

# 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 December, 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 ten areas of low pressure are traced on the chart for December, 1885, the average number for that month during the last twelve years being 12.6.

The month was warmer than the average in all districts west of the Mississippi River, except in the west Gulf states, where the temperature was normal; in the south Atlantic and east Gulf states the month was colder than the average; in the northern districts east of the Mississippi River the departures were slight, though generally above the normal temperature.

The rainfall was below the average over the greater part of the country, the deficiencies being greatest in the Ohio Valley, Tennessee, west Gulf states, and north Pacific coast region. Along the Atlantic coast, south of New England, the precipitation was above the average, the excess being greatest on the south Atlantic coast.

With this REVIEW are published two additional charts, numbers v and vi. The former exhibits the annual isotherms for 1885, and the departures from the normal temperature; the latter shows the annual precipitation for the same year.

In the preparation of this REVIEW the following data, received up to January 20, 1886, 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 sixty-one monthly journals and one hundred and sixty-three monthly means from the former, and eighteen monthly means from the latter; two hundred and ninety monthly registers from voluntary observers; forty-four 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, Missouri, 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 December, 1885, determined from the tri-daily telegraphic observations of the Signal Service, is shown by isobarometric lines on chart ii.

The mean pressure for the month is greatest over the central Rocky Mountain districts and least over the Canadian Maritime Provinces. Over the first-mentioned region the barometric means generally range from 30.2 to 30.3, while over the latter they fall to 29.9, or slightly below. The mean pressure exceeds 30.1 over nearly the entire country, the exceptions being the northern and southern Pacific coast regions and over the northern part of the country to the east of the Mississippi River. In eastern Tennessee and the Gulf States, except southern Texas, the mean pressure is slightly in excess of 30.15.

A comparison with the mean pressure for the preceding month shows an increase over the entire country, with the exception of the Canadian Maritime Provinces, where a slight decrease has occurred. The greatest difference is shown on the north Pacific coast, where the barometric means are from .20 to .25 higher than for November. Over the Rocky Mountain districts the difference ranges from .01 to .10, and over the central and southern districts to the eastward it is slightly in excess of .10.

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. In the Gulf States, central and southern Rocky Mountain districts, and on the Pacific coast, the mean pressure is above the normal, the departures not exceeding .10, except at Santa Fé, New Mexico, where it amounts to .11. Over the northern districts to the east of Washington Territory, and over the central portions of the country east of the Rocky Mountains, the pressure is below the normal, the departures being most marked in New England and portions of the lower lake region and middle Atlantic states, where they range from .10 to .12.

### BAROMETRIC RANGES.

The monthly barometric ranges at the various Signal Service stations are also given in the tables of miscellaneous data. They were greatest in New England and least in the southern portions of Florida and California.

The following are some of the extreme ranges:

Greatest.		Least.	
		Inches.	
Eastport, Maine.....	1.76	San Luis Obispo, California.....	0.39
Portland, Maine.....	1.71	Key West, Florida.....	0.42
Boston, Massachusetts.....	1.61	Los Angeles, California.....	0.45
Albany, New York.....	1.61	Sanford, Florida.....	0.61
Oswego, New York.....	1.58	Fort Grant, Arizona.....	0.64
Block Island, Rhode Island.....	1.58	Cedar Keys, Florida.....	0.65
New Haven, Connecticut.....	1.57	Yuma, Arizona.....	0.65
Buffalo, New York.....	1.56	Fort Apache, Arizona.....	0.66
Erie, Pennsylvania.....	1.56	Prescott, Arizona.....	0.67

On the north Pacific coast, and in all districts east of the Rocky Mountains to the north of the thirty-fifth parallel, the monthly ranges exceeded 1.00.

### AREAS OF HIGH PRESSURE.

Six areas of high pressure were traced from the Rocky Mountain regions to the Atlantic coast after the 6th of the month; previous to that date the high area, which had formed

over the northern and central plateau regions during the latter portion of November, remained almost stationary, the pressure ranging from 30.30 to 30.60. The general direction of progressive movement of these areas was to the southeast until they reached the Atlantic coast, where the course changed to east, or slightly to the north of east.

I.—This high area formed north of Dakota on the morning of the 6th, and probably resulted from the easterly movement of the area, previously referred to, extending over the northern plateau region; this last-named condition disappeared before the advance of the low area from the north Pacific coast. The weather chart of the morning of the 6th exhibited a well-defined storm-centre about one thousand miles to the southeast, and a second slight depression about the same distance to the west of this high area. After the advance movement had set in from the extreme northwest the rate was about fifty miles per hour, while the low area continued its easterly course at the rate of twenty-five miles per hour. The pressure ranged from .2 to .3 above the normal within this area, and it increased after reaching the Atlantic coast; it moved directly east from the Ohio Valley during the 7th, and inclined to the northeast after passing the coast line. No unusual change of temperature occurred during the transit of this area over the United States, although it was from 20° to 30° below the normal for the month near the line of greatest pressure.

II.—The pressure increased in the northern and central Rocky Mountain regions on the 9th, and continued above normal during the 10th; it was .3 above the normal in the Mississippi Valley, and .3 to .4 above the normal from Montana westward to the Pacific coast on the morning of the 11th, when this area extended from the north Pacific coast southward to the Gulf coast. The morning weather chart of the 11th indicated that this area of high pressure had three distinct centres, one in the east Gulf, one in the lower Missouri valley, and one in Montana, the pressure being greatest in the last-named. The morning reports of the 11th showed an easterly movement of these areas after uniting, forming a well-defined single area extending over the central valleys; this area extended from the Atlantic coast to the north Pacific coast on the 11th, and was attended by generally fair weather, except in the Lake regions and the southern Rocky Mountain stations, where light snows occurred. It moved eastwardly, with increasing pressure, during the 12th, and a trough of low pressure extended from Texas to Manitoba, apparently dividing this extended area, leaving the barometer from .3 to .4 above the normal over the Pacific coast and plateau regions. As it approached the coast the pressure increased from 30.50 to 30.70, the area became less extended and the bounding isobars more uniform in curvature, the gradients being greatest in the southwest and northeast quadrants; the area moved to the northeast after passing over the middle Atlantic states, and was quickly followed by general rains or snows in all districts east of the Mississippi during the 12th and 13th; this precipitation resulted from the storm that moved northeastwardly from the west Gulf coast. A light "norther" occurred on the Texas coast before the union of these three areas previously referred to, and killing frosts occurred as far south as San Antonio, Texas, on the 10th.

III.—When the previously-described area passed off the Atlantic coast, this area extended over the north Pacific coast, the two being separated by a storm of considerable energy, which was moving northward from the Gulf coast. During the 13th the pressure increased over the upper Missouri valley, the line of greatest pressure extending southwestward from Manitoba to southern California; during the same date the storm from the Gulf coast moved rapidly northward to the Lake region, causing general rain or snow. During the northward movement of this low area there was a rapid movement of translation in the area of high pressure from the upper Missouri valley to the west Gulf states, and the cold attending these changes caused killing frosts as far south as Indianola, Texas, and the Rio Grande Valley on the morning of the 14th; the

barometer was 30.52 at Rio Grande City, Texas, on this date, while a secondary high area remained over the central plateau region. The pressure increased over the Southern States along the Gulf coast during the 14th, attended by cold and freezing weather throughout the Gulf and south Atlantic states; by the morning of the 17th this area had disappeared to the eastward of the south Atlantic coast.

IV.—This high area appeared north of Minnesota on the 15th, and moved rapidly eastward north of the Lake region during the 16th, causing a slight cold wave in the Saint Lawrence Valley and New England. At midnight of the 17th it was central in the lower Saint Lawrence valley, where the pressure was .5 above the normal. Light snows occurred on the New England coast and westward over the lower lake region as this area moved eastward. On the morning of the 18th it extended over the Maritime Provinces, where the temperature ranged from -16° to +20°. This area disappeared rapidly to the east of Nova Scotia during the 18th.

V.—This area formed slowly over the southern Rocky Mountain region during the 17th, while a low area moved northward from the Pacific coast region to Manitoba; it extended slowly northward and eastward during the 17th, covering the entire Rocky Mountain regions during the 17th and 18th, the movement being in the direction of the area of low pressure previously referred to; it extended over the Saint Lawrence Valley during the 19th and 20th, accompanied by fair weather, and with temperatures generally above normal. The pressure continued high in the Southern States and in the southern Rocky Mountain region during the 20th and 21st, with warm, fair weather, while this area moved southeastward to the south Atlantic coast and disappeared.

VI.—As in the previous area described, the pressure gradually increased in the southern and central Rocky Mountain regions, and there was a gradual rise in the barometer on the 22d and 23d, resulting in the formation of this extended area of high pressure within the limits of the stations of observation. The area extended northeastwardly, and the pressure was greatest in northern Minnesota at midnight of the 24th, the line of greatest pressure extending northeast and southwest, while there were indications of low areas existing east of the south Atlantic coast and the north Pacific coast. It was central north of the lake region at midnight of the 25th, the southwest half of this area covering the greater portion of the United States east of the Rocky Mountains; the gradients were increased rapidly to the westward, owing to the advance of the low area from the Pacific coast; they also increased rapidly to the southward, owing to the northerly movement of the storm-centre east of the south Atlantic coast. Dangerous northeast gales occurred from Boston, Massachusetts, southward to Wilmington, North Carolina, on the morning of the 26th, the temperature ranging from 20° to 30° below the normal, and from 0° to -15° in the Saint Lawrence Valley when the pressure reached its maximum in this region on the 26th. The rapid movement northward of the storm on the Atlantic coast apparently prevented the further movement of this area to the eastward, and the gradients increased on the middle Atlantic coast, causing violent gales on the 26th and 27th, while the high area moved southwestward from the Saint Lawrence Valley to the Ohio Valley and the east Gulf states, the pressure during this movement diminishing from 30.80 to 30.30; during the 28th and 29th the area disappeared by a gradual fall of the barometer, without any apparent movement of translation.

A slight area of high pressure formed in the Rocky Mountain region on the 29th, but disappeared without extending over the regions to the eastward.

#### AREAS OF LOW PRESSURE.

Ten areas of low pressure have been traced over the United States, or near the limits of the stations of observation, during the month; five low areas either originated in British America, north of the territories, or on the north Pacific coast; two

passed from the Southwest to the Lake region; two moved northward along the Atlantic coast east of Cape Hatteras, North Carolina, and one was a secondary area which developed in the Lake region when the principal area was central in the extreme northwest. With the single exception of number i, these areas all passed north of the Saint Lawrence Valley. The mean latitude of these areas was north of the latitude of the normal storm-tracks for December, and they were also north of the mean latitude of the storm-tracks of the preceding month; the average direction was more directly to the northeast, after passing the Mississippi Valley, than the average direction of the areas for November.

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

Low areas.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
No. I.....	30 01	77 00	34 00	74 00	12.0
II.....	54 00	96 00	49 00	58 00	30.0
III.....	53 00	112 00	52 00	64 00	40.0
IV.....	48 00	82 00	46 00	71 00	30.0
V.....	34 00	100 00	50 00	73 00	35.0
VI.....	27 00	100 00	48 00	71 00	48.0
VII.....	52 00	99 00	49 00	64 00	30.0
VIII.....	53 00	101 00	52 00	60 00	40.0
IX.....			49 00	60 00	22.0
X.....			49 00	77 00	28.0
Mean hourly velocity.....	37 00	102 00	49 00	77 00	31.5

I.—The mouth opened with this area central off the south Atlantic coast, while a second low area was moving north of Dakota, and an extended high area covered the Rocky Mountain regions. This low area was at no time within the limits of the stations of observation, but reports from the coast stations serve to enable us to trace the northerly movements during the 1st and 2d. Light rains and brisk to high northerly winds, backing to northwesterly, were reported from the middle and south Atlantic states during the 1st and 2d. This storm either passed east of Cape Hatteras, North Carolina, or formed a secondary disturbance which became part of the low area which was moving eastward over the Saint Lawrence Valley on the 3d. Severe gales occurred northeast of the Nova Scotia coast, indicating that a union of these depressions did not occur until after both had passed eastward over the Atlantic.

II.—As previously stated, this low area was central north of Dakota at the morning report of the 1st. It probably originated on the north Pacific coast and moved eastward far to the north of the stations of observation, as the high area which covered the Rocky Mountain region remained almost stationary during its transit over the Rocky Mountains. This storm moved eastward, inclining southward towards the Saint Lawrence Valley, the pressure decreasing rapidly at its centre during the advance, and when it reached the latitude of Quebec, Province of Quebec, the barometer had fallen to 29.09 at the centre. Strong northwesterly winds prevailed in the Lake regions, and light snows were reported in New England, New York, the lower lake region, and the Saint Lawrence Valley. On the 3d the barometer was lower to the east of Sydney, Nova Scotia, indicating the existence of a second depression near the coast over the Atlantic, and it is probable that this latter disturbance is identical with that previously traced as number i off the south Atlantic coast. This storm reached the most southerly point of its track when central near Quebec, Province of Quebec, on the 3d, after which it moved east and northeast, extending in area, and the pressure continued to decrease, the barometer reading as low as 29.02 at Bird Rock, Gulf of Saint Lawrence, on the morning of the 4th; strong westerly gales continued in the Maritime Provinces on the 4th, with rapidly increasing pressure, indicating that the storm had passed to the east of the station.

III.—This low area was probably central on the British American coast when the preceding storm was north of the Lake region; it crossed the Rocky Mountains north of Montana, and without causing any marked change within the high area then covering the Rocky Mountain districts; its course was more to the southeast than that of the preceding areas; while they moved over nearly parallel tracks, number iii entered the United States near the Montana line and moved southeastward, with increasing energy; it was central near Saint Paul, Minnesota, at midnight of the 3d, while number ii was central near Father Point, Province of Quebec; the southeast course continued until the centre reached southern Michigan, when the course changed; the storm followed the lower lake region and the Saint Lawrence Valley and passed beyond the stations of observation. This storm was unusually severe in the west quadrants on the 4th and 5th; the gradient was rapid to the west and also to the east; after the centre reached New England, it was followed by a cold wave which was most severe in the Northwest, and caused general snows in the Northern States and as far south as the Gulf and south Atlantic states on the 4th and 5th, and severe gales occurred on the coast from Jacksonville, Florida, northward to Sydney, Nova Scotia, and in the lower lake region; a dry "norther" occurred in Texas on the 5th. Signals were displayed, giving ample warning of the advance of this storm.

The following notes from observers, relative to this storm, are of interest:

Buffalo, New York: a violent snow storm occurred on the 5-6th, the wind reaching a maximum velocity of forty-eight miles per hour; signs, trees, fences, and out-buildings suffered from the gale; trains from all directions were delayed; on Lake Erie the storm was unusually severe. The warnings gave entire satisfaction to all interested, being timely, and fully justified; no vessel left port, and the compliment to the service is all the more great, as many of the largest steamers were ready to sail when the cautionary signal was displayed.

Cleveland, Ohio: a heavy snow storm, accompanied by high winds, occurred on the 5th and 6th.

Sandusky, Ohio: the severest gale of the season occurred on the 5th, continuing into the 6th, the wind reaching a maximum velocity of fifty-six miles per hour. The signal display caused three heavily-laden vessels to remain in harbor that would probably have been lost.

Grand Haven, Michigan: a high westerly gale, pronounced by vesselmen to have been the worst storm ever experienced on the Lakes, occurred on the 4th and 5th.

Detroit, Michigan: a heavy northwest gale prevailed on the 5th and 6th, unusual in severity, with the temperature 5° to 10° below zero; several vessels have been wrecked, and great damage done to shipping interests on the Lakes.

Chicago, Illinois: a snow storm of unusual violence occurred on the 4th, the wind blowing a heavy gale from the northwest; Lake Michigan was very rough, the heavy sea causing great destruction of property along the shore; many vessels remained in harbor, and mariners consider the timely warning was the means of saving a large amount of property.

Milwaukee, Wisconsin: an unusually heavy gale occurred on the 4-5th, the wind reaching a velocity of forty-four miles per hour; the water-works pier was partially, and the breakwater entirely, destroyed; the damage was quite severe along the shore and for a considerable distance into the interior.

Port Huron, Michigan: a violent gale, accompanied with heavy snow, occurred on the 4th and 5th, the wind reaching a velocity of thirty-nine miles per hour at 5.20 a. m. of the 5th; considerable damage was done by the wind.

Mackinaw City, Michigan: a severe gale began at 12.15 a. m. of the 4th, continuing throughout the day; the warning of the cold wave included in the order to hoist cautionary signal was of great benefit to merchants, railroad agents, etc.; the Michigan Central railroad, by the timely warning, saved a car load of potatoes from freezing.

Erie, Pennsylvania: a heavy northwest gale occurred on the 6th, accompanied by heavy snow, the wind reaching a maximum velocity of forty-four miles per hour; considerable damage was done along the beach.

Smithville, North Carolina: a heavy southwest gale began at 11.30 p. m. of the 4th, and continued until the afternoon of the 5th, the wind reaching a velocity of forty-one miles per hour. Two wharves were washed away along the town front, and the schooner "Rebecca H. Queen" was driven ashore near New Inlet, North Carolina; the probability of saving vessel or cargo doubtful. The schooner "Paragon," from Charleston, South Carolina, bound to Washua, North Carolina, sank during this gale, sixty miles off Cape Fear, North Carolina. Many vessels heeded warning and remained in harbor.

Racine, Wisconsin: the storm of the 4th was the most severe that has been experienced in this vicinity for several years. Considerable damage was done to the piers and lake shore protections.

Cairo, Illinois: the high wind of the 4th, which accompanied the cold wave, was very destructive to navigation between here and Paducah, Kentucky; sev-

eral large produce boats were dashed to pieces. Sixteen miles north of this city a large produce boat, loaded with potatoes, was completely wrecked, and six of the crew drowned. The river men took timely warning from the afternoon bulletin, which pre-announced the cold wave and high wind, and all river craft were made doubly secure. The produce merchants took precaution to prevent the freezing of perishable goods, and suffered no loss. The cold-wave warning was a decided benefit, and highly appreciated by the entire community.

Sand Beach, Huron county, Michigan: the worst storm in twenty years occurred on the 5th, the whole protection wall of the harbor breakwater was washed away and a breach of five hundred feet formed in the main wall. Great damage was also done to the shipping interests.

Louisville, Kentucky: a severe gale commenced at 6.45 p. m. of the 4th and continued throughout the evening. Considerable damage was caused by the wind. Falling signs, shutters, etc., made travel on the streets dangerous, and several slight casualties are reported. On the river front much difficulty was experienced in holding vessels to their moorings.

Vermillion, Dakota: a very heavy wind prevailed on the 4th, doing considerable damage to buildings in this vicinity.

Farmingdale, Bledsoe county, Tennessee: at 11.30 p. m. of the 4th a furious wind storm, from the northwest, suddenly came on and, for five minutes, blew with great force, breaking down considerable timber in the forests.

Saint Louis, Missouri: a very high wind prevailed here on the 4th. Considerable damage was done in various parts of the city.

Kansas City, Jackson county, Missouri: one of the severest wind storms ever experienced at this place occurred on the 4th; considerable damage was done to movable property.

Carthage, Jasper county, Missouri: the highest wind known for years began on the 3d, and continued without intermission for thirty hours.

Wichita, Sedgwick county, Kansas: a heavy gale occurred on the 4th, doing considerable damage to buildings; vehicles were overturned in the streets, and chimneys blown down.

Concordia, Cloud county, Kansas: a destructive wind storm occurred on the 4th, unroofing buildings, blowing down chimneys, out-buildings, etc.

Leavenworth, Kansas: a heavy gale occurred on the 4th, doing considerable damage to property in the city.

Elk Falls, Elk county, Kansas: a severe gale on the 4th unroofed buildings, and caused serious damage.

Independence, Montgomery county, Kansas: a strong gale occurred on the 4th, which caused considerable damage to hay-stacks; several small houses were blown over.

Omaha, Nebraska: the severest wind storm in the history of this city occurred on the 4th; at least fifty houses were partially or wholly unroofed and miles of fencing prostrated; the damage is estimated at \$15,000 to \$20,000.

Stockham, Hamilton county, Nebraska: a heavy wind, causing serious damage to wind-mills, houses, and other property, occurred on the 4th.

Harvard, Clay county, Nebraska: a high wind on the 4th blew down wind-mills and other buildings.

Central City, Gilpin county, Colorado: from 7 to 9 p. m. of the 4th a violent wind prevailed, doing a great deal of damage.

IV.—When the low area, previously described, was moving over the Saint Lawrence Valley, a secondary storm-centre developed north of Lake Huron, causing the storm of the 4th to continue until after the 6th. The barometer, although unusually low, in this secondary area was still lower, being below 28.80 within the principal area, which was north of the Maritime Provinces on the 6th, while this depression moved across the upper Saint Lawrence valley and disappeared to the northeast, causing severe gales on the 7th and 8th, at the northeast Canadian stations and on the New England and middle Atlantic coasts.

V.—This storm probably developed on the north Pacific coast, or over the north plateau region, although it is not possible to trace it further to the west than northern Texas; it moved slowly eastward to the central Mississippi valley during the 8th, and the trough of low pressure extended northward to the Lake regions, while high areas covered the Atlantic and central Pacific coasts; the area of precipitation included all districts east of the Rocky Mountains. General rains fell in the east and south quadrants, followed by snow when the cold wave, which followed, passed over these districts; the direction of movement was almost directly north until the centre passed over Lake Huron, when it apparently changed to northeast, and disappeared during the 10th. This storm was severe in many localities, and attained its maximum energy while passing over the upper lake region on the 9th. The strongest wind occurred on Lake Michigan, in the southwest quadrants. The observer at Grand Haven, Michigan, reports as follows, relative to this storm: "A heavy southerly gale, having an average velocity of forty-eight miles per hour, occurred on the 9th;

very heavy seas swept the piers, doing great damage; the outer lighthouse was moved fifteen feet from its foundation, and turned half way around."

VI.—This storm had its origin in the Southwest, although there are indications that it may have originated further to the west, or in the south Pacific coast region. On the morning of the 12th an extended high area covered the region east of the Mississippi River, and a high area also covered the Pacific coast, while this low area was apparently forming in southern Texas, the pressure being .3 to .4 above the normal for the month. The high pressure already described in the east, extended westward over this region. The general distribution of pressure, the succeeding movements of the high and low areas, and the track of this low area, are very similar to the corresponding conditions attending the preceding storm, with the exception that this storm passed from southern Texas to the lower lake region over a course east of, and nearly parallel to the track of, the preceding storm. Rain or snow occurred in all districts during the passage of this area, and it was followed by a cold wave which caused freezing weather throughout the Southern States on the 14th and 15th. It was severe on the Atlantic coast, where signals announced the approach of this storm in ample time to prevent loss. The observer at New London, Connecticut, reports that the gale was unusually severe on the 13th, and that the harbor was full of shipping, none of which left during the display of the signal. This disturbance lost much of its energy while passing over the Saint Lawrence Valley, and the area became more extended, but the barometer remained low at stations northeast of New England on the 16th.

VII.—This storm was probably central on the north Pacific coast on the 16th, where general rains were reported from San Francisco, California, northward. The depression passed eastward rapidly, leaving the barometer high at the central Rocky Mountain stations, but it could not be definitely located until the 10 p. m. report of the 17th, when it was north of Manitoba. From this point the storm moved southeasterly, crossing over the northern portion of Lake Superior and the upper Saint Lawrence valley to the New England coast, where its course changed to the northward, and disappeared on the 21st. It was severe near the centre of disturbance after it reached the lower lake region. The pressure decreased near the centre as it approached the coast, but its maximum energy occurred some time before the barometer reached its minimum.

VIII.—The barometer was low on the Pacific coast, accompanied by general rains, previous to the appearance of this area in Manitoba on the 21st. The barometer was high at the southern stations, the centre of greatest pressure being in the east Gulf states, while it was low on the northern boundary of the United States from the Saint Lawrence Valley to Oregon. As this storm approached Lake Superior, light rains occurred in the adjoining districts on the 22d and 23d. It developed considerable energy before its course changed to the northeast on the 23d, after which it decreased in energy. The most southerly point of its course was reached when its centre was near Lake Huron.

IX.—This storm probably had its origin far to the south of the point marked as its centre on the 26th. Its course was almost directly north, while passing sufficiently near the coast to render it possible to approximately locate its centre at each of the tri-daily telegraphic reports. The high area over the eastern portion of the continent at the time this storm was moving northward, east of the coast, caused a very rapid increase in the gradient, and the gales resulting were unusually severe, as shown from reports of the observers on the coast. The advance of this storm-centre to the north apparently changed the course of the movement of the high area to the west, causing it to move southward and disappear by a gradual diminution of pressure, as previously described.

The following notes and reports of observers refer to conditions attending this storm.

Kitty Hawk, North Carolina: a northerly gale occurred on the 25th, con-

tinuing throughout the 26th, the wind reaching a maximum velocity of sixty-five miles per hour, and averaging 50.7 miles for the entire twenty-four hours.

Cape Henlopen, Delaware: a severe northeast gale, with heavy drifts of sand, occurred on the 26th; several casualties to shipping are reported.

Chincoteague, Virginia: a very heavy gale occurred on the 26th, the wind attaining a velocity of fifty-four miles per hour; many vessels remained in harbor during the signal display.

Block Island, Rhode Island: a violent northeast gale occurred on the 26th, continuing throughout the 27th, the wind reaching a maximum velocity of sixty miles per hour; several casualties to shipping are reported.

Boston, Massachusetts: the most severe gale that has been experienced for several years occurred on the 26th. Many wrecks are reported, and considerable damage was done along the coast.

Eastport, Maine, a heavy gale, attended with snow and sleet, began at 5.50 a. m. of the 26th and continued for thirty-two hours, the wind reaching a maximum velocity of forty-three miles per hour. Three steamers and thirty-one schooners remained in port; several wrecks are reported within a radius of twenty-five miles.

Portland, Maine: the gale of the 26th was very disastrous along the coast; several wrecks were reported.

The following is an extract from the Charleston (South Carolina) "News and Courier:—"

Captain J. H. I. Donahoo, of the schooner "J. B. Atkinson," from Mobile Alabama, bound for New York City, reports that on the 25th, when about thirty miles north of Cape Hatteras, he encountered a terrific gale from the north-northeast, which carried away a portion of the rigging; the heavy sea washed away part of the deck-load and stove in the cabin. Had it not been for bags of oakum and oil, which were towed astern and broke the force of the waves, the vessel would probably have been lost. Several of the crew were badly injured.

X.—This depression was first marked as central in the central Rocky Mountain region, although it apparently resulted in the barometric depression existing to the southward and was probably urged to the eastward by the high area then existing to the north and west, the course of the low area being to the northeast over the upper lake region during the 29th and 30th; when it passed to the Mississippi Valley it was elongated in a north and south direction, but the bounding isobars rapidly contracted while advancing towards the Lake region. The rainfall was general, but light, except near the centre. On the morning of the 31st a secondary depression developed in the middle Atlantic states, which moved rapidly along the coast to the northeast, increasing gradually in energy, and forming the principal feature of the storm, while the primary disturbance lost energy, and finally united with the secondary depression, which passed along the New England coast and disappeared over the Atlantic after the close of the month.

#### NORTH ATLANTIC STORMS DURING DECEMBER, 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 special 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 January 22, 1886.

The paths of ten areas of low pressure are shown on the chart for December, 1885. Of these, four, viz., numbers 4, 5, 8, and 10, are continuations of low areas which entered the Atlantic from the Gulf of Saint Lawrence, having previously passed over the United States and Canada; one, number 3, is a continuation of an area of low pressure which developed near the coast of Florida on the 1st, and which caused moderate to strong gales at stations on the south Atlantic coast before passing out to sea. One, number 9, was a storm which developed suddenly on the 19th, near N. 42°, W. 59°; it moved northeastward, and probably united, when northeast of Newfoundland, with number 10. The remaining low areas, numbers 1, 2, 6, and 7, apparently developed over the ocean

east of the fortieth meridian and between N. 45° and 55°. The general direction of movement of the storm-centres was north-easterly or east-northeasterly, except in the case of number 4, which, on reaching W. 25°, was forced to the southeast and south by the formation of an area of high pressure over the British Isles and over the ocean north of the fiftieth parallel.

The weather over the north Atlantic Ocean during December, 1885, was stormy and unsettled. During the first week the pressure was generally low; about the 7th an area of high pressure appears to have formed over mid-ocean, and this continued, with slight fluctuations, until the 13th, when it was replaced by areas of low pressure over the region east of 40° W. The pressure over mid-ocean remained comparatively low during the period from the 13th to about the 19th, while areas of high pressure appeared off the American and European coasts. From the last-mentioned date until the close of the month pressure was generally high over the region between the Banks and the European coasts, and low near the coasts of the United States.

The following are descriptions of the low areas charted:

1.—This area of low pressure appeared between W. 30° and 25°, and near N. 50°, on the 1st. On that date the s. s. "Aurania," W. H. P. Hains, commanding, in N. 50° 03', W. 25° 30', at noon (Greenwich time), reported barometer 29.76 (755.9), wind ssw., force 7, and on the same day, about five hours later, in N. 49° 46', W. 27° 20', the barometer had fallen to 29.46 (748.3), and the wind had increased to a whole gale from ssw., shifting suddenly to w. Captain Hains also reported: "The gale had been blowing steadily from ssw. for half an hour before the shift; lightning flashed out from wnw., with thunder and torrents of rain; the gale moderated towards midnight." Vessels to the westward of the "Aurania," as far as W. 40°, had pressure ranging from 29.6 (751.8) to 29.9 (759.4), with moderate gales or strong breezes from n. and nw. This area moved northeastward, and on the 2d it was apparently central off the northwestern coast of the British Isles, with pressure at the centre less than 29.6 (751.8).

2.—This area of low pressure first became well-defined on the 3d, when the centre was near N. 51°, W. 22°, but it had apparently existed as a depression on the preceding day farther to the westward, and at a lower latitude, as indicated by the following reports: The s. s. "Coventry," W. C. Bacon, commanding, in N. 44° 30', W. 43° 58', on the 2d, had barometer 29.98 (761.5), being a fall of about .4 inch since the observation of the 1st, wind ne., force 7, shifting to a heavy gale from se. at midnight, and continuing until 9 a. m. of the 3d. The bark "Livingstone," in N. 45° 0', W. 37° 30', on the 2d, reported heavy gales, from sw. to n., in which she lost and split sails, and sustained other damage. On the 3d the storm-centre was near N. 51°, W. 22°, with the barometer below 29.0 (736.6), and attended by gales of force 8 to 10 in all quadrants. On the 2d, Captain A. McRitchie, commanding the s. s. "Australia," in N. 49° 10', W. 29° 59', at noon (Greenwich time), reported: "Moderate breeze and cloudy, wind variable; 2 p. m., wind increasing from sse., with rain; 6 p. m., moderate to fresh breeze, with heavy rain-squalls, sea very much confused; 10 p. m., strong breeze, from e. by s., with very heavy rain; 11.30 p. m., wind hauling to sw., with continuous heavy rain; midnight, fresh gale; at 8 a. m. on the 3d, hard gale, with very high sea; 9.40 a. m., moderate gale, rain; 10 a. m., wind veering to nw. and blowing with hurricane force, sea high, ship laboring heavily, and shipping heavy seas; noon, 13th, in N. 49° 17', W. 24° 20', barometer 29.13 (739.9), wind nw., force 10." The s. s. "Lessing," B. Voss, commanding, in N. 49° 6', W. 25° 30', at noon (Greenwich time), on the 3d, had barometer 29.68 (753.9), wind nw., force 9. During the afternoon of the 2d the wind shifted from s. to nw., through e., the barometer falling, between midnight of the 2-3d and 4 a. m. of the 3d, from 29.23 (742.4) to 29.14 (740.1), accompanied by heavy nw. gale, with rain; at 6 a. m. on the 3d the barometer began to rise. Captain W. Fitt, commanding the s. s. "Brooklyn City," furnishes the following report (the barometer, aneroid, is corrected):

December 3.		Wind.		Barometer (aneroid).		Lat. N.	Long. W.
		Direction.	force.				
H. M.	(Greenwich mean time.)			Inches.	Mill.	° /	° /
00	00 a. m.	e.	8	29.71	754.6	50 48	24 45
2	00 a. m.	ese.	10	29.01	736.8	50 48	24 20
5	30 a. m.	s.	9	28.91	734.3	50 50	23 38
9	30 a. m.	sw.	8	29.91	734.3	50 50	22 46
11	00 a. m.	nsw.	10	29.01	736.8	50 50	22 35
0	30 p. m.	nsw.	10	29.11	739.4	50 50	22 33
3	00 p. m.	nsw.	8	29.31	744.5	50 00	22 30
5	30 p. m.	nw.	8	29.41	747.0	50 48	22 00
12	00 p. m.	wnw.	8	29.71	754.6	50 48	20 45

Captain Fitt remarks as follows: "At about 10 a. m. the wind lulled for half an hour; the sea was very much confused, and leaped as high as the funnel, one sea breaking on board and smashing a life-boat to pieces. Shortly after, the wind came from nw. and increased to hurricane force; the air was a mass of spray and foam, and we could scarcely see the length of the ship." The s. s. "Denmark," Geo. Cochrane, commanding, in N. 49° 44', W. 21° 08', had barometer 28.99 (736.3), at noon on the 3d, wind veering from s. to sw., w., and nw., and blowing with the force of a whole gale. The steamers "City of Richmond," "Australia," (Ger.) "Neckar," and "Rhaetia," between N. 49° 50' and N. 51° 23', and from W. 11° 30' to W. 20° 10', reported barometer ranging from 29.12 (739.6) to 29.45 (748.0), and all encountered gales of force 9 from s. to sw., w., and nw. Captain Pearce, commanding the bark "Exile," in N. 48° 45', W. 22° 20', at noon (Greenwich time) on the 3d, reported: "1 a. m., strong sw. by w. wind, barometer 29.62 (752.3); 4 a. m., heavy gale, barometer 29.42 (747.3); 8 a. m., terrific gale, with very high sea, barometer 29.22 (742.2), wind hauling to westerly; 10 a. m., wind flew into nw., blowing a hard gale, barometer rising; noon, hard gale, but moderating, barometer 29.32 (744.7)." During the 3d this low area moved northeastward, and on the 4th it was apparently central over the northern part of the British Isles, where the pressure was less than 29.15 (740.4), and moderate to strong sw. and w. gales were prevailing in those islands and over the adjacent seas.

3.—This is a continuation of the low area referred to as number i under "Areas of low pressure" in this REVIEW. On the 2d the storm-centre was between Bermuda and the coast of the Carolinas, causing strong n. and nw. gales along the Atlantic coast, and equally strong e. and ne. gales from the Banks of Newfoundland to the New England coast. On the 3d the storm-centre was shown near N. 43°, W. 56°, where the pressure was less than 29.0 (736.6), and strong gales prevailed in all quadrants of the depression, extending over the ocean eastward to the forty-fifth meridian, and westward and southward to the coast of the United States. At midnight of the 2d the s. s. "Wells City," T. L. Weiss, commanding, had a strong gale from se., shifting to s. and w. during the 3d; the lowest barometer was 29.19 (741.4), at midnight of the 2d, in N. 42° 6', W. 62° 57'. The s. s. "York City," E. W. Benn, commanding, in about N. 43°, W. 58°, at midnight of the 2d, had a heavy se. gale, which continued until 4 a. m. of the 3d, when the wind shifted to sw., and at 5 a. m. to wnw., blowing a heavy gale. On the 3d the s. s. "Assyrian Monarch," John Harrison, commanding, reported, at 4.15 a. m. (Greenwich time), wind freshening from se., barometer falling rapidly; noon, in N. 45° 20', W. 53° 15', barometer 29.10 (739.1), wind se., force 7; 3.30 p. m., wind shifted to sw.; 6 p. m., barometer was at its lowest reading, 28.92 (734.6), wind w., and blowing with hurricane force; 7.30 p. m., wind hauling to wnw., and moderating, barometer rising rapidly. The s. s. "Celtic," B. Gleadell, commanding, in N. 45° 45', W. 51° 42', at 2.30 p. m. on the 3d, had barometer down to 28.92 (734.6), strong gale from se., veering to wnw. The s. s. "Rosse," Jas. Dixon, commanding, in N. 42° 55', W. 55° 34', had a hard gale from ese. to s., w., and nw.; the lowest barometer was 29.01 (736.8), at 9.45 p. m. (Greenwich time) on the 3d. Strong gales from se., veering to s. and sw., were reported by vessels to the eastward as far

as the forty-fifth meridian, the barometer ranging from 29.2 (741.7) to 29.6 (751.8).

During the 3d the storm-centre moved rapidly northeastward, and by the 4th it was near N. 50° and between W. 35° and 40°. On that date the s. s. "State of Pennsylvania," A. Mann, commanding, reported barometer 28.92 (734.6), at 4 a. m., in N. 50° 20', W. 39° 40', wind se., backing to e., ne., n., and nw., and blowing with the force of a strong gale. At 4 a. m. of the 4th the s. s. "Nevada," J. Douglass, commanding, had barometer down to 29.12 (739.6), in N. 48° 33', W. 40° 02', with a strong gale from se., shifting to ssw. and wsw. Strong w. gales, shifting to s. on the approach of low area 4, prevailed over the ocean west of the fortieth meridian, and the slight increase of pressure which had occurred after the passage of number 3 was checked. At the same time a moderately steep barometric gradient existed to the eastward of 40° W., so that strong s. winds to gales occurred between W. 40° and 20°. On the 5th this low area was off the Irish coast, the centre being near N. 50°, W. 14°, where the barometer read 29.0 (736.6), and unsettled weather and strong s. gales prevailed over the British Isles and the Channel. The s. s. "Brooklyn City," W. Fitt, commanding, in N. 51° 10', W. 12° 50', at noon (Greenwich time) on the 5th, had barometer 29.01 (736.8), wind se., force 7. The s. s. "Republic," P. J. Irving, commanding, in N. 51° 29', W. 14° 14', barometer 29.11 (739.4), wind ese., force 7. The s. s. "Lake Superior," Wm. Stewart, commanding, in N. 51° 30', W. 12° 0', reported barometer 29.08 (738.6), whole gale from e., veering to s. and sw., and then backing again to s., e., and ne. During the 5th this low area apparently passed eastward over the British Isles.

4.—This was a continuation of the low area described as number ii under "Areas of low pressure" in this REVIEW. On the morning of the 4th it was over the Gulf of Saint Lawrence with the barometer less than 29.0 (736.6) at the centre of disturbance. During the day it moved rapidly east-northeastward, attended by strong gales from s. to sw. and w. over the Banks and the ocean southward to the fortieth parallel. On the 5th the region of least pressure was shown near N. 50°, W. 35°, where the barometer was down to 28.6 (726.4) The s. s. "Circassia," A. Campbell, commanding, at noon of the 5th, in N. 50° 50', W. 37° 31', had barometer 28.69 (728.7), wind nne., force 9. The s. s. "Rhyland," J. C. Jamison, commanding, reported barometer 28.45 (722.6), at 1 p. m. on the 5th, in N. 49° 57', W. 33° 10', hurricane from se. and s., shifting to nw. and n. During this date all vessels between W. 40° and 27°, and N. 48° and 51°, reported pressure ranging from 28.7 (729.0) to 29.0 (736.6); no readings exceeding the latter value.

On the 6th the storm-centre was near N. 50°, W. 25°, the pressure having increased about .4 inch, the lowest barometric reading reported being 28.85 (731.5). During this and the preceding day, strong gales from s. to nw. prevailed over the Atlantic from the American to the European coasts. During the 6th this low area was apparently forced to the southward. By the 7th the winds over the region between N. 50° and 52° and W. 10° and 20° had shifted to e. and ne., and blew with the force of a strong gale, while the pressure began to increase over the ocean north of 50° N. and over the British Isles. On the 8th the area of high pressures was well defined and of great extent, covering the ocean from the British Isles westward to the fortieth meridian and from N. 55° to 45°. At the same time the area of low pressure was apparently moving southward between the Azores and the coast of the Iberian Peninsula, and on the 8th and 9th the pressure was apparently lowest in the vicinity of Madeira.

5.—This was probably a continuation of the area of low pressure described as number iv under "Areas of low pressure" in this REVIEW. At midnight of the 7th the storm-centre was in Newfoundland, and by the following morning it had passed northeastward to about N. 50°, W. 47°, the lowest reported barometer on the 8th being 29.65 (753.1). During its passage over the Gulf this low area caused very strong gales over the ocean south of Nova Scotia and on the Banks

of Newfoundland. By the 9th it had reached N. 52°, W. 35°, the pressure having increased to 29.85 (758.2), and during the day it probably filled in; on the following day an area of high pressures occupied the ocean, extending apparently from the Banks of Newfoundland eastward to the European coasts.

6.—This low area appeared on the 12th between N. 50° and 55° and W. 30° and 40°. At midnight of the 11th the s. s. "State of Nebraska," A. G. Braes, commanding, had barometer 29.4 (746.7), wind sw., strong gale, in N. 50° 18', W. 40° 0', and at noon of the 12th the s. s. "Ethiopia," J. Wilson, commanding, reported barometer 29.37 (746.0), in N. 52° 51', W. 30° 03', wind sw., force 7. This depression moved northeastward with gradually decreasing pressure, and passed beyond the range of the observations during the 13th; on that date moderate sw. and w. gales prevailed over the region from the British Isles westward to the twentieth meridian, and from N. 50° northward to N. 55°.

7.—This low area appeared near N. 49°, W. 35°, on the 13th; during the 12th the s. s. "France," A. D. Hadley, commanding, in N. 45° 50', W. 35° 51', had barometer 30.0 (762.0), falling steadily, with strong ssw. breeze. On the 13th the s. s. "Baltic," G. Burton, commanding, in N. 48° 51', W. 37° 37', had barometer 29.56 (750.8), wind w. by s., force 4, having shifted from sw.; on the same date the s. s. "Persian Monarch," J. Watson, commanding, in N. 49° 58', W. 33° 18', had barometer 29.57 (751.1), wind ne., force 5, and the s. s. "France," in N. 46° 39', W. 30° 22', barometer 29.64 (752.8), wind s. by w., force 8. The reports for the 14th and 15th showed the existence of a large, apparently elongated, area of low pressure over the ocean between W. 35° and 18°, and stretching from about N. 40° northeastward to N. 55°; within this area the pressure ranged from 29.3 (744.2) to 29.7 (754.4), and moderate to fresh gales from se., e., and n. were reported. By the 15th the low area had apparently extended to the Azores, while high pressures occupied the Bay of Biscay and southwestern Europe.

8.—This was a continuation of the storm described as number vi under "Areas of low pressure" in this REVIEW. On the morning of the 15th the centre was over the Gulf of Saint Lawrence, with pressure about 29.3 (744.2), and attended by moderate to strong gales from s. to sw. and w. over the Banks and southward to 40° N. On the 16th the centre of the low area was near N. 53°, W. 40°, where the pressure was 29.35 (745.5), the barometric readings increasing to 29.65 (753.1) near the forty-sixth parallel. To the eastward of the storm-centre the winds were from s. to sw., blowing with the force of a moderate gale, and to the southward and westward they were from nw. and w., force 5 to 7. On the 17th the lowest readings were shown near N. 52° and between W. 30° and 35°, where they ranged from 29.53 (750.0) to 29.7 (754.4), while the wind did not, generally, exceed the force of a strong breeze. On the 18th the storm-centre, attended by moderate to strong breezes only, was shown near N. 52°, W. 25°, the lowest reported pressures being 29.4 (746.7) and 29.43 (747.5), with strong s. and se. winds to the eastward and northward of the above-mentioned position. This low area continued its easterly movement during the 19th, and by the following day it had apparently entered Ireland as a slight depression, with lowest barometer about 29.7 (754.4).

9.—This area appears to have developed over the ocean to the southeast of Nova Scotia, during the 19th, when the storm described as number vii under "Areas of low pressure" in this REVIEW, was moving northeastward over New England and the Canadian Maritime Provinces. On the 18th an area of high pressure occupied the Gulf of Saint Lawrence, Newfoundland, and the Banks, and apparently extended southward beyond the fortieth parallel. On the 19th the s. s. "Hugo," A. de Mugica, commanding, in N. 41° 52', W. 58° 48', at noon (Greenwich time), reported barometer 29.68 (753.9), being a fall of about .55 inch since the observation of the 18th, wind sse., force 7, cloudy and rainy; at 1.30 p. m. the wind was sw., and at 4 p. m. it was blowing a fresh gale from

wnw., barometer reading 29.59 (751.6); at 5 p. m., wind nnw., strong breeze, and at 11 p. m. the wind again shifted to sse., in a fresh breeze. The s. s. "Assyrian Monarch," John Harrison, commanding, in N. 41° 39', W. 59° 45', at noon (Greenwich time) on the 19th, had barometer 29.72 (754.9), being a fall of about .58 inch, wind nnw., force 8. The s. s. "Persian Monarch," J. Watson, commanding, passed in close proximity to the storm-centre on the 19th; that vessel, in N. 44° 21', W. 55° 01', at 7.10 p. m. (Greenwich time), had barometer down to 29.46 (748.7), the wind blowing a whole gale from se., and increasing to hurricane force. The wind shifted to sw. with heavy rain, then to w., falling calm, and then coming out from n. and nne. During the 20th the disturbance apparently passed northeastward, and probably united with the low area traced as number 10, which, on the 21st, was moving over Newfoundland. At noon of the 20th the s. s. "Roman," D. Williams, commanding, in N. 45° 57', W. 48° 50', had barometer 29.88 (758.9), wind sw. by w., force 4.

10.—This was a continuation of the low area described as number vii under "Areas of low pressure" in this REVIEW. During the 19th and 20th it passed northeastward over the Maritime Provinces and the Gulf of Saint Lawrence as a severe storm, with pressure at the centre about 29.2 (741.7), and attended by moderate to strong gales from sw. to nw. at sea and along the coast of the United States. On the 21st it was apparently central over Newfoundland, whence it passed northeastward, causing moderate to strong gales from s. to sw. over the ocean near the fiftieth parallel, with barometer ranging from 29.5 (749.3) to 29.7 (754.4). On the 22d the reports indicated the presence of a depression to the southeastward of Nova Scotia, and strong gales from s. to nw. were reported, but at the present writing the reports are insufficient to determine its course.

During the passage of the low area described as number ix under "Areas of low pressure" in this REVIEW, very strong gales prevailed over the western part of the ocean from the 25th to the 30th, the n. and nw. gales over the ocean between the coast of the United States and Bermuda being especially severe, and extending as far south as the West Indies.

#### OCEAN ICE.

The positions of the icebergs reported during December, 1885, are shown on chart i by shaded spots. They were observed by the following vessels:

December 18th.—S. S. "Devonia," in N. 47° 25', W. 46° 0', passed a large iceberg.

19th.—S. S. "Lake Huron," in N. 47° 15', W. 45° 40', passed a large iceberg.

24th.—S. S. "Circassia," in N. 47° 45', W. 45° 33', passed an iceberg.

30th.—S. S. "Carthagean" observed two icebergs off the entrance to Saint John's Harbor, Newfoundland. The s. s. "Portia" also passed several icebergs on the Newfoundland coast.

For December of the three preceding years no icebergs have been reported by observers of this office.

#### 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 December, 1885, twelve 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 December, 1885, is exhibited on chart ii by the dotted isothermal lines; and in the tables of miscella-