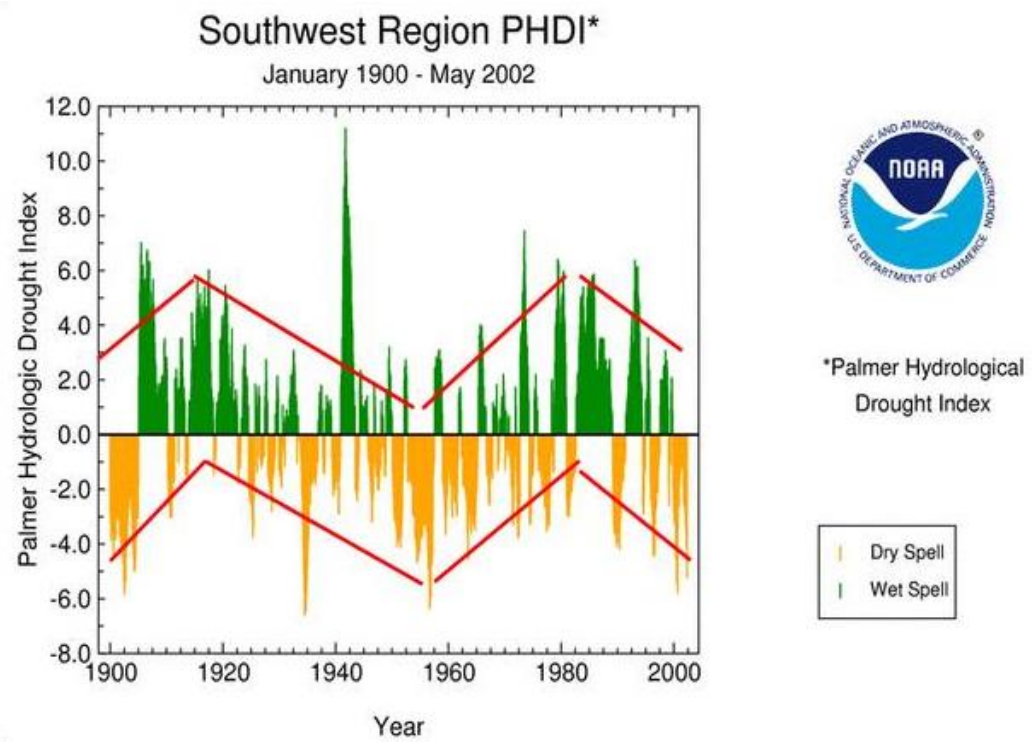


Frequency of Daily Rainfall Resulting from Hurricanes Exceeding 2 or 4 inches



Zhu & Quiring 2013

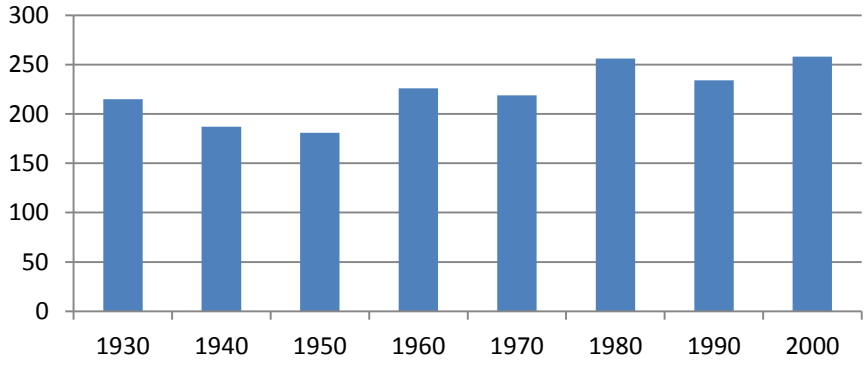
Are There Longer Cycles?



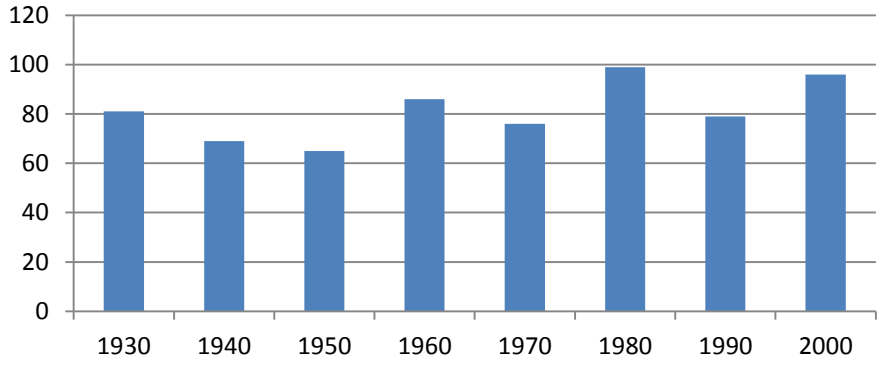
Not in the peer reviewed literature.

Has distribution of rainfall changed?

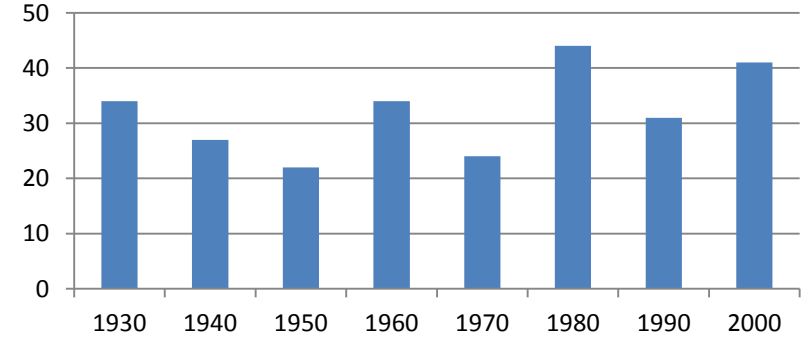
Number of Events per Decade with 2 Consecutive days of rain
P=0.0007



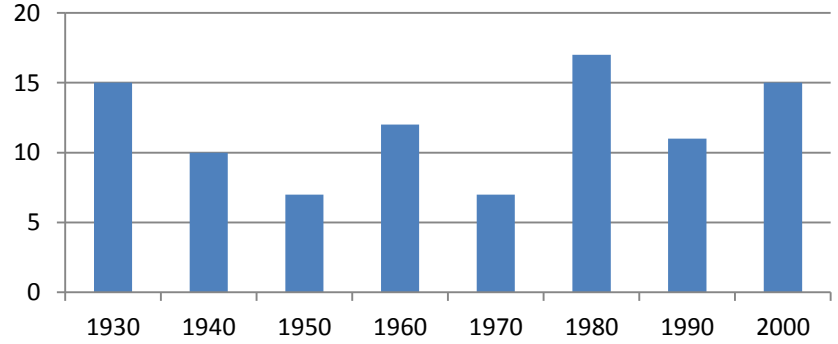
Number of Events per Decade with 3 Consecutive days of rain
P=0.09



Number of Events per Decade with 4 Consecutive days of rain
P=0.068

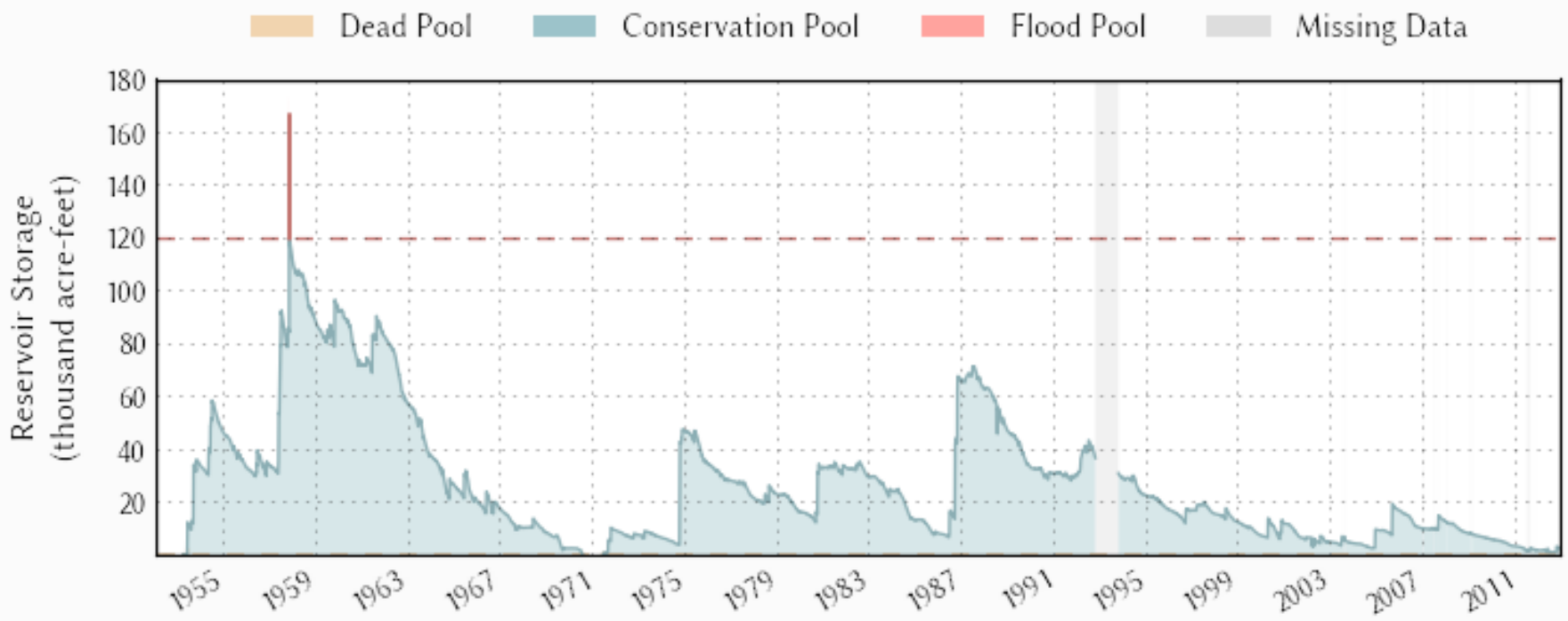


Number of Events per Decade with 5 Consecutive days of rain
P=0.31



Has the effectiveness of rainfall change?

O.C. Fisher Reservoir

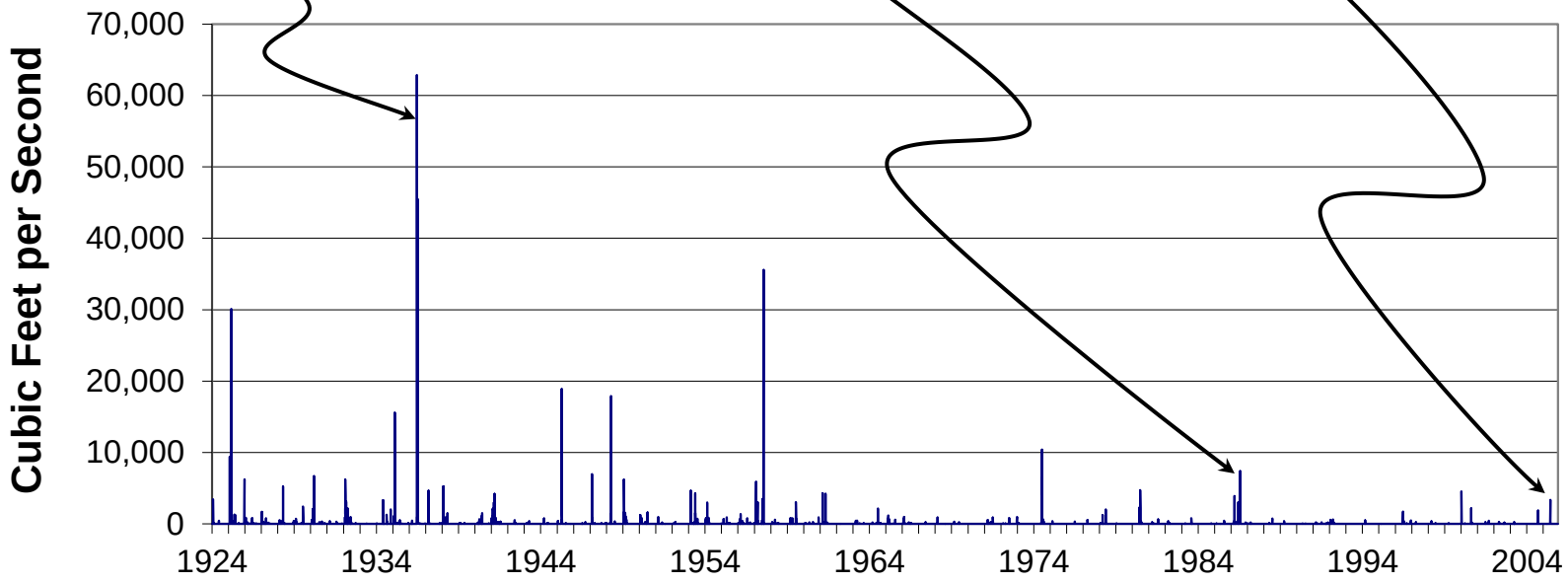


Towig Street, San Angelo, TX
September 1936 peak flow 62,900 CFS

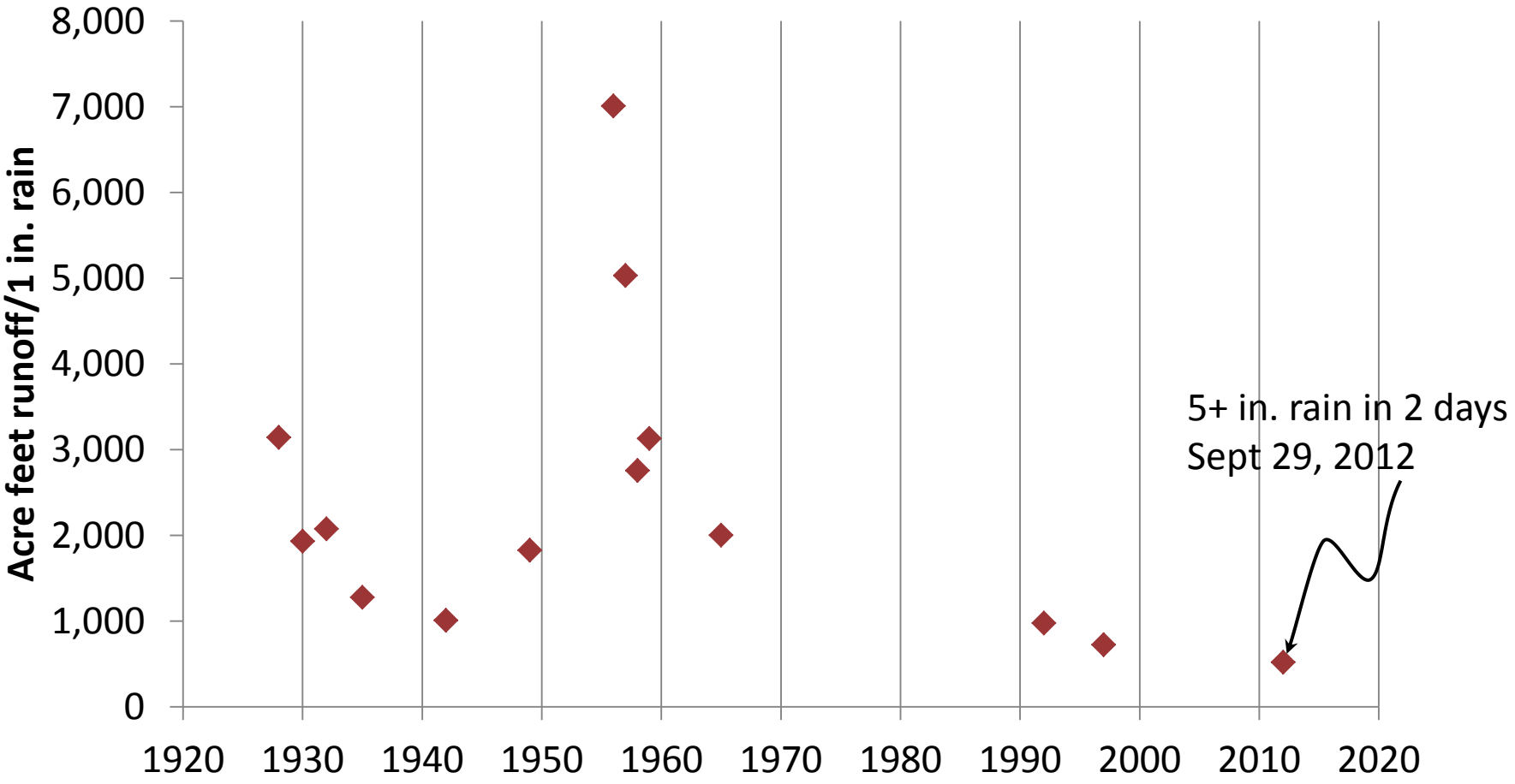
Bridge on FM 2288 at N. end of San Angelo State Park. In 1986 the bridge was underwater.

October 1986 peak flow 7,380 CFS

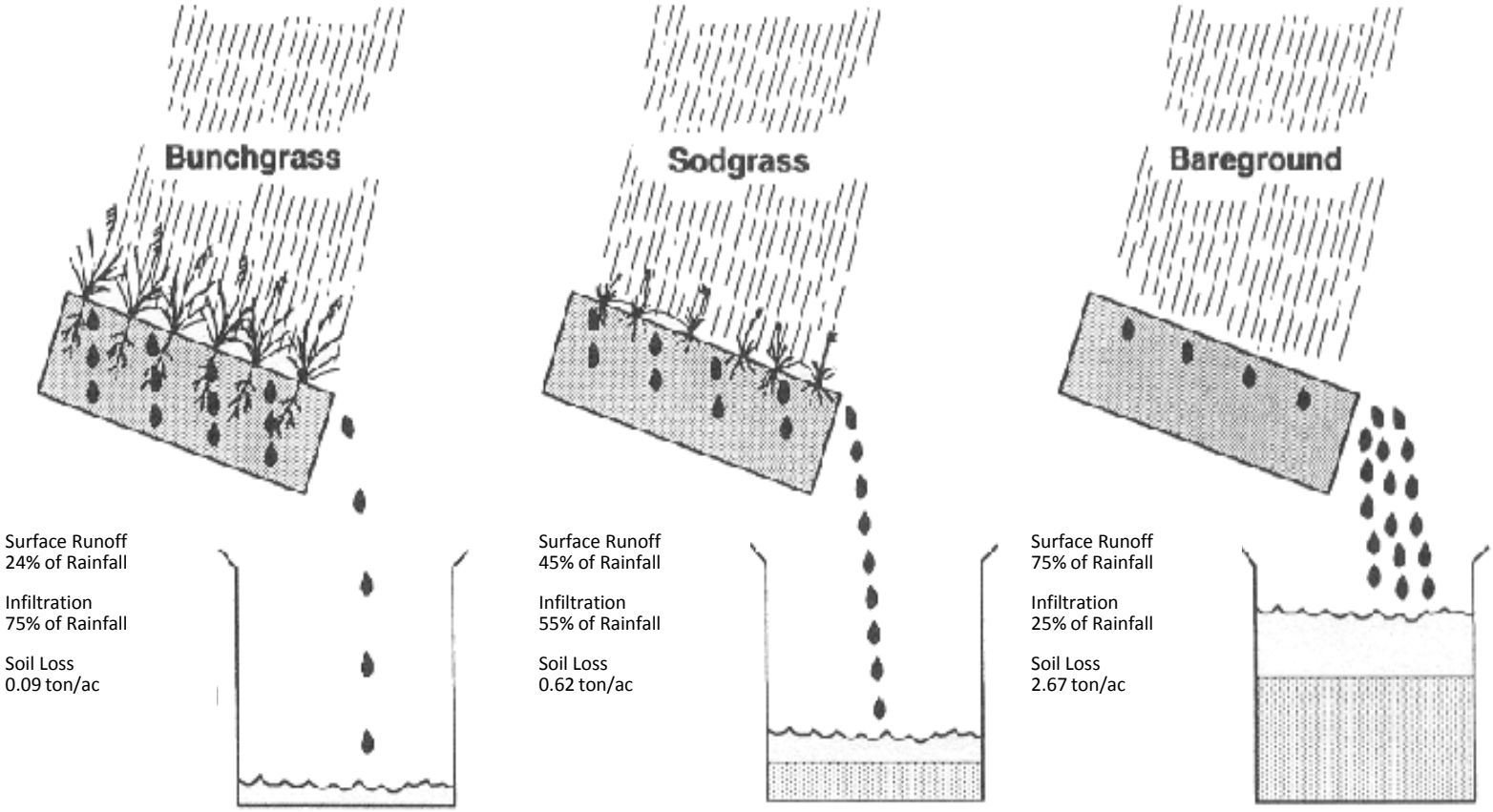
August 2005 peak flow 3,380 CFS



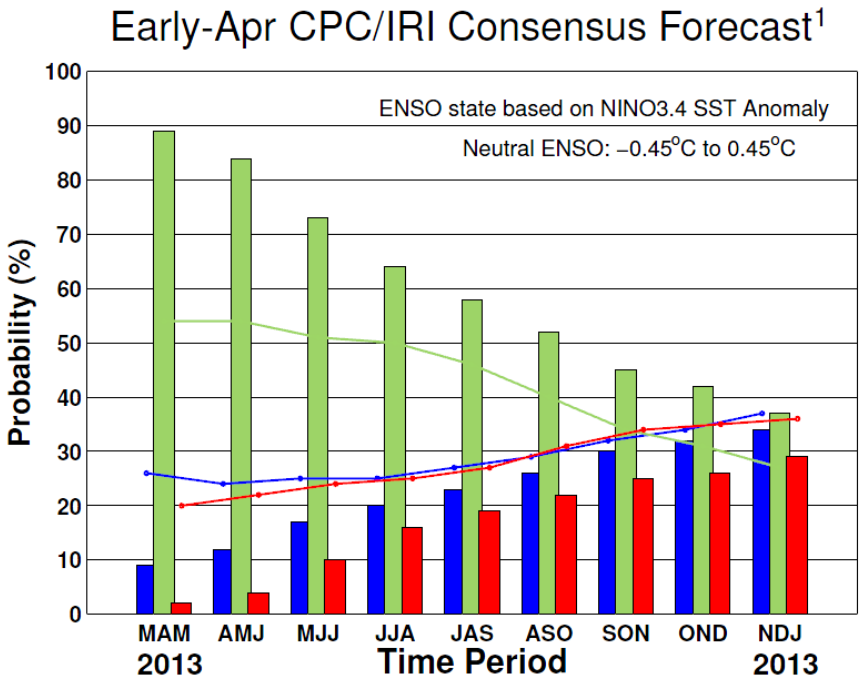
North Concho River Water Yield

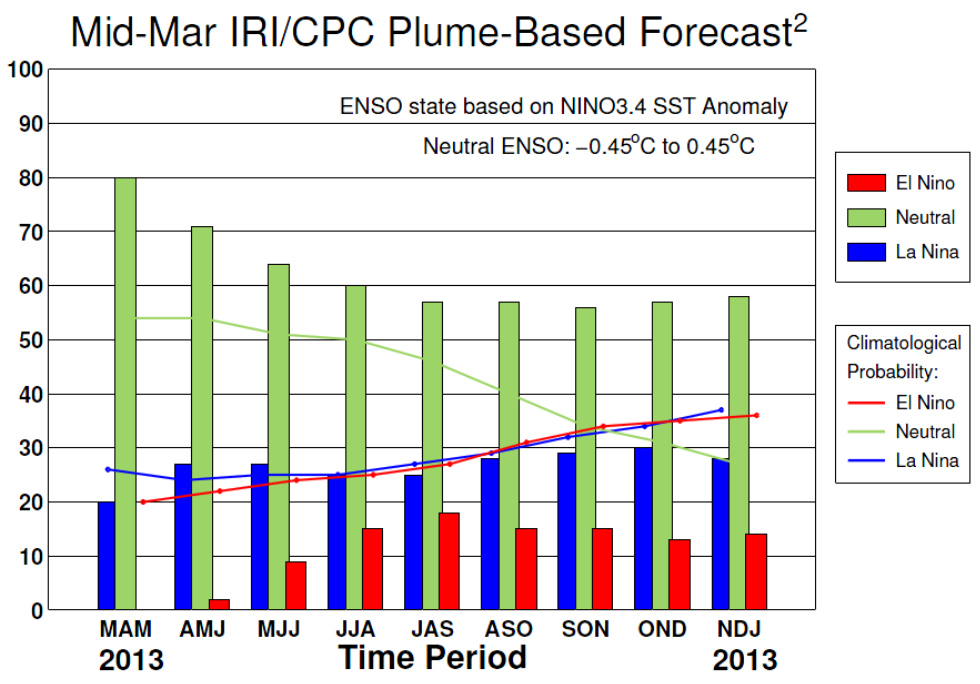


Effect of Vegetation on Runoff & Infiltration



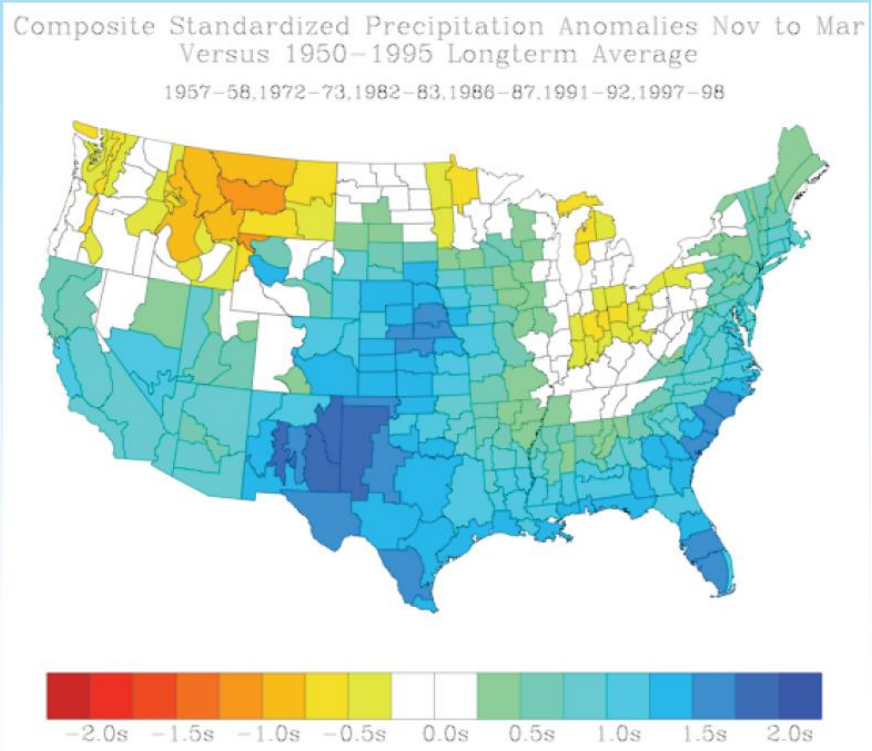
What Does is the Outlook for the Next 12 Months?



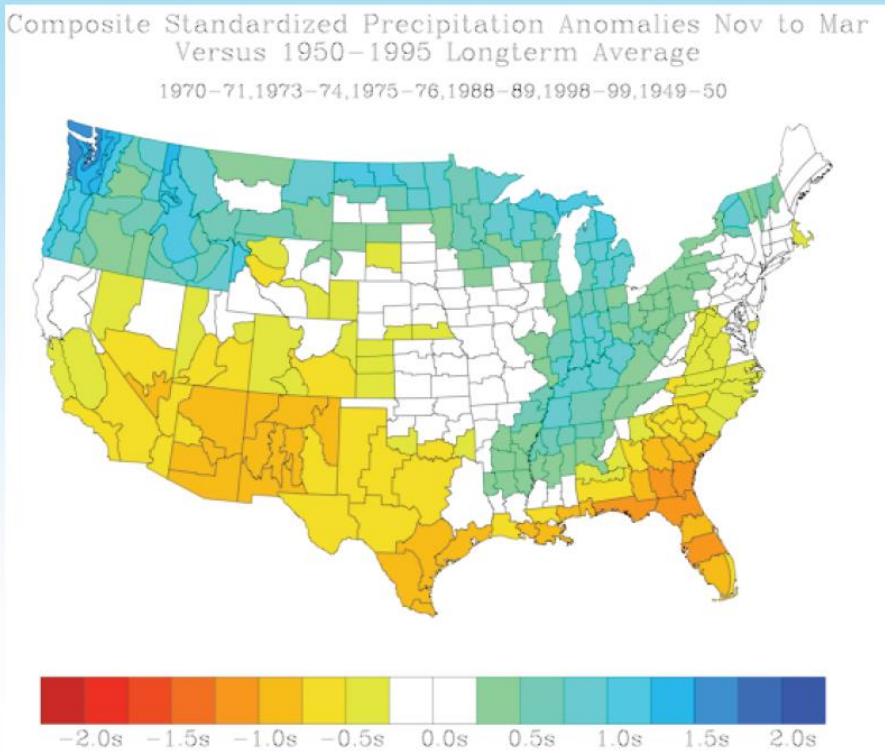


El Nino vs. La Nina Precipitation Patterns

El Niño **Precipitation** Composite *Nov-Mar Anomalies*



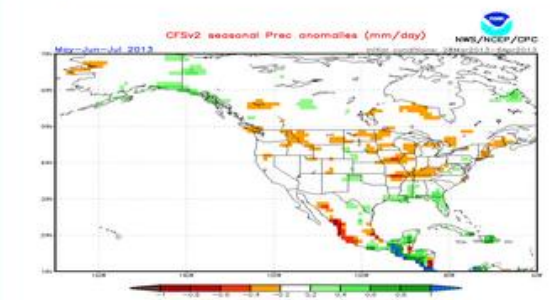
La Niña **Precipitation** Composite *Nov-Mar Anomalies*



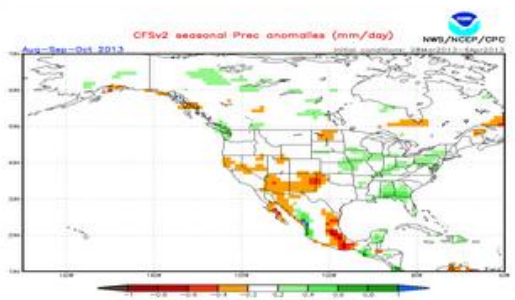
CFSv2 forecast seasonal Prec anomalies

ICs: 20130327 - 20130406

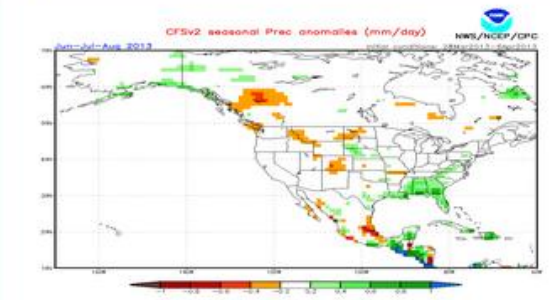
MJJ 2013



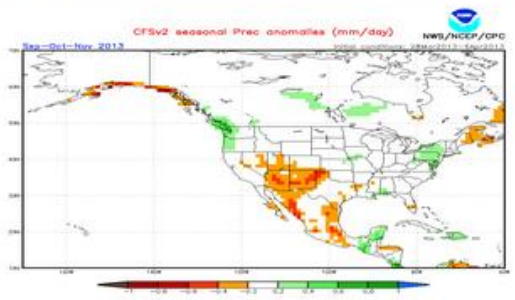
ASO 2013



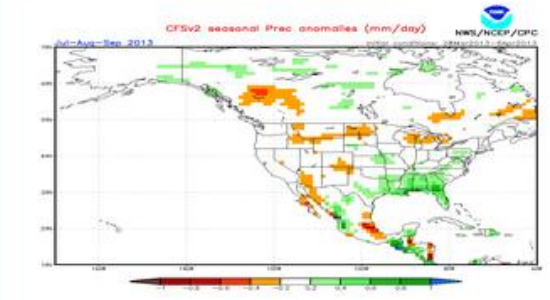
JJA 2013



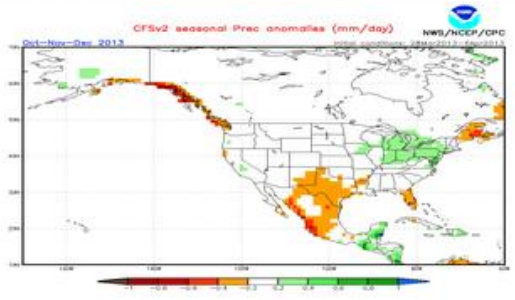
SON 2013



JAS 2013



OND 2013




Talks Cheap
Let it Rain