PRECIPITATION TRENDS [1]

By ELLIS L. ARMSTRONG

[Agricultural Experiment Station, Logan, Utah, March 1935]

The amount of precipitation and its time distribution determine to a large extent the status of the agricultural and associated industries of a region. This is particularly true in the western portion of the United States where it is the limiting factor of development. Consequently, variations in precipitation amounts are not only of interest but also of economic importance.

In any given locality, there is considerable variation in annual and seasonal amounts. These variations may seem radical when only a short interval of time is considered, but they fluctuate about the "normal" in such a way as to suggest stability over a longer range.

Much has been written concerning these variations, and many attempts have been made to determine periodic components. It is natural to expect an annual and a diurnal influence; and the possibility of an influence due to sunspots has not been overlooked. Whatever may develop in the future, it seems reasonably safe to say that forecasting has so far succeeded only in a general way, and only for a comparatively brief interval of time. There is, however, sufficient stability to give some significance to such terms as "normal" temperature, "normal" precipitation, etc., even though it be found necessary to revise the values of these magnitudes from time to time to correct for so-called secular trends.

Without any attempt to discuss the question of cause and effect, the author has found interest in a study of data available from publications of the Weather Bureau over a period of about 40 years. With no intention to bias the facts, straight lines were fitted to the various data by the method of least squares. It is to be expected that for a limited number of years, and for any given locality, a slope might be obtained, showing an upward or downward trend according to the data selected; however, as more years are added, temporary variations tend to lose their significance, and as larger areas are included the effect of local variations on average values becomes decreasingly important.

The United States was divided arbitrarily into three sections: (1) The section east of the one-hundredth meridian, which is humid; (2) the intermountain section, which includes the area between the one-hundredth meridian and the Pacific Coast States and which is decidedly arid; (3) the Pacific Coast States, which can be considered on the average as semiarid. The weighted annual average precipitation has been plotted on the accompanying graph and a straight line fitted. To obtain this weighted average, the simple average of the towns of a given State was multiplied by the area of the State as a weighting factor and the results averaged.

The slopes of the best fitting lines in the humid and the arid sections are negligible. In the case of the coastal section the slope is of considerable magnitude; during the 44-year-period, the decrease has averaged over 0.3 inch per year.

Table 1 gives the slope and intercept of the best fit straight line for a number of stations selected more or less at random.

TABLE 1.—*Constants for best fit straight lines representing precipitation data for various stations in the United States (40-year period, 1890–1930)*

Station	Intercept	Slope
Section east of 100th meridian		
Mobile, Ala	62.03	−0.029
Peoria, Ill	35.89	−0.012
Boston, Mass	39.24	−0.037
Baltimore, Md	42.83	−0.100
St. Paul, Minn	30.02	−0.138
St. Louis, Mo	36.11	+0.039
Omaha, Nebr	28.34	−0.120
Albany, N. Y	34.34	−0.077
Buffalo, N. Y	36.85	−0.133
New York City, N. Y	43.41	+0.093
Rochester, N. Y	33.65	−0.071
Cincinnati, Ohio	38.14	+0.178
Marietta, Ohio	38.65	+0.124
Camden, S. C	45.15	+0.121
Charleston, S. C	47.95	−0.275
Pacific Coast States		
Sacramento, Calif	19.09	−0.183
San Francisco, Calif	20.54	−0.012
Portland, Oreg	40.15	−0.042
Tacoma, Wash	49.31	−0.532
Section between 100th meridian and Pacific Coast States		
Tucson, Ariz	10.54	+0.033
Denver, Colo	14.39	−0.011
Boise, Idaho	13.68	−0.042
Porthill, Idaho	20.69	−0.187
State College, N. Mex	6.68	+0.116
Cheyenne, Wyo	14.57	+0.070
Corinne, Utah [1]	10.92	+0.062
Fillmore, Utah	14.38	+0.003
Logan, Utah [2]	15.34	+0.039
Ogden, Utah [3]	12.34	+0.129
Parowan, Utah	12.73	+0.016
Salt Lake City, Utah [4]	16.54	−0.014

[1] 1876–1930. [2] 1890–1934. [3] 1871–1930. [4] 1875–1934.

Emphasis should be laid on the fact that these data are based upon observational facts covering definite periods of years in the past, and any attempt to predict for the future would be unwarranted.

[1] Contribution from physics department, Utah Agricultural Experiment Station. Publication authorized by director, Mar. 11, 1935.

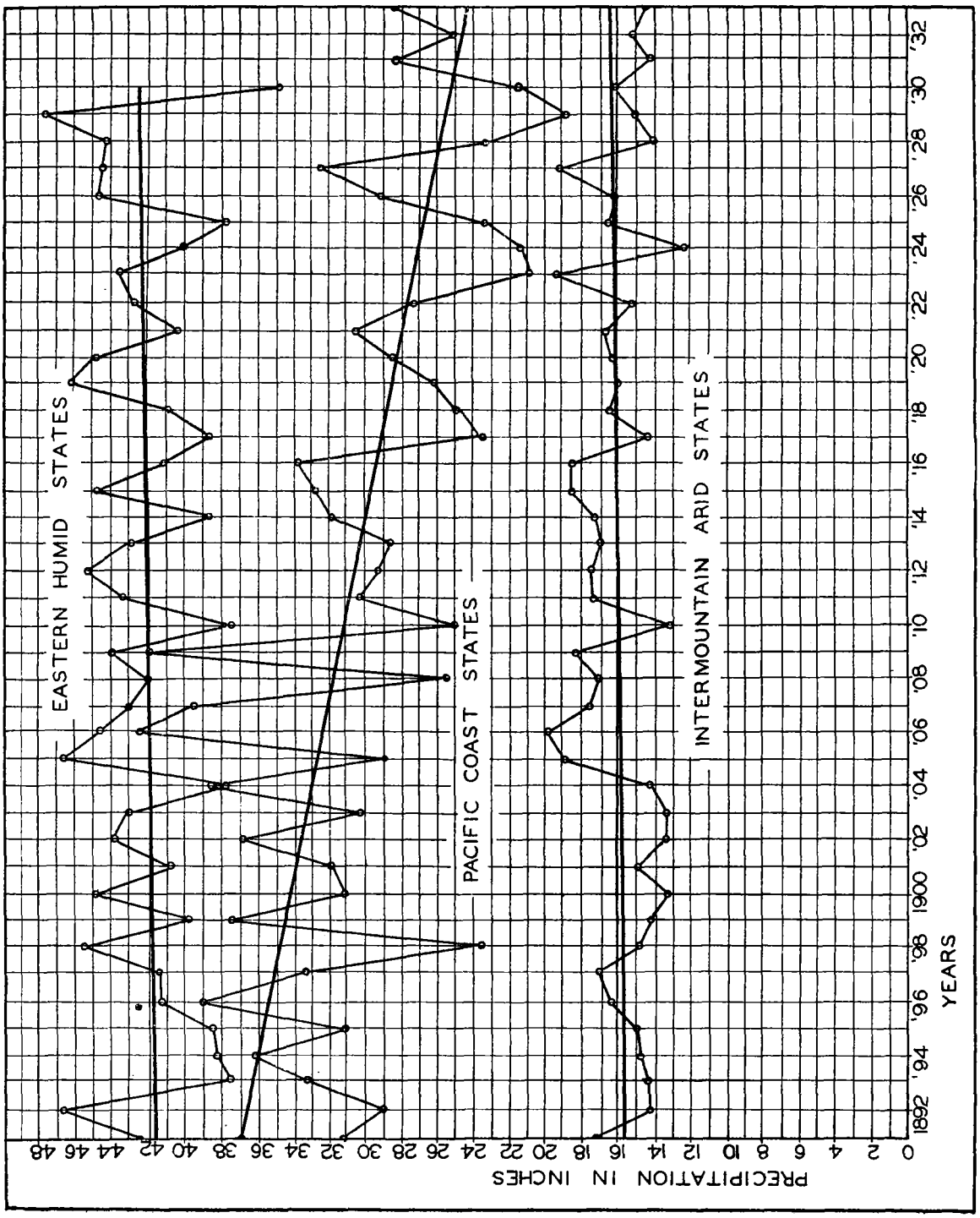

FIGURE 1.—Yearly average precipitation and trends for eastern section, intermountain section, and Pacific coast section, 1891–1933.

WEATHER OF JUNE AS INDICATING THE WEATHER OF THE FOLLOWING MAY IN IDAHO

By H. G. CARTER

[Weather Bureau, Boise, Idaho, February 1935]

The results of tabulations from the records of the Boise Weather Bureau Station, and of the Idaho Section, may be summarized as follows:

Boise records:
- Temperature:
  - Warm Junes, followed quite generally by warm Mays; followed by wet or dry Mays in about same ratio.
  - Cold Junes, followed quite generally by cold Mays; followed by wet or dry Mays in about same ratio.
- Precipitation:
  - Wet Junes; followed by warm or cold, and wet or dry Mays in about same ratio.
  - Dry Junes, followed by slightly more dry and slightly more cold Mays, but difference was small.

Idaho records:
- Temperature:
  - Warm Junes, followed quite generally by dry and warm Mays.
  - Cold Junes, followed quite generally by cold and wet Mays.
- Precipitation: Wet Junes, followed by slightly more wet and slightly more cold Mays.
  - Dry Junes, followed quite generally by dry Mays; by warm or cold Mays in about same ratio.

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