

# MONTHLY WEATHER REVIEW.

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No. 5.

## INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States during May, 1884, 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 most noteworthy features of the month were the destructive frosts which occurred in the lake region, New England and the northern portion of the middle Atlantic states, from the 28th to 31st, during the prevalence of high area vii.; and the excessive precipitation in the western Gulf states and southern slope, which resulted in damaging freshets in those districts.

Of the atmospheric depressions occurring during May, that described under "areas of low barometer" as number i. was especially severe during its passage over the lakes and resulted in great damage to shipping interests.

The month was slightly warmer than the average on the Atlantic coast south of New England, in the eastern Gulf states, and over the northwestern portion of the United States; elsewhere the mean temperature was below the average, the departure being greatest in the southern slope.

In the preparation of this REVIEW the following data, received up to June 20th, 1884, have been used, viz.: the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and twenty-two Signal Service stations and fourteen Canadian stations, as telegraphed to this office; one hundred and fifty-nine monthly journals, and one hundred and fifty monthly means from the former, and fourteen monthly means from the latter; two hundred and sixty-six monthly registers from voluntary observers; forty-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 local weather services of Alabama, Georgia, Illinois, Louisiana, Ohio, and Tennessee, and of the Central Pacific railway company; trustworthy newspaper extracts; and special reports.

## ATMOSPHERIC PRESSURE.

[Expressed in inches and hundredths.]

The distribution of mean atmospheric pressure for May, 1884, determined from the tri-daily telegraphic observations of the Signal Service, is shown by the isobarometric lines on chart ii.

The area of mean barometric minima for May occupies about the same position as that for the preceding month, viz.: the southern plateau, where a small area is enclosed by the isobar of 29.8, the isobar of 29.85 including nearly the entire district. The mean pressure for the month is greatest along the coast of southern California, and in the north Pacific coast region, and in the south Atlantic and east Gulf states, where the mean pressures exceed 30.0, the highest barometric means reported being 30.03 at Olympia, Washington Territory, and 30.02 at Cedar Keys, Florida, Atlanta and Augusta, Georgia.

The mean pressure for May compared with that for April is from .02 to .09 greater over the northern and middle plateau districts and north Pacific coast region; it is also greater in the Gulf states, Tennessee, the Ohio and Saint Lawrence valleys, and on the Atlantic coast, the increase being greatest in New England and Nova Scotia, where it varies from .10 to .15. A decrease occurs in the southern plateau, and over the northern part of the country from central Montana to Lake Huron, the deficiency being greatest from Lake Superior to eastern Montana, where it varies from .10 to .14.

## DEPARTURES FROM THE NORMAL VALUES FOR THE MONTH.

Compared with the normal pressure for May an increase of from .05 to .07 is shown over the eastern Rocky mountain slope; an increase varying from .01 to .04 also occurs in the Missouri valley, southern California, and in the middle and southern plateau districts. In the north and middle Pacific coast regions, Minnesota, and in all districts east of the Mississippi river the mean pressure is below the normal, the deficiencies varying from .05 to .07 in the north Pacific coast region, and from .05 to .10 in the lake region and Atlantic coast districts.

## BAROMETRIC RANGES.

The monthly barometric ranges were greatest in New England and the upper lake region, the largest being 1.04 at Eastport, Maine, .93 on the summit of Mount Washington, New Hampshire, and .90 at Grand Haven, Michigan and Portland, Maine; they were least in California, Arizona, and along the Gulf coast where they were generally less than .40, the smallest occurring at Los Angeles and San Diego, California, where they were .26 and .27 respectively.

## BAROMETRIC RANGES.

The monthly barometric ranges were greatest in New England and the upper lake region, where they varied from .76 to 1.04, the greatest range occurring at Eastport, Maine; they were, smallest in California and Arizona and along the Gulf coast, where they were from .26 to .48, the smallest being reported from Los Angeles, California.

In the several districts the ranges varied as follows:

*New England.*—From .76 at New Haven, Connecticut, to 1.04 at Eastport, Maine.

*Middle Atlantic states.*—From .59 at Lynchburg, Virginia, to .74 at Sandy Hook, New Jersey.

*South Atlantic states.*—From .43 at Atlanta, Georgia, to .61 at Kitty Hawk, North Carolina.

*Florida peninsula.*—From .32 at Key West to .38 at Cedar Keys.

*East Gulf states.*—From .33 at New Orleans, Louisiana, to .42 at Montgomery, Alabama.

*West Gulf states.*—From .36 at Shreveport, Louisiana, to .48 at Indianola, Texas.

*Rio Grande valley.*—From .43 at Brownsville, Texas, to .54 at Rio Grande City, Texas.

*Tennessee.*—From .44 at Chattanooga and Nashville, to .49 at Knoxville.

*Ohio valley.*—From .61 at Louisville, Kentucky, to .70 at Indianapolis, Indiana, and Columbus, Ohio.

*Lower lake region.*—From .65 at Buffalo, New York, to .79 at Detroit, Michigan, and Toledo, Ohio.

*Upper lake region.*—From .78 at Port Huron, Michigan, to .90 at Grand Haven, Michigan.

*Extreme northwest.*—From .61 at Bismarck, Dakota, to .73 at Saint Vincent, Minnesota.

*Upper Mississippi valley.*—From .55 at Cairo, Illinois, to .86 at Daveuport, Iowa.

*Missouri valley.*—From .64 at Yankton, Dakota, to .72 at Fort Bennett, Dakota.

*Northern slope.*—From .57 at Helena, Montana, to .67 at North Platte, Nebraska.

*Middle slope.*—From .63 at Denver, Colorado, to .78 at Dodge City, Kansas.

*Southern slope.*—From .49 at Fort Stockton, Texas, to .59 at Fort Concho, Texas.

*Southern plateau.*—From .33 at Fort Apache, Arizona, to .59 at El Paso, Texas.

*Middle plateau.*— .52 at Salt Lake City, Utah.

*Northern plateau.*—From .56 at Dayton, Washington Territory, to .68 at Lewiston, Idaho.

*North Pacific coast region.*—From .49 at Fort Cauby, Washington Territory, to .62 at Portland, Oregon.

*Middle Pacific coast region.*—From .31 at San Francisco, California, to .40 at Red Bluff, California.

*South Pacific coast region.*—From .26 at Los Angeles, California to .35 at Yuma, Arizona.

AREAS OF HIGH BAROMETER.

I.—During the 1st the barometer rose rapidly over the upper Mississippi and Missouri valleys, lake region, and south to the Gulf. The morning reports of the 2d showed this high area central in the Missouri valley; during the day it moved eastward, and on the morning of the 3d the barometer was highest on the middle Atlantic coast, and, though falling slowly from this date, it remained highest on the Atlantic coast until the 6th. The cold wave accompanying this high area reached the Missouri valley on the 1st, and on the 2d included the upper lake region and Lake Erie. The temperature fell from 10° to 18° in the Mississippi valley, from 10° to 20° in the upper lake region, and from 15° to 30° in the lower lake region. The cold wave reached the Atlantic coast on the 3d, causing a fall in temperature in the middle Atlantic states of 10° to 16°.

II.—This high area, advancing from the northwest, was central in the Missouri valley on the 10th, and then moved eastward, reaching the Atlantic coast on the 12th. It was accompanied by a slight fall in temperature in the Missouri valley on the 10th, over Lake Michigan and the lower lakes on the 11th, and in the middle and south Atlantic states on the 12th.

III.—This area of high barometer appeared north of Montana on the 12th and was central in Nebraska on the 13th. On the 14th the pressure increased over the lake region, the Ohio valley and Tennessee, and over the districts on the Atlantic coast. During the 12th the temperature fell 20° at Cheyenne, Wyoming, and 10° at Denver, Colorado, and at Omaha, Nebraska. During the 13th the cold wave moved eastward to Lake Erie and as far south as Tennessee, and on the 14th reached the middle and south Atlantic and eastern Gulf states.

IV.—The morning report of the 16th showed a rise of .10 to .30 over the upper lakes and Lake Erie. The temperature had fallen over the lake region and the Ohio valley. During the 16th the area of increased pressure moved east to and including the lower lakes and the Ohio valley, and on the 17th

reached the Atlantic coast. The temperature fell slightly in New England on the 16th, and on the Atlantic coast during the night of the same day.

V.—This high area appeared in Montana on the morning of the 18th, a rise of .20 extending as far south as Colorado. By the morning of the 19th the rise had extended over Texas with the highest barometer at Fort Elliott. During the 19th the barometer rose over the lake region and thence southward over the eastern Gulf states. On the morning of the 21st, the barometer was highest on the middle Atlantic coast, and had risen from .20 to .40 over the lake region. This marked rise extended to the northeast during the day, and on the morning of the 22d, the barometer was highest in the Saint Lawrence valley, and comparatively high on the middle and south Atlantic coasts. By the morning of the 23d, the area of greatest pressure had moved over Nova Scotia. Accompanying the increased pressure, a cold wave appeared in Montana on the 18th. On the 19th it was over the upper Mississippi and Missouri valleys. On the morning of the 20th it was over Lake Michigan, the lower lakes, and the Ohio valley and Tennessee. No marked change in temperature was produced on the Atlantic coast.

VI.—The barometer rose on the Pacific coast during the 21st, and on the 22d the rise extended eastward to and including the Missouri valley and southward over the Gulf states. The pressure increased in the upper lake region and the Mississippi valley and thence westward to the Pacific coast on the 23d; and on the morning of the 24th this high area was central in Dakota. On the morning of the 25th the barometer was highest at Duluth, Minnesota. During the day the area of increased pressure moved eastward to New England and to Nova Scotia on the 26th. The temperature fell from 7° to 18° in the Missouri valley on the 22d, and from 4° to 15° in the Mississippi valley on the 23d. On the 24th the temperature fell from 3° to 12° in the upper lake region and from 5° to 13° in the lower lake region, and slightly in the Ohio valley and Tennessee. During the 25th the cold wave extended eastward to the Atlantic coast, the temperature falling from 6° to 12° in the middle Atlantic states and from 6° to 21° in New England.

VII.—The midnight report of the 26th showed a slight rise over Lake Superior; during the 27th the pressure increased rapidly over the lake region, the barometer remaining highest over Lake Superior until the 29th. The area of increasing pressure moved eastward to the Atlantic coast on the 28th. The temperature fell decidedly over the lake region on the 27th, and a slight fall extending southward over Tennessee and the south Atlantic states. The temperature continued to fall in the lower lake region on the 28th, the cold wave extending over New England and the middle Atlantic states, and on the 29th the temperature fell from 4° to 12° in the south Atlantic states.

AREAS OF LOW BAROMETER.

The following table gives the latitude and longitude in which each depression was first and last located, and the average hourly velocity of movement.

| Areas of low barometer.   | First observed. |          | Last observed. |          | Average velocity in miles per hour. |
|---------------------------|-----------------|----------|----------------|----------|-------------------------------------|
|                           | Lat. N.         | Long. W. | Lat. N.        | Long. W. |                                     |
| No. I.....                | 0 1             | 0 1      | 0 1            | 0 1      | 34.4                                |
| II.....                   | 46 00           | 88 00    | 49 00          | 67 00    | 17.3                                |
| III.....                  | 50 30           | 111 00   | 41 00          | 80 30    | 29.4                                |
| IV.....                   | 51 00           | 105 30   | 44 30          | 50 30    | 29.4                                |
| V.....                    | 42 00           | 97 00    | 39 00          | 88 00    | 27.8                                |
| VI.....                   | 34 30           | 101 00   | 48 00          | 72 00    | 24.5                                |
| VII*.....                 | 44 30           | 87 00    | 45 00          | 58 00    | 26.9                                |
| VIII.....                 | 58 00           | 107 30   | 46 30          | 80 00    | 22.2                                |
| IX.....                   | 39 30           | 102 30   | 46 30          | 80 00    | 27.1                                |
|                           | 50 45           | 102 30   | 47 00          | 58 30    | 29.1                                |
|                           | 39 00           | 78 00    | 45 15          | 57 30    | 26.8                                |
| Mean hourly velocity..... |                 |          |                |          | 26.8                                |

\* Centres united in N. 43° 30', W. 96° 30'.

I.—This area is a continuation of number ix., described in the April REVIEW. On the morning of May the 1st, it was central near Escanaba, Michigan; during the day it moved southerly to Lake Michigan and thence to the northeast, and on the morning of the 2d was central near Rockcliffe, Canada. General rains and high winds occurred over the lake region on the 1st, clearing on the 2d, and local rains occurred in New England on the 2d, but had cleared by the morning of the 3d. The temperature rose rapidly in advance of the storm; in the lower lake region it rose from 7° to 22° above the normal. The afternoon reports of the 1st showed a rise of 15° to 40° over the lower lake region, and from 10° to 15° in the middle Atlantic states. The following maximum velocities occurred during the passage of this storm: Escanaba, 31 miles; Milwaukee, 41; Grand Haven, Port Huron and Detroit, 36; Sandusky, 42; Buffalo, 58; and from 30 to 60 on Lake Ontario.

II.—This depression appeared on the morning of the 3d in British America north of Montana. On the morning of the 4th, it extended as a trough of low barometer from Dakota to Colorado, and rain had fallen in the upper Mississippi and Missouri valleys, the lake region, Tennessee and the Ohio valley, and Texas. The rain area extended into the eastern Gulf and south Atlantic states on the 5th, and over New England and the middle Atlantic states on the 6th. The storm moved slowly and disappeared as a distinct area of low barometer on the 8th. Severe local storms occurred in Illinois on the 6th, and brisk to high winds over the lake region on the 6th and 7th, and on the Atlantic coast on the 7th and 8th.

III.—This depression appeared north of Montana on the afternoon of the 7th. It moved southeasterly and reached the Atlantic coast on the afternoon of the 10th. Rain occurred in the northern part of the upper lake region on the 8th, and the rains caused by the preceding storm, number ii., continued in the lower lake region on the 8th and 9th. Rain fell in New England on the 7th and 8th and continued on the 9th and 10th as area iii. passed off the New England coast. High winds prevailed on Lakes Superior and Michigan on the 8th, on Lake Michigan on the 9th, on the lower lakes on the 9th and 10th, and on the New England and middle Atlantic coasts on the 10th.

IV.—This area appeared as a secondary depression in the rear of number iii. It was central at midnight of the 9th near Omaha, and moved northeasterly to Lake Michigan. On the afternoon of the 10th it was central near Milwaukee, and by the next morning had disappeared as a storm-centre. It caused local rains in the upper Mississippi valley on the 10th, and the rains caused by number iii. continued in the lake region on the 10th. Brisk to high winds from the south prevailed over Lake Michigan during the day of the 10th, but by midnight the wind had shifted to the north with a maximum velocity of twenty-five miles at Grand Haven.

V.—The afternoon report of the 11th showed this depression central near Fort Elliott. By midnight rain had fallen at all stations in the Missouri valley with cloudy weather in the Mississippi valley, which was followed during the night by local rains from Cairo to Keokuk. The movement of the storm centre as shown by the chart was irregular until the morning of the 13th, when it had reached Lake Michigan and was clearly defined as a storm centre encircled by the isobar of 29.70. General rains occurred in the upper Mississippi and Missouri valleys on the 12th, and in the upper lake region on the 12th and 13th. On the afternoon of the 13th the storm was central over Lake Erie with cloudy, rainy weather and high winds prevailing over the lake region, and brisk to high winds on the Atlantic coast. During the afternoon and night of the 13th the winds increased in velocity on the Atlantic coast, and rain fell in New England and the middle Atlantic states, continuing in New England on the 14th. The following maximum velocities are reported: on the 13th, Duluth, 28 miles; Milwaukee, 30; Grand Haven, 25; Sandusky, 37; Fort Macon, 28; Kitty Hawk, 36; Delaware Breakwater, 38. On the 14th, Block Island, 38; and from 25 to 39 on Lakes Erie and Ontario.

VI.—This low area developed during the night of the 14th, and appeared on the morning of the 15th central near Mackinaw City, Michigan. Brisk to high southerly winds had prevailed during the night over Lake Michigan. On the afternoon of the 15th the storm was central near Kingston, Canada, with high southwest to northwest winds over the lake region, and with cloudy weather and rain over the lower lakes. Maximum velocities of forty miles at Sandusky and thirty-eight miles at Buffalo, were reported. The storm was central in the Saint Lawrence valley on the afternoon of the 16th, passed off the coast of Maine on the morning of the 17th, and was central over Nova Scotia at midnight of the same day. Local rains occurred in New England on the 15th and 16th. At midnight of the 16th a maximum velocity of thirty-one miles was reported from Eastport. The winds on the middle Atlantic coasts had generally shifted to northwest with fair weather in the middle Atlantic states and clearing weather in New England. The morning map of the 16th showed a fall in temperature over the lake region of 9° to 18°. By the next morning, however, the temperature had risen the same number of degrees, and a slight rise had also occurred in the upper Mississippi and Missouri valleys. During the day the rise extended eastward and included the districts on the Atlantic coast, where it continued during the 19th.

VII.—On the morning of the 17th two depressions appeared, one central in Manitoba, the other, separated from the first by only a slight barometric ridge, central in Colorado. The movement of these two areas during the day was such that at midnight they had united, and one distinct area of low barometer, encircled by the isobar of 29.70, was central in the Missouri valley, where rain had fallen during the day. During the 18th, the storm moved easterly to Lake Michigan, accompanied by rain in the upper Mississippi valley, the upper lake region, and the Ohio valley, and by high winds on Lake Superior, a maximum velocity of thirty-one miles being reported from Duluth. During the 19th the storm moved eastward and at midnight was central near Saugeen, Canada, accompanied by high winds and cloudy, rainy weather in the lower lake region and rains in the upper Ohio valley. On the 20th, the rain area had extended into New England, continuing in the northern part on the 21st. The temperature rose in advance of the storm in the Mississippi valley, the lake region and the Ohio valley on the 17th. It continued to rise over the lake region and extended eastward to, and including the Atlantic coast districts on the 18th.

VIII.—This depression appeared north of Montana at midnight of the 18th; on the morning of the 19th it was central in Manitoba, and during the day moved nearly south into the Mississippi valley. It then moved southwest into Colorado. From the morning of the 20th until midnight of the 21st the movement of the centre was slight. By the morning of the 22d however, the centre had made a marked movement to the north-east and was located in southwestern Minnesota. From this time on it moved steadily to the north and east until it disappeared over Nova Scotia on the 24th. The rain accompanying this storm did not begin until the evening of the 20th. At this time general rains were reported from the Mississippi valley, Colorado, Wyoming, and the western Gulf states. The rain continued in these districts and extended into the Mississippi valley on the 21st, and on the 22d included the lake region; on the 23d rain fell in all districts east of the Mississippi valley. At midnight of the 22d a maximum velocity of twenty-six miles was reported from Duluth, and brisk to high winds on Lake Michigan. On the 23d velocities of twenty-five to twenty-eight miles were reported on Lake Michigan, and from twenty-six to twenty-nine miles on the lower lakes, and brisk to high southwest to northwest winds on the New England and middle Atlantic coasts. The temperature rose in the upper Mississippi and Ohio valleys and the upper lake region on the 20th, and in the lower lake region and thence southward to Florida on the 21st. It remained nearly stationary on the 22d and rose on the Atlantic coast on the 24th.

IX.—A slight barometric depression moved from Virginia northeasterly up the Atlantic coast on the 28th and 29th, accompanied by rain in the New England and middle Atlantic states on the 28th, and high winds on the coast. The following maximum velocities are reported: Kitty Hawk, 35; Hatteras, 34; Delaware Breakwater, 34; Sandy Hook, 42, and Block Island, 32 miles.

#### NORTH ATLANTIC STORMS DURING MAY, 1884.

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

The tracks of the atmospheric depressions that have appeared in the north Atlantic ocean during the month are approximately determined from reports of observations furnished by agents and captains of ocean steamships and sailing vessels, and from other miscellaneous data received at this office up to June 21, 1884.

The observations used are in general simultaneous, being taken each day at 7 a. m. Washington, or 12h. 8m. p. m. Greenwich, mean time.

Six depressions have been charted during the month; of these, numbers 1, 3, 5, and 6 are continuations of disturbances which passed over the United States and Canada, the two latter apparently filling up near the twenty-fifth meridian. Numbers 2 and 4 developed in mid-ocean and passed northeastward to the British coasts. With the exception of that charted as number 4, in which the wind attained a force of 8, none of the depressions have exhibited any great storm-energy. During May, 1884, fresh to strong breezes, variable in direction, with generally changeable weather, prevailed over the north Atlantic ocean. Dense fogs were of frequent occurrence over the region west of the fortieth meridian. The following are descriptions of the depressions charted:

1.—This is a continuation of the depression charted and described as low area i. under "areas of low barometer" in this REVIEW. On the morning of the 3d the centre of disturbance was near Anticosti island, Gulf of Saint Lawrence, and was enclosed by the isobar for 29.6 (751.8); during the day the disturbance moved eastward without displaying any storm-energy and by the 4th the region of least pressure was near N. 51°, W. 45°, where the barometer read 29.55 (750.6). During the 5th and 6th the depression continued to move slowly eastward, attended by moderate winds and generally fair weather in all quadrants, and by the 7th it was central off the Irish coast, causing rather strong southerly gales and rainy weather over the west of Ireland.

2.—The decrease of pressure which occurred over the region between N 40° and 45° and W. 40° and 50° during the 5th, indicated the development of a disturbance in that neighborhood. By the morning of the 6th, the barometer had fallen to about 29.6 (751.8), being a decrease of nearly .3 inch during the twenty-four hours; the winds remained light or moderate except to the westward of W. 50°, where they blew with the force of a strong breeze to moderate gale. The lowest barometric readings were reported by the following: s. s. "Illinois," W. H. Warrington, commanding, N. 44° 51', W. 39° 00', barometer 29.57 (751.1), wind ssw., force 6, weather cloudy; s. s. "State of Nevada," J. A. Stewart, commanding, N. 44° 29', W. 43° 9', barometer 29.6 (751.8) wind nnw., force 6, cloudy; vessels near the fiftieth parallel had easterly winds of force 2 to 4, with pressure about 29.6 (751.8). During the 6th, the disturbance moved northeastward with diminishing pressure and increasing storm-energy, and by the 7th, the centre was near N. 47°, W. 31°; on the forty-ninth parallel and to the northward, the easterly winds now increased to force 6-7, and the southerly and westerly winds in the vicinity of the centre attained the force of a fresh to strong gale (7-8). The following vessel-reports indicate the probable position of the storm centre: s. s. "State of Nevada," J. A. Stewart, commanding, N. 47° 35', W. 37° 54', barometer 29.08 (738.6), wind s., force 5, cloudy; s. s. "Samarina," B. Woolfenden, commanding, N. 46° 15', W. 40° 53', barometer 29.02 (737.1), wind w. by n., force 6, squally; s. s. "Polynesian," R. Brown, commanding, N. 46° 41',

W. 38° 56', barometer 29.15 (740.4), wind sw. by w., 4, cloudy; s. s. "Wyoming," J. Douglas, commanding, N. 48° 38', W. 29° 46', barometer 29.35 (745.5), wind ssw., force 6, changeable; s. s. "Scythia," M. Murphy, commanding, N. 49° 12', W. 30° 10', barometer 29.35 (745.5), wind se., force 5, raining; s. s. "Salier," C. Wiegand, commanding, N. 46° 54', W. 34° 49', barometer 29.23 (742.4), wind w. and sw., force 8; s. s. "Rugia," A. Albers, commanding, N. 45° 24', W. 34° 27', barometer 29.38 (746.2), wind sw., force 7, fair; s. s. "Normandie," G. Frangeul, commanding, N. 45° 38', W. 32° 3', barometer 29.41 (747.0), wind sw., force 7. By the morning of the 8th there was but slight change in the position of the region of least pressure, but the area of disturbance appeared to be more extended than on the preceding day; the winds continued to blow with a force of 6 to 7, with occasional squalls of force 8. By the 9th the depression had moved by a north-northeasterly course to about N. 53°, W. 25°, where the pressure, as reported, was about 29.4 (746.7); southerly and southwesterly winds of force 4 to 6 prevailed over the region east of W. 25°, with northerly and northwesterly winds of 5 to 8 between W. 30° and 45°. During the 10th and 11th the disturbance passed north-northeastward at a considerable distance from the British coasts and disappeared on the last-mentioned date.

3.—This is a continuation of the disturbance described as low area iii. under "areas of low barometer." The depression remained near the coast of Nova Scotia during the 11th and 12th, with the pressure varying from 29.0 (736.6), to 29.4 (745.7), and causing rainy weather and moderate gales over the Maritime Provinces and the Gulf of Saint Lawrence. On the 13th, the storm-centre was south of Newfoundland and moving in an easterly direction, attended by moderate westerly and northwesterly winds to the southward and westward, and light southerly winds to the eastward. During the 14th and 15th, the course changed to northeast and the disturbance passed over the ocean without manifesting any special features. On the 16th the region of least pressure was near N. 52°, W. 20°, the barometer reading about 29.6 (751.8); during the day the depression apparently passed northeastward over the British Isles.

4.—This disturbance appeared in mid-ocean on the 12th; on that day the pressure near N. 48°, W. 34°, was about 29.3 (744.2). During the day the depression moved somewhat rapidly northeastward, with an increase of storm-energy and by the 13th, it was central off the Irish coast. The following vessel-reports indicate the character of the weather during the passage of this disturbance: Captain E. Kopff, commanding, the s. s. "Frisia," reported: "May 12th, between N. 49° and 48°, and W. 24° and 28°, had a moderate gale from sw. shifting to nw. and lasting 12 hours; at noon, Greenwich time, barometer 29.85 (758.2), rainy; 2 p. m., 29.69 (754.1), rainy; 4 p. m., 29.39 (746.5), squally; 6 p. m., 29.41 (747.0), wind shifting; 8 p. m., 29.57 (751.1), midnight, 29.83 (757.7), weather clearing, wind moderating." Captain W. McMickan, commanding, the s. s. "Gallia," reported as follows: "12th, heavy gale commenced about 9 p. m., with violent squalls veering from s. to wnw., and continued all night; split several sails; 13th, 6 a. m., furious squalls with high sea breaking over the ship fore and aft and doing some damage. At 4 p. m., 12th, barometer read 29.85 (758.2); 8 p. m., 29.62 (752.3), wind shifting gradually from s. to wnw., heavy squalls; midnight, barometer, 29.42 (747.3); 13th, 4 a. m., 29.57 (751.1), hard gale, furious squalls from wnw.; 8 a. m., 29.71 (754.6); 9 a. m., moderating; 10.39 a. m., N. 50° 11', W. 22° 11', barometer 30.12 (765.0); 4 p. m., 30.23 (767.8)." The steamships "Oregon" and "Hohenzollern," between N. 50°, W. 28°, and N. 48°, W. 32°, encountered strong sw. to nw. gales with very high sea on the 13th.

5.—This is a continuation of low area vi. of "areas of low barometer." On the morning of the 18th the disturbance was central between Cape Breton Island and Newfoundland the pressure at the centre being below 29.64 (752.8). During the 19th and 20th the depression apparently moved northeastward