

# MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

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WAR DEPARTMENT,  
OFFICE OF THE CHIEF SIGNAL OFFICER,  
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

## INTRODUCTION.

This REVIEW presents a general summary of the meteorological data collected by the Signal Service during the month of July, 1882.

The more prominent meteorological features of the month have been:

1st: The unusually high pressure, which has been above the normal in all sections of the country, except on the eastern slope of the Rocky mountains. The pressure ranged from normal in the New England states, to 0.08 inch above the normal in the Gulf states, and on the Pacific coast the same conditions prevailed, the pressure being from 0.02 to 0.08 inch above the normal.

2d: The deficiency in temperature, which has been below the normal throughout the country, except in New England and in the middle and south Pacific coast regions, where it was slightly above. In all other districts, the temperature ranged from 0.3 below the normal in Tennessee, to 6°.0 below the normal in the upper Mississippi valley.

The month has been particularly marked by the absence of storms, only six well-defined storm-centres occurring within the limits of the Signal Service stations during the month, and these did not exhibit any special energy. Local storms and tornadoes were comparatively few in number and were not very severe.

The rainfall has been below the average, except in that part of the country lying south of the thirty-sixth parallel of latitude.

Severe drought has prevailed in the New England states, and has to some extent injured the crops in that part of the country. In all other sections, the crops are almost uniformly reported to be making favorable progress. A large portion of the wheat crop has been harvested; the yield having proved above the average. The condition of the corn crop is reported to be promising, but owing to the cold weather during the planting season, it is from two to three weeks late.

The cotton region reports are continued, and for purposes of comparison, the tables of temperature and rainfall are given for the three months preceding July. The condition of the cotton crop is in general satisfactory.

Insects have been numerous in New England and caused severe ravages in crops, especially in Connecticut and Massachusetts.

The chart showing the limits of icebergs in the North Atlan-

tic ocean is continued, but the reports of vessels encountering ice are less numerous than for the two preceding months.

That part of the REVIEW referring to International Meteorology presents the general weather conditions which prevailed over the northern hemisphere during the month of May, 1880, the most marked feature being the prevalence of high pressures over central Europe during that month. Chart v. exhibits the tracks of barometric minima for August, 1880, traced from simultaneous observations taken at 7:35 a. m., Washington mean time, and will be found interesting as showing the tracks of three West Indian hurricanes, and of four typhoons occurring in the China sea.

In the preparation of this REVIEW the following data received up to August 20th, have been used, viz.: the regular tri-daily weather charts, containing the data of simultaneous observations taken at one hundred and thirty-six Signal Service stations and twelve Canadian stations, as telegraphed to this office; one hundred and eight-two monthly journals and one hundred and seventy-three monthly means from the former, and twelve monthly means from the latter; one hundred and eighty-seven monthly registers from voluntary observers; fifty-four monthly registers from United States Army Post Surgeons; Marine Records; International Simultaneous Observations; Marine Reports through the co-operation of the New York Herald Weather Service; abstracts of Ships' Logs, furnished by the publishers of "The New York Maritime Register"; monthly reports from the local weather services of Kansas, Nebraska, and Missouri, and of the Central Pacific railway company; trustworthy newspaper extracts; special reports.

## BAROMETRIC PRESSURE.

The mean barometric pressure for the month of July over the United States and Canada is shown by the isobarometric lines, in black, on chart ii. The area of lowest mean pressure covers Arizona, portions of Colorado, New Mexico and Utah, where the mean pressure ranges from 29.79 to 29.87 inches. The pressure gradually increases to the north, east, and west of this region, and is greatest over the south Atlantic states, Florida, the east Gulf states, and the north Pacific coast region. Compared with the previous month, the pressure is everywhere higher. In the northern slope the increase ranges from 0.06 to 0.12 inch; in the upper Mississippi and Missouri valleys, from 0.03 to 0.14 inch; in the lake region and Ohio valley, from 0.04 to 0.13 inch; in New England and the middle Atlantic states, from 0.09 to 0.13 inch; in the Gulf states, from 0.04 to 0.09 inch, and on the Pacific coast, from 0.03 to 0.08 inch.

## DEPARTURES FROM THE NORMAL VALUES FOR THE MONTH.

Compared with the means of previous years, the pressure is generally above the normal over the country east of the one hundredth meridian, the increase being from normal to 0.08 inch. On the Pacific coast, the pressure is from 0.02 to 0.08 inch above the normal, and at stations in Wyoming, Colorado, New Mexico, and Nevada, from normal to 0.08 inch below.

## BAROMETRIC RANGES.

The range of pressure during the present month has varied from nineteen to eighty-five hundredths of an inch, the greatest range being reported from Saint Vincent, Minnesota, and the least from Fort Grant, Arizona. In the several districts the barometric ranges have been as follows:

*New England:* From 0.72 inch at Springfield to 0.84 inch at Mount Washington.

*Middle Atlantic states:* From 0.58 inch at Lynchburg to 0.78 inch at New York and Sandy Hook.

*South Atlantic states:* From 0.41 inch at Jacksonville to 0.57 inch at Charlotte.

*Florida peninsula:* From 0.24 inch at Key West to 0.36 inch at Cedar Keys.

*East Gulf states:* From 0.28 inch at Vicksburg to 0.39 inch at Montgomery and Starkville.

*West Gulf states:* From 0.27 inch at Galveston to 0.39 inch at Fort Smith and Little Rock.

*Rio Grande valley:* From 0.25 inch at Brownsville to 0.35 inch at Eagle Pass.

*Ohio valley and Tennessee:* From 0.37 inch at Memphis to 0.58 inch at Pittsburg.

*Lower lake region:* From 0.52 inch at Toledo to 0.68 inch at Oswego.

*Upper lake region:* From 0.50 inch at Chicago to 0.75 inch at Marquette.

*Extreme northwest:* From 0.59 inch at Fort Stevenson to 0.85 inch at Saint Vincent.

*Upper Mississippi valley:* From 0.45 inch at Saint Louis to 0.68 inch at Saint Paul.

*Missouri valley:* From 0.44 inch at Springfield to 0.67 inch at Yankton.

*Northern slope:* From 0.46 inch at Cheyenne to 0.70 inch at Fort Custer.

*Middle slope:* From 0.31 inch on summit of Pike's Peak to 0.50 inch at Denver and Dodge City.

*Southern slope:* From 0.30 inch at Fort McKavett to 0.44 inch at Henrietta.

*Southern plateau:* From 0.19 inch at Fort Grant to 0.40 inch at Prescott and 0.41 inch at La Mesilla.

*Middle plateau:* From 0.37 inch at Pioche and Winnemucca to 0.44 inch at Salt Lake City.

*Northern plateau:* From 0.39 inch at Eagle Rock to 0.54 inch at Lewiston.

*North Pacific coast region:* From 0.43 inch at Roseburg to 0.48 inch at Olympia.

*Middle Pacific coast region:* From 0.33 inch at San Francisco to 0.37 inch at Red Bluff.

*South Pacific coast region:* From 0.25 inch at San Diego to 0.34 inch at Yuma.

## AREAS OF HIGH BAROMETER.

Five well-defined areas of high barometer have appeared within the limits of the map. They have pursued their usual track to the south of east. All have first appeared on the northern boundary of the United States between Minnesota and Idaho. None of the high areas have been associated with any strongly defined weather conditions.

I.—On the 1st, there was a sharp rise in pressure in the northwest and upper lake region in rear of low area i., then moving over the lower lakes and down the Saint Lawrence valley. On the 2d, there was a barometric rise of nearly 0.3 inch in the lower lakes and middle states, and at the end of

the day there was a great depression in the maritime provinces of Canada, averaging nearly 0.4 inch below the mean, and a second depression, low area ii., was advancing eastward from the northwest, and on the 3d the high pressure, moving in a southeasterly track, disappeared beyond the limits of the chart.

II.—On the 3d, the barometer rose from 0.3 to 0.4 inch in Montana, Dakota, and the northwest, in rear of low area ii., then moving in a southeasterly track down the Mississippi into the Ohio valley. The pressure in the two territories named averaged from 0.2 to 0.3 inch above the mean; on the same day the temperature in the northwest and lake region was from 10° to 15° below the mean for the month. On the 4th, the centre of high area moved in a southeasterly direction into the upper Mississippi valley and upper lake region, accompanied by clearing weather and northerly winds, which veered to the south and east in the Missouri valley and Manitoba. On the same day the temperature was from 15° to 20° below the mean in the lake region, Ohio valley and middle states. On the 5th, the high barometer extended from the lake region to the Gulf of Mexico, accompanied by unusually fair or clear weather, and the temperature continued from 5° to 20° below the mean for the month, east of the Mississippi river. On the 6th, the high pressure was transferred to the south Atlantic and middle Atlantic states, and clear weather with light northerly winds prevailed. On the 7th and 8th, the pressure remained highest, but only slightly above the mean, in the middle Atlantic and south Atlantic states during the disappearance of low area iii. in the upper lake region, and the approach of low area iv. into Dakota. On the 9th, 10th, and 11th, the highest barometers reported were from the south Atlantic and east Gulf states, while a great depression—not charted—existed in the lake region and Saint Lawrence valley. With respect to extent and duration, this was the most important high area of the month. The minimum temperatures for the month occurred during its prevalence, including many stations in the Mississippi valley, and in general in the lake region, Ohio valley, Tennessee, east Gulf, south Atlantic and middle states.

III.—There was a sharp barometric rise on the 11th in Idaho, Montana and Manitoba. At the morning observation of the 12th, the reported pressures from Idaho and Montana were from 0.36 to 0.49 inch above the normal; during the day the high area moved into the Missouri valley, accompanied by low temperatures, northwesterly winds and clearing weather. On the 13th the high area extended from Manitoba to the Gulf; on the 14th from the lake region to the Gulf and Atlantic coast states; during the day generally fair weather was reported from the interior of the country east of the Mississippi river, and general rains along the Atlantic coast. On the 15th, the pressure rose in the lower lakes, New England and middle states during the progress of low area vi. over the northwest. In these districts the barometer averaged nearly 0.3 inch above the normal. On the 16th the barometer rose along the middle Atlantic and New England coast; the highest pressures reported were Sandy Hook, 30.32, Philadelphia, New York and Block Island 30.33, and Boston and Baltimore 30.31, or from 0.35 to 0.4 inch above the mean. On the 17th the high area moved slowly to the eastward beyond the limits of the chart. In connection with this high area the minimum temperatures were quite generally reported from Idaho, Utah, Montana, Wyoming, Dakota, Colorado, Nebraska and Kansas.

IV.—On the 18th the pressure was high in the upper Missouri valley, averaging 0.2 inch above the normal. On the 19th the high area extended over the northwest, with clearing weather and northwest winds, and temperatures 10° to 15° below the mean for the month. On the 20th the barometer generally rose east of the Rocky mountains, remaining highest in Manitoba, Minnesota and Iowa. On the 21st, with a general rise east of the Mississippi river, the barometer still continued highest in the same region as on the previous day, when the pressure was from 0.25 to 0.3 inch above the normal.

On the 22d, the high area extended from lakes to the Gulf and Atlantic coasts, a sharp barometric fall taking place the same day in the extreme northwest. On the 21st and 22d, general, heavy rains, accompanied by northeasterly winds, were reported from the southern and eastern boundaries of the high pressure. On the 23d, the high area remained nearly stationary in position. On the 24th, with a general fall in pressure, the highest barometer was transferred to the middle Atlantic coast. The centre of high area on the 25th, 26th and 27th, extended, without exercising any special weather changes, to the south Atlantic and east Gulf states. During the prevalence of this high area the temperature in the regions covered by it were in general below the mean for the month.

V.—On the 27th there was a marked rise of pressure in Manitoba. On the 28th the high area extended over the upper lake region. On the 29th, it was central over the entire lakes, where clearing weather was reported with northerly winds. On the 30th, there was a rapid transfer of the high area to the middle states, New England and the maritime provinces of Canada. On the 31st the barometer continued rising in the middle states and New England, with south to east winds. At the 11 p. m. observation the highest readings of the month were recorded: Provincetown, 30.38; Boston and Block Island, 30.36; New Haven, 30.35; New York and Sandy Hook, 30.34; Philadelphia, 30.33, and Portland, 30.32. These readings were from 0.35 to 0.42 inch above the mean for the month.

AREAS OF LOW BAROMETER.

Six areas of low barometer have been sufficiently defined to permit their tracks to be charted, within the limits of the stations of observation. These tracks are exhibited on chart number i. Compared with the month of July in previous years, the storm-centres have shown a great diminution of energy; only seven cautionary signals being displayed for the month and these along the New England coast. It is worthy of note that the maximum temperatures for July do not as a rule correspond in date with the progress of any of the low areas charted. These temperatures generally occurred when the pressure over the country was near the mean, and during the prevalence of the usual southerly winds, resulting from such a distribution of pressure.

The following table gives the latitude and longitude in which each area was first and last observed, and the average hourly velocity:

Areas of low barometer.	FIRST OBSERVED.		LAST OBSERVED.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
No. I.	40° 00'	115° 00'	46° 30'	61° 00'	19.4
II.	47° 00'	107° 00'	48° 30'	68° 30'	25.6
III.	48° 00'	105° 00'	43° 30'	89° 40'	12.7
IV.	48° 00'	111° 30'	49° 00'	95° 30'	15.0
V.	48° 00'	85° 30'	49° 00'	63° 00'	32.2
VI.	48° 30'	109° 00'	49° 00'	86° 00'	17.0

The following table gives the number of areas of low pressures during the month of July, since 1873.

Month.	Year.	No.	Month.	Year.	No.
July.	1873,	13.	July.	1878,	11.
"	1874,	11.	"	1879,	9.
"	1875,	8.	"	1880,	12.
"	1876,	8.	"	1881,	5.
"	1877,	8.	"	1882,	6.

I.—This is the low area described as low area ix. of the June REVIEW. At the morning observation of the 1st, the isobar of lowest pressure, 29.6, included the lake Ontario region, the barometer being nearly 0.4 inch below the normal; during the day the low area moved slowly to the eastward, accompanied by heavy and general rains in the middle states and New England. On the 2d, the depression, increas-

ing considerably in energy, moved over the maritime provinces and beyond the limits of the chart. The lowest pressures reported were: Yarmouth, 29.47; Halifax, 29.44; Sydney, 29.47; or averaging about 0.45 inch below the normal. The maximum temperatures were reported on the 1st in connection with this depression from some of the stations in Tennessee, Ohio valley, and Illinois. The following reports furnished through the co-operation of "The New York Herald Weather Service," probably indicate the presence of this storm during its movement eastward over the ocean: 2d, s. s. "Republic," in N. 41° 23', W. 55° 40', barometer 29.94, sse., force 6, sky overcast with detached clouds and raining. The following day, 3d, in N. 41° 46', W. 47° 59', the barometer had risen to 30.16, sw. by s., force 5, fair weather. On the 4th, in N. 44° 48', W. 40° 58', the storm had in all probability passed beyond and to the east of the vessel, the barometer being then 30.30, w., force 3, and misty.

II.—On the 2d, a depression, developing in Montana, moved in a track slightly to the south of east over Dakota, accompanied by local rains in Minnesota, Wisconsin, and Dakota. On the 3d, the low area pursued a southeasterly course, exhibiting but slight energy, into the Ohio valley. Rain was reported during the day from all the states east of the Mississippi river. On the 4th, the storm centre moved to the southeast into North Carolina, and then changed to a northeasterly track, being charted at the 11 p. m. observation near Chincoteague, Virginia, at which time high northeast winds were reported along the middle Atlantic coast. On the 5th, the centre of the storm area moved as charted, and high north to east winds continued on the New Jersey coast and Long Island sound. On the 6th, the depression first moved to the northward into the Saint Lawrence valley and thence along the valley to the Gulf. Cautionary signals were displayed in advance of this storm from New Haven to Portland, and were generally justified. The following reports furnished through the co-operation of "The New York Herald Weather Service," probably indicate the presence of this storm during its movement eastward over the ocean: s. s. "Bothnia," 6th, in N. 40° 40', W. 68° 21', barometer 29.96, southerly, force 3, sea confused, misty at intervals. The following day, 7th, the storm seemed to have passed beyond and to the northeastward of the vessel; in N. 41° 06', W. 61° 27', the barometer having risen to 30.20, winds still southerly, force 4, but the sea-swell being from the north, with cloudy weather.

III.—On the 5th a depression of slight energy developed in Montana and Dakota. On the 6th it moved in an easterly track over Minnesota, accompanied by general rains in the northwest and lake region. The lowest pressures reported were: Saint Paul, 29.57; Duluth, 29.58, or 0.37 and 0.36 inch below the normal respectively. On the 7th the centre of the storm-area, diminishing in energy, moved to the southeast and ceased to exist as a depression near Lake Michigan.

IV.—On the 7th, a depression developing in Idaho, moved slightly to the south of east over Montana. On the 8th, with a slight easterly movement, the centre remained in Dakota, and rain was generally reported from Dakota and Minnesota. On the 9th the low area moved to the northeast beyond the limits of the chart. The lowest pressures reported were: Moorhead, 29.55; Saint Vincent, 29.37; Fort Garry, 29.5, or respectively 0.4, 0.57 and 0.5 inch below the normal. Although the centre of depression cannot be charted after the 9th, the pressure fell on the 10th and 11th in the lake region and Saint Lawrence valley, in some instances falling 0.4 inch below the normal. During the progress of this low area, rain was reported from all the states east of the Mississippi river. The pressure did not rise to the mean in the upper lake region until the 13th, and in the lower lake region, middle states and New England until the 14th.

V.—The track of this depression should be considered in connection with the description of low-area iv. While the barometer continued low in the lake region, a secondary depression was first located on the 12th near Mackinac, Mich-

igan, which, exhibiting but slight storm energy, moved on the 13th down the Saint Lawrence valley and beyond the limits of the chart.

VI.—At the midnight report of the 13th, a depression became apparent in Montana. On the 14th, showing but slight energy, it moved into southeastern Dakota, with local rains reported from the Missouri valley. On the 15th the low area changed its course to the northeast over Minnesota, and general rain was reported from the northwest. On the 16th the depression moved, while the barometer continued low in the lake region, over the Canadian provinces.

INTERNATIONAL METEOROLOGY.

International charts iv. and v. accompany the present number of this REVIEW. Chart iv. is published for May, 1880, and continues the series of that chart begun in January, 1877. Chart v. is prepared for August, 1880, and continues the series of that chart from November, 1877. In the description of these charts, much valuable information has been obtained from the "Monatliche Uebersicht der Witterung," published by Professor Dr. G. Neumayer, Director of the German Marine Observatory, and from the "Bulletin Mensuel," published by Mr. Marc. Dechrevens, of Zi-Ka-Wei, China.

Chart iv. exhibits the mean pressure, mean temperature and prevailing direction of the wind over the northern hemisphere for the month of May, 1880, as determined from one observation taken each day at 7.35 a. m., or 0.43 p. m. Greenwich mean time. Three areas of mean low barometer are exhibited on the chart, the first of which appears over British India, and is a constant feature of that part of Asia during the summer months. The isobar of 29.60 (751.8) encloses the central and eastern provinces of British India, where the mean pressure for the month was below 29.55 (750.6).

The second area of mean low pressure is also situated over Asia, and covers the whole of India, except the central provinces above referred to.

The third area of mean low barometer, 29.80, (756.9) extends over Greenland to northern Norway and Sweden, and thence over eastern and southern Russia. The isobarometric line of 29.80 (756.9) also covers Siberia eastward to the ninetieth meridian; it also covers the Chinese Empire south of the fiftieth parallel. An area of mean low pressure, 29.80, (756.9) also appears in North America over Minnesota and Manitoba.

Two areas of barometric maxima appear upon the chart; the first, 30.20, (767.1), occupies the Atlantic between the thirty-third and forty-fourth parallels of north latitude, and between 38° and 26° west longitude; the other, 30.10 (764.5), covers Texas and the Atlantic coast of the United States as far north as the fortieth parallel; it also extends eastward over the Atlantic, and includes the British Isles within its limits. The isobar of 30.00 (762.0) covers central and southern Europe, while that of 29.90 (759.4) extends over European Russia.

In North America, the high area of the Pacific covers the middle Pacific coast region, where the mean pressure ranges from 30.12 to 30.21 (765.0 to 767.3).

Compared with the preceding month (April), the pressure has increased over Greenland and northern Europe, the isobars of 29.60 (751.8) and 29.70 (754.6) being now replaced by those of 29.80 (756.9) and 29.90 (759.4). The pressure has remained nearly stationary in central Russia, but has decreased in the eastern part and in Siberia.

In Asia, the pressure has decreased generally in all parts of the continent, the most marked decrease appearing in China and Japan, where the mean pressure is about 0.10 inch below that of April.

In the United States, the mean pressure shows but slight changes. The high area of the south Atlantic extended farther northward during the month under consideration, and in Manitoba, the mean barometer was about 0.10 inch lower than in April. On the Pacific coast, the pressure was slightly above that of the preceding month.

Compared with the corresponding month of previous years, the mean pressure, in the United States, was above the normal on the Atlantic and Pacific coasts, and was slightly below the normal in the interior and northern parts of the country, the greatest deficiency occurring in Minnesota and Dakota.

In Canada, the pressure was slightly above the average, the greatest excess appearing in the maritime provinces.

The following table exhibits the mean pressure and mean temperature for the month of May, 1880, in the several countries of Europe and Asia, compared with the means as determined from observations taken during May in the years 1877, 1878, and 1879:

Table with 6 columns: Countries, Mean Barometer (May 1877, 1878 and 1879; May 1880; Departure), and Mean Temperature (May 1877, 1878 and 1879; May 1880; Departure). Rows include Algeria, Austria, British Isles, Denmark, France, Germany, India, Italy, Norway, Portugal, Russia, Spain, Sweden, and Turkey.

\* May mean for two years only.

The accompanying table shows the deviations in temperature and pressure at isolated stations during the month of May, 1880, as compared with the mean of three years:

Comparative Thermometric and Barometric Means, with corresponding Departures.

Table with 7 columns: STATION, Mean Barometer (May 1877-78-79, May 1880, Departure), and Mean Temperature (May 1877-78-79, May 1880, Departure). Rows list various stations from Lagonat to York Factory.

\* May mean for two years only.

In North America, the temperature was above the normal over the entire country east of the ninety-fifth meridian, except