



Climate and Watershed Science Fact Sheet

Grazinglands Research Laboratory, El Reno, Oklahoma

September 2005

Variations of Annual Precipitation and Air Temperature



Persistent, multi-year variations in annual precipitation can have significant implications for agriculture and water resources management. For example, the Dust Bowl of the 1930s was a multi-year dry spell that, in combination with land mismanagement, destroyed the agricultural economy of the Great Plains during that time. In western Kansas, dry conditions in the early 2000s, combined with depleted water tables, forced many agricultural producers to reconsider the continued viability of crops that were once profitable during wetter climate conditions in the 1990s.

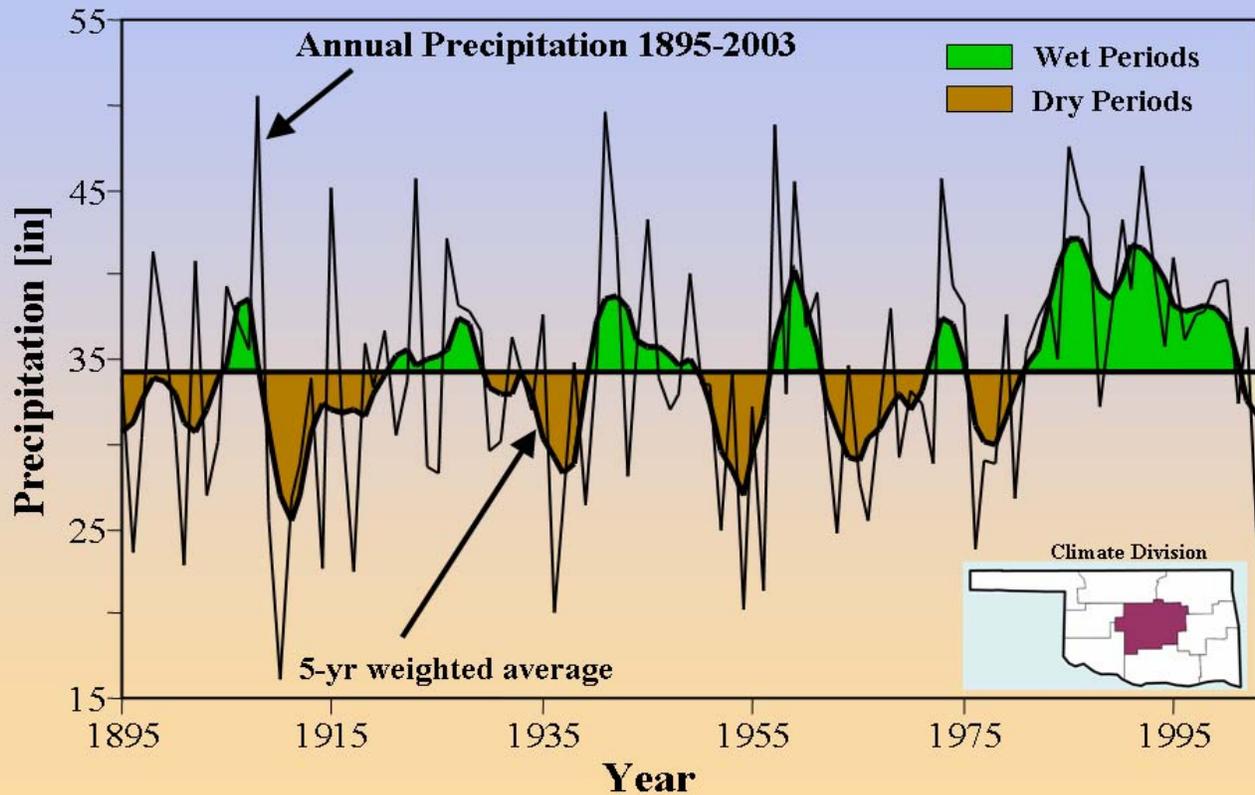
From the water resources point of view, droughts in the 1930s, 1950s and 1960s and population growth prompted Oklahoma officials to ask the Army Corps of Engineers to plan and build a number of water supply reservoirs. Sustained wet conditions, though usually welcomed in the semi-arid Great Plains, can also have significant, detrimental consequences. Recurring floods in the 1930s, 1940s and 1950s prompted the Soil Conservation Service to construct over 2000 flood retarding structures in Oklahoma alone. Similar impacts of climate fluctuations are noted throughout recorded history, and continue today in many parts of the country.



Research is being conducted at the ARS Grazinglands Research Laboratory to identify long-term precipitation and air temperature variations and to assess their impact on agricultural productivity and water resources availability. Statistical distributions representing wet, average and dry climatic periods are used to develop and assess risk-reducing strategies in support of agricultural and water resource decision making. Recognition and consideration of persistent climate variations can assist with selection of agronomic practices, enterprise planning, and water resources management that benefit from positive effects and mitigate negative impacts of climate variations.

A precipitation variation plot from a report of multi-year, persistent annual precipitation and air temperature variations for climate divisions in Oklahoma, Kansas and Texas is shown on the back page.

Annual Precipitation and Variability in Central Oklahoma



The above plot of annual precipitation for Central Oklahoma illustrates persistent precipitation variations lasting 5-years and longer. In this plot annual precipitation is represented by thin, black lines; the 5-year moving average of annual precipitation is represented by a heavy, black line; the long-term average (1895-2003) is plotted as a horizontal heavy, black line; and persistent precipitation variations, called wet/dry periods, are identified by green and brown areas. Wet/dry periods having large magnitude and duration are most relevant, while those with smaller magnitude and shorter duration are likely to have less impact.

Referring to the green and brown colored areas, it is easy to find the drought of the early 1910s and of the 1930s Dust Bowl years. But there were similar dry periods during the 1950s, 1960s and 1970s. Attention is also called to the period of sustained above-average precipitation during the 1980s and 1990s. It appears that producers and managers in central Oklahoma had mostly above normal precipitation for those 20 years.

Additional plots similar to the above are available for all climate divisions in Oklahoma, Kansas and Texas. The complete report "Variations of Annual Precipitation and Air Temperature in Oklahoma, Kansas and Texas 1895-2003" can be downloaded from the Grazinglands Research Laboratory web site at <http://ars.usda.gov/Main/docs.htm?docid=11617> under "Climate". Alternatively, graphics of climate variations for Oklahoma can be accessed interactively at the same web site. Updated climate variations for Oklahoma that include the most recent years can be accessed at the Oklahoma Climatological Survey's Climate Information web site. <http://climate.ocs.ou.edu>

The U.S. Department of Agriculture (USDA) prohibits discrimination in all programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write USDA, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.