The velocity of propagation of surface waves, such as those between air and water, is given by

$$V=\sqrt{gh} \quad (5)$$

when the depth $h$ is small compared to the wave length; here, however, $\Delta\rho/\rho_1$ is taken as unity; in a consideration of internal waves formed between two similar fluid bodies, a correction for small differences in density must be applied, and according to Ekman (**3**), equation (5) becomes

$$V=\sqrt{\frac{gh\Delta\rho}{\rho_1}}\simeq\sqrt{\frac{gh\Delta T}{T_1}}, \quad (6)$$

in which $\rho_1$ is the density of the upper layer. Assuming $\Delta T$ to be 3° and $T_1$ to be 287°, a velocity of propagation of 4.0 meters per second is found. By taking $\Delta T$ as 0.9° and $T_1$ as 287.9° a velocity of propagation of 2.1 meters per second is found, which checks with the computed velocity of 2.0 meters per second for the wave length of 4,452 meters and period of 37.1 minutes.

### WAVES ON AIR AND WATER SURFACES COMPARED

Waves in the atmosphere and in the sea have previously been compared, in a general way, as to magnitude; a similar comparison of the energy of wave forms in the two media is also possible. In any wave, two forms of energy occur; namely, the potential energy of the deformation and the kinetic energy of the motion. If, then, the energies of the waves in the two media are to be compared, a comparison of the densities of the two fluids is all that is necessary, assuming that the velocities are equal, and neglecting, for the time being, the effect of the different compressibilities of air and water. If the surface of the sea be at 14° C. (salinity 35.00) and the atmosphere (dry air) at 14.9° C. (pressure 1,013.3 mb), the ratio of densities is 1:0.001. It follows that waves formed on a level sea surface, corresponding to the atmospheric waves observed on January 15 and February 22, would be insignificant ripples of amplitudes 22.8 millimeters and 34.6 millimeters, respectively.

Helmholtz (**1**) concludes from the principle of mechanical similarity that if waves between two air masses (with a temperature discontinuity of 10° C.) and between air and water (both at 0° C.) are to be similar, the quantities $\frac{\sigma}{1-\sigma}\cdot\frac{b_1^2}{n}$ and $\frac{1}{1-\sigma}\cdot\frac{b_2^2}{n}$ must remain unchanged, where $\sigma$ denotes the ratio of densities on either side of the discontinuity, $b_1$ and $b_2$ the velocities parallel to the surface of discontinuity, and $n$ the linear dimension.

He finds that for the waves formed on these two surfaces, with the same wind velocity, to be geometrically similar, the wave length of the air wave must be increased in the ratio of 1 to 2630.3. With the same ratios, sea waves corresponding to the atmospheric waves on January 15 and February 22 would have wave lengths of 0.7 m and 1.7 m, respectively.[4]

Helmholtz' comparison of the internal waves fo the atmosphere with surface waves of the sea is, however, misleading inasmuch as two entirely different wave forms are being considered. According to McEwen and Chambers, of the Scripps Institution, if internal waves in the sea, such as boundary waves, be considered instead of surface forms, the wave lengths and the amplitudes would be more nearly comparable to those of atmospheric waves.

### CONCLUSION

Whether manifested by ceiling oscillations or by turbulent conditions aloft, the existence of atmospheric waves is of importance to the aerographer, the airplane pilot, and the airway weather forecaster. The study of atmospheric waves under different meteorological conditions and as influenced by various topographical features, with the end in view of forecasting their occurrence and effects, should prove to be of vital importance to these groups, and of interest to the meteorologist. Additional studies of ceiling oscillations, similar to the pressure oscillation studies by Haurwitz, Stone, and Brooks (**2**), Clayton (**4**), Lamb (**5**), Namekawa (**6**), and Murase (**7**), might reveal interesting facts regarding the formation and effects of atmospheric waves on isentropic surfaces.

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[4] The "breaking" effect commonly observed in water waves at shallow depths was not evident. It appears that the slopes of the curves in figs. 1 and 2 are as often steeper in the posterior portions as otherwise.

# WEATHER OF 1936 IN THE UNITED STATES

By J. P. KOHLER

[Weather Bureau, Washington, D. C., February 1937]

The weather during the year 1936 was characterized by marked extremes in temperature and precipitation. Unparalleled prolonged periods of subzero temperatures obtained in many Western States in the early months of the year followed by unprecedented drought conditions during the summer months.

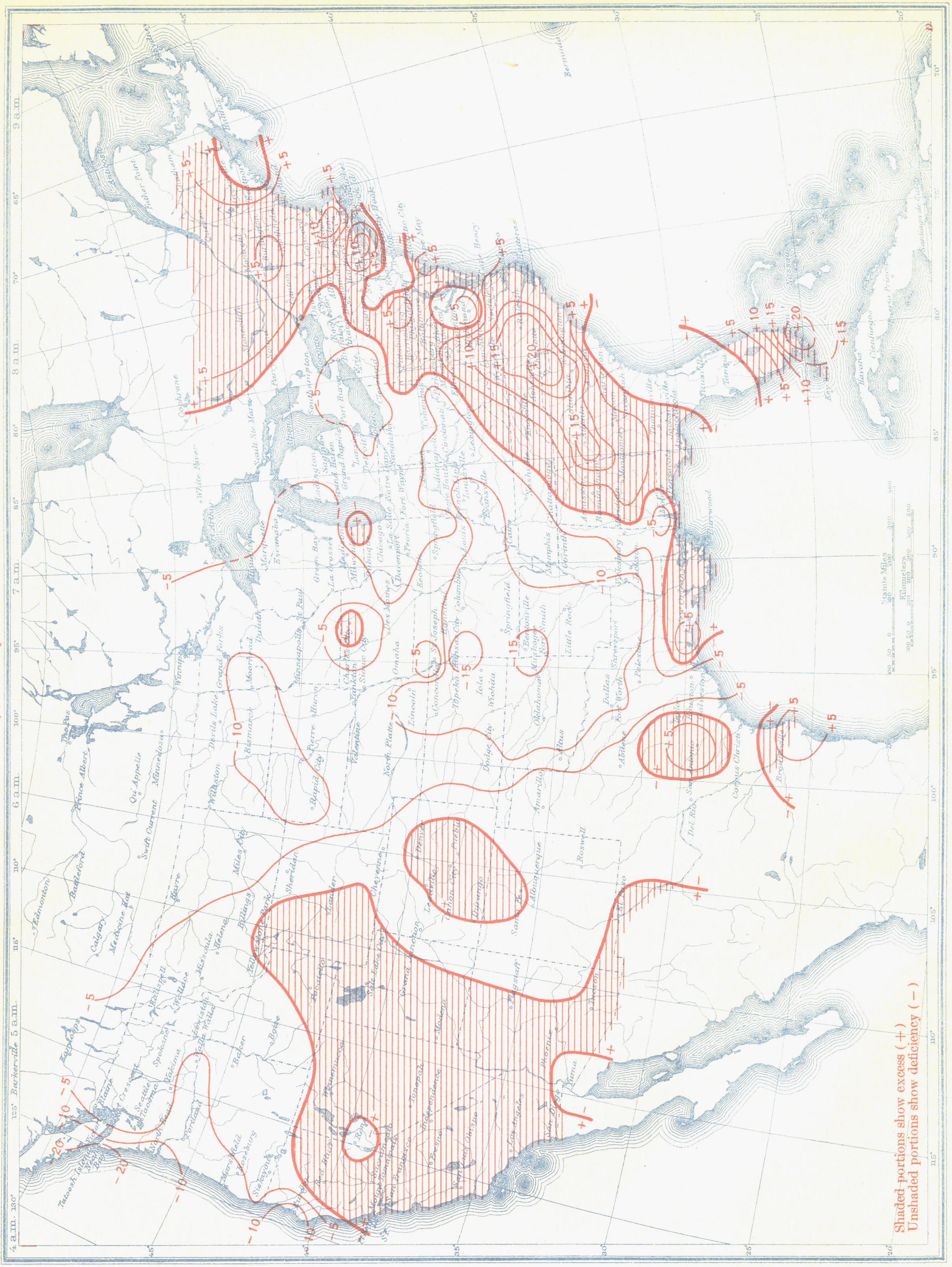
January and February 1936 brought the most severe weather ever experienced to several States in the north and middle sections of the Mississippi and Missouri Valleys; also locally in parts of the Ohio Valley. In the month of January only six States, namely, California, Colorado, Nevada, Oregon, Utah, and Washington had average temperatures above normal. The greatest negative departures were centered in the northern portions of the Missouri and Mississippi valleys. The mean temperature for North Dakota was −5.8°, or 12.1° below normal; likewise in Minnesota the departure from normal was −10.8°; South Dakota, −10.2°; Iowa, −9.0°; and

## Annual Temperature Departures (°F) in the United States, 1936

(Plotted by J. P. Kohler)

# Annual Precipitation Departures (inches) in the United States, 1936

(Plotted by J. P. Kohler)



Wisconsin, −6.0°. The lowest for the month was −55° at Warroad, Minn., on the 23d. In Kentucky a new monthly minimum was established with a temperature of −25°.

The winter reached its most severe stage in February. Only two States, Nevada, and Utah reported an average temperature above normal. The maximum negative departures, as in January, were centered in the northern portions of the Great Plains, the Mississippi and Missouri Valleys. New low mean temperature records were established in eight States, namely, Iowa, 6.0°, departure from normal, −16.3°; Missouri, −5.5°, departure, −17.8°; Montana, −0.1°, departure −22.3°; Nebraska, 8.9°, departure −17.3; North Dakota, −12.9°, departure −22.6°; South Dakota, −3.8°, departure −22.3°; Wisconsin, 2.8° departure −19.6°; and on the Pacific coast the State of Washington experienced an unusually severe month, the mean temperature being 22.5°, or 12.7° below normal, establishing a new low mean temperature for the State. The lowest minimum of the month and also a new record for the State of North Dakota was 60° below zero which occurred at Parshall on the 15th; the latter is within 6° of the lowest temperature ever reported in this country—66° below zero at Riverside Ranger station, Yellowstone Park, Wyo., in February 1933. Two other States in this area, namely, South Dakota and Wisconsin with minima of −58° and −52° established new minimum records. The highest minimum for the month was 18° which occurred at Quincy, Fla.

There was a sudden reversal toward warmer weather during the month of March, and only three stations reported mean temperatures below the average. Areas which in the preceding 2 months were from 10° to 20° below normal reported positive departures of as much as 5°.

The month of April 1936, was cool for the season over nearly all sections east of the Rocky Mountains and warmer than normal quite generally west of the Rockies. The monthly departures from normal temperature over the eastern two-thirds of the country ranged generally from deficiencies of 1° or 2° in the more southern sections to 4° or more in the area from the Lake region westward to the northern Great Plains. Along the Atlantic coast the month had about normal warmth. West of the Rocky Mountains plus departures from normal temperatures ranged generally from 3° to 6°. Notwithstanding the fact that average temperature departures were not excessive, several States reported the lowest monthly minimum of record; Arkansas with 17°, Idaho −21°, Nebraska −15°, Oklahoma 6°, Oregon −23°, and Washington −7°. Precipitation was much above normal over the States bordering the Atlantic coast, and quite generally along the Pacific coast, and over the north and central portions of the Rocky Mountain States. The greater portion of the country between the Rocky Mountains and the Appalachians had below normal rainfall. The area of maximum deficiencies centered over Oklahoma, Kansas, Arkansas, and Missouri.

In parts of the United States the next 5 months, May, June, July, August, and September, were almost constantly above normal temperatures. Scanty rainfall together with excessive heat during this period produced the most severe drought in the history of agriculture in the United States. In May every section and State reported their mean temperature above normal. Only three States, California, Michigan, and Minnesota, had temperatures below normal in June. The New England district was the only section below normal in July. Two States, Idaho and Kentucky, averaged slightly below normal in September, and in August every State and section, with the exception of the northern part of the New England district, reported mean temperatures above normal.

At the close of June high temperatures and the monthly accumulated deficiencies of rainfall began to materially affect crop conditions in the midwestern States. New maximum monthly temperatures were established in the following eight States: Arkansas, 113°; Indiana, 111°; Kentucky, 110°; Louisiana, 110°; Mississippi, 111°; Montana, 111°; Nebraska, 114°, and Tennessee, 110°. Previous high records were equalled in the following States: Colorado, Missouri, and Nevada.

During August a new record maximum was established in the following 15 States: Illinois, 115°; Indiana, 116°; Kansas, 121°; Michigan, 112°; Missouri, 118°; Montana, 113°; Nebraska, 118°; New Jersey, 110°; North Dakota, 121°; Oklahoma, 120°; Pennsylvania, 109°; West Virginia, 112°, and Wisconsin, 114°. The average departures from normal were exceptionally large in most States in the Mississippi and Missouri Valleys. In the Dakotas the excess exceeded 11°.

In August the heat wave over the midwestern and interior valley States continued unabated. Nine States established new maximum records: Arizona with 120°; Indiana, 111°; Kansas, 119°; Louisiana, 114°; Missouri, 116°; Nebraska, 117°; Oklahoma, 120°; South Dakota, 116°; and Texas, 120°. Several States in the Corn and Wheat Belts had average temperatures considerably in excess of any previous record; but, in general, positive departures averaged less than in the preceding month.

Tables 1 and 2 show the average temperature and precipitation conditions existing in the States most affected by the 1936 drought. Less than 70 percent of the normal rainfall for the crop-growing season occurred in Montana, the Dakotas, Nebraska, Kansas, Minnesota, Missouri, and Arkansas.

The persistent and universal prevalence of high temperatures in the agricultural States of the midwest is best shown by table 3. For example, in Oklahoma from July 14 to almost the close of the month practically all stations reported a maximum of 100° or above. In the period from August 2 to 28, similar conditions prevailed.

Tables 4 and 5 are included according to the custom of previous years.

The accompanying charts 1 and 2 are based on reports from some 180 stations showing temperature and precipitation departures in the United States for the year based on data obtained at regular Weather Bureau stations.

TABLE 1.—*Mean temperatures and departures from normal for States in and bordering the drought area during 1936*

| State | March | | April | | May | | June | | July | | August | | September | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average temperature | Departure from normal | Average temperature | Departure from normal | Average temperature | Departure from normal | Average temperature | Departure from normal | Average temperature | Departure from normal | Average temperature | Departure from normal | Average temperature | Departure from normal |
| Montana | 30.8 | +0.1 | 41.8 | −1.1 | 59.0 | +7.2 | 63.9 | +4.1 | 74.3 | +7.4 | 67.4 | +2.6 | 56.6 | +1.9 |
| Wyoming | 29.3 | −.5 | 39.9 | −.2 | 55.4 | +6.0 | 63.0 | +4.3 | 71.0 | +5.4 | 66.1 | +2.3 | 54.5 | +.3 |
| Colorado | 36.9 | +2.4 | 45.5 | +1.9 | 56.5 | +4.3 | 66.1 | +4.5 | 70.8 | +3.7 | 68.0 | +2.6 | 58.5 | +.6 |
| New Mexico | 44.8 | +1.0 | 52.0 | +.4 | 61.1 | +1.5 | 70.7 | +1.8 | 72.5 | +.2 | 71.7 | +1.1 | 62.9 | −1.5 |
| North Dakota | 25.5 | +1.2 | 35.6 | −6.0 | 61.0 | +8.2 | 66.4 | +3.9 | 79.9 | +11.8 | 69.8 | +3.6 | 60.3 | +4.0 |
| South Dakota | 33.7 | +2.8 | 41.6 | −4.3 | 63.3 | +6.8 | 71.4 | +4.8 | 84.2 | +11.2 | 76.3 | +5.7 | 65.4 | +3.9 |
| Nebraska | 40.5 | +4.2 | 47.1 | −2.1 | 64.2 | +5.2 | 72.7 | +3.6 | 83.6 | +8.3 | 79.4 | +6.4 | 67.4 | +3.3 |
| Kansas | 48.5 | +5.2 | 54.5 | −.2 | 67.7 | +3.9 | 77.3 | +3.5 | 85.7 | +6.7 | 85.3 | +7.7 | 72.5 | +2.9 |
| Oklahoma | 56.3 | +5.6 | 61.0 | +.7 | 71.2 | +3.0 | 80.8 | +3.6 | 86.5 | +4.8 | 88.0 | +6.6 | 76.6 | +2.4 |
| Texas | 62.0 | +3.5 | 65.0 | −1.1 | 73.5 | +.5 | 82.1 | +1.9 | 82.5 | −.5 | 84.4 | +1.6 | 77.9 | +.6 |
| Minnesota | 26.4 | +.1 | 36.4 | −6.6 | 60.5 | +5.4 | 63.9 | −1.0 | 77.1 | +7.1 | 70.7 | +3.4 | 62.0 | +3.0 |
| Iowa | 39.2 | +4.7 | 45.9 | −2.8 | 66.2 | +6.2 | 70.1 | +.5 | 83.4 | +8.8 | 79.2 | +7.2 | 68.0 | +4.3 |
| Missouri | 49.4 | +5.6 | 53.0 | −2.2 | 68.8 | +4.4 | 76.5 | +2.9 | 85.3 | +7.3 | 84.6 | +8.2 | 73.6 | +4.4 |
| Arkansas | 57.1 | +4.5 | 59.7 | −1.8 | 70.9 | +1.8 | 80.0 | +2.9 | 83.3 | +2.8 | 85.0 | +5.0 | 78.9 | +4.5 |
| Louisiana | 63.3 | +2.7 | 65.2 | −1.9 | 74.0 | +.3 | 81.9 | +1.8 | 82.1 | +.3 | 83.1 | +1.3 | 80.9 | +2.9 |
| Tennessee | 53.3 | +3.9 | 56.1 | −2.6 | 69.9 | +3.1 | 78.2 | +3.5 | 80.3 | +2.6 | 80.6 | +4.0 | 75.4 | +3.9 |
| Kentucky | 50.7 | +4.4 | 53.1 | −3.0 | 68.3 | +2.9 | 76.1 | +2.2 | 81.4 | +4.2 | 81.1 | +5.3 | 74.4 | +3.8 |
| Illinois | 44.8 | +4.7 | 49.0 | −3.1 | 67.4 | +4.9 | 72.8 | +1.2 | 83.5 | +7.1 | 81.0 | +6.9 | 71.2 | +4.2 |
| Indiana | 44.6 | +4.0 | 47.8 | −4.0 | 65.8 | +3.6 | 71.8 | +.3 | 81.4 | +5.7 | 79.4 | +5.9 | 70.7 | +3.5 |
| Ohio | 43.0 | +4.2 | 46.2 | −3.5 | 64.1 | +3.6 | 70.3 | +.8 | 77.0 | +3.3 | 76.1 | +4.5 | 69.3 | +3.6 |
| Michigan | 32.7 | +2.9 | 38.3 | −4.4 | 58.5 | +4.5 | 62.3 | −1.7 | 71.9 | +2.8 | 69.0 | +2.2 | 62.2 | +1.8 |
| Wisconsin | 30.8 | +1.5 | 38.1 | −5.5 | 60.4 | +5.2 | 62.8 | −2.3 | 75.2 | +5.1 | 70.7 | +3.3 | 62.9 | +2.6 |

TABLE 2.—*Average amounts of rainfall and departures from normal for States in and bordering the drought area during 1936*

| State | March | | April | | May | | June | | July | | August | | September | | Total March–September | Percent of normal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total rainfall | Departure from normal | Total rainfall | Departure from normal | Total rainfall | Departure from normal | Total rainfall | Departure from normal | Total rainfall | Departure from normal | Total rainfall | Departure from normal | Total rainfall | Departure from normal | | |
| Montana | 0.72 | −0.24 | 0.82 | −0.33 | 1.07 | −1.13 | 1.78 | −0.72 | 0.73 | −0.75 | 1.02 | −0.12 | 0.95 | −0.41 | 7.09 | 66 |
| Wyoming | 1.17 | .00 | 1.13 | −.46 | .52 | −1.60 | 1.82 | +.22 | 1.55 | +.25 | 1.26 | +.16 | .70 | −.44 | 8.15 | 81 |
| Colorado | .99 | −.31 | .80 | −.99 | 1.73 | −.18 | 1.41 | +.01 | 2.15 | −.07 | 2.68 | +.72 | 1.63 | +.31 | 11.39 | 96 |
| New Mexico | .32 | −.43 | .31 | −.58 | 1.78 | +.63 | .94 | −.30 | 2.07 | −.49 | 1.98 | −.51 | 2.78 | +1.17 | 10.18 | 95 |
| North Dakota | .81 | +.05 | .39 | −1.07 | .80 | −1.54 | 1.34 | −2.09 | .70 | −1.82 | 1.36 | −.71 | 1.15 | −.43 | 6.55 | 46 |
| South Dakota | .78 | −.34 | 1.28 | −.88 | 1.67 | −1.31 | 1.32 | −2.21 | .62 | −1.98 | 1.58 | −.71 | .74 | −.93 | 7.99 | 49 |
| Nebraska | .57 | −.53 | 1.59 | −.86 | 3.20 | −.33 | 2.01 | −1.75 | .57 | −2.77 | 1.60 | −1.22 | 1.78 | −.36 | 11.32 | 59 |
| Kansas | .14 | −1.30 | 1.17 | −1.42 | 4.88 | +1.11 | 1.26 | −2.74 | .86 | −2.38 | 1.06 | −2.11 | 4.84 | +2.03 | 14.21 | 68 |
| Oklahoma | .51 | −1.69 | .99 | −2.41 | 4.49 | −.25 | 1.97 | −1.87 | .71 | −2.28 | .22 | −2.78 | 7.85 | +4.78 | 16.74 | 72 |
| Texas | 1.02 | −1.08 | 1.69 | −1.39 | 6.52 | +2.52 | 1.59 | −1.52 | 4.15 | +1.53 | 1.52 | −.90 | 7.04 | +4.11 | 23.53 | 116 |
| Minnesota | 1.50 | +.31 | 1.30 | −.76 | 2.52 | −.65 | 1.87 | −2.19 | .73 | −2.63 | 2.90 | −.28 | 2.07 | −.81 | 12.89 | 67 |
| Iowa | 1.02 | −.71 | 1.10 | −1.63 | 2.91 | −1.18 | 2.85 | −1.80 | .51 | −3.22 | 3.48 | −.06 | 7.22 | +3.41 | 19.09 | 79 |
| Missouri | 1.27 | −1.91 | 2.45 | −1.42 | 2.52 | −2.29 | 1.42 | −3.42 | 1.52 | −2.25 | .84 | −3.07 | 8.62 | +4.49 | 18.64 | 65 |
| Arkansas | 2.19 | −2.60 | 2.64 | −2.25 | 2.50 | −2.57 | 1.26 | −2.83 | 4.90 | +1.12 | .40 | −3.25 | 4.75 | +1.38 | 18.64 | 63 |
| Louisiana | 2.07 | −2.72 | 4.32 | −.33 | 5.13 | +.52 | .53 | −4.12 | 6.42 | +.26 | 4.48 | −.58 | 2.73 | −1.18 | 25.68 | 76 |
| Tennessee | 6.77 | +1.36 | 4.32 | −.11 | 1.31 | −2.84 | 1.04 | −3.21 | 6.75 | +2.34 | 2.18 | −1.85 | 3.10 | +.03 | 25.47 | 86 |
| Kentucky | 4.85 | +.14 | 4.79 | +.83 | 1.50 | −2.54 | .81 | −3.38 | 3.78 | −.36 | 2.22 | −1.51 | 3.57 | +.61 | 21.52 | 78 |
| Illinois | 1.70 | −1.37 | 2.44 | −.95 | 2.07 | −2.09 | 1.66 | −2.43 | 1.22 | −2.07 | 2.66 | −.69 | 6.77 | +3.14 | 18.52 | 74 |
| Indiana | 2.74 | −1.02 | 3.17 | −.32 | 2.02 | −2.04 | 1.37 | −2.26 | 1.59 | −1.76 | 3.08 | −.30 | 4.84 | +1.44 | 18.81 | 75 |
| Ohio | 3.64 | +.27 | 2.92 | −.20 | 1.78 | −1.91 | 1.74 | −2.04 | 3.06 | −.74 | 3.54 | +.16 | 3.18 | +.19 | 19.86 | 82 |
| Michigan | 1.09 | −1.08 | 2.04 | −.53 | 2.11 | −1.09 | 2.00 | −1.12 | 1.10 | −1.75 | 3.46 | +.81 | 5.01 | +1.78 | 16.81 | 85 |
| Wisconsin | 1.58 | −.19 | 1.28 | −1.26 | 2.70 | −.90 | 2.29 | −1.76 | 1.01 | −2.59 | 5.20 | +2.01 | 3.48 | −.18 | 17.54 | 78 |

TABLE 3.—*Summary of selected stations with daily maxima of 100° or above*

| State and month | Number of station records examined | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North Dakota: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| May | 51 | | | | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | 1 |
| June | 51 | | | | | | | | | | | | 2 | 1 | | | | | 3 | | | | | | 44 | 24 | 3 | 14 | 8 | | | | 8 |
| July | 50 | | 4 | 2 | 9 | 38 | 50 | 40 | 37 | 30 | 47 | 49 | 37 | 30 | 10 | 40 | 46 | 45 | 40 | 8 | | 16 | 2 | 13 | 9 | 26 | 5 | | | | 11 | 28 | 26 |
| August | 51 | 16 | 3 | | | | 2 | 13 | 12 | 1 | 23 | 4 | | | 7 | 3 | | 1 | | | | | | | | | | | | | | | 11 |
| September | 50 | | | 1 | | 1 | | | | | | | | | | | | | | | | | 10 | | | | | | | | | | 3 |
| South Dakota: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June | 41 | | | | | | | | | | | | | 12 | | 23 | 13 | | 12 | 1 | | | | | 27 | 38 | 16 | 30 | 27 | 9 | 1 | | 12 |
| July | 41 | 1 | 22 | 21 | 37 | 36 | 41 | 38 | 35 | 40 | 39 | 38 | 31 | 25 | 16 | 40 | 40 | 38 | 39 | 36 | 4 | 15 | 35 | 27 | 33 | 32 | 24 | 4 | 1 | | | 13 | 29 |
| August | 41 | 30 | 14 | 1 | | 1 | 3 | 11 | 35 | 17 | 18 | 25 | 3 | 3 | 14 | 32 | 4 | 11 | 10 | 2 | | | 1 | 25 | 14 | 3 | | | | | | 7 | 23 |
| September | 51 | | | | | | | | | | | | | | | | | | | | | 5 | 20 | 1 | | | | | | | | | 3 |
| Nebraska: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June | 45 | | | | | | | | | | | | | 1 | 5 | 20 | 3 | 1 | 11 | 7 | 6 | 9 | 3 | | 3 | 37 | 31 | 28 | 42 | 15 | 1 | | 17 |
| July | 46 | | 12 | 45 | 46 | 46 | 20 | 9 | 16 | 43 | 43 | 28 | 20 | 29 | 28 | 44 | 45 | 45 | 43 | 45 | 2 | 1 | 43 | 41 | 44 | 46 | 40 | 18 | 6 | 1 | | 1 | 29 |
| August | 46 | 11 | 26 | 2 | | | | | 21 | 37 | 32 | 34 | 34 | 28 | 28 | 37 | 34 | 41 | 32 | 9 | 10 | 4 | 1 | 29 | 44 | 18 | 15 | 26 | 1 | | | 1 | 25 |
| September | 61 | 4 | | | | 2 | 12 | | | 1 | 17 | 2 | | | 2 | | | | | | | | | | | | | | | | | | 7 |
| Kansas: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June | 75 | | | | | | | | 5 | | | | | 1 | 17 | 23 | 12 | 42 | 62 | 74 | 64 | 62 | 22 | | 1 | 43 | 73 | 68 | 74 | 62 | 9 | | 18 |
| July | 75 | 1 | 16 | 62 | 65 | 50 | 11 | 7 | 15 | 41 | 55 | 46 | 40 | 58 | 74 | 75 | 74 | 75 | 75 | 75 | 62 | 11 | 67 | 75 | 75 | 75 | 74 | 72 | 27 | 7 | | | 29 |
| August | 74 | 3 | 43 | 33 | 32 | | 2 | 15 | 40 | 71 | 72 | 70 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 67 | 59 | 51 | 39 | 69 | 72 | 74 | 56 | 4 | | | | 21 | 27 |
| September | 73 | 35 | 12 | 1 | 2 | 34 | 41 | 15 | 19 | 3 | 47 | 33 | 3 | 1 | | | | | | | | | | | | | | | | | | | 13 |
| Oklahoma: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| April | 50 | | | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | 1 | | | 2 |
| May | 50 | | | | | | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | 1 |
| June | 49 | | | | | | 1 | | 6 | 8 | 2 | | | | 2 | 17 | 24 | 24 | 47 | 35 | 46 | 48 | 44 | 6 | | 4 | 32 | 45 | 38 | 21 | 7 | | 20 |
| July | 48 | 2 | 1 | 22 | 27 | 6 | 2 | 4 | 4 | 13 | 25 | 17 | 24 | 43 | 47 | 46 | 39 | 47 | 48 | 48 | 48 | 27 | 36 | 42 | 41 | 34 | 43 | 48 | 46 | 42 | 14 | 1 | 31 |
| August | 48 | 1 | 36 | 38 | 45 | 38 | 33 | 45 | 47 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 47 | 47 | 47 | 46 | 45 | 43 | 45 | 47 | 43 | 44 | 37 | 22 | 1 | 1 | 9 | 31 |
| September | 49 | 25 | 37 | 6 | 8 | 31 | 40 | 40 | 24 | 30 | 38 | 19 | 11 | 5 | | | | | | | | | | | | | | | | | | | 13 |

TABLE 3.—*Summary of selected stations with daily maxima of 100° or above*—Continued

| State and month | Number of station records examined | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Texas: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| April | 60 | | | | | 4 | | | | | | | | | | | | | | | | | | | | | | | 1 | 3 | 1 | | 4 |
| May | 60 | 1 | | | 1 | | | | 1 | | | | | | | | | 2 | | | 1 | | | | | | | | | | | | 5 |
| June | 54 | | 2 | 1 | | 4 | 4 | 7 | 12 | 13 | 8 | 5 | 4 | 3 | 1 | 13 | 13 | 15 | 11 | 6 | 14 | 37 | 29 | 13 | 5 | 5 | 9 | 15 | 7 | 3 | 6 | | 28 |
| July | 55 | 5 | | 2 | 3 | | 1 | | | 1 | 2 | 4 | 5 | 7 | 5 | 13 | 2 | 10 | 20 | 29 | 24 | 14 | 8 | 9 | 5 | 5 | 8 | 13 | 14 | 18 | 11 | | 26 |
| August | 56 | 1 | 6 | 6 | 11 | 13 | 17 | 19 | 29 | 39 | 44 | 45 | 34 | 31 | 30 | 22 | 18 | 18 | 20 | 14 | 15 | 17 | 17 | 29 | 27 | 22 | 13 | 4 | 5 | 2 | 2 | 1 | 31 |
| September | 56 | 4 | 11 | 3 | 7 | 13 | 11 | 5 | 6 | 11 | 11 | 9 | 5 | 3 | 1 | 1 | | | 1 | 1 | 1 | 1 | 1 | | | | | | | | | | 20 |
| Minnesota: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June | 45 | | | | | | | | | | | | | | | | | | | | | | | | 1 | 5 | | 2 | | | | | 3 |
| July | 45 | | | | 3 | 2 | 36 | 33 | 25 | 16 | 37 | 43 | 44 | 44 | 29 | 22 | 35 | 16 | 11 | 2 | | | 5 | 1 | | | | | | | | | 18 |
| August | 46 | | 1 | | | | | | 4 | 1 | | 2 | | | | 23 | | | | | | | | 1 | 7 | | | | | | | | 7 |
| September | 51 | | | | | | | | | | | | | | | | | | | | | | | 8 | | | | | | | | | 1 |
| Iowa: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June | 44 | | | | | | | | | | | | | | | | | | | 13 | | | | | | 3 | 14 | 2 | 17 | 21 | | | 6 |
| July | 45 | | | 16 | 31 | 44 | 41 | 32 | 27 | 38 | 45 | 45 | 44 | 45 | 45 | 45 | 42 | 45 | 13 | 16 | | | 20 | 8 | 13 | 26 | 43 | 13 | 9 | | | | 24 |
| August | 45 | | 4 | | | | | | 2 | 34 | 2 | 2 | 31 | 13 | 21 | 29 | 20 | 13 | 41 | 10 | 18 | 15 | 2 | 36 | 20 | 20 | 2 | 7 | | | | | 21 |
| September | 54 | | | | | | 6 | | | | | 13 | | | | | | | | | | | | | | | | | | | | | 2 |
| Missouri: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June | 49 | | | | | | | | | 6 | | | | | 1 | 9 | 23 | 17 | 14 | 43 | 29 | 8 | 2 | 1 | | 3 | 23 | 30 | 46 | 47 | 9 | | 17 |
| July | 49 | 1 | | 15 | 30 | 28 | 21 | 25 | 25 | 35 | 39 | 37 | 46 | 49 | 49 | 48 | 39 | 38 | 34 | 34 | 8 | | 17 | 38 | 42 | 42 | 42 | 46 | 30 | 12 | | | 27 |
| August | 50 | | | 7 | 16 | 8 | | | 9 | 44 | 32 | 9 | 41 | 40 | 42 | 46 | 49 | 50 | 50 | 49 | 45 | 47 | 47 | 40 | 37 | 36 | 45 | 47 | 19 | | | 5 | 25 |
| September | 50 | 2 | 1 | | 2 | 9 | 24 | 6 | 3 | | 8 | 28 | 11 | 9 | 4 | 1 | | | | | | | | | | | | | | | | | 13 |
| Arkansas: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June | 54 | | | | | | 2 | 1 | 3 | 13 | 3 | | | | 1 | 13 | 27 | 31 | 37 | 51 | 53 | 47 | 35 | 8 | | 2 | 10 | 26 | 47 | 31 | 26 | | 21 |
| July | 54 | 4 | | | 2 | 1 | 1 | 4 | 8 | 12 | 7 | 9 | 25 | 43 | 31 | 22 | 13 | 17 | 43 | 25 | 17 | 2 | 1 | 8 | 14 | 12 | 17 | 26 | 34 | 30 | 4 | 1 | 29 |
| August | 54 | 1 | | 5 | 11 | 31 | 20 | 15 | 23 | 52 | 50 | 38 | 34 | 33 | 34 | 42 | 49 | 52 | 51 | 46 | 46 | 46 | 45 | 25 | 5 | 1 | 31 | 43 | 49 | 10 | 2 | 11 | 30 |
| September | 54 | 1 | 4 | 13 | 21 | 29 | 14 | 18 | 18 | 14 | 27 | 24 | 20 | 14 | 12 | 1 | 1 | | | 2 | 2 | 1 | | 1 | | | | | | | | | 20 |
| Wisconsin: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| July | 40 | | | | | 1 | 8 | 34 | 35 | 30 | 29 | 33 | 34 | 36 | 29 | 7 | 6 | 10 | 3 | | | | | | | | 3 | 1 | | | | | 16 |
| August | 40 | | | | | | | | | 3 | | | 1 | | | 9 | | | 8 | 1 | | | | | | | | | | | | | 5 |
| Illinois: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June | 48 | | | | | | | | | | | | | | | | | 15 | | 16 | 17 | 1 | | | | | | 5 | 20 | 37 | 10 | | 8 |
| July | 48 | | | | 21 | 32 | 43 | 44 | 43 | 40 | 46 | 45 | 47 | 46 | 47 | 41 | 33 | 34 | 6 | 2 | | | 1 | 17 | 14 | 15 | 45 | 36 | 18 | 1 | | | 24 |
| August | 48 | | | | 1 | 2 | | | | 18 | 6 | 7 | 17 | 30 | 17 | 24 | 17 | 17 | 44 | 28 | 21 | 29 | 39 | 21 | 28 | 20 | 24 | 14 | 15 | | | | 22 |
| September | 48 | | | | | | | | | | | 5 | 5 | 8 | 3 | | | | | | | | | | | | | | | | | | 4 |
| Indiana: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June | 49 | | | | | | | | | | | | | | | | 1 | 8 | | | 4 | | | | | | | 4 | 11 | 24 | 8 | | 7 |
| July | 50 | | | | 4 | 15 | 18 | 41 | 46 | 44 | 50 | 46 | 48 | 48 | 50 | 41 | 18 | 21 | 1 | | | | | 2 | 5 | | 23 | 36 | 9 | | | | 20 |
| August | 49 | | | 1 | 1 | 1 | | | | 2 | 1 | 1 | 6 | 23 | 1 | 9 | 10 | 13 | 22 | 30 | 22 | 34 | 43 | 8 | 20 | 11 | 11 | 12 | 17 | 1 | | | 24 |
| September | 50 | 1 | | | | | | | | | | | 2 | 4 | 5 | 1 | 1 | | | | | | | | | | | | | | | | 6 |
| Ohio: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June | 35 | | | | | | | | | | | | | | | | | 5 | | | | | | | | | | | | 2 | 1 | | 3 |
| July | 35 | | | | | | | 3 | 19 | 34 | 31 | 26 | 30 | 22 | 34 | 12 | 2 | 4 | 1 | | | | | | | | 4 | 19 | 2 | | | | 15 |
| August | 35 | | | | | | | | | | | | | 5 | | | | | | 16 | 1 | 17 | 23 | 3 | | | | | | | | | 6 |
| September | 36 | | | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | | 1 |
| Kentucky: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June | 41 | | | | | | | | | | | | | | | 2 | 1 | 22 | 2 | 5 | 11 | 6 | | | | | 4 | 23 | 31 | 38 | 24 | | 12 |
| July | 39 | 1 | | | | | 1 | 22 | 20 | 36 | 36 | 31 | 32 | 34 | 37 | 37 | 2 | | | | | | | | 4 | | 7 | 19 | 22 | 1 | | | 17 |
| August | 40 | | | | | | | | | | 1 | 2 | 4 | 2 | 1 | 4 | 9 | 25 | 28 | 38 | 33 | 39 | 33 | 7 | 5 | 9 | 19 | 31 | 32 | 3 | 1 | | 21 |
| September | 40 | | | | | | | | | | | | 2 | 1 | 6 | 3 | 1 | | | | | | | | | | | | | | | | 5 |

TABLE 4.—*Monthly and annual temperature departures, 1936*

[Compiled from tables entitled "Climatological data for Weather Bureau stations" contained in the 12 issues of the REVIEW during 1936]

| Districts | January | February | March | April | May | June | July | August | September | October | November | December | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| New England | +0.1 | −4.9 | +7.2 | −0.8 | +2.1 | +0.5 | −0.7 | +0.2 | +0.2 | +0.5 | −2.3 | +3.1 | +0.4 |
| Middle Atlantic | −2.8 | −5.4 | +6.5 | −1.7 | +2.6 | +.3 | +1.5 | +2.1 | +1.9 | +1.6 | −1.7 | +3.4 | +.7 |
| South Atlantic | −2.4 | −3.7 | +3.8 | −1.2 | +1.9 | +.9 | +1.8 | +2.0 | +3.3 | +2.8 | −.7 | +2.0 | +.9 |
| Florida Peninsula | +1.7 | +.1 | −.2 | +1.3 | +.3 | −.6 | +.7 | +.2 | +1.3 | +2.9 | +.1 | +3.4 | +.9 |
| East Gulf | −1.3 | −3.7 | +3.8 | −1.3 | +1.7 | +2.7 | +1.1 | +1.5 | +3.5 | +2.0 | −1.2 | +2.1 | +.9 |
| West Gulf | −1.8 | −5.9 | +4.0 | −1.6 | +.5 | +2.6 | +.5 | +3.1 | +2.8 | −2.5 | −2.9 | +2.5 | +.1 |
| Ohio Valley and Tennessee | −5.6 | −6.5 | +4.2 | −3.5 | +3.0 | +2.3 | +3.8 | +4.9 | +4.1 | +.4 | −3.0 | +3.4 | +.6 |
| Lower Lakes | −2.7 | −6.9 | +4.8 | −2.8 | +2.9 | .0 | +1.9 | +2.2 | +2.5 | +.1 | −3.5 | +3.6 | +.2 |
| Upper Lakes | −2.5 | −10.3 | +3.4 | −3.9 | +4.3 | −1.9 | +4.4 | +2.5 | +2.6 | −2.5 | −3.6 | +3.5 | −.3 |
| North Dakota | −10.7 | −20.4 | +2.8 | −4.6 | +7.8 | +3.2 | +12.3 | +4.6 | +3.3 | −1.4 | +1.4 | +2.2 | :0 |
| Upper Mississippi Valley | −6.7 | −12.8 | +4.3 | −3.4 | +5.7 | +.5 | +8.2 | +6.4 | +3.9 | −.8 | −1.9 | +4.7 | +.7 |
| Missouri Valley | −7.4 | −13.2 | +5.9 | −1.5 | +6.0 | +3.9 | +10.3 | +8.8 | +4.6 | −.9 | −.9 | +4.4 | +1.7 |
| Northern Slope | −.2 | −16.7 | +1.5 | −.1 | +7.0 | +4.7 | +8.4 | +4.1 | +1.9 | +1.6 | −.4 | +2.1 | +1.2 |
| Middle Slope | −.6 | −8.3 | +4.6 | +1.2 | +4.2 | +4.6 | +6.2 | +6.6 | +2.2 | −1.9 | +.7 | +4.7 | +2.0 |
| Southern Slope | −.7 | −1.6 | +3.6 | .0 | +.6 | +2.6 | +.2 | +3.1 | +.1 | −2.6 | −1.9 | +3.4 | +.6 |
| Southern Plateau | +1.3 | +.8 | +2.7 | +4.1 | +3.5 | +3.6 | +1.7 | +2.2 | .0 | +.7 | +.9 | +1.6 | +1.9 |
| Middle Plateau | +3.4 | +1.5 | +1.4 | +4.1 | +4.2 | +3.6 | +2.9 | +1.9 | −.4 | +1.7 | −1.3 | +1.4 | +2.0 |
| Northern Plateau | +2.9 | −9.7 | −1.6 | +3.9 | +5.8 | +3.2 | +4.2 | +3.2 | +.6 | +4.3 | −3.7 | +3.5 | +1.4 |
| North Pacific | +3.9 | −4.4 | −1.2 | +3.6 | +3.7 | +3.4 | +2.1 | +2.4 | +.6 | +3.2 | −.2 | +1.5 | +1.6 |
| Middle Pacific | +3.6 | +1.3 | +1.6 | +2.4 | +3.3 | +2.6 | +2.4 | +1.8 | +2.3 | +2.9 | +1.9 | −.2 | +2.2 |
| South Pacific | +3.8 | +.9 | +1.8 | +1.4 | +3.1 | +1.6 | +3.3 | +2.5 | +1.8 | +2.3 | +4.4 | +1.2 | +2.3 |
| United States | −1.2 | −6.2 | +3.1 | −.2 | +3.5 | +2.1 | +3.7 | +3.2 | +2.1 | +.7 | −.9 | +2.7 | +1.0 |

TABLE 5.—*Precipitation departures, monthly and annual, 1936*

[Compiled from tables entitled "climatological data for Weather Bureau stations" contained in the 12 issues of the REVIEW during 1936]

| Districts | January | February | March | April | May | June | July | August | September | October | November | December | Sum |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| New England | +2.4 | −0.5 | +2.6 | +0.3 | −1.4 | +0.8 | −1.4 | −0.3 | +0.5 | +0.4 | −1.5 | +3.5 | +5.4 |
| Middle Atlantic | +2.7 | −.2 | +1.3 | .0 | −1.3 | +.1 | −1.3 | −.4 | +.3 | .0 | −1.3 | +1.7 | +1.6 |
| South Atlantic | +2.0 | +.7 | +1.9 | +1.9 | −2.4 | −1.1 | +.5 | −.4 | +.4 | +2.2 | −.6 | +1.8 | +6.9 |
| Florida Peninsula | +.8 | +3.1 | +1.5 | −.8 | +.8 | +6.1 | +1.6 | +1.6 | −2.3 | −1.1 | −.1 | +.2 | +11.4 |
| East Gulf | +4.8 | +1.8 | −2.4 | +2.0 | −1.4 | −2.5 | +1.1 | .0 | −1.2 | −.3 | −1.0 | +.6 | +1.5 |
| West Gulf | −1.7 | −1.4 | −1.3 | −.8 | +2.7 | −1.9 | +1.4 | −1.5 | +1.8 | −.5 | −1.0 | .0 | −4.2 |
| Ohio Valley and Tennessee | −.7 | −.7 | +.5 | +.1 | −2.1 | −2.5 | .0 | −.9 | +.2 | +1.0 | .0 | +.3 | −4.8 |
| Lower Lakes | −.6 | −.1 | +1.7 | .0 | −1.5 | −1.2 | −1.2 | −.6 | +.8 | .0 | −.1 | −.6 | −3.4 |
| Upper Lakes | +.2 | .0 | −.7 | −.4 | −.8 | −1.9 | −2.4 | +.8 | +1.4 | .0 | −1.1 | +.3 | −4.6 |
| North Dakota | −.1 | +.3 | +.2 | −1.2 | −1.7 | −2.5 | −1.8 | −1.2 | −.5 | −.9 | −.3 | −.2 | −9.9 |
| Upper Mississippi Valley | −.2 | .0 | −.3 | −1.0 | −2.2 | −1.9 | −2.6 | −.1 | +2.7 | −.1 | −.7 | +.7 | −5.7 |
| Missouri Valley | +.2 | −.5 | −1.3 | −1.3 | −.8 | −2.7 | −3.1 | −2.0 | +2.1 | −.6 | −.8 | +.3 | −10.5 |
| Northern Slope | .0 | +.3 | −.1 | −.5 | −1.2 | −.6 | −.5 | −.3 | −.5 | .0 | −.4 | .0 | −3.8 |
| Middle Slope | −.1 | −.6 | −.8 | −1.6 | +.5 | −2.1 | −1.9 | −1.1 | +2.0 | .0 | −.9 | .0 | −6.6 |
| Southern Slope | +.1 | −.6 | −.4 | −.4 | +2.0 | −1.0 | −1.0 | −1.6 | +2.5 | −.6 | −.7 | −.4 | −2.1 |
| Southern Plateau | −.1 | +.3 | −.3 | −.3 | −.1 | −.2 | +.3 | −.4 | +.8 | .0 | −.1 | +.1 | .0 |
| Middle Plateau | −.1 | +1.1 | −.2 | −.6 | −.8 | +.3 | +.7 | +.2 | −.2 | +.3 | −.5 | +.4 | +.6 |
| Northern Plateau | +.8 | +.3 | −.4 | −.5 | −.8 | +.4 | +.2 | .0 | −.2 | −.9 | −1.3 | −.6 | −3.0 |
| North Pacific | +2.1 | −.4 | −1.0 | −1.4 | +1.0 | +1.3 | +.3 | −.1 | −1.1 | −2.9 | −5.5 | −.7 | −8.4 |
| Middle Pacific | +1.0 | +3.6 | −2.3 | +.2 | −.2 | +.4 | +.1 | .0 | −.6 | −1.2 | −3.4 | −.9 | −3.3 |
| South Pacific | −1.6 | +3.5 | −.8 | −.3 | −.4 | .0 | .0 | +.1 | −.1 | +1.3 | −.8 | +2.8 | +3.7 |
| United States | +.6 | +.5 | −.1 | −.3 | −.6 | −.6 | −.5 | −.4 | +.4 | −.2 | −1.0 | +.5 | −1.8 |

## NOTES AND REVIEWS

Sir Napier Shaw (with the assistance of Elaine Austin). *Manual of Meteorology:* Volume II, Comparative Meteorology. Second Edition, Cambridge; at the University Press, New York; The Macmillan Co., 1936.

The *Manual of Meteorology* by Sir Napier Shaw first appeared in four large volumes during the years 1926–32 (a preliminary version of vol. IV was issued in 1919). Of these, the third and the fourth volumes are in general largely occupied with the physical and dynamical aspect of meteorology, the first volume with historical material, and the second with descriptive meteorology.

Volume II, Comparative Meteorology, which first appeared in 1928, has now, after a lapse of 8 years, appeared in a second edition, with both omissions and additions as well as corrections and modifications throughout the text, the net result of which is an increase of 35 in the number of pages. In using the volume, particular attention should be paid to the notes gathered together at the end (in ch. X), which bring information throughout the book up to date; a list of the omissions from the first edition is also included. The book comprises xlviii+472 royal octavo pages, and contains over 200 figures, including many maps and charts, numerous tables, bibliographies and references to literature, and a 20-page index.

The volume opens with 22 pages devoted to definitions and extended explanations of a number of physical and meteorological terms, followed by a 9-page discussion of meteorological nomenclature and units, and a graph that shows the duration of daylight throughout the year at different latitudes.

The first chapter briefly discusses solar and terrestrial radiation. The second chapter is a short account of the orographic features of the earth, sea ice, ocean currents, and geophysical phenomena more or less directly involved in meteorology—volcanoes, earthquakes, terrestrial magnetism, aurorae, atmospheric electricity; a map of annual frequency of days with thunder over the globe is included. Chapter III considers the composition of the atmosphere (at all heights), including the solid impurities such as dust, smoke and nuclei.

In chapter IV, the normal distribution of temperature over the globe is discussed. The principal feature of the chapter is a set of monthly and annual world maps of normal temperature reduced to sea level, supplemented by maps of the average daily range throughout the year, the seasonal range, and sea-surface temperatures. Numerous tables and diagrams are also given. Earth temperatures and upper air temperatures are discussed at length, including the distribution of potential temperature and entropy in the free air. Chapter V presents a corresponding discussion of humidity, fog, cloud, precipitation, and evaporation, accompanied by world maps of normal dewpoints, cloudiness, and rainfall. Pressure, and the surface and upper air winds of the globe, are similarly treated in chapter VI, which also includes world charts of normal pressure at 2, 4, 6, and 8 kilometers.

After this discussion of the normal state of the atmosphere as represented by monthly and annual mean values and mean diurnal and seasonal variations, it is pointed out that a mean value is not necessarily the value that actually occurs with the greatest frequency; and in chapter VII the problem of the variations from the normal which are observed to be continually in progress is considered. In this chapter is included a discussion of meteorological periodicities, with a list of periods, of from 1 to 260 years in length, which have been found in various meteorological phenomena by different writers (that occupies five pages of fine print!) and of the application of correlation theory to meteorological phenomena.

Chapters VIII and IX are devoted to cyclones and anticyclones—their general characteristics and phenomena, paths, and structure, with brief mention of tornadoes, whirlwinds, and waterspouts. A short note by E. Gold on weather forecasting is included.—*Edgar W. Woolard.*