MONTHLY WEATHER REVIEW.

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WAR DEPARTMENT,

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DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTION.

The meteorological data collected in this office during the month of June and until the 20th of July, 1882, has been carefully examined and a general summary of the several elements for each district in the United States, is presented in this REVIEW.

The temperature during the month of June averaged from 0.1 to 0.2 of a degree above the normal in the districts on the Atlantic coast; it rose slightly in all other districts east of the Rocky mountains, and this increase over the low mean temperature of the previous month, has been favorable to agricultural interests, especially in the eastern and southern sections of the country, where the crops have been greatly improved. The wheat crop has been secured in the southern districts and harvesting was in progress as far north as the fortieth parallel, at the close of the month. Heavy rains in the states north of the Ohio valley and in sections of the northwest, injured the growing corn, and the late spring reduced the acreage of this crop, but the recent warm weather in these sections has greatly improved its condition.

On the Pacific coast, the rainfall has been slightly below the mean for the month, except in southern California, and the wheat crop of Oregon and Washington territory promises to be above the average, while that of California will probably fall slightly below the average.

The cotton region reports have been continued, and for the purposes of comparison, the conditions of rainfall and temperature are given for the months, April, May and June. The warm weather of June in the cotton growing regions has improved the condition of the crop, in the Gulf and south Atlantic states. Reports from the lower Mississippi valley, indicate that a good, but late crop will be produced in the overflowed districts.

The month has been particularly marked by the occurrence of severe local storms and tornadoes, which in many cases, caused great loss of life and property. These destructive storms occurred in almost every section of the country, but were most numerous in the states of the upper Mississippi and lower Missouri valleys. The tornado which occurred in eastern Iowa on the night of the 17th, was the most destructive storm of the month.

Ocean ice continued in the north Atlantic during the month, but it will be seen from the chart that the area within which vessels have reported ice or icebergs, is not so large as in the previous month, although icebergs were observed in longitudes farther to the east, than in either May or April. Several vessels were wrecked in the ice-fields of the north Atlantic during the month, and the chart may be of service in selecting the safe routes for vessels leaving the Atlantic ports. The vessel reports, which give the latitude and longitude in which ice was observed will be found under the heading of OCEAN ICE. Under the same heading is given, an interesting extract of an article written by Mr. E. Douglas Archibald, in which the writer discusses the subject of ocean ice and gives its years of maximum frequency, compared with the years of maximum sun-spots.

That part of the REVIEW referring to International Meteorology, presents the general weather conditions which prevailed over the northern hemisphere during the month of April, 1880, and the tracks of barometric minima for July, 1880, traced from simultaneous observations taken at 7.35 a. m., Washington mean time. The month of April was chiefly remarkable for the high temperatures which prevailed in central Europe, and as an interesting feature of chart v., may be mentioned, the tracing of the first typhoon of July 1880, occurring in the China sea.

In the preparation of this REVIEW the following data 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 fourteen Canadian stations, as telegraphed to this office; one hundred and eighty monthly journals and one hundred and seventy-one monthly means from the former, and fourteen monthly means from the latter; one hundred and eighty monthly registers from voluntary observers; forty-eight 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 distribution of mean atmospheric pressure for the month of June, 1882, is shown by isobarometric lines, in black, on chart number ii.

The area of lowest mean pressure occupies the region north of New England, extending over the lower Saint Lawrence valley, and the second depression, extends over the Rocky mountain regions, the pressure being least in Arizona.

Compared with the previous month, the pressure has diminished from 0.1 to 0.15 of an inch in the lake region, and from 0.1 to 0.2 of an inch in New England, the middle states, and Saint Lawrence valley. On the Pacific coast, the pressure has fallen slightly, the distribution of pressure remaining unchanged. The low area in the Rocky mountain region occupies about the same position as that of May, but the isobar of 29.80 includes within its limits, Arizona, New Mexico, Colorado, and Utah, and parts of Nevada, Nebraska, Wyoming, and Idaho.

DEPARTURES FROM THE NORMAL VALUES FOR THE MONTH.

Compared with the means of June of previous years, the pressure differs slightly from the normal in the Southern states and at the Rocky mountain stations, and it is from 0.05 to 0.1 below the normal in New England and the middle states. It is also slightly below the normal on the North Pacific coast.

BAROMETRIC RANGES.

The barometric pressure during the month of June has varied from 0.18 of an inch to 0.9 of an inch, the least range being at Campo, California, and the greatest range being at Escanaba, Michigan; generally the range increases with the latitude, and, on the same latitude, the range on the Pacific coast is equal to about one-half the range on the Atlantic coast.

In the several districts the barometric ranges have been as follows:

New England: 0.8 inch at Portland, 0.81 inch at Springfield, and 0.68 inch on the summit of Mount Washington.

Middle Atlantic states: 0.86 inch at Albany, 0.62 inch at Norfolk.

South Atlantic states: 0.58 inch at Kittyhawk, and 0.40 inch at Jacksonville.

Florida peninsula: 0.25 inch at Key West, and 0.34 inch at Cedar Keys.

East Gulf states: 0.52 inch at Starkville, and 0.49 inch at Montgomery.

West Gulf states: 0.67 inch at Little Rock, and 0.33 inch at Brownsville.

Ohio valley and Tennessee: 0.61 inch at Memphis, 0.54 inch at Cincinnati, and 0.51 inch at Knoxville.

Lower lake region: 0.77 inch at Oswego, and 0.63 inch at Cleveland.

Upper lake region: 0.90 inch at Escanaba, and 0.72 inch at Chicago.

Upper Mississippi valley: 0.89 inch at Saint Paul, and 0.68 inch at Davenport.

Missouri valley: 0.84 inch at Yankton, and 0.68 inch at Springfield.

Extreme northwest: 0.75 inch at Moorhead, and 0.58 inch at Saint Vincent.

Northern slope: 0.69 inch at North Platte, and 0.51 inch at Cheyenne.

Middle slope: 0.62 inch at Dodge City, and 0.45 inch at Pike's Peak.

Southern slope: 0.67 inch at Henrietta, and 0.38 inch at Stockton.

Northern plateau: 0.53 inch at Umatilla and 0.34 inch at Dayton.

Middle plateau: 0.41 inch at Salt Lake City, and 0.37 inch at Winnemucca.

Southern plateau: 0.39 inch at Santa Fé, and 0.27 inch at Silver City.

North Pacific coast region: 0.52 inch at Portland, and 0.42 inch at Olympia.

Middle Pacific coast region: 0.43 inch at Red Bluff, and 0.30 inch at San Francisco.

South Pacific coast region: 0.32 inch at Yuma, and 0.18 inch at Campo.

AREAS OF HIGH BAROMETER.

Four areas of high barometer have been traced over the eastern part of the United States during the month of June. They were first observed in the region north of the upper Missouri valley, or north of Lake Superior, and moved to the southeast over the Atlantic, developing but slight energy, and causing no unusual change in barometric pressure. In no case has an area of high pressure been traced to the west of the Rocky mountains, while two such areas have apparently approached the north Pacific coast from the Pacific.

I.—The pressure was above the normal for the month in the region north of the Missouri valley on the 1st and 2d, but the development of low area ii, on the eastern slope of the Rocky mountains, apparently retarded the movement of this area. The pressure increased in the western districts on the 4th, a slight excess of pressure appearing over Texas, while the greater pressure continued in British America, north of Dakota. A light "norther" occurred on the Texas coast on the 3d and 4th, in advance of this area, and on the 5th the pressure had increased to 30.20 and above, in the Mississippi and lower Missouri valleys, the centre of greatest pressure being near Springfield, Missouri on the morning of the 5th. The midnight report of the 5th showed that this area was extending eastward over the Southern states, the pressure having increased during the day at stations south of the lake region, and the winds in the southwest shifting to easterly, with light rains in Texas, Indian territory, and Kansas. At the midnight report of the 6th, this area had moved to the east of the coast line, advancing slowly to the southeast, but the pressure continued high in the south Atlantic and Gulf states, with rain gradually extending eastward over the districts as the pressure diminished.

II.—This area appeared in British America, north of Lake Superior and Minnesota on the 10th. It extended over the lake region, Saint Lawrence valley and the middle states, and on the morning of the 12th was central near Montreal, where the pressure was 30.25. At the afternoon report of the 10th this area was central off the middle Atlantic coast, where the pressure continued high until the 14th, when it diminished in advance of low area iv. The pressure increased on the south Atlantic coast as this area passed over New England to the southeast, and, when the barometer fell in the northern districts on the 14th, the region of high pressure was transferred to the Gulf States, where the barometer continued relatively high until the 18th.

III.—This advanced from the northwestward over Lake Superior on the 19th, the isobar of 30.10 enclosing the upper lake region at the midnight report of that date. On the 20th, this area was central over lake Erie, and, on the morning of the 21st, over the middle Atlantic states, enclosed by an isobar of 30.20, which extended from Cape Hatteras to Toronto, Canada. The pressure increased at stations on the Atlantic coast on the 21st, with cool fair weather in New England and the middle states, and without any marked change in the position of this area, which continued over the middle states until the 22d, when it passed slowly to the southeast over the Atlantic, the barometer remaining high in the south Atlantic and Gulf states until the 28th.

IV.—Appeared north of the lake region on the 29th, and extended over the middle states and Saint Lawrence valley, attended by cool northerly winds in these districts on the 29th and 30th. This area disappeared rapidly in advance of low area ix. which was moving eastward from the upper Missouri valley on the morning of the 30th.

Areas of high barometer appeared on the Pacific coast on the following dates, but in no case could they be traced to the east of the Rocky mountains. On the 11th and 12th, the pressure increased to 30.12 at Roseburg and 30.14 at Portland, and continued high until the 18th, reaching the maximum, 30.22, on the 17th. During this period of high pressure on the north Pacific coast, the barometer was below the mean for the month at the central and southern California stations, and over the

middle and southern plateau regions. On the 20th, a second area of high pressure advanced from the Pacific over Oregon and Washington territory, accompanied by cool north to west winds and fair weather, which continued until the close of the month, the pressure in California remaining generally below the mean.

AREAS OF LOW BAROMETER.

Nine areas of low pressure appeared within the limits of the Signal Service stations, sufficiently well-defined to render it possible to trace the movements of each, during at least three consecutive tri-daily reports.

On chart i. will be found the tracks of the centre of these depressions, seven of which reached the Atlantic coast, passing to the east of the Saint Lawrence valley, north of the mean track of the low areas of June. Two extended areas of low pressure developed in the Rocky mountain regions, where they remained almost stationary for several days. The centres of these depressions have been approximately located, with a view of illustrating the continuance of low areas in the Rocky mountain regions, during summer months.

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.	45° 30′	103° 00′	47° 30′	60° 00′	23.8
II.	42° 00′	102° 30′	42° 00′	69° 00′	24.0
III.	42° 00′	112° 00′	37° 00′	107° 00′	
IV.	37° 30′	103° 00′	50° 30′	69° 00′	30.5
V.	47° 30′	93° 00′	47° 00′	77° 30′	28.1
VI.	47° 00′	104° 00′	47° 30′	77° 00′	26.0
VII.	46° 30′	109° 00′	40° 00′	102° 00′	
VIII.	48° 00′	86° 00′	48° 00′	59° 00′	31.0
IX.	40° 00′	115° 00′	44° 00′	82° 00′	24.4

The noticeable feature of chart i. is the absence of storm tracks from the southern states and Atlantic coast districts. No depression appeared south of the fortieth parallel of latitude, except on the middle Rocky mountain slope.

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

Month.	Year.	No.	Month.	Year.	No.
June.	1873,	10.	June.	1878,	10.
"	1874,	9.	"	1879,	9.
"	1875,	7.	"	1880,	13.
"	1876.	6.	"	1881,	6.
"	1877,	11.	"	1882,	9.

I.—This depression developed in Dakota on the 29th of the preceding month, and passed slowly to the eastward over Minnesota and Michigan with increasing energy, causing dangerous winds on lakes Erie and Huron, cautionary signals having been displayed in advance. On the morning of the 1st this depression was central in the Saint Lawrence valley, northwest of Montreal, where the barometer had fallen to 29.36. Heavy rains occurred in the districts on the Atlantic coasts on the 1st, and dangerous southwest to northwest winds prevailed on the Atlantic coast from Eastport to Jacksonville. This storm apparently lost much of its energy after reaching the Atlantic, and when last observed, north of Nova Scotia, the pressure at the centre had increased and the isobars were less crowded than they had been when the centre of this disturbance was passing over the lake regions. The following maximum wind velocities were reported during this storm: Hatteras, 52, sw.; Delaware Breakwater, 40, sw.; Cape May, 40, s.; Sandusky, 46, sw.; Smithville, 30, sw.; Cedar Keys, 31, s. A heavy southeast gale, accompanied by heavy rains, occurred near Cape Cod on the 1st, the wind reaching its maximum velocity about 11 a. m., when the tide was unusually high. Captain Gregson, of the s. s. "Circassian," reports, May 30th, at 8.30 a. m., in latitude N. 47° 35′, longitude W. 57° 05′, barometer 29.53. The wind, which was easterly, force 4, with passing rain and fog, suddenly shifted to nw., se. and back to se., and then to sw., making this revolution several times, and the weather also suddenly cleared up. About a mile from the ship the water appeared to curl up as if from the force of the wind, but at the ship the wind was nearly calm, or of force 1. The wind eventually settled down and blew from the ene., force 7 to 8, and decreased in force toward noon.

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. "Lepanto," 2d, in N. 42° 32′, W. 56° 57′, barometer 29.83, wsw., force 6, drizzling rain; s. s. "P. Calland," 5th, in N. 41° 27′, W. 48° 30′, barometer 29.87, ssw., force 5, cloudy; s. s. "Adriatic," 4th, in N. 45° 05′, W. 39° 45′, strong head wind and sea; 6th, in N. 41° 52′, W. 52° 54′, strong ssw. wind and head sea.

II.—This depression was central in western Nebraska on the afternoon of the 1st, enclosed by an isobarometric line of 29.70 extending over the eastern slope of the Rocky mountains, north of the Arkansas valley, with rain at all stations in the upper Missouri valley. On the morning of the 2d the centre of disturbance had moved eastward to Omaha, and the depression extended southward to northern Texas, while the rain-area had moved eastward to Michigan and the lower Ohio valley. This storm continued its easterly course during the 2d and until the morning report of the 3d, passing over Iowa and Illinois with increasing energy, and accompanied by very heavy rains near the centre of disturbance. A secondary depression formed over northern Texas on the 2d, but disappeared as the original depression passed to the eastward. On the morning of the 3d, the course changed to the northeast, the centre was near Chicago, and the disturbance passed over southern Michigan and the lower lake region, causing severe gales, barometer at the centre falling below 29.50, and the storm becoming more clearly defined as a cyclonic disturbance. Heavy rain occurred in the lake region on the 3d, accompanied by dangerous winds on lakes Michigan, Huron and Erie. This storm passed to the north of the lower lake region, with decreasing force and increasing pressure at the centre. At the midnight report of the 4th the barometer was low at all stations in the northeastern part of the United States and in the Saint Lawrence valley, and the isobarometric lines indicated that this depression had moved eastward over northern New England. On the morning of the 5th, the centre was near Eastport, the lowest isobar, 29.60, enclosing the centre of disturbance and extending from Montreal to Halifax. The pressure continued low in the northeast during the 5th, and the winds in New England, and at stations northeastward, shifted to westerly, indicating the continued northeasterly movement of the depression. The following maximum velocities of wind occurred during this storm: Hatteras, 40 sw.; Delaware Breakwater, 43 s.; Milwaukee, 42 n.; Grand Haven, 40 w.; Sandusky, 37 w.; Toledo, 36 w.; Detroit, 32 sw. Destructive local storms were reported in Virginia and North Carolina on the 4th, which were in some cases accompanied by hail. The following vessel reports, furnished through the co-operation of the "New York Herald Weather Service," probably indicate the presence of this storm during its eastward movement over the ocean: 5th, s. s. "Gallia," N. 40° 37′, W. 70° 54′, barometer 29.79, sw., force 5, lightning; 6th, s. s. "City of Montreal," in N. 41° 37′, W. 63° 57′, strong head winds

III.—The area of high barometer, which followed low area ii., extended slowly over the districts east of the Mississippi, where the pressure continued relatively high until the 21th, while, at the Rocky mountain stations, the barometer continued below the mean. The low area traced as iii. was a large barometric depression, generally enclosed by an isobar of 29.70, and including within its limits, Colorado, New Mexico and Utah. The position of the centre of this depression has been located approximately at each report from the date of its appearance on the 12th. The barometer continued low in this region,

from the 12th to the 13th, but the general distribution of pressure and direction of wind at the Rocky mountain stations, did not warrant the continuation of the track of this depression as a part of that traced as iv. A severe tornado occurred in St. Clair county, Michigan, on the 8th, when the pressure was lowest near Salt Lake City, but an examination of the weather chart of that date indicated the presence of a slight depression in the upper Mississippi valley, with northerly winds over Lake Superior and southerly winds in eastern Iowa and southern Illinois. Very heavy winds occurred in Iowa on the 10th, when the barometer was lowest in Colorado.

IV.—This depression was central in eastern Colorado on the morning of the 13th; the barometer at Denver reading 29.62, and that of Cheyenne, 29.63, with northerly winds and light rain. This depression extended in a north and south direction, from Texas to northern Dakota, the winds being from east to south in the Mississippi and Missouri valleys, accompanied by light rains. This area moved northward into western Nebraska during the day, enclosed by an elliptical isobar, the longer axis of which inclined slightly to the east, and extended from Santa Fé to Bismarck. The course changed to the eastward during the night of the 13th, and the centre passed over southern Minnesota, central Wisconsin, and the southern part of Lake Superior on the 14th, the storm increasing in force and becoming more contracted as it approached the lake region. The rain-area of this depression extended over the states north of the Ohio valley, but the amount of precipitation was slight. After passing to the east of the lake region over the Saint Lawrence valley, the pressure diminished at the centre, and the disturbance became more extended; rain fell in New England and the middle Atlantic states as the centre of this disturbance passed to the eastward and northward of these districts. At the 7 a. m. report of the 16th, when the centre of disturbance was near Farther Point, the barometer at that station read 29.41; the following maximum velocities of wind were reported at stations on the lakes: Milwaukee, 36; Grand Haven, 38; Port Huron, 36; Sandusky, 25.

V.—This depression developed rapidly during the 16th, and was probably central near the western part of Lake Superior on the morning of that date. At the p. m. report of the 16th, it was central in Wisconsin as a slight disturbance, causing light rains in the upper lake region and thence southward to the Ohio valley. This depression moved southeasterly until the centre reached Lake Huron on the morning of the 17th, when the a. m. weather chart exhibited a trough of low pressure, extending from the upper Saint Lawrence to the upper Missouri valley. This area became less defined during the 17th, and finally disappeared to the northeast of Lake Huron, the course changing after the morning report of that date. Light rains occurred in all districts east of the Mississippi on the 17th, when this depression was moving to the northeast of the lakes.

VI.—This depression was first observed as central in Dakota, at the midnight report of the 16th. It became more clearly defined during the 17th, as the centre moved in a southeasterly direction, enclosed by an isobar of 29.50, at the p. m., report of the 17th. At midnight of the 17th, the centre of this storm had reached northern Iowa, the barometer at Des Moines reading 29.34, wind w.; Omaha, 29.44, wind nw.; Saint Paul, 29.42, wind e.; Huron, Dakota, 29.46, wind nw.; at this report, the depression was elliptical in form, the longer axis being in a north and south direction, inclining slightly to the westward. On the 18th the centre passed to the northeast near Saint Paul, where the barometer fell to 29.24 at the 7 a. m., report, and at the same report, the observer at Duluth reported barometer 29.41, violent ne., gale and heavy rain. This storm passed directly eastward over Lake Michigan, causing severe gales, and heavy rains; after passing to the eastward of the lake region, the pressure increased at the centre, and the storm lost much of its energy before passing beyond the limits of observation. The succeeding reports indicate that it disappeared as a slight disturbance, northeast of Nova Scotia on the 20th. Under the heading of local storms, will be found a description of the tornadoes which occurred while this depression was passing over the northern part of the United States.

VII.—This depression was first observed in the upper Missouri valley on the morning of the 19th. The pressure continued below the normal in this region during the 19th and 20th, when the centre of low pressure moved southward to Colorado, leaving a slight secondary depression in Dakota, on the afternoon of the 20th. This depression continued in Colorado until the midnight report of the 21st, when it disappeared before reaching the Missouri valley.

VIII.—Was central north of Lake Superior on the 24th, and passed eastward over the lower Saint Lawrence valley, causing only a slight disturbance in northern districts of the United States. It was at no time within the limits of the Signal Service stations, and the position of the centre is only approximately located at the tri-daily telegraphic reports.

The following report furnished by Captain Moody, of the s. s. "State of Georgia," probably indicates the presence of this storm: 26th, in N. 41° 01′, W. 56° 27′, barometer 29·76, wind sw., force 7, heavy rain.

IX.—An extended area of low pressure was central in the southern plateau region, on the morning of the 27th; this depression moved slowly to the eastward over Utah and Colorado, during the 27th and 28th, when its course changed to the north. On the morning of the 29th, it was central near Deadwood, Dakota, where the barometer was slightly below 29.70; on this, and the following day, this disturbance moved directly eastward over the lake region, with increasing energy and at the close of the month, it was central near Saugeen, where the barometer read 29.57. Cautionary signals were ordered at stations on Lakes Michigan, Huron, and Erie, in advance of this storm; these signals were justified by dangerous winds on Lakes Erie, and Huron, but they were not justified at stations on the southern and western shores of Lake Michigan.

INTERNATIONAL METEOROLOGY.

International charts iv. and v. accompany the present number of this REVIEW. Chart iv. is published for April, 1880, and continues the series of that chart begun in January, 1877. Chart v. is prepared for July, 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 Prof. Dr. G. Neumayer, Director of the German Marine Observatory, and from the "Bulletin Mensuel," published by Mr. Marc Dechevrens, 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 April, 1880, as determined from one observation taken each day at 7.35 a. m. or 0.43 p. m., Greenwich mean time.

The area of lowest mean pressure occupies southeastern Greenland, the mean pressure at Godthaab being 29.54 (750.3 m. m.), prevailing wind, south, force 4. The barometric gradients increase slowly toward the east and southeast, but in the south the increase is more rapid.

A second area of mean low barometer extends over British India, where the lowest mean pressure for the month was 29.63 (752.6 m. m.).

An area of relatively mean low pressure, 29.90 (759.4 m. m.), extends over the United States from the lake region southward and westward to the Rocky mountains.

The isobar of 29.90 (759.4 m. m.) also covers the European continent from northern Russia southward to the Black sea and the Mediterranean, and westward to the North sea and Bay of Biscay.

Three areas of barometric maxima appear on the chart.

The first area of mean high barometer, 30.20 (767.7), is that of the Atlantic, which extends over the ocean between the

parallels of 20° and 40° N., and between the meridians of 20° and 50° W.

In Asia, the isobar of 30.10 (764.5) appears in southern Siberia, and encloses the provinces of Tomsk and the southern part of Yeneseisk. An area of high pressure, 30.10 (764.5), also covers the eastern part of China, while a second area of 30.10 extends from the western coast of Japan northwestward over Corea toward Irkutsk.

In North America, the high area of the Pacific appears over California, where the mean pressure ranges from 30.04 (763.0) to 30.10 (764.5), and the isobar of 30.00 (762.0) covers the territory from Manitoba northward to Hudson's Bay.

Compared with the preceding month, the pressure has remained nearly stationary over Greenland, the mean barometer being 0.01 inch below the mean for March. The pressure has increased over Russia; the area of low barometer 29.60 (751.8), which was central over that country during March, is, this month, replaced by the isobars of 29.90 (759.4), and 30.00 (762.0).

In central Europe, the pressure has decreased, the isobars of 30.20 (767.1), and 30.10 (764.5) of March, being now replaced by the isobar of 29.90 (759.4).

In eastern Asia, the pressure has averaged about 0.10 inch below the mean for March, while the area of 30.20 (767.1) has moved into Siberia.

In the United States, the pressure has generally decreased throughout the country, except in Florida and in parts of Alabama and Georgia. On the north Pacific coast, the pressure was about 0.07 inch below the mean of the preceding month.

Compared with the corresponding month of previous years, the pressure was below the normal in Iowa, Minnesota, and the lake region, while it was correspondingly above the normal in the middle and south Atlantic states and in Georgia and Alabama. On the north Pacific coast, a deficiency occurred, ranging from 0.02 to 0.09 inch, while in California, the pressure was from 0.02 inch to 0.11 inch above the normal. In Canada, the pressure was generally below the normal.

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

Countries.	Mean Barometer.			Mean Temperature.		
	April, 1877, 1878 and 1879	April, 1880.	Departure.	April, 1877, 1878 and 1879.	April, 1880.	Departure.
				°	°	°
Algeria	29.97	29.98	+0.01	66.6	67.3	+ 0.7
Austria	29.76	29.86	+0.10	56.3	61.6	+ 5.3
British Isles	29.78	28.85	+0.07	49.2	50.5	+ 1.3
Denmark	29.84	29.89	+0.05	44.8	48.8	+ 4.0
France	29.77	29.89	+0.12	57.1	56.5	− 0.6
Germany	29.81	29.91	+0.10	50.2	54.2	+ 4.0
India	29.74	28.71	−0.03	89.1	90.2	+ 1.1
Italy	29.81	29.90	+0.09	61.6	62.9	+ 1.3
Norway	29.91	29.85	−0.06	44.5	45.9	+ 1.4
Portugal	29.89	29.98	−0.01	60.2	59.7	− 0.5
Russia	29.89	29.98	+0.09	47.1	46.8	− 0.3
Spain	29.89	29.95	+0.06	62.0	59.5	− 2.5
Sweden	29.90	29.89	−0.01	38.9	41.2	+ 2.3
Turkey	29.87	29.96	+0.09	63.8	50.8	−13.0

In North America, the temperature was above the normal, from Texas and the Mississippi river, eastward to the Atlantic, except in the Canadian maritime provinces, where it was slightly below the normal. Over the entire country west of the 100th meridian, it was below the normal, except in Kansas and Colorado. The greatest excess of temperature occurred in the middle Atlantic states, and the greatest deficiency prevailed in the Missouri valley. On the Pacific coast, the greatest deficiency occurred in the central region.

In central Europe, the temperature was everywhere above the normal, except in France, where it was slightly below, the greatest excess appearing in Austria and Germany. In Russia the temperature was below the normal.

The accompanying table shows the deviations in temperature and pressure at isolated stations for the month of April, 1880, as compared with the means of three years:

Comparative Thermometric and Barometric Means, with corresponding Departures.

Station.	Mean Barometer.			Mean Temperature.		
	April, 1877–78–79.	April, 1880.	Departure.	April, 1877–78–79.	April, 1880.	Departure.
				°	°	°
York Factory	30.10	30.08	−0.02	16.6	1.3	−15.3
Godthaab	29.91	29.54	−0.37	28.9	27.1	− 1.8
Stykkisholm	29.87	29.62	−0.25	31.1	42.6	+11.5
Tromso	29.86	29.67	−0.19	33.4	33.1	− 0.3
Thorshavn	29.91	29.76	−0.15	42.8	46.2	+ 3.4
Archangel	29.94	29.84	−0.10	33.1	32.9	− 0.2
Ekaterinburg	29.94	29.98	+0.04	41.8	36.9	− 4.9
Barnaul	30.07	30.17	+0.10	39.1	31.1	− 8.0
Yeniseisk	29.98	30.07	+0.09	30.9	32.2	+ 1.3
Nikolaievsk on the Amoor				20.7	23.0	+ 2.3
Zi-Ka-Wei	30.06	30.10	+0.04	55.0	52.5	− 2.5
Pekin	30.01	30.07	+0.06	56.4	56.8	+ 0.4
Beirut	29.92	29.91	−0.01	71.4	67.5	− 3.9
Mauritius	29.99	30.02	+0.03	78.9	79.3	+ 0.4
Paramaribo	29.99	30.04	+0.05	81.2	81.1	− 0.1
Funchal	30.14	30.15	+0.01	65.5	63.9	− 1.6
Ponta Delgado	30.03	30.24	+0.21	64.1	62.2	− 1.9
Bridgetown	30.02	30.02	Normal	83.4	80.2	− 3.2
Navassa	29.96*	30.16	+0.20	80.2*	77.3	− 2.9
Melbourne	30.15	30.12	−0.03	58.0	59.4	+ 1.4
Hobart Town	29.94	30.01	+0.07	62.9	57.1	− 5.8
Astrakhan	29.95	30.09	+0.14	59.3	48.2	−11.1
Athens	29.86	29.93	+0.07	68.1	66.7	− 1.4
Tiflis	29.88	29.97	+0.09	65.1	59.7	− 5.4
Laghouat	30.03	29.96	−0.07	72.3	71.2	− 1.1
Fort-de-France	29.84	30.22	+0.38	80.4	77.2	− 3.2
Lisbon	30.00	30.02	+0.02	59.9	59.5	− 0.4
Sandwick Manse	29.88*	29.78	−0.10	44.2	46.8	+ 2.6
Malta	29.87	29.91	+0.04	65.6	52.2	−13.4
Gibraltar	30.00	30.00	Normal	66.1	65.4	− 0.7
Tashkend	30.04	30.04	Normal	66.1	62.4	− 3.7
Cape Town	30.06	30.05	−0.01	72.8	70.3	− 2.5
Angra	29.99	30.26	+0.27	60.6	63.3	+ 2.7
Cagliari	29.81	29.87	+0.06	63.9	62.8	− 1.1
Free Town	29.92	29.89	−0.03	87.5	87.4	− 0.1
Madrid	29.89*	29.92	+0.03	60.4	56.3	− 4.1
Nukuss	29.92	30.03	+0.11	68.1	57.9	−10.2
Nassau	30.03	30.15	+0.12	75.8	77.5	+ 1.7
Havana	29.96*	30.15	+0.19	75.9*	75.2	− 0.7
Mexico	29.97*	30.12	+0.15	54.4*	53.8	− 0.6
Lahore	29.86*	29.63	−0.23	89.5*	96.3	+ 6.8
Tokei	30.07	30.08	+0.01	53.1	52.0	− 1.1
San Juan de Puerto Rico	30.00	30.12	+0.12	77.3	77.2	− 0 1
San Jose de Costa Rico				69.3	66.6	− 2.7

* April mean for two years only.

The following table shows some of the extreme monthly mean temperatures, reported from isolated stations:

LOWEST.	Degrees.	HIGHEST.	Degrees.
York Factory	+1.3	Freetown	87.4
Moose Factory	21.6	Manilla	83.1
Nikolaievsk on the Amoor	23.0	Paramaribo	81.1
Fort Garry	23.8	Bridgetown	80.2
Godthaab	27.1	Puerto Berrio	79.8
		Mauritius	79 3

In British India, the temperature was slightly above the mean, the highest monthly mean reported being 100°.8 (+38°.3 cent.) at Deesa, and the lowest, 75°.9 (+24°.3 cent.) at Sibsagar.

The prevailing direction of the wind over North America, was, north of the fortieth parallel, northwesterly, except in the lake region and on the New England coast, where it was southwest and south or southwest respectively. South of the fortieth parallel, the prevailing direction was generally southerly and southwesterly; on the Pacific coast it was southeasterly, except at San Diego and Los Angeles, where the prevailing direction was northerly. In Canada the winds were northerly to westerly.

In Europe, the prevailing directions were as follows: In Germany, northerly to northeasterly; in France, northeasterly to northwesterly; in Austria, southerly to southeasterly; in Denmark, Sweden, and Norway, generally southwesterly. In Algeria, the winds were northwesterly; in Hindostan, northwesterly, and in China and Japan, they were generally northeasterly.

Over the north Atlantic, south of 35° N., and between 20° and 70° W., the winds were northeasterly; north of 35° N. and between 20° and 60° W., they were generally southwesterly,

and north of 30° N. and between 10° and 20° W., they were northeasterly.

The following brief notes, descriptive of the meteorological conditions over Europe, during the month, are gathered from the "Monatliche Uebersicht der Witterung:"

During the first week, the area of high barometer, which was central over Lapland, moved slowly eastward with increasing pressure, and formed steep gradients in connection with an area of low barometer then central over the British Isles and North sea. On the morning of the 3d, the barometer over the Hebrides was 29.13 (739.9); at Hernosand, it was 30.34 (770.6), and at Archangel 30.80 (782.3); southward, the barometer at Helgoland, was 29.41 (747.1); at Cherbourg, 29.65 (753.2), and at Biarritz 30.02 (762.5). Stormy easterly winds prevailed on the Norwegian and Swedish coasts, and strong westerly winds on the western coast of France.

The noteworthy features of the month were, first, the unusually large number of barometric minima which prevailed over northwestern Europe, but these were, in general of short duration, and developed only slight energy; they were accompanied in most cases by thunder and hail storms; second, the extreme high temperature recorded between the 15th and 24th of the month, in some cases, being as high as recorded during the summer months. The following maximum temperatures were reported in Germany: At Aschaffenburg, 82°.2 (27°.9 cent.); Berlin, 81°.3 (27°.4 cent.); Magdeburg, 79°.3 (26°.3 cent.)

From the 27th to the end of the month, the temperature fell rapidly, and severe frosts injuring vegetation, occurred throughout the northern part of central Europe. On the 29th and 30th, the minimum temperatures of the month occurred, 22°.1 (—5°.5 cent.), being reported from Oberweisenthal, (altitude of station, 927 metres, or 3041 feet), and 27°.9 (—2°.3 cent.) from Potsdam.

Chart v. exhibits the paths of barometric depressions which have been traced from the daily international charts for the month of July, 1880, supplemented by vessel reports from the north Atlantic.

The data are charted for each day of the month, on the charts accompanying the "International Bulletin" for that day, and from these charts and additional reports the movement of the centres of barometric minima are traced. Twenty-three storm-areas, occurring in the northern hemisphere, have thus been traced.

Concerning the general distribution of these depressions, the following is given:

Seven appeared in the United States and Canada, two of which are traced to the Atlantic, but, during this month, no storm appeared sufficiently well-defined, after leaving the American coasts, to warrant its being traced as a continuous storm across the ocean.

Twelve depressions appear over Europe, and these in general exhibited but slight energy during their prevalence.

Four depressions are traced in Asia, extending from the coast of China generally in a northeasterly course over Japan.

On this chart will also be found a tracing of the first typhoon that occurred in the China sea during the month of July, 1880, a detailed description of which is given below.

The following brief descriptions are given of the storms first appearing within the limits of the Signal Service stations:

I.—This depression was central in Kansas on the 1st, and during the 2d and 3d it moved in a north-northeasterly course towards lake Superior, and on the 4th it passed into the British possessions and beyond the limits of the stations of observations. During the early part of its course, this storm was accompanied by heavy rains and severe thunder-storms.

II.—This area probably developed in Colorado during the 3d, and on the 4th and 5th it moved in an east-northeasterly direction over the lake region, and thence down the Saint Lawrence valley, where it disappeared on the 6th. This storm exhibited considerable energy during its eastward movement through Kansas and Nebraska, and was accompanied by severe thunder and hail storms. At North Platte, Nebraska, the wind reached a velocity of 80 miles per hour from the northwest, and heavy rains were reported from Dodge City, Kansas.

III.—This disturbance first appeared in Montana on the 6th, and, moving eastward at an average velocity of about 15 miles per hour, was probably central on the morning of the 8th, near Fort Garry, barometer 29.58 (m. m. 751.3), a fall of 0.30 inch in twenty-four hours. Continuing its course, which was now north-northeasterly, the centre was probably north of Moose Factory on the 9th. On the 10th, the storm-centre moved in a southeasterly direction over the Gulf of Saint Lawrence, and disappeared on the 11th over the Atlantic.

IV.—This depression first appeared in Utah on the 10th, and moved eastward during that day and the following, causing threatening and stormy weather in Colorado, Montana and Nebraska. The lowest pressures for the month occurred in the states just mentioned, during the passage of this storm. On the 12th, the depression moved northeastwardly and was central near Duluth. During the 13th, this low-area moved in a southeasterly direction over Lake Superior to the New England coast, and was attended by local rains and occasional high winds. On the 14th, the centre passed off the coast to about N. 43°, W. 60°, the U. S. ship "Portsmouth," in N. 42° 38′, W. 60° 00′, reporting barometer 29.57 (m. m. 751.1), wind ssw., force 5, raining. On the 15th, the storm pursued a north-northeasterly track and disappeared south of Greenland.

V.—This appeared in Manitoba on the 15th, and passed eastward with its centre north of the lake region on the 16th. On the 17th, it moved in a northeasterly course down the Saint Lawrence valley, and on the 18th, disappeared beyond the stations of observation.

VI.—This area probably developed during the 18th, and, on the 19th, moved by an easterly course through Iowa. Its course then changed to the northeastward, and, moving over the lake region on the 20th, its centre was near Rockliffe, Ontario, barometer, 29.68 (m. m. 753.9), a fall of 0.36 inch in twenty-four hours. During the 20th and 21st the centre moved northeastward, and disappeared beyond the stations of observation.

VII.—This depression developed north of York Factory on the 24th, and on the 25th and 26th it moved eastward over Canada. The path of this storm-centre was too far north to admit of its being more fully described.

The weather over the north Atlantic ocean during this month was unusually free from storms. West of the fiftieth meridian, high barometer, with light winds, prevailed, attended by occasional rains and thunder-storms.

Between 50° and 30° W. the winds were variable, and high barometer and generally fine weather prevailed. During the night of the 1st and 2d, in N. 36°, W. 37°, a hurricane occurred, lasting 2½ hours, barometer 29.72 (m. m. 754.9), wind s. to w. and nnw.

East of 30° W., the weather was generally fine, with fresh southwest and northeast winds and barometer generally high, except over the English Channel.

Of the storms occurring over Europe, the following is given, supplemented by notes from the "Monatliche Uebersicht der Witterung," published by Prof. Dr. Geo. Neumayer, director of the German Marine Observatory at Hamburg:

VIII.—This first appeared in Sweden on the 1st, and, pursuing a somewhat unusual course toward the northwest, passed into Norway, and on the 2d the storm was probably central near Brønö, barometer 29.48 (m. m. 748.7). The centre of disturbance then followed a northeasterly course toward Tromsoe, the barometer at that station reading 29.48 (m. m. 748.8) on the morning of the 3d. On the following day the storm passed in an easterly direction over the Arctic ocean.

IX.—This depression was central off the western coast of Scotland on the 2d, and moved across that country in an east-southeasterly direction towards the North sea, where it was central on the 3d. On the 4th, it reached the northwestern

coast of Germany, causing stormy westerly winds and rain. During the 5th and 6th, it passed over the southern part of Norway to the ocean, where it disappeared.

X.—This disturbance probably developed in the north of Scotland on the 7th, and during the 8th and 9th, it passed northeastward over the North sea to the Arctic ocean.

XI.—This was central near Yarmouth on the 9th, and moved in a northeasterly course along the coasts of Germany and Denmark. On the 10th, the centre was probably near Fanöe, and, continuing its northeasterly movement during the 11th and 12th, it passed through Sweden and Norway, and finally disappeared in Finland.

XII.—This storm first appeared on the 10th, near the Orkney Islands, and pursuing a northeasterly course, disappeared off the Norwegian coast on the 11th.

XIII.—This disturbance developed in northern Norway on the 15th, and moved by a southeasterly course across the White sea; on the 16th, the storm-centre was near Archangel, barometer 29.62 (m. m. 752.3), a fall of 0.20 inch in twenty-four hours. On the 17th, its course changed slightly to the northward, and on this day the storm probably disappeared in the valley of the Obi.

XIV.—This appeared in Scotland on the 18th, Glasgow barometer 29.82 (m. m. 757.4), wind west, squally; on the 19th the centre of disturbance crossed the North sea in an east-northeasterly course to Norway; passing thence southeastwardly, it crossed the Baltic on the 20th, and was probably near Memel on the 21st. On the 22d the storm-centre reached Moscow, barometer 29.50 (m. m. 751.6), where it disappeared or became merged in low area xv.

XV.—This depression developed over the Black sea on the 18th or 19th, and moving northeastwardly, was central on the morning of the 20th, near, and north of Kasan, barometer 29.26 (m. m. 743.2). During the 21st, the storm apparently curved to the westward, and on the 22d was central near Archangel, barometer 29.28 (m. m. 743.7). On the 23d, the storm recurved and resumed its northeasterly course, disappearing in the valley of the Obi.

XVI.—This storm appeared on the western shores of the Black sea on the 23d, and on the 24th, was central over the sea of Azov. Following a northeasterly course during the 25th, 26th, and 27th, it was central near Ekaterinburg, 29.16 (m. m. 740.6), on the last-named date, and on the 28th, it disappeared in the valley of the Obi.

XVI.—On the 24th there was a decrease of pressure in southern Sweden, and on the 25th, and 26th, the disturbance passed into northern Russia, where it disappeared.

XVIII.—This depression developed over the north Atlantic ocean, south of Ireland, on the 26th, and, passing over England and western Europe at an average velocity of forty-five miles per hour, was central near Posen on the 27th, the barometer at that station reading 29.41 (m. m. 747.1). During the 28th and 29th, it followed an easterly course through Russia, and disappeared on the latter date.

XIX.—This storm apparently developed on the 27th, in about N. 47°, W. 18°, and, passing northeastward, skirted the west coasts of Ireland and Scotland. On the 28th, the centre was probably near Galway, barometer 29.47 (m. m. 748.5). On the 29th and 30th, it passed to the northward of the Shetland Islands, where it finally disappeared.

It is worthy of note, in connection with the storms occurring over western Europe during the month, that they were generally accompanied by severe thunder-storms and continuous rains, the rainfall for the month in northwestern Europe being slightly above the normal.

Of the storms appearing over Asia, the following is given:

XX.—This probably developed in the interior of China, and passed near Shanghai on the 6th and 7th, and was accompanied by severe thunder-storms and heavy rains. On the 7th and 8th, the storm moved slowly northeastward over Japan; at midnight of the latter date 0.31 inch of rain fell in fifteen minutes at Zi-Ka-Wei.

In connection with this depression, Mr. Marc. Dechrevens, of the Zi-Ka-Wei Observatory, reports the occurrence of a violent storm on the 4th and 5th:

The storm first appeared in the north-northwest and pursued a south-southeasterly course through the districts of Kwa-Chow, Chang-Choo and Yang-che-fou, in the province of Kiang-Su. During its path through these districts, it caused great destruction to life and property; churches were blown down and trees uprooted, city walls demolished and dwellings unroofed, and many persons were killed; several junks and other vessels were destroyed or damaged. The Chinese newspapers report a rain-fall of nine inches during the morning at Yang Chow. On the arrival of the storm at Shanghai, it appeared to have lost much of its energy, although still severe.

The above-mentioned storm does not appear on the international charts, but it is probable that it was closely connected with low area xx. during the early development of that storm.

XXI.—This disturbance appeared in the north of China on the 10th. Its influence was felt at Zi-Ka-Wei, where it caused heavy rains; during the 11th and 12th it passed northeastward over Corea and Japan to the ocean.

XXII.—This depression developed to the east of Zi-Ka-Wei on the 21st and 22d, and passed thence northeastward over southern Japan; Nagasaki barometer, 29.47 (m. m. 748.5). It passed over the island of Niphon during the 23d, and was probably near Tokei on that day; on the 24th it disappeared northeastward over the ocean.

XXIII.—This apparently developed in the region northwest of Zi-Ka-Wei during the 22d, and following a south-southeasterly course, was central on the 23d in about N. 30°, E. 126°. Its course then changed to the eastward, and the storm-centre passed south of Japan on the 24th; on the 25th it was probably central near N. 33°, E. 135°, the U. S. steamer "Richmond" reporting in N. 34°, E. 135°, barometer 29.58 (m. m. 751.3). During the 26th and 27th, it passed northeastward and disappeared on the latter date.

In connection with the weather in China, during the month under consideration, may be mentioned the prevalence of northeast winds. The means of seven years show the resultant direction of wind in July to be southeast, while the mean direction during the present month was northeast. Instead of the usual torrid heat, the month was relatively cool and agreeable.

The following description of the first typhoon of July 1880, is taken from the "Bulletin Mensuel" published Mr. Marc Dechevrens of the Zi-Ka-Wei Observatory:

This typhoon prevailed from the 13th to the 19th, and probably developed between the islands of Borneo and Mindanao. It followed a northwesterly course, crossing the parallels of 10° and 20°, the first in longitude 120° E., and the second in 107° E., and traversed the island of Hainan and the Gulf of Tonquin.

Its average velocity was eight miles (thirteen kilometres) per hour, which is about the usual velocity of the southern typhoons. It will be noted that the velocity and direction of the movement of this typhoon, contrasts strongly with those of the atmospheric disturbances of the interior and north of China.

Notwithstanding its proximity to Manilla and its slow movement, this typhoon was almost imperceptible to the inhabitants of that place. On the 14th, when the typhoon was central near N. 15°, the barometer at Manilla, which had remained almost stationary during the preceding forty-eight hours, began to rise, and it is probable that its slight oscillations during the forty-eight hours indicated the slow movement of the storm and that its track remained at the same distance from Manilla. The east and southeast winds which prevailed at Manilla before the passage of the centre were very light; after the centre had passed, the wind changed to southwest, 13 miles per hour. The storm crossed the Gulf of Tonquin without developing much energy, but the ship "Fabius," which left Hong-Kong on July 15th, for Cochin-China, probably experienced the full force of the typhoon, as she returned to Hong-Kong, dismasted, on the

20th. At noon of the 17th, this vessel was in N. 18° 41′, E. 111° 44′, wind blowing from the north with extreme violence, barometer 29.68 (753.9), and falling; at midnight of the 18th, the barometer reached its minimum, 29.42 (747.2), and the wind shifted by west to southwest.

OCEAN ICE.

May 22d: bark "Emilie," in N. 43° 42′, W. 48° 36′, passed hundreds of icebergs and a large ice-field extending from ene. to wsw.

23d: bark "Amaranth," in N. 44° 00′, W. 46° 50′, passed three icebergs from forty to fifty feet high; 24th, from N. 43° 05′, W. 42° 30′ to N. 42° 30′, W. 50° 30′, passed sixty icebergs, some of which were seventy to ninety feet high, and from four hundred to five hundred feet long; 25th, in N. 42° 00′, W. 51° 20′, passed three icebergs.

27th: s. s. "Elbe," in N. 41° 51′, W. 48° 39′, passed two icebergs; in N. 41° 46′, W. 50° 37′, passed one iceberg.

28th: ship "Saint Nicholas," in N. 42° 40′, W. 40° 00′, was in the ice for twenty-four hours.

29th: ship "W. R. Grace," in N. 41° 28′, W. 47° 50′, passed remnant of an iceberg; s. s. "Lessing," in N. 40° 46′, W. 47° 35′, passed several large icebergs.

30th: s. s. "Circassian," in N. 47° 35′, W. 57° 05′, passed a number of icebergs.

31st: bark "Scotland," in N. 41° 11′, W. 46° 55′, passed a large iceberg; in N. 40° 58′, W. 48° 02′, passed two icebergs.

June 1st: s. s. "Britannic," in N. 42° 40′, W. 50° 38′ and N. 42° 30′, W. 52° 02′, passed several icebergs, some very large; s. s. "Coventina," in N. 40° 56′, W. 46° 08′, passed an iceberg; s. s. "England," in N. 41° 44′, W. 47° 34′, passed a very large iceberg; s. s. "Heckla," in N. 42° 29′, W. 53° 08′, passed several icebergs; s. s. "The Queen," in N. 41° 28′, W. 48° 00′, passed several icebergs; s. s. "Lepanto," from N. 42° 30′, W. 49° 00′ to N. 42° 30′, W. 53° 00′, passed numerous icebergs.

2d: s. s. "Coventina," in N. 42° 48′, W. 51° 15′, passed two very large icebergs; s. s. "Devonia," in N. 43° 40′, W. 46° 53′, passed two small icebergs.

3d: s. s. "City of Montreal," in N. 41° 16′, W. 47° 27′, passed a large iceberg with several large pieces of ice floating around it; s. s. "Devonia," in N. 42° 24′, W. 51° 15′, passed a large iceberg; in N. 42° 24′, W. 51° 28′, passed one large and two small icebergs; in N. 42° 24′, W. 51° 55′, passed three large icebergs; s. s. "France," in N. 42° 21′, W. 51° 05′, passed a number of large icebergs; s. s. "Frisia," in N. 42° 37′, W. 47° 08′, passed an iceberg about two hundred feet high; in N. 42° 06′. W. 49° 04′, passed two icebergs; s. s. "State of Nebraska," from N. 53° 56′, W. 49° 12′ to N. 43° 37′, W. 50° 50′, passed large numbers of icebergs; bark "Scotland," in N. 41° 48′, W. 51° 48′, was surrounded by a great number of large and small icebergs.

4th: s. s. "Belgenland," in N. 40° 18′, W. 48° 50′, passed a large iceberg; s. s. "Pollux," in N. 44° 41′, W. 51° 31′, passed several large icebergs.

5th: s. s. "Adriatic," in N. 42° 10′, W. 48° 30′, passed a small iceberg; in N. 42° 05′, W. 49° 00′, passed an iceberg; s. s. "Main," in N. 42° 43′, W. 47° 16′, passed an iceberg about two hundred feet high; in N. 42° 13′, W. 48° 06′, passed one large and two small icebergs; in N. 41° 56′, W. 50° 03′, passed a small iceberg.

6th: Ship "Larnica," in N. 44° 26′, W. 42° 50′, passed an iceberg.

7th: s. s. "Westphalia," in N. 41° 20′, W. 47° 25′, passed an iceberg.

9th: Bark "Petunia," at St. Johns, Newfoundland, reported having sighted 932 icebergs between N. 44° 00′, W. 43° 20′ and the Cape Race coast; s. s. "Cassius," in N. 45° 00′, W. 44° 36′, passed several icebergs; s. s. "Irthington," in N. 41° 50′, W. 48° 16′, passed two large icebergs; ship "Larnica," in N. 44° 00′, W. 48° 30′, passed six icebergs; bark "Alice M. Claridge," off the Banks of Newfoundland, passed seven icebergs and a quantity of drift ice.

10th: s. s. "America," in N. 42° 30′, W. 50° 36′, passed through a fleet of icebergs, some of which were three hundred feet high; s. s. "Bohemia," in N. 42° 12′, W. 50° 00′, passed a number of icebergs; s. s. "Cassius," in N. 42° 35′, W. 48° 30′, passed seven large icebergs from one hundred and fifty to three hundred feet high; s. s. "Wieland," in N. 42° 46′, W. 46° 22′, passed an iceberg about fifty feet high; bark "Heinrich and Antoine," in N. 41° 55′, W. 51° 20′, passed two icebergs.

11th: s. s. "Alhambra," twenty miles ene. of Cape Race, met several icebergs; 11th to 13th, s. s. "Abyssinia," from N. 42° 04′, W. 49° 13′, to N. 42° 37′, W. 52° 57′, passed several icebergs; s. s. "Istrian," in N. 42° 30′, W. 50° 00′, passed several icebergs and considerable drift ice; s. s. "Thingvalla," in N. 44° 00′, W. 45° 00′, passed three large icebergs; s. s. "Wieland," in N. 42° 28′, W. 50° 20′, passed an iceberg; in in N. 42° 21′, W. 45° 27′, passed two icebergs.

12th: s. s. "Edam," in N. 43° 38′, W. 48° 50′, passed a small iceberg; bark "Marco Polo," in N. 44°, W. 45°, passed several large icebergs.

13th: s. s. "Edam," in N. 42° 50′, W. 48° 50′, passed a large iceberg; ship "John Harvey," in N. 41° 00′, W. 48° 20′, passed a large iceberg.

15th: s. s. "Bulgarian," from N. 43°, W. 48° to W. 50°, passed fifty or sixty icebergs, large and small, extending north and south as far as could be observed; bark "Quebec," in N. 43° 36′, W. 57° 00′, passed twelve icebergs.

17th: s. s. "Colina," at Saint John's, Newfoundland, reported numerous icebergs from Cow Bay to Cape Race; s. s. "Scythia," in N. 43° 18′, W. 48° 05′, passed an iceberg, also in N. 42° 19′, W. 50° 52′, passed a large iceberg.

18th: bark "Sendemanden," at New York, from Trieste, reported a large iceberg in N. 39° 34′, W. 38° 46′.

21st: s. s. "Ashdrubal," struck an iceberg twenty miles off Cape Race, and sank.

24th: s. s. "Bothnia," in N. 42° 37′, W. 49° 48′, passed several large icebergs.

25th: s. s. "Bristol," in N. 43° 15′, W. 49° 10′, passed an iceberg; s. s. "De Ruyter," in N. 43° 33′, W. 50° 40′, passed a large iceberg.

The following extract of a communication by Mr. E. Douglas Archibald, published in "Nature," contains valuable information bearing on the subject of ocean ice:

"In view of the recent unusually cold weather in England and Scotland, which has been so well described and proximately explained in last week's 'Nature', the following paragraph, extracted from the 'Standard' of June 15th, appears to me highly suggestive, especially as regards one of the probable causes for the 'unwonted high pressures' on the northern side of the depression, which is accused of being the immediate source of these unseasonable conditions:

'News from Iceland states that the Spitzbergen floe-ice surrounds the north and east coast, entirely preventing navigation. A Norwegian steamer, endeavoring to reach Bernfiord, on the southeast coast, last week, was caught in the ice and had to put back. Owing to the presence of these immense ice-fields, vegetation has made no progress, causing a great loss of horses and sheep through starvation. Epidemics of measles and smallpox have been introduced into the island from Europe, and are making extensive ravages among the population; the former is especially prevalent in Rejkjavik.'

"Now it has been ascertained, with some considerable degree of certainty, by Messrs. Blanford and Elliot, the government meteorologists in India, that a heavy winter snowfall over the northwest Himalaya exercises a marked and prolonged influence in lowering the temperature and elevating the atmospheric pressure, and thereby directly affecting the winds and weather over the whole of northern India and parts of central India; and indirectly to a much greater distance. Turning to Europe, we find the distance from Rejkjavik, on the west coast of Iceland, to London is about 1140 miles, or about the same as from Lahore to Calcutta (1080 miles), while from

Cape Horn, on the east coast of Iceland, to Edinburgh the distance is only seven hundred and fifty miles, or about the same as from Calcutta to Agra. To any one familiar with Indian weather charts or the meteorology of that country, it would appear absurd not to attempt to correlate the meteorological conditions at places so comparatively near as the above-mentioned towns; and, in fact, experience has shown that the meteorology of the Punjab is not only intimately connected with that of lower Bengal, but also with that of southern India. If, therefore, it has been found that an abnormally heavy snowfall in the northwest Himalaya, such as that which characterised the winters of 1876–77, and 1877–78, exercised a marked effect on the meteorology of northern India, which was felt at places situated 1000 miles or more from the seat of action, may it not be reasonably inferred, that the presence of a large mass of ice and snow in the Icelandic area would be likely to give rise to similar atmospheric conditions over these islands? It seems, therefore, not at all improbable, that the abnormal weather during the past few weeks, may be directly due in some considerable measure to the coincident appearance of large masses of ice off the eastern coasts of Iceland, like those which, from the account in the 'Standard,' appear to be at present prevailing to an unusual extent.

"In the case of India, an abnormally heavy fall of snow in the Himalayan zone is found to be associated, not only with the subsequent conditions already named, but also with an *initially*, and therefore according to experience, *subsequently* weak, southwest monsoon, which in its turn, invariably causes local, if not general drought and famine. These heavy snowfalls are found to have a tendency to recur at the minimum sun spot epochs, and are proximately due to some condition of the upper antimonsoon current, at present not exactly known, by which a larger amount of vapor is deposited in the winter, on the Himalaya as snow, and on the north Indian plains, as the winter rains.

"It does not appear that we can so readily account for the occurrence of the present ice-floes off Ireland, or for the large masses which have been encountered this spring, in the western Atlantic. They must, however, to some extent be due to the unusually warm winter which seems to have prevailed pretty uniformly over the north Atlantic and northwest Europe, and which has detached a larger proportion than usual, of the arctic ice-fields. And though it is improbable that we shall find any such regular periodicity in the amount of these ice-floes in the Atlantic, as in that of the Indian winter snows and rains, it is worthy of notice to observe that they have a decided tendency to occur to an unwonted extent about the times of maximum sun-spot—like the present. Thus, Professor Fritz, of Zurich, gives the following as the list of years in which floating ice was found most abundantly in the lower latitudes of the north Atlantic:—

Years of greatest frequency of floating ice.	Epochs of maximum sun-spot.
1789	1788.1
	1804.2
1816–18	1816.4
1828–29	
1831	1829.9
	1837.2
	1848.1
1862–64	1860.1
1868	
1869	1870.6

"It is also interesting to notice that in 1862, Heis's 'Wochenschrift' mentions that the floating ice-masses in the Atlantic, caused 'a noticeable cooling of the weather in June, over Europe.' And it is further significant to find in a detailed list of the ice met with every month in the Atlantic, by ships belonging to the North German lines, from 1860 to 1869, that in 1868 and 1869, (the year in which similar weather to the present is mentioned as having been observed by the writer of the paragraph in 'Nature') were the years in which the greatest quantity of ice was encountered. Though I agree with Dr. Hann in attributing more importance to the *tropical* than to the *polar* area, in influencing the *general* weather of these latitudes, I think it very probable on theoretical grounds, that we are relatively more influenced by the *latter* area in *summer*, and by the *former* in *winter*, and that, just as it has been inferred, that the regular recurrence of periods of diminished temperature in Europe, is due to the regular movements of the ice in the polar area, so we may reasonably conclude that abnormal movements of the ice, especially in the Spitzbergen area, are likely to produce periods of abnormal coolness such as that which at present prevails. In any case, the moral to be drawn, if we really do intend to solve the weather problem, is by all means to have a meteorological station in Iceland, and endeavor to study the weather, as we are fortunately able to do in India, on a *large scale*, instead of merely confining our attention to the minute range of conditions we are able to observe within the limited area of these islands."

TEMPERATURE OF THE AIR.

The distribution of mean temperature over the United States and Canada for the month of June, 1882, is exhibited by the dotted isothermal lines on chart ii. The table of mean temperatures at the lower left-hand corner on chart ii. shows the average temperature which prevailed in each district during the current month, compared with the mean temperature of each district, as determined from observations taken at Signal Service stations during the corresponding month of the past ten years.

The temperature has differed slightly from the normal in the districts on the Atlantic coast, the excess being only one-tenth of one degree in the middle states and two-tenths in New England. In all other districts east of the Rocky mountains, the temperature has ranged from one to two degrees below the normal, except in the Missouri valley, where it is slightly above the normal for the month. On the Pacific coast, the temperature was about two degrees below the normal in California, and slightly above in Oregon and Washington territory. At the station on the summit of Mount Washington, it was one and eight-tenths degrees below, and on the summit of Pikes' Peak, it was three and four-tenths degrees below the mean for the month.

DEVIATIONS FROM MEAN TEMPERATURE.

Under this heading, departures exhibited by the reports from the regular Signal Service stations are shown in the table of comparative temperatures on the left-hand side of chart ii. The following items of importance, in connection with this subject, are reported by voluntary observers:

Illinois: Riley, mean temperature 63°.7, or 2°.9 below the mean of past twenty-one years. During that period, the only June mean temperature, lower than that of the present year, occurred in 1869.

Kansas: Wellington, mean temperature 72°.5, or 3°.2 below the average of past three years. Yates Centre, mean temperature 74°.6, or 0°.4 below the average of past two years.

Maine: Gardiner, mean temperature 61°.94, or 1°.45 below the average of the past forty-six years.

Maryland: Fallston, mean temperature 70°.36, or 0°.25 below the average of the past eleven years. During that period, the highest means, 72°.40, 72°.61, and 72°.17 occurred in 1871, '74 and '76 respectively; the lowest, 67°.42, occurred in 1881.

Missouri: Saint Louis, "Missouri Weather Service" "mean temperature differs but little from the average of reports, past forty years."

New York: North Volney, mean temperature 62°.82, or 2°.22 below the average of the past thirteen years. During that period, the lowest mean temperature, 58°.68, occurred in 1881; the highest, 71°.59, occurred in 1870. Palermo, mean temperature 62°.4, or 1°.9 below the average of the past twenty-nine years. During that period, the highest monthly mean, 71°.6, occurred in 1870; the lowest, 59°.3, occurred in 1855.

Vermont: Woodstock, mean temperature 64°.27, or 0°.78 above the average of the past fifteen years. During that period, the highest June mean, 67°.07, occurred in 1876; lowest,

58°.78, occurred in 1869; the highest maximum temperature, 95°.3, occurred June 30th, 1878; lowest minimum, 31°.4, occurred June 7th, 1881.

Virginia: The following records, furnished by Mr. Howard Shriver, of Wytheville, show the mean, maximum and minimum temperatures for each month for a number of years, with the monthly and annual averages:

Maximum and minimum temperatures.

Year.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1861	48	25	56	25	63	27	70	38	75	44	80	43	80	61	81	62	73	49	67	44	57	31	56	26
1862	63	29	52	29	56	25	66	35	74	50	74	56	.....	.....	.....	.....	73	59	69	40	63	32	59	20
1866	63	8	62	—3	72	17	81	31	83	40	89	48	96	54	88	.....	.....	.....	.....	.....	.....	.....	.....	.....
1868	.....	.....	56	—1	.....	10	83	28	81	44	82	48	92	61	82	56	84	36	76	28	68	21	30	—10
1869	50	15	65	14	76	—1	78	28	84	40	90	53	88	52	92	47	82	36	68	25	65	18	53	13
1870	60	6	64	5	60	10	80	36	84	40	85	56	86	57	84	62	80	45	71	34	66	20	60	— 4
1871	62	17	60	14	72	28	82	38	84	43	86	59	88	51	89	56	82	37	79	31	68	22	68	— 3
1872	59	—6	62	—6	70	10	80	33	82	42	86	54	87	65	87	59	88	42	79	31	57	6	58	0
1873	61	11	62	—3	60	1	81	33	83	46	85	51	86	59	88	52	85	39	74	21	64	2	64	2
1874	64	3	74	20	70	21	74	31	90	44	92	56	80	57	89	56	84	49	74	28	70	17	69	21
1875	60	4	63	5	70	24	75	20	86	40	88	55	88	65	85	58	84	36	75	30	65	21	61	7
1876	70	13	69	8	73	15	78	32	84	37	87	54	90	50	88	56	85	50	77	27	75	23	51	0
1877	65	3	61	18	72	11	78	33	90	38	87	48	91	58	89	57	83	44	80	32	69	12	73	13
1878	54	—4	62	9	74	22	83	31	83	32	85	44	91	54	88	54	81	41	77	22	70	23	52	5
1879	60	—6	65	6	74	20	79	22	84	32	86	45	91	55	87	47	82	32	86	22	83	8	64	10
1880	74	19	73	10	70	24	81	23	86	36	88	42	91	52	89	50	87	36	78	27	70	10	56	—10
1881	47	7	60	6	67	12	80	17	90	43	88	44	96	50	94	51	96	48	86	34	77	10	64	12
1882	65	11	64	12	75	20	79	24	83	32	88	45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Means	60.2	9.1	62.8	8.9	69.6	16.4	78.2	29.6	83.7	40.2	85.9	50.2	88.8	56.3	87.5	54.9	83.1	42.5	76.0	29.6	67.9	18.5	60.2	3.4

NOTE.—Observations made at or near 7 a. m., 2 p. m., and 9 p. m., until October 1st, 1878; subsequently by self-registering instruments.

Mean temperatures.

Year.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual means.
1860	..	....	....	....	65°	68	.....	.....	62°	55°	43°	33°	54°
1861	57	41	45	52	60	72	67	71	65	55	43	40	54
1862	41	40	41	51	61	68	75	74	67	56	44	37	55
1866	33	34	42	56	50	64	74	.....	.....	.....	.....	.....	.....
1868	.....	31	45	49	59	65	74	69	64	53	40	29	53
1869	38	37	40	51	57	68	72	74	61	47	36	34	50
1870	37	35	37	52	61	68	74	72	64	53	41	31	53
1871	36	40	48	55	62	71	71	73	60	55	43	34	54
1872	30	34	37	55	64	69	74	73	64	53	37	30	54
1873	34	37	47	52	61	70	73	71	64	50	38	38	53
1874	37	39	44	50	63	73	72	69	64	53	43	39	54
1875	34	33	44	49	62	69	73	68	61	49	44	41	52
1876	41	40	41	50	62	68	72	72	64	51	43	26	52
1877	33	39	41	52	53	69	74	70	63	55	43	41	53
1878	31	37	49	55	60	64	74	71	62	51	42	28	53
1879	31	31	45	50	62	67	72	67	60	50	44	42	53
1880	44	40	43	54	66	68	72	71	62	53	38	29	53
1881	31	35	37	47	64	68	73	72	70	58	45	39	53
1882	36	42	46	54	58	67	.....	.....	.....	.....	.....	.....	.....
Average monthly means.	36	37	43	52	61	68	73	71	63	53	42	35	53

It will be seen from the table of mean temperature above, that the mean of June for the current year is one degree below the average mean. The table of maximum and minimum temperatures shows that the maximum temperature of June, 1882, has been exceeded but three times during the period covered by the record.

West Virginia: Helvetia, mean temperature 65°.54, or 0°.23 below the average of the past six years.

RANGES OF TEMPERATURE AT SIGNAL SERVICE STATIONS.

Monthly ranges of temperature during the month of June, varied from 22° to 65° over the country east of the Rocky Mountains, and from 19° to 67° on the Pacific coast. The smallest ranges are: San Francisco, 19°; San Diego, 20°; Galveston and Key West, 22°; Cedar Keys and Punta Rassa, 23°; Indianola, 24°; Brownsville, Texas, Pensacola and New Orleans, 25°; Cape May and Fort Macon, 30°: Hatteras and Jacksonville, 31°; New Shoreham, Rhode Island, 32°; Charleston and Mobile, 34°; Fredericksburg, Charlotte and Savannah, 35°. The largest are: Campo, California, 67°; Fort Supply, Indian territory, 65°; Deer Lodge, Montana, 63°: Cartersville, Montana, 61°; La Mesilla, 60°; Colfax, Washington territory, Missoula, Montana, and Fort Apache, Arizona, 59°; Prescott, Arizona, and El Paso, Texas, 58; Tucson, Arizona, Fort Washakie, Wyoming, Dodge City, Kansas, and Fort Bennett, Dakota, 57°; Spokane Falls, Washington territory, Winnemucca, Graham, Texas, Concho, Texas, and Fort Stevenson, Dakota, 56°; Umatilla, Oregon, Smithville, Dakota, and Fort Elliott, Texas, 55°. The greatest daily ranges of temperature varied in the different districts as follows: New England, from 21° at New Shoreham on the 22d, and 22° at Newport on the 16th, to 31° at Boston on the 7th, Provincetown on the 13th, and 32° at Springfield on the 23d; middle Atlantic states, from 18° at Cape May on the 12th, and 22° at Delaware Breakwater on the 15th, to 34° at Williamsport and 36° at Barnegat on the 25th; south Atlantic states, from 20° at Macon on the 6th and 14th, and 21° at Hatteras on the 21st, to 28° at Augusta on the 27th, and 30° at Kittyhawk on the 15th; Florida peninsula, from 17° at Cedar Keys on the 13th, to 19° at Key West on the 11th; east Gulf states, from 16° at New Orleans on the 2d, to 27° at Mobile on the 23d, and 28° at Montgomery on the 28th; west Gulf states, from 11° at Galveston on the 3d, and 16° at Indianola on the 23d, to 29° at Denison on the 1st, Shreveport on the 2d, San Antonio on the 18th, and 32° at Fort Smith, Arkansas, on the 2d; Rio Grande valley, from 18° at Brownsville on the 24th, to 35° at Eagle Pass on the 18th; Ohio valley and Tennessee, from 23° at Cincinnati and Champaign on the 6th and Louisville on the 21st, to 30° at Pittsburgh on the 23d; lower lake region, from 22° at Erie on the 27th, to 29° at Detroit on the 6th, Rochester on the 22d and Oswego on the 23d; upper lake region, from 23° at Grand Haven on the 12th, to 34° at Escanaba on the 6th, and 36° at Marquette on the 16th; extreme northwest, from 36° at Moorhead on the 6th, to 41° at Fort Buford on the 7th; upper Mississippi valley; from 22° at Keokuk on the 6th and 25th, 24° at Springfield on the 21st, to 34° at Saint Paul and 35° at Dubuque on the 5th; Missouri valley, from 28° at Springfield and 29° at Omaha on the 6th, to 39° at Fort Bennett and Huron, Dakota; northern slope, from 30° at North Platte on the 7th, to 45° at Fort Shaw on the 5th, and Fort Keogh on 6th; middle slope, from 23° on the summit of Pike's Peak on the 3d, to 37° at Dodge City on the 14th, and 38° at West Las Animas, Colorado, on the 21st, 24th and 28th; southern slope, from 31° at Henrietta and 32°, at Fort McKavett on the 2d, to 39° at Stockton on the 1st, and 45° at El Paso on the 11th and 21st; southern plateau, from 35° at Santa Fé on the 13th, to 52° at Fort Apache on the 15th; middle plateau, from 34° at Pioche on the 12th, to 42° at Winnemucca on the 1st; northern plateau, from 36° at Dayton on the 4th, to 47° at Missoula on the 4th; north Pacific coast region, from 33° at Portland on the 1st, to 41° at Roseburg on the 2d; middle Pacific coast region, from 15° at San Francisco on the 21st, to 33° at Sacramento, and 37° at Red Bluff on the 29th; south Pacific coast region, from 18° at San Diego on the 25th, to 59° at Campo on the 23d.

Table of Comparative Maximum Temperatures for the Month of June.

State or Territory.	Maximum for June, 1882, Signal Service.		Highest since Signal Service stations were opened—3 to 11 years.			Highest from any other source.			
	Station	Temp.	Station.	Temp.	Year.	Place.	Temp.	Year.	Length of Record.
		°		°			°		
Alabama	Mobile	100	Montgomery	106	1881	Mount Vernon Barracks	102	1876	34 years.
Arizona	Tucson	108	Maricopa	116	1876	Fort Mojave	119	1876	12 "
Do	San Carlos	105	Yuma	114	'76 & '77	Fort Lowell	116	1876	11 "
Arkansas	Fort Smith	101	Little Rock	97	1881	Fort Smith	99		21 "
Do	Little Rock	98							
California	Red Bluff	102	Visalia	109	1879	Fort Miller	121	1853	13 "
Do			Red Bluff	105	1878	Fort Yuma	117	1859	31 "
Colorado	West Las Animas	100	Denver	99	1873	Fort Lyon	107		21 "
Do	Pike's Peak	47				Fort Lewis	106	1880	2 "
Connecticut	New Haven	91	New Haven	92	1880	New Haven	102	1864	87 "
Dakota	Fort Sully	95	Fort Sully	111	'74 & '76	Fort Sully	108		15 "
Do			Fort Meade	103	1881	Fort Buford	106	'68 & '70	14 "
Delaware	Delaware Breakwater	88	Delaware Breakwater	87	1880	Fort Delaware	97		45 "
Dist. of Columbia	Washington	95	Washington	102.5	1874	Washington	99		49 "
Florida	Jacksonville	96	Jacksonville	100	1880	Fort King	106	1833?	10 "
Do						Houston	104	1880	3 "
Do.						Fort Barrancas	104	1854	57 "
Georgia	Augusta and Savannah	97	Augusta	102	1881	Forsyth	104	1881	7 "
Do						Oglethorpe Barracks	102	1845	40 "
Do						Savannah	102	'39 & '45	38 "
Idaho	Lewiston	96	Fort Lapwai	97	1881	Fort Boise	107	1876	15 "
Do						Fort Lapwai	105		16 "
Illinois	Springfield	93	Chicago	98	1872	Chicago	102		38 "
Do						Rock Island Arsenal	102	'70&'73?	12 "
Indiana	Indianapolis	94	Indianapolis	96	1874	Vevay	100	'65&'66?	13 "
Do						Richmond	100	1878	2 "
Indian Territory	Fort Supply	103	Fort Sill	105	'79 & '81	Fort Gibson	103		48 "
Do						Fort Sill	103		9 "
Do						Fort Supply	105	1875	1 "
Iowa	Des Moines and Keokuk	92	Dubuque	98	1874	Guttenburg	103	1870	11 "
Do			Des Moines	96	1881				
Kansas	Dodge City	100	Dodge City	102	1880	Fort Wallace	108	1879	7 "
Do						Fort Hays	106		10 "
Do						Holton	106		9 "
Kentucky	Louisville	95	Louisville	100	1874	Newport Barracks	96		28 "
Do						Bowling Green	96	1881	2 "
Louisiana	Shreveport	101	Shreveport	104	1875	Point Pleasant	101	1881	6 "
Do						Baton Rouge	98		57 "
Maine	Portland	93	Portland	90	1876	Brunswick	98	1808?	53 "
Do						Hancock Barracks	98	1836?	17 "
Maryland	Baltimore	97	Baltimore	97.5	1874	Fort Washington	105	1853?	38 "
Massachusetts	Boston	94	Boston	98	1874	Fort Independence	99	'54& '72?	47 "
Michigan	Port Huron	88	Alpena	97	1874	Marquette	101	1862?	8 "
Do						Monroe	101	1866?	10 "
Minnesota	Saint Paul	88	Breckenridge	96	1876	Saint Paul	99	1870	7 "
Mississippi	Vicksburg	99	Vicksburg	101	1881	Brookhaven	100	1875	5 "
Do						Fayette	99	1881	7 "
Missouri	Springfield	98	Saint Louis	99	1881	Allenton	101	1868?	4 "
Do						Jefferson Barracks	100	1860?	26 "
Do						Saint Louis	100		39 "
Montana	Fort Keogh	96	Fort Keogh	104	1881	Fort Benton	104	1870?	10 "
Nebraska	Omaha	93	North Platte	101	1876	Fort McPherson	108	1876	13 "
Do						Lincoln	108	1881	1 "
Nevada	Winnemucca	92	Winnemucca	95	1881	Camp Halleck	107	1871	15 "
New Hampshire	Mount Washington	63	Mount Washington	71	1878	Dunbarton	100	1876	5 "
Do						Fort Constitution	96	'50 & '52	34 "
New Jersey	Little Egg Harbor	96	Sandy Hook	97	1874	Atco	102	1875	7 "
Do						Rio Grande	102	1875	1 "
New Mexico	La Mesilla	105	La Mesilla	108	1881	Fort McRae	120	1873	11 "
Do						Albuquerque	114	1857	18 "
New York	New York City and Oswego	91	Oswego	98	1875	Fort Hamilton	106	1825	39 "
Do						Newburg	102	1849?	47 "
North Carolina	Charlotte	97	Wilmington	100	1880	Weldon	103	1880	7 "
Do						Goldsboro	102	1876	4 "
Do						Fort Johnson	99		57 "
Ohio	Cincinnati	96	Cincinnati	98	1874	College Hill	100	1881	64 "
Do						Ruggles	100	1879	7 "
Oregon	Umatilla	101	Umatilla	103	'78 & '80	Fort Dalles	104	1853?	15 "
Do						Fort Haskins	102	1860?	8 "
Pennsylvania	Pittsburgh	97	Pittsburgh	98	1874	Carlisle Barracks	100	1868?	37 "
Do						Mount Joy	100	1869?	10 "
Rhode Island	Newport	86	Newport	89	1876	Providence	97	1866?	35 "
South Carolina	Charleston	97	Charleston	100	'77 & '80	Aiken	102	1881	4 "
Do						Charleston	96		105 "
Tennessee	Memphis	98	Memphis	100	1881	Humboldt	104	'71 & '74	4 "
Do						Castalian Springs	100	1875	2 "
Texas	Eagle Pass and El Paso	110	Fort Davis	111	1881	Fort Ringgold	114	1877	32 "
Do			El Paso	109	1881	Fort Duncan	112	1860	31 "
Utah	Salt Lake City	91	Salt Lake City	94	'74'76'79	Mount Carmel	107	1876	3 "
Do						Fort Crittenden	103	1859	3 "
Vermont	Burlington		Burlington	94	1878	Lunenburgh	98		16 "
Virginia	Norfolk	96	Norfolk	102	1874	Accotink	98	1881	7 "
Do						Fortress Monroe	97		56 "
Washington T'y	Spokane Falls	94	Dayton	97	1880	Fort Walla Walla	106	1876	12 "
Do						Fort Vancouver	98		19 "
West Virginia	Morgantown	85	Morgantown	93	1874	Weston	94	1875	2 "
Do						Helvetia	89	1880	3 "
Wisconsin	Madison	87	La Crosse	98	1874	Fort Howard	100		30 "
Do						Milwaukee	100	1870	11 "
Wyoming	Fort Washakie	90	Cheyenne	97	'80 & '81	Fort Fred Steele	104	1871	

FROSTS.

Frosts occurred in the various states and territories, as follows:

California: Campo, 5th, 21st, 23d; San Gorgonio, 13th, 14th, 21st.

Colorado: on summit of Pike's Peak, 2d, 3d, 8th, 9th, 10th, 11th, 14th.

Dakota: Fort Bennett, 4th; Alexandria 3d, 5th.

Illinois: Chicago, 1st; Riley, 1st, 5th.

Iowa: Cresco, and Monticello, 5th; Muscatine, 1st, 5th; Nora Springs, 19th; Dubuque, 1st.

Kentucky: Bowling Green, 4th.

Michigan: Lansing, 5th; Detroit, 6th; Marquette, 10th, 11th, 20th.

Table of Maximum and Minimum Temperatures for June, 1882.

State or Territory.	Signal Service.			U. S. Army Post Surgeons or Voluntary Observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
		°	°		°	°
Alabama	Mobile	100		State Line	105	
Do	Montgomery		61	Calera		43
Arizona	Tucson	108		Texas Hill	111	
Do	San Carlos	105				
Do	Fort Apache and Prescott		36			
Arkansas	Fort Smith	101	50	Madison	103	35
Do	Little Rock	98	55	Arkansas City, Prescott, and Walnut Ridge	103	
California	Red Bluff	102		Borden and Mammoth Tank	112	
Do	Campo		31	Fort Lyon	100	
Colorado	West Las Animas	100	46	Fort Garland		30
Do	Pike's Peak	47	2	Southington	95	52
Connecticut	New Haven	91	46	Morriston	98	
Dakota	Fort Sully	95				
Do	Fort Stevenson		33			
Delaware	Del. Breakwater	88	50			
District of Columbia	Washington	95	51			
Florida	Jacksonville	96	65	Live Oak	100	
Do				Fernandino and Waldo		62
				Smithville	114?	
Georgia	Augusta and Savannah	97		Way Cross	103	
Do	Atlanta		56	Madison		43
Idaho	Lewiston	96				
Do	Eagle Rock		34			
Illinois	Springfield	93		Charleston and Peoria	97	
Do	Chicago		42	Riley		39
Indiana	Indianapolis	94	45	Laconia	98	
Do				Lafayette		42
Indian Territory	Fort Supply	103	38			
Iowa	Des Moines and Keokuk	92		Ames	98	
Do	Dubuque		41	Clinton		33
Kansas	Dodge City	100	43	Manhattan and Yates Centre		40
Kentucky	Louisville	95	50	Bowling Green	97	52
Louisiana	Shreveport	101	59	Vermillionville	107	
Do				Franklin		38
Maine	Portland	93				
Do	Eastport		42			
Maryland	Baltimore	97	53	Emmittsburg		45
Massachusetts	Boston	94		Somerset	96	
Do	Provincetown		46	Heath		40
Michigan	Port Huron	88		Niles	91	
Do	Escanaba		37			
Minnesota	St. Paul	88				
Do	Moorhead		35			
Mississippi	Vicksburg	99	57	Hernando	106	
Do				Okolona		44
Missouri	Springfield	98	46	Sedalia	98	42
Do				Oregon		28?
Montana	Fort Keogh	96				
Do	Deer Lodge and Missoula		32			
Nebraska	Omaha	93		Fremont	95	
Do	North Platte		38			
Nevada	Winnemucca	92	36	Humboldt	99	
Do				Boca		28
New Hampshire	Mt. Washington	63	21	New Market	92	42
New Jersey	Little Egg Harbor	96		New Brunswick	96	
Do	Atlantic City		50	Vineland		50
New Mexico	La Mesilla	105		Fort Union		32
Do	Santa Fé and Silver City		42			
New York	New York City and			West Point	97	
Do	Oswego	91		Factoryville and Madison Barracks		41
Do	Rochester		44			
North Carolina	Charlotte	97				
Do	Smithville		54			
Ohio	Cincinnati	96		Westerville		40
Do	Cleveland and Toledo		46			
Oregon	Umatilla	101				
Do	Roseburg		44			
Pennsylvania	Pittsburg	97		Dyberry		36
Do	Erie		45			
Rhode Island	Newport	86		Fort Adams	93	45
Do	Narragansett Pier		44			
South Carolina	Charleston	97	63	Hardeville, King's Tree, Georges and Cheraw	100	
Do				Allendale		38
Tennessee	Memphis	98		Milan	103	
Do	Knoxville and Nashville		50	Corinthe		39
Texas	Eagle Pass and El Paso	110				
Do	Fort Elliott		44			
Utah	Salt Lake City	91	46	Fort Douglas	93	44
Vermont	Burlington			Woodstock	93	38
Virginia	Norfolk	96		Johnsontown	98	
Do	Chincoteague		50	Snowville and Wytheville		45
Washington Ter	Spokane Falls	94	39			
West Virginia	Morgantown	85	45	Helvetia	86	42
Wisconsin	Madison	87		Beloit	92	41
Do	Milwaukee		40	Franklin		41
Wyoming	Fort Washakie	90	33	Fort Bridger		29

Minnesota: Moorhead, 4th.
Montana: Fort Ellis 20th.
Nebraska: North Platte, 3d, 4th, 5th.
Nevada: Carson City, 7th, 21st, 22d.
New Hampshire: Mount Washington, 1st, 2d, 3d, 5th, 6th, 20th, 29th.
New York: Friendship, and Palermo, 2d, 12th.
New Mexico: Sante Fé, 13th.
Ohio: North Lewisburg, 2d; Westerville, 20th.
Pennsylvania: Meadville, 6th; Dyberry, 12th, 22d.
Rhode Island: Newport, 2d.
Utah: Coalville, 22d.
Vermont: Burlington, 2d, 12th; Woodstock, 12th, 30th.
Wisconsin: Milwaukee, 1st, slightly damaging tender plants; La Crosse, 5th; Embarrass, 1st, 11th.
Wyoming: Fort Washakie, 22d.

PRECIPITATION.

The distribution of rainfall in the United States and Canada, during the month of June, as determined from observations taken at more than six hundred stations, is exhibited on chart iii.

The table at the lower left-hand corner of the chart, shows the average rainfall of June in each district, as determined from Signal Service observatjons during the past ten years, and the actual rainfall during the current month, with excess or deficiency as compared with the average.

There has been a deficiency of rainfall in the Gulf states, the middle, and New England states; the greatest deficiency being in the Gulf states, where it ranged from 1.55 to 1.90 inches. In the northwest and lake region, and in the states north of the Ohio river, there has been an excess of rainfall, the region of greatest precipitation being in the states of the upper Mississippi valley. On the Pacific coast, the rainfall has been slightly below the average for the month, except in southern California, where it has been slightly in excess, although the average rainfall in that section was less than 0.2 of an inch.

DEVIATIONS FROM AVERAGE PRECIPITATION.

Under this heading departures exhibited by the reports from the regular Signal Service stations, are shown in the table of comparative monthly rainfalls (as published in the lower left-hand corner of chart iii.) The following items of importance, in connection with this subject, are reported by voluntary observers:

Illinois: Riley, monthly rainfall 4.42 inches, or 0.32 inch more than the June average of the past twenty-one years.

Iowa: Clinton, monthly rainfall 9.05 inches, or about 2.50 inches more than the June average.

Kansas: Yates Centre, monthly rainfall 8.24, or 4.42 inches more than the average of the past two years. Total precipitation for six months ending June 30th, is 7.13 inches more than the average of the corresponding period for the past two years. Wellington, monthly rainfall 3.62 inches or 0.78 inch below the average of past three years.

Maine: Gardiner, monthly rainfall 4.25 inches, or 1.02 inches more than the June average of the past forty-six years.

Maryland: Fallston, monthly rainfall 2.32 inches, or 1.43 inches less than the June average of the past eleven years. During that period the largest June rainfall, 7.86 inches, occurred in 1881; the smallest, 1.05 inches, occurred in 1873.

Missouri: Saint Louis, "Missouri Weather Service," reports: "The monthly rainfall was greatest in the northeastern, and least in the southwestern counties. At Saint Louis the monthly rainfall was a little more than two-thirds of the average June rainfall."

New York: North Volney, monthly rainfall 3.33 inches, or 0.18 inch more than the June average for the past nine years. Palermo, monthly rainfall 2.90 inches. The largest June rainfall that has occurred since 1859, 8.80 inches, occurred in 1865; the smallest, 0.70 inch, occurred in 1864 and 1870. Hector, amount of rainfall for the year ending June 30, 1882, is 23.75 inches.

Virginia: The following record, furnished by Mr. Howard Shriver, of Wytheville, shows the monthly and annual precipitations, with the monthly averages for a number of years:

Year.	Jan.	Feb.	Mc'h.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1860	3.1	3.6	3.3	3.6	3.4	3.1	4.1	3.7	2.6	9.4	4.3	4.4	47.0
1861	6.3	5.3	2.3	3.6	3.6	3.2	8.1	3.1	5.3	5.8	4.3	0.2	51.1
1862	4.6	8.0	4.0	6.5	3.2	5.9	4.6	3.2	0.3	2.8	0.5	1.1	44.7
1868	3.1	1.7	2.3	3.3	3.8	2.5	6.6	3.4	4.3	2.6	1.3	3.2	38.2
1869	2.2	2.8	3.2	1.9	4.4	2.0	2.8	2.6	4.2	2.7	1.6	4.1	34.4
1870	2.3	3.0	4.3	2.8	2.3	5.5	2.5	7.6	1.3	2.8	1.5	1.4	37.6
1871	2.3	2.8	4.0	3.3	4.7	3.2	1.7	3.4	3.4	1.7	1.6	6.0	38.1
1872	1.5	2.1	3.3	4.0	5.7	4.9	2.3	2.5	2.4	1.7	1.5	2.9	34.8
1873	3.8	5.4	3.0	3.4	7.3	2.8	2.2	5.3	2.5	2.2	2.5	3.1	43.5
1874	2.7	3.9	2.7	6.2	1.1	5.8	5.6	2.7	5.7	1.1	3.2	1.2	39.9
1875	3.1	4.0	6.5	4.0	0.5	9.1	7.8	4.6	2.4	0.5	3.8	2.7	49.0
1876	2.1	3.0	2.0	0.8	3.4	4.0	2.7	2.6	4.5	1.9	5.4	1.0	33.1
1877	4.0	0.3	5.7	5.4	3.0	4.0	4.1	1.9	3.3	3.9	7.1	4.1	46.8
1878	5.7	2.7	3.2	4.3	5.0	2.9	6.4	3.8	8.3	3.2	3.8	3.2	52.5
1879	4.4	2.4	1.5	2.6	5.1	2.0	2.8	4.5	1.8	5.2	1.1	5.4	38.9
1880	1.8	2.6	5.6	3.9	2.3	2.4	4.4	4.8	3.7	1.8	3.4	2.4	39.1
1881	2.3	3.2	2.0	2.3	0.9	3.4	4.1	2.0	5.7	3.4	2.6	4.1	36.1
1882	7.1	5.1	3.2	2.8	4.5	5.6	.....	.....	.....	.....	.....	.....	.....
Means.	3.47	3.44	3.45	3.59	3.57	3.92	4.28	3.63	3.63	3.10	2.91	2.97	41.46

West Virginia: Helvetia, monthly rainfall 8.27, or 2.65 inches more than the June average of the past six years.

Table of Special Heavy, Largest and Smallest Monthly Rainfalls.

STATION.	Special Heavy.			Largest Monthly.	Smallest Monthly.	
	Date.	Amt.	Duration	Amount, Inches.	STATION.	Amt.
		inch.				in's.
Alabama.					*Alabama.*	
Mt. Vernon Barracks	21	2.00	2 hrs.	.....	Talladega	0.10
Birmingham	19	6.00	.....	14.41	Calera	0.13
Arkansas.					*Arizona.*	
Madison	19	3.03	.....	.....	Mammoth Tank	0.00
Canada.					Maricopa	0.00
Chatham, N. B.	.....	.....	.....	6.77	Texas Hill	0.00
Charlottetown, P. E. I.	.....	.....	.....	6.15	Yuma	0.05
Connecticut.					San Simon	0.21
New London	24	1.69	1hr.30m.	.....	Prescott	0.47
Dakota.					*Arkansas.*	
Smithville	26	2.53	.....	9.59	Brinkley	0.06
Fort Sisseton	.....	.....	.....	7.42	*California.*	
Olivet	.....	.....	.....	6.69	Presidio	0.00
Fort Stevenson	.....	.....	.....	6.07	Oakland	0.00
Florida.					Pleasanton	0.00
Cedar Keys	.....	.....	.....	9.56	Livermore	0.00
Punta Rassa	11	6.31	.....	8.46	Tracy	0.00
Waldo	.....	.....	.....	8.43	Lathrop	0.00
Fort Barrancas	8 and 9	2.64	19 hrs.	.....	Stockton	0.00
Key West	11	2.26	3hrs.40m.	.....	Galt	0.00
Pensacola	23	1.48	30 min.	.....	Summit	0.00
Georgia.					Chico	0.00
Way Cross	.....	.....	.....	10.63	Redding	0.00
Savannah	29 and 30	3.53	.....	7.95	Turlock	0.00
Toccoa	25	2.85	.....	7.86	Merced	0.00
Macon	.....	.....	.....	7.76	Borden	0 00
Griffin	.....	.....	.....	7.08	Fresno	0.00
Madison	.....	.....	.....	6.52	Kingsburg	0.00
Atlanta	15	1.45	1hr.10m.	.....	Martinez	0.00
Illinois.					Byron	0.00
Springfield	2	2.51	.....	12.71	South Valejo	0.00
Peoria	.....	.....	.....	11.18	Suisun	0.00
Morrison	.....	.....	.....	10.06	Davis	0.00
Champaign	.....	.....	.....	9.93	Napa	0.00
Charleston	.....	.....	.....	7.70	Calistoga	0.00
Elmira	.....	.....	.....	6.23	Woodland	0.00
Rockford	24	1.40	1 hr.	.....	Goshen	0.00
Indiana.					Tulare	0.00
Indianapolis	16	1.40	30 min.	9.35	Delano	0.00
Lafayette	.....	.....	.....	9.10	Mojave	0.00
Logansport	13	3.45	1hr.45m.	8.89	Newhall	0.00
Saint Meinrad	.....	.....	.....	6.75	San Fernando	0.00
Vevay	.....	.....	.....	6.53	Spadra	0.00
New Corydon	.....	.....	.....	6.17	Whitewater	0.00
Indian Territory.					Indio	0.00
Fort Supply	12	3.10	.....	.....	Anaheim	0.00
Iowa.					Petaluma	0.00
De Moines	10	3.51	.....	12.16	Point San Jose	t'ce
do.	28	2.75	.....	.....	Niles	t'ce
Keokuk	.....	.....	.....	9.75	Antioch	t'ce
Logan	11	3.30	.....	9.60	Lemoore	t'ce
do.	29	3.10	.....	.....	Los Angeles	t'ce
Clinton	.....	.....	.....	9.05	Benetia Barracks	0.02
Fort Madison	.....	.....	.....	8.75	San Francisco	0.04
Davenport	.....	.....	.....	8.43	Ione	0.04
Muscatine	.....	.....	.....	8.25	Sumner	0.05
Ames	.....	.....	.....	7.43	San Diego	0.07
Dubuque	.....	.....	.....	6.29	Poway	0.09
Cresco	24	2.50	9 hrs.	6.10	Alcatraz Island	0.10
Nora Springs	24	1.50	1 hr.	.....	Keene	0.10
Le Claire	25	4.25	.....	.....	Sacramento	0.10
Kansas.					Tuohey's Ranche	0.10
Yates Centre	14 and 15	2.54	14 hrs.	8.24	Dunnigan	0.12
Maine.					Colfax	0.13
Eastport	.....	.....	.....	6.53	Farmington	0.13
Maryland.					Red Bluff	0.15
Sandy Springs	19	1.07	30 min.	.....	Tehachapi	0.15

Table of Special Heavy, Largest and Smallest Monthly Rainfalls—Continued.

STATION.	Special Heavy.			Largest Monthly.	Smallest Monthly.	
	Date.	Amt.	Duration	Amount, Inches.	STATION.	Amt.
Massachusetts.					Knight's Landing	0.16
Springfield	4	1.88	2 hrs.	.....	Williams	0.17
Michigan.					Modesto	0.19
Northport	3 and 4	3.15	21 hrs.	13.50	Salinas City	0.19
do.	14	2.60	4hrs.50m.	.....	Ravenna	0.25
do.	18	2.40	1hr.50m.	.....	Rocklin	0.25
do.	30	2.80	.....	.....	Campo	0.26
Battle Creek	25	3.00	1 hr.	8.00	Willows	0.27
Hastings	.....	.....	.....	6.90	Auburn	0.28
Alpena	.....	.....	.....	6.66	Fort Gaston	0.28
Port Huron	.....	.....	.....	6.34	Tehama	0.28
Thornville	14	2.35	13 hrs.	6.22	Brighton	0.31
Escanaba	.....	.....	.....	6.15	Fort Bidwell	0.38
Grand Haven	.....	.....	.....	6.05	Cisco	0.48
Coldwater	25	2.00	2hrs.15m.	.....	Colton	0.50
Minnesota.					*Georgia.*	
Duluth	17 and 18	2.54	.....	6.72	Gainesville	0.21
Mississippi.					*Idaho.*	
Meridian	22	3.01	.....	6.76	Cœur d' Alene	0.16
Lake	16	3.00	.....	.....	Lewiston	0.36
Missouri.					*Mississippi.*	
Protem	11	1.30	50 min.	7.14	Okalona	0.31
Nebraska.					Vicksburg	0.40
Fremont	.....	.....	.....	7.61	Grenada	0.50
De Soto	.....	.....	.....	7.31	*Nevada.*	
Omaha	25	3.38	3hrs.10m.	.....	Boca	0.00
New Hampshire.					Wadsworth	0.00
Mt. Washington	1	2.80	.....	11.40	Beowawee	0.10
New Jersey.					Toano	0.10
Paterson	.....	.....	.....	9.00	Tecoma	0.15
New York.					Carlin	0.20
Troy	.....	.....	.....	8.64	Elko	0.20
North Carolina.					Reno	0.20
New River Inlet	.....	.....	.....	6.27	Wells	0.25
Murphy	.....	.....	.....	6.05	Halleck	0.27
Kittyhawk	15	1.00	40 min.	.....	Fort McDermitt	0.28
Ohio.					Otega	0.37
College Hill	.....	.....	.....	9.75	Humboldt	0.49
Pennsylvania.					*New Mexico.*	
Franklin	.....	.....	.....	7.88	Deming	0.43
Pittsburgh	16	1.44	1hr.15m.	.....	*Oregon*	
South Carolina.					Umatilla	0.17
Charleston	18	3.25	3hrs.35m.	9.12	Albany	0.41
Jacksonborough	.....	.....	.....	6.44	*Texas.*	
Tennessee.					Austin	0.00
Corinth	19	2.94	.....	.....	Orange	0.00
Texas.					Longview	0.02
Galveston	6 and 7	5.62	.....	6.16	Tyler	0.09
Concho	13	1.47	1hr.40m.	.....	San Antonio	0.11
Vermont.					Belton	0.16
Newport	.....	.....	.....	6.49	Luling	0.27
Virginia.					Fredericksburg	0.30
Fort Monroe	16	2.84	4 hrs.	.....	Beaumont	0.35
West Virginia.					Uvalde	0.36
Helvetia	.....	.....	.....	8.27	College Station	0.40
Wisconsin.					Hearne	0.42
Madison	.....	.....	.....	7.76	Waco	0.50
Beloit	.....	.....	.....	6.51	*Utah.*	
Embarrass	.....	.....	.....	6.40	Kelton	0.09
	.....	.....	.....	.....	Terrace	0.00
	.....	.....	.....	.....	*Washington.*	
	.....	.....	.....	.....	Almota	0.01
	.....	.....	.....	.....	Colfax	0.12
	.....	.....	.....	.....	Pomeroy	0.27

The following table shows the least and greatest numbers of rainy and cloudy days and percentages of mean relative humidity as reported from the various districts during the month:

Table of rainy and cloudy days and relative humidity for June, 1882.

Districts.	Rainy days	Cloudy days.	Relative humidity.
			Percentages.
New England	From 9 to 17	From 2 to 11	From 62.1 to 82.2.
Middle Atlantic states	" 7 " 22	" 1 " 12	" 58.6 " 80..6
South Atlantic states	" 9 " 18	" 1 " 8	" 60.6 " 80.1.
Florida peninsula	" 9 " 14	" 2 " 9	" 68.3 " 75.3.
East Gulf states	" 4 " 15	" 1 " 6	" 62.8 " 78.6.
West Gulf states	" 3 " 8	" 1 " 4	" 67.1 " 79.6.
Rio Grande valley	" 2 " 7	" 2 " 7	" 60.6 " 81.1.
Ohio valley and Tennessee	" 12 " 22	" 1 " 14	" 65.0 " 75.2.
Lower lake region	" 13 " 18	" 4 " 11	" 65.1 " 70.6.
Upper lake region	" 10 " 20	" 3 " 10	" 62.6 " 77.3.
Extreme northwest	" 9 " 17	" 4 " 10	" 67.5 " 73.5.
Upper Mississippi valley	" 12 " 23	" 9 " 18	" 58.8 " 82.0.
Missouri valley	" 11 " 20	" 3 " 14	" 67.0 " 74.6.
Northern slope	" 6 " 17	" 2 " 11	" 57.1 " 74.8.
Middle slope	" 4 " 18	" 4 " 7	" 55.0 " 81.7.
Southern slope	" 4 " 10	" 1 " 5	" 37.0 " 63.8.
Southern plateau	" 3 " 11	" 1 " 6	" 35.4 " 49.8.
Middle plateau	" 6 " 9	" 3 " 7	" 39.1 " 42.2.
Northern plateau	" 4 " 14	" 0 " 9	" 44.8 " 63.8.
North Pacific coast region	" 8 " 11	" 7 " 11	" 62.1 " 71.7.
Middle Pacific coast region	" 1 " 4	" 0 " 6	" 41.0 " 78.5.
South Pacific coast region	" 1 " 3	" 1 " 9	" 37.5 " 71.0.

SNOW.

Snow has been reported by the following stations: Lansing, Michigan, 4th; Wytheville, Virginia, 5th, light spitting snow, lasting a few minutes; Milwaukee, 3d; Pike's Peak, 2d, 3d, 4th, 5th, 7th, 8th, 10th, 12th, 13th, 15th; Mount Washington, 2d, 3d, 5th; Burlington, Vermont, 1st, summits of mountains covered with snow; 12th, 20th and 21st, summit of Mount Marcy covered with snow.

HAIL.

Kittyhawk, North Carolina, 28th: Severe hail storm, doing great damage to crops in this locality; hail-stones as large as walnuts.

Laredo, Texas, 8th: Severe hail storm from 6.20 to 7.25 p. m.; all windows of northern exposure were broken; hail-stones of enormous size fell, (some of them weighing one pound) and drifted in places to a depth of six inches. Great damage was done by the breaking of sky-lights in stores, exposing goods to the violence of the storm.

Dubuque, Iowa, 16th: For thirteen minutes, commencing at 2.54 p. m., the largest and most destructive hail-stones fell that were ever seen at this place. The hail-stones measured from one to seventeen inches in circumference; the largest weighing one pound and twelve ounces. Washington park was literally covered with hail-stones as large as lemons, and large basketfuls could be gathered in a few minutes. They exhibited diverse and peculiar formations, some being covered with knobs and icicles half an inch in length; others were surrounded by rings of different colored ice with gravel and blades of grass imbedded within them. The foreman of the Novelty Iron Works, of this city, states that in two large hail-stones, melted by him, were found small living frogs. A number of persons were severly cut and bruised by the falling hail-stones. The damage inflicted is estimated at $5,000. One florist lost 2,387 panes of glass. Hundreds of windows of south and west exposure were broken, including twenty windows of heavy French plate glass. Railroad men report that hail fell at 2 p. m., at McGregor, forty miles northwest. No hail fell on the eastern side of the Mississippi, or at Julien, six miles west of this city.

Cairo, Illinois, 27th: During the violent storm, a description of which will be found elsewhere in the REVIEW under the head of "local storms", considerable large hail fell along the centre of the storm north of this station.

La Crosse, Wisconsin, 27th: Large quantities of hail fell along the track of the tornado (see local storms) of this date.

Omaha, 25th: Hail-stones measuring one-eighth of an inch in diameter fell for twenty-five minutes during storm.

Huron, Dakota, 23d: Storm accompanied by destructive hail.

Helena, Montana, 8th: During storm hail-stones fell measuring one inch in diameter.

West Las Animas, Colorado, 11th: Heavy shower of hail lasting thirty minutes; hail-stones measuring three-eights of an inch in diameter fell, breaking much window glass.

Morrison, Illinois, 16th: Destructive hail storm reported to have occurred near Lyndon in this state.

Anna, Illinois, 18th: Severe hail storm; hail-stones three-fourths of an inch in diameter, breaking much glass.

Worcester, Massachusetts, 4th: A heavy hail storm occurred a few miles north of this city.

Thornville, Michigan, 8th: Considerable damage done to corn and wheat fields and gardens by hail. The track of the storm was about one mile in width. On the 18th, a hail storm occurred in the township of Goodland, in this state. Several wheat fields were entirely destroyed. Hail-stones fell weighing two ounces.

Protem, Missouri, 11th: Hail storm causing great damage to the wheat crop and fruit. The hail-stones were about two-thirds as large as hen's eggs, and were of irregular shapes.

Freehold, New Jersey, 4th: Destructive hail storm occurred between 9.20 and 10.15 p. m., over a strip of country lying to the east of this place. The path of the storm was about thirty miles in length and half a mile in width. 25th: severe storm accompanied by hail, consisting mostly of jagged and broken ice; some specimens measuring one and three-eighths inches in length and half an inch in thickness.

Weldon, North Carolina, 4th: During severe storm, hail-stones as large as hen's eggs fell.

Fallsington, Pennsylvania, 25th: Hail storm at 5 p. m., during which the temperature fell 16° in a few minutes; some of the hail-stones were an inch and a half in length and of irregular shapes.

Sydney, Nebraska, 14th: Heavy storm accompanied by hail of remarkable size, destroying much window glass.

Hail storms of less violence have occurred in the various states and territories as follows:

Arizona: Yuma, 18th.
Colorado: Fort Lewis, 12th.
Dakota: Fort Meade, 12th; Bismarck, 12th, 30th; Rapid City, 15th; Fort Hale, 17th; Fort Stevenson, 21st; Wicklow, 24th.
Georgia: Atlanta, 17th; Augusta, 18th; Savannah, 29th.
Illinois: Swanwick, 21st; Rockford, 24th.
Indiana: Saint Meinrad, 26th.
Iowa: Clinton, 16th; Guttenburg, 16th, 24th; Nora Springs, 17th, 21st; Burlington, 18th; Des Moines and Independence, 22d.
Kansas: Yates Centre, 14th, 15th.
Maine: Gardiner, 9th.
Maryland: Baltimore, 19th.
Massachusetts: Worcester, 4th; Boston, 5th.
Michigan: Thornville, 8th; Port Huron, 14th, 18th; Litchfield, 15th.
Missouri: Protem, 2d, 15th.
Montana: New Chicago, 9th; Terry's Landing, 20th, 28th; Fort Shaw, 23d; Forts Custer and Ellis, 28th.
Nebraska: Fremont, 17th; Fort Niobrara, 20th; Genoa, 23d.
Nevada: Winnemucca, 9th; Fort McDermitt, 11th; Carson City, 14th; Pioche, 28th.
New Hampshire: Grafton, 19th.
New Jersey: Freehold, 4th, 25th; Readington, 15th; Cape May, 19th; Paterson, 20th.
New York: North Volney, 2d, 15th; Palermo, 2d; Troy, 4th; Oswego and Rochester, 19th.
Ohio: Cleveland, 4th; Cincinnati, 16th.
Oregon: Portland and Umatilla, 18th.
Pennsylvania: Dyberry, 6th, 17th.
South Carolina: Charleston, 15th.
Tennessee: Memphis, 12th; Chattanooga, 17th; Murfreesboro', 18th; Nashville, 22d; Knoxville, 28th.
Texas: Henrietta, 2d; Laredo, 8th; Eagle Pass, 13th.
Vermont: Lunenburg, 9th.
Washington territory: Dayton and Spangle, 20th.
West Virginia: Morgantown, 19th.

SLEET.

Sleet was reported as follows: On summit of Mount Washington, 2d; Pike's Peak, 1st, 2d, 3d, 7th to 11th, 18th, 19th, 27th.

COTTON REGION REPORTS.

The following table gives the average rainfall, mean of maximum and mean of minimum temperatures, in each of the cotton districts, as shown on chart vi. issued with the April REVIEW.

Meteorological Record for the Cotton Districts for the month of June, 1882.

DISTRICTS.	Average rainfall in inches.	Mean of the maximum.	Mean of the minimum.
New Orleans	2.43	90.6	72.5
Savannah	4.97	89.9	70.4
Charleston	4.98	89.9	67.5
Atlanta	3.85	88.6	66.8
Wilmington	1.97	90.0	66.2
Memphis	2.89	90.4	67.0
Galveston	0.90	92.7	70.0
Vicksburg	1.44	91.2	68.5
Montgomery	3.49	91.5	69.4
Augusta	4.06	90.5	67.6
Little Rock	1.58	91.3	64.2
Mobile	2.60	94.8	68.8

Meteorological Record for the Cotton Districts for the month of May, 1882.

DISTRICTS.	Average rainfall in inches.	Mean of the maximum.	Mean of the minimum.
New Orleans	5.57	84.4	61.1
Savannah	2.59	84.8	60.7
Charleston	2.53	81.9	58.1
Atlanta	2.39	78.9	56.2
Wilmington	2.52	79.0	54.6
Memphis	7.58	77.7	56.3
Galveston	5.25	83.0	59.9
Vicksburg	7.03	81.9	60.8
Montgomery	3.02	81.9	58.2
Augusta	2.11	82.2	57.8
Little Rock	11.04	78.7	53.6
Mobile	4.69	83.4	58.3

Meteorological Record for the Cotton Districts for the month of April, 1882.

DISTRICTS.	Average rainfall in inches.	Mean of the maximum.	Mean of the minimum.
New Orleans	5.63	81.9	59.9
Savannah	3.73	81.1	60.2
Charleston	2.66	77.5	54.5
Atlanta	4.49	76.3	54.9
Wilmington	3.88	74.2	50.0
Memphis	5.29	74.9	54.0
Galveston	1.58	82.1	57.9
Vicksburg	7.03	78.6	56.8
Montgomery	4.92	78.5	57.2
Augusta	3.05	78.2	54.7
Little Rock	4.74	75.9	51.9
Mobile	8.80	79.1	57.3

WINDS.

The prevailing winds at Signal Service stations during the month of June, 1882, are shown on chart ii. by arrows, which fly with the wind. In New England, the middle, and southern states, and from the Ohio valley westward to Colorado, the winds were southerly: in Texas, and at stations on the southern slope, south to southeasterly; in the upper lake region and the extreme northwest, northerly to easterly; in the upper Mississippi valley and in the plateau regions, variable; in the Missouri valley, southeasterly, and on the Pacific coast, northwesterly to southwesterly.

TOTAL MOVEMENTS OF THE AIR.

The following are the largest total movements at Signal Service stations: Mount Washington, 28,235 miles; Pike's Peak, 15,023; Hatteras, 12,410; Kittyhawk, 9,969; San Francisco, 9,739; Macon, North Carolina, 9,610; Indianola, 9,351; Sandusky, 9,342; Concho, 9,339; Galveston, 9,329; Delaware Breakwater, 9,303; New Shoreham, Rhode Island, 8,957; Stockton, Texas, 8,910; Fort Elliott, Texas, 8,749; Cape Henry, Virginia, 8,749; Champaign, Illinois, 8,415; Dodge City, 8,249; Milwaukee, 8,178; Sandy Hook, 8,044. The smallest are: Vicksburg, 1,895; La Mesilla, New Mexico, 1,967; Silver City, New Mexico, 2,360; Lynchburg, 2,447; Roseburg, Oregon, 2,591; Nashville, 2,634; Augusta, Georgia, 2,636; Missoula, Montana, 2,733; Olympia, 2,775; Tucson, 2,791; Fort Smith, Arkansas, 2,965.

HIGH WIDNS.

The following high velocities were reported from the summit of Mount Washington: 1st, 84 miles, sw.; 2d, 77, nw.; 9th, 75, nw.; 19th, 92, w.; 20th, 80, nw.; 21st, 80 nw.; 25th and 26th, 95, nw., maximum for the month. On all other days during the month, velocities reached or exceeded fifty miles per hour, with the exception of the following: 4th, 6th, 11th to 14th, 23d and 30th. Stations reporting velocities of fifty miles per hour or over, are as follows: Pike's Peak, 64, w., 17th; Fort Benton, Montana, 64, w., 20th; Yankton, 61, nw., 24th; Saint Louis, 61, n., 17th; Fort Elliott, Texas, 60, ne., 12th; Indianapolis, 60, w., 20th; Dodge City, 56, nw., 30th; North Platte, 53, e., 19th; Fort Custer, 52, w., 28th; West Las Animas, Colorado, 52, se., 19th; Henrietta, Texas, 52, nw., 12th; Nashville, 52 w., 18th; Hatteras, 52, sw., 1st; La Crosse, 50, sw., 24th.

LOCAL STORMS.

There have been in the month of June many tornadoes and severe storms which have resulted in great loss of life and destruction to property. By far the most disastrous was the tornado which swept through eastern Iowa on the 17th of the month.

The following accounts of storms have been arranged in states and in successive dates as nearly as possible:

Arkansas: Osceola, 17th, a severe wind storm, accompanied by hail, unroofed several houses and totally demolished one. Much damage was done to crops.

Dakota: Wicklow, 24th, a severe storm occurred, accompanied by rain and hail. Considerable injury was done to farm property and crops, the wind reaching a velocity of sixty miles per hour, from the south-southwest. At Forestburg, twenty-five miles northwest of Alexandria, 24th, a severe storm occurred, several buildings were blown down. Yankton, 24th, severe storm, several buildings in the country blown down. The steamer "Tompkins" was blown from her moorings.

Georgia: Atlanta, 17th, severe thunder and rain storm, accompanied by hail; the wind attained a velocity of forty-nine miles per hour. Many trees in the suberbs were blown down. Forsyth, 18th, a violent wind and rain storm occurred west of this place, doing much damage to crops and fences.

Illinois: Geneseo, 17th, during a heavy storm, the spires of two churches were blown down and several buildings were more or less damaged At Oregon, the storm was equally severe, many barns and out-buildings were blown down by the wind or carried off by the flood. Clinton, 17th, a heavy wind and rain storm passed over DeWitt county, doing a large amount of damage to farm property and crops. The storm passed from nw. to se., and is described as being a whirlwind; in Wilson township it demolished a barn and injured much stock, and the rye crop, which was nearly ready to harvest, was greatly injured and numbers of fruit trees were uprooted. Vandalia, 17th, the storm was accompanied by rain and vivid lightning; much of the wheat crop was blown down and also a considerable amount of timber. The Okaw bottom-lands were submerged and several hundred acres of corn were under water. Carmi, 17th, during a severe wind storm, the opera house was unroofed and several buildings sustained severe damage. Many fruit and shade trees were destroyed. At Lebanon, Salem, and Edwardsville, the storm was more or less severe, some damage was done to wheat, but not so much as in other districts.

Cairo, 17th, 3.10 p. m., the wind suddenly veered from northwest to southwest, when a tornado appeared, which lasted from 3.10 to 3.35 p. m. The storm-cloud advanced from the northwest and was of a dense black color in front, while the northwestern edge of the cloud presented a smooth surface, having a greenish hue. A roaring noise, and a rotating cloud of dust, which enveloped every object in its path, preceded the storm. Several houses were unroofed, including the U. S. custom house, and twenty empty freight cars were derailed, and overthrown by the wind. The track of the storm was from from west to east, passing through Alexander, Pulaski and Massac counties, and was from eight to ten miles wide. In the centre of the track, large hail fell, but none was observed at this station; trains were delayed by the fallen trees across the track, and one man was killed and others were more or less injured. Steamers had their smoke-stacks blown down, others broke adrift and sank, or sustained great damage. The total damage caused by this storm, in southern Illinois, is estimated at $16,000. Morrison, 24th, a severe storm of thunder, lightning and rain occurred at this place, several buildings were damaged by lightning and many hundreds of fruit trees were destroyed.

Rockford, 24th, a tornado and heavy hail-storm occurred; hail-stones were as large as hen's eggs, and nearly every window in the town was broken. The storm caused great damage to fruit and other crops.

Champaign, 25th, from 2.45 to 4.45 p. m., a severe gale caused much damage, especially in the northwestern part of the city; a large barn was blown down, fruit trees uprooted or broken off, and great damage resulted to corn and other crops.

Charleston, 25th, heavy storm during the evening, many orchards were destroyed and forest trees blown down.

Oregon, 30th, a heavy storm of wind and rain, accompanied by thunder and lightning, caused great damage. Fifteen houses were damaged by lightning, and one person was killed; bridges were swept away, and hundreds of acres of grain were entirely ruined. The damage in the town and vicinity is estimated at $50,000.

Indiana: Indianapolis, 16th, severe thunder-storm, accompanied by high wind and very heavy rain, occurred at 4.30 p. m. Many streets were flooded and several buildings were damaged by lightning; hundreds of shade trees were blown down or broken off. Shelbyville, 16th, severe storm, with torrents of rain; streets were inundated and the southwestern part of the city was under water. North Vernon, 16th, several buildings were damaged by lightning and flood, and growing crops sustained great injury. Saint Meinrad, 17th, during a fierce northwest gale, with heavy thunder and rain, many forest and fruit trees were uprooted. Indianapolis, 25th, at 6 p. m., heavy wind-squall swept over the city. Many houses were unroofed, and fences and trees were blown down. The greatest damage caused by the storm, was the destruction of the steeple of Saint Paul's cathedral. The wind attained a velocity of sixty miles per hour and the duration of the squall did not exceed one minute. The total damage to the city is estimated at $20,000.

Iowa: Iowa City, 17th, a tornado visited this place, demolishing several houses and other buildings and causing considerable damage to other property. Davenport, 17th, very severe storm; telegraph wires were prostrated and much damage was done to buildings. Ames, 17th, at 7.45 p. m., a tornado passed about three-quarters of a mile south of that place. The width of the track was from thirty to forty rods, and the tornado pursued an easterly course. Grinnell, 17th, the tornado at this place was of unequalled severity, and wrought great destruction to life and property. From reports at hand, the tornado appears to have formed in Green county, in the centre of the western half of the state, and about ninety miles west of Grinnell. The tornado pursued an easterly course through Boone and Story counties, and almost parallel with the Chicago and Northwestern railroad as far as Marshall county, here its course changed to the southeastward toward Poweshiek county. Persons residing at Ogden, fifteen miles east of Jefferson, Green county, saw the tornado pass along, a little to the south of that place, but no damage was done in that vicinity, as the tornado probably did not strike the earth near there. Three persons were killed, and considerable damage was done near Nevada, Story county, and much damage was also done in Jasper county during the passage of the tornado-cloud. At Rock Creek township, Jasper county, fifteen houses were demolished and four persons killed.

The tornado then advanced toward Grinnell, where it proved more destructive than at any point along its track, causing great loss of life; it then passed southeastward, and it is probable that the same tornado caused the destruction at Mount Pleasant, in Henry county. The distance from Jefferson, where the storm was first observed, to Mount Pleasant, is, following the track of the tornado, about two hundred miles, and as it was first observed at 7.30 p. m., at Jefferson, and the damage occurred at Mount Pleasant at about 11 o'clock, it would appear that the tornado travelled at about fifty-five or sixty miles an hour. Respecting the destruction caused by this disastrous storm, the following is given: The storm-cloud, which was of the usual funnel-shaped appearance, and accompanied by a roaring noise, floods of rain, and a vivid electrical display, struck the town about 8.30 p. m. of Saturday, June 17. The width of the track appears to have been comparatively narrow, but within its limits everything was destroyed; it entered the town from the west, and moved a little north of east, laying the entire northwestern part of the town in ruins, nearly all the buildings being crushed to splinters by its terrific force, and the streets flooded to a depth of one foot of water. The total damage was inflicted in five minutes, not less than one hundred dwellings in the town being reduced to ruins. The tornado then turned toward the southeast and struck Iowa College, a three-story brick building, which was levelled to the ground, some of the students being killed and others injured. A train, consisting of an engine and twenty-one cars, was wrecked about one and a half miles east of the town, fourteen cars being blown from the track by the terrific force of the wind. The number of persons killed amounts to about sixty, and one hundred and fifty persons were more or less seriously injured; the number of houses destroyed and damaged is one hundred and forty, and the loss of property will amount to about $600,000.

Before reaching the town, the tornado devastated several farms in its track, killing or seriously injuring the inmates of the dwellings. Some of the houses appear to have been blown outward, while others were lifted up and carried some distance, then deposited in splinters on the ground. The storm then passed eastward, with unabated fury, to Malcolm, a small town of about eight hundred people, eight miles east of Grinnell; it struck this place in its northern half, and wrought destruction as complete as at Grinnell. Houses were blown down and completely demolished, two churches were ruined, seven persons were killed and a number were seriously injured, and much stock was also killed. Leaving Malcolm, the tornado struck Brooklyn, where it inflicted serious damage to life and property; at this point it took a southeasterly course toward Henry county, and finished its work of destruction at Mount Pleasant. The tornado struck that place at about 11 p. m., and in a few minutes had caused great damage to buildings, fences, merchandise, etc. The storm continued to rage with violence for two hours, but the greatest destruction occurred at its beginning. Houses were blown down or unroofed, churches were unroofed and the steeples swept away, and orchards and crops more or less ruined. Nearly all the houses were unroofed and their interiors were deluged by the heavy rain, causing great damage to goods. Some loss of life is also reported from this place, while many persons have been injured. The damage to property and crops in the town and vicinity is estimated at $500,000.

It is probable that the total number of lives destroyed by this tornado, during its entire path, will amount to more than one hundred, while the damage to property is incalculable.

Dubuque, 22d, at 5.50 p. m., a heavy thunder-storm with violent gusts of wind, burst over the city. Trees were uprooted and fences and out-houses, sheds, &c., were blown down. Considerable damage was done in the northern and western parts of the city. Independence, 22d, a severe storm, of hurricane force, burst over that place between 4.30 and 5.00 p. m. It would appear that this storm was a violent and exceptional wind storm, yet it partook somewhat of the nature of a tornado, having at times, the spiral and twisting motion characteristic of tornadoes, but it was without the funnel-shaped cloud, and only displayed the whirling motion at intervals. Many houses were blown down or unroofed, and a number of outbuildings and large quantities of fencing were carried completely away. A large smoke-stack, one hundred and thirty feet high, was levelled to the ground, two persons were killed and several injured, the loss of property amounts to about $150,000. The track of the storm was not extended, and was about twenty miles in length. It formed east of Cedar river and visited Jessup at about 4.30 p. m, and was very severe at that place. Rain fell in torrents, flooding the streets, and the wind swept everything before it; maple trees ten inches in diameter were twisted off, several houses were unroofed and a great many barns were totally wrecked. At Pleasantville, Marion county, some damage was also done to buildings, and also in the townships of Walker and Rowley. Emmittsburg, 24th, a tornado passed through Clay county, doing considerable damage, and struck Emmittsburg about 7.30 a. m. The storm raged with terrific violence for twenty-five minutes, during which time many houses were demolished

and others unroofed; barns and fences were carried away. Immense volumes of water from Swan lake were caught up and dashed against the houses left standing. Four persons were killed and several were injured; during the passage of the storm through Clay county, twenty farm houses were blown down and four persons were killed. Patterson, 24th, a heavy wind and rain storm did considerable damage; a store, five dwellings and two stables were blown down, and many farms in the vicinity were more or less damaged. Hoopersville, 24th, a hurricane, which lasted fifteen minutes, caused great damage; a church, school-house and twenty-five dwellings and barns were more or less damaged, and one man was fatally injured. Cedar Rapids, 29th, a furious storm occurred, but did not strike the ground except in a few places, where it caused much damage.

Kansas: Atchison, 16th, one of the most severe storms ever experienced occurred at Atchison on the above date. Rain fell in torrents, flooding cellars and basements, and the electrical phenomenon was particularly brilliant, the heavens appearing as one blaze of light for two hours. Several houses were struck by lightning and injured, while many others were either completely demolished or unroofed. All telegraph wires were prostrated and railroad travel suspended. No lives were lost during the storm, but many persons were injured. The damage in the town is estimated at $15,000. On the Santa Fé railroad, twenty miles east of Topeka, fifteen freight cars were blown from, and across the track; growing crops were much injured, corn being flattened and broken, and in some sections the damage is irreparable. Leavenworth, 17th, the heaviest and most destructive wind storm ever known visited this station. The storm began at 12.13 a. m., and for five minutes the wind registered a velocity of seventy-two miles an hour, and during that five minutes, the most of the damage occurred. Many buildings were unroofed and frame structures blown down; the top of the Kansas Central Elevator was blown off and the building twisted off its foundation; trees were uprooted and others broken off close to the ground. The storm struck the Mount St. Mary's Female College, a few miles south of the city and blew down the main tower of the building; the tower fell on the roof and crashed through the dormitories, killing four children and injuring many others. A man is reported to have been blown into the Missouri river and drowned, near the Union depot. Fruit was stripped from the trees, but wheat is reported to be not seriously injured. The total damage to the city is estimated at $200,000. Topeka, 17th, the storm did considerable damage, unroofing many buildings and uprooting trees; no loss of life or stock is reported. Valley Falls, 17th, a building was blown from its foundation and another unroofed. Hundreds of trees were broken off and the damage to the fruit crop is very great, but field crops did not suffer much injury. 25th, a tornado passed through Phillips county, doing considerable damage at Kirwin; the storm pursued an easterly course and struck the town of Marysville, where it did much damage. Residences, churches and barns were demolished and several persons were more or less injured; the same storm wrecked a train near Talmage and demolished five houses at Avola, about three miles from Talmage. Several persons are reported killed and some injured.

Kentucky: Anchorage, 15th, heavy thunder and rain-storm accompanied by hail. Several buildings were set on fire and completely destroyed by lightning.

Michigan: 8th, a tornado swept through Saint Clair county on the night of this date. It first begun as a wind and rain-storm, which continued for about two hours, when black and heavy clouds formed in the northwest and advanced across the county. The tornado swept away houses, barns, fences, etc., and all farming implements in its path. Objects were lifted upwards and deposited at several rods distant from their starting point. Great destruction occurred to crops and orchards, and in some parts of its track, not a single tree was left standing and several persons were more or less injured. The width of the track varied from thirty to eighty rods. 18th, a tornado occurred in Saginaw county, and sweeping through a part of Huron county, struck the lake south of Port Austin and formed two distinct water-spouts, which passed rapidly eastward.

In the track of the tornado-cloud, which was funnel-shaped and accompanied by a roaring sound, buildings were lifted from their foundations and demolished, the inmates sustaining, in some cases, serious injury. Many barns were destroyed and much valuable stock was killed; in the townships of Grant, Brookfield and Bad Axe, several buildings were destroyed and standing timber was twisted off and carried away. The storm was accompanied, in some places, by heavy rain and hail. 24th, a severe storm passed through Livingston county, on this day, destroying crops, fruit, fences, etc., and several persons were injured.

Maine: Gardiner, 26th, at 5.45 p. m., a severe northwest storm occurred. Several large trees were blown down and an ice-house was unroofed; the extreme violence of the gale lasted about ten minutes.

Missouri: St. Louis, 16th, a severe storm began on this date and increased in force until the 17th. The wind blew with great violence, reaching a velocity of sixty miles per hour; rain fell in torrents and the storm was accompanied by heavy thunder and a vivid and brilliant display of lightning. In the city, chimneys, signs, windows and trees were blown down and telegraph wires were prostrated. It is estimated that $10,000 will cover the loss. The greatest damage occurred along the river; steamboats dragged their moorings and were carried down the river, and others collided with irresistible force and sank; a large number of coal flats were more or less damaged. It is estimated that the loss to steamboat property will exceed $25,000. Kansas City, 17th, a hurricane of wind and rain broke over the city at about 1 a. m. The storm passed through Clay county, blowing down or unroofing houses, leveling fences and uprooting the largest and strongest trees. Fruit trees and corn were prostrated, and irreparable injury was done to the wheat crop. The storm was accompanied by incessant and blinding flashes of lightning, the heavens appearing fairly ablaze. Many large builings were blown down or unroofed, several blocks being completely destroyed. Several persons were buried in the falling ruins and many valuable horses were killed. The damage to property in this city will probably exceed $150,000. At Missouri City, many houses, outbuildings and fences were swept away, and growing crops were beaten down by the severe hail which accompanied the storm. No loss of life has been reported at that place, although several persons were more or less injured. Brownsville, 17th, the storm struck that town at about 2 a. m., and was accompanied by heavy rain and hail. Houses and fences were blown down, and chimneys shattered to pieces. A large frame building was lifted from its foundation and deposited six feet from where it formerly stood, and the Christian church, which escaped the tornado of April, was blown down. Belton, Cass county, 17th, the track of the tornado at this point, was only about forty feet wide, but in its track, orchards were destroyed, fences blown down, and crops, to some extent, were injured. A house was picked up bodily, and dashed to pieces, the inmates, four in number, being more or less seriously injured; a new barn was also blown down. At Marshall, Saline county, the tornado caused great damage to buildings and to the wheat and oat crops.

Nebraska: Omaha, 25th, masses of heavy, dark clouds advanced with a rolling motion from the northwest until they reached the city, when they broke in a furious storm of wind, rain and hail. The wind reached a velocity of sixty miles per hour for a few minutes, and then fell to a steady velocity of thirty-four miles per hour. Signs were wrenched off, trees uprooted and some houses unroofed, but the principal damage appears to have resulted from the heavy rains, which swelled the creeks, causing them to overflow; many buildings were flooded and others carried from their foundations. Some damage also resulted from the heavy and continuous hail

which accompanied the storm. 25th, a severe storm formed in Butler county, and swept in a southeasterly direction through Saunders, Lancaster, Cass, Nemaha and Otoe counties, destroying nearly all small grain and beating down the corn. The storm was accompanied by hail, which caused much destruction; at Wahoo, several dwellings were unroofed and all windows facing the west were demolished; a herd of ponies was blown eight miles southward; at Clear Creek, a school-house was demolished, and severe damage was done at Brainard. At Lincoln, the storm was also very severe, most of the orchards and crops being ruined by the large hail-stones. Several persons were injured during the storm, some fatally.

New York: Amsterdam, 17th, a tornado struck the town and did considerable damage to buildings of light construction. The storm-path was sixty feet wide.

New Jersey: Freehold, 4th, 9.20 to 10.15 p. m., a destructive storm occurred over a strip of country south of this place. Hail fell to a depth of two inches, causing damage to the amount of more than one thousand dollars to crops in the immediate vicinity, and several houses were injured. 27th, severe thunder-storm, accompanied by hail, which was mostly jagged, broken ice, some pieces of which measured one and three-eighths inches long and half an inch thick. From 5.50 to 5.57 p. m., the wind reached a velocity of sixty miles per hour. Reports from localities southwest of Freehold state that much damage was done to crops.

North Carolina: Weldon, 4th, a destructive tornado, originating in Southampton county, Virginia, swept through Northhampton and Halifax counties; many houses were blown down and crops were completely ruined. The storm was accompanied by heavy hail-stones of unusual size, which covered the ground to a depth of several inches. At Weldon, several buildings were blown down, and two children were killed by falling timbers. At Garysburg, the "Fetter" academy was blown down. The damage to property by this storm, will amount to several thousand dollars. Kittyhawk, 28th, severe wind storm, telegraph poles were prostrated, and one house was blown down.,

Ohio: Sandusky, 18th, severe wind storm, many telegraph poles and trees blown down. 30th, a heavy wind storm occurred over southern Ohio, telegraph wires and trees were prostrated, and growing crops were blown down, corn and oats being broken off by the heavy rain, and several houses were unroofed.

South Carolina: Stateburg, 22d, about three miles north of station, a storm of considerable energy occurred. Much damage was done and several large trees were uprooted.

Tennessee: Nashville, 18th, a severe wind storm, reaching a velocity of fifty-two miles an hour; trees, fences, and awnings were destroyed, and several houses were unroofed. Spring City, Rhea county, a tornado occurred on the 25th; several buildings were blown down.

Texas: Henrietta, 12th, at 7.20 p. m., a severe storm burst over the city, doing considerable damage to buildings. The storm cloud had a whirling motion, and dipped occasionally toward the earth, each dip being attended with great destruction. A house was twisted off its foundation, and many barns and outbuildings were blown away. As the storm cloud only struck the ground at intervals, many houses in its close proximity, were left untouched. The total damage is estimated at $6,000.

Vermont: Woodstock and Strafford, 19th, a severe wind storm passed through these places; many buildings and fences were blown down and trees uprooted. The track of the storm was about fifteen miles in length and from one to five miles in width.

Wisconsin: 27th, a tornado formed near the village of Onalaska and passed through that place at 10.45 a. m.; it then passed in a northeasterly direction through La Crosse, Monroe, and part of Vernon counties. The whole distance traveled was about forty miles, and the width of the track was about eighty rods. Several buildings were unroofed, but the principal damage was done to the crops, which were in some cases completely carried away; great numbers of fruit trees were twisted and broken. The towns of Bangor, Washington, Jefferson and Sheldon were also visited by the storm and sustained more or less damage. One person was seriously injured; the damage to buildings is estimated at $20,000, and the damage to crops cannot be estimated. The observer at La Crosse reports the appearance of the storm cloud, as follows: The storm cloud appeared of a dark blue or nearly black color, followed immediately by a cloud which appeared to be highly illumined and of a yellow color, changing at times to green. After the cloud passed the station the wind changed to north, with moderate breeze and light rain. Five miles from station, rain is reported to have fallen in torrents, many streams were swollen and bridges washed away. At Cashton the storm destroyed five houses and caused great damage to crops. Several persons were injured but none fatally.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for June, 1882, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 86.7 per cent. The percentages for the four elements are: Weather, 88.9; Direction of the Wind, 80.9; Temperature, 88.3; Barometer, 88.9 per cent. By geographical districts they are: For New England, 88.4; middle Atlantic states, 90.1; south Atlantic states, 86.7; east Gulf states, 85.7; west Gulf states, 91.9; lower lake region, 85.7; upper lake region, 81.5; Tennessee and the Ohio valley, 88.5; upper Mississippi valley, 84.8; lower Missouri valley, 82.9; northern Pacific coast region, 94.4; middle Pacific coast region, 98.9; southern Pacific coast region, 97.8

There were 160 omissions to predict (37 being due to the absence of reports from the Pacific coast) out of 3,690, or 4.33 per cent. Of the 3,530 predictions that have been made, 109, or 3.08 per cent., are considered to have entirely failed; 92, or 2.60 per cent., were one-fourth verified; 398, or 11.30 per cent., were one-half verified; 365, or 10.33 per cent., were three-fourths verified; 2,566, or 72.69 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

One hundred cautionary signals were displayed during the month of June, of which eighty-two, or 82 per cent were justified by winds of twenty-five miles per hour, at or within one hundred miles of the station. Eight "off-shore" signals were displayed, all of which were fully justified as to direction and velocity. One hundred and eight signals of all kinds were displayed, of which ninety, or 83.3 per cent., were justified. The above does not include signals ordered at sixty-nine display stations, where the velocity is only estimated.

Ninety-five winds of twenty-five miles per hour or over, were reported, for which no signals were ordered.

Fifteen signals were reported late.

NAVIGATION.

STAGE OF WATER IN RIVERS.

In the table on the right-hand of chart iii., are given the highest and lowest stages of water observed at Signal Service stations during the month of June, 1882. In the first column of this table are given the heights of water on the gauge, which have been found dangerous to property at stations:

The Mississippi reached its highest stage at Keokuk on the last of the month, when it was one foot, three inches above the danger-line. At Cairo it was two feet above the danger-line on the 6th of the month, and, on the 17th, it had fallen to thirty-two feet, four inches, the lowest point reached during the month. At Vicksburg, it remained above the danger-line

during the month, the height of water ranging from forty-one feet, six inches to forty-one feet, two inches on the guage.

The Missouri river rose slowly during the month and reached its greatest height between Yankton and Leavenworth from the 27th to 30th. The Ohio, Cumberland and Tennessee rivers were highest on the 2d and 3d of the month, and lowest from the 15th to 28th, except the Tennessee at Chattanooga, where the lowest water, four feet, six inches, occurred on the 13th.

The observer at Nashville, reports the suspension of navigation in the Cumberland river on the 16th. During the past two months, navigation has been better than for any corresponding period during the past six or seven years. The highest water for the year ending June 30th, 1882, fifty-four feet and seven inches, occurred January 22d; the lowest, three feet and three inches, occurred September 12th, 13th, 14th.

FLOODS.

The excessive rainfall of the month has caused local floods in various sections of the country, which were more or less destructive to life and property. The most disastrous flood of of the month was that of Pogue's run, Indianapolis, where ten lives were lost and much property destroyed.

Fort Missoula, Montana, 8th: The river overflowed, completely submerging the bottom-lands; all crops under cultivation were destroyed.

Umatilla, Oregon, 9th and 11th: Severe washouts occurred along portions of the railroad between Umatilla and the Dalles; travel was suspended.

Winnemucca, Nevada, 11th: Five hundred feet of track west of the railroad station, were washed away by heavy rain.

Denver, Colorado, 10th: During a heavy rain storm, the Dry creek overflowed, sweeping away a number of houses, and drowning five persons. Cellars and basements were flooded, and at Golden, several houses were washed away. The damage to property is estimated at $75,000.

Paxton, Illinois, 13th: A heavy rain storm occurred, assuming the proportions of cloud-bursts in some places. The streets were flooded and several buildings were damaged. At Gibson city, Ford county, bridges were washed away and railroad embankments destroyed, impeding travel. The injury to crops in the county is very great.

Winchester, Kentucky, 13th: Very heavy rain fell between 7 and 8 o'clock p. m. The waters of Two Mile creek were so increased in volume as to wash away a cabin containing ten persons, all of whom were drowned. Much damage was done to fencing along the streams in the county.

Indianapolis, Indiana, 14th: Heavy rains caused an overflow in Pogue's run, a small stream running through the city. The Union depot, railroad track, and several streets were flooded, in some parts to a depth of from three to four feet. Many bridges were swept away, and a platform spanning Pogue's run, on which a large number of people had gathered to watch the flood, was suddenly swept away, throwing the occupants into the swift current; many were rescued by bystanders, but others were swept out by the current into the tunnel under Union depot. Ten bodies have been recovered, but the total number drowned is not known.

The cellars of many wholesale houses were flooded, damaging goods to a large amount. The total damage in the city is estimated at $150,000. This flood was the highest since 1865. On the 16th, heavy rains occurred, flooding several streets in the city.

Rushville, Indiana, 14th: A flood equalling that of 1866, caused much damage to the corn and wheat crops. Outside of the town, all the railroad culverts are washed out, and the surrounding country is submerged. Several streets are flooded, and more than 1,000,000 feet of lumber almost ruined.

Five thousand acres of corn are submerged near Lawrenceburg. At Liberty, communication was cut off by the carrying away of bridges, and much damage resulted to crops.

Sydney, Nebraska, 14th: Ground flooded, and people living on low ground and in the valley, were obliged to seek shelter on the roofs of their houses.

Lebanon, Ohio, 14th: Barley and corn-fields submerged, and many railroad bridges in that section damaged. At Camden, the first floors of houses were under water, bridges were injured and great damage to crops resulted from the heavy rains. At Middleton, Eaton and Wilmington, many washouts occurred, and bridges injured, many houses were flooded, and crops greatly damaged.

Fort Scott, Kansas, 17th: The track of the Missouri Pacific railroad, two miles south of Fort Scott, was three feet under water. Heavy rains caused overflows in all the rivers of southern Kansas, doing more or less damage to the wheat crops. Railway travel was delayed.

Cheyenne, Wyoming, 19th: Several streets were flooded by the heavy rain. Cellars and basements were filled with water.

Coleman City, Texas, 20th: The bottom-lands were flooded and a large amount of lumber, wood, and fencing carried away by an overflow of the creek.

Davenport, Iowa, 24th: Serious washouts occurred on the Chicago, Rock Island and Pacific railroad, a train was wrecked by having the earth washed from under the ties. The loss of bridges in Fremont county, will exceed $15,000.

Hannibal, Missouri, 28th: Bear Creek overflowed, sweeping 500,000 feet of lumber into the Mississippi river. Several houses were also swept away, and many bridges damaged. Two railroads have been abandoned, owing to destruction of bridges.

Minneapolis, Minnesota, 23d: A heavy rain storm at Otwatonna caused great damage to crops, and washed away much farm machinery.

Oregon, Illinois, 30th: Severe rain storm, flooding the flats, and driving families from their homes, many bridges were damaged, and barns and outbuildings floated away.

Lafayette, Indiana, 30th: A heavy rain washed away the street crossings, fences, and filled the cellars and basement of houses. The damage to property amounts to several thousand dollars.

Morrison, Illinois, 30th: Rock Creek near Malvern, rose eight feet in one hour. Bridges and mills were washed away and much stock drowned. Two men were drowned at Empire.

Elmira, 25th: From 1.20 to 4 p. m., a heavy rain storm washed away bridges, fences, and did much damage.

Patterson, New Jersey, 19th: During a heavy rain, sewers were unable to contain the water, street and cellars were flooded in all parts of the city.

Variety Mills, Virginia, 23d: 3 to 5 p. m., during heavy rain, creeks overflowed and caused much damage to wheat and corn.

At Keokuk, Iowa, the Mississippi river has been above the danger line throughout the month. On the 28th, the Des Moines levee was broken, flooding a large tract of farming land under cultivation; the railroad tracks were submerged and much damage was done.

TIDAL WAVE.

A most remarkable phenomenon of this character occurred in lake Erie at Cleveland on the 23d, concerning which the Signal Service observer at that station reports as follows: About 6 a. m. a dark, angry-looking cloud was observed over the lake, moving rapidly toward the shore. When first noticed this cloud was of moderate proportions, but as it advanced it extended in width and increased in height above its base, which remained at nearly the same elevation. It had the appearance of a heavy thunder cloud of an unusually low height, the lower part of which resembled a heavy curtain of grayish color hanging over the water and nearly parallel with the shore; above this, a contorted mass of cloud, whirling and writhing within itself, showed the existence of a disturbance of great violence. At 6.20 a. m., at distance of about half a mile from the shore, was noticed an immense wave directly under the curtain-like cloud, moving silently inward with terrific velocity, without crest until it reached the shallow water near the shore, when a white foaming crest formed. A moment later it broke upon the shore

with a deafening sound. When the wave entered the shallow water the cloud passed overhead, while scarcely more than a gentle breeze was felt. This inrushing of the water was followed by two recoiling waves about one hundred feet apart, which could be seen for a long distance moving back into the lake with about the same velocity as an ordinary storm wave. Following this, the water, which seemed piled up along the shore, soon subsided. Preceding this phenomenon, the lake was unusually calm. At 6.35 a. m., a brisk shower set in lasting fifteen minutes. No peculiar atmospheric conditions preceded the disturbance; the maximum wind velocity in this city for the eight hours preceding 7 a. m. did not exceed ten miles per hour, but the wind blew fiercely south of the city, and at the mouth of the river vessels parted the lines. Hundreds of fish were cast ashore, and the fires in the Lake Erie rolling-mills were put out. A scow loaded with sand at the breakwater was landed high and dry upon the shore. Some iron rails, twenty-eight feet long, piled near the depot, were lifted and scattered in every direction. The wave broke completely over the railroad tracks along the shore, covering them to a depth of several feet and submerging the Erie street pier. On this pier, the flooring of which is eight feet above the level of the lake, a boat-house was wrecked and a man washed overboard and drowned. The damage to property along the shore is roughly estimated at $30,000. The wave is known to have extended from a point five miles east of this city to Fairport, a distance of thirty-five miles. Steamboat men who arrived during the morning report the occurrence of a short squall and sudden movement of the water off this port, of which no especial notice was taken at the time.

The Signal Service observer at Erie reports that between 1.30 and 2.00 p. m., the tidal wave was also slightly felt at that city; the water suddenly rushed over the piers, floating away lumber, etc.

A similar tidal wave occurred on Lake Erie May 10, 1823 at Otter creek, on the Canada shore, and at Kettle creek, twenty miles distant, which attained a height of nine feet. In 1830, three waves were observed at Madison creek, Ohio, the first rising fifteen or twenty feet. In 1844 or 1845 a wave came into Euclid creek, fifteen feet in height. On June 15, 1872, the water rose twenty-six inches at Charlotte, on the mouth of the Genesee river. On November 18, 1845, the water at Cleveland suddenly fell two and eight-tenths feet during a high wind from the southwest, and, according to the "Toledo Blade," a change of ten feet in the waters of Lake Erie took place December 5, 1856. In May, 1855, a similar phenomenon was observed on Lake Seneca, the water continuing to rise and fall from sixteen and a half inches to two feet during two days. Old residents of Conneaut, Ohio, remember a sudden rise of four feet in the lake, covering the orchards upon the flats for several weeks and compelling the people to gather their fruit in boats. Similar agitations of the waters occurred on Lake Geneva, in Switzerland. In 1841, at Berne, the water receded to such an extent as to leave the ships that were at anchor on bare ground.

Like phenomena have occurred on Lake Superior. In 1789, opposite Isle Royal, the water suddenly fell four feet, returning with a great rush. In 1834 the waters above Sault Rapids suddenly receded, and in half an hour returned with great velocity. In August, 1845, an enormous wave, twenty feet in height, was observed between Copper Harbor and Eagle River, rolling towards the shore. In 1847, 1848, and 1849, sudden rises and falls of the waters were repeatedly observed to precede or follow storms on the lake. In 1851, during a perfect calm, the water suddenly rose one foot and three inches, and during another, two and one-half feet. On July 17, 1855, extreme fluctuations on Lake Superior took place between nine in the morning and four in the evening. Other remarkable phenomena of a like nature occurred at the mouth of the Sault Saint Marie, on Lake Huron, in 1856, and at the head of Lake Erie, at Monroe, Michigan, in 1844.

TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors at Signal Service stations, with the average depth at which observations were taken, is given in the table on the right-hand of chart ii. In the first column of the table is given the maximum temperature observed during the month; and in the second column the minimum temperature observed during the same period.

The following table gives the highest and lowest temperature of water at the several stations, with the range of water temperature, mean temperature of the air at the station, and the depth of water at which the observations were taken. It will be seen that the greatest ranges are: 22°.4 at Thatcher's Island, 22° at Toledo, 21° at Grand Haven, 19°.3 at Alpena, and 19° at Chincoteague. The smallest are: 4°.4 at Key West and 5°.4 at Eastport.

Temperature of Water for June, 1882.

STATION.	Temperature at bottom.		Range.	Average depth in feet and inches.		Mean temperature of the air at station.
	Max.	Min.				
	°	°	°	ft.	in.	°
Atlantic City	71.5	55.3	16.2	6	7	66.6
Alpena	69.8	50.5	19.3	12	0	57.8
Augusta	88.8	78.	10.8	6	6	78.6
Baltimore	79.5	68.	11.5	9	9	74.0
Boston	66.5	51.	15.5	25	0	65.9
Buffalo	71.	54.3	16.7	10	5	62.4
Burlington						
Cedar Keys	87.	74.	13.0	9	7	79.9
Charleston	84.1	75.4	8.7	41	5	79.3
*Chicago	67.	64.	3.0	7	9	63.6
Chincoteague	83.	64.	19.0	6	0	69.7
Cleveland	72.2	56.1	16.1	14	0	66.2
Detroit	70.	54.	16.0	24	4	67.2
Duluth	62.	45.	17.0	14	4	57.9
Delaware Breakwater	69.4	57.	12.4	8	2	67.9
Eastport	44.2	38.8	5.4	17	3	56.2
Escanaba	67.	49.	18.0	15	0	59.5
Galveston	85.	69.	16.0	14	8	81.3
Grand Haven	72.5	51.5	21.0	19	0	62.9
Indianola	86.3	76.4	9.9	9	4	81.1
Jacksonville	87.	77.	10.0	18	0	91.1
Key West	89.1	84.7	4.4	16	8	84.3
Marquette	52.9	45.9	7.0	10	11	56.5
Milwaukee	61.5	44.6	16.9	8	0	61.4
Mobile	86.3	74.5	11.8	15	11	81.3
New Haven	75.2	58.	17.2	15	2	66.2
New London	63.	56.	8.0	12	8	63.9
Newport	67.5	52.	15.5	11	0	64.2
New York	73.	59.	14.0	22	11	66.1
New Shoreham	63.5	51.	12.5	8	7	66.4
Norfolk	83.	69.	14.0	17	2	75.2
Pensacola	83.8	74.5	9.3	17	10	79.8
Portland, Me	57.6	45.	12.6	19	0	65.1
Portland, Oreg	64.5	53.4	11.1	82	3	62.7
Port Eads						
Provincetown	68.5	53.	15.5	14	0	64.1
Punta Rassa	90.5	80.1	10.4	11	9	80.5
Sandusky	76.4	59.3	17.1	10	0	67.0
Sandy Hook	67.2	55.	12.2	1	5	68.7
San Francisco	61.5	55.9	5.6	28	7	57.0
Savannah	87.4	76.8	10.6	12	2	80.3
Smithville	83.	74.	9.0	10	0	76.9
Thatcher's Island	67.4	45.	22.4	7	0	61.7
Toledo	81.	59.	22.0	11	8	68.1
Wilmington	85.5	75.	10.5	13	0	76.9

*Observations wanting, from 1st to 26th, inclusive.

ATMOSPHERIC ELECTRICITY.

AURORAS.

The most extensive display of the month occurred on the evening of the 14th. It was reported by numerous stations throughout the northern part of the United States. The line of observation extended from Mount Washington, New Hampshire, to Dayton, Washington territory. The most southerly stations at which it was observed, were Springfield, Illinois, and New Corydon, Indiana.

On the summit of Mount Washington, it is reported to have been a faint display, lasting from 8.20 p. m., to the morning of the 15th. Buffalo, from 11.15 p. m., to 1.40 a. m., of the 15th, faint aurora, consisting of a whitish light, seen through the broken clouds. Davenport, Iowa, 11 p. m., until midnight, consisting of a diffuse yellow light, extending to an altitude of 30°. Saint Paul, 10.20 p. m., aurora consisting of a diffuse light of a pale straw color, with dark segment beneath. At 11 p. m., vertical beams beams shot upward to an altitude of

45°; they were of a straw color near the base, and the upper extremities were of a rosy hue. Before disappearing the beams acquired a tremulous motion from west to east. At 11.25 p. m., the display was obscured by clouds. Bismarck, Dakota, 9.30 p. m., faint display; at 10.30 p. m., it extended to the zenith; faint stationary beams and two arches were visible. Helena, Montana, 10 p. m., brilliant aurora covering 30° of the northern horizon. A perfect arch was formed, with numerous parallel rays proceeding from a bank of luminous clouds; these rays had a graceful, undulating motion, and extended nearly to the zenith. The display was most brilliant at midnight and disappeared at 1 a. m., of the 15th.

Numerous displays of less importance have been reported by various stations as follows:

4th: New Corydon, Indiana, 9 p. m.

6th: Vevay, Indiana, 9. p. m.; Burlington, Vermont, 11 to 11.40 p. m.

7th: Saint Vincent, Minnesota, 11 p. m. to 1 a. m., of 8th; Moorhead, Minnesota, 9 to 9.30 p. m.

12th: New Corydon, Indiana, 10 p. m.; Embarrass, Wisconsin; Thornville, Michigan; Gardiner, Maine 10 p. m.; Thatcher's Island, Massachusetts, 11 p. m.

13th: Atlantic City, New Jersey, 10.30 p. m.; New Corydon, Indiana, 11 p. m. to 2 a. m. of 14th.

15th: Oswego, 11 p. m.; Saint Paul, 9.30 p. m.; Atlantic City, New Jersey, 12.10 to 3.05 a. m. of 16th; Manitowoc, Wisconsin; Madison, Wisconsin, 10.30 p. m.; Duluth, Minnesota, 10.30 to 11.45 p. m.; Clinton, Iowa, 11 p. m.; Monticello, Iowa, 10 p. m.; Springfield, Illinois, 10.40 to 11.20 p. m.; Moorhead, Minnesota, 1 to 3 a. m. of 16th; Bismarck, Dakota, 8 to 11 p. m.; Burlington, Vermont, 10 to 11.40 p. m.; Northfield, Minnesota; Independence, Iowa.

16th: New Corydon, Indiana, 10 p. m. to 2 a. m. of 17th; Springfield, Missouri, 11.15 to 11.45 p. m.

17th: New Corydon, Indiana, 11 p. m.

18th: Fort Meade, Dakota.

19th: Saint Paul, 9.30 to 11 p. m.; Alpena, Michigan, 8.50 p. m to 1.30 a. m. of 20th.

20th: Fort Custer, Montana, 10 to 11.10 p. m.; Bismarck, Dakota, 11 p. m. to midnight; Eastport, Maine, 9 to 11.40 p. m.; Gardiner, Maine, 9 p. m.; Thatcher's Island, Massachusetts, 11 p. m. to 2 a. m. of 21st.

21st: Fall River, Massachusetts, 9 p. m.; Cambridge, Massachusetts, 10.15 p. m. to 12.15 a. m. of 22d; Springfield, Massachusetts, visible shortly after midnight; Gardiner, Maine, 12.30 a. m.

22d: Eastport, Maine, 8.15 to 11 p. m.; Mount Washington, 8 p. m. to a. m. of 23d; Burlington, Vermont, 11 to 11.45 p. m.; Marquette, Michigan, 10 to 10.40 p. m.

23d: Mount Washington, 9 to 10.20 p. m.; Burlington, Vermont, 11 to 11.45 p. m.; Alpena, Michigan, 9.25 p. m. to 3 a. m. of the 24th.

24th: Manasquan, New Jersey, 8.30 p. m.; Little Egg Harbor, New Jersey, during early evening; Fort Myer, Virginia, 9.05 to 9.15 p. m.

25th: Marquette, Michigan, 11 to 11.20 p. m.; New London, 1.20 to 4.15 a. m. of the 26th; Agawam, Massachusetts, during early morning.

THUNDER-STORMS.

Thunder-storms were reported in the various districts on the following dates:

New England: 4th, 6th to 9th, 15th to 19th, 23d to 29th.

Middle Atlantic states: 1st, 3d to 6th, 9th to 11th, 14th to 28th.

South Atlantic states: 1st, 4th, 6th, 10th, 11th, 15th to 23d, 25th to 30th.

Florida peninsula: 1st, 4th, 8th to 13th, 20th to 23d, 26th, 27th, 29th, 30th.

East Gulf states: 3d, 8th to 16th, 20th to 30th.

West Gulf states: 2d, 3d, 6th, 7th, 9th to 16th, 18th, 19th, 21st, 25th, 26th, 30th.

Rio Grande valley: 5th, 6th, 9th, 11th, 13th, 19th.

Ohio valley and Tennessee: 1st, 3d, 8th to 30th.

Lower lake region: 3d, 7th to 10th, 14th to 19th, 23d to 26th, 28th, 30th.

Upper lake region: 6th to 10th, 12th to 18th, 22d to 25th, 27th to 30th.

Extreme northwest: 8th, 12th, 13th, 15th, 16th, 17th, 21st, 23d, 24th, 26th to 29th.

Upper Mississippi valley: 1st to 3d, 7th to 30th.

Missouri valley: 1st, 2d, 7th to 30th.

Northern slope: 1st, 2d, 6th to 14th, 16th, 19th to 30th.

Middle slope: 6th to 21st, 24th to 26th, 28th to 30th.

Southern slope: 2d, 5th, 7th to 14th, 16th, 18th to 21st, 25th, 30th.

Northern plateau: 4th to 6th, 8th to 11th, 18th, 23d, 26th, 27th.

Middle plateau: 3d to 5th, 8th to 14th, 19th, 20th, 28th 29th.

Southern plateau: 3d to 10th, 13th to 19th, 27th to 30th.

Middle Pacific coast region: 10th, 12th, 30th.

South Pacific coast region: 15th, 16th, 18th, 19th.

Thunder-storms were also reported from the following stations not included in the districts named above: Portland, Oregon, 4th; Roseburg, Oregon, 3d; Olympia, Washington, territory, 5th, 6th; Fort Bidwell, California, 2d, 25th, 26th; Salinas City, California, 9th, 30th; Carson City, Nevada, 13th, 18th, 28th.

During thunder-storms the following instances of damage by lightning occurred:

Mobile, Alabama, 29th: Lightning struck city tower, damaging the fire-alarm apparatus and the face of the city clock; several persons were stunned.

Chattanooga, Tennessee, 3d: Lightning struck a dwelling in the southern section of the city. The chimney was torn to pieces, window panes were shattered, and an occupant of the house severely shocked.

Grand Haven, Michigan, 18th: Building struck by lightning, damaging the front, side, and part of the roof; several persons were stunned.

Newburg, New York, 16th: A sloop was struck by lightning, and one man killed. At West Newburg, a barn was struck, killing a horse and rendering two men unconscious.

Reading, Pennsylvania, 16th: A stable containing twelve valuable horses was struck by lightning and entirely destroyed, entailing a loss of $4,000.

Davenport, Iowa, 24th: Lightning struck and set on fire Trinity church; several other objects were also struck.

Winnemucca, Nevada, 12th: Lightntng struck and entirely destroyed a milk-house, four miles south of station.

Morrison, Illinois, 16th: Great damage done by lightning; a man killed near Coleta. 24th, several buildings struck by lightning.

Riley, Illinois, 30th: A large oak tree, within ten rods of the observer's house was struck by lightning. The trunk of tree measured about two feet in diameter. Nearly half of the tree was torn off, and some of the fragments, weighing from seventy-five to one hundred pounds, were thrown a distance of one hundred feet; other portions were hurled into the tops of the neighboring trees. Large pieces were split and twisted, resembling bundles of small rope.

Port Jervis, New York, 15th: Lightning struck and considerably damaged the spire of the Catholic church; it also struck and damaged a building at Matamoras.

Cleveland, Ohio, 17th: Barn struck by lightning; one person killed.

Variety Mills, Virginia, 21st: House struck by lightning near Livingston, killing three persons.

The observer on the summit of Pike's Peak reports the occurrence of an unusual electrical phenomenon at that station on the 7th and 9th. At 8.45 p. m. of the former date, the telegraph line was distinctly outlined in bright light. On near approach to the wire, small jets of flame about the size of a

pencil lead, and of a very bright violet, color were observed. It was impossible to touch the flames as they vanished, or escaped to other points on the wire. The cups of the anemometer, which were rapidly revolving, appeared as a ring of fire; the wind vane and other objects were also tipped with light. On approaching the light, the hands and face of the observer were similarly affected, but no heat was felt. The phenomenon was preceded by lightning and thunder and was accompanied by a dense driving snow. It disappeared at 8.55 p. m., simultaneously with the cessation of the snow. A similar display also occurred on the 9th.

West Las Animas, Colorado, 12th: The observer reports that the points of the wind vane were tipped with flame and the anemometer cups revolved in a circle of light.

ATMOSPHERIC ELECTRICITY INTERFERING WITH TELEGRAPHIC COMMUNICATION.

Coleman City, Texas, 13th; Fort McKavett, Texas, 8th, 19th.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various districts on the following dates:

New England: 5th, 6th, 7th, 10th, 13th, 14th, 17th, 19th, 21st to 24th, 26th, 28th to 30th.

Middle Atlantic states: 7th, 8th, 14th, 19th, 30th.

South Atlantic states: 7th to 10th.

East Gulf states: 4th to 6th, 13th, 21st, 27th, 28th.

Ohio valley: 1st, 2d, 8th, 10th, 11th, 14th to 18th, 20th, 21st, 23d, 30th.

Tennessee: 16th, 18th.

Lower lake region: 6th, 7th, 9th to 12th, 14th, 16th, 17th, 20th, 24th, 26th to 28th.

Upper lake region: 5th, 10th, 20th, 22d, 28th.

Upper Mississippi valley: 1st, 3d, 6th, 8th, 11th, 14th, to 17th, 21st, 27th.

Middle Pacific coast region: 7th, 8th, 13th, 22d, 23d, 26th, 27th, 30th.

Solar halos were also reported from the following stations not included in the districts named above:

Saint Vincent, Minnesota, 13th.
Olivet, Dakota, 27th.
Huron, Dakota, 1st, 2d.
Fort Keogh, Montana, 7th.
Yates Centre, Kansas, 1st, 2d, 3d, 6th, 18th, 19th, 24th.
Palestine, Texas, 13th, 26th.
Indianola, Texas, 1st.
Santa Fé, New Mexico, 4th.
Yuma, Arizona, 7th.
Salt Lake City, Utah, 1st, 4th, 7th.
Mission, Idaho, 7th.
Umatilla, Oregon, 21st.
Albany, Oregon, 16th, 28th.
Roseburg, Oregon, 26th.
San Diego, California, 14th.

LUNAR HALOS.

Lunar halos have been observed in the various districts on the following dates:

New England: 25th.

Middle Atlantic states: 1st, 3d, 14th, 21st, 23d, 25th, 28th, 29th.

South Atlantic states: 23d, 25th, 28th, 29th.

Florida peninsula: 1st, 2d, 27th.

East Gulf states. 1st, 3d, 21st, 22d, 25th, 27th, 28th, 29th.

West Gulf states: 2d, 20th, 22d to 30th.

Ohio valley and Tennessee: 3d, 24th, 26th to 30th.

Lower lake region: 7th, 12th, 23d, 25th, 26th, 27th, 29th.

Lunar halos were also reported from the following stations not included in the districts named above: Moorhead, Minnesota, 30th; Olivet, Dakota, 26th; Alexandria, Dakota, 1st; Dodge City, Kansas, 23d, 24th; Yates Centre, Kansas, 25th; Umatilla, Oregon, 29th; Olympia, Washington territory, 28th.

MIRAGE.

Nantasket Beach, Massachusetts, 24th; Barnegat, New Jersey, 24th, 25th; Indianola, 1st, 2d, 3d, 5th; Alexandria, Dakota, 5th.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky as indicative of fair or foul weather for the succeeding twenty-four hours have been observed at all Signal Service stations. Reports from one hundred and eighty-six stations show 5,534 observations to have been made, of which twenty-five were reported doubtful; of the remainder, 5,509, there were 4,420, or 82.2 per cent., followed by the expected weather.

SUN SPOTS.

The following record of observations has been forwarded by Mr. D. P. Todd, Director of the Lawrence Observatory, Amherst, Mass.:

DATE—June, 1882.	No. of new		Disappear'd by solar rotation.		Reappear'd by solar rotation.		Total No. visible.		REMARKS.
	Gr'ps	Spots	Gr'p	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 3 p. m...	0	0	0	0	0	0	2	2	
2, 4 p. m...	2	5	0	0	1	3	4	7	
3, 5 p. m...	0	2	0	0	0	0	3	8	
5, 2 p. m...	0	2	0	0	0	0	2	6	
6, 2 p. m...	1	1	1	1	0	0	2	6	
3 p. m...	0	0	0	0	0	0	2	6	
7, 7 p. m...	0	0	0	1	0	0	2	5	
8, 2 p. m...	2	6	0	0	1	4	4	11	
9, 4 p. m...	0	8	0	0	0	8	4	19	
10, 3 p. m...	0	10‡	2	3	0	8	2	25‡	
13, 2 p. m...	1	7	.....	.....	1	2	2	35‡	
15, 7 p. m...	0	5	0	0	0	0	2	40‡	
16, 1 p. m...	0	10	0	0	0	0	2	50‡	
18, 6 p. m...	1	5	0	0	1	5	2	55‡	
19, 2 p. m...	0	0	0	0	0	0	3	55‡	
21, 4 p. m...	0	0	1	10‡	0	0	2	45‡	
22, 12 m.....	1	5	0	10	1	5	3	40‡	
23, 3 p. m...	0	0	0	5	0	0	3	35‡	
24, 3 p. m...	1	5	1	15‡	1	5	3	25‡	
26, 2 p. m...	2	10	0	0	1	5	5	35‡	
27, 3 p. m...	1	5	0	5	0	0	6	35‡	
29, 3 p. m...	1	5	1	5	1	5	6	35‡	
30, 4 p. m...	1	5	0	0	1	5	7	40‡	

‡Approximated. Faculæ were seen at the time of every observation.

Mr. H. D. Gowey, at North Lewisburg, Ohio, reports sun spots were observed on all clear days during the month. They were least numerous on the 8th, largest on the 14th, and most numerous on the 30th.

Mr. David Trowbridge, at Waterburg, New York, reports: 2d, two groups, two spots; one faint group has disappeared. 6th, one group, one spot. 7th, one group, one stop. 8th, one group, one spot, hazy atmosphere. 9th, one group, two spots; the group observed on 8th has disappeared and a new group appeared by rotation; faculæ in west and east. 11th, two groups, seven spots; the new group observed on the 9th is extensive; a new group has arisen near the middle of the disk; faculæ numerous. 12th, one group, four spots; the new group observed on the 11th has disappeared. 13th, two groups, six spots; the group of the 12th appears to have separated into two. 14th, two groups, thirteen spots; the large group has twelve spots; a new group has appeared by rotation; faculæ in the east. 18th, two groups, seven spots; faculæ in the west. 20th, two groups, ten spots; the large group has disappeared by rotation and a new one has appeared. 21st, two groups, six spots; same as observed on 20th. 22d, two groups, four spots; the spots are fading out. 23d, three groups, five spots; one new group has appeared by rotation. 24th, two groups, three spots; one of the groups observed on the 22d has disappeared; faculæ in the east; 26th, one group, one spot; one of the groups observed on the 24th appears to have faded out. 27th, four groups, eight spots; one group has appeared by rotation; faculæ in the east; 28th, four groups, twelve spots; faculæ. 29th, five groups, eight spots; one new group of nine spots has appeared by rotation.

METEORS.

Grand Haven, 20th: At 9.35 p. m., a brilliant meteor, apparently about three feet in diameter, resembling a huge ball of fire, was observed in the northern sky, at an altitude of about 45°. It pursued a northeasterly course and disappeared at a point about 20° east of north. During its passage, which was of about fifteen seconds duration, a hissing noise was distinctly heard; a light was produced, sufficiently brilliant to enable persons to read fine print.

Yates Centre, Kansas, 17th: Between 11 p. m. and midnight, a large meteor was observed, passing from a southwesterly to a northwesterly point, in a horizontal path about 30° above the horizon. It produced a light sufficiently bright to cast well-defined shadows, and left behind it a long fan-shaped trail, of pale red color, which remained visible for several seconds. Before disappearing it burst into numerous fragments.

POLAR BANDS.

Springfield, Massachusetts, 14th.
Punta Rassa, 5th.
Nashville, 4th.
New Corydon, Indiana, 1st, 2d, 12th, 14th to 20th, 23d, 26th.
Guttenburg, Iowa, 9th, 13th.
Gardiner, Maine, 9th, 24th.
Freehold, New Jersey, 6th, 11th, 29th.
Vineland, New Jersey, 8th, 13th.
Woodstock, Vermont, 13th.
Wytheville, Virginia, 2d, 7th, 18th.

EARTHQUAKES.

San Francisco, 27th: At 5.32 a. m., two severe shocks of earthquake, each of about ten seconds duration, were experienced. The interval between the shocks was about four seconds. No serious damage resulted, but crockery, glassware, etc., were broken. Reports from points along the coast between Petaluma and Hollister and as far east as Stockton, state that this shock was the severest that has occurred since the remarkable earthquake of 1868. It was most severe along the immediate coast, and decreased in severity eastward, it being reported as a slight shock at Stockton. At San José, the walls of a number of buildings were reported to have been badly cracked. At Santa Cruz mountains, chimneys were overturned and windows were broken. In this city, the shock was unexpected, as such phenomena generally occur on warm, sultry days, while on this occasion the weather was cool and damp.

ZODIACAL LIGHT.

Nashville, 4th, 6th, 10th, 12th, 14th, 16th; Monticello, Iowa, 5th, 6th, 12th; Cambridge, Massachusetts, zodiacal light suspected, 5th, 9th, 12th.

PRAIRIE AND FOREST FIRES.

Fort McKavett, Texas, 29th.

DROUGHT.

Shreveport, 30th: No rain has fallen since the 10th; crops are very much in need of rain. Westborough, Massachusetts, 30th; Month very dry; season backward. Clarksville, Texas, 30th: The corn and cotton crops are suffering for rain. College station, Texas, 30th: Rain much needed in this locality.

WATER-SPOUTS.

Port Hope, Michigan, 18th. Shortly before 2 p. m., a tornado-like cloud was observed passing over this section, about half a mile south of this village. After passing out over the lake, other clouds of ominous blackness were seen moving with great rapidity toward one point, and the water in the lake was thrown up in places and dashed into the finest spray. As the clouds met, a large black cone formed, projecting downward toward the water, which was boiling and seething with great fury. A few minutes later, the water and clouds met, forming a perfect water spout. The water ascended the spout with great rapidity, causing foam and spray to fill the air on every side. The phenomenon lasted about ten minutes.

Steamship "Colorado," off the coast of North Carolina, on the 5th, observed a large water spout.

INSECTS.

Toledo, Ohio, 7th: Farmers report the appearance of a species of worm on wheat, causing considerable damage to the tender stalks.

Winnemucca, 29th: Black beetles and grasshoppers have caused great damage in this vicinity.

Sandy Springs, Maryland: From 16th to 24th, the army worm appeared in great numbers; no serious damage has been done.

Springfield, Missouri, 5th: The army worm has been observed in this section during the past week, in considerable numbers, but no serious damage has been done.

Leavenworth, Kansas, 13th: Reports from Republican county, state that the chinch bug has done considerable damage to grain.

SAND STORMS.

Coleman City, Texas, 19th, 20th; Santa Fé, 12th, 15th, 27th; Tucson, 9th; Yuma, 8th, 9th; Fort Verde, Arizona, 15th; Camp Thomas, Arizona, 1st to 6th, 10th, 11th. 12th, 15th, 28th; Umatilla, Oregon, 4th, 6th, 11th, 16th, 17th, 18th, 20th, 21st, 25th; West Las Animas, Colorado, 29th, violent dust storm from northwest.

ERRATA.

In the May REVIEW, on page 2, under "Barometric Ranges," the paragraph giving ranges at Eagle Rock and Umatilla should read northern plateau, and not southern plateau.

On page 9, under the heading "Deviations from Mean Temperature," in paragraphs giving mean temperature for Indiana, should read Illinois, and for Illinois, should read Indiana.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR:

W. B. HAZEN,
Brig. & Bvt. Maj. Gen'l,
Chief Signal Officer, U. S. A.

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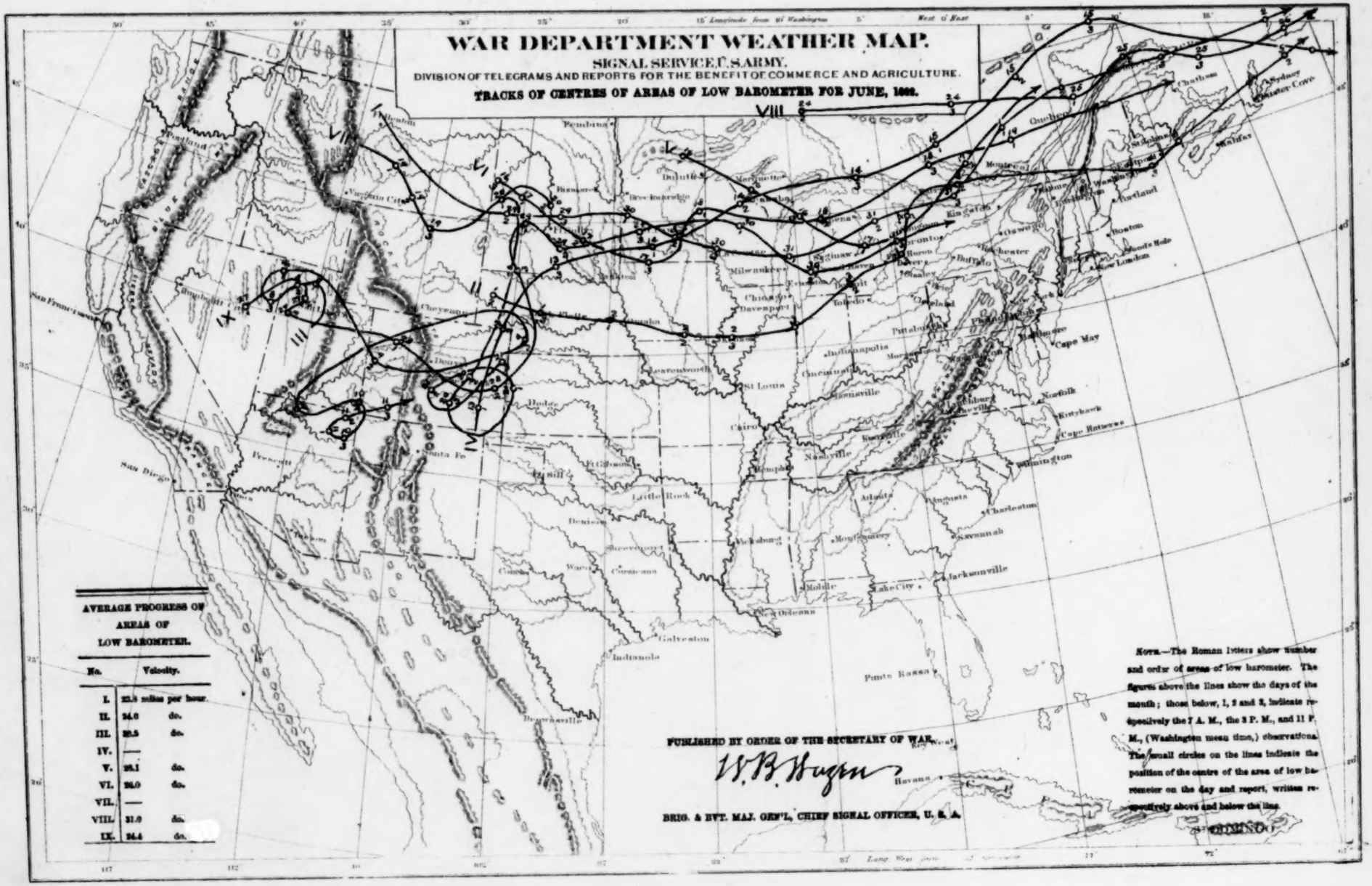
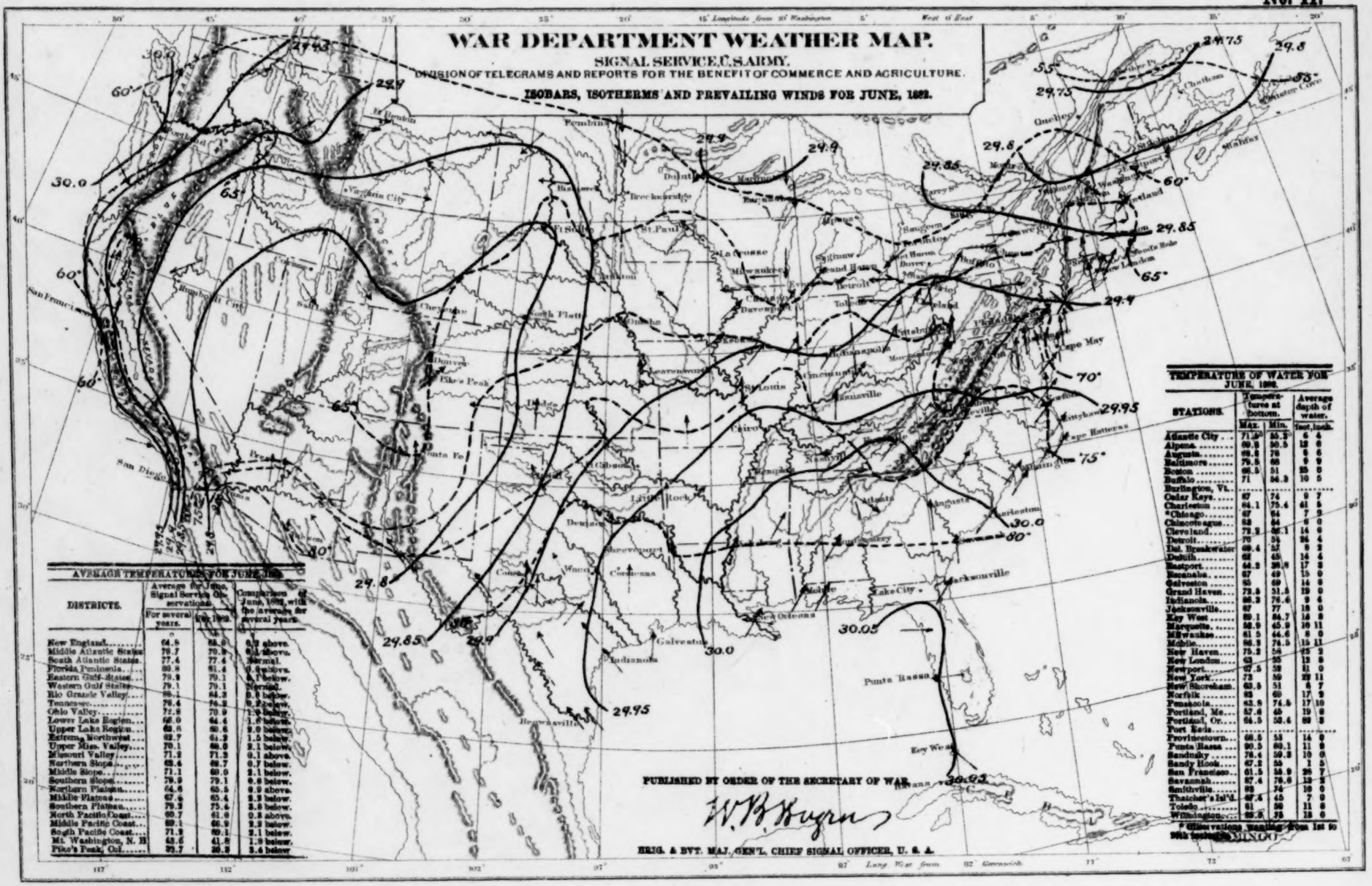
No. I.


WAR DEPARTMENT WEATHER MAP.
SIGNAL SERVICE, U. S. ARMY.
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.
TRACKS OF CENTRES OF AREAS OF LOW BAROMETER FOR JUNE, 1882.
AVERAGE PROGRESS OF AREAS OF LOW BAROMETER.
No. Velocity.
I. 22.8 miles per hour.
II. 14.6 do.
III. 22.5 do.
IV. —
V. 28.1 do.
VI. 26.0 do.
VII. —
VIII. 31.0 do.
IX. 24.4 do.
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
W. B. Hazen
BRIG. & BVT. MAJ. GEN'L, CHIEF SIGNAL OFFICER, U. S. A.
NOTE.—The Roman letters show number and order of areas of low barometer. The figures above the lines show the days of the month; those below, 1, 2 and 3, indicate respectively the 7 A. M., the 3 P. M., and 11 P. M., (Washington mean time,) observations. The small circles on the lines indicate the position of the centre of the area of low barometer on the day and report, written respectively above and below the line.
Pembina
Duluth
Marquette
Milwaukee
Chicago
Toledo
Cleveland
Buffalo
Rochester
Oswego
Ogdensburg
Montreal
Quebec
Portland
Boston
New London
Cape May
Norfolk
Kitty Hawk
Cape Hatteras
Wilmington
Charleston
Savannah
Jacksonville
Lake City
Atlanta
Augusta
Montgomery
Vicksburg
New Orleans
Galveston
Indianola
Pinta Rassa
Havana
Yuma
San Diego
Prescott
Santa Fe
Fort Smith
Little Rock
Memphis
Nashville
Louisville
Cincinnati
Indianapolis
St Louis
Cairo
Leavenworth
Dodge
Cheyenne
Omaha
Davenport
Milwaukee
Virginia City
Portland
Winnemucca
Salt Lake City
Ogden
Grand Junction
Pueblo
Denver
Bismarck
Duluth
Marquette
Port Arthur
Parry Sound
Toronto
Kingston
Ottawa
Montreal
Quebec
Chatham
Sydney
Chester Cove
Halifax
Portland
Boston
New London
Cape May
Norfolk
Kitty Hawk
Cape Hatteras
Wilmington
Charleston
Savannah
Jacksonville
Lake City
Atlanta
Augusta
Montgomery
Vicksburg
New Orleans
Galveston
Indianola
Pinta Rassa
Havana
Yuma
San Diego
Prescott
Santa Fe
Fort Smith
Little Rock
Memphis
Nashville
Louisville
Cincinnati
Indianapolis
St Louis
Cairo
Leavenworth
Dodge
Cheyenne
Omaha
Davenport
Milwaukee
Virginia City
Portland
Winnemucca
Salt Lake City
Ogden
Grand Junction
Pueblo
Denver
Bismarck
Duluth
Marquette
Port Arthur
Parry Sound
Toronto
Kingston
Ottawa
Montreal
Quebec
Chatham
Sydney
Chester Cove
Halifax

No. II.



AVERAGE TEMPERATURES FOR JUNE, 1882.

DISTRICTS.	Average for June, Signal Service Observations. For several years.	Average for June, 1882.	Comparisons of June, 1882, with the averages for several years.
	°	°	
New England	64.8	63.0	0.2 above.
Middle Atlantic States	70.7	70.9	0.1 above.
South Atlantic States	77.4	77.4	Normal.
Florida Peninsula	80.8	81.4	0.6 above.
Eastern Gulf States	79.9	79.1	0.8 below.
Western Gulf States	79.1	79.1	Normal.
Rio Grande Valley	79.1	84.3	0.2 below.
Tennessee	76.4	76.2	0.2 below.
Ohio Valley	72.8	70 9	1.9 below.
Lower Lake Region	68.0	64.6	1.4 below.
Upper Lake Region	62.6	60.6	2.0 below.
Extreme Northwest	62.7	61.2	1.5 below.
Upper Miss. Valley	70.1	69.0	1.1 below.
Missouri Valley	71.2	71.3	0.1 above.
Northern Slope	63.4	62.7	0.7 below.
Middle Slope	71.1	69.0	2.1 below.
Southern Slope	79.9	79.1	0.8 below.
Northern Plateau	64.6	65.5	0.9 above.
Middle Plateau	67.6	65.4	2.2 below.
Southern Plateau	79.2	75.6	3.6 below.
North Pacific Coast	60.7	61.0	0.3 above.
Middle Pacific Coast	69.1	66.9	2.2 below.
South Pacific Coast	71.2	69.1	2.1 below.
Mt. Washington, N. H	43.6	41.8	1.9 below.
Pike's Peak, Col	32.7	30.2	2.5 below.

TEMPERATURE OF WATER FOR JUNE, 1882.

STATIONS.	Temperatures at bottom. Max.	Min.	Average depth of water. feet.	inch.
Atlantic City	71.5	65.3	6	4
Alpena	60.3	50.5	12	6
Augusta	68.8	78	6	6
Baltimore	79.5	66	6	9
Boston	62.5	51	25	0
Buffalo	71	54.3	10	5
Burlington, Vt.				
Cedar Keys	87	74	0	7
Charleston	84.1	75.4	61	5
*Chicago	67	54	7	9
Chincoteague	82	64	6	0
Cleveland	72.2	57.1	14	6
Detroit	70	54	26	4
Del. Breakwater	69.4	57	6	3
Duluth	62	45	14	4
Eastport	64.2	50.8	17	3
Escanaba	67	49	15	0
Galveston	85	69	14	6
Grand Haven	73.5	51.8	19	0
Ile Ranch	66.2	76.6	9	4
Jacksonville	87	77	15	0
Key West	89.1	84.7	16	8
Marquette	58.9	45.9	20	11
Milwaukee	61 5	44.6	6	0
Mobile	86.3	74.5	15	11
New Haven	75.2	58	25	2
New London	63	55	13	8
Newport	67.5	58	11	0
New York	73	59	29	11
New Shoreham	63.8	51	4	7
Norfolk	83	66	17	3
Pensacola	83.8	74.5	17	10
Portland, Me	57.6	45	19	0
Portland, Or	64.5	53.4	60	8
Port Eads				
Provincetown	66.5	53	14	0
Punta Rassa	90.5	80.1	11	0
Sandusky	70.4	59.8	10	0
Sandy Hook	67.2	55	7	5
San Francisco	61.5	54.9	36	7
Savannah	87.4	76.6	13	7
Smithville	93	74	10	0
Thatcher's Isl'd	67.4	45	7	0
Toledo	81	56	11	0
Wilmington	86.5	75	13	0

* Observations running from 1st to 26th instead of 30th.

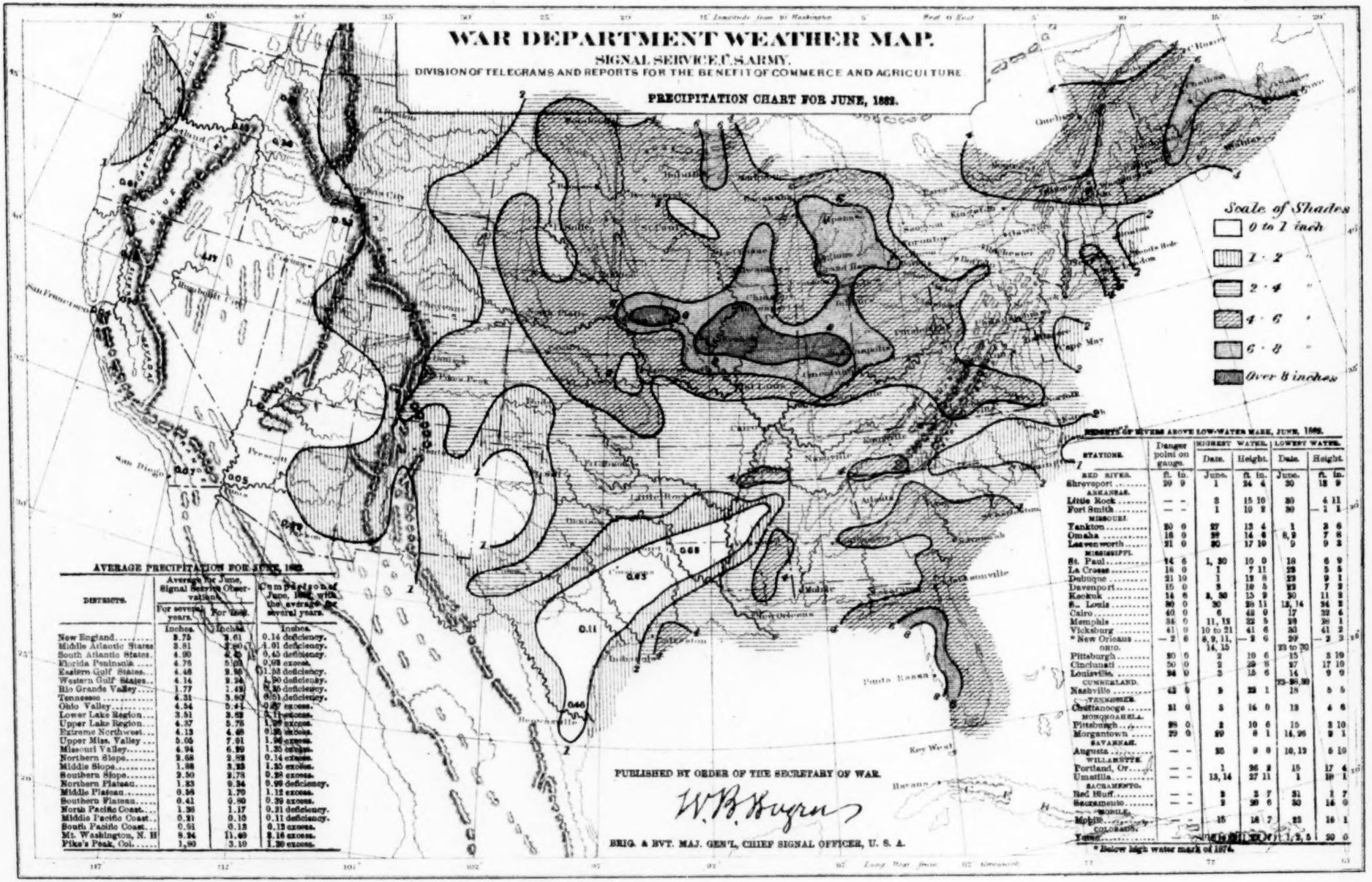
No. III.

WAR DEPARTMENT WEATHER MAP.

SIGNAL SERVICE, U.S.ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

PRECIPITATION CHART FOR JUNE, 1882.



AVERAGE PRECIPITATION FOR JUNE, 1882.

DISTRICTS.	Average for June, Signal Service Observations. For several years.	For 1882.	Compared with the average for several years.
	Inches.	Inches.	Inches.
New England	3.75	2.61	0.14 deficiency.
Middle Atlantic States	3.81	3.80	1.01 deficiency.
South Atlantic States	4.90	4.45	0.45 deficiency.
Florida Peninsula	4.78	5.09	0.03 excess.
Eastern Gulf States	4.48	2.97	1.51 deficiency.
Western Gulf States	4.14	2.24	1.90 deficiency.
Rio Grande Valley	1.77	1.42	0.35 deficiency.
Tennessee	4.31	3.92	0.39 deficiency.
Ohio Valley	4.54	5.41	0.87 excess.
Lower Lake Region	3.51	3.62	0.11 excess.
Upper Lake Region	4.37	5.76	1.39 excess.
Extreme Northwest	4.13	4.48	0.35 excess.
Upper Miss. Valley	5.05	7.01	1.96 excess.
Missouri Valley	4.94	6.29	1.35 excess.
Northern Slope	2.69	2.83	0.14 excess.
Middle Slope	1.98	3.33	1.35 excess.
Southern Slope	2.50	2.78	0.28 excess.
Northern Plateau	1.83	0.84	0.99 deficiency.
Middle Plateau	0.58	1.70	1.12 excess.
Southern Plateau	0.41	0.80	0.39 excess.
North Pacific Coast	1.38	1.17	0.21 deficiency.
Middle Pacific Coast	0.31	0.10	0.11 deficiency.
South Pacific Coast	0.01	0.13	0.12 excess.
Mt. Washington, N. H	9.34	11.49	2.15 excess.
Pike's Peak, Col	1.80	3.10	1.30 excess.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

W. B. Hazen

BRIG. & BVT. MAJ. GEN'L, CHIEF SIGNAL OFFICER, U. S. A.

HEIGHTS OF RIVERS ABOVE LOW-WATER MARK, JUNE, 1882.

STATIONS.	Danger point on gauge.	HIGHEST WATER. Date.	HIGHEST WATER. Height.	LOWEST WATER. Date.	LOWEST WATER. Height.
RED RIVER.	ft. in.	June.	ft. in.	June.	ft. in.
Shreveport	20 9	1	24 4	30	13 9
ARKANSAS.					
Little Rock	— —	3	15 10	30	4 11
Fort Smith	— —	1	10 9	30	1 1
MISSOURI.					
Yankton	20 0	27	13 4	1	3 6
Omaha	16 0	29	14 6	8, 9	7 6
Leavenworth	21 0	30	17 10	9	9 3
MISSISSIPPI.					
St. Paul	14 6	1, 30	10 0	10	6 9
La Crosse	18 0	1	7 11	23	5 5
Dubuque	21 10	1	13 6	23	9 1
Davenport	15 0	3	10 5	23	7 3
Rockuk	14 6	3, 30	15 9	30	11 3
St. Louis	30 0	30	26 11	13, 14	24 2
Cairo	40 0	6	43 0	17	33 4
Memphis	34 6	11, 15	33 5	29	30 1
Vicksburg	41 0	10 to 21	41 6	30	41 2
* New Orleans	— 2 6	8, 9, 11, 14, 15	— 2 6	29	— 2 3
OHIO.				23 to 30	
Pittsburgh	30 6	2	10 6	15	3 10
Cincinnati	50 0	2	29 8	27	17 10
Louisville	34 0	3	15 6	14	9 9
CUMBERLAND.				23-26, 30	
Nashville	40 6	5	23 1	18	5 5
TENNESSEE.					
Chattanooga	31 0	3	14 0	13	4 6
MONONGAHELA.					
Pittsburgh	28 0	2	10 6	15	3 10
Morgantown	29 0	29	9 1	14, 26	9 1
SAVANNAH.					
Augusta	— —	25	9 0	10, 13	5 10
WILLAMETTE.					
Portland, Or	— —	1	26 9	15	17 4
Umatilla	— —	13, 14	27 11	1	10 1
SACRAMENTO.					
Red Bluff	— —	3	3 7	31	1 7
Sacramento	— —	3	20 6	30	14 0
MOBILE.					
Mobile	— —	15	14 7	23	16 1
COLORADO.					
Yuma	— —	1, 2, 3	11 6	1, 2, 5	10 0

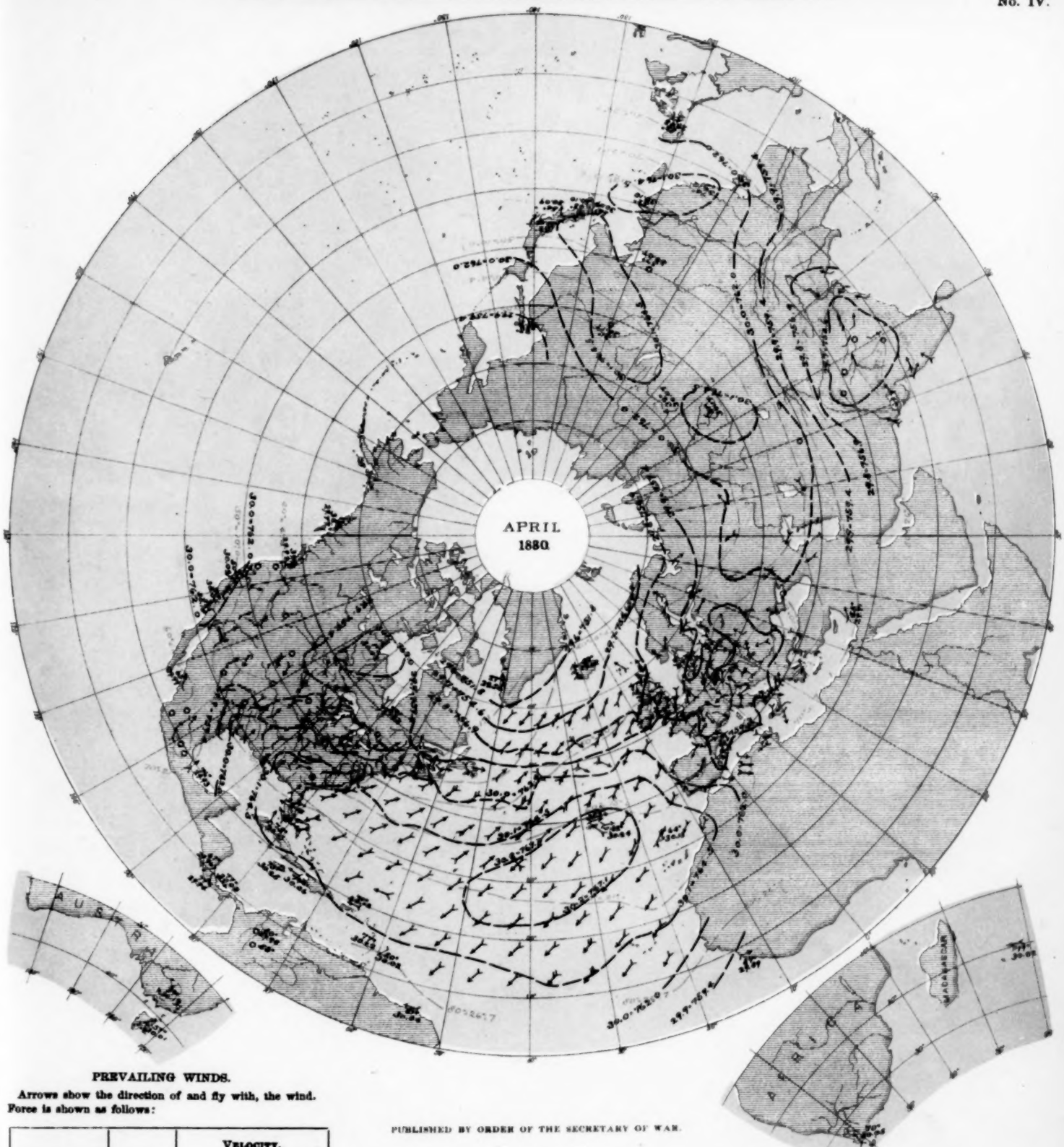
* Below high water mark of 1874.

Office of the Chief Signal Officer,

UNITED STATES ARMY.

Charted from Actual Observations taken Simultaneously, Series commencing January, 1877.

No. IV.



PREVAILING WINDS.

Arrows show the direction of and fly with, the wind.
Force is shown as follows:

Symbols.	Force.	Velocity.	
		Miles per hour.	Metres per second.
O	0	0	0
→	1, 2	0 to 9	0 to 4.0
→	3, 4	9.1 to 22.5	4.1 to 10.1
→	5, 6	22.6 to 40.5	10.1 to 18.1
→	7, 8	40.6 to 67.5	18.1 to 30.2
→	9, 10	67.6 up.	30.2 & over.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

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BRIG. & BVT. MAJ. GEN'L.
CHIEF SIGNAL OFFICER, U. S. A.

ISOBARS AND ISOTHERMS.

Isobars in *black*; detached barometer means in English inches.

Isotherms in *red*; detached temperature means in degrees Fahrenheit.

Broken lines, are doubtful.

INTERNATIONAL MONTHLY CHART.

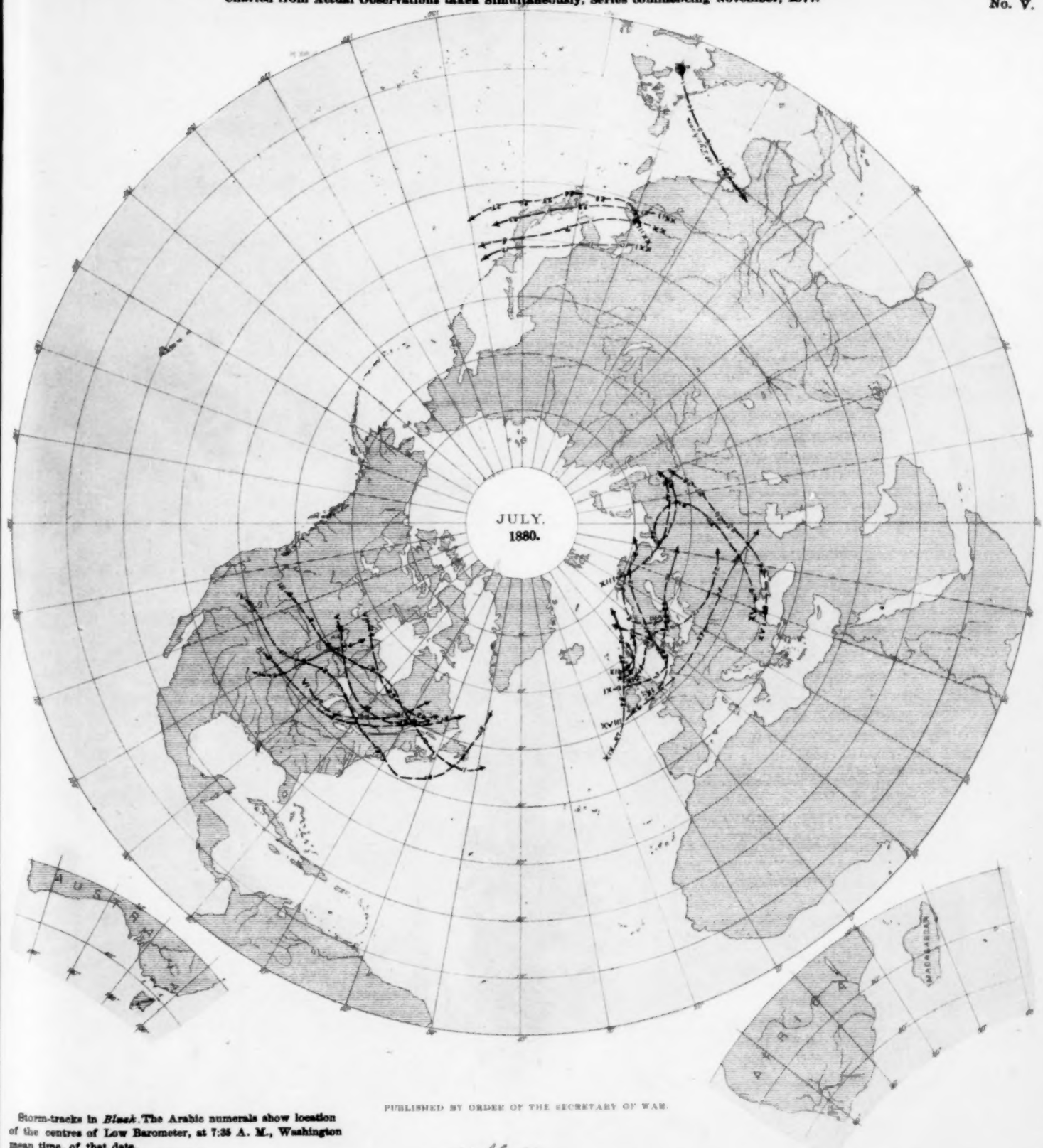
Showing mean pressure, mean temperature, mean force and prevailing direction of winds at 7:35 A. M., Washington mean time, for the month of April, 1880. based on the daily charts of the International Bulletin.

Office of the Chief Signal Officer,

UNITED STATES ARMY.

Charted from Actual Observations taken Simultaneously, Series commencing November, 1877.

No. V.



Storm-tracks in *Black*. The Arabic numerals show location of the centres of Low Barometer, at 7:35 A. M., Washington mean time, of that date.

Broken or dotted lines, are doubtful.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

W. B. Hazen

BRIG. & BVT. MAJ. GEN'L.
CHIEF SIGNAL OFFICER U. S. A.

INTERNATIONAL CHART.

Showing Tracks of Centres of Low Barometer for July, 1880.

No. VII.

No. VII.

CHART SHOWING THE LIMIT OF ICEBERGS DURING THE MONTH OF JUNE, 1882, FROM OBSERVATIONS ON FILE IN THE OFFICE OF THE CHIEF SIGNAL OFFICER.