Iowa Weather Bulletin.

By

Dr. Gustavus Hinrichs,

Director of the Iowa Weather Service.

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Written and drawn with the electric pen by the Director, printed by means of a Duplicating Press, by Gustavus Hinrichs, Jr.

Iowa City, Iowa,
1878.
**Symbols and Definitions**

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<td>Thunder</td>
<td><strong>Storm</strong>, very high winds</td>
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<tr>
<td>Thunderstorm, both thunder and lightning</td>
<td><strong>Storm</strong>, very high winds</td>
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<tr>
<td>Thunder-bolt, Lightning strike any object on the earth</td>
<td><strong>Storm</strong>, very high winds</td>
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The symbol of Phenomena is to be entered under the heading Phenomena on the face of the blanks, followed by the indication of the time of observation, using A for AM, and P for PM, the date of entry being the civil day, beginning at midnight, 0 a.m. Noon, 12 p.m., or 0 p.m., to avoid mistakes. Thus **Th**, 0 a.m., would represent a severe thunder-storm beginning at midnight and continuing until 0 a.m. of the next day. Any phenomenon, beginning before midnight, but continuing until after midnight, will therefore be recorded on both days.

A stormy day is one during which, at any time, the wind was very high, blowing a gale, accompanied by phenomena, also direction of the wind, estimated force, and duration of same time. A blowing gale is a wind of 45+ of total sky covered, clear, or less than 1/2 total cloud. Thus, if 3 obs. a day on scale 5 are taken, a day is cloudy if sum of sky equal to or greater than 12, clear, if 3 or less than 3.

The different number of times on separate dates that **A** and **P** have been recorded will be the number of days on which snow or hail fell and thunder and lightning occurred. On one day, there may have been more than one thunder or lightning, however, counted as but one day of thunder-storm.

The Rain day is invariably the Solar Day ending at noon of the day of entry or record. It is counted a rainy day or day with precipitation, if so marked, to which the actual amount is added. No.
The Thunderstorm of July 31, 1877

was quite severe over an area of 20,000 square miles, about 3/5 of all Iowa. Like most of our severe thunderstorms, it was not associated with any marked changes in the barometer. Hence, as usual, it was not foreseen in the Indications of the Signal Service, which stated at 7:35 AM of that date: "For Upper Mississippi and Lower Missouri Valleys, rising barometer, warmer southerly, shifting to cooler northwesterly winds, partly cloudy weather, and occasional light rain."

The map below shows the extent of the storm in Iowa, the greatest area with over one inch of rainfall, the smallest area with over 1000 square miles with more than 2 inches of rain. At Iowa City, 2.85 fell in 50 minutes, a decidedly severe summer rain. The places from which thunder and lightning is reported are also shown, as well as the stations where lightning struck, indicated thus: 7.

By a study of the special maps of 8 a.m., noon, and 8 p.m., it appears, that both in the morning and in the evening, SE winds prevailed over the State; at some places S or E. At noon, likewise in the entire East and South, the winds were the same. Hence the storm was due to an enormous and spreading influx of cold NW winds, rolling over the country with a velocity of 25 miles an hour, having its dark front along the line marked at the hours specified. Its arrival in the East and South of Iowa, could have been predicted by a local telegraphic weather service.
Jowa Weather Service.

The Earthquake of Nov. 15th extended from Julesburg, Colorado, to La Crosse, Wisconsin, and from Olina, Dakota, to Topeka, Kansas. The territory disturbed forms an ellipse, the minor axis of which measures over 300 miles from N to S, while the major axis extends from NW to ENE over 600 miles. The area of this ellipse comprises over 150,000 square miles.

The greatest energy of the Earthquake was manifest along the Missouri Valley, from Yankton to Sioux City, at 11:30 A.M., and along the Platte River, from Columbus to Omaha, at 11:40. The principal shocks reached the eastern southern and western limits about 11:50. From these data it follows that the velocity of the waves of the disturbance was fully 600 miles per hour.

In Iowa, the greatest disturbance occurred along the Missouri River, the effects diminishing southwards. A secondary line of greatest disturbance is very distinctly marked, running from Council Bluffs, by way of Avoca, Boone, and Waverly, to Dubuque and McGregor. Both north and south of this line, the disturbance is very much less marked.

The effects ranged from a swaying and rolling motion of the ground, associated with a rumbling noise, alarming the entire population of a town, to a more oscillation of furniture and liquors. Generally the effects were more pronounced on high ground, in brick buildings, especially in the upper stories of the latter. The most feeble manifestations were most readily noticed by children at their school-desks and by clergymen, lawyers and others at their writing tables. Thus the schoolchildren were alarmed at Dubuque and Waverly, fully 300 miles away from the center of the disturbance.

In this Bulletin I have aimed to state the most general features of the Earthquake only. The great number of letters and reports from which these results have been extracted, will be kept on file for future publication.

Iowa City, Dec. 26, 1877.

Gustavus Hinrichs.

Please compare the accompanying map of the Earthquake with the above description. Persons having favored me with special reports, receive this Bulletin as an expression of my thanks.
Symbols representing the severity of the Earthquake.

2. Buildings cracked.
3. Buildings shaken so as to create alarm, of many people in different parts of town.
4. Buildings shaken, alarming many persons in one building only.
5. Buildings shaken, so as to alarm a few individuals only.
6. Rattling and moving of things, Z = Swinging of chandeliers, etc.

Map of the Earthquake of 1883.
Iowa Weather Service.

October was very cloudy and rainy, with northeasterly and northwesterly winds prevailing; the rainfall and mean temperatures were considerably above normal.

At Iowa City, the mean temperature was two and a half degrees above normal, and the rainfall was over three inches in excess of normal.

In eastern Iowa, and also from Charles City and Waverly, southeastward to Greene County, the number of rain days exceeded ten. In a belt from Fairfield over Iowa City, to Elkader and Waukon, the number of rain days was greater than fifteen.

The least amount of rain — about two inches — fell from Sioux City to Sac City. — Eastward, between Grand Junction, Fort Dodge, to Forest City and Cresco in the North, and down by Waterloo to Rosehill (Mahaska Co.) in the South, the rainfall averaged three inches and a half. East and south of this, the rainfall exceeded four inches, reaching six inches along the lower Maquoketa River, also in the southwest of Iowa. The rainfall was greatest at Sabo, Fremont County, namely eight inches.

The Sun was almost free from spots until the 27th, when a spot of very large size appeared, followed by smaller ones, in two distinct groups. The daily oscillation of the magnetic needle averaged five minutes and a half.

Iowa City, Nov 6, 1877.

Osmundus Hinrichs.
Iowa Weather Service

November was warm, cloudy and rainy, with frequent northeasterly winds and a moderate excess in the amount of rainfall.

At Iowa City, the mean temperature was nearly three degrees above normal, and the rainfall was one inch in excess of normal. The amount of Ozone in the air was remarkably low. The 27, 28 and 29 were cold days.

In eastern and middle Iowa, the number of days with rainfall (rain or snow) ranged from 10 to 15, in Western Iowa, from 6 to 9. — The greatest rainfall occurred in nearly all Iowa during the storm of the 20 and 21st.

In November, Western and Middle Iowa received from one to two inches of rainfall (rain or melted snow). The rainfall exceeded two inches north and east of a line running from Sioux City over Algona, Waverly, Waterloo, Florence, Iowa City and Washington to Fairfield. — The rainfall was greatest and exceeding three inches east and south of the line: Monticello, Maquoketa, Davenport, Burlington, Denmark and Corydon.

A bright Aurora was observed on the second, from Dubuque to Newton and Eton, also, on the ninth at Clermont and Waukon in the Northeast. — A solar halo was seen on the 29th at many places in eastern, southern, and central Iowa. But the most remarkable phenomenon of the month was the Earthquake which at noon on the fifteenth was experienced throughout Iowa, a special report of which will soon be issued.

Large sunspots were seen on the 3rd, 15th, and 23rd. The daily variation of the magnetic needle averaged five minutes.

Iowa City Dec. 5th 1877

Gustavus Hinrichs.
Central Station,
Iowa Weather Service,
at Iowa City,
Observations of
November 1877

Pressure: 29.304, 29.313, 29.252, 29.312, 29.312
Lowest: 29.252

Temperature: 30.3, 38.5, 34.1, 34.1
Max: 39.4, 34.1 +29 warm

Humidity: 45.15, 18.4, 16.9, 16.8
Relative: 80, 80, 80, 80, 80, 80, 80
+27 moist

Cloudiness: 73, 65, 55, 64, 60 cloudy

Rainsfall: 2.57 +0.88 rainy

Wind: WNW - ESE, calms

Total run: 34.27 miles, 114.2 miles

Ozone: 55, 48, 44, 49

Mean daily variation: 5 minutes

Date: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18

Phenomena: Phenomena

Barometer

Wind

Thermometers: Minima and Maxima

Insolation

Ozone

Daily Variation of Declination

Observed, 5-9 AM, noon, 3-7 PM

Sunrise: Nov 3rd, 6:05, only large spot visible.

Nov 15th, 8:19, the spot much smaller.

Nov 23rd, 6:47, the spot a certain two or three small lines visible, by account of fleeting clouds.

Magnetic Instruments are not yet properly localized, for want of suitable room.
Central Station, Iowa Weather Service, Iowa City.

Observations of December, 1877:

Pressure: 29.315
Temperature: 40°
Humidity: 39%
Cloudiness: 5
Rainfall amount: 0.628
Wind total run: 3 7/6 miles

Ozone: mean 4/2 low
Daily Variet: of Declined 4/3
Sunsopole mean relative 0.4

Frequency: 10 7 8
Wind: 6 7 17 18

Date 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Pressure
Temperature
Humidity
Cloudiness
Rainfall
Wind

Graphical representation of weather data.
December 1877 was by far the warmest December ever observed in this part of the Mississippi Valley. The mean temperature at Iowa City was 40.1 degrees, which is ten degrees above the highest mean temperature observed before (1875), and 27.5 degrees above the mean temperature of Dec. 1876, which is the lowest ever observed. Hence the last two December months differ more from one another than any other two December months since 1860, and even since 1840.

The absolute temperature of the air was at no time excessive, the highest reading being 63° which is only one degree above earlier observations. The high mean temperature is due to the uniformly high temperature of the nights only during 13 nights did the temperature sink below the freezing point, and at no time did the temperature sink below 15 degrees above zero.

The first half of the month was clear and mild, the latter half was warm, very foggy and cloudy, with frequent slight rains, and one thunderstorm along the Skunk and lower Des Moines on the 17th. The dense fog of the 16th and 24th covered the entire State.

Rainfall was most frequent in the South and East of the state, also at the line Corydon - Oskaloosa, and East of the line Linnville - Dubuque, rain fell on from 10 to 14 days.

The amount of rainfall, while above normal, was not excessive. It averaged one inch and a half in the north and along the Mississippi. Two inches fell in the Des Moines river valley from Fort Dodge down to Keokuk, also east of the line drawn from Kistler over Grinnell, Blairston and Independence to Waukon. A rainfall of over three inches was measured at but a few points - in Warren, Jefferson, Benton and Clinton counties.

One large sunspot was observed on the 7th and 9th; until the 23 the sun's disk remained free from spots, and was also free of spots on the 31st at the close of an cloudy weather. The daily variation of the magnetic needle averaged four minutes.

Iowa City January 4, 1878

Gustavus Hinrichs