

## NOTES AND CORRESPONDENCE

## Los Angeles Rainfall Frequencies Change as Record Lengthens

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Wet and dry rainfall years (July–June) at Los Angeles alternated more frequently than would be expected by chance, Showalter (1948) found from tabulation of 70 years of data, 1877–78 through 1947–48. Dividing the record into three precipitation classes of 33, 34 and 33 years, he showed that 6 wet, 5 “normal” and 5 dry years were followed by similar years less often than the expected numbers of 8 for each such pair (Table 1). Hence he concluded “that probabilities indicate that rainfall amounts for a coming year will be considerably different than those of the past year.”

During the 33 succeeding years, however, the trend reversed, so that wet-wet, normal-normal, and dry-dry pairs occurred 5, 5 and 4 times, respectively, whereas only 3 each were expected. For the combined 103-year period, 11 repetitions are expected in each class, and 10, 11 and 11 occurred. The later 33-year period was a little drier than the first 70 years, so that class limits differed from period to period (Fig. 1).

For a two-class dichotomy, in the earlier 70-year period, 30 years were above average, 40 below, while in the ensuing 33 years, the average was exceeded

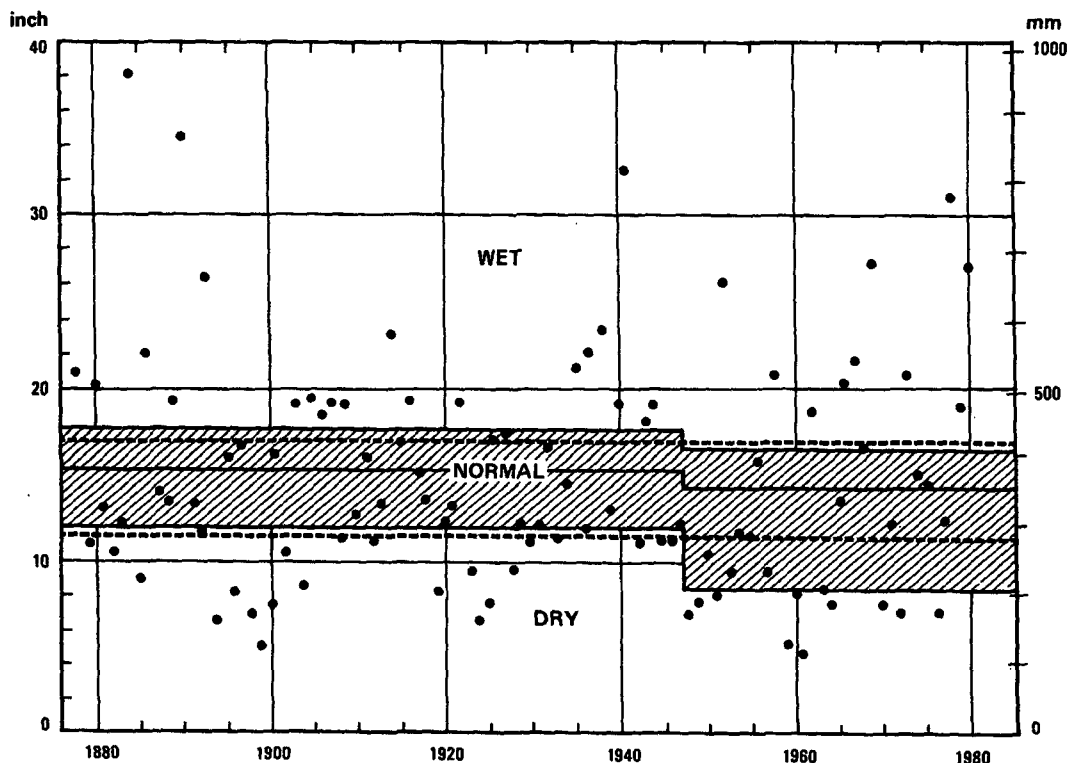


FIG. 1. Seasonal (July–June) precipitation at Los Angeles, 1877–78 through 1979–80, divided into two periods: the first 70 years discussed by Showalter (1948) and the 33 succeeding seasons, indicated by the year of ending. Means and terciles are shown for each period, and for the entire 103-year record.

TABLE 1. Observed/expected numbers of wet-wet, normal-normal, and dry-dry sequences of rainfall years (July-June), and of runs of 2, 3, 4 and 5 years above or below average, at Los Angeles.

	1877-1947	1947-1980	1877-1980
Wet-Wet	6/8	5/3	10/11
Normal-normal	5/8	5/3	11/11
Dry-Dry	5/8	4/3	11/11
AA	9/13	7/6	15/18
BB	19/22	12/11	33/35
AAA	2/5	4/2	6/7
BBB	9/13	6/6	18/20
AAAA	0/2	1/1	2/3
BBBB	3/7	1/3	7/11
AAAAA	0/1	0/0	0/1
BBBBB	1/4	0/2	3/7

14 times, not reached 19 times, so that of all 103 years, 43 were above average and 60 below. In the earlier period, fewer sequences of 2, 3, 4 and 5 years above or below average (AA and BB, etc., in Table 1) occurred than expected if all years were independent, but in the second period, 2 and 3 year sequences were slightly more frequent. Thus for the entire 103 years, short runs were only slightly less common than

expected while those of 4 years and longer were definitely less frequent. No above-average rainfall runs of more than 4 years occurred, while only two 6-year runs (4 expected) and one 7-year run (2 expected) below-average were counted.

Over the 70 years of record available to him in 1948, Showalter pointed out, "a 60% score would have been made by forecasting that a below-average year would be followed by an above-average year." Such a routine forecast would have been right in only 40% of the following 33 years. He also said that, based on the number of years of record given in parentheses, like-like successions were less frequent than might be expected at Sacramento (97), Louisville (75), Denver (76) and Salt Lake City (73), but more frequent at San Diego (97), Albany (121), St. Louis (111), Washington (75) and New York City (74). The results given here for the following 33 years at Los Angeles cast doubt on the permanence of any such findings.

This study is part of a term paper by the second author in a hydroclimatology class directed by the first author.

#### REFERENCE

- Showalter, A. K., 1948: Chance for successive dry years in Southern California. *Mon. Wea. Rev.*, **76**, 221-223.

### Reply

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I am in agreement with the comments and revision of Arnold Court and William Reid.