THE HISTORICAL ROME, GEORGIA RAINFALL SERIES 1855-1988

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INTRODUCTION

The Rome, Georgia meteorological record is among the oldest continuous series in the Southeastern United States. Commencing in 1855, it is today the nation's longest voluntary climatic record maintained within one family. The same instrument site was utilized for nearly 100 years, affording excellent continuity and comparability. In addition, recent changes in location have been minor.

Realizing the potential value of a very long rainfall record, this paper documents the temporal characteristics of the annual and seasonal precipitation series 1855-1988.

BACKGROUND

Earliest Records 1855-1891

Reuben S. Norton (1807-1897) was a prominent citizen of Rome, Georgia throughout the latter half of the 19th century. Born in Windsor, Vermont, he arrived in Georgia about 1830 and moved to Rome in 1848. An important merchant in the community, he was also active in civic circles. Among his many interests was the weather. On May 1, 1855 he began a detailed private meteorological diary. For the next 36 years he maintained daily records of temperature, precipitation, and general weather conditions (M.S., four volumes, Georgia Department of Archives and History). Remarkably, there were very few omissions, even during the chaos attendant the Civil War.

Norton fashioned a metal rain gauge, with a ground exposure on the big lot behind his home. Although he gave no precise information as to design, there is evidence from his diary to suggest it was a small cylindrical gauge, perhaps 3 inches or so in diameter. Similar instruments were commonly employed by Smithsonian weather observers at the time. It was not until some years later that the transition to the modern 8-inch rain gauge attained general usage.

1891 to Present

On July 1, 1891, R. S. Norton relinquished his duty as weather observer to his son-in-law, W. M. Towers, Sr. The task of gathering voluntary weather data was now under the auspices of the newly formed U.S. Weather Bureau. With time, instruments and observations were standardized. For the next 62 years the rain gauge and other instruments remained in the same location. Observers serving were W. M. Towers, Sr. (1891-1904), W. M. Towers, Jr. (1904-1918), and Miss Mary N. Towers (1918-1953). Finally in 1953, after nearly a century on the same lot, the instruments were moved to a new site 2.3 km southwest. Since that time, there have been two other minor relocations (Substation History, 1982). The present location is but 0.7 km north-northeast of the original site.

DATA SOURCES

Monthly precipitation totals from 1855 to 1930 were taken from the U.S. Weather Bureau Bulletin W (from the establishment of stations to 1930). Data were verified and supplemented by the author with reference to the original manuscript.

Rainfall data from 1931 to 1988 were extracted from "Climatological Data" (U.S. Department of Commerce).

RELIABILITY OF THE DATA

In several respects, the Rome, Georgia rainfall series is uniquely homogeneous. The data have been kept by the same family throughout. Also, the environment and exposure of the rain gauge remained essentially unchanged for almost a hundred years. This is an important consideration, since exposure of a gauge to different wind regimes, is the major source of error in precipitation measurement (e.g., Kurtyka, 1953).

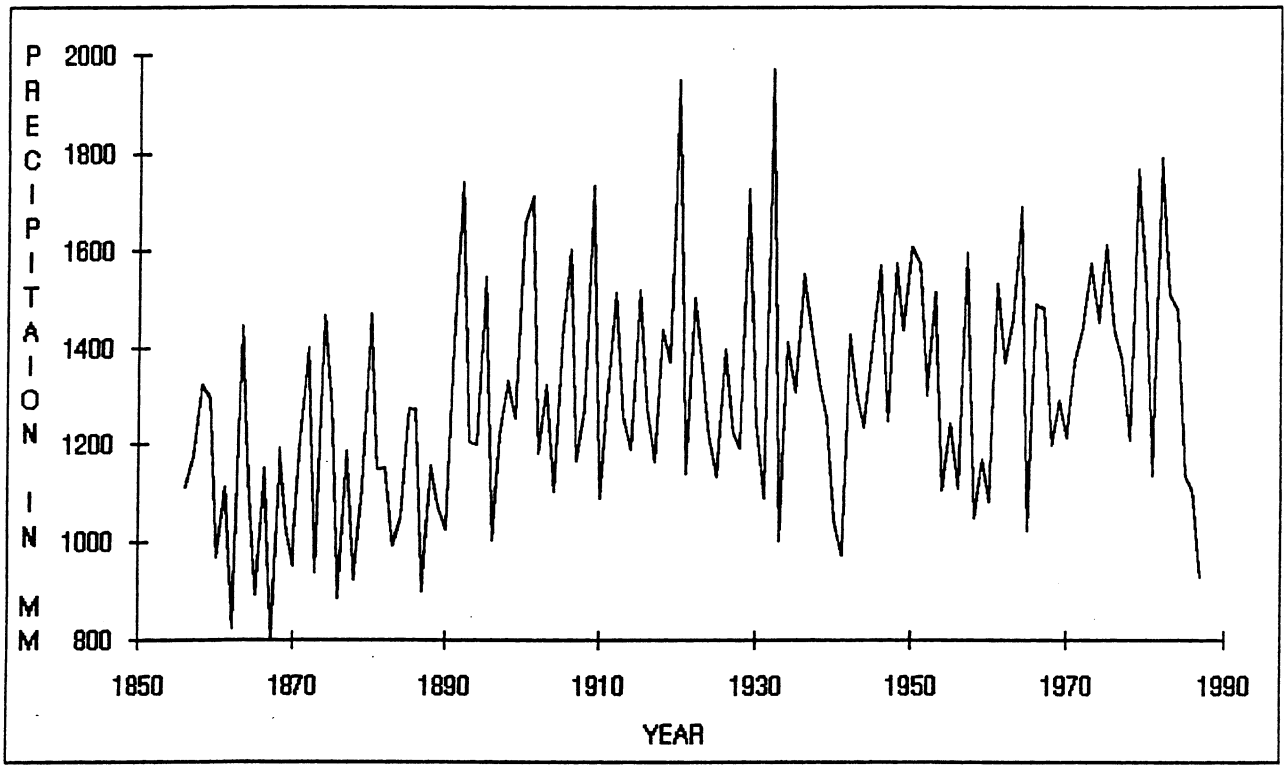

Figure 1. Time Series of Annual Rainfall at Rome, Georgia From 1856 to 1987.

The primary source of heterogeneity concerns the early use of a rain gauge of non-standard size. No attempt has been made to quantify these differences here. However, other studies have shown that except for extremely small gauges, the differences in catch never exceed 2 percent (Mill, 1901).

DATA ANALYSIS

Annual Fluctuations of Rainfall

The mean annual rainfall at Rome, Georgia from 1856 to 1987 was 1288.3 mm (50.72 in.). The wettest year on record, 1932, had a fall of 1972.3 mm (77.65 in.). The driest year, 1867, received only 800.1 mm (31.50 in.).

Figure 1 shows a plot of annual rainfall from 1856-1987. The resultant 131-yr time series exhibits little change from circa 1890 to 1980. A sharp decline is evident after 1980, coincident with recent drought conditions in the Southeast. However, the most unusual portion of the record, that from 1855-1890, is noteworthy as an extended period of exceptionally low rainfall. In particular, the decade of the 1860's contains the three driest years of the entire series.

Evidence of a drier period in the mid to late 19th century is corroborated by historical accounts of regional weather. In Alabama, general droughts were experienced with uncommon frequency in the 1850's and 1860's. Owens (1921), cites such occurrences in 1851, 1853, 1854, 1855, 1857, 1860 and 1870. Mell (1890), states that in the summer of 1860 the effects of drought in Eastern Alabama were exhibited by "the dried up creeks, stunted cotton bare of fruit and the forest shrubbery dying for want of moisture in the earth". For many parts of the country, the drought of 1860 was the worst in history to that time (Tannehill, 1947). Yet, only two years later local conditions in Northwest Georgia must have been even worse. At Rome, R. S. Norton's diary entry for December 2, 1862 reads "we have had a dry time from the first of June, the longest drought I have known, having only 8.15 inches of rain in the last 6 months."

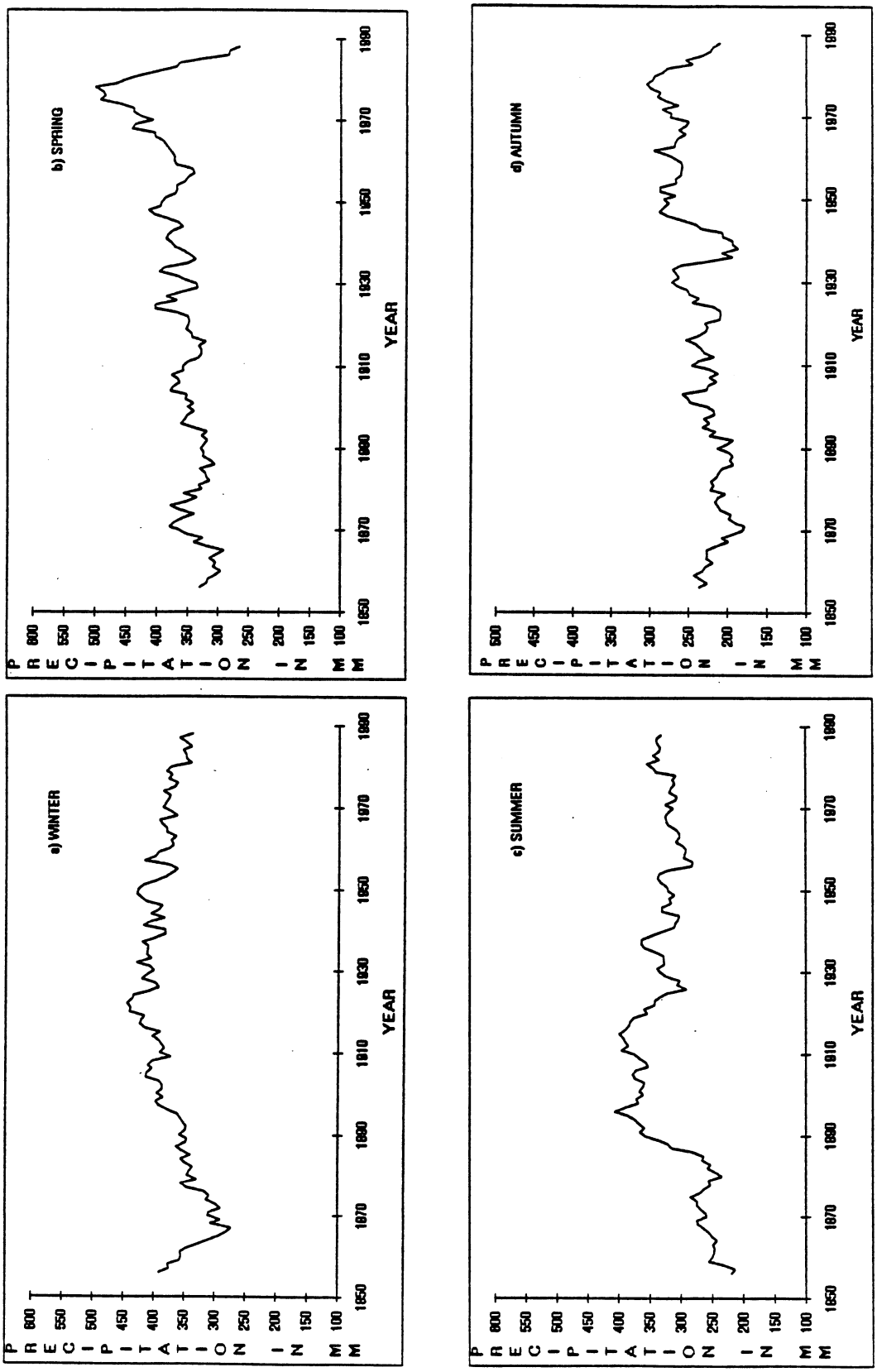

Figure 2. Seasonal Rainfall at Rome, Georgia From 1855 to Present. The Data Have Been Smoothed by an 11 yr Running Mean as Described in the Text.

Seasonal Rainfall Fluctuations

In the following discussion the seasons are defined as the three months normally attributed to the climatological season i.e. winter rainfall is that falling during the months of December, January and February; the subsequent seasons being similarly defined.

Figure 2 depicts the fluctuations of seasonal rainfall at Rome, Georgia from 1855 to present. To suppress short-term variations, the data have been smoothed by an 11-yr running mean. Values are plotted at midpoint of the smoothing interval. To estimate smoothed values at the ends of the curves, five extra years are used at each end with values equal to the mean of the five years at the beginning/end.

Several interesting features are evident from the plotted records:

(1) Autumn and winter season precipitation has remained remarkably consistant through the years. In fact, it is hard to see any trend in the 131-yr history.

(2) During the dry years of the mid and late 19th century, the summers especially were drought prone. Indeed, the summer season, along with a concentration of dry winters around 1870, seem to have contributed most to the scant rainfall noted in Fig. 1 between about 1855 and 1890.

(3) The decline in rainfall during the 1980's has been almost entirely due to a decrease in springtime precipitation. This trend seems to have been accentuated by the unusally wet conditions of the 1960's and 1970's.

SUMMARY

A very long and reasonably homogeneous rainfall series for a single station in Northwest Georgia has been presented. Corroborative evidence has been found confirming the existence of a prolonged drought epoch centered circa 1870. This drought episode appears far more severe than any experienced in the 20th century.

It seems likely that within the period of early historical data, rainfall in Northern Georgia and perhaps much of the interior Southeast, has varied considerably from 20th century averages. This secular variability may have important implications for water resources, agriculture and modern day society. Clearly, the standard use of 30-yr rainfall averages are too short to indicate the true climatic norm for the area.

ACKNOWLEDGEMENTS

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LITERATURE CITED

Georgia Department of Archives and History: The R. S. Norton Notebooks. Manuscript Collection No. 74-14, 4 Vol. (unpublished).

Kurtyka, J.C., 1953. Precipitation Measurements Study. Urbana, Illinois State Water Survey Report of Investigation 20, 177 pp.

Mell, P.H., 1890. Climatology of Alabama. Agri. Exp. Station, Auburn, AL., Bulletin No. 18. NS. 73 pp.

Mill, H.R., 1901. "The development of rainfall measurement in the last forty years." British Rainfall, 1900. pp. 23-45.

Owens, T.M., 1921. History of Alabama. Vol. 1, S.J. Clarke, Chicago, 722 pp.

Substation History, Georgia, 1982. National Weather Service, Southern Region, Substation Management Branch, Fort Worth, TX., USA.

Tannehill I.R., 1947. Drought, Its' Causes and Effects, Princeton University Press, Princeton, N.J., 264 pp.

U.S. Department of Commerce, Climatological Data: Georgia. NOAA, National Climatic Data Center, Asheville, N.C., USA.

U.S. Weather Bureau, 1931. Climatic Summary of the United States. Climatic data from the establishment of stations to 1930, inclusive. Section 102, Western Georgia, 23 pp.