NOTE ON DEEP NORTHEAST-COMPONENT WINDS OBSERVED JANUARY 27–31, 1920.

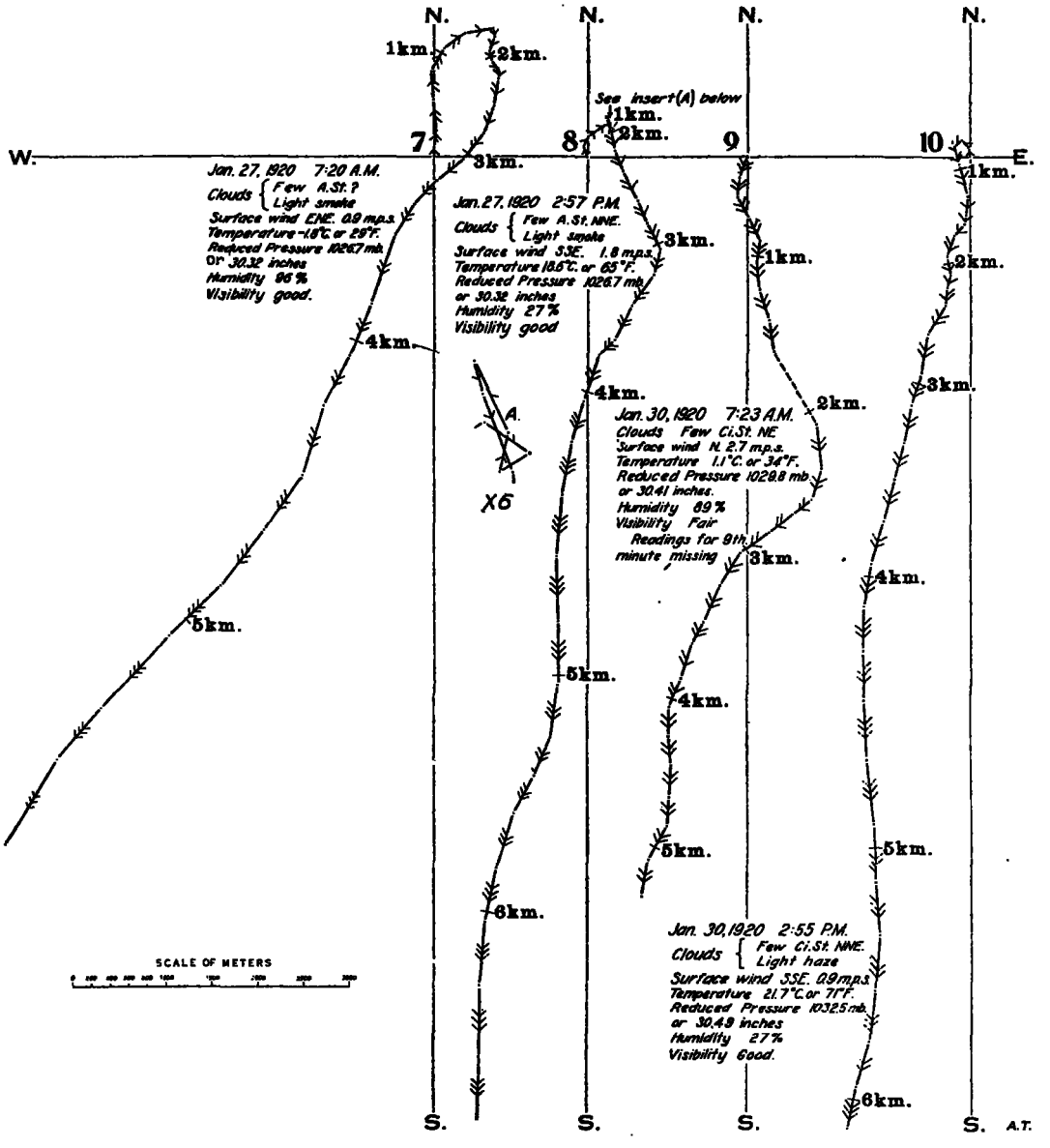
By SAMUEL GOTTLICH, Observer.

[Weather Bureau, Washington, Mar. 29, 1920.]

During the period January 27–31, 1920, the winds at the aerological stations far south, particularly those in Texas, had a northeast component persisting to considerable altitudes. An examination of the weather maps for those days indicates that from Texas some distance north-northwestward there was little temperature change. In fact, on the 29th–31st there were increasing temperatures as northerly latitudes were reached. These warm areas in Wyoming and Nebraska were probably chinook effects. Meanwhile temperatures in Texas were below normal. The result was a spreading apart of the isobars, in the vertical, over the regions north of Texas and a crowding together over Texas; consequently a pressure gradient in the upper strata from north-northwest to south-southeast and therefore northeasterly winds.

The maximum altitude at which these northeast component winds were observed was 10.2 kilometers. Above this level there was a gradual backing to the southwest and then veering back to north at 12.5 kilometers.

The accompanying stereoscopic views (figs. 4–10.) show the surface pressure and temperature distribution over the country and the free-air conditions at selected pilot-balloon stations during this period. Figures 7–10 represent the horizontal projections of balloons at Kelly Field, Tex., on selected days.



FIGS. 7–10.—Horizontal projections of pilot balloon flights from Kelly Field, Tex. The barbs for each minute indicate wind velocities in beaufort numbers. The directions and speeds indicated at the ends of the projections for figs. 7, 8, and 10 are the means for the remainders of the flights, which continued for several minutes more.

In connection with the ascension at Kelly Field on January 27, 8 a. m., the following meteorological phenomenon was observed:

At the beginning of the observation, what appeared to be a combination of fog and smoke was observed banked to the east and northeast of the station. No outline of the city of San Antonio could be seen,

although the visibility in every other direction was good. At 7:30 a. m. smoke sheets in pronounced billow formation began moving toward the station with good velocities. This phenomenon was unusual on account of the great amplitude and wave lengths of the billows, which passed only a short distance overhead, but a little frayed and torn, suggesting the appearance of a large blanket being whipped by the wind. As indicated by the wind-aloft-data from this observation there appeared a stratification of air currents near the surface which probably accounted for the billow formation. Further in this connection attention is invited to the great difference in temperature observed in San Antonio, where there was the protective covering of fog and smoke, and at Kelly Field, 5 miles to the southwest, where free radiation was possible. The temperature in San Antonio at 7 a. m. was 40° F., while at Kelly Field it was 29° F

Attention is called to the surface and free-air wind conditions attending the cold wave that overspread the northeastern part of the country on January 31.

BLIZZARDS AND CHINOOKS OF THE NORTH DAKOTA PLAINS.

By F. J. BAVENDICK, Observer.

[Aerological Station, Ellendale, N. Dak., Mar. 16, 1920.]

Note on the meaning of "Blizzard."—So far as known, this term was first used in the middle western United States to describe a type of winter storm of rather frequent occurrence in that region, characterized by (1) high wind, (2) very low temperature, and (3) an abundance of fine snow in the air. The etymology of the word is still speculative. A plausible hypothesis traces its origin to the German word *blitzartig* ("lightninglike), said to have been applied to these storms by early German settlers in Dakota.

There is a tendency, both in the United States and in other English-speaking countries, to apply the word "blizzard" indiscriminately to any heavy snowstorm accompanied by more or less wind. Some remarks pertinent to this subject, by Bostwick, Dines, and Bonacina will be found in Nature, volume 97, 1916, pages 261, 280, and 301. This broad use of the term impairs its utility for purposes of exact description, and should be discouraged.

It is doubtful whether true blizzards, characterized by intense cold, high wind, and blinding clouds of dry, powdery "snowdrift," ever occur in the British Isles, and they are exceedingly rare in the eastern United States. They are not, however, peculiar to the interior of the American Continent, for the most intense storms of this character heretofore recorded are those of Adelie Land, Antarctica, so graphically described in Sir Douglas Mawson's "Home of the Blizzard" (London, 1915).—*C. F. Talman.*

Picture to yourself a strong gale, snowstorm, and cold wave combined and you have the state of the weather in a blizzard on the open prairie. The most favorable time for one is after a snowstorm, when the temperature is low and the snow has not packed. The blizzard generally begins early in the morning and ends about sunset, although some of the more severe last for three or four days. The whole atmosphere becomes filled with needlelike snow and ice crystals, which, driven by a cold wind of gale force, sting the flesh and sift through the finest crevices. Caught in such a blast one runs the risk of suffocation, the action of the lungs being stopped by the swiftness as well as the intense cold of the wind, while the ice dust, which penetrates the thickest clothing, is more choking than a summer dust storm.

It seems surprising to people unaccustomed to North Dakota weather how easily one may get lost, but should they stop to consider that at times it is impossible to see more than 10 feet away and there is such a roaring and commotion that the human voice can scarcely make itself heard, they would know that one may lose all sense of direction. Experience shows that a person almost invariably walks to the right of the course supposedly being taken, and as a result wanders about in a circle. As a safeguard against this danger some farmers stretch wires from their houses to outbuildings.

Some cattle roam at will and thrive on the grasses without any care or shelter; but during a blizzard they wander aimlessly here and there, sometimes being buried under drifted snow or, in vain attempts to find food and shelter, more frequently traveling with the wind, for no animal will face the storm.

The storm is much more severe on the open prairie than in town because the buildings offer resistance to the wind. The buildings, trees, and cultivation of the soil have also probably locally decreased the severity of blizzards, though, of course, not generally, as compared with former years. The logic of this statement may be more clearly understood after reading the next paragraph which shows that blizzards are comparatively "shallow."

An area of low pressure passes south or east of the station during a blizzard and the wind aloft is usually much lighter than near the ground. The surface wind is from a northerly direction, while aloft it veers toward the easterly, often becoming too light to support the kites. If the kites do not go too far to the west and if they rise through the light air, it is found that the wind backs to a northwesterly direction.

There is much more static electricity in the air during a blizzard than at other times, due, presumably, to the rubbing of snow crystals on each other. There are records of over 10,000 volts on a few hundred meters of wire (see kite flights of Nov. 10, 1919, and Mar. 3, 1920), while on ordinary days the recorded amounts are less than 100 volts for the same amount of wire out. There is usually a slight rise in temperature with altitude sometimes extending to a mile above the surface. The relative humidity is high on the surface and aloft. The one-day blizzards, which were the only kind observed at Ellendale during the past three winters, extend to an altitude of very little over a thousand feet. Above this level weather conditions are about normal. Late in the afternoon the sky usually clears off entirely, while the snow still blows until shortly after sunset. Halos and parhelia, caused by the ice crystals in the air, are often seen before sunset.

After a blizzard, even when the temperature drops to about 40° below zero, it does not feel so cold as during the storm because we are, by this time, near the center of the HIGH, which is accompanied by light wind and low humidity. In the blizzard the temperature drops all day, while on these extremely cold, calm days the temperature is very low at sunrise and rises rapidly during the day. If the wind is strong enough to raise the kites it is found that the temperature does not fall at the usual rate but is about the same at all levels to as high as it is possible to go with the kites.

The weather is not always so cold during the winter or it would be impossible to raise live stock. Sometimes the temperature changes almost 100° F. in a few days, as on February 21 to 23, 1918. This is caused mainly by the effect of the chinook winds. The approach of the chinook is marked by a falling barometer, the winds are light, the sky is cloudless, and the air clear and cold. Objects stand out in bold relief against an intensely blue sky. On some mornings it is possible to see objects which in reality are below the horizon. This is a condition known as looming. The surface wind is always light and generally from the south while, when it is