fog." This term should be applied to cloud banks of considerable continuity and density,[4] and not confused with cirrus (high altitude) clouds or with ordinary "low fog."

Possibly we may establish a safer criterion by determining whether a shadow is being cast. We have observed that in some cases the record varies over 5 microamperes, but the total intensity is not much reduced below the maximum for a clear day. In these cases it was noticed that shadows were cast. On the other hand, when the cloud density increases sufficiently a shadow is no longer cast and the record sinks to 6 microamperes or less. As an illustration of some of these points we may cite the record for the day of the total solar eclipse, April 28, 1930. (See fig. 7.) Here it will be noticed that the trace becomes quite continuous below 12 microamperes (40 on the chart) having the smoothness of a record for a clear day but forming a beautiful V-shaped indentation in the record.

Kimball,[3] in several articles dealing with the design, construction, and performance of the pyranometer, refers to irregularities in the traces of the instrument on apparently clear days but comes to no definite decision regarding the probable cause of the irregularities. On another occasion he states that they may be caused by smoke. At a location like La Jolla, this hypothesis is ruled out, since the atmosphere is always smoke-free except on rare occasions when there are forest fires.

[4] See Carpenter, Ford A.: The Climate and Weather of San Diego. 1913, pp. 5–7.

[3] Kimball, Herbert H.: Records of Total Solar Radiation Intensity and Their Relation to Daylight Intensity. MONTHLY WEATHER REVIEW, October, 1924, vol. 52, p. 473, fig. 5.

SOME CHARACTERISTICS OF CONTINUOUS RECORDS OF THE TOTAL SOLAR RADIATION (DIRECT+DIFFUSE) RECEIVED ON A HORIZONTAL SURFACE

By HERBERT H. KIMBALL

In the paper preceding this, Gorton and Chambers have pointed out some interesting relations between the character of solar radiation records and the condition of the sky. Ångström [1] has already noted some of these relations at Stockholm, and especially the increased intensity with the sun shining between broken clouds.

In an earlier paper entitled "On Continuous Radiation Records and Their Bearing upon Geophysical Problems." (Särtryck ur Förhandlingar 17: de skandinaviska naturforskaremötet i Götchorg, 1923) he discusses the cloud formation during the passage of a cold-wave front at Stockholm on August 4, 1922. The formation of a uniform cloud layer preceded the arrival of the cold air at the surface by an appreciable time interval, and breaks occur in this cloud layer at uniform intervals of two hours. This is explained as follows:

> The upper boundary of the cold wave is in general subjected to a pronounced wave formation. Sometimes waves of higher orders are well developed. As a rule the uniform cloud layer appears at the wave tops, the breaches in the cloud layer at the valleys, but exceptions therefrom sometimes occur. In the special case referred to above the breaches in the cloud layer have occurred almost exactly at the lowest points of the waves.

Apparently, atmospheric waves sometimes occur without forming visible clouds. For example, in the MONTHLY WEATHER REVIEW for September, 1915, volume 43, page 441, in Figure 1 are plotted logarithms of solar radiation intensity against air mass, measured on unusually clear days. With a sky of uniform clearness throughout, the plotted values should fall on a line only slightly concave upwards. Actually, however, the values fall on a wavy line, and especially those for Washington, during the afternoon of February 28, 1915, and for Mount Weather, Va., during the morning of September 28, 1914.

Attention has also been called to the effect of smoke on the solar radiation intensity. See, for example, MONTHLY WEATHER REVIEW, volume 52, page 478, Figure 5, October, 1924, and volume 53, page 147, Figure 1, April, 1925. The first of these reproduces records of intensity of the total solar radiation received on a horizontal surface at the university station, Chicago, Ill., and its depletion by smoke on both a cloudless and a cloudy day. The second shows the depletion of direct solar radiation intensity at normal incidence at the American University, District of Columbia, by a smoke cloud that was brought over the university from the city by an east wind. Clouds of less density frequently cause depressions in the records obtained in the vicinity of any city.

It is apparent that much valuable information about sky conditions may be obtained from continuous records of the intensity of solar radiation as received on either a horizontal surface or on a surface normal to the incident rays.

[1] Ångström, Anders. Recording solar radiation. Medd. Från Statens Meteorologisk-Hydrografiska Anstalt, Band 4, No. 3, 1928.

COMPARISON OF ROOF AND GROUND EXPOSURE OF THERMOMETERS

By BERNARD R. LASKOWSKI

[Weather Bureau, Topeka, Kans.]

It is generally conceded that the average temperature readings obtained from properly exposed thermometers in the Plains States, where the ground surface is level or slightly rolling, agree quite closely within a radius of from 15 to 25 miles. What, however, is the relation between official temperatures taken in downtown sections of middle-western cities and their suburbs? In other words, do official temperatures taken on high buildings of cities reflect conditions under which people live in the residence sections? It must be remembered that in a great percentage of the larger cities the usual practice is to locate the thermometers on roofs of high buildings, while in the suburbs, the thermometers are more likely to be exposed over a ground surface. In order to investigate this question a 6-year record of daily maximum and minimum temperature readings was obtained in Topeka, Kans.

The thermometers used in this study were of standard pattern, compared for accuracy, and exposed in standard shelters having louvered sides and double-decked roofs. These favor the free circulation of the passing air, but do not absorb any added heat due to radiation or reflection from near-by objects or from the direct rays of the sun. One set, that of the Weather Bureau office, was