Thornthwaite's Original Climatic Classification And Oklahoma's Climate

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It is difficult to assess the impact which C. Warren Thornthwaite has had upon climatic classification and analysis. There is no doubt but that his influence has been considerable and that his earlier and later classification schemes have been controversial.

Much of Dr. Thornthwaite's early work in the study of climate was undertaken while he was a faculty member at the University of Oklahoma. It seems appropriate, therefore, that a staff member at the University of Oklahoma should test the scheme in the framework of the state of Oklahoma.

The early classification[2] is much more amenable to electronic programming than later Thornthwaite systems. More than 80 stations were selected in Oklahoma for the period from 1923-1958[3]. No station is located more than 40 miles from a neighboring station, (Fig. 1) and the length of record covers two periods of abnormally low rainfall as well as intervening periods which were perhumid.

Nothing greatly surprising concerning Oklahoma's climate was uncovered in this project, but several maps worthy of study and analysis are presented in the following section.

Thornthwaite probably never intended for all letters of the classification to be combined in a single map, but such maps prove to be quite interesting. In fact, the divisions depicted on the Thornthwaite Mean map (Fig. 2) correspond roughly with gross vegetation types. That is DB'db areas correlate approximately with short grass steppe, CB'db areas relate roughly to tall grass steppe, CB'rb regions show a relationship to prairie and mixed forest - prairie regimes, BB'rb sections are forested as are AB'rb regions, but species dominance varies.

Indeed, while correlations alluded to are by no means perfect it is amazing that correspondence is as close as is the case. Heterogeneity of structure, altitude, and slope mitigate against close juxtaposition of climate and vegetative types.

There is some indication that a frequency map, i.e. one which depicts conditions prevailing the majority of the time may be more valuable for human purposes than a map illustrating mean conditions. Such a frequency map (Fig. 3) seems to indicate that agricultural risk diminishes in nothern Oklahoma — presumably because evaporation rates are lower and storm tracks are nearer.

Comparisons with Köppen maps drawn from comparable data seems to show that Thornthwaite's classification is more precise and useful for

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[1]Gratitude is expressed to the Faculty Research Fund of the University of Oklahoma for financial assistance which made this study possible.

[2]For readers not familiar with the classification system, or for those wishing to be refreshed, reference is made to: F. Kenneth Hare, "Climatic Classification" London Essays in Geography, Harvard University Press, 1951, pp. 121-128 which neatly summarizes articles dealing with the Thornthwaite system written by Thornthwaite and appearing in the Geographical Review in 1931 and 1933.

[3]It should be recognized that the number of stations utilized in this study is greater than the total number of stations used by Thornthwaite in the evolution of his classification scheme.

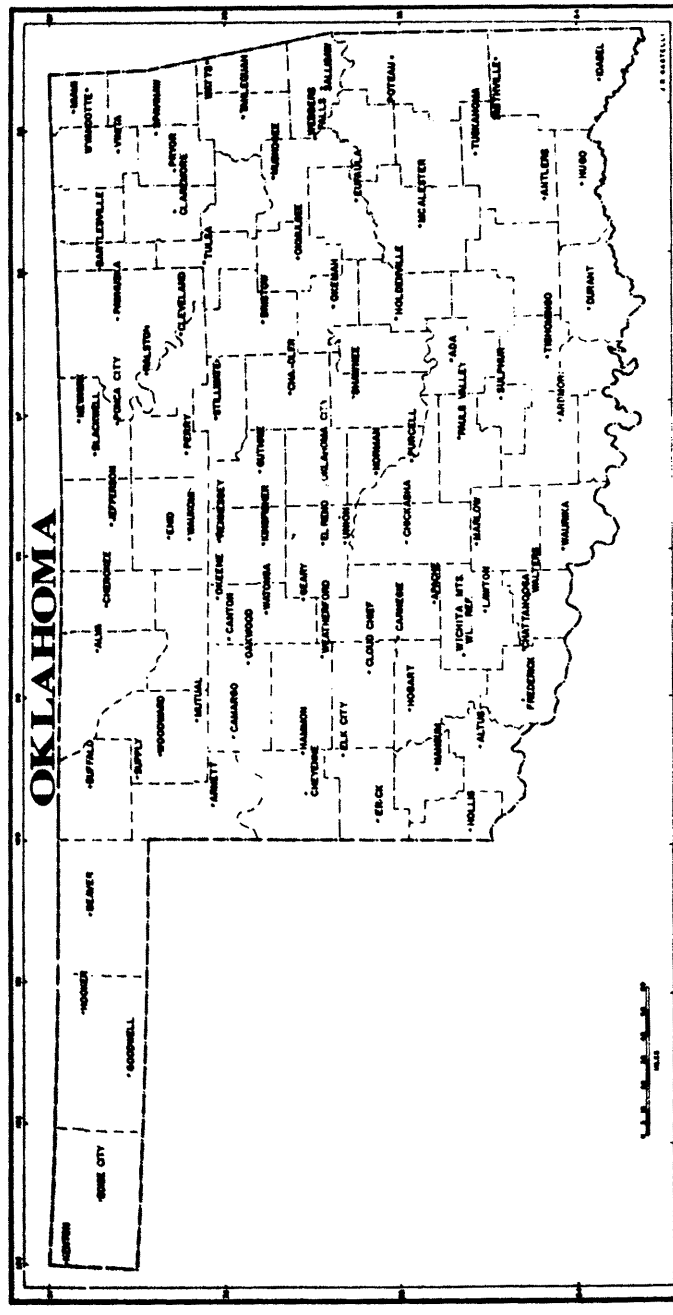

Figure 1

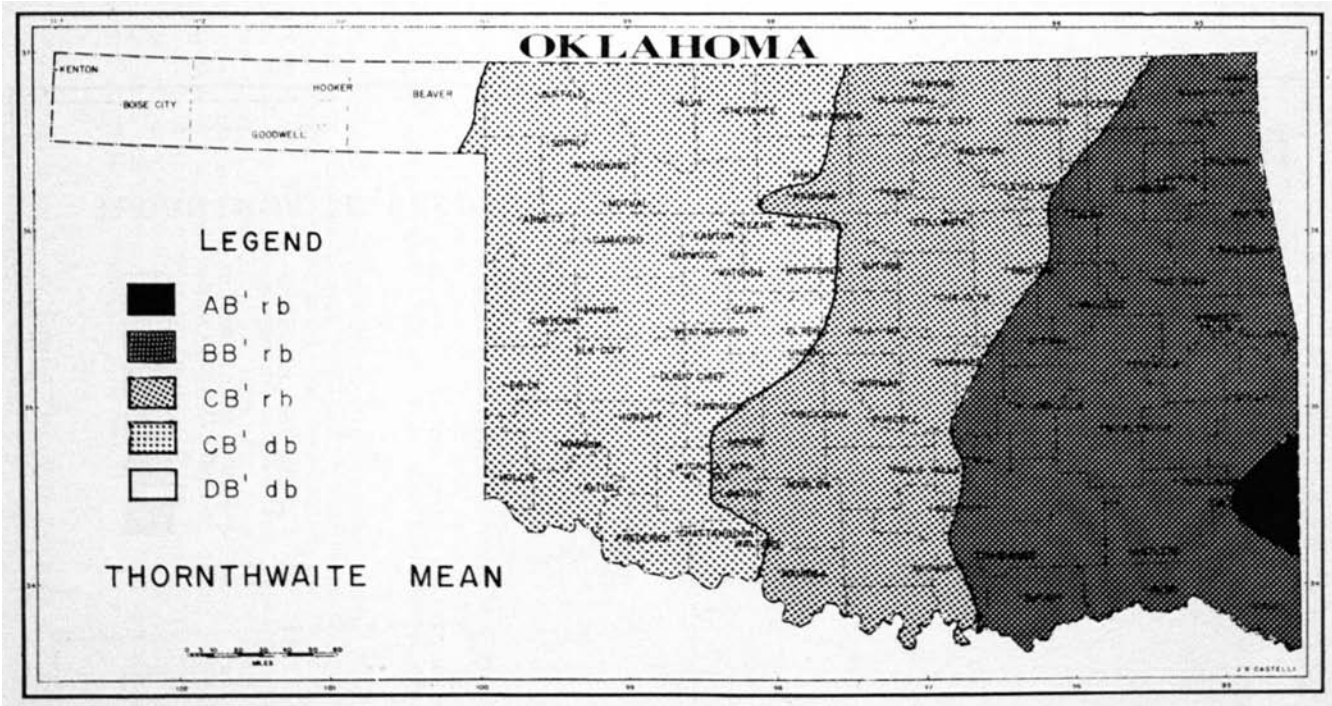
OKLAHOMA
KENTON
BOISE CITY
HOOKER
BEAVER
GOODWELL
LEGEND
AB' rb
BB' rb
CB' rh
CB' db
DB' db
THORNTHWAITE MEAN

Figure 2

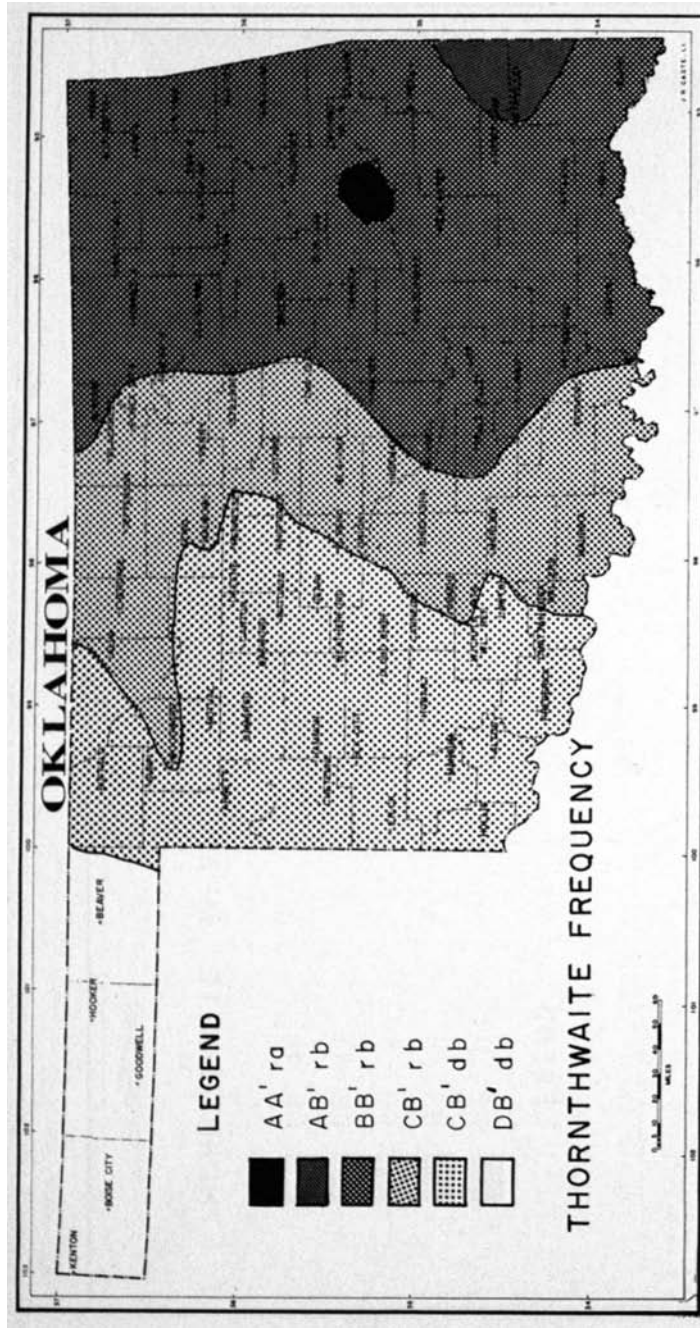
OKLAHOMA
LEGEND
AA' ra
AB' rb
BB' rb
CB' rb
CB' db
DB' db
THORNTHWAITE FREQUENCY
KENTON
BOISE CITY
GOODWELL
HOOKER
BEAVER

Figure 3

describing Oklahoma's climates. Traditional patterns of Thornthwaite's system, i.e. P-E and T-E ratios, can readily be drawn from Figures 2 and 3.

In summary, an analysis of data from a dense network of stations over a 36 year period shows the Thornthwaite classification to be eminently useful in describing salient climatic characteristics of Oklahoma.