

NORTH ATLANTIC METEOROLOGY.

[Pressure in inches and millimeters; wind-force by Beaufort scale.]

NORMAL CONDITIONS.

The normal barometric pressure for November over the North Atlantic Ocean, as deduced from international simultaneous meteorological observations taken at Greenwich noon and not reduced to standard gravity, is lowest, 29.60 (752), in a small oval covering Iceland and North Cape. A similar oval of 29.60 (752) covers the North Pacific from the southern portion of Alaska westward to Kamchatka, between N. 50° and N. 60°. The area of highest pressure, 30.10 (764) to 30.20 (767), extends from California eastward in a narrow belt over the south Atlantic States and the middle Atlantic Ocean to Morocco and Algeria; still higher pressures prevail farther eastward, rising to a maximum of 30.40 to 30.50 in southern Siberia. During November and December, and January and February, the maxima in Siberia and the minima over the North Atlantic and North Pacific are the prominent features in the meteorology of the Northern Hemisphere.

As compared with October, the mean pressures in November are higher by 0.05 to 0.10 over the entire United States, as also over British North America, the North Pacific, and the arctic regions. The maximum rise of pressure is 0.30 in central Asia. Over the North Atlantic pressure is lower by 0.05 or less.

The general path of storm centers in November is appreciably the same as in October and September, the principal change being an increase in the number and frequency of low areas in northern latitudes. The general velocity of movement of storm centers over the United States increases from about 25 miles per hour in the summer months to 37 in the winter months and is 31 miles in November.

NORTH ATLANTIC STORMS.

The following paragraphs give some account of the areas of low pressure and strong winds on the North Atlantic Ocean during November, 1894. Daily charts are compiled at the Weather Bureau showing the atmospheric conditions over the United States, Europe, and the Atlantic Ocean, as nearly as practicable at Greenwich noon, and afford a basis for approximating the locations and paths of the more important areas of high and low pressure.

The individual low pressures are enumerated as follows:

A. This was a continuation of *I* from the series for October and was central off the coast of Ireland on the 1st. It moved northeastward and disappeared on the 2d.

B. This was central on the 1st at N. 52°, W. 49°, and on the 2d, at N. 53°, W. 23°. After this the central pressure fell rapidly, with increasing northwest winds. On the 3d it was at N. 56°, W. 17°. It then passed northeastward over the Orkneys and disappeared on the 5th over the Baltic.

C. This was a continuation of No. II of the United States series, which was central near Labrador on the 4th; at N. 52°, W. 39°, on the 5th; at N. 56°, W. 27°, on the 6th. On the 7th, noon, it was north of Ireland, at N. 60°, W. 10°. Here it merged into the general low of the North Atlantic Ocean.

D. This was a continuation of No. VI of the United States series which developed suddenly on the 5th, and passed slowly northeastward along the southern coast of New England; it was central on the 7th in the Straits of Belle Isle; on the 8th, N. 54°, W. 48°; on the 9th, N. 60°, W. 20°; on the 10th, N. 63°, W. 5°, after which it disappeared from our maps by enlarging and merging into the following.

E. This was apparently central at about N. 45°, W. 20°, on the 10th, moving northward; on the 11th, N. 48°, W. 20°; on the 12th, N. 50°, W. 8°. By the 13th the areas *D* and *E* had

united and were central over Denmark. By the 14th a new depression had formed to the westward and these had moved to the Gulf of Finland, after which they disappeared.

F. On the 12th the pressure was falling west of Great Britain and south of Greenland. Apparently the low pressure that was central on the 10th over the middle Atlantic States moved rapidly northeastward over Labrador, where it was central on the 11th, a. m., to southern Greenland, where it was central on the 12th, and to the south of Iceland, where it was central on the 13th, at N. 60°, W. 20°; by the 14th, noon, it was about N. 61°, W. 9°. By such a movement this low area lost the characteristic which it first had of a local whirl and acquired the character of a general depression or meiobar, such as characterizes the general circulation of the atmosphere. Thus, on the 9th comparatively small depressions, *C*, *D*, and *F*, existed respectively west of Norway, south of Iceland, and over the Lake region, whereas by the 12th, and especially the 13th, these had expanded and joined with *E* and *G*, so as to form an extensive meiobaric area reaching from Sweden to Greenland and thence to the Lake region. We thus see that as these great depressions break up into cyclonic storms when they are properly fed with air from the surrounding high areas, so on the other hand they develop further by the running together of cyclonic storms when the latter are not maintained in their integrity by an appropriate inflow from the adjoining high areas. If we restrict the words meiobar and pleiobar, as defined in the preceding chapter, to the four great areas of high and low pressure that are usually found on the maps of the Northern Hemisphere, then it may be said that, in general, special storms develop from small depressions only when these are gently fed by the adjoining pleiobars and that when they are not thus nurtured they flatten out and disappear, but when they are overfed they run into and temporarily increase the size and depth of the nearest meiobar.

G and *H*. *G* was a continuation of low No. IX of the United States series that was central on the 13th, a. m., in the upper Lake region and on the 14th, a. m., in the St. Lawrence Valley, but by the 15th, a. m., was central in the Straits of Belle Isle and had been almost overtaken by low No. X of the United States series, which receives the letter *H*. By the 16th, noon, area *G* was central about N. 55° and W. 30°, while *H* was central in Labrador and *F* was between Iceland and Scotland, thus again forming, respectively, the western and eastern ends and the center of the meiobar *F*, *G*, *H*. During the 17th, 18th, and 19th the winds in this meiobaric area appreciably diminished in force, and by the 19th a small area of low pressure, 29.6, between Iceland and Great Britain, was all that remained. On the other hand, unusual areas of high pressure advanced from central Asia westward over Europe and from arctic North America southeastward over the United States, which movements, although at first tending apparently to complete the process of rising pressure over the North Atlantic, yet actually soon resulted in the formation of new cyclonic whirls and low areas. The European high pressure attained its maximum on the 26th, but dominated Europe during the rest of the month.

I. This small depression was central over the Lake region on the 18th, over New England on the 19th, and near the Straits of Belle Isle on the 20th. The central pressure had fallen rapidly. On the 21st it was central near N. 56°, W. 40°; 22d, N. 60°, W. 20°, after which it disappeared, although the neighboring winds indicated that it passed rather far to the north and near to Iceland.

J. This was a continuation of United States series No. XIII,

which was central in the Lake region on the 24th, noon, and passed southeastward over New England. On the 25th, noon, it was central at N. 42°, W. 62°; 26th, noon, N. 40°, W. 57°, after which it disappeared.

K. This was a continuation of United States series No. XI, which was central in the St. Lawrence Valley on the 27th, noon, and passed to the east-northeast, being central on the 29th at about N. 53°, W. 43°, after which it disappeared.

IN GENERAL.

From the 17th to the 30th of the month there was a general tendency in the pressure to increase over the Atlantic Ocean in the belt between Newfoundland and Great Britain, and at the close of the month the pressure in this region ranged between 30.2 and 30.6; high pressure also prevailed over central and western Europe and over all the eastern portion of North America. As this was not an average normal condition of the atmosphere for this season over the ocean, although it fairly represented the tendency over the land, it was expected that a return to the normal condition during the following month of December would be accompanied by severe storms.

OCEAN FOG.

The limits of fog belts west of the fortieth meridian, as determined by reports of shipmasters, are shown on Chart I by dotted shading. Near the Grand Banks of Newfoundland, fog was reported on 17 dates; between the fifty-fifth and sixty-

fifth meridians on 2 dates; and west of the sixty-fifth meridian on 3 dates. Compared with the corresponding months of the last seven years, the dates of occurrence of fog near the Grand Banks numbered 7 more than the average; between the fifty-fifth and sixty-fifth meridians, 1 less than the average. No fog west of the sixty-fifth meridian was reported in November, 1893.

OCEAN ICE.

The limits of the region within which field ice or icebergs were reported for November, 1894, are shown on Chart I by crosses.

The southernmost ice, a berg 1,000 feet long with two high peaks, was reported on the 3d, in N. 47° 05', W. 51° 15'; and the easternmost ice was reported on the 26th, in N. 47° 30', W. 49° 34'. The ice of the current month was noted on one date in the Straits of Belle Isle.

No arctic ice was reported for November, 1892. In November, 1891, an iceberg was observed in N. 51° 58', W. 55° 35', on the 8th. In November, 1890, a small piece of ice was noted in N. 46° 35', W. 47° 51'. In November, 1882, 1883, 1887, and 1888, no ice was reported near Newfoundland and the Grand Banks. In November, 1884 and 1889, several icebergs were seen over the eastern part of the Banks of Newfoundland. On one date in November, 1885, and one date in November, 1886, ice was observed south of the fiftieth parallel.

TEMPERATURE OF THE AIR.

[In degrees Fahrenheit.]

The distribution of the monthly mean temperature of the air over the United States and Canada is shown by the dotted isotherms on Chart II; the lines are drawn over the high irregular surface of the Rocky Mountain plateau, although the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country occupied by our observers; such isotherms are controlled largely by the local topography, and should be drawn and studied in connection with a contour map.

DIURNAL PERIODICITY.

The regular diurnal period in temperature is shown by the hourly means given in Table V for all stations having self-registers.

NORMAL TEMPERATURE.

In Table II, for voluntary observers, the mean temperature is given for each station, but in Table I, for the regular stations of the Weather Bureau, both the mean temperatures and the departures from the normal are given for the current month. In the latter table the stations are grouped by geographical districts, for each of which is given the average temperature and departure from the normal; the normal for any district or station may be found by adding the departures to the current average when the latter is below the normal and by subtracting when it is above.

DEPARTURES FROM NORMAL TEMPERATURE FOR NOVEMBER, 1894.

As compared with the normal for November the mean temperatures for the current month were decidedly in excess from Texas, Kansas, Nebraska, western North and South Dakota westward to the Pacific Ocean. The ridge of greatest excess includes the following: Laramie, 9.8; Helena, 8.4; Red Bluff, 6.0; Salt Lake City and Yuma, 5.6; Spokane and Tucson, 5.5.

Considered by districts, the mean temperatures for the current month show the following departures from normal temperatures:

Positive departures: Northern slope, 4.8; middle slope, 2.4; southern slope (Abilene), 2.1; southern plateau, 4.5; middle plateau, 4.3; northern plateau, 5.1; north Pacific, 1.4; middle Pacific, 3.7; southern Pacific, 0.6.

Negative departures: New England, 3.5; middle Atlantic, 3.0; south Atlantic, 2.1; Key West, 0.6; east Gulf, 1.7; west Gulf, 0.4; Ohio Valley and Tennessee, 3.8; lower lakes, 4.2; upper lakes, 4.1; North Dakota (extreme northwest), 1.3; upper Mississippi, 4.5; Missouri Valley, 1.2.

For certain voluntary stations of rather long periods of observation the normal and extreme mean temperatures and the departures are shown in detail in Table X a, which is now placed among the meteorological tables instead of being inserted in the text as heretofore.

YEARS OF HIGHEST MEAN TEMPERATURE FOR NOVEMBER.

The mean temperature for November, 1894, was the highest on record at regular Weather Bureau stations as shown in the following table, which also gives the highest previous record:

Stations.	November, 1894.		Highest previous.	
	Mean temperature.	Departure from normal.	Temperature.	Year.
Wichita, Kans	46.0	+2.5	45.9	1890
Santa Fe, N. Mex	43.2	+5.1	42.7	1873
Tucson, Ariz	62.5	+5.5	58.6	1892
Yuma, Ariz	68.3	+5.6	65.2	1890
Pueblo, Colo	43.6	+2.9	42.3	1892
Denver, Colo	44.8	+4.8	42.9	*
Cheyenne, Wyo	41.0	+5.6	39.3	1873
Lander, Wyo	36.8	+9.8	34.3	1887
Salt Lake City, Utah	45.6	+5.6	44.2	1891
Helena, Mont	41.0	+8.4	39.1	1885
Walla Walla, Wash	47.2	+4.7	46.8	1892
Spokane, Wash	42.9	+5.5	41.1	1885
Olympia, Wash	47.4	+2.2	47.2	1891
Red Bluff, Cal	59.4	+6.0	58.0	1890
Carson City, Nev	44.4	+2.7	44.4	1891
Sacramento, Cal	58.2	+4.8	55.9	1891
San Francisco, Cal	59.4	+3.4	59.0	1890
Fresno, Cal	58.6	+3.2	56.9	1890

* Frequently.