

the present form substantially as they are. These pages, it may be remembered, provide for the 8 o'clock and special observations. The last-named page has been brought forward and takes the place of the instructions which now stand on page 4 of the present form. Page 5 of the present form, "Wind, number of miles and length of time from," has been stricken from the new form.

The board recommends that no further compilation be made of the data now recorded on page 5, Form 1001-Met'l, after December 31, 1904. The new form contains four additional pages on which it is proposed to enter the hourly temperatures, the hourly wind directions and velocities, and the hourly sunshine. These four pages replace the present Forms 1026-Met'l, Thermograph; 1021 Met'l, Hourly Wind Direction; 1022 Met'l, Hourly Wind Velocity, and 1070-Met'l, Hourly Sunshine. In other words the board has consolidated with Form 1001-Met'l four additional forms, and has thus brought together, in compact shape, information that is now carried on four different papers. The board desires to invite attention to the fact that the adoption of the above recommendations obviates the necessity of press copying the forms just mentioned.

The copy of Form 1001-Met'l retained at station will contain only a record of the observations at 8 a. m. and 8 p. m. (seventy-fifth meridian time), the special observations, and the summary of temperature and precipitation on page 8, except that the beginnings and endings of rainfall will not be entered on the last-named page. The beginnings and endings of rainfall will appear on the Central Office copy, however, in seventy-fifth meridian time, and the total precipitation there given will be for the period midnight to midnight, local standard time.

6. The board recommends that all instrumental records and the Daily Local Record be kept on *local standard time*, but that all data intended for the Central Office shall be recorded on seventy-fifth meridian time, except that the hourly temperature, the hourly records of wind velocity and direction, and the hourly sunshine shall be entered on local standard time.

7. The board recommends the discontinuance of the present form of Daily Journal and the substitution thereof of \* \* \* a report to contain a description of unusual or remarkable atmospheric phenomena that have been observed during the month, and any matters that seem to call for special mention. It is not the intention that entries shall be made for each and every day of the month, but rather that a succinct narrative be given of the important events of the month, such as the occurrence of severe storms, cold waves, thunderstorms, or the prevalence of abnormal conditions extending over several days. It is believed that a copy of the notes made for the Daily Local Record will, as a rule, meet the requirements of the Central Office. This shall be known as the Monthly Meteorological Report.

8. The board recommends that the following data be no longer recorded:

(1). Extreme wind velocity. This information is of doubtful value. It must always be accompanied by a statement of how it was obtained, and it is liable to be confused with maximum velocities for five-minute periods; moreover when high velocities are attained it is difficult to accurately read them from the wind sheets.

(2). Number of days with mean temperature below 14° and 32°, and above 41°, 50°, 59°, 68°, 77°, and 90°, as recorded in the summary of Form 1001-Met'l, Form 1002-Met'l, and the Means Book. These data have been compiled for a number of years. They have not yet been used, so far as known to the board, in any manner. They can be obtained, if desired, from other records, and it is therefore believed that time and space can be saved by discontinuing their further compilation.

10. The board recommends that the present Means Book be known, hereafter, as the Climatological Record. It further recommends that the manner of entering the data therein, or the form of the volume, be changed as follows: Instead of entering the several elements for each month consecutively on seven pages, as at present, let them be grouped under several general heads, as Pressure, Temperature, Precipitation, etc., according to the character of the data, and entered separately.

Finally, the board believes that the Climatological Record should contain the following data:

*Pressure (reduced to sea level).*—Highest; lowest; mean; absolute monthly range.

*Temperature.*—Monthly mean, departure from the normal; mean monthly maximum and mean monthly minimum; absolute monthly minimum and date; absolute monthly maximum and date; mean daily range; greatest daily range; absolute monthly range; mean monthly variability; lowest monthly maximum; highest monthly minimum; number of days with maximum 32°, or below, and 90°, or above; minimum 32°, or below, and zero, or below.

*Relative humidity.*—Mean a. m. and p. m.

*Precipitation.*—Total amount for the month, departure from normal; greatest amount in twenty-four hours, amount and date; one inch an hour or over, total amount and date; 2.50 inches in twenty-four hours, amount and date; number of days with .01 inch and over, .04 and over, .25 or more, 1.00 or more; total depth of snowfall; number of days with

snow; snow on ground at end of month; greatest snowfall in twenty-four hours; greatest depth of snow on ground and date.

*Wind.*—Total movement; prevailing direction; average hourly velocity; maximum velocity, direction, and date.

*Weather.*—Actual hours of sunshine, percentage; average cloudiness, a. m. and p. m.; number of days clear, partly cloudy, cloudy; number of days with fog or hail; thunderstorms; auroras; solar halos; lunar halos.

*Daily and hourly data.*—Daily maximum, minimum, and mean temperature; daily precipitation; daily snowfall; hourly values of pressure, temperature, wind, and sunshine.

Before closing this report the board desires to urge the importance of devising some method of recording the cloudiness at night and the beginnings and endings of light precipitation. The board recognizes the very great importance to stations of retained copies of the wind sheets, Form 1017-Met'l. It is understood that as yet no means have been devised whereby such copies can be had. The hope is expressed that the Instrument Division of the Central Office may be able to take up the problem and eventually solve it.

WEATHER BUREAU MEN AS INSTRUCTORS.

Prof. H. J. Cox, Chicago, Ill., delivered an address upon Recent Advances in Meteorology before the earth science section of the Central Association of Science and Mathematics Teachers at its fourth annual convention, held in Chicago, November 28.

Mr. H. W. Richardson, Local Forecaster, Duluth, Minn., reports that a class of about twenty students from the Blaine High School of Superior, Wis., visited the Weather Bureau office at Duluth on November 21. After showing the visitors the instrumental equipment, Mr. Richardson gave them a somewhat extended, though informal, lecture upon the general work and methods of the Weather Bureau.

Mr. J. P. Bolton, Observer, Fresno, Cal., lectured on November 28 to the physical geography class of the Fresno High School.

Mr. E. C. Vose, Section Director, Parkersburg, W. Va., is conducting a course of study in practical meteorology for the class in physical geography of the local high school. The study began early in November, and forty minutes each week are devoted to the work.

Mr. George T. Todd, Observer, Wichita, Kans., on November 17 and 18, 1904, addressed the high school class in physical geography, which came to the office in two sections. The instruction consisted of an explanation of the instruments, weather maps, and charts, the value of the records, and some remarks on weather forecasting.

ASSMANN'S SOUNDING BALLOONS AT THE ST. LOUIS EXPOSITION.

It is generally known that some years ago the Weather Bureau prepared to undertake a series of balloon ascensions to great heights from some point in the interior of the continent, but that owing to a change of plan the Bureau is now preparing to make these ascensions first from Mount Weather.

Meanwhile the aeronauts of the German meteorological office brought to this country for exhibition a very complete collection of balloon apparatus, and with this apparatus the officials of the Blue Hill Observatory have made a number of soundings from the grounds of the World's Fair at St. Louis. Four balloons were sent up in September, reaching altitudes of nine or ten miles, and all of the records were secured. The balloons are what are called Assmann's expansible and exploding balloons. They are made of thin India rubber, about a yard in diameter, and burst when the pressure of the gas inside, relative to that on the outside, has distended the balloon sufficiently to burst it. The balloon being free is carried hori-

zontally by the wind. In the four experiments at St. Louis in the month of September all descended within fifty miles of St. Louis. In ten ascents during November and December the balloon traveled much farther, reaching 200 miles from St. Louis. In general it would seem that even in midsummer, at altitudes above four miles, there are perpetual freezing temperatures, and an upper air current blowing steadily from the west. The Blue Hill Observatory is again to be congratulated on the energy it shows in the matter of upper air observations, and it is to be hoped that Mr. Rotch will be able to continue the balloon work at St. Louis. Many such stations will be needed in order to perfect our knowledge of the atmosphere over the United States.—*C. A.*

#### TRAILS OF METEORS.

A newspaper clipping from Portland, Oreg., says:

Residents of the Knob Hill district going home last night (December 21, 1904), shortly after 6 o'clock were startled by the appearance out of the cloudy air of a meteor with a trail of fire behind it, flying close over the city, apparently not over 150 feet above them. It was glowing red and threw out sparks behind like the tail of a comet.

The quotation relates to a phenomenon that would give us much information about the upper atmosphere if only the observers would give us a more exact account of what they saw. The smokelike trail left behind by a meteor is undoubtedly higher up in the air than any altitude attained by balloons, and the changes that it undergoes must be supposed to depend, at least in part, on the atmospheric conditions in its neighborhood. What the meteorologist wants is a sketch, as exact as possible, of the location of the trail among the stars. Several successive sketches, stating the moments of time, and the apparent angular altitude, and the bearing or azimuth, would give us the basis for some calculation as to atmospheric influences. When several observers happen to see the same meteor from different points of view, their separate sketches of the trail would give us still more interesting results. A large collection of data of this kind has been made by Mr. W. P. Trowbridge of Columbia University, New York, N. Y., and every additional sketch would be highly valued by him.—*C. A.*

#### DARKNESS AT MEMPHIS.

From a newspaper clipping we learn that on December 2, about 10 a. m., a dark pall covered Memphis for about fifteen minutes. The sunlight was wholly cut off by a dense cloud and the darkness of night prevailed. Of course artificial light was used and business temporarily paralyzed, but the light returned as suddenly as it went. We are told that in some quarters a panic prevailed, and that some were shouting and praying, imagining that the end of the world had come. A similar darkness frequently attends a heavy local cloud, and is a common attendant upon prairie and forest fires and upon volcanic eruptions; everyone is familiar with the accounts of the great darkness attending the fogs that prevail in London during the winter season, and with less intensity in New York, Philadelphia, Chicago, and other large cities where soft coal is used.

Every intelligent person understands that such darkness gives no occasion for superstitious fears. However, we must recognize the fact that there are some in every class, ignorant or educated, American or foreign, rich or poor, who are liable to loose self control when anything very unexpected occurs. A panic is almost as easily precipitated among men, women, and children as it is among herds of animals. For the Weather Bureau men it should be a proud record that they have stayed many panics by words of assurance and a cool bearing. We ought never to forget that every natural phenomenon has a natural cause, and requires to be considered and treated calmly. No matter what the impending disaster, the first requisite is to preserve one's self-possession and help others to do the same.—*C. A.*

#### FLOOD ON THE SOUTH CANADIAN RIVER, IN OKLAHOMA AND INDIAN TERRITORY, OCTOBER 1-4, 1904.

The Canadian River rises in eastern New Mexico and flows across the panhandle of Texas into Oklahoma and Indian Territory, where it joins the Arkansas. In the preceding number of the MONTHLY WEATHER REVIEW, page 466, we published an account of the floods in New Mexico due to heavy rains in that Territory from September 26-30. The resulting flood during the first days of October on the Grand River, below the point where it enters Oklahoma, is described in detail by Mr. C. M. Strong, Section Director, in the October and November reports of the Oklahoma and Indian Territory section of the Climate and Crop Service of the Weather Bureau. That the flood originated in the mountains of New Mexico is shown by the fact that only in that State were there any heavy rains on the Canadian River basin between September 25 and October 4. Mr. Strong states:

The flood of the South Canadian River of October 1 to 4, 1904, will stand memorable as the most destructive one in the history of this section since its settlement. To thoroughly understand its destructive effects one must have a knowledge of the topographical features of that stream.

Finding its source in the mountain ranges of New Mexico, it thence meanders southeastward across the high uplands of the Texas panhandle to the fertile plains of Oklahoma, and on through the Indian Territory to its connection with the Arkansas River.

Throughout its course its bed lies inclosed in a wide valley, whose bottom levels are but slightly above the surface of the stream. Its waters are usually shallow, of small width, and to a large extent are underground throughout the year, the usual width of the surface stream varying from 60 to 200 yards.

Previous to the flood the river valley was covered with fertile farms from its entrance into Oklahoma to its mouth in the Indian Territory, rich with fields of cotton, corn, and wheat.

Conceive in your mind this beautiful and fertile valley, rich in the finest products of the earth, and then turn to the results following the flood.

The feeble stream, winding its way in a shallow bed, became a vast flood that rolled a wall of water eighteen to twenty feet deep, in places spreading from hill to hill, with width varying from one to two miles, sweeping everything from its path and covering the valley with sand from one-half to four feet in depth, completely obliterating everything in the form of vegetation.

The force of the water was so tremendous that nothing could stand in its course; crops, bridges—both iron and wooden—trees, and houses were swept away like straws and swallowed up in the sands. The roar of the waters was heard for miles on either side, like that of the sea.

The scene along the full course of the river beggars description. The fertile valley is to-day practically destroyed, and its heretofore valuable farms are worthless, as the sand with which they are covered can never be removed. Many of the farmers are left destitute, nothing of any value remaining after the flood.

The flood originated in the mountains of New Mexico, and in successive waves swept the full course of the river, indicating that terrific cloud-bursts were the cause of the phenomenon.

During the progress of the flood over this section the weather was generally clear and pleasant, alleviating to some extent the suffering that was caused to the people made homeless by its destructive effects.

The nearest estimate that can be made of the damage caused is as follows: Loss to personal property, crops, and bridges, \$600,000; loss to farms by overflow, \$3,000,000.

At Stone, Okla., where before the flood there was merely a dry bed of sand about half a mile wide, the river attained a depth of twelve feet and width of two miles. At Bridgeport, Okla., the river rose slowly all day on the 1st, and by the morning of the 2d was six feet above the normal. It continued to rise slowly on the 2d, and at 5 a. m. on the 3d a wave eight feet high struck the railway, washing out three-fourths mile of embankment on the Choctaw Railroad and one and one-half miles on the Rock Island Railroad. Thirty quarters of 160 acres each were covered with sand to a depth of from two to four feet, and some are completely washed away. The following table is based on reports from postmasters and others at the places mentioned.

The distances given in the second column are obtained by measurements on a postroute map, following the windings of the river as closely as practicable. According to the contour map of the U. S. Geological Survey, the elevations on the