

following memorandum by Mr. L. T. Samuels of the Aerological Division:

NOTE

Pilot-balloon observations over Missouri and Oklahoma and kite observations over the latter State show decidedly abnormal and significant free-air conditions on the dates when tornadoes occurred in this section, viz, May 8-9, 18, 24, 27. The outstanding features are:

(1) A marked fall in the free-air temperature occurring coincidentally with a rise at the surface and lower levels.

(2) The development or intensification of a temperature inversion immediately above the stratum wherein the marked decrease in temperature referred to in (1) occurred.

(3) An abnormally high lapse rate superimposed on the inversion level referred to in (2).

(4) An excessive increase in wind velocity within the first few hundred meters' elevation.

(5) A veering of the wind with height, usually from southerly at the ground to southwesterly at the level of maximum velocity and occasionally veering until a diametrically opposite direction occurs at about 1,500 meters.

WASHINGTON, D. C., TORNADO OF MAY 14, 1927

By L. T. SAMUELS

A tornado, small but distinct and accompanied by a well-marked funnel-shaped cloud, was observed in Washington, D. C., about 6 p. m. on May 14, 1927. At this time the entire western sky was overcast with Cu. Nb. clouds and a thunderstorm seemed imminent. At Fourth and Channing Streets NE. my attention was attracted by a peculiar movement of the clouds in a small portion of the sky toward the northwest. Although no funnel-shaped cloud had yet formed, a rather violent rotary motion was seen at the lower surface of the clouds in this region. The whole cloud mass, including the rotating area, moved moderately fast from the northwest, and portions of cloud in the rotating area soon protruded downward toward the earth and became funnel shaped. A counterclockwise rotation was clearly observed.

While the funnel increased in length small patches of cloud continued to appear and disappear as if by magic out of the comparatively clear air adjacent to and *below* its tip. These puffs of cloud moved rapidly inward or upward (depending on where they formed) toward the main trunk and usually attached themselves onto the latter. When the cloud was 0.7 of a mile south by west of the writer, its lower end appeared to be about 100 feet above the tree tops which formed the horizon. Its actual height above the ground, however, must have been greater, since it was on the opposite side of an intervening ridge. The patches of cloud rising swiftly upward, seemingly out of the tree tops, toward the main trunk presented an exceedingly striking appearance. It was evident that the air was rushing along both inward and upward and that condensation was occurring with a very small vertical displacement.

As the cloud became more and more pronounced and extended to probably between 200 and 300 feet of the ground the surrounding air became densely filled with scraps of paper, branches, dust, etc., which rose within or very close to the cloud itself and then spread out laterally as the top was approached.

The main trunk at the time of its fullest development appeared to be about 50 feet in diameter. By the time it reached a point to the southwest of the observer it had begun to rise and then gradually became absorbed

by the main Cu. Nb. layer from which it protruded. The lower extremity, which lashed violently throughout its journey, seemed constantly to fling off patches of cloud from its tip, while new bits formed and took their place.

The length of the path along which the effects of the tornado were greatest was about one-half mile and its width about 30 feet. It extended from First and Adams Streets NW. southeastward across Prospect Hill Cemetery to Rhode Island Avenue and Second Street NE. The damage consisted of a number of good-sized trees being either uprooted or having large limbs torn off, awnings badly twisted, slate shingles torn from roofs, and several tombstones, approximately 4 by 2 by 1/2 foot blown over.

Practically no wind was noticed on either side of the actual path. The characteristic noise which usually accompanies tornadoes was not heard by the writer, but others closer to its path described the noise as resembling a "siren." Mr. Albert Kiernan, of 49 V Street NW, saw the funnel-shaped cloud as it approached his home from the northwest, and when it appeared to be over the reservoir at the filtration plant he observed what seemed to be a stream of water rising toward the cloud to a height of 200 feet.

A rather heavy shower of short duration occurred in the vicinity shortly after the tornado passed, but only 0.04 of an inch of rain fell at the Weather Bureau 2 1/2 miles to the southwest. The barograph and thermograph records at the latter place showed only the usual fluctuations characteristic of a thunderstorm. This tornado occurred in the southeast quadrant of a low-pressure area. The 3 p. m. pilot-balloon observation at Washington showed a light surface wind from the south-southeast, becoming southwesterly above 500 meters and increasing steadily to 22 m. p. s. at 2,300 meters, where the balloon entered St. Cu. clouds. An unusually large temperature lapse rate was already evident in the morning, when an airplane observation made at the Naval Air Station, Anacostia, D. C., showed this to be 0.80° C. per 100 m. between the 1,500 m. and 2,400 m. levels.