

# MONTHLY WEATHER REVIEW,

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(General Weather Service of the United States.)

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WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

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## INTRODUCTION.

In preparing this REVIEW the following data, received up to March 14th, have been used, viz: the regular tri-daily weather charts, containing the data of simultaneous observations taken at 138 Signal Service stations and 13 Canadian stations, as telegraphed to this office; 142 monthly journals and 146 monthly means from the former, and 12 monthly means from the latter; reports from 27 Sunset stations; 238 monthly registers from Voluntary Observers; 38 monthly registers from United States Army Post Surgeons; Marine Records; International Simultaneous Observations; monthly reports from Voluntary Observers in, and the local Weather Service of, Missouri; reliable newspaper extracts; special reports.

Since July 31, 1878, the following stations of the first class have been opened on the dates named:— Des Moines, Iowa, August 1, 1878; Unalashka, Alaska, August, 18, 1878; Stevenson, D. T., September 19, 1878; Madison, Wis., September 29, 1878; Charlotte, N. C., October 6, 1878; Buford, D. T., October 23, 1878; Deadwood, D. T., November 1, 1878; Keogh, M. T., November 18, 1878; Custer, M. T., December 5, 1878; Chattanooga, Tenn., January 8, 1879; Little Rock, Ark., July 1, 1878; Springfield, Ill., July 1, 1879; Pensacola, Fla., October 27, 1879; Cedar Keys, Fla., November 5, 1879; Yates, D. T., November 10, 1879; Helena, M. T., November 10, 1879; Lewiston, Idaho, November 23, 1879; Dayton, Wash. T., December 1, 1879; Elliott, Tex., December 1, 1878; Assiniboine, M. T., December 13, 1879; Missoula, M. T., December 16, 1879; Breakwater, Del., January 29, 1880. The station at Tybee Island, Ga., was closed February 15, 1879, and that at St. Marks, Fla., on October 30, 1879.

## BAROMETRIC PRESSURE.

The mean barometric pressure for the month is shown on chart No. II. Compared with the preceding month, the area of 30.20 which extended over the southern portion of the Middle States and northern portion of the South Atlantic States has moved to the southern portion of Georgia, and the line of 30.10 has moved westward over Texas and southward from New England to the central portion of the Middle States. The pressure has changed slightly in the southern portion of the Lake region, while the area of mean low barometer has moved eastward to the northern portion of Lake Superior. In the Northwest the pressure is generally one-tenth of an inch below the average for the month, while at the Rocky Mountain stations it remains near the normal. The most decided change in the distribution of pressure has occurred on the Pacific coast; the high area which was apparently west of the coast during January having moved northeast over Oregon replacing the low area of 29.90 by a general increase of pressure on the entire coast. Compared with the same month in previous years, the pressure continues above the normal in the Southern, Middle and New England States and it is slightly below the normal in the Ohio valley and thence northward and northwestward.

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This Paper is furnished by the Government of the United States, without charge to the Co-operating Observers acting with the Signal Office in the collection of Simultaneous Reports.

*Local Barometric Ranges.*—These have been least in Florida, southern California, New Mexico, Colorado, Wyoming and western Texas. They have been greatest over the Middle Atlantic States, Upper Lake region, the Upper Mississippi valley and the Northwest. By districts they are as follows: New England, States, 1.22 to 1.60 inch; Middle Atlantic States, 1.26 to 1.72 inch; South Atlantic States, 0.80 to 1.31 inch; Eastern Gulf States, 0.88 to 1.05 inch; Western Gulf States, 0.86 to 1.13 inch; Ohio Valley and Tennessee, 1.04 to 1.40 inch; Lower Lake region, 1.23 to 1.36 inch; Upper Lake region, 1.37 to 1.95 inch; Upper Mississippi valley, 1.30 to 1.80 inch; Red River of the North valley, 1.56 to 1.70 inch; Lower Missouri valley, 1.33 to 1.54 inch; Upper Missouri valley, 0.73 to 1.02 inch; Middle Eastern Rocky Mountain slope, 1.04 to 1.22 inch; Texas, 0.67 to 1.19 inch; Rocky Mountain stations, 0.64 to 0.95 inch; Middle Plateau, 0.86 to 1.10 inch; California, 0.51 to 0.83 inch; Oregon, 1.16 to 1.22 inch; Washington Territory, 1.27 inch.

*Areas of High Barometer.*—These areas have moved more directly to the east than usual, and in three cases the direction appears to have been changed from the east to the northeast along the Atlantic coast. Eight of these areas have been traced over the districts east of the Rocky Mountains, while three periods of decidedly high pressure occurred on the Pacific coast during the month attended by unusually low temperature.

No. I.—This is a continuation of No. XI of the preceding month, the centre of greatest pressure having moved northward during the night of January 31st, from southern Illinois to the central portion of Minnesota. At the afternoon report the centre of the greatest pressure was near St. Paul and during the succeeding twenty-four hours the area moved directly east to New England attended by generally clear and colder weather in all districts north of the Gulf States. On the morning of the 1st the temperature at Eastport was  $-10^{\circ}$ , at Burlington  $-8^{\circ}$  and at Boston  $-1^{\circ}$ .

No. II.—On the morning of the 3rd this area was central near Yankton while reports from all stations west of the Mississippi valley and on the Pacific coast indicate that this entire region was within the limits of an extended area of high barometer. The unusual pressure of 30.74 at Olympia and 30.76 at Portland occurred on the morning of the 3rd, the former being a departure from the normal of  $+0.91$ . The barometer continued very high on the Pacific coast as this area moved directly south to Texas on the 3rd preceded by a light "norther" on the west Gulf coast and attended by cold, clear weather in the interior and light rains on the coast. During the 4th and 5th the pressure increased in the Gulf and South Atlantic States, and the centre passed to the east from San Antonio to Montgomery, where it changed direction to the northeast, following the general direction of the coast line immediately in rear of the severe storm traced as No. II on chart No. I.

No. III.—appeared on the night of the 6th in the Northwest, attended by cold northerly winds and clear weather and preceded by an area of low barometer charted as No. IV. Morning report of the 7th places the center of this area over Iowa, where the pressure was 30.60, the barometer having risen to 30.50 over the Gulf States and central Mississippi valley, with lower temperature and cold northerly winds in Texas. This area became well defined and moved towards the South Atlantic coast during the 7th attended by generally clear weather in all districts east of the Mississippi. High northwest winds occurred on the Middle Atlantic coast, as the center advanced from the Ohio valley, but as the area passed to the east of the coast, the wind at stations south of Cape May shifted to the northeast, indicating that the center continued north of or near the  $40^{\circ}$  of latitude.

No. IV.—The telegraphic reports of the 8th, indicate the advance of of this area from British America north of the Upper Missouri valley, and at midnight of the 8th it was central near Breckenridge, where the barometer was 30.60 and the temperature  $-18^{\circ}$ , the wind had shifted to southerly at Pembina and Fort Garry, but the temperature remained at  $-20^{\circ}$  at the former station and  $-22^{\circ}$  at the latter. This area moved east during the 9th over the track previously given as No. I, and on the morning of the 10th was central near Boston. Light snows were reported in the Lake region and in the northern portions of the Middle States and New England, when the wind shifted to northwest, but clear, cold weather followed with the increasing pressure. High winds were reported on the coast, the maximum velocity at Eastport being NW. 35 miles, at Lewes NE. 34 miles.

No. V.—At midnight of the 17th the barometer was above the normal over the Plateau regions, from the Upper Mississippi valley to the coast of California. The crowding of the isothermal lines to the south indicated the advance of this area, which was apparently central near Yankton. During the 18th, the barometer continued to rise in the Central valleys and in the Gulf States, while the central pressure increased and moved north to Minnesota. A "norther" occurred in the Western Gulf States, the temperature falling to freezing in northern Texas, and the wind reaching a velocity of 44 miles at Indianola. This area continued central near Fort Garry at the morning telegraphic report of the 19th, when the pressure was 30.86 and the temperature  $-30^{\circ}$ . This was the most decided area of the high barometer during the month, and on the 19th all stations east of the Rocky Mountains were apparently within the limits of this disturbance. Northerly to westerly winds prevailed in all districts east of the 100th meridian and the temperature fall to  $32^{\circ}$  at stations in the northern portions of the Gulf and South Atlantic States. The barometric gradient increased in the western half of this area as the centre moved toward the Atlantic coast, on the 19th and 20th and severe northwesterly gales occurred at stations north of Cape Hatteras, the winds shifting to northeasterly on the North Carolina coast during the 19th. This area passed to the southeast

over the Middle States on the 20th and was last observed as central over the Atlantic about 300 miles east of Norfolk.

No. VI.—Although this area has been indicated as central on the morning of the 21st in Indian Territory, the maps of normal barometric variation for the reports immediately preceding, indicate that this area of increased pressure passed east from the Pacific coast over the Southern Plateau districts and New Mexico. During the 21st this area passed to the east over the Gulf States following in the rear of low area No. XI and disappearing to the southeast of Florida on the 22nd.

No. VII.—This area although well defined as to extent and movement was only relatively high, its centre being enclosed by an isobaric line of 30.10, while low areas of 29.50 were central in New England and Minnesota on the 23rd. At the afternoon and midnight reports the centre remained near Cairo, with northerly winds in the Eastern Gulf States, northwesterly winds in the Middle and South Atlantic States, west to northwest winds in the Lower Lake region, southerly winds in the Northwest and Upper Lake region, and east to south winds in the Western Gulf States. The telegraphic reports indicate the anti-cyclonic movement of the wind, and the central pressure of 30.10 shows that this movement may occur when the central area is near or even below the normal pressure. The morning report of the 24th exhibits an extended of high barometer on the Atlantic coast, covering all districts from Florida to the St. Lawrence valley, and at the afternoon reports of the same day the western portion of this area was still observed on the South Atlantic coast.

No. VIII.—Developed slowly in the Southwest on the 28th, while an area of high barometer disappeared north of Minnesota, the depression traced as No. XIV, apparently dividing the two areas of high barometer. On the 29th it moved eastward to the Mississippi valley and was central near Cairo at the close of the month. Rain prevailed in the Gulf States on the 29th, with cold northerly winds and a light "norther" in the Southwest.

*Areas of Low Barometer.*—Chart No. I exhibits the tracks of the centres of the areas of barometric depression as traced from the regular tri-daily reports. Of the fifteen areas traced, four, Nos. VII, IX, X and XV, passed from the Pacific coast to the Atlantic near the northern boundary of the United States. No. II passed northeast from the west Gulf, and all the others were first observed east of the Rocky Mountains and west of the Mississippi river.

No. I.—This area was partly described in January *Review* as No. XVIII, it having passed eastward from Montana to Lake Superior on the 31st accompanied by light snow. On the morning of the 1st, this depression was central near Montreal and severe gales were reported from the Lake region, where the winds had shifted to westerly, with velocities ranging from 20 to 50 miles. This disturbance increased in severity in the south and west quadrants during the day as its centre passed to the east of the coast. The barometric gradient between Portland and Burlington reaching two-tenths of an inch in one hundred miles at 3 p. m. of the 1st. Cautionary Off-shore Signals were ordered and fully justified at the stations on the coast from Cape Henry to Portland, and the Cautionary Signal at Eastport was justified by a velocity of 38 miles. The Signal Service Observer at Albany, N. Y., reports on the 1st "a very high westerly wind which increased to a gale at noon and reached its height at 12:45 p. m., having at that time a velocity of 53 miles per hour. Considerable damage is reported in this vicinity; trees were blown down, houses unroofed and several persons severely injured." The morning report of the 2nd indicated that this depression had continued its easterly course over the Atlantic, followed by colder, clear weather and rapidly rising barometer.

No. II.—This storm is first located in the west Gulf, south of Galveston, at the 11 p. m. report of the 1st, and the previous reports from this region indicate that it developed south of latitude 25°. The centre of this depression had passed northeastward to a point near New Orleans on the morning of the 2nd, and the area of rain had extended eastward to the South Atlantic coast, with cold northerly winds, sleet and snow in North Carolina, Tennessee and the northern portion of the Gulf States. The temperature had fallen to 40° at Indianola and the "norther" of the 1st continued with great severity. On the afternoon of the 2nd the centre was near Montgomery, with a well defined elliptical area of 29.60, the longer axis pointing to the northeast in the direction of the storm's movement. During the eight hours preceding the p. m. report of the 2nd, the following heavy rain-falls were reported: at Mobile, 1.58 inch; Montgomery, 1.31 in; New Orleans, 1.01 in; Vicksburg, 1.07 in; Pensacola, 1.06 in. The barometer continued high in New England, with clear, cold weather and northerly winds during the 2nd, as this depression advanced to the northeast with falling barometer at the centre, thus causing a rapid increase of the barometric gradient in the northeast quadrant. At midnight of the 2nd the centre had advanced to a point near Knoxville; the heavy rains had extended over the South Atlantic States, and snow was falling Virginia, Maryland, Pennsylvania and westward to the Ohio valley. The weather continued clear, with gentle winds or calms on the New England coast, where the pressure was above 30.40, while the pressure at Knoxville was 29.46. As the centre moved to southern Virginia during the morning of the 3rd, the force of wind from the northeast increased on the Middle Atlantic and New England coasts and the snow extended over New England, the Lake region and the Ohio valley. The barometer continued to fall at the centre as this depression passed over New England, the afternoon report of the 3rd, giving the pressure of 29.08 at New London, 29.12 at New York, with a north wind, maximum velocity 48 miles; Boston, NE. 60 miles; Thatcher's Island, SE. 88 miles. Snow continued in New England during the 3rd, the wind shifted to the northwest, with rising barometer and clear and cold weather at night, as the depression disappeared to the northeast over Nova Scotia. Cautionary Signals were displayed

in advance of this storm, on the Gulf and Atlantic coasts, and the following reports from the Signal Service Observers have been received: The observer at Mobile reports, "weather, during display of signal, was decidedly threatening and the display was beneficial as it prevented vessels from leaving port." The observer at Pensacola reports, "no vessels left port during display, signals fully justified, maximum velocity 40 miles per hour, no damage of any consequence occurred as the masters of vessels were on the alert." The observer at Smithville, N. C., reports, "Cautionary Signal fully justified, gale set in at 12:30 p. m., and increased until 6:45 p. m., when wind had reached a velocity of 32 miles, NE. The wind lulled at midnight and shifted to southwest with increasing velocity until it reached 32 miles at 3 a. m. Amount of rainfall during gale, 2.35 inches." Delaware Breakwater, on the 3rd, "gale from the northeast, 48 miles, wind shifting to southwest, 58 miles." Observer at Sandy Hook reports this as the severest storm ever known at the station, wind at 7:45 a. m. reached a velocity of 84 miles from the east. The barometer stood at its lowest, 28.91, at 2 p. m. of the 3rd. A number of wrecks occurred, and about two miles of the track of the Southern New Jersey railroad, near Highlands, were washed away. The observer at Boston reports, "heavy snow set in at 4:20 a. m. of the 3rd, with puffs of brisk wind from the east-southeast, it having clouded very suddenly at 2 a. m. The barometer fell rapidly after midnight, being 30.40 at 1 a. m., 30.03 at 7 a. m., 29.70 at 10 a. m., 29.33 at 2 p. m., 29.12 at 4:15 p. m., 29.06 at 5:16 p. m. The wind rose rapidly soon after 5 a. m., and at 11:23 a. m. was E. 56 miles. Velocities taken at five minutes' intervals showed a greater speed, sometimes 66 miles and the squalls and puffs, which characterized the gale, came in velocities of 60 to 90 miles. After 4 p. m. the wind backed gradually to the northeast and at 7 p. m. to northwest. At 6 p. m. the barometer began to rise; the snow ended at 10:15 p. m.; amount of precipitation 1.05 in. or about 10 inches of snow." The observer at Portland reports, "severe snow-storm commenced before daylight and continued until after midnight, accompanied by high winds from the northeast backing to north about 8 p. m." The gale commenced at Eastport about 1:20 of the 3rd, and reached its maximum velocity of 54 miles, NE, at 10:10 p. m. and ended at 3:25 a. m. on the 4th. During the display of the Cautionary Signal one steamer and twenty schooners remained in port." The following reports have been received from vessels near the Atlantic coast during this storm: Schooner *Starlight*, February 2nd and 3rd, off Cape Fear, heavy gale from east veering to south and west, lost 10,000 feet of lumber off deck. Schooner *Samuel Gilman*, on February 3rd, off Fire Island, had terrific gale from east veering to northwest, lasting thirty hours and increasing to hurricane, with high sea—vessel hove to for nine hours and decks swept of everything." Brig *Walter Smith*, February 3rd, 38° 40' N., 72° 56' W., heavy gale from NE. to NW., increasing at 2 p. m. to hurricane, lost sail and had deck swept. Brig *Texada*, at Boston, February 6th, from Mayaguez, was 8 days north of Hatteras with strong north gales and high seas, and February 3rd took a heavy gale from NE., lasting 12 hours with high seas. Brig *Minnie Butler*, February 3rd, in Boston Bay, ESE. gale, with thick snow-storm. Schooner *Stephen Harding*, driven ashore two miles south of Sandy Hook, crew saved but vessel probably a total loss. Brig *Alice Tarlton*, February 3rd, 37° N., 71° 30' W., had a heavy gale from ESE. to WSW., veering to W., lasting 26 hours, with heavy sea and snow-squalls.

No. III—appeared as a slight depression in the Upper Missouri valley at midnight of the 3rd, accompanied by snow and cold northerly winds in the region west of the Upper Mississippi river, and east of the Rocky Mountains. During the 4th the central area moved directly east, and at midnight it was near Lake Superior, the area of snow having extended eastward over the Upper Lake region, and southward over Illinois, Iowa and northern Missouri. Light snow fell in the Lower Lake region during the 5th, and in the northern portions of New England and the Middle States on the night of the 5th, as the area passed to the east with the pressure increasing at the center. The temperature fell to —30° at Pembina and to —31° at Fort Garry, when the wind shifted to the northwest on the 5th, and cold, clearing weather followed rapidly in the northeastern districts of the United States.

No. IV.—A well-marked depression in the Upper Missouri valley which advanced rapidly in a southeastern direction to the northern portion of Iowa, where it was central on the morning of the 6th. The temperature continued below freezing in the regions north of the Gulf States at the a. m. report of the 6th, but increased rapidly in the Ohio valley and Middle States, as the depression moved over the Lake region on the 6th. This area moved directly to the east after reaching the Lake region, accompanied by very light snow, and causing no marked disturbance, the barometric gradient being very slight and the barometer at the center only relatively low. The pressure continued to rise at the center as this area passed over the Atlantic east of New England, and by midnight it had disappeared to the east followed by clear weather in all districts east of the Mississippi river.

No. V—probably advanced from the Pacific coast, but its center was first approximately located north of Montana on the morning of the 7th. This depression moved over the northern districts of the United States during the 7th and 8th, with an average hourly velocity of 60 miles, causing brisk to high winds in the Lake region on the 8th, and on the Middle and East Atlantic coasts on the 9th. Unlike the depression which immediately preceded this, the pressure decreased at the center as it approached the coast. On the morning of the 8th the lowest isobaric line on the chart was 29.90, when the center was near Duluth, and on the morning of the 9th the isobaric line of 29.50 included the center near Chatham. Cautionary Signals were ordered for Grand Haven, Milwaukee and Ludington, and Cautionary Off-shore Signals were ordered at stations on the Atlantic coast between Lewes, Del., and Eastport, and were verified as follows: Milwaukee, 37 miles; Grand Haven, 28 miles; Breakwater, 40 miles; Sandy Hook and Thatcher's Island,

42 miles; Eastport, 36 miles. The area of precipitation extended from the Upper Mississippi valley to the New England coast, but only light snows prevailed with partly cloudy weather.

No. VI.—Generally clear weather continued during the 9th, with the pressure above the normal east of the Mississippi river, and winds slowly shifting to easterly and southerly in advance of this depression, which was central near Fort Shaw in the Upper Missouri valley at 11 p. m. on the 8th. By midnight of the 9th the lowest barometer readings were observed in Minnesota, and on the morning of the 10th this area was well defined in the Upper Lake region. The temperature increased during the 10th, and clear weather continued in the eastern districts, except in the northeastern portion of the United States where light snows prevailed.

No. VII.—Reports from the Pacific coast on the 9th indicated the advance of a disturbance in the north Pacific, and on the morning of the 10th, easterly to southerly winds were reported from San Diego to Portland, with slowly falling barometer. At this report the centre of the disturbance appeared to the west of Washington Territory and at the p. m. telegraphic report of the same day it had moved to the east of Portland. Rain continued on the coast and in the interior from Arizona to Idaho. Snow and cold threatening weather prevailed in the Rocky Mountain regions during the 10th as this depression advanced to the east, the temperature falling below freezing at stations in the interior of California and in the Plateau regions, after the centre had passed to the east. On the morning of the 11th this area was central near Yankton, although the reports from the northern stations showed the barometer to be very low north of Minnesota. The direction of the winds as noted at the stations on the Eastern slope of the Rocky Mountains, and the rapid fall of barometer at all stations in the Mississippi valley including those in the Western Gulf States indicate the advance of an extended trough of low barometer, which would probably include within its area all the districts east of the Rocky Mountains. The centre moved eastward during the 11th, the rain-area including all stations from the Gulf coast northward to Lake Superior, extending over the Lower Lake region by midnight and causing severe gales in the northern districts. At midnight of the 11th the barometer at Duluth read 28.96; at Marquette 28.78 and at Escanaba 28.95, the centre of depression being apparently north of Lake Superior. Very heavy rains occurred in the northern portion of the Gulf States, Tennessee and the Ohio valley, causing a rapid rise in the rivers of these districts. Violent westerly gales continued in the Lake region during the 12th, as the depression moved to the east-northeast over the St. Lawrence valley and New England. A maximum velocity of 42 miles was reported at Milwaukee and 26 miles at Grand Haven. Dangerous southerly winds veering to westerly occurred on the Middle and East Atlantic coasts on the night of the 12th.

No. VIII.—This area probably developed over the southern Plateau region during the night of the 11th, when the barometer was below the normal in Colorado, New Mexico, Arizona and Utah. Cold threatening weather and snow prevailed in these districts on the morning of the 12th, and the barometer continued to fall in the Southwest, with rain extending east over the Lower Mississippi valley and Tennessee. At the afternoon report of the 12th this depression was central near Fort Sill, and southerly gales prevailed on the West Gulf coast, the wind at Indianola reaching a velocity of 48 miles from the southwest. The midnight report of the 12th showed two depressions, one central near Nashville, where the barometer read 29.49, the other central immediately west of Little Rock, Ark. The storm continued during the night with great severity near the centres of the depressions and the area of greatest rain-fall extended northeastward from Texas over Arkansas, Tennessee, Kentucky and the Ohio valley. A tornado occurred at Nashville about 11 p. m. on the 12th, accompanied by thunder and lightning and very heavy rain, and causing great destruction of property. A violent wind and thunder-storm passed over the eastern portion of Lincoln county, Kentucky, late on the night of the 12, blowing down numerous houses. At Louisville the wind averaged 42 miles per hour for several hours blowing from the southwest, and the temperature fell 21° in six hours. The total rain-fall at this station was 3.02 inches. At Frankfort the river rose at the rate of one-foot per hour, flooding the lower portion of the city. On the 13th the Ohio river was reported rising at all stations from Pittsburg to Cairo. The following heavy rain-falls occurred between the 11th and 13th: Austin, Tenn., 6.25 in.; Memphis, 6.14 in.; Nashville, 8.02 in.; Highlands, N. C., 3.15 in. The Tennessee and Cumberland rivers rose rapidly, causing great loss to property. By the morning of the 13th this storm had extended over the Middle States, the lowest isobaric line being 29.60, enclosing the depression and extending from Little Rock to the eastern portion of Pennsylvania. The center was near Cincinnati on the afternoon of the 13th where the two depressions united and afterward moved to the east as a single area, disappearing to the east of the Atlantic coast on the 14th followed by decidedly colder and high northwest winds. A "norther" occurred in Texas immediately after this depression passed east of the Mississippi river.

No. IX.—This is the second storm of the month which approached Signal Service stations from the Pacific and crossed the mountain range to the Missouri valley, pursuing a well defined course over the districts in the eastern portion of the United States. The advance of this depression was indicated by a rapid fall in the barometer accompanied by rain and snow on the night of the 13th in the North Pacific coast region. Rain and snow extended east and south on the 14th and the wind veered to westerly at the northern stations on the Pacific coast. The midnight report from Humboldt, Battleford and Edmonton on the 14th indicated the easterly movement of this depression, and cold northerly winds, with snow prevailed from the stations named southward to the Missouri valley. During the 15th, the storm passed north of the Lake region causing only a slight disturbance within the limits of the Signal Service stations. Generally clear weather prevailed in all districts except on the New England and Middle Atlantic coasts where light snow prevailed,

owing to the approach of a small depression which apparently developed over the Atlantic near the coast during the night of the 14th.

No. X.—The barometer fell rapidly on the Pacific coast during the 14th, as this depression advanced to the eastward, causing snow in Washington Territory and Oregon on the morning of the 15th, when the barometer was lowest west of Olympia, the pressure at that station being 29.61. During the 15th cloudy weather and rain prevailed on the Pacific coast, except in southern California, and the area of snow extended eastward to the Upper Missouri valley. The barometer was below the normal in the districts on the Eastern and Western Slopes of the Rocky Mountains, and by the morning of the 16th, the centre had advanced to the western portion of Dakota, with slowly rising barometer on the Pacific coast, and continued snow in Montana, Idaho, Utah and Wyoming. At the afternoon of the 16th, the barometer was 29.42 at Yankton near the centre of the disturbance, which had become well defined, with a decided gradient to the eastward as far as Michigan, and to the southward as far as Texas. Clear weather and rising temperature were reported from all districts east of the Rocky Mountain Slope, while snow prevailed in the extreme Northwest, and in the Saskatchewan region of British America. The course of this storm changed to the northeast on the 16th, passing over Lake Superior causing high south to west winds over the lakes and followed by very light rain or snow as the wind shifted to westerly, with lower temperature, in the Upper Mississippi valley and thence eastward over the Lake region. The cold northerly winds which followed this depression on the 16th were accompanied by rain in the central valleys and thence eastward to the Atlantic coast, the rain changing to snow and the weather clearing rapidly as the wind shifted. Cautionary Signals were ordered at the lake Stations and on the Atlantic coast north of Wilmington, in advance of this storm. The following dangerous winds were reported: Milwaukee, maximum velocity 42 miles; Grand Haven, 38 miles; Breakwater, Del., 42 miles; Sandy Hook, 44 miles; Boston, 36 miles; Eastport, 32 miles. Westerly gales were reported at Montreal and Quebec on the morning of the 19th, when the centre of depression was northeast of Chatham, and the storm continued over Newfoundland during the 20th.

No. XI first appeared in the western portion of Dakota on the afternoon of the 19th, and advanced directly to the east during the 19th and 20th, causing light snow in the Lake region, the Ohio valley and thence eastward over the Middle and New England States. The pressure at the centre of this depression decreased from 29.90 to 29.50 in the transit from the Northwest to the New England coast. High winds occurred in the Lake region on the 21st, when the storm passed to the east, and southerly gales were reported off the coast of Nova Scotia in advance of its centre.

No. XII.—This slight disturbance followed rapidly in rear of the preceding, between the 21st and 23rd, first appearing on the afternoon of the 21st in British America north of Dakota. On the 22nd the movement to the southeastward over the Lake region was accompanied by very light snow, but as the centre passed over New England the gradient to the west increased rapidly owing to the advance of high area No. VII, and the winds became dangerous after shifting to the northwest on the Middle and East Atlantic coasts. This storm moved directly east, over the Atlantic on the 24th and probably increased in severity, as the barometer continued to fall at the centre while within the limits of observation.

No. XIII.—This area has been traced westward to the Rocky Mountains, and it probably passed from the Pacific north of Washington Territory. Vessels report stormy weather on the North Pacific during the 21st and 22nd. From the morning of the 23rd to the afternoon of the 24th, this depression moved southeastward to the Upper Mississippi valley, attended by decidedly stormy weather throughout the Northwest and lake region. The rain area extended southward to Tennessee and Texas, and as the centre passed over the Lakes, light rains occurred in the Middle and New England States. The winds increased in force as the centre advanced. On the morning of the 25th the weather was threatening on the Atlantic coast, but the afternoon report showed a change of direction in the movement, and the succeeding report showed that this area was moving from Lake Superior northeastward north of the Canadian stations.

No. XIV.—The barometer continued below the normal in the Lower Missouri valley during the 25th and 26th, while cold northerly winds and snow prevailed in the northern portion of the United States west of Lake Superior. This depression remained almost stationary until the 27th, when it moved eastward as a severe storm, the winds being strongest on the west side, where the gradient was very great. Snow prevailed in the Northwest and in the northern portion of the Lake region on the 28th, and rain fell at all stations, except those in the South Atlantic States. After reaching the southern portion of Michigan on the 28th, the centre was retarded, and then moved slightly to the west between the morning and afternoon reports, after which, the movement was rapidly toward the northeast, attended by violent winds from the south and west in the Lake region and on the coast north of North Carolina. A severe "norther" occurred in Texas on the 28th, and the centre of this storm was near Alpena. Maximum velocity of wind reported at Grand Haven, was 48 miles southwest; at Milwaukee, 47 miles west; at Indianola, 54 miles north.

No. XV.—This depression was central off the North Pacific coast at the midnight report of the 28th, when south to east winds, rain and snow prevailed in Oregon and Washington Territory. The barometer at Olympia fell from 30.16 to 29.75 in 8 hours, and at the morning report it had risen to 29.80, indicating that the centre of this depression had passed to the north or east of that station. The midnight report of the 29th indicated the continued advance of this depression to the east.