

MONTHLY WEATHER REVIEW.

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INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States and Canada during November, 1885, based upon the reports from the regular and voluntary observers of the Signal Service and from co-operating state weather services.

Descriptions of the storms which occurred over the north Atlantic Ocean during the month are also given, and their approximate paths shown on chart i.

The paths of the centres of eight areas of low pressure are traced on chart i, this number being four less than the average for November during the last thirteen years. That described as number viii was the severest storm of the month, and on reaching the Atlantic coast caused severe gales from Eastport, Maine, to Wilmington, North Carolina, and unusually high tides on the New Jersey coast.

A prominent feature in connection with the meteorology of the month was the unusually low mean pressure over nearly the whole country, the departures from the normal being greatest on the north Pacific coast, where they ranged from .25 to .35; over the greater part of the country east of the Rocky Mountains the departures ranged from .10 to .22.

The mean temperature was above the normal in all districts, except in the south Atlantic and east Gulf states, where the month was slightly colder than the average November. The greatest departures above the normal temperature occurred in the extreme northwest and in northern and central Rocky Mountain districts, where they generally ranged from 6° to 10°.

The rainfall on the Pacific coast was remarkably heavy, and caused destructive freshets in that region. On the middle Pacific coast the rainfall was about ten inches in excess of the average. The rainfall was also considerably in excess of the average in the middle Atlantic states, while over the interior and southwestern districts there was a general deficiency.

In the preparation of this REVIEW the following data, received up to December 20, 1885, have been used, viz., the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and thirty-three Signal Service stations and eighteen Canadian stations, as telegraphed to this office; one hundred and seventy-one monthly journals and one hundred and sixty-four monthly means from the former, and eighteen monthly means from the latter; two hundred and seventy-two monthly registers from voluntary observers; forty monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly weather reports from the New England Meteorological Society, and from the local weather services of Alabama, Indiana, Iowa, Minnesota, Nebraska, Ohio, and Tennessee,

and of the Central Pacific Railway Company; trustworthy newspaper extracts, and special reports.

ATMOSPHERIC PRESSURE.

[Expressed in inches and hundredths.]

The mean atmospheric pressure for November, 1885, determined from the tri-daily telegraphic observations of the Signal Service, is shown by isobarometric lines on chart ii.

An area of barometric maxima covers the central Rocky Mountain districts, the pressure being greatest over Colorado and Utah, where the monthly mean exceeds 30.2. The mean pressure is least on the north Pacific coast, over which region the barometric means fall to 29.75, or about .50 lower than those at stations in the central Rocky Mountain districts. Over the southern districts to the eastward of the one hundredth meridian the mean pressure ranges from 30.0 to 30.05; while in the northern districts to the eastward of the same meridian there is a gradual decrease from 30.05, in Dakota, to 29.9, in Canadian Maritime Provinces and northern New England.

Compared with the mean pressure for the preceding month, there has been an increase in the extreme northwest and in all southern districts, the difference being greatest in the middle and southern plateau districts, where it varies from .10 to .19. In the middle Atlantic states, upper lake region, and in the upper Mississippi, Missouri, and Ohio Valleys, the pressure has differed but slightly from that for the preceding month. In New England and the Canadian Maritime Provinces, and from central Montana westward to the Pacific coast, a marked decrease has occurred; in the first-named districts the difference ranges from .10 to .17, and in the last-named from .10 to .27.

The departures from the normal pressure at the various Signal Service stations are given in the tables of miscellaneous meteorological data, and on chart iv they are exhibited by lines connecting stations of equal departure. Except over a small area, including portions of Arizona and New Mexico, the mean pressure for November, 1885, has been below the normal throughout the country. The departures are unusually large over the greater part of the country; east of the one hundredth meridian they exceed .10 in nearly all districts, and on the middle Atlantic and southern New England coasts they are above .20. The most marked departures occurred on the north Pacific coast, where they range from .20 to .35. These abnormal departures form the most marked meteorological feature of the month.

BAROMETRIC RANGES.

The monthly barometric ranges at the various Signal Service stations are also given in the tables of miscellaneous data. They were greatest on the north Pacific coast, and over portions of the Missouri Valley and eastern slope; they were least over Florida, Arizona, and southern California.

The following are some of the extreme ranges:

Greatest.	Least.
Fort Canby, Washington Territory..... 1.17	Key West, Florida..... 0.34
Olympia, Washington Territory..... 1.16	San Diego, California..... 0.39
Port Angeles, Washington Territory... 1.13	Los Angeles, California..... 0.48
Portland, Oregon..... 1.12	Pensacola, Florida..... 0.49
North Platte, Nebraska..... 1.03	Cedar Keys, Florida..... 0.50
Omaha, Nebraska..... 1.03	Sanford, Florida..... 0.55
Leavenworth, Kansas..... 1.03	Fort Grant, Arizona..... 0.56

AREAS OF HIGH PRESSURE.

Five areas of high pressure occurring during the month are described. In two instances, although the areas spread slowly eastward over all districts, the centre of greatest pressure remained for several days over Colorado and Utah, disappearing only on the formation of an area of low pressure in the vicinity. During a large proportion of the month the pressure was greatest over Colorado and Utah. The first killing frosts of the season in Tennessee, Georgia, North and South Carolina occurred during the passage of area number i, and in Florida during the passage of area number v.

I.—Immediately following the passage of low area number i, the pressure increased slightly in the upper Mississippi and Missouri Valleys. The pressure continued to increase steadily, and a well-defined area of high pressure resulted, which was central on the morning of the 3d in Tennessee, causing killing frosts, the first of the season, in Tennessee, Georgia, North and South Carolina. The area was not extensive, and after its appearance moved in a southeasterly direction; it disappeared off the coast of the south Atlantic states on the 4th.

II.—The pressure began to increase somewhat over the western territories after the passage of low area number iv. At the morning report of the 7th the centre of greatest pressure was over Colorado. At this hour the temperature in the states and territories west of the Mississippi River had fallen from 10° to 20°. As the pressure increased in rear of low area there was a regular diminution of about 20° in temperature in all districts. The centre of greatest pressure remained persistently stationary over Colorado from the 7th to the 10th; on the latter date it became dissipated by the formation of low area number vi. A light "norther" occurred in Texas on the 7th.

III.—This decided area of high pressure made its appearance on the north Pacific coast at midnight of the 10th. The morning report of the 11th showed a decided fall in temperature in Washington Territory, Oregon, and adjacent territories, and the indications were that the area would move in a southeasterly direction. During the day cold-wave signals were ordered for all stations from the Mississippi River as far west as Cheyenne, Wyoming, and Denver, Colorado, and warnings of a "norther" sent to all railroads and other interested parties in the regions to be affected. At midnight the display of cold-wave signals was extended east to Buffalo, New York. At 7 a. m. of the 12th the centre of greatest pressure was over Utah, and the temperature in the Missouri Valley and thence westward to Utah had fallen about 20°. The area moved slowly eastward, causing a severe "norther" in Texas, Indian Territory, Kansas, and Nebraska. Killing frosts occurred on the morning of the 13th in northern Texas and northern Louisiana, and on the 14th in Georgia and Alabama. The cold wave, moving easterly, covered all districts and finally disappeared into the Atlantic on the 15th. After the centre of area reached Utah it remained stationary till the 15th, the pressure diminishing slightly each day. The area, however, gradually extended itself over all districts east of the Rocky Mountains. On the morning of the 17th the pressure was greatest over the middle Atlantic states, and passed off into the Atlantic during the day.

IV.—The pressure began increasing in Idaho on the 17th, and by the morning of the 18th a well-defined area of high pressure was central in Colorado, where the temperature had fallen over 20°. As with areas numbers ii and iii, the centre of greatest pressure remained stationary over Colorado and Utah, but the area gradually extended itself eastward, accompanied by a fall in temperature of about 20° in all districts. The cold wave passed off into the Atlantic on the 20th, the pressure decreasing slightly from the Atlantic coast to the Rocky Mountains.

V.—In rear of low area number viii the pressure began rapidly to increase on the 20th, with a corresponding diminution of temperature. On the 22d the area of high pressure extended from New Mexico to the upper lake region. In the

west Gulf states and Missouri Valley the winds shifted to northerly and the temperature fell about 20°. This diminution of temperature followed the storm, and the cold wave disappeared off the Atlantic coast on the 24th. On the 23d the pressure continued to increase over the upper lake region, where the area was central. It remained nearly stationary for two days, after which it moved slowly in a southeasterly direction and passed into the Atlantic on the 27th. Killing frosts occurred during its passage as far south as Jacksonville, Florida.

AREAS OF LOW PRESSURE.

Eight areas of low pressure have passed over the country during the month. Area number ii was very severe on the New England coast, and area number viii very severe on the New Jersey and New England coasts. Numbers ii and v. approached the districts bordering on the Atlantic from the sea. All other areas formed west of the Mississippi River. Number viii proved to be the severest storm on the Atlantic coast during the month; it advanced with great rapidity until it reached the Chesapeake Bay, after which its movement was greatly retarded and it remained nearly stationary off the New Jersey coast for two days, causing severe gales and high tides from Virginia to Maine.

The following table shows the latitude and longitude in which the centre of each low area was first and last observed, with the average rate of movement in miles per hour:

Low areas.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
No. I ^a	38 00	101 00	47 00	81 30	19.5
II	34 00	76 00	50 00	66 00	24.6
III	46 30	107 00	45 00	83 00	29.7
IV	36 00	100 00	48 00	87 00	23.2
V	39 00	72 00	50 00	62 30	29.2
VI	41 45	96 00	46 30	79 30	19.7
VII	44 30	98 00	47 00	58 00	31.2
VIII	39 00	101 00	41 00	70 00	18.2
Mean hourly velocity					24.4

* Continuation of number viii for October, 1885.

I.—The early movements of this area were described in the REVIEW for October. At midnight of the 31st the depression was central in Illinois, moving in a northeasterly direction. The morning report of November 1st showed the area to be central in northern Indiana. At this report precipitation had occurred in the Lake region, Ohio Valley and Tennessee, upper Mississippi Valley, and eastern Gulf states. The winds in the lower lake region had shifted to southeasterly, with increasing force, and during the day, as the depression, continuing its northeasterly course, passed over the upper lake region and disappeared beyond stations of observation north of Lake Huron, they veered to the west, with diminishing force. This area had but little energy and was unaccompanied by high winds, except in the lower lake region.

II.—As low area number i disappeared, the midnight report of the 1st showed the presence of another depression on the North Carolina coast. General rains were then falling in the middle and south Atlantic states, and brisk to high northeasterly winds prevailed on the coast. On the morning of the 2d the depression was central off the New Jersey coast, and the area of precipitation covered the New England states. Severe gales occurred on the coast from Cape Hatteras to Eastport, Maine, the velocity of the wind at the various stations ranging from thirty to fifty-two miles an hour. The depression moved in a northerly direction and was central at the afternoon report over Lake Champlain. From Lake Champlain it moved northeasterly until the midnight report, when it was central near Rockliffe, Province of Ontario. This abnormal track was caused by an area of high pressure which appeared off the Nova Scotia coast. After making its appearance, this area of high pressure rapidly passed off in a southeasterly direction and permitted the depression to move eastwardly. The morning report of the 3d showed the area to be central in northern

Maine, and on that date it passed off into the Gulf of Saint Lawrence. Relative to this storm, the observer at Boston reports: "This storm was very severe all along the coast, in fact, the most severe for many years, and much damage was done; chimneys and church spires were blown down; a number of vessels in Boston harbor were damaged, and a number of yachts in Salem harbor broke from their moorings and were wrecked." The observer at New London says: "This was the strongest gale experienced at this station in five years. No vessel, steamer or sail, attempted to leave the harbor. The Osprey Beach wharf was partially destroyed, and the adjoining one of the Pequot and Ocean Transit Company was carried away." On the morning of the 2d the following message was sent to the secretary of the Maritime Exchange, New York City:

Dangerous storm on New Jersey coast, which has entered from the sea. Severe gales will occur to-day from Connecticut to Nova Scotia. The wind at New York City and southward will be strong northwesterly.

HAZEN.

Cautionary signals were ordered on the morning of the 1st from Norfolk, Virginia, to Narragansett Pier, Rhode Island, and from Newport, Rhode Island, to Eastport, Maine, at midnight.

III.—The barometer began falling in the vicinity of British Columbia during the night of the 1st-2d, but no well-defined depression formed till the afternoon of the 2d, when a low area was found to be central in Montana. It pursued a southerly direction until it reached Kansas, where it was central on the afternoon of the 3d, after which it altered its course and moved northeastwardly, with constantly diminishing energy, until it reached Lake Huron at midnight of the 4th, where it ceased to exist as a well-defined area. General rains fell in the Lake regions and Ohio Valley during its passage. It was not accompanied by high winds.

IV.—This area formed in the western portion of the Indian Territory during the afternoon of the 5th, at which time rains were falling in the Gulf States, Ohio Valley and Tennessee, Lake regions, upper Mississippi and Missouri Valleys. The wind had increased considerably in force in the western Gulf states, and was blowing on the coast at the rate of thirty miles an hour. On the morning of the 6th the depression was central in eastern Kansas. Cautionary signals, which were ordered at all stations in the Lake regions for low area number iii, were continued. The morning report of the 7th showed the depression to be central in southern Minnesota, and brisk to high winds prevailed in the Lake regions. At midnight of the 7th the area passed beyond the stations of observation, north of Lake Superior. This storm was very severe at Duluth, Minnesota, and other stations on Lake Superior. During its passage precipitation occurred in all districts, and tornadoes are reported as having occurred in Illinois, Tennessee, and Alabama on the 6th.

V.—Instead of clearing in the middle Atlantic and New England states, after the disappearance of low area number iv, the precipitation became more general and continuous, and the winds on the New Jersey coast increased greatly in force, giving evidence of the formation or approach of a depression. At the midnight report of the 8th a weak depression was found to be present on the New Jersey coast. It moved in a north-northeast direction, increasing somewhat in energy, and passed into the Gulf of Saint Lawrence on the 10th. No high winds marked its passage along the New England and Middle States, but dangerous gales were reported from stations bordering on the Gulf of Saint Lawrence, and in the Saint Lawrence Valley.

VI.—A rapid fall of the barometer in the northwestern territories during the 10th gave indications of the formation of an area of low pressure in that locality, and by the morning of the 11th a well-defined area had formed in the Missouri Valley. Light snows began falling in that district during the day and in the upper Mississippi Valley during the night. This area increased somewhat in energy as it approached the upper lake region, where it was central on the morning of the 12th, causing dangerous gales on the Lakes. The morning

report of the 13th showed the centre of depression to be near Rockliffe, Province of Ontario, and on that date it passed beyond the limits of observation. General precipitation occurred in all districts during its passage.

VII.—At the morning report of the 17th an area of low pressure was found to be central in Dakota. On the morning of the 18th it was central south of Lake Michigan. At that hour general rains were falling in the Lake regions, Ohio Valley, and Tennessee. The depression moved rapidly eastward, passing over the Lake regions, accompanied by high winds, and was central in Massachusetts on the morning of the 19th. This report showed that the rain-area had extended to the New England and middle Atlantic states. The winds on the coast shifted to northwesterly and increased to gales. On the morning of the 20th the area was central over the Gulf of Saint Lawrence, and disappeared on that date.

VIII.—Falling barometer and rising temperature on the 20th, in Colorado, gave unmistakable evidence of the formation of a depression in that vicinity, and the 7 a. m. report of the 21st showed a well-defined area of low pressure central in western Kansas; it moved eastward during the day, with the ordinary velocity, and by the morning of the 22d was central near Cairo, Illinois. High area number v, which made its appearance in the extreme northwest, caused the depression, after reaching Cairo, Illinois, to alter its direct easterly movement to a southeasterly direction, and greatly increased its velocity of translation. At midnight of the 22d it was central in western North Carolina, where it again changed its course to the northeast, and was moving with considerable rapidity. On the morning of the 23d it was central over the Chesapeake Bay. During the afternoon of the 22d, when the storm was central in Tennessee, cautionary signals were ordered at all stations on the Atlantic coast from Wilmington, North Carolina, to New York City, and at midnight from New Haven, Connecticut, to Eastport, Maine. On the morning of the 23d the following message was sent to the secretary of the Maritime Exchange, New York City:

Storm now central over Chesapeake Bay, which will move northeasterly along the Atlantic coast, causing dangerous northeasterly winds.

HAZEN.

General precipitation in all districts accompanied the passage of this area, followed by clearing weather in the Western and Southern States. The morning report of the 23d showed that the area of high pressure was gradually spreading over the Provinces of Ontario and Quebec, but there was no indication of the presence of a high area to the eastward which would retard the progress of the depression. It was believed that on reaching the Atlantic coast the depression would follow the usual course of storms by following the Gulf Stream and disappearing in about sixteen hours, and be followed in the middle Atlantic states by clearing weather; therefore a prediction to this effect was made. The afternoon report of the 23d, however, showed that, for some reason, the depression had ceased its previous rapid movement and remained nearly stationary. The centre at that hour was near Chincoteague, Virginia; at 10 p. m. it was near Atlantic City, New Jersey, and at 7 a. m. of the 24th it was near Barnegat City, New Jersey; at 3 p. m. between Barnegat City and Sandy Hook, New Jersey; at 10 p. m. off Sandy Hook; at 7 a. m. of the 25th it was near the extremity of Long Island, and, at 3 p. m., it was off the southern coast of Massachusetts. After the last-mentioned report it disappeared. From the 23d to the 26th, inclusive, violent gales prevailed all along the Atlantic coast, and the highest tides known for many years are reported as having occurred. A study of the conditions in connection with the movement of this area has failed to discover any satisfactory reason for its great retardation after reaching the Atlantic. The cause, however, may be determined when all reports of vessels crossing the Atlantic on the dates named are received and studied. The highest pressure was in rear of the storm, which increased its progressive movement after reaching Cairo, Illinois. Over Nova Scotia the pressure was not abnormally high, and, therefore, the only

supposition is that an area of high pressure was present at sea, moving slowly southeastward from Newfoundland, checking the progress of the low area.

The following are extracts from reports in connection with this storm, made by the observers at the cities named:

New York City: "Gale began at 4 a. m. of the 23d and continued until 3 p. m. of the 24th; very severe in this vicinity and on the New Jersey coast. It was accompanied by the highest tide known for forty-five years, doing much damage to sewers and cellars."

New London, Connecticut: "A gale, which attained great violence, began at 10.05 a. m., 24th. The barge 'Grinnel' in tow of the 'America,' both of this city, was lost in the gale off Highland Light, New Jersey, and her crew of three men were drowned."

New Haven, Connecticut: "Heavy northeaster on the Sound all day; highest tide in twenty-nine years; it rose three feet above high-water mark, covering the wharves."

Chincoteague, Virginia: "Cautionary signals hoisted at 8.10 a. m. of the 23d. The wind during the night and early a. m. blew fresh from the southwest, veering to west at noon. A high wind began at 1 p. m. and continued all day. Remarkably high tides prevailed, submerging the water front of the island."

Portland, Maine: "High tide in the harbor yesterday and to-day, being three feet higher than usual."

Boston, Massachusetts: "This gale continued for four days and was very severe all along the coast. Ample warning was given, and all vessels remained in harbor. No damage reported to shipping in this section. The storm caused very high tides, and considerable damage was done to property along the beach."

NORTH ATLANTIC STORMS DURING NOVEMBER, 1885.

[Pressure expressed in inches and millimetres; wind-force by scale of 0-10.]

The tracks of the areas of low pressure that have appeared over the north Atlantic Ocean are determined, approximately, from international simultaneous observations furnished by captains of ocean steamships and sailing vessels; abstracts of ships' logs and reports collected by the Signal Service agencies at the ports of New York, Boston, and Philadelphia; reports received through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs furnished by the proprietors of the "New York Maritime Register," and from other miscellaneous data received at this office up to December 22, 1885.

The paths of nine areas of low pressure are shown on the chart for November, 1885; three of these, viz., numbers 5, 7, and 9, were apparently continuations of storms which passed into the Atlantic from the American continent. Two, numbers 1 and 3, appeared on the Banks of Newfoundland, and one, number 6, over the Gulf of Saint Lawrence; one, number 2, occupied the ocean to the northwest of the British Isles during the 2d and 3d, and of the remaining areas of low pressure, that traced as number 8 apparently developed over the ocean between the coast of the United States and Bermuda, prior to the 21st, while that traced as number 4 appeared in the vicinity of the Azores during the second decade of the month. The general direction of movement of the storm-centres was northeasterly or east-northeasterly, inclining to the southward after the storm-centres had passed to the eastward of the thirtieth meridian.

The month of November, 1885, was marked by generally unsettled weather and moderate to strong gales; the atmospheric pressure over the region covered by the reports was comparatively low throughout the month, and especially so during the last decade, when the storms traced as numbers 8 and 9 moved over the ocean.

The following are brief descriptions of the low areas charted:

1.—This area of low pressure occupied the Banks of Newfoundland on the 1st, the pressure near the centre of disturbance being about 29.55 (750.6). Strong n. winds prevailed over

the region west of the fiftieth meridian, but moderate to fresh breezes only were reported over the ocean to the eastward, the barometric gradients in front of the depression being very slight. On the 2d the region of low pressure was shown near N. 50°, W. 30°, where the barometer read 29.57 (751.1), with strong breezes to moderate n. gales between W. 35° and 45°, and strong sw. winds to the eastward of the first-mentioned meridian. By the 3d this depression had apparently filled in.

2.—This low area appeared on the 2d between N. 55° and 60° and W. 20° and 30°; on that date the s. s. "State of Nebraska," A. G. Braes, commanding, in N. 54° 54', W. 17° 14', had a whole gale from sw. to w., the barometer falling to 29.35 (745.5) at 8 p. m. On the 3d the disturbance was off the north-west coast of Ireland, causing moderate sw. gales near the coastline and southward to the fiftieth parallel, while strong nw. gales prevailed over the ocean between N. 50° and 55°, and from W. 17° westward to 30°.

3.—This area of low pressure appeared over the Banks of Newfoundland on the 4th. At midnight of the 3d the s. s. "Holland," Wm. Tyson, commanding, in about N. 42° 41', W. 60° 18', had a strong breeze to moderate s. gale, barometer 29.69 (754.1), and by morning of the 4th the wind had shifted to w. and was blowing a moderate gale, with heavy squalls and rainy weather. At 4 a. m. (Greenwich time) on the 4th, Captain G. Mitchell, commanding the s. s. "Trinacria," reported having experienced a very heavy swell from s., wind moderate; 10 a. m., thunder, lightning, and heavy rain, with wind squalls of hurricane force, very heavy sea from southward; at 11.30, barometer 29.79 (756.7), wind hauling to w., light breeze, weather clearing (ship's position at noon, Greenwich time, N. 42° 00', W. 52° 10'). The s. s. "Ems," W. Willigerod, commanding, in N. 45° 00', W. 54° 00', on the 4th, had barometer 29.53 (750.0), strong se. to sw. and wnw. gale. On this date nearly all vessels between N. 45° and 50° and W. 40° and 50° reported strong s. gales, shifting to sw. and wsw. During the 5th, 6th, and 7th this low area moved slowly northeastward, with pressure ranging from 29.25 (742.9) to 29.65 (753.1), and attended by moderate to strong gales from sw. to w. and nw. over the region between N. 45° and 53°, and from W. 50° to 25°. On the 8th the storm-centre was probably near N. 55°, W. 25°, where the barometer ranged from 29.4 (746.7) to 29.6 (751.8), and by the following day it had passed beyond the range of the observations.

4.—A decrease of pressure occurred near the Azores on the 8th, and by the 9th the barometer in that region had fallen to 29.5 (749.3); the decrease continued during the 9th, and on the 10th vessels near the Azores had barometer down to 29.16 (740.7), the s. s. "Ponca," W. Brown, commanding, in N. 36° 45', W. 28° 0', reporting barometer 29.16 (740.7), wind wnw., force 5, and the bark "River Ganges," Thomas Naile, commanding, in N. 37° 43', W. 30° 50', barometer 29.27 (743.4), wind nw., force 7. Captain Pearson, commanding the s. s. "Strathleven," in N. 36° 37', W. 13° 53', on the 10th, had barometer 29.96 (761.0), falling, wind sse., force 5, weather overcast, lightning in w. and sw. During the 10th the storm-centre moved slowly eastward, and on the 11th it was near N. 37°, W. 20°; the s. s. "Strathleven" had a strong gale from sse. to nw., which lasted until the 13th. The lowest barometric reading, 29.14 (740.1), was observed at 4 p. m. on the 11th, in N. 36° 34', W. 19° 20'; the gale began at sse. at noon on the 10th, and shifted to s., s. by w., ssw., sw. by w., and at 6 a. m. on the 11th it fell calm; the wind then shifted to se., ene., ne., n., and nw. Captain Pearson reported: "At 6 a. m. on the 11th it was calm, the wind then came away from se., and freshened as it went around; at noon, ene., force 4; 2 p. m., ne., 6; 4 p. m. (lowest barometer), n., force 7; 8 p. m., wnw., force 8, to nw. by n., force 9, at 10 a. m. on the 12th, and continuing to blow a fresh gale until midnight, when it gradually moderated."

The bark "Francesco," in N. 33° 40', W. 20° 0', on the 11th, encountered a heavy gale from sw. to nw., lasting twenty-four hours; vessel lost and split several sails. The storm continued

to move eastward during the 12th and 13th, with gradually decreasing pressure, and attended by moderate to strong gales over the ocean between the Azores and the tenth meridian west of Greenwich. At 8 a. m. on the 12th the s. s. "Indipendente," P. Pirandello, commanding, in N. 36° 48', W. 16° 10', had barometer 28.87 (733.3), wind blowing a gale of force 11 from n., and shifting to nw., sw., and se. During the 13th the pressure over the ocean between W. 10° and 20° and N. 30° and 40° ranged from 29.3 (744.2) to 29.6 (751.8), and by the following day the low area had apparently entered the continent.

5.—This was a continuation of the area of low pressure described as number v. under "Areas of low pressure." During the 10th it moved from the Gulf of Saint Lawrence over Newfoundland, and on the morning of the 11th it was central off the southeastern coast of that island, where it was probably joined to a cyclonic storm which had apparently moved north-eastward from the vicinity of the Bermudas. In connection with the last-mentioned storm, Captain Verries, commanding the s. s. "Neustria," in about N. 36° 30', W. 60° 0', reported: "At about 8 p. m. on November 10th we encountered a heavy gale, which was indicated several hours in advance by the rapid fall that occurred in the barometer, which at 11 p. m. read 29.03 (737.3). The wind, which had remained at southeast during the fall of the barometer, shifted suddenly to sw., w., nw., and n., continuing from the last-mentioned direction while the barometer remained stationary at 29.03 (737.3). As soon as the barometer began to rise, the wind shifted to nw., then to w., and continued to blow with great violence throughout the 11th." The s. s. "Essex," in N. 37°, W. 58°, also encountered a strong w. gale on the 10th, continuing for twenty-four hours, while vessels to the westward of Bermuda had moderate to strong northerly gales.

During the 10th and 11th strong se. to w. gales prevailed over the Banks of Newfoundland and westward to the sixty-fifth meridian, the barometer falling, on the last-mentioned date, to 28.9 (734.0), near N. 45° and between W. 51° 30' and W. 54° 30'. On the 12th and 13th the region of least pressure was shown near N. 52° and between W. 40° and 45°, where the barometer ranged from 29.2 (741.7) to 29.4 (746.7), while sw. to w. gales, of force 8 to 10, prevailed over the ocean southward to the forty-fifth parallel. By the 14th the storm-centre had moved eastward to about N. 51°, W. 32°, with pressure ranging from 29.08 (738.6) to 29.2 (741.7); in the vicinity of the storm-centre the winds, on this date, did not exceed the force of a strong breeze, nor did they anywhere exceed that of a moderate gale, except in the western quadrants, where they occasionally attained a force of 8-9. On the 15th the atmospheric pressure over the ocean between W. 20° and 40°, and from N. 48° to 52°, ranged from 29.0 (736.7) to 29.2 (741.7), and the circulation of the winds indicated the presence of a storm-centre near N. 50°, W. 25°; at the same time the area of low pressure apparently extended southward to, and beyond, the Azores, and within this region moderate to strong gales from s. to w. and nw. were reported. During the 16th, 17th, and 18th this low area was apparently forced to the southeastward, while the barometer was high in the neighborhood of the British Isles; on those dates stormy and unsettled weather prevailed over the ocean from W. 40° eastward to the Bay of Biscay, with strong e. winds to gales near the fiftieth parallel. During this period the pressure over the region above mentioned ranged from 29.14 (740.1) to 29.7 (754.4); and on the 19th the low area apparently occupied the Iberian Peninsula and the Bay of Biscay.

6.—This area of low pressure occupied the Gulf of Saint Lawrence and Newfoundland from the 15th to the 17th, during which period the barometer ranged from 29.25 (742.9) to 29.55 (750.6), and strong westerly breezes to moderate or fresh gales occurred over the region north of 40° N., and from the coast of the United States westward to the Banks of Newfoundland. By the 18th the area of low pressure was shown near N. 51°, W. 41°, with barometer about 29.45 (748.0), and attended by fresh

breezes to moderate gales from s. to sw. and w.; the depression continued its easterly movement north of the fiftieth parallel during the 19th, with slightly decreasing pressure, while the winds, especially in the western quadrants, began to increase in force. On the 20th the storm-centre, which had moved south of east after passing the thirtieth meridian, was shown near N. 51°, W. 20°, where the barometer read 29.2 (741.7) to 29.33 (745.0), and the area of decreasing pressure spread south-eastward to the Bay of Biscay; on the 21st the storm-centre was off the southwest coast of Ireland, and the pressure had decreased to 29.0 (736.6). Moderate to strong se. gales prevailed over the British Isles, and se. to sw. gales over the Bay of Biscay. On the 22d this low area was apparently central near the entrance to the English Channel, with barometer about 29.3 (744.2).

7.—This was a continuation of the low area described as number vii under "Areas of low pressure." On the 20th it was central near the southern coast of Newfoundland, with pressure about 29.1 (739.1), and by the following day it had passed eastward to about N. 48°, W. 49°, the barometer near the centre ranging from 29.35 (745.5) to 29.55 (750.6). On the 22d the lowest pressures, 29.19 (741.4) to 29.26 (743.2), were indicated near N. 52°, W. 26°, and in no part of the ocean between Newfoundland and the tenth meridian, and from N. 40° to N. 55°, did the pressure exceed 29.6 (751.8). During the 23d and 24th the low area moved slightly south of east, with the pressure ranging from 29.0 (736.6) to 29.3 (744.2); and on the last-mentioned date it was central south of Ireland. During its passage over the ocean this area of low pressure was attended by strong winds to moderate gales, mostly from the west.

8.—This was probably the most severe storm of the month over the Atlantic Ocean. It was apparently developed over the ocean in the vicinity of Bermuda, prior to the 21st, the date on which it first became well-defined on the chart; on the 19th the s. s. "Bellingham," in N. 34°, W. 58°, had a heavy gale in which she lost yawl-boat and had sails damaged, and on the 20th strong wsw. to wnw. gales were reported near the Bahamas, while moderate to strong gales from n. and ne. were reported by vessels off the coast south of Hatteras. Captain Locke, commanding the s. s. "Muriel," reported: "During the 19th, 20th, and 21st had strong gales from sw. to w., attended by violent rain squalls; at 10 a. m. of the 21st had a very heavy squall, accompanied by hail, thunder, and lightning; some of the hail-stones measured over one inch in size; very heavy sea from sw.; lowest barometer, 29.45 (748.0)." The vessel's position from the 19th to 21st was N. 35° 45', W. 70° 12' to N. 30° 40', W. 67° 12'.

At Bermuda, on the 21st, the barometer read 29.5 (749.3), having fallen steadily since the 19th; wind w., force 6, having shifted from sse., force 6, on the 19th, to sw., force 2, on the 20th; weather unsettled and squally. The s. s. "Manhattan," F. Stevens, commanding, had a whole gale from w. by s. to wnw. from noon of the 19th until the 20th; the lowest barometer was 29.52 (749.8), at 5 p. m. on the 19th. Captain Stevens reports as follows: "Sailed from Turk's Island 1.30 p. m., November 19th; have had strong westerly winds and heavy seas all the passage, with low barometer, standing generally at 29.6 (751.8), heavy westerly sea." On the 21st this cyclone was central to the north or northeast of Bermuda, the lowest pressures, as shown by the observations at hand, ranging from 29.4 (746.7) to 29.5 (749.3). Strong gales from s. prevailed near W. 60°; strong e. to ne. gales north of the fortieth parallel and west of 60° W., while n. to nw. and w. gales occurred between the coast of the United States and Bermuda. On the 22d the storm-centre was near N. 43°, W. 55°; the s. s. "Wyoming," O. L. Rigby, commanding, in N. 44° 8', W. 55° 50', had barometer down to 29.26 (743.2), whole gale from e., shifting to ene., ne., n., and nw.; on the same date the s. s. "St. Laurent," M. de Jousselin, commanding, had barometer 29.37 (746.0), in N. 43° 51', W. 56° 15', fresh gale from ne., shifting to nnw.

During the 22d the cyclone moved northeastward, and on the following date it was central near N. 47°, W. 47°, as shown by the following reports: s. s. "France," A. D. Hadley, commanding, at 1 a. m. on the 23d, in N. 44° 43', W. 49° 52', barometer 28.88 (733.5); whole gale from ssw. to nw. and nne.; s. s. "Lydian Monarch," T. C. Huggett, commanding, in N. 46°, W. 49° 20', barometer 29.0 (736.6), at 4 a. m. on the 23d, whole gale from w. to wnw.; s. s. "Noordland," H. E. Nickles, commanding, in N. 45° 28', W. 49° 50', at 5.40 a. m., barometer 28.86 (733.0), strong gale from sw. by s. to w. and nw.; s. s. "City of Chester," H. Condron, commanding, in N. 46° 40', W. 47° 0', at 10 a. m., barometer 28.88 (733.5), fresh gale from sw. to w., nw., and nne.; s. s. "Edam," J. H. Taat, commanding, in N. 45° 52', W. 49° 20', at 10 a. m., barometer 29.02 (737.1), whole gale from nw., shifting to ue.; s. s. "Jan Breydel," H. Myer, commanding, in N. 45° 15', W. 47° 05', at noon, barometer 28.97 (735.8), gale of force 10 (11 Beaufort scale) from sw. by w., shifting to wnw. On the 24th the region of least pressure was transferred to about N. 49°, W. 35°, the position of the storm-centre being clearly indicated by the well-defined cyclonic action of the winds. At 3 p. m. of the 23d the s. s. "Geiser," F. V. Schierbeck, commanding, in N. 47° 32', W. 45° 23', had barometer 29.0 (736.6), whole gale from ese. to sse. and sw., and thence to wnw; and at midnight of the 23d the s. s. "Germanic," H. Perry, commanding, in N. 48° 29', W. 38° 57', had barometer 28.74 (730.0), wind wsw., force 3, increasing, and veering to nw. until it reached force 9. The s. s. "Lord Clive," P. Urquhart, commanding, in N. 50°, W. 35° 30', at 6 p. m. on the 23d had barometer 29.17 (740.9), wind e., force 2, and at midnight, in N. 49° 40', W. 37° 0', it read 28.9 (734.0). Throughout the 24th and 25th, as the storm-centre moved slowly eastward, the pressure remained below 29.0 (736.6), and heavy nw. and n. gales were reported to the west of the storm-centre, although the winds in the eastern quadrants did not exceed the force of a moderate gale. By the 26th this storm had reached the west coast of Ireland, and the pressure at the storm-centre had fallen to 28.4 (721.3), and strong gales were now prevailing in all quadrants. During the 26th the storm-centre passed over the British Isles.

9.—This was a continuation of the low area described as number viii under "Areas of low pressure." It passed off the coast of the United States on the 25th, and by the 26th the storm-centre was near N. 41°, W. 56°, with lowest reported pressure 29.28 (743.7), with fresh to strong e. to ne. gales over the region between N. 40° and 45° and from W. 55° to 60°. By the 27th the storm-centre had moved northeastward to about N. 50°, W. 37°, where the barometer ranged from 29.0 (736.6) to 29.2 (741.7); moderate w. gales prevailed over the region west of the fortieth meridian, with pressure ranging from 29.3 (744.2) to 29.7 (754.4) between W. 40° and the Banks of Newfoundland. Over the eastern part of the ocean, from about W. 40° eastward to about W. 15°, the pressure ranged from 28.99 (736.3) to 29.24 (742.7), and variable winds, moderate to strong in force, were reported. During the 28th and 29th this low area continued its northeasterly movement, and on the last-mentioned date it was apparently central to the northwest of the British Isles, with pressure near the storm-centre about 29.15 (740.4); during that date the pressure over the ocean between W. 35° and the British Isles, and north of the fiftieth parallel, did not exceed 29.5 (749.3), but on the last day of the month an increase set in and barometer rose to 30.0 (762.0) between W. 40° and 20°, and to 29.6 (751.8) between the last-mentioned meridian and the British Isles.

OCEAN ICE.

The only iceberg reported during the month of November, 1885, was observed in N. 48° 00', W. 51° 10' by Captain Poland, commanding the s. s. "Missouri."

In November, 1884, several icebergs were seen in N. 45° 56', W. 52° 38', but none were reported in that month of the years 1882 and 1883.

SIGNAL SERVICE AGENCIES.

Signal Service agencies have been established in the Maritime Exchange buildings at New York City and Philadelphia, and in the Custom-House, Boston, where the necessary blanks and other information will be furnished to ship-masters.

In pursuance of the arrangements made with the Meteorological Office of London, England, there were cabled to that office from New York during November, 1885, thirteen reports concerning storms encountered by vessels in the Atlantic west of the forty-fifth meridian; one message was sent from Boston.

TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

The distribution of mean temperature over the United States and Canada for November, 1885, is exhibited on chart ii by the dotted isothermal lines; and in the tables of miscellaneous data are given the monthly mean temperatures, with the departures from the normal, for the various stations of the Signal Service.

In the following table are given the mean temperatures for the several geographical districts, with the normals and departures, as deduced from Signal Service observations:

Average temperatures for November.

Districts.	Average for Nov. Signal-Service observations.		Comparison of Nov., 1885, with the average for several years.
	For several years.	For 1885.	
New England.....	39.6	41.9	+ 2.3
Middle Atlantic States.....	45.3	46.5	+ 1.2
South Atlantic States.....	55.1	54.4	- 0.7
Florida Peninsula.....	68.5	64.9	- 3.6
Eastern Gulf States.....	55.6	54.6	- 1.0
Western Gulf States.....	56.9	58.2	+ 1.3
Rio Grande Valley.....	64.8	67.5	+ 2.8
Tennessee.....	48.2	48.9	+ 0.7
Ohio Valley.....	43.1	46.3	+ 3.2
Lower Lake region.....	38.8	41.0	+ 2.2
Upper Lake region.....	33.9	36.7	+ 2.8
Extreme Northwest.....	24.4	30.5	+ 6.1
Upper Mississippi Valley.....	38.2	41.0	+ 2.8
Missouri Valley.....	33.5	36.4	+ 2.9
Northern slope.....	31.2	40.3	+ 9.1
Middle slope.....	37.7	43.4	+ 5.7
Southern slope.....	48.6	53.4	+ 4.8
Southern plateau.....	48.2	51.8	+ 3.6
Middle plateau.....	37.0	43.0	+ 6.0
Northern plateau.....	37.1	43.6	+ 6.5
North Pacific coast region.....	44.3	46.5	+ 2.0
Middle Pacific coast region.....	52.8	54.3	+ 1.5
South Pacific coast region.....	59.1	60.8	+ 1.7

Over the central Ohio Valley, southwestern Virginia, the east Gulf states, Florida, and in the south Atlantic states, except along the South Carolina coast, the mean temperature for November, 1885, was slightly below the normal, the departures being most marked over the Florida Peninsula, where they were from 3° to 4°. In all other districts the mean temperature was above the average. Along the Pacific coast the departures ranged from 0°.8, at Red Bluff, California, to 2°.1, at Portland, Oregon; over the Rocky Mountain districts the departures generally varied from 4° to 10°, the greatest occurring in Montana; from Louisiana and eastern Texas northward to British America, and from the upper Mississippi Valley eastward to the New England coast, the departures below the normal generally varied from 2° to 4°.

The following are some of the most marked departures from the normal:

Above normal.		Below normal.	
Fort Benton, Montana.....	13.8	Sanford, Florida.....	4.4
Fort Assinaboine, Montana.....	11.8	Cedar Keys, Florida.....	3.2
Fort Shaw, Montana.....	11.1	Key West, Florida.....	3.1
Helens, Montana.....	9.5	Pensacola, Florida.....	2.1
Fort Buford, Dakota.....	9.1	Mobile, Alabama.....	1.8
Deadwood, Dakota.....	8.9	Hatteras, North Carolina.....	1.5
Fort Maginnis, Montana.....	8.2	New Orleans, Louisiana.....	1.2
Fort Custer, Montana.....	7.7	Kitty Hawk, North Carolina.....	1.1
Dayton, Washington Territory.....	7.3	Fort Macon, North Carolina.....	1.0