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INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States and Canada during February, 1886, 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.

A series of remarkably low barometric readings were reported over the ocean west of the fortieth meridian from the 24th to the 28th, inclusive; pressures below 29.0 continued throughout this period.

The average number of areas of low pressure during February in the last twelve years is 11.8, or 2.8 greater than the number traced on chart i for February, 1886.

The temperature has been below the normal by from 1° to 7° in the districts east of the one-hundredth meridian, except in the Canadian Maritime Provinces, where it was slightly above the normal; to the westward of the meridian mentioned the month has been warmer than the average, the departures above the normal temperature being most marked in the northern slope, where they ranged from 10° to 16°.

The minimum temperatures recorded from the 3d to 5th, during the passage of high area number i, were, generally, the lowest observed in February since the establishment of Signal Service stations; this was especially the case in the Ohio Valley, Tennessee, and in the Atlantic and Gulf States.

A decided excess over the average precipitation is shown in New England and the middle Atlantic states, while marked deficiencies occurred on the Pacific coast, in the Gulf States, and central valleys.

The excessive rains in southeastern New England from the 10th to 14th, during the prevalence of low area ii, may be considered one of the most important features of the month. These heavy rains resulted in freshets which caused the destruction of much property in Massachusetts, Rhode Island, and Connecticut.

An additional chart, number v, is issued with this REVIEW; it shows the oscillations of atmospheric pressure and temperature during the month, as charted from the tri-daily telegraphic observations, for the following stations: Eastport, Maine; New Orleans, Louisiana; Portland, Oregon; and Saint Paul, Minnesota.

In the preparation of this REVIEW the following data, received up to March 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 twenty-one Canadian stations, as telegraphed to this office; one hundred and fifty-eight monthly journals and one hundred and sixty-five monthly means from the former, and twenty-one monthly means from the latter; three hundred and eleven monthly registers from voluntary observers; fifty-nine 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, Illinois, Indiana, 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 February, 1886, determined from the tri-daily telegraphic observations of the Signal Service, is shown by isobarometric lines on chart ii.

The mean pressure is greatest over the middle slope and middle plateau; it is least over the Canadian Maritime Provinces. The isobar for 30.25 incloses the area of barometric maxima, and that for 29.9 indicates the region of least pressure. The barometric means have generally exceeded 30.1 in all parts of the country, except over the northern districts eastward of the upper Mississippi valley, in southern Arizona, and along the Gulf and Pacific coasts. The highest and lowest barometric means, 30.27 and 29.89, are reported from Salt Lake City, Utah, and Sydney, Nova Scotia, respectively.

As compared with the mean pressure for the preceding month, a decrease is shown over the southern portions of Arizona and California; also in northern Texas, Indian Territory, Kansas, Nebraska, and over the northern districts from western Montana eastward to the New England coast. The decrease is most marked in the extreme northwest and Canadian Maritime Provinces, where it amounts to .15. To the southward of the Lake region and upper Mississippi valley, and over an area extending from the west Gulf states to the north Pacific coast, the barometric means are higher than for January, the increase being greatest on the north Pacific coast, where it ranges from .10 to .15.

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 shown by lines connecting stations of equal departure. Along the Atlantic coast, and over the northern districts from the lower lake region westward to Washington Territory, the mean pressure is below the normal; it is also below the normal in the lower Missouri valley, California, and southern Oregon; the departures in the districts named are generally less than .05, except in New England where they range from .05 to .09. In the Ohio Valley, west Gulf states, Rio Grande Valley, north Pacific coast region, and in the northern and central Rocky Mountain districts, the mean pressure for February, 1886, is above the normal, the departures nowhere exceeding .06.

BAROMETRIC RANGES.

The following are some of the extreme monthly ranges:

Greatest.		Least.	
Inches.		Inches.	
Eastport, Maine.....	2.32	San Diego, California.....	0.43
Portland, Maine.....	2.07	Key West, Florida.....	0.50
Mount Washington, New Hampshire.....	1.91	Los Angeles, California.....	0.51
Boston, Massachusetts.....	1.76	Fort Grant, Arizona.....	0.53
Mackinaw City, Michigan.....	1.54	San Louis Obispo, California.....	0.55
Escanaba, Michigan.....	1.49	Fort Thomas, Arizona.....	0.58
New London, Connecticut.....	1.48	Fort Apache, Arizona.....	0.60
Block Island, Rhode Island.....	1.47	San Francisco, California.....	0.63

The monthly barometric ranges at the various Signal Ser-

vice stations are also shown in the tables of miscellaneous meteorological data; they were greatest in New England, where they were unusually large, Eastport, Maine, reporting 2.32, and Portland, Maine, 2.07. The smallest ranges, as usual, are shown over the southern districts, San Diego, California, reporting the least, 0.43. Except at Tatoosh Island, Washington Territory, where a range of 1.04 occurred, the monthly ranges do not exceed 1.00 to the west of the one-hundredth meridian.

AREAS OF HIGH PRESSURE.

Seven areas of high pressure were observed within, or near, the limits of the stations of observation during the month of February. These areas generally appeared first on the Pacific coast, but the maximum pressures were, as usual, observed near the centre of the continent. There was an exception to this, however, in the case of high area number ii, which was attended by the highest barometric readings observed during the month, as it passed to the northeast of New England from northern Canada. The high areas that passed within the limits of the stations of observation were attended by cold waves, and as they approached the Atlantic the pressure decreased. Two of these areas disappeared off the south Atlantic coast; two passed eastward to New England from the north Pacific coast, leaving the pressure above the normal over the plateau and Rocky Mountain regions. The direction of movement was easterly in the regions west of the Rocky Mountains, probably inclining slightly to the north of east; it was to the southeast east of the Rocky Mountains, except in two cases, when the high areas were apparently forced to the north of east as they approached the Atlantic coast.

I.—The morning report of the 1st indicated the approach of a cold wave from the region north of Dakota, the temperature in that section being 20° below zero within the limits of this area of high pressure. The barometer had risen over the central valleys, while areas of low pressure extended over the Saint Lawrence and lower Colorado valleys. The temperature was also 20° below zero at stations north of the lower lake region on the morning of the 1st. During the 1st and 2d the pressure increased in the Northwest and the low area central over the southern plateau region moved eastward, forming a well-defined cyclonic disturbance in the lower Mississippi valley. This distribution of pressure resulted in a rapid increase of the barometric gradient over the central valleys and on the eastern Rocky Mountain slope. The barometer continued to rise at the northern stations, and by midnight of the 2d it had risen to 30.85 in Manitoba. The maximum pressure due to this area, 30.92, was observed at Fort Garry, Manitoba, on the morning of the 3d, but the attending cold wave had extended southward to the west Gulf coast and over all districts east of the Mississippi, except the south Atlantic states. Heavy snows occurred in the northern quadrant of the storm which passed over the Southern States, immediately to the south of this high area, and as the temperature fell to the eastward the snows extended along the Atlantic coast during the 3d and 4th. The movement was to the southeast during the 4th, although the centre of greatest pressure remained near Lake Superior. The barometer rose in the central Rocky Mountain region, forming a secondary high area, after which the centre of the principal high area moved southward to the Mississippi Valley. At the 10 p. m. report of the 4th the pressure exceeded 30.60 at Cairo, Illinois, and at stations in that vicinity, and generally clear, cold weather prevailed in all districts. The temperature was below freezing along the east Gulf coast, and below zero from New England westward to Iowa. During the 5th the barometer rose on the Atlantic coast, but it did not reach the height observed in the western districts. This area disappeared on the 6th, moving slowly to the east of the coast line. The secondary area of high pressure which formed over Colorado became well defined on the 6th, being enclosed by the isobars of 30.60, 30.50, and 30.40. It remained almost stationary until the 7th, when it slowly disappeared by a gradual decrease of pressure.

II.—This area appeared in the extreme northeast, although it probably extended westward to Manitoba on the 9th. A storm of slight energy was moving southward over the Missouri Valley, apparently following the general direction of the course of this high area. The pressure increased rapidly at the extreme northeast stations, the rise ranging from 0.7 to 1.0 in sixteen hours. During this rapid increase of pressure the storm, which had previously moved southward over the Missouri Valley, changed its course during the succeeding twenty-four hours and moved almost directly north, and disappeared by loss of energy and gradual increase of pressure, leaving, however, a secondary storm-centre in the barometric trough which extended southward to the Gulf coast. This high area was at no time wholly within the limits of the field of observation, but it moved slowly southeastward during the 10th, 11th, and 12th, the barometer reaching its maximum, 31.01, at Anticosti, Province of Quebec, on the 11th, while it exceeded 30.90 in northern New England; on the 12th the direction of wind at the Canadian stations indicated that the centre had passed to the east of Nova Scotia, and by the 13th it had passed over the Atlantic.

III.—This was a slight area of high pressure which approached from the Pacific coast and extended over the central plateau region on the 10th. It moved slowly eastward during the 11th and 12th, and disappeared by a gradual fall of the barometer in the Rocky Mountain regions, unattended by marked change in the weather or temperature.

IV.—This area of high pressure was also first observed on the Pacific coast; it apparently followed the coast line, moving slowly northward during the 12th, 13th, and 14th, when it was re-enforced from the northeast by the resulting area of high pressure extending from Manitoba to California; the eastern portion moved rapidly southward, following the course of the Missouri Valley, and thence eastward over the Ohio Valley, while the western portion moved to the north Pacific coast, where it remained almost stationary from the 15th to the 18th.

V.—On the 19th this area of high pressure appeared to the north of Montana and united with that on the Pacific coast, and moved rapidly southward over the east slope of the Rocky Mountains. The barometer fell during the southeast movement; it was central in southern Missouri on the morning of the 20th, but after that date it could not be defined by the bounding isobars, but it was felt as a slight cold wave while passing over the Gulf States; the morning chart of the 21st exhibited the last trace of this area of high pressure on the south Atlantic coast.

VI.—This area appeared on the north Pacific coast on the 20th immediately to the west of the storm-centre, and it passed to the southeastward over Colorado during the following day, following the storm previously referred to, which had reached the upper lake region. Both the low and high areas moved to the southeast during the 22d; the area of high pressure became much larger and a portion passed over the Southern States, while the greater part remained over the Maritime districts. The area of low pressure referred to disappeared before reaching the Atlantic coast, and a second storm appeared in the Northwest, which passed rapidly eastward, north of the Lake regions. The area of high pressure, which had remained almost stationary in the mountain regions several days, followed this northern storm-centre, and it presented the only case observed during the month of an area of high pressure moving to the north of east from the interior of the continent to the Atlantic coast; it was also the only high area within which the pressure increased during the transit east of the Mississippi. It passed over northern New England during the 25th, and was east of Nova Scotia on the night of the 25th.

VII.—This area of high pressure was first observed on the north Pacific coast on the 24th, but it was at no time wholly within the limits of the United States; it passed eastward, north of the stations of observation, increasing in energy, and was apparently central north of Dakota on the 25th. During the two succeeding days it passed over Minnesota and to the

Lake regions, where it remained until the close of the month. The pressure increased at the centre, and during the 28th there was an apparent movement to the west. It was attended by a severe cold wave, and the area extended from the Saint Lawrence Valley to the Rocky Mountains. The eastern movement was apparently retarded by the severe storm immediately to the east of New England; the barometric gradient to the west from Nova Scotia was unusually great, the difference of pressure being 1.86 between the low and high areas, which were not distant from each other.

AREAS OF LOW PRESSURE.

Nine areas of low pressure were traced on the tri-daily weather charts during February; six were first observed in the regions north of Montana and Dakota; one appeared first in the central Rocky Mountain regions, and two advanced northeastward from the lower Rio Grande valley. Referring to the course or direction of movement, six passed to the east of the Atlantic coast, five of which reached the coast north of the latitude of Boston, Massachusetts. Low areas originating to the northwest of Dakota, generally moved southeastward when to the west of the Mississippi River, and all moved to the north of east as they approached the Atlantic coast.

The following table gives the latitude and longitude in which each area of low pressure was first and last observed, with the average hourly velocity of each.

Low areas.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
No. I *	28 00	99 00	37 00	72 00	33.0
II.....	45 00	97 00	44 00	92 00	16.0
II a.....	35 00	93 00	40 00	91 00	43.0
II b.....	30 00	91 00	50 00	63 00	22.0
II c.....	34 00	80 00	45 00	79 00	40.0
III.....	58 00	111 00	46 00	93 00	20.0
III a.....	44 00	97 00	43 00	80 00	25.0
IV.....	30 00	98 00	52 00	62 00	54.0
V.....	52 00	105 00	48 00	64 00	30.0
VI.....	53 00	104 00	43 00	76 00	33.0
VII.....	54 00	109 00	50 00	61 00	48.0
VIII.....	52 00	110 00	47 00	59 00	28.0
IX.....	39 00	104 00	33 00	95 00	22.0

* This storm probably developed to the west of the longitude given and continued its north-east movement along the Atlantic coast.

I.—The morning weather chart of the 1st exhibited two areas of low pressure, one passing eastward over New England and a second central on the Pacific coast south of California, and between these areas was a well-marked area of high pressure extended over the Northwest, attended by a decided cold wave. The track of the centre of number i is extended to the westward of the point where its centre was first located, as an indication that it probably originated on the south Pacific coast. On the morning of the 2d this storm was central in the extreme southern portion of Texas; it developed quickly and became a well-defined cyclonic area, which passed almost directly east, over the Gulf States, to the south Atlantic coast during the 2d and 3d, attended by very heavy snows in the northern quadrant south of the Ohio Valley. The barometer remained almost stationary at the centre, and slightly above 29.70, while this disturbance remained over the land, but the area of high pressure immediately to the north moved towards the storm, thus causing a rapid gradient in the northern quadrant of the low area and a severe "norther" to the west of the storm-centre. This storm passed to the east of the south Atlantic coast on the 3d, but its course changed to the northeast when the centre reached the vicinity of the Gulf Stream. Its movement to the northeast can be readily traced from the coast reports to the northeast of Hatteras, North Carolina, and it was probably near, and to the east of, Sydney, Nova Scotia, on the 5th.

II.—Previous to the appearance of this storm in the Northwest a slight depression moved southeastward to the Lake region, causing light snows at the more northern stations, but quickly disappeared, by increase of pressure, before reaching

the coast; this was followed by an extended depression in the Northwest and north of the Lake region, the lowest isobar (29.60) forming a loop to the southwest, within which this storm developed during the 8th. It moved directly south until the afternoon report of the 9th, with increasing energy and decreasing pressure; the afternoon report of the 9th showed a well-marked storm-centre in eastern Kansas bounded by an isobar of 29.50; at this report the isobars encircling the storm were almost circular, and those of 29.50, 29.60, and 29.70 bounded the storm, while the pressure had increased rapidly to the northward, causing a rapid gradient which resulted in high winds and gales on the east slope of the Rocky Mountains during the 9th. These high winds extended eastward over Dakota and Minnesota, but to the south of the storm-centre, and dangerous southerly winds occurred on the same date in southern Texas. The unusual track of this storm, and its secondary low areas, is given on chart i as number ii. It will be seen that after reaching eastern Kansas the direction of movement changed from south to north and the centre approached the vicinity of Saint Paul, Minnesota, where it disappeared, but an extended barometric trough was formed, covering the Mississippi Valley and the Gulf coast. During the northerly movement of this storm the pressure increased slowly at the centre, thus indicating that it was losing energy. A secondary low area formed over Arkansas on the afternoon of the 10th, and there are indications that a third depression existed still further to the southward over the west Gulf states. The barometric trough containing these secondary depressions moved slowly eastward, and at 10 p. m. of the 10th it extended from Lake Superior to the Gulf coast, with a slight depression in the vicinity of Saint Louis, Missouri. The secondary depression disappeared as it moved to the north, and a third low area formed over the lower Mississippi valley on the 11th, which, after reaching the east Gulf states, moved directly north to the Lake region. During the northerly movement of this area the well-marked high areas extending over the northeast and the mountain districts in the West became less clearly defined. After reaching the southern part of Lake Michigan the depression remained almost stationary until the fourth low area, which had formed over the south Atlantic states on the 12th, passed along the middle Atlantic coast and thence to the upper Saint Lawrence valley, where the two storm-centres united on the morning of the 13th. After these centres united the storm moved directly to the northeast; the barometer fell rapidly as the centre passed over the Maritime Provinces during the 13th, reaching the minimum (29.15) at Father Point, Province of Quebec, at 10 p. m. This storm was most severe after passing to the northeast of New England.

III.—This was first observed north of Montana on the 11th, and moved southeasterly until the 11 p. m. report of the 12th, when it was last observed immediately north of Minnesota, but at the same report a secondary low area formed in the Missouri Valley, and moved east over the Lake region as an extended but feeble depression without sufficient energy to carry it to the coast; it therefore disappeared, as indicated on chart i, within the limits of the stations of observation.

IV.—This storm developed in southern Texas on the 14th, when the barometer was from .2 to .5 above the normal over the regions west of the Mississippi and generally below the normal in the eastern districts. It moved with great rapidity (the average hourly velocity being over fifty miles) directly to the east, becoming more severe as it advanced, until it reached the stations in the extreme northeast, where the most severe gales occurred. Dangerous winds also occurred at stations on the coast of the United States north of Hatteras, North Carolina, but they were usually off-shore, and to the west of the storm-centre. The precipitation attending this storm at stations within the limits of the United States was very slight, and was generally in the form of light snow at stations to the north and west of the storm-centre. The barometer was low to the northeast of this storm when it developed, and was

decidedly above the normal at the Rocky Mountain stations. The advance of the high area to the southeast probably caused the rapid movement of this storm to the northeast.

V.—Was first observed north of Montana on the 17th; it moved to the southeast during the 18th, over the upper lake region, followed by a cold wave and severe gales at the northern stations. The pressure decreased as the storm moved eastward, and the lowest reading, 28.90, was observed at Anticosti, Province of Quebec; at Eastport, Maine, on the 20th, the barometer fell to below 29.0. The pressure increased rapidly to the west, and when this low area was central northeast of New England some of the most severe gales of the month occurred in the Lake regions and in the Saint Lawrence Valley. It was last observed as central near Anticosti, Province of Quebec, on the 20th, but the easterly movement was apparently retarded, causing the gales to continue in this region until the 22d.

VI.—This storm was observed north of Dakota and moved over a southeast course to the upper lake region; it followed the preceding storm without an intervening high area, while the barometer rose in the Southern States immediately after the storm reached the Lake region. This increase of pressure was apparently due to the advance of a portion of the high area then extending over the Rocky Mountain districts. The result of the advance of the high area was the filling up of this storm before it reached the Atlantic coast; the movement of the secondary high area was in this case from the southwest. This storm was attended by light snows in the northern districts, but it caused no change in the weather conditions of the Southern States.

VII.—This depression was at no time within the limits of the United States, but its movement eastward can be readily traced on the weather charts by the tri-daily telegraphic reports, from which its centre can be approximately located during its transit from north of Dakota to the lower Saint Lawrence valley. The weather continued generally fair within the United States, except at some of the Lake stations, where light snows occurred. This storm track was far to the north of the stations of observation; the movement was rapid, and it was followed by the high areas then located to the Southwest, the latter apparently moving to the north of east.

VIII.—This storm is not traced on chart i to the west of longitude 110°, but the reports from the Pacific coast indicate that it originated west of the Rocky Mountains; this storm also moved southeastward over the upper lake region, following the same general course marked out for the three preceding storms, and was attended by severe gales and also the lowest barometer readings of the month; on the 25th, when the centre was near Mackinaw City, Michigan, the barometer fell to 29.09, while in Manitoba and Nova Scotia it was above 30.40. The gradient was steep in all quadrants of this storm and the temperature was as low as zero at Halifax, Nova Scotia, and at Saint Paul, Minnesota, while it was 39° above at Mackinaw City, Michigan, near the centre of the storm. During the easterly movement it increased in severity, and dangerous gales occurred in the Northern States; on the night of the 25th the centre of this storm passed over northern New England, causing very heavy snows, and the most severe gales of the month occurred on the 26-27th when the pressure was 28.56, at Eastport, Maine. The barometer was 1.00 lower at Eastport, Maine, than it was at Albany, New York, and .5 lower at Boston, Massachusetts, than at Albany, while there was a difference of pressure of 1.63 between Halifax, Nova Scotia, and Toronto, Province of Ontario. This storm moved much slower than the average rate while passing over the New England coast, where the course changed to the northeast.

The following extracts from observers refer to the weather conditions attending this storm:

Chincoteague, Virginia: a violent northwest gale occurred on the 26th, the wind reaching a velocity of sixty-one miles per hour; several slight casualties were reported, but no serious damage done. The cautionary signal which had been flying was changed to off-shore signal at exactly the proper time to be of great value to the shipping interests.

Washington City: a severe wind storm occurred on the 26th; several houses

were unroofed, trees blown down, and considerable damage done in various parts of the city.

Baltimore, Maryland: a heavy gale occurred on the 26th; many houses were unroofed, signs and fences blown down, and trees uprooted. The gale on Chesapeake Bay was very severe, but only a few vessels left port during the display of the cautionary signal.

Frederick, Frederick county, Maryland: a terrific wind storm occurred on the 25-26th; a school house was blown down, and considerable damage done to other property.

Westminster, Carroll county, Maryland: a violent wind storm began at 10 p. m. of the 25th, which continued, with increased violence, throughout the 26th; trees were uprooted, chimneys and fences blown down, and considerable damage done in all sections of the county.

Havre de Grace, Harford county, Maryland: a terrific northwest gale occurred on the 25-26th; during its height the immense "traveller" used on the Baltimore and Ohio new railroad bridge, for raising iron work, was lifted up and blown down. It was forty feet high, and weighed one hundred tons.

Harrisburg, Dauphin county, Pennsylvania: a wind storm of a most disastrous character occurred on the 25-26th; houses were unroofed, and two of the largest stand-pipes of the Lochiel Iron Works were blown down. The damage throughout the county was considerable.

Philadelphia, Pennsylvania: a heavy northwest gale set in shortly after midnight of the 25th and continued throughout the 26th, the wind reaching a velocity of forty-eight miles per hour and doing great damage in the city.

Wilmington, New Castle county, Delaware: the wind storm of the 26th was the most severe that has been felt in this vicinity for several years; a number of houses in the city were unroofed, chimneys blown down, and trees torn up by their roots.

New York City: a westerly gale began at 12.35 a. m. of the 26th, continuing throughout the day and increasing in violence up to 2.30 p. m. when a velocity of seven miles in five minutes was registered, being at the rate of eighty-four miles per hour; the total movement of the wind for the twenty-four hours averaged 42.9 miles per hour, being the greatest daily velocity ever recorded at this station; the gale continued, with but little decrease in violence, on the 27th. This gale was the most severe ever known in this vicinity, both as to duration and violence; telegraph wires were prostrated in every direction, trees and chimneys blown down, houses unroofed, and several persons severely injured.

Poughkeepsie, Dutchess county, New York: a heavy gale occurred on the 25-26th along the Hudson River, tearing branches from trees, demolishing fences, and prostrating telegraph lines.

Port Jervis, Orange county, New York: a heavy gale occurred on the 25-26th, during the prevalence of which the spire of the Reformed church was lifted bodily from its brick foundation and blown over. The damage is estimated at \$10,000.

Nyack, Rockland county, New York: an unusually heavy gale occurred on the 26th; shutters were torn from their hinges, trees blown down, and great damage done to property throughout the county.

New London, Connecticut: for severity and duration the storm of the 26-27th was unprecedented in the records of this station. Never since the Norwich and New York Transportation Company began running their boats between this city and New York was a trip missed until the 27th when the steamer "City of Boston" attempted to leave but was compelled to return. For three days none of the freight boats either left or entered this port.

New Haven, Connecticut: a heavy gale occurred on the 26-27th, the wind averaging thirty miles an hour; telegraph and telephone wires were prostrated, buildings unroofed, chimneys blown down, etc.; the steamer "Idlewild" was blown on a rock off Stamford, Connecticut, and sunk; eight lives were lost.

Hartford, Hartford county, Connecticut: The heavy gale of the 26-28th caused considerable damage to telegraph and telephone, wires, trees, signs, etc., and many barns were unroofed.

Westfield, Hampden county, Massachusetts: the heavy wind of the 26th blew down the spire of the Congregational church, causing damage to the amount of \$10,000.

Malden, Middlesex county, Massachusetts: an unusually heavy gale occurred on the 26th, the wind reaching almost hurricane violence, and causing considerable damage throughout the city.

Dover, Strafford county, New Hampshire: a severe gale occurred on the 26th, hundreds of trees were blown down, houses unroofed, and telegraph lines prostrated.

Machias, Washington county, Maine: an unusually severe easterly gale occurred on the 25-26th; the schooner "Ximena" was blown on the rocks at this station, breaking her keel and staving in her bottom.

IX.—The reports from the plateau regions and the Pacific coast indicate that this area of low pressure, or the conditions which resulted in its formation, passed from the west of the Rocky Mountains. It moved over Colorado on the 26th, and was apparently forced to the southeastward by the high area then extending over the northern districts; a second depression was also formed in southern Texas on the 27th, but the high area to the northeast moved southward over the central valleys and replaced the low areas, or forced them to the south of the Gulf coast. The indications are that this low area filled up before it reached the Gulf coast.

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 February, 1886, eight reports concerning storms encountered by vessels in the Atlantic west of the forty-fifth meridian; one message was sent from Boston.

NORTH ATLANTIC STORMS DURING FEBRUARY, 1886.

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

The paths of the depressions that have appeared over the north Atlantic Ocean during the month are determined, approximately, from international simultaneous observations furnished by captains of ocean steamships and sailing vessels; abstracts of ships' logs and other data 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 March 21, 1886.

Eleven depressions are traced over the ocean within the region covered by the reports. Four of these, viz., numbers 2, 7, 9, and 11, are continuations of storms which passed into the Atlantic from the North American continent. Of the remainder, the depression charted as number 1 apparently developed off the coast of Cape Hatteras; number 4 seems to have originated in the Caribbean Sea; number 10 appeared over the ocean near N. 33°, W. 55°; and numbers 3, 5, 6, and 8 are shown between N. 42° and 55° and the meridians of W. 20° and 33°. The general direction of movement of these depressions was northeastward, with exception of number 6 whose course was about south-southeast.

The weather over the Atlantic during February, 1886, was of a varied character; from the 6th to the 19th unusually high pressure and fair weather prevailed, steamers in general reporting a fine passage across the Atlantic between these dates. From the 1st to the 6th high gales of force 7-9 prevailed during the passage of low areas numbers 1 and 2, and the last ten days of the month were marked by severe gales, high seas, and extraordinarily low barometer; on each of the days from the 24th to the 28th pressures below 29.00 (736.6) were reported west of the fortieth meridian, accompanied by winds of force 9-10.

The following are brief descriptions of the depressions charted:

1.—This depression appeared on the 1st in N. 37°, W. 67° with pressure at 29.84 (757.9) to the northward. The s. s. "Wyoming," C. L. Rigby, commanding, in N. 40° 45', W. 67° 30', reports a fresh gale, with barometer falling to 29.79 (756.6) at 8 a. m. On the 2d the centre had moved eastward, and is charted in N. 39°, W. 51°, where the pressure had fallen to 29.57 (751.0) at 7 a. m., and the wind had increased to a whole gale, as indicated by the following reports: The s. s. "State of Georgia," S. Moodie, commanding, in N. 40° 30', W. 68°, had strong gales, continuing until 4 a. m. on the 3d; s. s. "Kansas," W. Gleig, commanding, in N. 42° 35', W. 61° 12', had pressure 29.65 (753.1) at 12 noon, and wind from the northwest, blowing a whole gale until the 3d; s. s. "Ontario," W. P. Couch, commanding, in N. 41° 15', W. 64° 00', had lowest barometer at 10.20 a. m., followed by winds increasing to the force of a storm; the s. s. "City of Chester," A. Redford, commanding, in N. 44°, W. 54° 15', experienced a whole gale, setting in from the s. and veering to wnw.; at 10 p. m. the barometer fell to 28.96 (735.6). Wind of hurricane force was reported by Capt. B. Jamieson, of the s. s. "Sidonian," in N. 42° 17', W. 55° 10', with barometer reading 29.31 (744.5) at 5 p. m. The s. s. "Roman," David Williams, commanding, had a gale setting in from the nw. and continuing until the

5th; at 12 noon, in N. 41° 42', W. 64°, the barometer was 29.55 (750.6). In N. 42° 5', W. 61° 6', the s. s. "Waesland," T. Ueberweg, commanding, had a strong gale setting in with a sudden squall from the nw. and lowest barometer, 29.62 (752.3), at noon. S. S. "Kansas," W. Gleig, commanding, in N. 42° 35', W. 61° 12', reports a strong gale from nw. began at 4 p. m., with barometer rising from 29.65 (753.1) at noon; on the 3d the wind increased to hard gale, with furious squalls, in N. 42° 13', W. 65° 15'. The depression moved rapidly north-eastward, and at 7 a. m. on the 3d is indicated in N. 52°, W. 40°, where the pressure was about 29.50 (749.3).

The following special reports from vessels to the southeast and southwest of this point give an indication of the severity of the storm on this date:

S. S. "British Queen," R. Wills, commanding, in N. 45° 21', W. 54°, had strong nw. gale, setting in with heavy squalls, and increasing at noon to a whole gale, furious squalls, and mountainous seas; lowest barometer, 29.57 (748.5), at 4 a. m. Capt. W. W. Black, of the s. s. "Amaryllis," in N. 41° 58', W. 55° 32', reports "terrific gale continued from sw., with heavy squalls, rain, and sleet; lowest barometer, 29.45 (748.0), at noon; a strong gale continued on the 4th from sw. to sse., with very heavy squalls and rain." S. S. "Britannic," H. Perry, commanding, had a strong gale, setting in from the se. on the 2d and veering to sw. and w. on the 3d, on which date the barometer fell to 29.59 (751.6) at 4 a. m., in N. 46° 55', W. 42° 44'. The s. s. "Arizona," Samuel Brooks, commanding, reports a whole gale setting in from the wsw. and continuing until the 4th, with very high breaking sea from the wnw. prevailing during the gale; in N. 47° 49', W. 36° 51', the barometer read 29.80 (756.9) at 11 p. m. on the 3d. On the 4th the depression had passed to the northeast where it is charted in N. 54° 30', W. 31°, and on the 5th it was central off the west coast of the British Isles, in N. 55°, W. 15°.

The intensity of the attendant gales during these last two days may be judged from the following reports:

S. S. "Missouri," R. Poland, commanding, "encountered terrific squalls and high seas on the 4th in N. 50° 45', W. 27° 24', and moderate nw. to sw. gales; violent squalls and high seas on the 5th in W. 30°." Captain de Joussetin, of the s. s. "St. Laurent," in N. 49°, W. 31', on the 4th, reports the wind set in rapidly from the wsw., with rising barometer and enormous seas, and continued a whole gale through the 5th. S. S. "Circassia," A. Campbell, commanding, in N. 50° 31', W. 36° 16', at 7 a. m. on the 4th, had pressure 29.61 (752.1), and wind with force of a storm from the wsw, accompanied by squalls of hurricane violence.

2.—This was a continuation of the depression described as low area i under "Areas of low pressure" in this REVIEW. It passed off the coast on the 3d, and was accompanied by very heavy gales along the coast of the United States during its passage northeastward. On the 4th its centre is indicated near N. 37°, where the pressure was 29.50 (749.3); at 7 a. m. wind gales of force 7 to 8 prevailed from N. 29° to 43°. The pressure increased rapidly to the west of the low area, being 29.90 (759.4) on the coast, and 30.60 (777.2) in the Lake region. Accompanying this steep pressure gradient there was also a parallel temperature gradient of equal intensity over the same area, as shown by the following observations at 7 a. m.: Erie, Pennsylvania, 7°; Kitty Hawk, North Carolina, 36°; s. s. "Leerdam," N. 29° 17', W. 77° 20', 73°. These two gradients combined to produce the high wind-velocities experienced by vessels on the ocean, of which the following special reports have been received for February 4th:

The s. s. "Linn O'Dee," A. B. Millar, commanding, in N. 42° 46', W. 69° 9', 12.30 a. m., had ne. wind blowing a whole gale and heavy snow storm until 8 a. m.; the wind continued blowing a heavy gale until 4 p. m. of the 5th. The ship "Reporter," Robert Bayley, commanding, in N. 36°, W. 72°, had barometer 29.41 (747.0) at 9 p. m., and experienced a whole gale setting in from the sw. and veering to the nw. Capt. Geo. Witchell, of the s. s. "Lutetia," reports: "In N. 33° 12',

W. $75^{\circ} 15'$, had pressure 29.62 (752.3) at 4 a. m., and westerly winds, with force of a strong gale; on the 5th, in N. $34^{\circ} 26'$, W. $74^{\circ} 17'$, the wind had veered to wnw., and experienced hard squalls, with snow and hail and very heavy seas, which several times broke over the ship."

On the 5th the depression was central near the southern coast of Newfoundland where the pressure had fallen to about 29.35 (745.5); the temperature gradient continued without diminution as may be seen from the following observations: Norfolk, 4° Fahr.; s. s. "Clement," N. 32° , W. 69° , $18'$, 56° Fahr.; s. s. "Hugo," N. $29^{\circ} 32'$, W. $60^{\circ} 37'$, 73° Fahr. High gales also prevailed from N. 25° to 50° , but were most violent from the middle Atlantic states southeast to the Bermudas, the area where the temperature and pressure gradients were parallel and of greatest combined intensity. The s. s. "British Queen," R. Wills, commanding, in N. $44^{\circ} 57'$, W. $59^{\circ} 16'$, had pressure 29.36 (745.7) at 4 a. m. and wind of force 7; s. s. "Britannic," in N. $43^{\circ} 44'$, W. $52^{\circ} 42'$, had pressure 29.36 (745.7) at 6 a. m. and wind blowing a strong gale from sw. On the 6th vessels north of N. 45° and between west 30° and 40° , experienced violent gales from the southwest, indicating that the centre of the depression had passed northeastward beyond the limit of observation.

3.—This was a small depression which developed on the 7th, and was apparent on the morning of the 8th near N. 50° , W. 27° ; vessels from W. 15° to 32° having rains and moderate to fresh gales. The s. s. "Milanese," John Trinick, commanding, reports strong sw. winds, increasing to a whole gale with heavy squalls, in N. $44^{\circ} 53'$, W. 36° . The s. s. "Pavonia," B. Woolfender, commanding, had a fresh gale setting in on the 7th from the sw., and in N. $49^{\circ} 28'$, W. 29° the barometer fell to 29.97 (761.2) at 10 a. m. on the 8th. The s. s. "Carthaginian" had strong gale from the south on the morning of the 8th in N. $52^{\circ} 50'$, W. $26^{\circ} 4'$, veering to nw. at 11 a. m. when the barometer fell to 29.82 (757.4). On the 9th the depression had probably passed beyond the limits of observation to the northward; the most northern vessels in N. 55° and 56° , having southerly and southwesterly gales and the lowest barometer readings.

4.—This depression is first reported in the Caribbean Sea, where the "City of Para," L. Dexter, commanding, in N. $14^{\circ} 33'$, W. 77° , reports barometer at noon, February 8th, 29.81 (757.2), with wind from the nw. to nne., moderate to fresh gales; large swell from the nw. and heavy showers of rain. On the 9th the depression was apparent from reports of vessels in the vicinity of N. 26° , W. 73° . The ship "Columbus," Captain Saermilch, commanding, in N. $26^{\circ} 30'$, W. $71^{\circ} 15'$, had pressure 29.78 (756.4) and wind blowing a fresh gale. The course of the depression was thence northeastward, and its position on the 10th is approximately located from the report of the ship "Georg," G. A. Scholtz, commanding; at 7 a. m., in N. $26^{\circ} 48'$, W. $61^{\circ} 48'$, moderate to fresh gales from ese. and light rains prevailed.

5.—This depression, first charted on the 11th in N. 54° , W. 22° , apparently existed on the 10th further to the southeast as indicated by a report of the s. s. "Carthaginian," which experienced a strong gale setting in from the wnw., in N. $50^{\circ} 18'$, W. $36^{\circ} 30'$, and at noon had lowest barometer, 30.12 (765.0). On the 11th the pressure had fallen to 29.76 (755.9) at 7 a. m., and on the 12th the centre of the depression was off the northwest coast of the British Isles, where the pressure ranged from 29.50 (749.3) to 29.70 (754.4), and vessels westward to the thirty-fourth meridian had high westerly and northwesterly gales. The s. s. "Australia," G. Franck, commanding, reported "a gale setting in from the wsw. on the 11th and continuing until the 14th with the force of a whole gale, accompanied by heavy snow and hail squalls, blowing sometimes with hurricane force; the barometer read unusually high for the season."

6.—Rains and moderate gales on the 12th and 13th near N. 50° and between W. 13° and 40° accompanied the development of this depression, whose centre is charted on the 14th in N. 47° , W. 21° ; vessels to the northwest of that position had n. and nnw. gales and pressures ranging from 29.54 (750.3)

to 29.80 (756.9), in N. 50° . The s. s. "Ems," W. Willigerod, commanding, in N. $48^{\circ} 30'$, W. $26^{\circ} 15'$, reported fresh to strong gales and high seas from the nnw., with stormy, squally weather. At 7 a. m. on the 15th the pressure on the twentieth meridian had risen to 30.00 (762.0) in N. 50° , and fallen to 29.52 (749.8) in N. 44° , where nne. winds, reported by the s. s. "Stag," indicated that the centre of the depression had passed even further to the southward. On the 16th, at 7 a. m., the same vessel, in N. $41^{\circ} 24'$, W. $24^{\circ} 12'$, had pressure 29.88 (758.9) and ne. winds, while the pressure to the southward had fallen to 29.61 (752.1), as reported by the s. s. "Olympia," James Brown, commanding, in N. $33^{\circ} 51'$, where westerly and northwesterly winds prevailed, with force of a fresh gale. The position of the centre of the depression at 7 a. m. was apparently near N. 36° , and on the following day had passed beyond the region of observation.

7.—This was a continuation of low area number iv., described under "Areas of low pressure." At 7 a. m. of the 16th the depression was central north of the Gulf of Saint Lawrence, where the pressure was below 29.40 (746.7). On the 17th the centre of the depression was indicated west of Newfoundland by strong westerly winds, experienced by vessels in N. 44° , between W. 47° and 57° , and southerly winds between W. 39° and 46° , the lowest pressure reported being 29.85 (758.2) by the s. s. "Bassano," in N. $44^{\circ} 42'$, W. 47° , no observations being received to the northward of that position. At 7 a. m. on the 18th the winds between W. 33° and 40° had shifted to the nw. and the pressure to the eastward had fallen from 30.15 (765.8) to 29.80 (756.9); the centre of the depression is charted in N. 48° , W. 30° , in the vicinity of which position the 7 a. m. observations show rain and moderate gales. In the quadrant to the south and east of this position no reports have been received for the 19th and the further track of this depression is discontinued.

8.—This storm appeared suddenly on the 19th between N. 40° and 47° and W. 31° and 38° where vessels reported pressures ranging between 29.21 (741.9) and 29.34 (745.2). On account of the energy displayed by these low readings the depression seems to be a new development rather than a continuation of the depression described as number 7.

The s. s. "Scotland," A. H. Luckhurst, commanding, in N. $46^{\circ} 57'$, W. $32^{\circ} 38'$, reported the wind blowing a storm, and the pressure at 29.26 (743.2) at noon. The depression moved rapidly to the northeast, and at 7 a. m. of the 20th the lowest reported barometer was 29.43 (747.5), in N. 54° W. 20° , after which it passed beyond the region of observation. Vessels to the s. and sw. of this position had high westerly gales on the 20th, as indicated by the following reports:

The s. s. "Galileo," R. Potter, commanding, had fresh gales, with barometer 29.50 (749.3) at 5.30 a. m., in N. $49^{\circ} 36'$, W. $23^{\circ} 20'$. The s. s. "Samaria," in N. $50^{\circ} 57'$, W. $21^{\circ} 51'$, had a fresh gale setting in from the ssw. and pressure 29.80 (756.9) at 4 a. m. The s. s. "Prussian," J. Amburg, commanding, in N. $53^{\circ} 43'$, W. $20^{\circ} 41'$, had a strong gale setting in from the sw. and veering to nw. and lowest pressure, 29.46 (748.3), from 8 to 10 a. m.

9.—This was a continuation of low area number v. At 7 a. m. of the 20th it was central on the coast of Maine, where the barometer was below 29.20 (741.7). On this date vessels near the coast had high winds and rough seas. The following are a portion of the special reports received: The s. s. "Bassano," W. Rea, commanding, in N. 42° , W. $60^{\circ} 12'$, reports the wind set in from the sse., with the force of a whole gale, and veered to the wnw., accompanied by high, confused seas; at 8 p. m. the barometer had fallen to 29.08 (738.6). The s. s. "Holland," W. Tyson, commanding, in N. 42° , W. $64^{\circ} 34'$, had a strong gale from the west and barometer 29.10 (739.1) at 9 p. m. The s. s. "Servia," Horatio McKay, commanding, had a gale beginning at 6 p. m. from the sw.; at 8 p. m. the pressure fell to 29.15 (740.4), after which, the wind, blowing with the force of a strong gale, veered to the nw., accompanied by heavy snow squalls and very cold weather. The s. s. "State of Nevada" encountered a gale setting in from the sw. at 4 p. m.,

in N. 40° 40', W. 68° 25', when the barometer fell to 29.25 (742.9); veering to the nw., the gale continued until noon of the 21st. S. S. "Zaandam," H. v. d. Zee, commanding, in N. 40° 46', W. 68° 56', had a whole gale and barometer 29.20 (741.7) at 4.30 p. m. At 3 p. m. of the 20th the centre of the depression had reached the Gulf of Saint Lawrence, and on the morning of the 21st is charted off the southeast coast of Newfoundland. Passing from the land to the ocean, the energy of the depression increased; the pressure fell below 28.90 (734.0), and furious gales prevailed eastward and southward of the storm-centre, extending to the meridian of W. 40° and to the parallel of N. 35°.

The following special reports serve to show the intensity of the storm on this date:

S. S. "Ponca," William Bowen, commanding, in N. 35° 30', W. 58° 18', had west wind with force of a storm, accompanied by six hours' heavy rain and very heavy swell; the barometer at 7 a. m. recorded 29.61 (752.1), showing a gradient northward to the storm-centre of very nearly .10 inch to each degree. The s. s. "Virginian," M. Pitt, commanding, in N. 42° 33', W. 54° 7', reported strong sw. gale, with hard squalls and high seas. The s. s. "Scotland," A. H. Luckhurst, commanding, in N. 45° 31', W. 39° 48', reported barometer 29.41 (747.0) at 8 p. m., wind from sw. to nw., a storm. S. S. "England," T. P. Heeley, commanding, in N. 41° 52', W. 59° 25', had barometer 29.14 (740.1) at 7 a. m., and gale from the 20th to the 22d from the se. to nw., with force of a storm on the 21st. The steamers "Bassano," "Ethiopia," "Rhyndland," "Wisconsin," "Canada," "Pieter de Coninck," and "British Crown," encountered this storm on the 21st, and had pressures ranging from 28.86 (733.0) to 29.13 (739.9) between W. 42° and 63°, with fresh to whole gales from s. to w. The course of the depression was northeastward, and on the 22d the centre had reached W. 35°, the lowest barometer reported on this date being 29.36 (745.7) at 5.30 a. m., by the s. s. "Eider," H. Hellmers, commanding, in N. 47° 45', W. 33° 40'. Capt. P. Lobbett, of the s. s. "Warwick," in N. 50° 26', W. 25° 51', reported a whole gale, setting in from the ssw. and veering to wnw.; the barometer, which during the gale read 29.95 (760.7), continued falling, and remained below 29.00 (736.6) until March 3d. The steamers "Galileo" and "Prussian" reported whole and fresh gales from s. to w., with barometer ranging from 29.66 (753.4) to 29.76 (755.9) between N. 49° and 52° and W. 30° and 32°. On the 23d the lowest reported pressures ranged from 29.70 (754.4) to 29.80 (756.9) in N. 50° and on the 24th at N. 55°, when the depression passed beyond the limit of observation.

10.—Depression number 9 was immediately followed by numbers 10 and 11, during the passage of which the low barometers, above-recorded, continued throughout the remainder of the month. Number 10 first appeared near N. 33°, W. 55°, where the s. s. "Gottardo" had fresh gales from the wnw. and barometer 29.72 (754.9), the pressures to the northward ranging above 30.00 (762.0); the course of the depression was ne., and on the 23d is shown near N. 37°, W. 48°. On the 24th its energy had increased, and pressures ranging from 29.35 (745.5) to 29.40 (746.7) were reported by vessels in W. 39°, N. 44° to 47°, among these was the s. s. "British Princess," E. H. Freeth, commanding, which had wind from the n. and w., a whole gale, six hours' heavy rain and very heavy swell. On the 25th the pressure had risen north of N. 49°, and to the south of that parallel, east of W. 35°, no reports have been received; the further course of this depression, if any, cannot, therefore, be traced. Eastward from W. 35° to W. 65° the winds were controlled by depression number 11.

11.—This was a continuation of low area vii. During the 23d it was central north of the Gulf of Saint Lawrence, where the pressure ranged from 29.70 (754.4) to 29.80 (756.9), and on the 24th it had moved westward to the fifty-third meridian. Like number 9 its energy increased on passing into the ocean. In N. 42° 28', W. 55° 20', the s. s. "Pieter de Coninck," E. Smit, commanding, reports wind from the se. to nw., blowing a storm,

and pressure 28.92 (734.6) at 1 p. m.; in N. 42°, W. 41° the s. s. "Tyrian" had wind from sw. veering to nw., a hurricane, and barometer reported at 29.06 (738.1) at 4 a. m. The s. s. "Scotland," in N. 34° 44', W. 49° 32', "experienced a very furious gale setting in from se. and veering to the nw., blowing with almost hurricane force; at 12 midnight, 24th, the barometer fell to 28.84 (732.5)." The steamers "Eider," "Bohemia," and "Brooklyn City," between N. 42° and 44°, W. 52° to 55°, had pressures ranging from 29.00 (736.6) to 29.25 (742.9), the wind blowing with force of 9-10 and continuing until the 26th; all these vessels had tremendous high, rough seas from the nw. Captain Jas. Brown of the s. s. "Olympia," reports: "Had a continuation of high gales, from sw. to w., from the 24th to March 5th, never falling below the force of a fresh gale and going as high as a storm during squalls; the barometer was low during the entire voyage." The depression moved northeastward, and on the 25th controlled the pressure and winds from W. 65° to 35°, manifesting, if possible, increased energy, with the pressure falling to 28.70 (729.0) between W. 46° and 49°.

Captain B. Gleadell, of the s. s. "Celtic," in N. 43° 30', W. 49° 20', reports "a whole gale from the e. backing to the nww. and pressure 28.70 (729.0) at 10 a. m.; the weather preceding and following this disturbance, stormy and unsettled, with high confused seas; during the gale the sea was tremendous, violent, and confused; a very low barometer all the passage." Captain G. Dobson, of the s. s. "Elphinstone," in N. 33° 55', W. 71° 48', reports "a gale from the 25th to the 27th, with storm force and barometer 29.58 (751.3) at midnight of the 25th; sometimes the squalls were terrific." Captain Lobbett, of the s. s. "Warwick," in N. 47°, W. 41°, reports "a whole gale on the 25th, with pressure 29.02 (737.1) at 8 p. m.; the barometer read below 29.00 (736.6) from the 25th until March 2d, the lowest reading being 28.60 (726.4), at 2 p. m. on the 27th, in N. 43° 55', W. 50° 44'." The steamers "Iowa," "Samararia," and "Prussian," between N. 42° and 45° and W. 36° to 59°, report remarkably low barometer, from 28.85 (732.8) to 29.40 (746.7), on the 25th, 26th, 27th, and 28th, with only fresh to moderate breezes and fair weather. On the 26th the centre of the depression was in W. 43°, where the pressure at 7 a. m. was about 29.00 (736.6). During the 27th and 28th the storm moved eastward, and at the close of the month is charted in W. 25°, where the pressure ranged from 29.60 (751.8) to 29.75 (755.6).

During the last three days of the month vessels on the ocean from the coast of the United States eastward to the forty-eighth meridian experienced high winds (of storm-force) developed by low area number viii. This depression on the 26th was central on the coast of Maine, with pressure 28.82 (732.0), and moved eastward until on the 28th it entered the ocean south of Newfoundland. Captain F. Graham, of the s. s. "Biela," encountered the gale on the 27th in N. 30° 40', W. 66° 55', and reports: "This gale, with terrific squalls, blew harder and lasted longer than any I have experienced before; the sea was tremendous." On the 27th and 28th pressures below 28.90 (734.0) extended eastward to the forty-eighth meridian, accompanied by snow storms and cold weather, in which vessels were covered with ice. The continuation of this storm over the ocean will be described in the March number of this REVIEW.

OCEAN ICE.

On chart i are also exhibited the positions of ocean ice observed during February, 1886.

These positions are taken from reports furnished by ship-masters and from trustworthy data published in the "New York Maritime Register" and other newspapers.

During this month the eastern limit of icebergs reached W. 44° 47' in about N. 48°; from that point the outer edge of the ice extended in a southwesterly direction to N. 46° 10', W. 47° 15'.

The area of the ice region during February, 1886, was materially smaller than in the same month of the years, 1883, 1884, and 1885, as shown by the following:

Southern limit.			Eastern limit.		
Date.	Lat. N.	Lon. W.	Date.	Lat. N.	Lon. W.
February, 1883	42 01	52 46	February, 1883	46 19	45 44
February, 1884	42 00	50 00	February, 1884	46 50	43 45
February, 1885	41 50	51 10	February, 1885	47 52	42 00
February, 1886	46 10	47 15	February, 1886	48 00	44 47

Icebergs and field-ice were reported as follows:

14th.—S. S. "Surrey" passed through heavy field-ice and observed three large icebergs in N. 46° 32', W. 47° 2'. S. S. "Castor," in N. 47° 16', W. 46° 16', encountered a large field of ice through which it passed for fourteen hours; the ice was very heavy, being from twelve to fourteen inches thick; steered to the south for eighty miles to clear it.

15th.—S. S. "Palestine," in N. 46° 30', W. 46° 45', passed a quantity of field-ice from four to five miles long.

The s. s. "Kehrwieder," at Halifax, February 17th, reported having passed a large field of ice in N. 46° 10', W. 47° 40', about thirty miles long, extending southwest to northeast.

16th.—Captain Arthur Lewis, of the s. s. "City of Richmond," encountered field-ice in N. 46° 15', W. 46° 50', of which he reports as follows: "3.30 a. m., temperature of the air, 36°; temperature of the water, 42°. 4 a. m., air temperature, 32°; water temperature, 34°. 4.13 a. m., fell in with field-ice, some of it very close; steered southwest about twenty miles to clear it."

18th.—S. S. "Lero" met large fields of floating ice and passed an iceberg in N. 48°, W. 44° 47'. S. S. "Ethiopia," in N. 47° 10', W. 46° 30', passed a berg and a large quantity of field-ice.

20th.—S. S. "British Crown," in N. 46° 25', W. 46° 30', observed two medium sized icebergs, and in N. 46° 21', W. 46° 45', passed twenty miles of field-ice steering southwest.

28th.—S. S. "Polaria" passed an iceberg in N. 46° 10', W. 47° 15'. S. S. "Vancouver," at Halifax, February 28th, reported a large quantity of thick field-ice in N. 47°, W. 48°; steamed south to get clear of it.

TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

The distribution of mean temperature over the United States and Canada for February, 1886, 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.

Over the country to the eastward of the one-hundredth meridian, except in the Canadian Maritime Provinces, the mean temperatures are below the normal, the departures being most marked from the Ohio River southward to the Gulf and south Atlantic coasts, where they range from 4° to 7°. In the Canadian Maritime Provinces, and over the country to the westward to the meridian above mentioned, the mean temperatures are above the normal; the departures are slight over the Maritime Provinces, but in the Rocky Mountain region they range from about 3° in the southern plateau to from 10° to 16° in Montana. Along the Pacific coast the mean temperature averaged about 4° above the normal.

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

Above normal.		Below normal.	
Fort Assinaboine, Montana.....	16.1	Nashville, Tennessee.....	7.5
Fort Maginnis, Montana.....	15.2	Cedar Keys, Florida.....	7.1
Fort Shaw, Montana.....	14.5	Cincinnati, Ohio.....	7.0
Fort Benton, Montana.....	14.1	Chattanooga, Tennessee.....	6.5
Helena, Montana.....	13.1	Louisville, Kentucky.....	5.9
Spokane Falls, Washington Territory..	10.9	Pensacola, Florida.....	5.9
Fort Custer, Montana.....	9.3	Cape Henry, Virginia.....	5.9
Fort Buford, Dakota.....	8.8	Kitty Hawk, North Carolina.....	5.7

DEVIATIONS FROM NORMAL TEMPERATURES.

In the table below are given, for certain stations, as reported by voluntary observers, the normal temperatures for February for a series of years, the mean temperature for February, 1886, and the departures from the normal:

Station.	County.	Normal temperature for February.	Number of years.	Mean temperature for Feb., 1886.	Departure.
<i>Arkansas.</i>					
Lead Hill.....	Boone.....	39.4	4	36.2	- 3.2
<i>California.</i>					
Princeton.....	Colusa.....	50.5	14	53.8	+ 3.3
Sacramento.....	Sacramento.....	48.9	20	53.0	+ 4.1
<i>Connecticut.</i>					
Middletown.....	Middlesex.....	26.8	28	24.9	- 1.9
<i>Dakota.</i>					
Webster.....	Day.....	6.0	3	18.1	+12.1
<i>Illinois.</i>					
Anna.....	Union.....	38.1	11	33.8	- 4.3
Mattoon.....	Coles.....	31.5	6	30.0	- 1.5
Peoria.....	Peoria.....	29.2	30	19.2	- 10.0
Riley.....	McHenry.....	22.0	25	19.2	- 2.8
Swanwick.....	Perry.....	33.0	4	29.8	- 3.2
Sycamore.....	De Kalb.....	21.6	4	21.2	- 0.4
<i>Indiana.</i>					
Lafayette.....	Tippecanoe.....	27.8	7	26.2	- 1.6
Mauzy.....	Rush.....	23.5	6	23.0	- 0.5
Spiceland.....	Henry.....	29.5	32	26.7	- 2.8
Vevay.....	Switzerland.....	35.9	21	30.6	- 5.3
<i>Iowa.</i>					
Creco.....	Howard.....	17.8	10	14.2	- 3.6
Monticello.....	Jones.....	21.8	32	19.8	- 2.0
<i>Kansas.</i>					
Independence.....	Montgomery.....	35.0	14	33.5	- 1.5
Wollington.....	Sumner.....	32.0	8	32.0	0.0
Yates Centre.....	Woodson.....	29.3	6	31.0	+ 1.7
<i>Maine.</i>					
Bridgeton.....	Cumberland.....	21.0	11	17.5	- 3.5
Belfast.....	Waldo.....	22.3	27	20.1	- 2.2
Cornish.....	York.....	21.6	29	18.9	- 2.7
Gardiner.....	Kennebec.....	20.6	50	20.6	0.0
Orono.....	Penobscot.....	19.0	18	18.3	- 0.7
<i>Maryland.</i>					
Fallston.....	Harford.....	32.1	15	29.7	- 2.4
<i>Massachusetts.</i>					
Amherst.....	Hampshire.....	24.7	49	24.4	- 0.3
Cambridge.....	Middlesex.....	26.1	64	25.6	- 0.5
Fitchburg.....	Worcester.....	24.1	30	22.1	- 2.0
Lowell.....	Middlesex.....	26.5	10	24.0	- 2.5
New Bedford.....	Bristol.....	28.9	74	26.7	- 2.2
Somerset.....	Bristol.....	27.4	16	27.2	- 0.2
Springfield.....	Hampden.....	25.6	19	25.0	- 0.6
Taunton.....	Bristol.....	28.5	16	27.3	- 1.2
Williamstown.....	Berkshire.....	22.5	34	21.1	- 1.4
Worcester.....	Worcester.....	26.3	47	22.2	- 4.1
<i>Nevada.</i>					
Carson City.....	Ormsby.....	33.7	7	42.2	+ 8.5
<i>New Brunswick.</i>					
Saint John.....	Saint John.....	20.9	26	19.8	- 1.1
<i>New Hampshire.</i>					
Concord.....	Merrimac.....	24.4	18	23.1	- 1.3
Hanover.....	Grafton.....	19.0	22	17.5	- 1.5
<i>New York.</i>					
Factoryville.....	Tioga.....	22.6	4	20.3	- 2.3
Palermo.....	Oswego.....	21.5	32	19.6	- 1.9
Plattsburg Barracks.....	Clinton.....	17.9	17	15.5	- 2.4
North Volney.....	Oswego.....	22.0	18	20.7	- 1.3
<i>North Carolina.</i>					
Raleigh.....	Wake.....	47.7	3	39.0	- 8.7
<i>Ohio.</i>					
Wauson.....	Fulton.....	25.5	16	25.0	- 0.5
<i>Pennsylvania.</i>					
Dyberry.....	Wayne.....	22.5	22	21.5	- 1.0
<i>Rhode Island.</i>					
Providence.....	Providence.....	27.5	52	27.0	- 0.5
<i>South Carolina.</i>					
Stateburg.....	Sumpter.....	50.5	6	44.7	- 5.8
<i>Texas.</i>					
New Ulm.....	Austin.....	56.2	14	54.2	- 2.0
<i>Vermont.</i>					
Lunenburg.....	Essex.....	17.3	38	15.4	- 1.9
Newport.....	Orleans.....	17.9	11	14.0	- 3.9
Strafford.....	Orange.....	18.9	11	16.4	- 2.5
<i>Virginia.</i>					
Bird's Nest.....	Northampton.....	41.9	18	35.6	- 6.3
Dale Enterprise.....	Rockingham.....	32.9	6	32.7	- 0.2
Variety Hills.....	Nelson.....	39.1	9	32.6	- 6.5
Wytheville.....	Wythe.....	37.0	22	33.3	- 3.7
<i>West Virginia.</i>					
Helvetia.....	Randolph.....	34.9	10	29.0	- 5.9

* From the "Bulletin of the New England Meteorological Society."

The following notes on the temperature for February, and the winter months of 1885-'86, are given by voluntary observers:

Arkansas.—Lead Hill, Boone county: the mean temperature for the winter of 1885-'86 is 2°.8 below the average for the past four years.

Illinois.—Riley, McHenry county: the mean temperature for the winter of 1885-'86, 18°.5, is 2°.2 below the mean for the past twenty-three winters.

Indiana.—Spiceland, Henry county: the mean temperature for the winter of 1885-'86, 26°.5, is 1°.6 below the mean of the past thirty-two winters.