weather in South America by Señor Julio Bustos Navarrete on pages 120-121 of this REVIEW.

Meteorologists will place a large ? over the region here considered and watch the course of future events with much interest.

Dr. Murphy plans to publish an account of his studies in a forthcoming number of the Geographical Review.—*A. J. H.*

THE SEVERE TORNADOES OF MARCH 18, 1925

The details of loss of life and property caused by the severe tornadoes that occurred in the great central valleys on March 18 will be found in the table of "Severe local hail and wind storms March, 1925" in this issue of the REVIEW. An account of the storms as meteorological phenomena will appear in the April, 1925, issue.—*Ed.*

NOTES, ABSTRACTS, AND REVIEWS

LOCAL BRIGHTNESS OF ULTRA-VIOLET LIGHT

By F. W. PAUL GÖTZ

[Abstract by H. H. Kimball, from Verhandlungen der Schweizer. Naturforschenden Gesellschaft, Luzern, 1924, S. 109-111]

The measurements were made with a cadmium photo-electric cell at Arosa, Switzerland, elevation above sea level 1,860 meters, with auxiliary stations, functioning at intervals, at Chur, elevation 590 meters, Hörnligrat (Skihütte), elevation 2,500 meters, and Aroser Rathorn, elevation 3,000 meters.

The summarized results concern themselves principally with the following:

(1) The intensity of ultra-violet radiation in the spectral regions $\mu\mu > 320$ and $\mu\mu < 320$.

(2) Systematic investigations relative to the influence of elevation.

Results of measurements of solar radiation show that ultra-violet of the longer wave lengths has less seasonal variation than the shorter wave lengths, and that the spring intensities about equal the fall intensities. With increased elevation of the sun, and likewise with increased altitude above sea level, the annual amplitude diminishes in both spectral regions, but does not vanish with extrapolation to zero atmosphere. This conclusion makes desirable a verification of the measurements, with an eventual extension of the research to the stars.

Ratio of intensity, Arosa: Chur

Solar altitude	10°	15°	20°	30°	40°	60°
Red-ultra-red	1.21	1.14	1.13	1.09	1.07	1.09
Ultra-violet $>320\mu\mu$	3.52	2.79	2.04	1.53	1.49	1.48
Ultra-violet $<320\mu\mu$	3.33	2.32	1.86	1.45	1.39	1.33

The greater weakening in the ultra-violet region $\mu\mu > 320$ was unexpected, and is not fully explained.

The dark sky of the high mountains gives rather more ultra-violet light than the brighter sky of lower levels. The skylight shows a linear relation to solar altitude down to about 13°.

At Chur, the sun, even with its highest position, yields less ultra-violet < 320 $\mu\mu$ than does the sky. At Arosa it first equals the skylight at 52° elevation. At 2,500 meters the equality occurs with solar altitude 45°.

Instead of defining the local brightness as the overlight (the light received on a horizontal plane from the sun and sky), it has been considered to be the light radiated to the entire surface of a sphere, or one-sixth the overlight plus the front light of four sides, plus the underlight. The author states that when we take into account the 100 per cent (?) reflection from snow this removes the disagreement between physical and physiological results emphasized on the medical side in the relative pigment-forming power of spring and autumn light.

MARVIN AND DAY ON NORMALS OF DAILY TEMPERATURE IN UNITED STATES[1]

ALFRED J. HENRY

The publication under review is the second revision of the daily normals of temperature for Weather Bureau stations throughout the United States. It contains the daily normals for 161 individual stations as computed by a method which is believed to be superior to that used in computing previous normals.

The explanation of the methods used in the analysis, as given by the authors follows:

A true normal daily temperature can be computed with entirely sufficient accuracy only from a long series of values of 24 hourly temperatures for each day, derived from the maintenance of automatically-recording thermometers.

While the Weather Bureau has records of this character covering periods of 20 years or more at many stations, these are insufficient in number to adequately represent the details of climatic conditions of a great area like the United States, the period of time covered by such data is too short, and especially the labor of computing normals from hourly readings is too enormous to justify their general use for that purpose. On the other hand, observations of the daily extremes of temperature are available for probably as many as 10,000 stations for periods ranging from a few years in many cases to 50 years or more in a considerable number of cases. In addition, other observations at stated hours are also available and serve to fix appropriate diurnal normals which are nearly identical with so-called true normals derived from 24-hourly readings. In presenting the present series of station normals based on daily observations of the maxima and the minima of temperature, the close relation between such values and those based on hourly readings will be indicated, at least for the United States.

Previous normals.—Bulletin R of the Weather Bureau, published in 1908, contained tables of the daily normal temperatures based upon a 33-year record, 1873 to 1905, inclusive. These daily values were obtained by charting on large sheets of cross-section paper the average temperature for each of the 12 months, drawing a smooth curve through these values, and scaling therefrom the approximate daily averages. This plan is objectionable in that each of the 12 points on the scale indicating the values for the respective months covered too great a period in days to enable the approximate location of the points of highest and lowest temperatures, or to give an adequate idea of the rates of change during the various portions of the months. Furthermore, the length of record at that time, 33 years only, is recognized as too short to give dependable values from computed actual daily means.

The monthly means used in computing the values appearing in Bulletin R were obtained from the tri-daily observations, 7 a. m., 3 p. m., and 11 p. m., 75th meridian time, for the period 1873 to June, 1888, inclusive, and from the mean of the daily maximum and minimum temperatures from July, 1888, to the end of 1905. As the observations at stated hours were necessarily made at the same moment of time over all portions of the country, there was a constant and increasing earlier occurrence of the hours of observation to the westward. That is, at the first observation of the day, made at 7 a. m., say, for Philadelphia; the local time of observation at St. Louis would be an hour earlier, or 6 a. m.; at Denver it would be 2 hours earlier, or 5 a. m., and in California 3 hours earlier, or at 4 a. m.; the same conditions apply to the other observations. The means obtained from these data are, therefore, not strictly homogeneous throughout all parts of the country, due to the earlier hours of observation over the western portions.

In the early days of the service the means determined from the maximum and minimum readings were mainly worked out after the last observation of the day, usually 11 p. m. Later, when self-

[1] Marvin, C. F., and Day, P. C., Normals of temperature for the United States, 46-year period, July 3, 1875, to July 2, 1921, MONTHLY WEATHER REVIEW SUPPLEMENT No. 25, Washington, 1925.