

MOUNTAIN AND VALLEY WINDS AT SYRACUSE, N. Y.

By ERNEST S. CLOWES, Assistant Observer.

[Dated Aug. 19, 1919, Syracuse, N. Y.]

While mountain and valley winds are usually associated with the relatively narrow valleys leading up to high mountain ranges there have been a few cases recorded of these typical winds where the topographical features were not so strongly pronounced. Such cases have been noted at Utica, N. Y.<sup>1</sup> and at Ithaca, N. Y.<sup>1</sup> and a further interesting example may be found at Syracuse in the same State.

Before considering the local topography at Syracuse it might be well to give a brief glance at that of central New York in general. This section is very sharply divided into two parts, the interior plateau, and the northern plain which extends for 30 to 40 miles south and southeast of Lake Ontario. The line of division is a little south of and parallel to the old Erie Canal which runs through the center of Syracuse. The canal has here an elevation above sea level of about 400 feet and the land to the north of it is generally level and of about the same altitude. Southward it rises quite abruptly 150 to 200 feet and continues to rise rather steadily until elevations of 2,000 feet above sea level are reached about 20 miles south. The topography is so pronounced that viewed from the north side of Oneida Lake, 20 miles northward across the plain, the highlands extend in a wall from southeast to southwest quite like a distant range of mountains. The edge of this plateau passes through Syracuse. The greater part of the city lies on the plain but has spread up on the hills, which bound it on the east, south, and west, and which within a couple of miles rise about 200 feet above the center of the city. On one of these hills to the southeast the Weather Bureau station is located; the wind vane being 113 feet above the surface of the ground and about 300 feet above the level of the plain. To the southeasterly the land rises in irregular hills, the general trend being upward for about 25 miles. South and southwestward and directly south of the city is the valley of Onandaga Creek. This valley is about 2 miles wide at the entrance and extends inland

about 8 miles. Such are the topographical features in the neighborhood of the station.

The accompanying table shows the prevailing hourly direction of the wind for every hour of the day, by months, and has been compiled from records of 16 years. The diurnal variation from south to northwest is clearly marked for every month except for November to February, inclusive, and the hour of the shift in the wind is quite clearly indicated. In conformity with most observations of such winds the wind from the hills is shown to be more pronounced during the winter when its force in this case is sufficient to mask entirely the northwesterly wind that prevails at that season in this latitude and pull it around into a westerly or southwesterly direction. This is readily explained by the greater radiation from the hills during the long winter nights. Neighboring stations in the hills at elevations of even 1,300 feet above the sea show January normals a degree or more below Syracuse and the difference must be more pronounced at higher levels especially at night. There is a singular exception to the general plan of the wind system during February, which although a cold month, has less south wind than any month in the year. This may be due to the fact that the northwest wind at that time is strong enough to prevail over the local circulation to the extent of pulling the night wind from the south around as far west as shown in the table.

It would be interesting to determine whether this diurnal wind system extends uniformly along the whole northern slope of the plateau region of central New York or whether it is confined to localities, such as Syracuse, that stand at or near the lower end of valleys. A fact that points to the former conclusion is that although the Weather Bureau station at Syracuse is well up on the eastern slope of the valley the night wind seldom shows an easterly component and southeasterly winds are comparatively rare. It may be added in conclusion that when a south wind is normally to be expected here, because of general cyclonic conditions, it is usually stronger than the pressure gradient would indicate, especially at night; and the highest velocities recorded here at all seasons except from summer thunderstorm squalls have been from the south, which direction also holds the record for the absolute maximum velocity.

<sup>1</sup> E. T. Turner, "The climate of the State of New York." Fifth Ann. Rept. Met. Bureau and Weather Service of the State of New York.

Prevailing hourly wind directions for every month in the year at Syracuse, N. Y.

[Based upon records of 16 years.]

| Hour.      | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Means. |
|------------|------|------|------|------|------|-------|-------|------|-------|------|------|------|--------|
| 1 a. m.    | s.   | w.   | s.   | s.   | s.   | s.    | s.    | s.   | s.    | s.   | s.   | s.   | s.     |
| 2 a. m.    | s.   | w.   | s.   | s.   | s.   | s.    | s.    | s.   | s.    | s.   | s.   | s.   | s.     |
| 3 a. m.    | s.   | w.   | s.   | s.   | s.   | s.    | s.    | s.   | s.    | s.   | s.   | s.   | s.     |
| 4 a. m.    | s.   | w.   | s.   | s.   | s.   | s.    | s.    | s.   | s.    | s.   | s.   | s.   | s.     |
| 5 a. m.    | s.   | w.   | s.   | s.   | s.   | s.    | s.    | s.   | s.    | s.   | s.   | s.   | s.     |
| 6 a. m.    | s.   | w.   | s.   | s.   | s.   | s.    | s.    | s.   | s.    | s.   | s.   | s.   | s.     |
| 7 a. m.    | s.   | w.   | s.   | s.   | s.   | s.    | s.    | s.   | s.    | s.   | s.   | s.   | s.     |
| 8 a. m.    | s.   | s.   | s.   | s.   | s.   | s.    | s.    | s.   | s.    | s.   | s.   | s.   | s.     |
| 9 a. m.    | s.   | s.   | nw.  | nw.  | w.   | w.    | s.    | s.   | s.    | s.   | s.   | s.   | s.     |
| 10 a. m.   | s.   | s.   | nw.  | nw.  | nw.  | nw.   | s.    | s.   | s.    | s.   | s.   | s.   | s.     |
| 11 a. m.   | s.   | s.   | nw.  | nw.  | nw.  | nw.   | nw.   | nw.  | nw.   | s.   | s.   | sw.  | nw.    |
| 12 noon.   | s.   | s.   | nw.  | nw.  | nw.  | nw.   | nw.   | nw.  | nw.   | nw.  | s.   | sw.  | nw.    |
| 1 p. m.    | s.   | nw.  | nw.  | nw.  | nw.  | nw.   | nw.   | nw.  | nw.   | nw.  | w.   | sw.  | nw.    |
| 2 p. m.    | w.   | nw.  | nw.  | nw.  | nw.  | nw.   | nw.   | nw.  | nw.   | nw.  | w.   | w.   | nw.    |
| 3 p. m.    | w.   | nw.  | nw.  | nw.  | nw.  | nw.   | nw.   | nw.  | nw.   | nw.  | w.   | w.   | nw.    |
| 4 p. m.    | w.   | w.   | nw.  | nw.  | nw.  | nw.   | nw.   | nw.  | nw.   | nw.  | w.   | w.   | nw.    |
| 5 p. m.    | w.   | w.   | nw.  | nw.  | nw.  | nw.   | nw.   | nw.  | nw.   | nw.  | w.   | sw.  | nw.    |
| 6 p. m.    | w.   | w.   | nw.  | nw.  | nw.  | nw.   | nw.   | nw.  | nw.   | nw.  | w.   | sw.  | nw.    |
| 7 p. m.    | w.   | w.   | nw.  | nw.  | nw.  | nw.   | nw.   | nw.  | nw.   | s.   | w.   | sw.  | nw.    |
| 8 p. m.    | w.   | w.   | w.   | nw.  | nw.  | nw.   | w.    | s.   | s.    | s.   | w.   | sw.  | w.     |
| 9 p. m.    | w.   | w.   | w.   | nw.  | nw.  | nw.   | s.    | s.   | s.    | s.   | w.   | sw.  | s., w. |
| 10 p. m.   | w.   | w.   | w.   | w.   | w.   | s.    | s.    | s.   | s.    | s.   | s.   | sw.  | s.     |
| 11 p. m.   | s.   | w.   | w.   | w.   | s.   | s.    | s.    | s.   | s.    | s.   | s.   | s.   | s.     |
| 12 night.  | s.   | w.   | w.   | s.   | s.   | s.    | s.    | s.   | s.    | s.   | w.   | s.   | s.     |
| Means..... | s.   | w.   | nw.  | nw.  | nw.  | nw.   | s.    | s.   | s.    | s.   | s.   | s.   | s.     |