

MONTHLY WEATHER REVIEW,

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WAR DEPARTMENT,

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DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE

INTRODUCTORY.

The Monthly Weather Review for September is based upon reports from 442 stations, classified principally as follows:

Canadian Meteorological Service.....	14
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together with numerous extracts from logs of vessels. Destructive storms have not been numerous, the single prominent exception was No. XIII, which was only destructive in its passage from Florida to North Carolina.

The weather, in general, for the month, has been marked only by the not unusual features of droughts in some portions of the country, while other portions have experienced unusually heavy rains. These latter regions are well shown by the heavily-shaded spots on Map No. III, in Texas, the Missouri and Mississippi valleys and the Middle Atlantic States. Portions of Ohio, Indiana and Illinois, still continue to report a deficiency of rain-fall, thus prolonging the dry season in that region, to the great detriment of agriculture.

BAROMETRIC PRESSURE.

(1.) *In general.*—The general distribution of barometric pressure is seen from the isobars on Map No. II, where it appears that the highest average, 30.10, pertains to the Middle Atlantic, between Capes Hatteras and Cod, whence the pressure steadily diminished to 29.90 in Dakota. The mean 29.90 for the southern end of California seems low for that region.

(2.) *Areas of low barometer.*—The tracks pursued by the areas of low pressure are given on Map No. I, further details are found in the following paragraphs. It will be seen that these have, as in previous years, been frequently pushed far to the west and north, but that the better developed severe cyclones Nos. I, III, IV, V and XIII have pursued tracks differing but little from their normal courses.

Storm No. I. This small but well-marked cyclonic depression became first apparent on the 1st, near Nova Scotia, but kept to the eastward of that province and passed

beyond Cape Breton without being accompanied by high winds on the land as far as reported. In its earlier course, during the latter part of August, this storm may have passed near and to the northeast of the Bermudas.

No. II. This depression moved eastward over Lake Superior to the Gulf of St. Lawrence, followed by an area of high barometer and generally accompanied by rain in the Lower Lake region and St. Lawrence valley. While this disturbance was central over the Gulf of St. Lawrence on the 3d, a belt of notable contrasts of temperature extended from Iowa to New England, and severe gales were reported in eastern Massachusetts, followed by rapidly falling temperatures.

No. III. The brisk and high northeast winds that prevailed on the 3d on the western coast of Texas, appear to have been connected with the presence of a barometric depression in northern Mexico and which may originally have entered that country from the Pacific coast, as the barometer was below the average in southern California during the preceding day. If a definite central area of depression existed on the 2d and 3d in Mexico and Texas, its location must have been, approximately, as given on the chart. The cyclonic character of the disturbance on the 4th is not well shown by our observations, but may reasonably be inferred from the severity of the gale which raged on the 4th and 5th from Galveston southward, and which resulted in a large destruction of property along that coast. The barometric disturbance undoubtedly spent itself in great part in central Texas, where however the depression continued during the 7th, and on the 8th the existence of a storm-centre in the interior of Kansas became evident. This depression then continued its course northward to Manitoba, which it passed on the 10th.

No. IV. While the severe storm mentioned in the previous paragraph was moving northward into Texas, a similar and better developed cyclone was pursuing an almost parallel course about 1,500 miles to the eastward. The published weather maps of the morning of the 7th show the existence of this storm a short distance southeast of Nova Scotia. Its previous history has been traced by means of the published logs of ocean vessels, from which it appears that during the 5th the storm-centre passed a short distance southwest of the Bermudas, where the gale was quite severe; and on the 6th recurved on its northward track, and that as early as the 2d inst., its force was felt by a vessel in latitude $28^{\circ} 10'$ and longitude $55^{\circ} 38'$. The track given on Chart No. I may be regarded as a first approximate determination of its course, which, on the afternoon of the 7th, passed over Cape Breton Island. The lowest depression observed at Cape Breton was 28.75, which corresponds with the figures reported from ocean vessels, by many of which the hurricane wind was described as being one of the most severe ever experienced.

No. V. The cyclone No. IV was immediately followed by No. V, which passed nearly midway between Cape Hatteras and the Bermudas on the 9th, producing high winds on the North Carolina coast. The path of this depression remained persistently some distance east of the Atlantic coast, but its centre must have passed quite near Cape Breton on the morning of the 11th.

No. VI. This depression was preceded by rain and low barometer, with southerly winds in Oregon on the 10th. It was itself first well-defined on the afternoon of the 11th, when it was central in Minnesota. The cold northwesterly winds that followed in its rear gave rise to numerous rain-areas from Missouri to the Upper Lake region, while

the barometric depression moved rapidly northeastward over Lake Superior and beyond our stations.

No. VII. The origin of this depression during the 13th appears to have been similar to that of area No. III, the barometer having been reported quite low during the 11th in southern California, and the existence of a depression in northern Mexico and western Texas on the 12th and 13th may be inferred from the prevailing winds. This depression was, however, but very feebly marked, as it moved eastward, and became more or less masked by the influence of depression No. VIII to the northward. On the afternoon of the 15th, however, No. VII became distinctly separate from No. VIII, and on the morning of the 16th was central in North Carolina, while northeast winds and heavy rains extended from that State northeastward to New England. The further history of this disturbance becomes very interesting, from the fact that an unexpectedly large area of high barometer moved into the Gulf of St. Lawrence, whence a stream of air flowed steadily for over three days from the northeast along the middle and east Atlantic coasts, bringing cloud and rain to all that region and causing the barometric depression to dwindle away and disappear as it moved *northwestward* into central New York. The rains of the 15th, 16th and 17th ended the drought which had prevailed for six weeks on the middle and east Atlantic coasts.

No. VIII. This depression, of which but slight and uncertain traces are visible previous to the afternoon of the 13th, moved eastward into upper Canada, where it was lost sight of on the 15th.

No. IX. The low barometric pressure that prevailed on the 14th and 15th from California to Texas, was probably the initiative of a disturbance that was central on that day in Montana and on the 16th in Dakota, whence it slowly moved into Manitoba and thence apparently eastward.

No. X. This depression developed slowly in Kansas and northern Texas on the 16th and 17th, and was well defined on the 18th, as it passed eastward over the lower Missouri valley into Illinois. On this day occurred the lowest barometer during the month in Kansas, New Mexico, Colorado, &c. In the southeastern portion of Iowa and the adjacent portions of Illinois and Missouri, the wind and rain on the 18th were exceedingly severe and much damage was reported. The course of this storm-center then turned northward over upper Michigan into Canada, producing high southwest wind on Lakes Michigan, Erie and Huron on the 19th.

No. XI. This disturbance was preceded by a low barometer in southern California and probably southward over Mexico, but itself apparently had an origin on the border of Texas and Mexico on the 22d, in a manner similar to that of No. X, since it would appear that during the previous two days dry cold currents of air flowing southeastward from the extreme northwestern part of Texas under-ran and uplifted the warm air of the plains. On the 24th, this area of low barometer passed northward over Indian Territory, and on the 25th united with No. XII, which had rapidly developed in Montana.

No. XII. The trough of low pressure that stretched during the 25th from Kansas to Manitoba had, by midnight of that day, contracted to a small area in Minnesota, which moved slowly eastward into Canada, developing a quite low central pressure and accompanied by southerly winds and rain over the Lower Lakes on the 26th and 27th.

No. XIII. While No. XII threatened on the 26th to give rise to a very severe storm on the Lakes, a notable cyclonic disturbance moved northeastward over the Gulf of Mexico, for whose early history no data have as yet been received. Its existence was first rendered evident by strong northeast winds on the Texas coast on the afternoon of the 25th; at which time the central depression must have been south of Louisiana and possibly nearer Yucatan or Mexico. During the nights of the 27th and 28th the centre passed northeastwardly over upper Florida to the coast of Georgia, pursuing a track medial between those followed by storms Nos. VI and VII of September, 1873. As the present cyclone passed along the Carolina coast on the 28th, it developed a force that has been very generally compared to the hurricane of 1854. The centre of this storm passed a short distance east of Charleston and west of Wilmington and Norfolk, crossing Chesapeake Bay on the morning of the 29th; here the violence of the winds sensibly diminished, while the barometric depression spread irregularly in various directions. After passing east of the New Jersey coast the storm seems to have turned northward through New England and is lost sight of on the afternoon of the 30th at the mouth of the St. Lawrence. The lowest reported barometric pressures at points near the track of the storm-centre were as follows:

Lake City, 29.40 at 4 A. M. 28th.	Cape May, 29.39 " 4.35 P. M. 29th.
Jacksonville, 29.42 " 7 " "	New York, 29.37 " 11 " "
Savannah, 29.40 " 9 " "	New Haven, 29.29 " 11.16 " "
Charleston, 29.06 " 1 P. M. "	New London, 29.24 " 11.35 " "
Augusta, 29.57 " 4 " "	Wood's Hole, 29.31 " 7 A. M. 30th.
Wilmington, 29.15 " 6.15 " "	Boston, 29.13 " 4 " "
Cape Henry, 29.31? " 11 " "	Portland, 29.05 " 7.35 " "
Norfolk, 29.41? " 11 " "	Eastport, 29.20 " 7 " "
Lynchburg, 29.47 " 11 " "	Father Point, 28.94 " 4.35 P. M. "

The highest winds were: At Savannah, NW., 36 miles; at Tybee Island, E., 60; at Charleston, E., 51, and NW., 48; at Cape Hatteras, SE., 75; at Wilmington, SE., 45, and SW., 50; at Cape Henry, 60 miles.

(3.) *Areas of High Barometer.*—Of these areas the most notable has been No. V, which obtained its greatest development on the 18th, when it was probably central on the Gulf of St. Lawrence.

I. This passed from British America on the 1st southeastward over the Lakes to the Carolina coast on the 3d, followed by storm No. II on its northeastern boundary, and by the still higher pressure of the next paragraph.

No. II is first reported in Oregon and British Columbia on the 2d. It moved southeastward over Dakota on the 3d, to South Carolina and Georgia on the 8th. Clear, dry weather accompanied it over the greater part of the country, except the Texas coast, during that period.

No. III began to press southward, over the St. Lawrence valley, on the 12th, and, after passing over New England, disappeared east of Cape Cod on the 15th.

No. IV was, apparently, a western division of the same area of cold, dry air, and moved southeastward on the 12th over Dakota, disappearing on the 14th over the Lake region.

No. V appears on the 14th as a continuation of No. IV, and extended, on the morning of that day, over the upper Missouri valley. It passed thence eastward to the Upper

Lake region on the 16th, where it appears to have been re-enforced by further contributions from Hudson's Bay and Labrador, forming an unusually extensive area of high pressure, whose centre was over the Gulf of St. Lawrence on the 18th and 19th, where the barometric reading averaged 30.70 on the morning of the former day. The influence of this high barometer in producing continued easterly winds and rain on the New England and New Jersey coasts from the 15th to the 20th, has already been alluded to.

No. VI. The extensive area of low pressure prevailing over the Lake region on the 18th and 19th, seems not only to have drawn from the northward and eastward the air that produced the high barometer of the preceding section, but also induced a flow from the south and west that gave rise to No. VI, whose existence may be traced from the Ohio valley on the morning of the 21st, backward to Indian Territory on the 19th, and forward over Maryland on the 22d to the Middle Atlantic coast, where traces of it still remained on the 26th.

No. VII. This area began, like the preceding one, in or near Texas, and, like it, its origin is attributable to the presence of an area of low pressure, (No. XIII,) which existed on the 27th in the Gulf of Mexico. Like it, also, the highest barometer at centre moved eastward, and was not remarkably conspicuous.

ATMOSPHERIC TEMPERATURE.

The isothermal lines, as given on chart No. II, show the average distribution of temperature during the month, which are supplemented by the small table, which gives the mean temperatures for the different geographical divisions. The cool weather of August was gradually succeeded throughout the Middle Atlantic States and neighboring sections by hot weather, accompanying the drought, the influence of which is not fully seen in the average temperatures. The extremes of temperature reported from sections in Dakota, and adjoining sections, have been quite remarkable—very hot southerly winds being reported during the 2d and 9th, followed by frost on the 15th. Frosts were reported over extensive portions of the country on the 4th and 5th in New England; on the 15th and 16th from Michigan and Illinois to Dakota; on the 20th, 21st and 22nd, from Massachusetts and Pennsylvania to Wisconsin; on the 28th, 29th and 30th, from Ohio to Kansas and Minnesota; besides these, frosts were reported in portions of one or two States on the 8th, 10th, 12th, 14th, 19th, 23d, 25th, 26th and 27th.

PRECIPITATION.

Map No. III gives the details of the total amount of rain-fall for the month over the entire country, and the accompanying table shows the districts in which there has been an excess or deficiency. Remarkable rain-falls occurred on the 3d, 4th, 5th and 6th, in Texas, accompanying storm No. III, and in Iowa, Missouri and Illinois, on the 18th, accompanying storm No. X. The heavy rain-fall of the Middle Atlantic States occurred, principally, on the 16th, 17th and 18th, in connection with storm No. VII, and on the 29th in connection with No. XIII.

The drought in the Middle Atlantic and southern New England States closed on the 15th, after lasting about six weeks; that in central New York closed on September 3d; that in Tennessee, Ohio, Indiana and portions of Illinois and Iowa, has been only in a slight degree abated by the light rains in those States.

The distribution of the number of rainy days exhibits, in some respects, a notable contrast to the distribution of the number of cloudy days. The greatest number