MONTHLY WEATHER REVIEW.

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Desk Officer in Charge
Bulletin Room
Signal Office

INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States and Canada during January, 1886, based upon the reports from the regular and voluntary observers of the Signal Service and from co-operating state weather services.

Descriptions of the storms which occurred over the north Atlantic Ocean during the month are also given, and their approximate paths shown on chart i.

The most noteworthy meteorological feature of the month was the area of high pressure, described herein as number i, and the attendant cold wave, which passed over the districts east of the Rocky Mountains from the 6th to the 12th. The loss of life and stock in the western districts was very great, and during the eastward movement of this high area the lowest temperatures recorded in many years occurred in the Southern States, causing much suffering among the people of that section. Very heavy losses to agricultural, fruit-growing, and other interests throughout the South also resulted from this cold wave.

The average number of areas of low pressure for the month of January during the last twelve years is 13.2. The paths of the centres of eleven low areas are traced on chart i for January, 1886.

The mean temperature for the month averaged below the normal over nearly the whole country, the exceptions being California, the western portions of the middle and southern plateau districts, northern New England, and the Canadian Maritime Provinces. The most marked deficiencies occurred in the Southern States and Missouri Valley.

The precipitation was in excess of the average on the Pacific coast, in the Rocky Mountain regions and thence eastward over the northern districts to the Atlantic coast. In the Southern States, except over portions of Alabama, Mississippi, and Louisiana, there was a general deficiency. The greatest departure from the normal precipitation occurred in California, where it was from two to three inches in excess of the average.

In the preparation of this REVIEW the following data, received up to February 20, 1886, have been used, viz., the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and thirty-three Signal Service stations and fifteen Canadian stations, as telegraphed to this office; one hundred and sixty-one monthly journals and one hundred and sixty-five monthly means from the former, and fifteen monthly means from the latter; two hundred and ninety-seven monthly registers from voluntary observers; sixty monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly weather reports from the New England Meteorological Society, and from the local weather services of Alabama, Illinois, Indiana, Iowa, Minnesota, Nebraska, Ohio, and Tennessee, and of the Central Pacific Railway Company; trustworthy newspaper extracts, and special reports.

ATMOSPHERIC PRESSURE.

[*Expressed in inches and hundredths.*]

The mean atmospheric pressure for January, 1886, determined from the tri-daily telegraphic observations of the Signal Service, is shown by the isobarometric lines on chart ii. It will be seen from this chart that the mean pressure is greatest over the extreme northwest, upper Missouri valley, and northern slope, while the area of least pressure occupies the north Pacific coast. The isobar for 30.35 indicates the region of greatest pressure, and that for 29.95 shows the region over which the barometric means were lowest. The highest monthly barometric means, 30.36 and 30.37, were reported from Poplar River, Montana, and Fort Garry, Manitoba, respectively; and the lowest, 29.92 and 29.94, occurred at Fort Canby and Tatoosh Island, Washington Terrritory, respectively. In the districts east of the Mississippi River the barometric means range from 30.0 to 30.1, the lower means occurring at stations on the Atlantic coast and in the lower lake region. Over the southern districts to the west of the Mississippi the mean pressure generally ranges from 30.1 to 30.2.

As compared with the mean pressure for the preceding month, an increase has occurred in the lower Missouri valley and in the northern districts from western Montana to the Atlantic coast, the difference being greatest in the extreme northwest, where it amounts to from .15 to .21. In all other districts the mean pressure for January, 1886, is lower than for the preceding month, the difference being most marked in the central Rocky Mountain districts and east Gulf states, where it ranges from .10 to .14.

The departures from the normal pressure at the various Signal Service stations are given in the tables of miscellaneous meteorological data, and on chart iv they are exhibited by lines connecting stations of equal departure. In the upper Missouri valley, extreme northwest, and in portions of the upper lake region and northern slope, the mean pressure for January, 1886, is above the normal, the departures being greatest at stations in northern Dakota and northern Minnesota. Over a small area, including portions of the Indian Territory and Texas, the mean pressure is normal, or slightly above. In all other parts of the country the pressure is below the normal, the departures being greatest on the north Pacific coast and in the Atlantic coast districts south of New England, where they generally exceed .10.

BAROMETRIC RANGES.

The following are some of the extreme monthly ranges:

Greatest.	Inches.	Least.	Inches.
Boston, Massachusetts	2.09	Key West, Florida	0.58
Sandy Hook, New Jersey	2.04	Fort Davis, Texas	0.58
New London, Connecticut	2.03	Fort Grant, Arizona	0.58
New York City	2.03	Fort Apache, Arizona	0.62
Portland, Maine	2.02	Fort Thomas, Arizona	0.65
Atlantic City, New Jersey	2.01	Prescott, Arizona	0.65
New Haven, Connecticut	1.96	Los Angeles, California	0.66
Block Island, Rhode Island	1.96	Keeler, California	0.67
Eastport, Maine	1.93	Yuma, Arizona	0.71

The monthly barometric ranges are also given in the tables

of miscellaneous data; they were greatest at stations along the New England and middle Atlantic coasts, and least over the southern plateau and southern Florida.

AREAS OF HIGH PRESSURE.

Four areas of high pressure appeared within, or near, the limits of the stations of observation during the month. Only two of these areas passed eastward to the Atlantic coast, while a third was far to the north of Manitoba on the 25th, and disappeared north of Lake Superior, without causing any marked change in the weather conditions within the United States. The fourth area extended over the Rocky Mountain regions during the last three days of the month and had advanced to the Missouri Valley by the midnight report of the 31st.

I.—This is probably the most noteworthy high area which has appeared within the limits of the United States for several years, as it was attended by a cold wave which extended over the entire country east of the Rocky Mountains, causing unusually low temperatures, especially in the southern sections of the country. The barometer was high from the Rocky Mountain regions to the Pacific coast on the 2d, and from that date to the 5th a slow northeasterly movement of this high area was observed; after the 5th there was an apparent increase of this high area from the region north of the Saskatchewan Valley and Manitoba. On the morning of the 6th it had so increased as to leave little doubt of the immediate approach of a decided cold wave, and warnings and cold-wave signals were ordered for the extreme northwestern stations. The following warnings were sent on the afternoon of the 6th:

WASHINGTON CITY, *January* 6, 1886—4.45 p. m.

To observers, Cheyenne, Wyoming; North Platte, Nebraska; Yankton, Dakota; Denver, Colorado; Dodge City, Kansas; Omaha, Nebraska; Concordia, Kansas; Leavenworth, Kansas (repeating to Wellington); Kansas City, postmaster, and dispatcher Fort Scott and Gulf Railway; Lamar, Missouri:

Hoist cold-wave signal. Cold wave, accompanied by a "norther;" temperature will fall from 20° to 25° in the next twenty-four hours at western and northern stations, and in twenty-four to thirty-six hours at southern stations.

HAZEN.

The centre of greatest barometric pressure remained north of Dakota from the 6th until the 12th, but the cold wave had reached the Gulf coast and Florida before that date, causing, in many places, a lower temperature than had been observed in many years. The barometer ranged from 30.70 to 30.99 in the Northwest during the advance of this cold wave, and then the centre of high pressure moved southward to Arkansas on the 12th, where the pressure had decreased to 30.60. After the 12th this high area moved eastward to the Atlantic coast and thence northeastward; it followed the coast line, passing over Nova Scotia and disappearing to the eastward on the 16th.

The special charts issued with this REVIEW show the isothermal lines at each of the 7 a. m. telegraphic reports from the 5th to the 12th, inclusive.

The telegraphic warnings and orders for the display of cold-wave signals issued by this office are given below, in the order in which they were issued, for the purpose of illustrating the value of such warnings:

WASHINGTON CITY, *January* 7, 1886—12.02 a. m.

To observers, Saint Paul, Minnesota (repeating to Northfield and to Professor Payne, for interior of state); Madison, Wisconsin, C. P. Chapman; Dubuque, Iowa; Des Moines, Iowa; Davenport, Iowa; Keokuk, Iowa; Springfield, Illinois; Saint Louis, Missouri (repeating to Professor Nipher, for interior of state); Cairo, Illinois; Memphis, Tennessee; Little Rock, Arkansas; Shreveport, Louisiana; Galveston, Texas; Abilene, Texas:

Hoist cold-wave signal. There is a cold wave advancing from Montana; the temperature in the upper Mississippi valley will fall from 15° to 20° during to-day and to-night, and in the southern portion of the Mississippi Valley, Texas, and Arkansas in the next twenty-four to thirty-six hours, with a "norther" in Texas.

HAZEN.

WASHINGTON CITY, *January* 7, 1886—12.05 a. m.

To assistant superintendent of telegraph, International and Great Northern Railroad, Palestine, Texas; general superintendent, Texas and Saint Louis Railway, Pine Bluff, Arkansas; superintendent of telegraph, Texas and Pacific Railway, Marshall, Texas; general superintendent, Houston and Texas Central Railway, Houston, Texas; general superintendent, Galveston, Harrisburg, and San Antonio Railway, Houston, Texas; general superintendent, Mexican National Railway, Corpus Christi, Texas:

Cold wave approaching; temperature will fall 15° to 25° during the next twenty-four to thirty-six hours.

HAZEN.

WASHINGTON CITY, *January* 7, 1886—12.30 a. m.

To observer, Saint Louis, Missouri:

There is a severe cold wave moving slowly southeastward from Montana; it will cover the Missouri Valley to-day and the Mississippi Valley during the night, with a "norther" in the Western States.

HAZEN.

WASHINGTON CITY, *January* 7, 1886—12.40 a. m.

To observers, Milwaukee, Wisconsin; Chicago, Illinois:

Hoist cold-wave signal. The temperature will rise slightly to-day, but will be followed on Friday by a cold wave which will cause the temperature to fall 15° to 25°.

HAZEN.

WASHINGTON CITY, *January* 7, 1886—10.25 a. m.

To observers, New Orleans, Louisiana; Vicksburg, Mississippi:

Hoist cold-wave signal; severe cold wave approaching, which will cause damaging frosts in Louisiana and Texas Friday and Saturday mornings.

HAZEN.

WASHINGTON CITY, *January* 7, 1886—5.55 p. m.

To Baltimore and Ohio Telegraph superintendents, Selden, Baltimore, Maryland; Zeublin, Chicago, Illinois; and chief in charge Baltimore and Ohio Telegraph Office, New York City:

The cold wave previously mentioned will extend over Indiana and Kentucky during Friday.

HAZEN.

WASHINGTON CITY, *January* 7, 1886—5.15 p. m.

To observers, Greencastle, Indiana; Indianapolis, Indiana; Cincinnati, Ohio; Nashville, Tennessee; Chattanooga, Tennessee; Knoxville, Tennessee; Montgomery, Alabama; Auburn, Alabama, Professor Mell; Atlanta, Georgia; Mobile, Alabama:

Hoist cold-wave signal. A cold wave coming; the temperature will fall from 20° to 25° in the next thirty-two hours in western Ohio, Indiana, Kentucky, from 20° to 25° in Tennessee, and from 20° to 30° in the eastern Gulf states.

HAZEN.

WASHINGTON CITY, *January* 7, 1886—5.45 p. m.

To observer, New Orleans, Louisiana:

The cold wave will be unusually severe in Louisiana and Texas; parties interested should take warning to protect against frost.

HAZEN.

WASHINGTON CITY, *January* 7, 1886—6 p. m.

To observer, Grand Haven, Michigan:

Hoist cold-wave signal. The cold wave now central in the Missouri Valley. The temperature will remain nearly stationary, followed during Friday or Friday night by a fall of from 15° to 20°.

HAZEN.

WASHINGTON CITY, *January* 8, 1886— — m.

To observers, Jacksonville, Florida; Charleston, South Carolina; Chattanooga, Tennessee; and David Risley, Georgetown, South Carolina; Prof. P. H. Mell, jr., Auburn, Alabama; J. E. Ingraham, Sanford, Florida:

Decidedly colder, freezing weather to-night in northwestern Florida, Alabama, and Tennessee, with a severe cold wave, which will overspread the south Atlantic states and Florida during Saturday and on Sunday morning; damaging frosts as far south as Tampa Bay.

HAZEN.

WASHINGTON CITY, *January* 8, 1886—11 a. m.

To observers, Grand Haven, Michigan; Detroit, Michigan; Toledo, Ohio:

Hoist cold-wave signal. Cold wave coming; temperature will fall from 15° to 20° during Saturday night, but will begin to be felt during Saturday, preceded by slightly warmer weather.

HAZEN.

WASHINGTON CITY, *January* 8, 1886—11.33 a. m.

To observers, Charlotte, North Carolina; Wilmington, North Carolina:

Hoist cold-wave signal. The temperature will rise slightly to-day, followed by decidedly colder weather and a severe cold wave.

HAZEN.

WASHINGTON CITY, *January* 8, 1886—5.45 p. m.

To observers, Columbus, Ohio; Pittsburg, Pennsylvania; Sandusky, Ohio; Cleveland, Ohio; New York City; Philadelphia, Pennsylvania; Baltimore, Maryland; Washington City; Lynchburg, Virginia; Richmond, Virginia, W. D. Chesterman, Chamber of Commerce; Norfolk, Virginia:

Hoist cold-wave signal. Cold wave now advancing from the West, and will cause fall in temperature of from 15° to 20° during Saturday and Saturday night.

HAZEN.

WASHINGTON CITY, *January* 8, 1886 —— m.

Professor Thomas, Columbus, Ohio; J. G. McCandlish, Pittsburg, Pennsylvania:

Cold wave now advancing from the West, and will cause fall in temperature of from 15° to 20° during Saturday night.

HAZEN.

WASHINGTON CITY, *January* 8, 1886—5.55 p. m.

To Superintendent Selden, Baltimore and Ohio Telegraph Company, Baltimore, Maryland; Zeublin, Chicago, Illinois; chief in charge Baltimore and Ohio Telegraph Company, New York City:

The cold wave is already felt in Indiana, Illinois, Kentucky, and will move slowly eastward over Ohio, Pennsylvania, West Virginia, Virginia, and Maryland during Saturday night or on Sunday.

HAZEN.

WASHINGTON CITY, *January* 9, 1886—12.40 a. m

To observers, Boston, Massachusetts; New London and New Haven, Connecticut:

Hoist cold-wave signal. A cold wave approaching; the temperature will rise slightly at Boston to-day, to be followed during the night and on Sunday by a fall in the temperature of from 15° to 20° HAZEN.

The accompanying notes from observers serve to indicate the intense effect of this cold wave in the several sections of the country:

North Platte, Nebraska: a severe "norther" occurred on the 6th and 7th; business was entirely suspended and railroad trains delayed for several hours.

Wellington, Sumner county, Kansas: a severe cold wave and high wind, with snow, occurred on the 7th; the extent and duration of the storm, in connection with the extreme low temperature, characterized it as one of the severest ever known in western Kansas; two men were frozen to death in this county. Many heeded the timely warning of the cold-wave signal that was displayed, and large numbers of stock were cared for that would otherwise have been lost.

Salina, Saline county, Kansas: an unusually severe storm occurred on the 7th, the wind averaging thirty-five miles per hour, and continued for about twenty hours; great loss was occasioned to the sheep and cattle interests in the western portion of the state.

Dodge City, Kansas: one of the most severe storms that has been experienced in this locality for several years occurred on the 7th; the wind blew a gale from the north, averaging forty miles per hour, with a mean temperature for the day of 10°.1 below zero; the snow was so blinding that at no time during the day could a person see a rod ahead; a number of people and a large amount of stock were frozen to death.

Fort Supply, Indian Territory: a terrific "norther" occurred on the 7th and 8th, the wind reaching a velocity of fifty miles per hour, accompanied by a low temperature and, at times, a blinding fall of snow; much suffering was caused, and large numbers of cattle were frozen to death; ice formed to the depth of eleven inches, and the snow piled up in huge drifts.

Reports from Fort Reno, Indian Territory, state that in Greer county, and on the Wichita and Comanche reservation, thousands of cattle were frozen to death during the prevalence of the "norther" on the 7th and 8th.

Oskaloosa, Mahaska county, Iowa: reports from various parts of the state show that from the 7th to 11th about twenty lives and a large amount of stock were lost on account of the extreme cold.

Sioux City, Woodbury county, Iowa: the high wind and extreme cold of the 8th and 9th was unprecedented; all trains were practically abandoned.

Hamburg, Fremont county, Iowa: a heavy blizzard occurred on the 8th; railroad trains were abandoned, and much damage done to stock.

Nashville, Tennessee: from the 9th to the 10th the cold was the most severe known in this city for the past forty years; while other cold waves have shown a lower minimum temperature, notably those of January, 1877, 1884, and 1885, still, the mercury did not remain below zero as long as in the cold wave of January, 1886.

Memphis, Tennessee: the temperature fell to 8° below zero on the morning of the 9th, being the lowest since the establishment of this station in 1871.

New Orleans, Louisiana: the cold wave struck this city at 3 a. m. of the 8th, and the temperature fell throughout the day, the thermometer recording 19°.0 at 11 p. m., and falling to 15°.2 on the morning of the 9th. Great damage was done to the sugar-growing interest in this state and Texas.

Shreveport, Louisiana: the 8th was the coldest day in the history of this station, the minimum thermometer recording 1°.3.

Indianola, Texas: the coldest weather experienced for several years occurred from the 8th to the 13th; ice from one-quarter inch to three inches thick formed on bayous and ponds; on the 12th snow fell to the depth of three inches.

The following is an extract from a special report of the Signal Service observer at Galveston, Texas, in reference to the cold wave from the 7th to 13th: "'Hoist cold-wave signal, January 7th, 1.20 a. m.,' were the well-timed warning notes that preceded the heaviest snowfall, severest frost, and the most intense cold wave ever experienced in this city or vicinity, either by comparison with the records of this office or with the most reliable data to be obtained from the very oldest residents. At 11 a. m of the 6th the barometer commenced to fall rapidly and the temperature to increase correspondingly, and at 1.20 p. m. of the 7th the temperature was as high as 65°. At 5.50 p. m. of the 7th the wind reached a storm-velocity of twenty-five miles per hour from the north, and kept on increasing, until, at 7.20 p. m., the wind registered forty-two miles per hour. After the advent of the "norther," at 5.50 p. m., the temperature commenced to fall with unprecedented rapidity; about 9 p. m. of the 7th ice commenced to form, and at the morning observation of the 8th the minimum thermometer recorded 11°, the lowest of which there is any record, being a fall of 54° in less than eighteen hours, causing intense suffering. The great and continued cold of the day and night of the 9th caused Galveston Bay to freeze over. Frosty and cold weather continued throughout the 10th and 11th, and at 8 a. m. of the 12th a heavy snow set in, covering the ground to the depth of about six inches."

San Antonio, Texas: on the morning of the 12th the ground was covered with snow, a very rare occurrence at this place, and one that has not occurred before since 1866. The long spell of cold weather was the most severe in many years, and caused considerable loss of stock.

Palestine, Texas: the "norther" which began on the 7th continued throughout the 8th, the weather being the coldest ever known at this place; the minimum thermometer recorded 0°, which is 6°.5 lower than has ever been recorded; telegraph lines were prostrated, water mains in the city frozen, and ice from three to six inches thick formed on lakes and ponds.

Fort Elliott, Texas: a severe "norther" occurred on the 7th; 14,000 head of cattle were frozen to death in this vicinity, and several persons badly frost-bitten.

Mobile, Alabama: on the morning of the 9th the minimum thermometer recorded 11°, which was the coldest on record since the establishment of the signal office at this place in 1871, and from other reliable sources the coldest since 1852, at which time the thermometer fell to 8°. The extreme cold destroyed the largest cotton crop ever known, plants out and under cover were killed; the loss will aggregate $750,000.

Montgomery, Alabama: on the morning of the 9th the minimum thermometer recorded 5°.4, which is the lowest on record since the establishment of the station in 1872.

Greensborough, Hale county, Alabama: at 7 a. m. of the 9th the thermometer was 2°, which is the coldest ever recorded, and the average temperature for the 9th and 10th was the lowest ever known at this place; ice from four to five inches thick formed on ponds from the 9th to 13th.

Birmingham, Jefferson county, Alabama: during the cold spell from the 8th to 14th, ice formed four inches thick; great damage was done to fruit trees and garden vegetables.

Pensacola, Florida: the most severe cold spell ever known occurred from the 9th to 13th, the minimum thermometer recording 14°.9 on the morning of the 9th; the salt water along the shore of the bay froze to a considerable thickness, and ice three inches thick formed on ponds; great damage was done to fruit trees.

The following is an extract from the Pensacola (Florida) "Commercial," of January 16th: "One of the most remarkable results of the late cold snap was the curious effect it had on the fish in the shallow bayous. On the 12th several fishermen visited the Little Sabine, on Santa Rosa Sound, for the purpose of capturing any fish that might be benumbed by the cold. The Sabine was found frozen from shore to shore, and under the ice, in water ranging from two to four feet in depth, they found hundreds of fish so paralyzed with cold as to be almost motionless. By breaking the ice ahead of the boat the fish were easily speared and captured, fully 2,500 pounds being secured. They were mostly trout, mullet, and red fish, and some were of large size. This is certainly a proof of the unusual severity of the cold in this section."

Jacksonville, Florida: it is estimated that the damage done to fruit by the cold spell from the 9th to 12th will reach $1,000,000; the entire crop of fruit unpicked was frozen; ice formed on the shallow parts of the river, and water-pipes and hydrants in the city froze.

Gainesville, Alachua county, Florida: the temperature fell to 16° on the morning of the 11th, causing great damage to fruit trees; oranges unpicked were frozen, and ice formed two and a half inches thick.

Orlando, Orange county, Florida: the weather during the 11th and 12th was the coldest ever known; great damage has been done to fruit and tender plants.

Fernandina, Nassau county, Florida: business was practically suspended on the 11th and 12th on account of the extreme cold weather.

The following is an extract from the report of the Signal Service observer at Sanford, Florida: "The warning of the approach of the cold wave was received at 11.45 a. m. of the 8th, and immediately sent to all points. On receipt of the warning, owners of orange groves employed men to gather wood and other combustibles and place them on the west and north sides of their groves, ready to be ignited, hoping by this means to protect trees and crops from damage; their faith in the prediction of the Signal Service was such that many went to considerable trouble and expense. On the evening of the 9th the country was lighted up with the fires that had been ignited when the temperature reached 32°. On the morning of the 10th temperature fell to 21°, being the lowest ever recorded at this place; ice formed more than an inch thick; crops were destroyed; young orange trees killed, and old trees seriously injured; pineapples and bananas were killed, and many water pipes froze and burst. The cold weather continued throughout the 11th and 12th; on the latter date an inappreciable amount of snow fell."

Live Oak, Suwannee county, Florida: the thermometer on the morning of the 12th was 16°; two of the largest ponds in this place were frozen over, the ice being from one-half to three-fourths of an inch thick.

The following is an extract from the report of the Signal Service observer at Cedar Keys, Florida: "The cold wave of the 8th to 12th was very severe; the damage in this vicinity amounts to about $5,000, chiefly to the fish and oyster business; in the state the damage is estimated at $2,100,000, and it is doubtful if there are five hundred boxes of oranges left in the whole state; a large number of young trees have been killed or seriously injured, the old trees suffered but little; reports in regard to the damage done are conflicting, but the above statement may be relied upon as correct, as I make it upon the best authority and by personal inspection. Very few oranges are grown in this immediate vicinity, but by sending the warnings received on the 7th to neighboring towns, it accomplished much good and saved a good deal of fruit which was gathered before the freeze. The public showed their appreciation of the timely warning given by the Signal Service by high praise through the press, and to the observer in person."

Manatee, Manatee county, Florida: on the 10th the beach was lined with frozen fish; ice formed on ponds and shallow water on the 12th, causing the destruction of large numbers of fish.

Lake City, Columbia county, Florida: ice formed on the 11th and 12th from two to three inches thick; oranges on trees were frozen.

Tampa, Hillsborough county, Florida: quite a number of flakes of snow fell on the 11th.

Cedar Keys, Florida: the cold weather experienced during the week ending the 16th was without precedent; ice formed one and-a-half inches thick,

and at Sara Sota (one hundred and twenty-five miles south of this place) a snow storm raged for four hours.

Key West, Florida: the lowest temperature since the establishment of this station occurred on the 12th; a temperature of 19° was recorded at Tampa, where ice formed to the thickness of an inch on shallow water; throughout southern Florida the thermometer fell below freezing, and the injury done to the fruit interest is incalculable.

Mr. Charles C. Livermore, Fort Gatlin, Orange county, Florida, reports that at 6 a. m. of the 12th the temperature was 19°.5; at 6 p. m. sleet began, and at 8 p. m. it turned into snow. This was the first instance on record of snow falling at this place.

Atlanta, Georgia: the thermometer fell to 2°.4 below zero on the 11th, which is the lowest on record; the ground was frozen to the depth of eighteen inches; twelve inches has always been considered below the freezing line by builders.

Augusta, Georgia: the temperature fell to 6°.0 on the morning of the 12th, which is the lowest in the record of the Signal Service, and, from information from trustworthy sources, the coldest weather experienced since 1835.

Savannah, Georgia: on the morning of the 12th the minimum thermometer recorded 12°, being the lowest ever recorded at this place; Ogeechee Canal froze, and people crossed on the ice; this has never occurred before; gas-metres and water-pipes froze, and great damage was done to crops.

Milledgeville, Baldwin county, Georgia: a more protracted cold spell is not remembered here; oats and all growing crops, except onions and spinach, were generally killed; on the 12th the river froze over, which is an unusual occurrence.

Athens, Clarke county, Georgia: the cold spell from the 9th to the 15th was the severest in the past ten years; the temperature is known to have been lower, but the duration and the accompanying strong wind made it unusually severe. The Oconee River froze on the 13th, which is an extremely rare occurrence.

Mr. C. B. La Hatte, Gainesville, Hall county, Georgia, furnishes the following: "The cold spell from the 8th to the 16th was the severest ever experienced in this region. During the night of the 8th four inches of snow fell, and on the morning of the 9th the temperature was 0°, the average for that day being 3°.3. On the 10th it was 2°.0 below zero, and on the morning of the 11th 7°.0 below zero, which was the minimum recorded during the cold spell; at noon the temperature was zero, the average for the day being 1°.3. * * * * Much suffering was caused among the poorer classes and to cattle; some trees were killed, and all tender shrubbery seriously injured if not killed. The ground froze to the depth of eighteen to twenty inches in exposed places, and small running streams froze over."

Charleston, South Carolina: the minimum thermometer recorded 10°.5 on the morning of the 11th, which is the lowest since the establishment of this station; ice three inches thick formed on ponds; all the early vegetables were killed, and several persons froze to death in this vicinity.

New River Inlet, North Carolina: the average minimum temperature for the 10th, 11th, 12th, and 13th was 9°.4, which, from all information obtainable, was the coldest weather ever known in this vicinity. The ice in New River is from six to eight inches thick, causing the suspension of navigation, which has not occurred before since 1835.

Mr. T. C. Harris, of the Department of Agriculture, Raleigh, North Carolina, reports as follows: "The cold spell from the 9th to the 13th was remarkable for this place, the thermometer falling to 5° on the mornings of the 11th and 12th; ice from three to seven inches thick formed on ponds. In western North Carolina the cold was much more intense, being as low as —12° in some places."

Mr. W. G. Simmons, voluntary observer at Wake Forest College, Wake county, North Carolina, reports that on the morning of the 8th there was a light fall of snow; on the morning of the 9th the minimum thermometer recorded 17°.5, from which time it gradually fell until the morning of the 12th, when it recorded 2°.0; the weather was clear throughout the cold spell.

Mr. Howard Shriver, voluntary observer at Wytheville, Wythe county, Virginia, reports as follows in reference to the cold spell in January: "All records revert to 1835 as the last date at which such a cold wave occurred. The temperature for a week was but a little above or a little below zero, the minimum at this place being 8° below zero on the morning of the 11th; reports from neighboring towns give 13°, 18° and 20° below zero; all these reports come from a belt lying to the south or southeast of my station, and the same phenomenon has occurred several times before, indicating the presence of a colder belt there than at this place; during this storm the wind was the most violent ever experienced; six inches of snow fell, and the drifts were eight to twelve feet deep."

Strafford, Strafford county, New Hampshire: the 12th was the coldest day for the past twenty-seven years.

II.—This area appeared north of Montana at 10 p. m. of the 13th, when the preceding one extended over the Atlantic coast districts, the high areas being separated by a well-defined low area which passed almost directly north from the Gulf States over the upper lake region. This high area remained in the region north of Dakota and Minnesota until the 22d, when it moved southward to northern Iowa and thence eastward over the Lake region and the Saint Lawrence Valley during the 23d, 24th, and 25th, when it disappeared over the north Atlantic.

III.—This area was at no time within the limits of the United States, but it was first observed on the 25th far to the north of Manitoba, and after moving slowly eastward during the 26th and 27th it apparently disappeared as a separate area without causing decided changes of temperature within the United States or Canada.

IV.—This area appeared north of Montana on the morning of the 28th and extended southward over the Rocky Mountain districts; the barometer, however, was not unusually high (ranging from 30.40 to 30.50) and no decided fall of temperature was observed. This area extended westward over the plateau regions during the following day, and on the 30th and 31st it extended eastward over the Missouri Valley, where it was central at the close of the month.

AREAS OF LOW PRESSURE.

Eleven areas of low pressure have been traced upon the tri-daily weather charts for January, while several barometric depressions appeared near the coast or along the northern boundary of the United States, which, although indicating the presence of low areas, were not sufficiently well defined to render it possible to locate on the chart the centre of depression. Six of these low areas apparently formed near the west Gulf coast; three resulted from low areas on the Pacific coast, and two were first observed north of Dakota.

The following table shows the latitude and longitude at which each area was first and last observed, and the average hourly velocity of each.

Low areas.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
	° ′	° ′	° ′	° ′	
No. I	36 00	102 00	43 00	64 00	.....
II	29 00	98 00	47 00	63 00	20.0
III	27 00	98 00	51 00	66 00	34.0
IV	53 00	101 00	52 00	84 00	30 0
V	29 00	96 00	48 00	61 00	39.0
VI	37 00	92 00	49 00	61 00	52.0
VII	39 00	101 00	45 00	74 00	37.0
VIII	43 00	108 00	52 00	66 00	48 0
IX	29 00	97 00	37 00	85 00	23.0
X	50 00	124 00	53 00	101 00	47.0
XI	51 00	105 00	87 00	40 00	37.0

Mean hourly velocity, 36.7 miles.

I.—This area has been previously described in the REVIEW for December, 1885, it having originated in the Southwest and moved along the Atlantic coast to New England, where it was central on the morning of the 1st. This storm developed considerable energy along the New England coast before disappearing to the eastward over the Atlantic.

II.—When the preceding storm was passing along the New England coast this area was forming in the extreme southwest, or the lower Rio Grande valley, the barometer being low from the west Gulf coast westward to southern California, and high areas of 30.30 extended over the middle Atlantic states, Dakota, and the north Pacific coast. During the 2d this storm moved slowly northward over the west Gulf states, forming a trough-shaped depression which extended to the upper lake region, while the high area in the eastern portion of the country moved in the same direction to the lower Saint Lawrence valley. The high area referred to as central over Dakota was apparently crowded to the westward and became a part of that on the Pacific coast, which increased in intensity and became more clearly defined as a high area over the central plateau region. On the 2d the area of precipitation included all districts of the central valleys and the Lake region; the winds were strong and from the north in the eastern Rocky Mountain districts, and there was a marked contrast of temperatures in these districts when compared with temperatures observed in the Mississippi Valley. At midnight of the 2d the temperature at Saint Louis, Missouri, was 57°, while at Dodge City, Kansas, on about the same latitude, it was 13°. This storm passed over the Mississippi Valley during the 2d and 3d, and was central near Milwaukee, Wisconsin, on the morning of the