

MONTHLY WEATHER REVIEW,

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WAR DEPARTMENT,
Office of the Chief Signal Officer,
DIVISION OF
TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE

INTRODUCTORY.

The current Weather Review is a summary of the meteorology of the United States for November, as determined by the instrumental and other observations from the following sources, representing 450 regular stations and other points from which observations have been taken :

United States Army Signal Service.....	92
Canadian Meteorological Service.....	13
United States Army Surgeons.....	50
United States Naval Hospitals.....	1
Regular Volunteer Observers.....	283
Miscellaneous Sources.....	11

Among the latter, the press reports have been found useful.

The great meteorological event of the month of November was the inland cyclone which swept, with devastating force, across the northern portion of the country towards the close of the month, and of which the track is charted on Map No. I, and marked Storm VIII.

The prominent characteristics of the November weather have been rapid and severe thermal transitions, well-defined barometric areas and contrasts of pressure, with high winds and heavy snows in the North, and considerable rain-fall, supplying, in a large degree, the deficiency of water, so unmistakably exhibited by the autumn river-reports, and so disastrously felt by the agricultural interests since last August.

A T M O S P H E R I C P R E S S U R E .

(1.) This meteoric element is graphically delineated by the isobaric lines (in black) on Map No. II, from which the reader will discover the mean pressure of the atmosphere in all sections of the United States. Although the high pressure areas were not excessive for the month in review, they were as high as experience teaches the meteorologist generally to look for in the last month of the fall season.

(2.) *Areas of low pressure.*—These areas, otherwise registered as storm-centres, so far as they call for special notice, are ten in number, and are specially tracked on Map No. I, where they are classified chronologically. The details, of importance, of each such depression are herewith enumerated. The most disastrous (Storm No. VIII) is highly instructive, and is a fine type of the terrific autumnal gales which ravage the Lake region. Unlike most of the October cyclones, which spent their fury in the region far north of the Lakes, the November gales pursued tracks upon lower latitudes, and their cyclonic winds were felt in the United States with most disastrous consequences.

Storm No. I, though of comparatively minor moment, was dangerously felt on the Lower Lakes. It appeared on the 1st of November, northeast of Lake Superior, moving in an east-southeast direction, and passed beyond Nova Scotia on the morning of the 2d.

No. II. This depression was originally noticed in Montana on the 3d of November, moving along the upper Missouri valley eastward. It passed over Minnesota and the height of land just north of the Lakes, and finally vanished beyond the lower St. Lawrence valley on the morning of the 6th. It was attended by high winds on Lakes Huron and Michigan during the night of the 4th, but its later track lay on parallels too northerly to produce any violent commotion on the Lower Lakes. Rain and light snow, however, marked its passage to the eastward.

No. III also made its first appearance in the Northwest. On the morning of the 6th it was central in the northern part of Wyoming Territory, whence it moved first north-eastwardly into Dakota, and, thence, on the night of the 7th and morning of the 8th, slowly passed over Lake Superior, finding its way towards Hudson's Bay and Labrador, wholly disappearing in those high latitudes on the 9th.

The most severe winds connected with this storm were on Lake Superior and the northern part of Lake Michigan; after passing the latter, its northerly course insured the Lower Lakes against serious disturbance.

No. IV had its origin nearer to the upper Mississippi valley, in northwestern Iowa, on the morning of the 9th, whence, advancing towards northern Lake Michigan and Lake Huron on the 10th, it progressed to the lower St. Lawrence valley, apparently pausing off the coast of Cape Breton for forty-eight hours.

This was a feeble depression, attended by light winds and very light precipitation. It was followed, however, by a high pressure area, the highest barometers of which read over 30.60 inches.

No. V. This storm enters the field of observation in western Dakota on the 13th, and on the morning of the 14th it had reached southern Minnesota, whence its course lay northeastward to the northern shore of Lake Superior, and thence, with a slight southerly trend, almost due east to the Province of Quebec, which it visited on the 15th.

The depression of the 13th came in the rear of an area of high barometer, which had occupied three days in its transit of the country, during which low temperatures prevailed very generally. As the earth was thus chilled, the conditions favoring precipitation were present, and the snows and rains which preceded and followed the storm were considerable. The storm-vortex occasioned high and dangerous winds on the Upper Lakes, but no decided gales on Lakes Erie and Ontario.

No. VI began in southwestern Kansas at midnight of the 15th, whence its track lies nearly due northeastward over the Lake region and the St. Lawrence valley, the lower part of which it passed on the 18th.

Quite a considerable precipitation in the upper Mississippi valley preceded this disturbance, and the rain-fall over the whole Lake region was large, though not torrential. The storm subjected Lake navigation to no danger or inconvenience until it approached Lake Ontario. After it, came, rapidly, an area of very high barometer and excessive cold in the Northwest. The barometer readings in the upper Missouri valley reached the very high figures of 30.97 inches—one of the highest, if not the highest, reading ever recorded by the Signal Office observers. Attending this high pressure were low temperatures, as low as -15° Fahrenheit.

No. VII's track is traceable from the lower Ohio valley (on the 19th) to Lake Ontario (on the 20th) and thence to Nova Scotia (on the 21st).

This depression probably arose from the precipitation in the lower Ohio valley, but it was faint and unimportant, except that its course was marked by considerable rain-fall and snow-fall.

No. VIII. This extraordinarily violent and extensive cyclone also had a Northwestern origin, and may, perhaps, be traced to the Pacific coast. It is first distinctly visible on the night of the 20th in western Wyoming, and pursued thence a course slightly east of northeast to southwestern Dakota, over which it passed on the night of the 21st, moving very leisurely. On the morning of the 22d, after taking a southeast course, it was central in northern Nebraska, and thence commenced advancing more rapidly to the Mississippi valley, which it crossed near the southern boundary of Iowa on the evening of the same day. It now struck off in a different direction, nearly due northeast, to Lake Huron, sweeping over that inland sea on the 22d. Having on the afternoon of the 23d gained the vicinity of Georgian Bay, its centre appears to have divided; one part, as an offshoot, going a little by the south of east, and, with the extraordinary progressive velocity of about 480 miles in 8 hours, (or 60 miles per hour,) reached Vermont and New Hampshire by midnight; the other part of the cyclone moved from Georgian Bay, a little by the north of east, and, with similar speed, reached the meridian of Quebec early on the morning of the 24th. Meantime, since the midnight of the 23d, the southern section, having crossed Vermont and New Hampshire, pushed rapidly northward and reunited with the northern section near Quebec, whither it had by this time come up. From this point, during the rest of the 24th, the combined depression, with high but diminishing velocity, swept away to the northeast, and at midnight was lost to view in the vicinity of Newfoundland. While this dangerous tempest was approaching the Lake region on the evening of the 22d, the atmospheric equilibrium in the Southern States was violently disturbed; and, in Alabama, a terrific wind-storm ravaged the town and vicinity of Tuscumbia, killing twelve persons, wounding thirty, destroying upwards of one hundred buildings and inflicting disaster on many other structures. Nearly one-half of Tuscumbia was destroyed; and, almost simultaneously, the town of Montevallo, about sixty miles north of Selma, fared a similar fate. Although the Tuscumbia tornado is not perfectly shown by the weather-maps to have been an offshoot from the main storm-centre—No. VIII—yet it is highly probable the former was almost directly caused by the latter when the great storm-centre crossed the Tuscumbia meridian. The tornado occurred just as the cyclonic winds shifted to the southwest

and west from the indraught towards the centre, and when the temperature of the air was suddenly and greatly lowered and the condensation of vapor became correspondingly great. The main storm was preceded and followed by large quantities of rain and snow, which rapidly filled the tributaries of the Western rivers. The commotion of the lakes was very great, the water in some parts of the Lower Lakes being shoaled, so that vessels were grounded.

The winds were of the most dangerous velocities, and but for the timely fore-warning and the lateness of the season—many vessels having been laid up for the winter—the Lake disasters, numerous as they were, must have been largely augmented. Among the high wind-velocities reported were the following: At Chicago, 35 miles an hour; Milwaukee, 46; Port Huron, 48; Toledo, 48; Grand Haven, 52; Buffalo, 52; miles; Cleveland, 52; Cape Hatteras, 52; Knoxville, 60.

The lowest barometers recorded were: At Buffalo, 28.93 inches—considerably below the lowest record of the past two years at this station; at Alpena, an uncorrected barometer read 28.20—the lowest reading ever taken at this station; at Dubuque, 29.07—the lowest record of the station; at Milwaukee, 28.84 inches.

The following Readings were made at Milwaukee, during the rise and progress of this storm.

DATE.	HOUR.	BAROMETER.	THERMOMETER.	HUMIDITY.	WIND.	VELOCITY.	WEATHER.
November 22,	10 A. M.,	29.551	40	94	S.E.,	8	Threatening.
	11 A. M.,	29.528	40	100	S.E.,	8	Light Rain.
	12 M.,	29.501	41	100	S.E.,	12	Light Rain.
	1 P. M.,	29.478	41	100	S.E.,	12	Light Rain.
	2 P. M.,	29.426	42	100	S.E.,	16	Light Rain.
	3 P. M.,	29.402	42	100	S.E.,	16	Light Rain.
	4 P. M.,	29.360	42	100	S.E.,	16	Light Rain.
	5 P. M.,	29.319	42	100	S.E.,	18	Light Rain.
	6 P. M.,	29.260	42	100	S.E.,	16	Heavy Rain.
	7 P. M.,	29.212	42	100	S.E.,	17	Heavy Rain.
	8 P. M.,	29.165	42	100	S.E.,	22	Heavy Rain.
	9 P. M.,	29.118	42	100	S.E.,	20	Heavy Rain.
November 23,	10 P. M.,	29.042	42	100	S.E.,	24	Heavy Rain.
	11 P. M.,	28.960	42	100	S.E.,	20	Heavy Rain.
	12 M.,	28.913	42	100	S.E.,	8	Heavy Rain.
	1 A. M.,	28.841	42	100	S.E.,	16	Heavy Rain.
	7 A. M.,	29.102	35	100	W.N.W.,	28	Light Snow.
	8 A. M.,	29.143	34	100	W.N.W.,	32	Light Snow.
	9 A. M.,	29.174	32	89	W.N.W.,	36	Light Snow.
	10 A. M.,	29.262	30	89	W.N.W.,	40	Light Snow.
	11 A. M.,	29.338	28	88	W.N.W.,	46	Light Snow.
	12 M.,	29.381	28	84	W.N.W.,	42	Cloudy.
	1 P. M.,	29.420	27	84	W.N.W.,	40	Clearing.
	2 P. M.,	29.452	26	86	W.N.W.,	36	Fair.

The electrical phenomena of this storm were very extensive and intense, although the cold season had so far advanced. The most terrific lightning and thunder were observed at Baltimore. (during the furious winds there which destroyed about \$60 000 worth of property,) in Alabama, Georgia, Tennessee, Connecticut, Massachusetts, West Virginia, New York and along the Atlantic seacoast.

Thus, while heavy snow was falling on the northern edges of this immense cyclone, its southern quadrants were illuminated by brilliant lightning.

The effects of the storm were felt in powerful winds as far south as Cape Hatteras, where the storm-wind blew 52 miles an hour. The lakes were lashed into high and dangerous seas, and the cyclonic indraught exerted its force to the Northwest and far Southwest as well as over all the interior districts.

No. IX was mostly felt on the Lakes, having apparently begun on the 26th in Dakota, and thence followed a course almost due east. Though by no means so severe as its memorable predecessor, it was attended with dangerous and disastrous winds on the Lakes.

No. X was peculiarly a Southern storm-centre, approaching Texas from the Valley of the Rio Grande on the 27th of November, and moving eastward to Mississippi, whence, on the 28th, it selected a nearly direct northeast path along the Appalachian chain to New Brunswick, whch it reached on the 29th without unusual progressive velocity.

(3.) *Areas of high barometer.*—These areas were far more definite than those of October. Only six, however, were of note.

No. I Appears, November 1st, in the Gulf States, where it slowly progresses eastwardly to the Carolina coast, where, by accretions of pressure from the northwest, it apparently moved in an unusual (northeast) direction from the 2d to the 4th.

No. II Began to enter the country from the Northwest on the 10th, moving very slowly, its pressure accumulating rapidly in the Northwest, whence it descended with low temperatures over the eastern part of the United States in a east-southeast direction. It reached the New England and Middle Atlantic coast on the night of the 14th, with pressure as high as 30.65 inches. It gradually worked its way down the Atlantic coast. It was speedily followed by

No. III, which overtook and reinforced it before its final departure off the Atlantic coast.

No. IV. Another very high baric area from the Northwest, entered the country on the 16th and rapidly developed in the Northwest, till, on the morning of the 18th, the pressure had risen in Dakota to 31.00 inches—an almost unprecedented height. This pressure subsided as rapidly as it had formed, and, before it could cross the Mississippi river, it had lost its phenomenal features, sinking into comparative insignificance.

No. V also arose in the Northwest on the 27th and had a well marked barometric character, moving southwardly without any peculiar consequences.

No. VI. The last notable area pursued the usual track from northwest to southeast, having barometer readings in the Northwest as high as 30.60 inches.

ATMOSPHERIC TEMPERATURE.

This element is represented on Map No. II, and needs no comment, except that November was abnormally warm in nearly all sections of the country. Some of the extreme ranges of temperature were *e. g.* At Breckenridge, Minn., from 64° to — 18°; at Chicago, 72° to 0°; Davenport, 71° to 0°; Duluth, 65° to — 12°; St. Paul, 72° to — 8°. See Table, Map No. II. The greatest daily range at Key West was 13°.