

MONTHLY WEATHER REVIEW.

VOL. XX.

WASHINGTON, D. C., OCTOBER, 1892.

No. 10.

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INTRODUCTION.

This REVIEW is based on reports for October, 1892, from 2,799 regular and voluntary observers. These reports are classified as follows: 164 reports from Weather Bureau stations; 45 reports from United States Army post surgeons; 1,920 monthly reports from state weather service and voluntary observers; 220 reports through the Central Pacific Rail-

way Company; 419 marine reports through the co-operation of the Hydrographic Office, Navy Department; 31 reports from Canadian stations; marine reports through the "New York Herald Weather Service"; monthly reports from local services established in all states and territories; and international simultaneous observations. Trustworthy newspaper extracts and special reports have also been used.

CHARACTERISTICS OF THE WEATHER FOR OCTOBER, 1892.

In the Atlantic coast states from New England to Florida and in parts of the Ohio and upper Mississippi valleys and Tennessee the month was the driest October on record. In many localities in the districts named serious inconvenience and suffering were caused by the failure of cisterns, wells, and streams. In Indian Territory excessive rainfall damaged cotton.

TEMPERATURE.

The month was warmer than usual, except in the middle and south Atlantic and Pacific coast states and in the middle Rocky Mountain and southern plateau regions. In the middle Missouri and Red River of the North valleys the month was the warmest October on record. The most important cold wave of the month advanced from the northeast slope of the Rocky Mountains to the south Atlantic and east Gulf states from the 21st to the 25th, carrying the frost line to the Gulf and south Atlantic states and northern Florida. From the 26th to the 28th the line of freezing weather extended to southern New Mexico, extreme northwestern Texas, and central Mississippi.

PRECIPITATION.

The monthly precipitation was deficient except in the middle and southern Rocky Mountain regions and the southwestern states. The most marked deficiency was noted in the middle Atlantic states and the Ohio Valley and Tennessee, where the monthly rainfall was 10 to 20 per cent. of the average amount for October. At Denver, Colo., the monthly precipitation was about five times greater than the average, and at Abilene, Tex., and Fort Smith, Ark., it was about double the usual amount for October. In the central Rocky Mountains the monthly snowfall was 20 to 40 inches. On the 11th and 12th a heavy snowstorm, with low temperature and high wind, interrupted travel and caused loss of life and stock in eastern Colorado. A notable feature of the month was a fall of .02 inch of rain from a cloudless sky at Eureka, Cal., the night of the 13th.

STORMS.

The most destructive storm of the month prevailed over the Great Lakes on the 28th and 29th. Many vessels were wrecked or damaged, and loss of life was reported. At Milwaukee, Wis., fire, driven by the high wind, destroyed property to the estimated value of \$5,000,000. The local storms of the month were generally of slight intensity.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for October, 1892, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown on Chart II by isobars.

The normal pressure for October is highest over the south Atlantic and east Gulf states, the Ohio Valley and Tennessee, and Oregon, where it is above 30.10, and it is above 30.05 along the Atlantic coast from Florida to Nova Scotia, and in a belt extending thence over the middle and lower Mississippi valleys, and thence to the north Pacific coast. The normal pressure is lowest in the Saskatchewan and lower Saint Lawrence valleys, and over southern California and the lower Colorado valley, where it is below 30.00.

In October there is usually an increase of pressure over the United States. The greatest increase generally occurs from the lower Colorado valley over the middle plateau region, where the normal pressure is more than .10 higher than for September.

In October, 1892, the highest mean pressure was shown in two extensive areas bounded by isobars of 30.10, one of which covered the middle plateau region; the other included districts lying between the Ohio and middle Mississippi valleys and the south Atlantic coast. In a wide belt extending from the Atlantic coast between the 30th and 40th parallels to the Pacific coast between the 40th and 45th parallels the mean pressure was above 30.05. The mean pressure was lowest

over the Gulf of Saint Lawrence region, where it was below 29.80, and it was below 29.95 over the greater part of New England, in the middle Saskatchewan valley, and over south-eastern California and western Arizona.

A comparison of the pressure chart for October with that of the preceding month shows an increase of pressure over the Rocky Mountain, plateau, and Pacific coast regions. There was also a slight increase in the upper Mississippi, lower Missouri, and Red River of the North valleys, and over the east Gulf states. From Texas over the middle Mississippi and Ohio valleys, the Lake region, and middle Atlantic and New England states the mean pressure was lower than for September. The greatest increase of pressure was noted over the central part of the middle plateau region, where it was .15, and the most marked decrease occurred over Nova Scotia, where it was more than .30.

The mean pressure was above the normal over interior districts and was below the normal along the Atlantic, Gulf, and Pacific coasts, over the lower lake region and the north part of the upper lake region, and in the eastern Saskatchewan valley. The greatest departure above the normal pressure was shown in Colorado and the western Saskatchewan valley, where it was .05, and the most marked departure below the normal appeared over the Canadian Maritime Provinces, where it was more than .20.

HIGH AND LOW AREAS.

The paths of areas of high and low barometric pressure over the United States and Canada for October, 1892, are shown on Charts IV and I, respectively, and some of the more prominent characteristics of the areas are given in the table at the end of this chapter.

HIGH AREAS.

The average velocity of high areas over the United States in October is about 23 statute miles per hour. They generally move from the British Northwest Territory or the north Pacific coast southeastward over the central valleys or the Lake region and pass thence eastward to the Atlantic coast.

In October, 1892, 11 high areas appeared, the average number traced for the corresponding month of the last 16 years being 7.6. Of the high areas traced for the current month 3 advanced from the north Pacific coast, 5 first appeared over the western Saskatchewan valley, 1 over Manitoba, 1 north of Lake Superior, and 1 north of the Lake region. Two of the Pacific coast high areas disappeared by a decrease of pressure over the middle plateau region, and 1 over Manitoba; 3 of the areas from the western Saskatchewan valley, the high area from Manitoba and those from north of the Great Lakes, reached the south Atlantic coast. Of the remaining 2 high areas from the Saskatchewan Valley, 1 disappeared over Manitoba and the other moved southeastward to the Gulf of Mexico. The general course of the high areas was southeastward; in 3 instances the tracks recurved slightly to the westward along the Atlantic coast. The following is a description of the high areas referred to:

I.—The month opened with an extensive area of high barometer overlying the central valleys and the Lake region, with highest pressure, 30.48, over eastern Lake Superior, and a temperature fall of 10° to 20° from the Lake region over New York and New England. The night of the 2d this high area was central over Virginia. On that date the temperature fell below freezing in eastern Ontario, a fall of 16° to 22° occurred in Virginia, and heavy frost was reported in the Catskill and Pennsylvania mountain regions. Moving southward the center passed off the south Atlantic coast by the evening of the 3d, with temperature below freezing in New Brunswick and eastern Quebec, and heavy frost generally throughout Virginia and Maryland.

II.—Occupied the north Pacific coast on the 1st. By the

night of the 1st a 24-hour temperature fall of 15° to 20° occurred over southern Montana. During the 2d the high area moved to western Wyoming, with pressure above 30.20, a fall of 10° in temperature in South Dakota, and a minimum reading of 32° at Lander, Wyo. During the 3d the high area remained central over the middle Rocky Mountain region, with pressure above 30.30 at the morning report, and the temperature fell 10° over eastern Nebraska. During the 4th the center appeared to move slightly to the westward, and on the 5th this high area disappeared by a decrease of pressure over the middle plateau region.

III.—The morning of the 4th, when high area II occupied the middle Rocky Mountain region, the pressure was high from the middle plateau over the eastern Saskatchewan valley, and this high area was central over Manitoba, with pressure above 30.20. By the evening report low area II had extended its influence southeastward over the Missouri Valley and divided the area of high pressure, one part, high area II, retreating over Colorado, and the other, high area III, moving east of Manitoba. On that date the cooler weather over South Dakota and Nebraska, due to high area II, was carried over the Lake region and upper Ohio valley, where the temperature fell 10° to 18°. At Saint Vincent, Minn., the minimum temperature was 30°.

On the 5th this high area passed southeastward over Lower Michigan, the temperature fell 10° to 18° from the middle Mississippi valley to the middle Atlantic and south New England coasts, the temperature was 10° to 20° below the normal from the upper Ohio valley to New Jersey and western New England, the minimum temperature was 24° to 26° on the north shore of Lake Superior, and heavy frost was reported in northwestern Ohio. On the 6th the high area passed to the North Carolina coast, the temperature fell 10° to 12° over eastern Nova Scotia and on the Carolina coast, the minimum temperature was below freezing in the upper Ohio valley, and heavy frost was reported generally throughout Ohio and in eastern Lower Michigan.

IV.—Appeared north of Montana the morning of the 6th, with pressure above 30.20, and moved thence over eastern Montana by the evening report. On the 5th the temperature fell 10° to 15° in the Saskatchewan Valley and over the northern plateau region, and on the 6th there was a fall of 10° to 16° over the Dakotas, and the minimum temperature was below freezing in the western Saskatchewan valley. On the 7th the high area moved slowly eastward over the Dakotas, the temperature fell 10° to 20° from the middle-eastern slope of the Rocky Mountains over the upper lakes, and the minimum temperature was 24° at Valentine, Nebr., and Huron, S. Dak.

During the 8th the center passed southward to Kansas, with pressure rising above 30.30 at the morning report, the temperature fell 10° to 20° from Texas to western New York, the temperature was 10° to 17° below the normal from Arkansas to Ohio, and heavy frost was reported in north-central Kansas, Iowa, and east-central Minnesota. During the 9th the area moved to Oklahoma and thence to Tennessee, the temperature fell 10° to 14° along the immediate Atlantic coast from New York to Florida and on the west Gulf coast, and heavy frost was noted in northeastern Kansas, eastern Nebraska, northwestern Missouri, eastern Iowa, and central Illinois. On the 10th the center moved eastward off the Carolina coast, heavy frost was reported at Oswego, N. Y., and light frost at Albany, N. Y., Sandusky, Ohio, and Knoxville, Tenn.

V.—Appeared north of the Lake region on the 11th, moved southeastward over the middle Saint Lawrence valley and New England during the 12th, with pressure above 30.40, and passing thence west of south disappeared off the south Atlantic coast after the 15th. The advance of this high area was attended by a slight fall in temperature over the upper lakes and northern New England on the 11th, along the im-

mediate middle Atlantic and New England coasts on the 12th, from Pennsylvania to Florida on the 13th, over the Florida Peninsula on the 14th, and along the immediate Gulf coast on the 15th.

VI.—Appeared off the Oregon coast on the 11th, with pressure above 30.30. On that date the temperature fell 10° to 20° over the middle and northern plateau regions, and the temperature was 10° to 20° below the normal over the middle plateau. During the 12th the center moved southeastward over the middle plateau, with pressure above 30.40 at the morning report, and the temperature fell 20° to 30° on the middle-eastern slope of the Rocky Mountains. By the evening of the 13th the high area had moved over the eastern part of the middle plateau, the temperature had fallen slightly from the middle Missouri valley to Texas, and heavy frost was noted at Salt Lake City, Utah. On the 14th the high area remained over the middle Rocky Mountain region, the temperature fell 10° to 18° from east-central Texas to southwestern Arkansas, and the minimum temperature was below freezing from the Saskatchewan Valley over Wyoming. By the morning of the 15th this high area had disappeared by an increase of pressure over the middle Rocky Mountain region.

VII.—Appeared over the western Saskatchewan valley on the 14th, with pressure above 30.10. On that date a slight fall in temperature occurred in the Red River of the North and upper Mississippi valleys. During the 15th the high area moved south of east over Manitoba, and the temperature fell slightly in the western lake region and lower Ohio valley. During the 16th the center moved eastward north of Lake Superior, with pressure above 30.30, and the temperature fell 10° to 20° over the Lake region. Passing to the middle Saint Lawrence valley during the 17th, with a temperature fall of 10° in northern New England and Virginia, the high area moved thence southward over New England and thence to the south Atlantic states, where it apparently disappeared by a decrease of pressure during the night of the 18th.

VIII.—Appeared off the middle Pacific coast on the 17th, with pressure above 30.20. In conjunction with high area VII this high area caused a marked fall in temperature over the Rocky Mountain and plateau regions and along the Pacific coast from the 13th to 16th. On the 17th the temperature fell 20° to 30° from Colorado to South Dakota, and a minimum temperature of 8° was noted at Calgary, Alberta. During the 18th the center passed slowly northward off the north Pacific coast, with pressure above 30.30 at the evening report, and the pressure was high thence to the southeast slope of the Rocky Mountains, the temperature fell 10° to 20° from northwestern Texas to the upper Mississippi valley, and light frost was reported in western Kansas.

On the 19th the center remained nearly stationary over Washington, the temperature fell 10° to 12° from western Tennessee to the lower lakes, and the minimum temperature was 20° at Saint Vincent, Minn. By the evening of the 20th the high area had advanced to Wyoming. On that date a slight fall in temperature occurred in the middle Mississippi and lower Missouri valleys. During the 21st the high area remained nearly stationary over Wyoming, and by the morning of the 22d it had united with high area IX, which had advanced southeastward from the western Saskatchewan valley.

IX.—Appeared over Alberta the morning of the 21st, with pressure above 30.30, and moved thence slowly eastward north of Montana by the evening report. On that date the temperature fell 10° to 16° on the northeast slope of the Rocky Mountains, and the minimum temperature was below freezing over the middle and northern Rocky Mountain and plateau regions. During the 22d the center advanced to South Dakota, the temperature fell more than 10° from New Mexico

to the western lake region, and a minimum of 14° was noted at Fort Buford, N. Dak. On the 23d the high area moved slowly northeastward over Minnesota, and the line of freezing weather extended to northern Missouri. During the 24th the path of the center recurved to the northwest over Manitoba, with pressure above 30.50 at the morning report, and this high area apparently united with high area X which occupied the western Saskatchewan valley. On that date the line of freezing weather extended to central Ohio and West Virginia, and heavy frost and temperature below freezing were reported in New Mexico.

X.—The morning of the 25th the center of this high area occupied the northeast slope of the Rocky Mountains, with pressure rising to 30.60 at Medicine Hat, N. W. T., and by the evening report it had passed to Wyoming. On that date a slight fall in temperature occurred in the lower Missouri valley, the minimum temperature was below 32° in southern Kansas and southern Missouri, and frost was reported in various parts of northern Texas, northern Louisiana, Arkansas, Tennessee, and Missouri. On the 26th the center remained nearly stationary over the middle Rocky Mountain region, a slight fall in temperature occurred from the middle Mississippi valley to the middle Gulf coast, and frost was reported in the Southern States from Louisiana to northern Florida. On the 27th the high area passed to southeastern New Mexico, the temperature fell slightly from the east Gulf coast to the upper Ohio valley, the line of freezing weather extended to northern Arkansas, and frost was reported in parts of Louisiana and Kentucky. During the 28th the high area advanced over the Gulf of Mexico, the temperature fell slightly over the Florida Peninsula, the line of freezing weather reached the northern part of the east Gulf states, and heavy frost was noted throughout Tennessee.

XI.—Appeared over Alberta during the 27th, with pressure above 30.20. On that date a marked fall in temperature occurred from the western Saskatchewan valley over the plateau and Pacific coast regions, and the minimum temperature fell to 24° at Winnemucca, Nev. By the night of the 28th the center advanced to northern North Dakota, with pressure above 30.50 at the morning report, the temperature fell 10° to 26° in the Northwest, and a minimum temperature of 28° was noted at Tucson, Ariz. On the 29th the high area moved to the middle Mississippi valley, the temperature fell more than 10° from the Ohio Valley to New Mexico, the line of freezing weather extended to southern Kansas, and heavy frost occurred on the middle-eastern slope of the Rocky Mountains. On the 30th the center advanced to the middle Alleghany Mountain region, the temperature fell more than 10° along the immediate Atlantic coast from Maryland to Florida, and the line of freezing weather reached eastern Tennessee. On the 31st this high area passed off the North Carolina coast, the line of freezing weather reached northern Georgia, and the first heavy frost of the season was reported at Augusta, Ga.

LOW AREAS.

The average velocity of October areas of low barometric pressure over the United States is 30 statute miles per hour. The principal track of the low areas of that month lies along the northern border of the country from the Rocky Mountains to the 100th meridian and thence over the Great Lakes and Saint Lawrence Valley. A less frequented course is from the middle plateau to the Lake region and thence eastward, and low areas of marked strength averaging about one per month pass up the south and middle Atlantic coasts. Tracings for October of preceding years show that an average of about one low area per month crosses the Pacific coast and Rocky Mountain ranges and traverses the continent.

The paths of 10 low areas are plotted on Chart I for October, 1892, the average number traced for the corresponding month of the last 16 years being 10.9. Of the low areas

traced for the current month 2 advanced from the Pacific Ocean, 5 appeared over the Saskatchewan Valley, 2 apparently developed over the middle plateau region, and 1 recurved eastward over the north part of the Gulf of Mexico. One of the Pacific low areas reached the Gulf of Saint Lawrence; the other disappeared by an increase of pressure over Manitoba. All of the low areas from the British Northwest Territory moved eastward to the Gulf of Saint Lawrence. One of the low areas from the middle plateau region advanced to the Gulf of Saint Lawrence; the other occupied the middle Mississippi valley at the close of the month. The low area from the Gulf of Mexico crossed the Florida Peninsula and moved thence northeastward over the Atlantic Ocean. The average velocity of the low areas was about 3 miles per hour less than the average velocity of low areas traced for October of preceding years. The following is a description of the low areas traced for October, 1892:

I.—Appeared north of Montana on the 1st, with pressure 29.70. On that date the temperature rose 10° to 16° and was 20° to 30° above the normal over the Dakotas, the maximum temperature was 90° to 98° in South Dakota, and rain fell on the northeast slope of the Rocky Mountains. During the 2d the center of disturbance passed to the region north of Lake Superior, the temperature rose 10° to 20° in Manitoba, the maximum temperature was 80° to 88° in the lower Missouri and middle Mississippi valleys, rain fell in the upper lake region, and thunderstorms occurred in the morning in Upper Michigan. On the 3d the center moved north of the eastern lake region, the temperature rose 10° to 20° in the middle Atlantic states, the maximum temperature was 82° to 86° in the middle Mississippi and Ohio valleys, rain fell from the Lake region over New England, and thunderstorms occurred in the evening in northern Ohio.

By the morning of the 4th the low area had passed southeastward to the Maine coast, avoiding the lower temperature which obtained over and north of the Gulf of Saint Lawrence, and by the evening report was central over Nova Scotia. On that date rain fell in areas from the Great Lakes to the Atlantic coast north of the 35th parallel, and heavy thunderstorms occurred along the North Carolina coast. During the 5th the storm-center moved slowly northeastward over the Gulf of Saint Lawrence, with a marked increase in energy, and rain fell from the eastern lake region to the middle Atlantic and New England coasts. The morning of the 6th the low area was apparently central over the north part of the Gulf of Saint Lawrence, with pressure below 29.20, and by the evening report it had passed northeastward beyond the region of observation.

II.—Appeared over northern Alberta the evening of the 4th, with pressure below 29.70. During the 5th the center moved eastward over the Saskatchewan Valley, the temperature rose 10° to 20° in Manitoba, and the maximum temperature was 86° to 88° in the Dakotas and Kansas. On the 6th the low area moved southeastward to Lake Superior, with pressure 29.50, a marked rise in temperature occurred over the Great Lakes, the Ohio Valley, Pennsylvania, and New York, and light rain fell in western South Dakota. On the 7th the center passed to Georgian Bay, with pressure below 29.50, the temperature rose in the Atlantic coast states north of Florida, thunderstorms were noted in the middle Ohio valley, rain fell generally throughout the Lake region and middle and upper Ohio valleys, and severe northwest gales prevailed over Lake Superior. During the 8th the low area advanced to New England, rain fell generally east of the Mississippi River, high winds prevailed in the morning over Lakes Michigan and Huron, and severe thunderstorms occurred in Maryland in the evening. On the 9th the center passed south and east of Nova Scotia, and rain was followed by clearing weather in the Atlantic coast states.

III.—Approached from the Pacific Ocean and the evening of the 8th was apparently central off the mouth of the Columbia River, with pressure below 29.60. On that date the temperature rose slightly in the Northwest, high winds and heavy rain prevailed along the middle and north Pacific coasts, and the wind reached a velocity of 51 miles per hour from the southeast at Tatoosh Island, Wash. On the 9th the center advanced to Alberta, with pressure 29.50, the temperature rose slightly on the eastern slope of the Rocky Mountains, rain fell in areas in the middle and north Pacific coast and middle and northern plateau regions and in western Montana, and a wind velocity of 64 miles per hour from the southeast was reported at Fort Canby, Wash.

On the 10th the center passed southeastward to South Dakota, and at the evening report a trough of low pressure extended from the middle Missouri valley to Alberta, with two areas of lower pressure, one over Alberta and the other over South Dakota. On that date the temperature rose 10° to 15° in the Lake region, and rain fell in areas in the middle and northern Rocky Mountain regions. During the 11th the low area occupied the middle Missouri valley, and at the evening report a trough of low pressure extended from Manitoba to New Mexico, with pressure below 29.50 over South Dakota. On that date the temperature rose slightly in the middle and south Atlantic states, rain fell in the middle and northern Rocky Mountain regions and in areas in the Lake region, and high northwest wind and heavy snow were reported in the middle Rocky Mountain region.

On the 12th the center of disturbance occupied Kansas, a slight rise in temperature occurred over the Gulf States, rain fell from the Red River of the North Valley to Colorado and Oklahoma, high northwest winds and snow were reported in eastern Colorado, and wind velocities of 72 miles per hour from the southwest and 64 miles per hour from the northwest were noted at Amarillo, Tex., and Pueblo, Colo., respectively. During the 13th the center moved northward to South Dakota, rain fell in the Missouri Valley, the middle Rocky Mountain region, and on the west Gulf coast, and thunder, rain, and hail storms were reported in the lower Missouri valley. On the 14th the low area advanced to the Red River of the North Valley, rain fell from Manitoba to the west Gulf coast, and a general and slight rise in temperature occurred east of the Mississippi River. During the 15th the center moved eastward north of the Lake region, the temperature rose slightly from the lower lakes to the Gulf of Mexico, and rain fell in the Lake region and Ohio Valley. By the morning of the 16th the center of disturbance had reached the lower Saint Lawrence valley. On that date rain was followed by clearing weather from the lower lakes and upper Ohio valley to the New Jersey and New England coasts, and severe thunderstorms occurred in southern New England.

IV.—Appeared on the north Pacific coast the morning of the 10th, with pressure below 29.80, and by the evening report had advanced to Alberta with central pressure below 29.40. On that date the temperature rose slightly over the middle plateau, rain fell from the north Pacific coast over the middle and northern Rocky Mountain regions, and the wind reached a velocity of 72 miles per hour from the southwest at Fort Canby, Wash. During the 11th the center moved slowly eastward over the Saskatchewan Valley, and on the 12th passed southward and united with low area III which occupied the eastern slope of the Rocky Mountains.

V.—Apparently developed over the middle plateau region and the morning of the 15th the center occupied northern Utah, with pressure below 29.70. By the evening of the 15th the center had reached southeastern Montana, the temperature had risen 6° to 14° from the Mississippi River to the Rocky Mountains, and rain had fallen from the middle and north Pacific coast states over the northeast slope of the

Rocky Mountains. The evening of the 15th a trough of low pressure extended from Manitoba to New Mexico with two cyclonic centers, one over North Dakota and the other over northern Colorado. On that date the temperature rose slightly in the central valleys, rain fell in small areas in the Rocky Mountain regions and the Red River of the North Valley, and high winds were reported from the Missouri River to the Rocky Mountains, a velocity of 88 miles per hour from the southwest being noted at Pikes Peak, Colo.

During the 17th the center moved northeastward over Manitoba, with pressure below 29.10 at the morning report, when a very steep barometric gradient was shown to the eastward and between this low area and high area VII. On that date the temperature rose 10° over the western lake region, light rain fell from the middle Missouri valley to Manitoba, snow was reported in the Saskatchewan Valley, and south to southeast gales occurred in the middle Missouri and Red River of the North valleys. On the 18th the low area moved north of Lake Superior, the temperature rose 10° to 20° in the Ohio Valley and the lower lake region, and rain fell from the Southwestern States over the western and northern lake regions. On the 19th the center moved rapidly south of east and reached the Gulf of Saint Lawrence, the temperature rose 10° to 12° along the middle Atlantic and New England coasts, and rain was followed by clearing weather from the Ohio Valley over the middle Atlantic and New England states.

VI.—Was central over the eastern Saskatchewan valley the evening of the 20th, with pressure below 29.60. During the 21st the center passed south of east over Manitoba, the temperature fell slightly from the upper Mississippi valley over the upper lakes, and heavy rain fell in the Southwest. During the 22d the low area moved rapidly south of east and reached the Gulf of Saint Lawrence, the temperature rose slightly in the middle Atlantic and New England states, rain fell in a belt from New Mexico to the middle Atlantic coast, and high northwest winds were encountered off the south New England coast.

VII.—A dispatch from Habana, Cuba, dated 10.10 p. m., 21st, stated that a cyclonic disturbance increasing in energy was recurving southwest of that place and would cross western Cuba. The presence of this low area over the Gulf of Mexico was indicated by reports of the 22d. On that date heavy rain fell on the middle Gulf coast, and a wind velocity

of 50 miles per hour from the northeast was reported at New Orleans, La. During the 23d the low area recurved north and east off the middle Gulf coast, and the rain area extended northeastward to the middle Atlantic coast. On the 24th the center of disturbance moved eastward over the Florida Peninsula, with heavy rain in eastern Florida and along the Georgia and South Carolina coasts, after which it apparently moved northeastward off the Atlantic coast, attended by high wind and heavy rain, reaching the New England coast the evening of the 26th and the lower Saint Lawrence valley the morning of the 27th.

VIII.—Appeared over Manitoba the evening of the 26th, and by the evening of the 27th had advanced to the region north of the lower lakes, with pressure below 29.70, and rain over the northern lakes and in the Saint Lawrence Valley. During the 28th the center passed eastward north of the Gulf of Saint Lawrence.

IX.—Appeared over Manitoba the evening of the 27th, with pressure below 29.70, and during the 28th advanced over the upper lake region, with pressure below 29.30. On the latter-named date unusually severe gales prevailed over the Great Lakes; these gales continued during the 29th, and were attended by considerable loss of shipping. At points on Lakes Michigan, Huron, and Erie the wind velocity exceeded 50 miles per hour, and at Cleveland, Ohio, a velocity of 60 miles per hour from the northwest was recorded on the 29th. The temperature rose 10° to 20° in the middle Mississippi and Ohio valleys on the 28th, and 10° to 12° on the south Atlantic coast on the 29th. On the 28th the rain area was confined to the Lake region, and on the 29th it extended over the middle Atlantic and New England states, and thunderstorms were reported in parts of New England. On the 30th the center moved north of east over Nova Scotia.

X.—Appeared over western Kansas the evening of the 30th, with pressure below 29.90. On that date the temperature rose 10° to 14° in the middle Mississippi valley, snow fell in the middle Rocky Mountain region, and rain was reported from the middle-eastern slope of the Rocky Mountains to western Iowa and western Missouri. During the 31st the center moved eastward to the lower Missouri valley, with pressure below 29.80, a marked rise in temperature occurred east of the middle and lower Mississippi rivers, and the rain area extended from the Mississippi Valley over the Lake region.

Tabulated statement showing principal characteristics of areas of high and low pressure.

Barometer.	First observed.			Last observed.			Duration.	Velocity per hour.	Maximum pressure change in 12 hours, maximum abnormal temperature change in 12 hours, and maximum wind velocity.											
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.	Days.			Miles.	Station.	Rise.	Date.	Station.	Fall.	Date.	Station.	Direction.	Miles per hour.	Date.	
											Inch.			Inch.						Inch.
High areas.	0	0	0	0	0															
I.....	1	48	85	34	81	1-5	33	Rockliffe, Ont.....	.46	1	Marquette, Mich.....	23	1	Chicago, Ill.....	n.	46	1			
II.....	1	46	120	40	107	3-0	17	Calgary, N. W. T.....	.40	2	Montrose, Colo.....	19	2	Fort Canby, Wash.....	s.	36	1			
III.....	4	52	97	35	77	2-5	27	Block Island, R. I.....	.32	5	Hatteras, N. C.....	17	6	Hatteras, N. C.....	n.	36	6			
IV.....	6	51	110	36	83	4-0	25	White River, Ont.....	.38	7	Havre, Mont.....	27	6	Amarillo, Tex.....	ne.	32	7			
V.....	11	48	77	33	80	4-0	17	Northfield, Vt.....	.26	11	Cincinnati, Ohio.....	11	11	Block Island, R. I.....	ne.	36	12			
VI.....	12	46	113	41	105	2-5	16	Helena, Mont.....	.36	11	Montrose, Colo.....	25	11	Helena, Mont.....	sw.	30	12			
VII.....	14	53	118	34	82	4-5	28	Father Point, Quebec.....	.34	16	Rockliffe, Ont.....	18	16	Block Island, R. I.....	ne.	38	17			
VIII.....	17	39	125	52	100	7-5	17	Pueblo, Colo.....	.20	20	Duluth, Minn.....	19	22	Eureka, Cal.....	n.	30	18			
IX.....	21	51	114	34	102	3-5	21	Medicine Hat, N. W. T.....	.54	21	Havre, Mont.....	17	21	Amarillo, Tex.....	n.	36	22			
X.....	25	51	113	28	88	3-5	30	.....do.....	.18	25	Dodge City, Kans.....	14	27	.....do.....	n.	36	26	
XI.....	27	53	115	36	75	3-5	31	Rockliffe, Ont.....	.60	30	Havre, Mont.....	21	28	.....do.....	n.	36	26		
											(Springfield, Mo.....	21	29	Kearney, Nebr.....	nw.	42	28			
Mean.....						3-7	24		.37			19				36				
Low areas.																				
I.....	1	53	109	49	62	4-5	24	Boston, Mass.....	Fall.	3	Rapid City, S. Dak.....	22	1	Hatteras, N. C.....	w.	44	5			
II.....	4	53	115	46	58	5-0	25	Marquette, Mich.....	.38	6	Bismarck, N. Dak.....	21	5	Chicago, Ill.....	s.	40	6			
III.....	8	46	126	50	68	7-5	26	Pueblo, Colo.....	.34	11	Yankton, S. Dak.....	23	9	Amarillo, Tex.....	sw.	72	12			
IV.....	10	50	125	50	98	2-0	26	Winnemucca, Nev.....	.30	10	Huron, S. Dak.....	18	11	Fort Canby, Wash.....	s.	72	10			
V.....	15	40	113	47	63	4-5	27	Winnipeg, Man.....	.54	17	Cleveland, Ohio.....	20	18	Huron, S. Dak.....	se.	52	17			
VI.....	20	54	107	48	81	1-5	31	Swift Current, N. W. T.....	.26	20	Duluth, Minn.....	15	21	Bismarck, N. Dak.....	nw.	54	17			
VII.....	23	28	90	28	79	1-5	20	Mobile, Ala.....	.12	22	New Orleans, La.....	8	23	New Orleans, La.....	ne.	30	21			
VIII.....	26	53	98	51	66	1-5	42	Minnedosa, Man.....	.30	26	Port Buford, N. Dak.....	15	26	Kearney, Nebr.....	n.	30	26			
IX.....	27	52	100	47	59	3-0	32	Port Huron, Mich.....	.40	28	Louisville, Ky.....	27	28	Cleveland, Ohio.....	nw.	60	29			
X.....	30	58	100	40	93	1-0	17	Sandusky, Ohio.....	.26	31	Chattanooga, Tenn.....	22	31	Amarillo, Tex.....	s.	36	30			
Mean.....						3-2	27		.34			19				49				

• Pikes Peak, Colo., sw., 88, 16th.