

MONTHLY WEATHER REVIEW,

SEPTEMBER, 1877.

WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTION.

The present REVIEW for the month of September depends upon all data received up to the 14th of October from the Canadian Meteorological Service, the United States Navy, the Army Post Surgeons, Voluntary Observers and the United States Signal Service. The most interesting features have been: First, the cyclones of the Gulf of Mexico and of the Caribbean Sea. Second, the drought and prairie fires of certain regions. Third, the universal high temperature.

BAROMETRIC PRESSURE.

In General.—The general distribution of atmospheric pressure for the month is shown by the isobars on Map No. II, from which it appears that the area of highest pressure, 30.05, covers the Middle Atlantic States and southern New England. In September, 1871, the area of highest pressure, 30.15, covered the greater part of the region from Missouri to the Alleghanies. In September, 1872, the highest pressure, 30.05, covered the South Atlantic States. In September, 1873 and 1874, the area of 30.05 to 30.10 covered the South Atlantic, East Gulf, and Middle Atlantic States. In September, 1875, the area 30.05 covered the South Atlantic and East Gulf States; but in September, 1876, the pressure of 30.05 is found only in a small portion of northern Louisiana. On the average, therefore, the pressures for 1877 have been below the normal in the Gulf States and in the extreme Northwest, but have agreed with the normals in the Middle Atlantic States.

Barometric Ranges.—The general range of pressure is shown by the following table, from which it appears that for the whole country a range of 1.06 inches has been recorded:

LOW AREAS.				HIGH AREAS.			
No.	Location.	Date.	Minimum Pressure.	No.	Location.	Date.	Maximum Pressure.
I	Mouth St. Lawrence.....	Sept. 1st, 7:35 a. m.....	29.56	I	Lower Missouri valley..	Sept. 2nd, 7:35 a. m.....	30.26
II	Southern Minnesota.....	Sept. 4th, 4:35 p. m.....	29.75	II	Lower St. Lawrence val.	Sept. 7th, 7:35 a. m.....	30.42
III	Missouri.....	Sept. 9, 7:35 a. m. 4:35 p. m. 9	29.61	III	Lower Missouri valley..	Sept. 17th, 7:35 a. m.....	30.31
IV	Manitoba.....	Sept. 11th, 4:35 p. m.....	29.44	IV	Middle Atlantic States..	Sept. 23rd, 7:35 a. m.....	30.33
V	Manitoba.....	Sept. 13th, 4:35 p. m.....	29.37				
VI	Louisiana.....	Sept. 16th, 4:35 & 11 p. m.	29.43				
VII	Nova Scotia.....	Sept. 21st, 11 p. m.....	29.45				
VIII	Minnesota.....	Sept. 21st, 4:35 p. m.....	29.52				
IX	Minnesota.....	Sept. 24th, 11 p. m.....	29.79				
X	Dakota.....	Sept. 26th, 4:35 p. m.....	29.60				
XI	Cape Hatteras.....	Sept. 26th, 4:35 p. m.....	29.56				
XII	Minnesota.....	Sept. 29th, 4:35 p. m.....	29.36				

The local barometric ranges have been as follows: *Large Ranges*—Bismarck, 1.01; Breckenridge, 0.95; Boise City, 0.96; North Platte, 1.00. *Small Ranges*—Cambridge City, Tex., 0.31; Corsicana, 0.36; Pilot Point, 0.38; San Francisco, 0.34; Santa Fé, 0.29; Shreveport, 0.32; San Antonio, 0.37; Vicksburg, 0.33.

Areas of High Pressure.—In general but few high areas have been reported, and none of these presented cases of very high pressures.

No. I.—extended on the 1st, 2nd and 3rd from the Northwest slowly southeastward to the Gulf States, and thence eastward, reaching the South Atlantic coast on the 4th.

No. II.—covered British America on the 5th, and on the 6th had moved eastward to the St. Lawrence valley. On the 7th it moved southward over the Middle States and New England, producing high north-east winds on the coast, while the central highest pressure continued until the 9th to occupy the St. Lawrence valley, where the barometer fell on the 10th, and the highest pressure was transferred to the Middle Atlantic coast, where it remained, with slight variations, until the 13th.

No. III.—The pressure continued highest along the Atlantic coast from Florida to Newfoundland until the 16th, on which date an area of rising barometer and cool northerly winds extended rapidly southward from Oregon and Manitoba to California, Arizona and Kansas, apparently induced by the low barometer and cyclone that then prevailed in the Gulf of Mexico. The highest pressure was, on the 17th, 7:35 a. m. central in the Lower Missouri valley, and on the 18th, 7:35 a. m. central at St. Louis. The area now extended east and east-northeast, and on the 19th, 7:35 a. m., was central in Pennsylvania, and on the 20th, 7:35 a. m., was central off the Middle Atlantic coast. The path of this area of high pressure was to the northward of and parallel to the path of low barometer No. VI.

Nos. IV and V.—The three depressions that appear upon the map of September 21st, 7:35 a. m., were separated by an area of high pressure, then central over Lakes Huron and Michigan, which moved rapidly southeastward over Pennsylvania, and on the 23rd, 7:35 a. m., was central in the Middle Atlantic States, off which coast it remained until the 26th, 4:35 p. m., after which it was reinforced by high area No. V, which was then advancing directly southward over the St. Lawrence valley, and which was, on the 28th, still further reinforced, so that on the morning of that day almost the entire country was under a pressure exceeding 30.05, the highest, 30.35, being in Nova Scotia, and the whole acting as a feeder to the cyclones XI and XIII that were advancing from the Caribbean sea northward.

Areas of Low Pressure in General.—Of the barometric depressions recorded during September, six have been attended by violent winds, *i. e.*, Nos. II, VI, VII, IX, XI and XIII; the others have been characterized only by local winds, and have soon died away. Four severe storms have pursued their paths off our south and east coasts, and have not encroached upon the land so much as in the September of previous years. The other depressions have originated in the heated air of the Rocky Mountains; and of these No. II was the only one which advanced so far as the Atlantic ocean, where it soon became a severe storm.

Areas of Low Pressure.—No. I was central on the 1st in the lower St. Lawrence valley, and on the 2d over the Gulf of St. Lawrence, where it developed into a moderate storm; on the 3d, at 11 p. m., it was central over the northern part of the Gulf, and on the 4th was followed by westerly gales.

No. II.—This depression appears in the Northwest on the 4th, at 11 p. m.; it was, at 7 a. m. of the 5th, central in Illinois, whence it moved very slowly eastward, and was, at 7 a. m. of the 7th, central over the Chesapeake Bay. During the rest of the 7th it apparently moved eastward, and afterwards, during the 8th and 9th, northeastward; at 7 a. m. of the 10th, the centre was apparently east of Nova Scotia. During the 7th, 8th and 9th, heavy northeast gales prevailed along the Middle Atlantic and New England coasts, doing much damage, and was accompanied by high seas at Long Branch, Martha's Vineyard and other places. The schooner Addie Fuller, on the 9th off Hatteras, experienced a wind of 40 miles as measured by her anemometer.

No. III.—On the 7th a slight depression existed in New Mexico, while southeast winds prevailed in Texas. On the 8th this had developed into a trough of low pressure, extending from Texas to Montana, while the area of greatest deviation from the normal pressures for the month lay considerably to the northward. At 11 p. m. of the 8th and 7 a. m. of the 9th this trough is replaced by a well-defined area of low pressure, central in eastern Kansas and Nebraska. This depression now moved slowly eastward, reaching Ohio and Indiana at 7 a. m. of the 10th, and remained nearly stationary in this region until it disappeared at 11 p. m. of the 11th.

No. IV.—This depression was west of Manitoba at 4:35 p. m. of the 9th, and continued in the British Possessions until 11 p. m. of the 11th, where it was succeeded by northwest winds and rising barometer.

No. V.—This depression apparently began as the southern portion of the preceding one, and developed, during the 12th, in western Kansas and Nebraska, moved northward, and on the 13th, at 4:35 p. m., was central in Manitoba. It now extended slowly eastward, and on the 15th, at 4:35 p. m., had disappeared northeast of Lake Superior.

No. VI.—This severe storm first appeared on our tri-daily maps at 7:35 a. m., of the 16th. There had been a steady fall of pressure at all our Gulf stations from 11 p. m. of the 12th to 11 p. m. of the 15th; the

amount of this fall varied from 0.07 at Punta Rassa to 0.14 at Brownsville. The winds had been steady south-southeast and east, with clear or partly cloudy weather, except in the eastern portions occasional rains. The velocity of the winds had, however, increased from 4:35 to 11 p. m. instead of diminishing, in accordance with the normal diurnal changes, and at 7:35 a. m. of the 16th they had still further increased at Galveston and Indianola, and had backed to the northeast, with threatening and rainy weather. The fall of 0.06 in pressure at these stations, while it remained stationary at Brownsville and New Orleans, was additional evidence to indicate that the centre of the storm was approaching these stations. At this time the area of 29.80, or less, seems to have occupied the western third of the Gulf of Mexico, while the region of lowest pressure was still nearer to the Texas gulf. From 11 p. m. of the 15th to 11 p. m. of the 16th the barometer was stationary in Louisiana and the East Gulf States; it fell on the Texas coast, but fell and rose again at Brownsville. The central depression apparently moved northward from latitude 26° to latitude 28°, and thence northeast to latitude 29°, and at 11 p. m. of the 17th the lowest pressure was probably 29.50 or 55, and situated 100 miles east-southeast of Galveston. The following notes were reported by the Signal Service observer at Galveston: "An unusually high temperature prevailed for several days previous to the cyclone of 1875, and to the present one. On the 15th nothing unusual was noticed, except a faint lunar halo in the evening; later at night light, fleecy cirro-cumulus clouds came up from the south. The morning of the 16th opened with heavy fitful showers from the east, lasting at first but a quarter of a minute, but soon increased to a nearly continuous rain from the northeast. The peculiarities of the clouds were closely watched. At times they consisted of a uniform veil of stratus or nimbus, apparently calm; at other times of low cumulo-stratus-like scud, moving rapidly from the northeast; through rifts in the latter were frequently discernible a higher veil of stratus or cirro-stratus also apparently calm. This upper stratum was occasionally broken in places, disclosing spots of hazy sky. Increasing northeasterly winds and heavy rains continued throughout the day, with slowly but steadily diminishing pressure. The falling barometer would not have been considered worthy of notice but for the northerly winds and peculiar threatening aspect of the clouds. The tide was also rising slowly, and the gulf flecked with breakers and caps. At 7:50 p. m., Washington time, the display of cautionary signals was ordered; but the threatening weather had already been sufficient to warn the mariners, all of whom had made themselves as secure as possible. At 11 p. m., Washington time, the wind had increased to 24 miles; and about 1 a. m. of the 17th, on learning from Indianola that a velocity of 52 miles was prevailing there, the following series of observations was begun:

Date and Hour.	Barom. t. r.	Thermom.	Relative humidity.	Wind.	Velocity.	Weather.	Date and Hour.	Barom. t. r.	Thermom.	Relative humidity.	Wind.	Velocity.	Weather.
Sept. 16, 11:30 p. m.	29.72	78	85	NE	21	Light rain.	Sept. 17, 3:00 p. m.	29.50	72	100	NE	43	Light rain.
17, 12 Mid-n't.	29.70	79	100	NE	19	Light rain.	17, 3:30 p. m.	29.51	72	100	NE	40	Light rain.
17, 12:30 a. m.	29.67	79	100	NE	20	Light rain.	17, 4:00 p. m.	29.50	72	100	NE	41	Light rain.
17, 1:00 a. m.	29.68	79	100	NE	22	Heavy rain.	17, 4:30 p. m.	29.50	73	90	NE	48	Threatening.
17, 1:30 a. m.	29.67	78	100	NE	21	Light rain.	17, 5:00 p. m.	29.53	73	90	NE	48	Light rain.
17, 2:00 a. m.	29.65	79	100	NE	21	Light rain.	17, 5:30 p. m.	29.52	74	90	NE	48	Light rain.
17, 2:30 a. m.	29.64	79	100	NE	21	Light rain.	17, 6:00 p. m.	29.52	74	90	NE	50	Light rain.
17, 3:00 a. m.	29.63	79	100	NE	20	Light rain.	17, 6:30 p. m.	29.55	75	85	NNE	48	Threatening.
17, 3:30 a. m.	29.63	79	100	NE	23	Light rain.	17, 7:00 p. m.	29.57	75	85	NNE	48	Threatening.
17, 4:00 a. m.	29.61	79	100	NE	20	Light rain.	17, 7:30 p. m.	29.60	74	85	NNE	50	Threatening.
17, 4:30 a. m.	29.61	79	100	NE	21	Light rain.	17, 8:00 p. m.	29.62	74	90	NNE	48	Cloudy.
17, 5:00 a. m.	29.61	79	100	NE	24	Light rain.	17, 8:30 p. m.	29.62	74	90	NNE	48	Clearing.
17, 5:30 a. m.	29.60	79	100	NE	24	Light rain.	17, 9:00 p. m.	29.65	74	85	NNE	48	Threatening.
17, 6:00 a. m.	29.61	79	100	NE	24	Light rain.	17, 9:30 p. m.	29.67	73	90	NNE	48	Light rain.
17, 6:30 a. m.	29.62	78	100	NE	24	Light rain.	17, 10:00 p. m.	29.66	73	90	NNE	50	Light rain.
17, 7:00 a. m.	29.60	78	100	NE	21	Light rain.	17, 10:30 p. m.	29.66	73	90	NNE	50	Light rain.
17, 7:30 a. m.	29.62	75	100	NE	28	Heavy rain.	17, 11:00 p. m.	29.68	73	85	NNE	48	Threatening.
17, 8:00 a. m.	29.61	73	100	NE	27	Light rain.	17, 11:30 p. m.	29.69	73	81	N	44	Cloudy.
17, 8:30 a. m.	29.61	73	100	NE	28	Light rain.	17, 12 Mid-n't.	29.69	72	57	N	41	Threatening.
17, 9:00 a. m.	29.61	73	100	NE	30	Light rain.	18, 12:30 a. m.	29.69	71	90	N	40	Threatening.
17, 9:30 a. m.	29.57	73	100	NE	44	Heavy rain.	18, 1:00 a. m.	29.68	71	85	N	39	Cloudy.
17, 10:00 a. m.	29.56	73	100	NE	40	Heavy rain.	18, 1:30 a. m.	29.68	71	80	N	43	Cloudy.
17, 10:30 a. m.	29.54	73	100	NE	47	Light rain.	18, 2:00 a. m.	29.69	71	80	N	41	Cloudy.
17, 11:00 a. m.	29.53	73	100	NE	33	Light rain.	18, 2:30 a. m.	29.69	70	84	N	44	Cloudy.
17, 11:30 a. m.	29.52	72	100	NE	50	Light rain.	18, 3:00 a. m.	29.71	70	84	N	58	Cloudy.
17, 12 noon	29.49	72	100	NE	41	Light rain.	18, 3:30 a. m.	29.71	70	79	N	34	Cloudy.
17, 12:30 p. m.	29.49	71	100	NE	49	Light rain.	18, 4:00 a. m.	29.73	70	79	N	36	Cloudy.
17, 1:00 p. m.	29.48	71	100	NE	53	Light rain.	18, 4:30 a. m.	29.73	70	79	N	37	Cloudy.
17, 1:30 p. m.	29.49	72	100	NE	50	Light rain.	18, 5:00 a. m.	29.75	69	79	N	34	Cloudy.
17, 2:00 p. m.	29.49	72	100	NE	44	Light rain.	18, 5:30 a. m.	29.76	69	79	N	35	Cloudy.
17, 2:30 p. m.	29.48	72	100	NE	49	Light rain.	18, 6:00 a. m.	29.77	69	79	N	34	Cloudy.

It is believed that the anemometer would have registered higher but for the presence of a large building on the north side of this office, which has a tendency to deflect the (northerly) winds upwards and over the instrument. The only evidence of atmospheric electricity observed during the storm, consisted of a single faint glare of light at 2:35 a. m. on the 18th, visible for an instant in the northern portion of the heavens.

The damage done to property in Galveston and the vicinity is estimated at about \$100,000. Total rain-fall during storm, 8.76 inches. Highest velocity, 69 miles, on the 7th, 6:45 p. m. Average velocity of the wind 38.8 miles during 48½ hours. The log of the steamship State of Texas furnishes no additional items.

This storm-centre passed eastward along the Louisiana coast to the mouth of the Mississippi, thence eastward through the Gulf and South Atlantic States, until it was lost to our view on the 21st over the Gulf stream. The observer at Indianola reports as follows: 15th, tide rose 3 feet. 16th, strong wind and very high tide all day; rain showers in the morning and afternoon; many inhabitants left the town at 5 p. m. 17th, north wind all day, maximum 72 miles, lowest pressure 29.62, at 4 a. m.; tide had risen 10 ft. 6 in., and then fell 2 ft. 18th, strong north wind; cloudless day. Cautionary Signals ordered September 16th, 7:50 p. m., whereupon everyone left the city, which was subsequently flooded with the high tide. No great amount of damage reported.

New Orleans reports on the 16th light showers, and on the 17th heavy showers, with increasing winds. Cautionary Signal was displayed during the whole of the 17th, and vessels remained in harbor. On the 18th very heavy rain and wind exceeding 25 miles per hour throughout the day. Lowest pressure, 29.49 in., occurred on the 18th, 7 p. m. Heavy gale prevailed from the 18th, 9 p. m., to 19th, 3 a. m. Maximum wind velocity, northeast, 39 miles, occurred on the 19th.

The observer at Mobile reports signal displayed during the whole of the 17th. Wind exceeded 25 miles per hour, after 4:30 p. m., of 18th, and up to 11:15 a. m., of 19th. The maximum was 35 miles at 9:15 a. m. The barometer was lowest, 29.45, at 7 a. m., of 19th. Very heavy rain fell from 12:30 a. m., of 18th to 8 a. m., of 19th.

The observer at Montgomery, Ala., reports heavy rain and north to east winds throughout the 18th and 19th. On the 18th the upper stratum of clouds moved slowly from the southeast, while the lower stratum of scud moved rapidly from the northeast. The Black Warrior river rose 63 feet. The loss of crops was very heavy. Key West reports high seas and southwest winds on the 19th.

Tybee Island reports the Cautionary Signal ordered up, 7 p. m., of 18th. Very perfect solar halo visible throughout the day. Northeast gale began at 3 a. m., 19th, continuing until 11 p. m., highest velocity 38 miles. On the 20th, light showers all day, with very heavy sea. On the 21st, signal ordered down, but another gale set in, accompanied by intense zig-zag lightning and culminating in a velocity of 60 miles per hour at 4 a. m., of 22d. Severe northeast gales continued during the 23d, 24th, 25th, 26th and 27th. No vessels were able to go out and on the latter date sea captains reported a hurricane outside of harbor. (See No. XI.)

The steamship *Saragossa*, left Savannah on the 20th, for Baltimore, and returning reached Savannah on the 30th. Experienced northeast gales during the entire time, and especially on the 20th and 21st. On the 27th to 29th, off Cape Henry, the northeast winds were of hurricane violence. The gale of the 20th and 21st was related to the storm No. V; the hurricane of the 27th to 29th, accompanied low No. XI.

No. VII. While the preceding storm was moving eastward through the Gulf States a severe storm (No. VII.) was moving northward toward Nova Scotia, somewhat as shown by the dotted track given on chart No. I. Its nearest approach to the coast was apparently 11 p. m. of 21st. Of its previous history the only report that has as yet come to hand, is the loss of the Brig *Harley John* in lat. 30° 19', long. 56° 45', on Sept. 17th, during a hurricane from E. veering W.

No. XI.—This storm having every appearance of a cyclone, first appeared on our tri-daily maps on the 27th, at 4.35 p. m., east of Florida and moving slowly northward. It was preceded by heavy rain and northeast to southeast gales on the North Carolina coast. It was on the 28th, at 7.35 a. m., southeast of Wilmington, where heavy rain was reported, but no wind, owing to its sheltered location. The barometer had for the previous week been highest to the north of Cape Hatteras, and northeast winds increasing to gales, had prevailed along the South Atlantic coast ever since the disappearance of low barometer No. VI. Owing to its slow progress this storm was very severely felt from Cape Lookout to Cape Henry, where steady northeast gales and high seas continued. The U. S. Steamer Frolic reports experiencing a hurricane on the 22nd and 23rd on the routes between Curacao, Venezuela (latitude 12° N, longitude 69° W,) and Porto Rico. The storm-centre was probably then moving northwest and must be identical with the present No. XI. On the 24th the observers at Kingston and Santiago de Cuba reported every appearance of a hurricane at a distance to the northeast. On the 21st a cyclone was reported at St. Vincent and Grenada, (about 8° of longitude east of Curacao,) which therefore apparently extends the path of this cyclone back into the Atlantic ocean.

No. XIII.—This cyclone existed in the Caribbean sea on the 27th, and will be described in the October Review.

Storms at Sea.—The following notes have come to hand relative to storms experienced at sea: 2nd, lat. $40^{\circ} 10'$ N., lon. $70^{\circ} 42'$ W., heavy SW., squall; 7th, hurricane passed north of St. Thomas; gale off Kent Island Flats, Md.; 9th, lat. $49^{\circ} 34'$ N., lon. $37^{\circ} 38'$ W., NW., gale; 10th, lat. $49^{\circ} 50'$ N., lon. $38^{\circ} 43'$ W., strong gale, NE. to W. by N., high NW. sea; lat. $47^{\circ} 20'$ N., lon. $37^{\circ} 21'$ W., strong gale, NNW. to NNE., head sea; lat. $48^{\circ} 11'$, lon. $44^{\circ} 14'$, NNW. gale; 11th, lat. $49^{\circ} 34'$ N., lon. $24^{\circ} 33'$ WNW. gale; 11th, off Rough and Ready, Cal., strong northwest gale; 12th, lat. $49^{\circ} 18'$ N., lon. $18^{\circ} 39'$ W., fresh W. gale, heavy squalls and thick rain; lat. $49^{\circ} 44'$ N., lon. $6^{\circ} 54'$ W., fresh SW. gale; 13th, lat. $49^{\circ} 32'$ N., lon. $39^{\circ} 10'$ W., strong W. gale, very high sea; lat. $47^{\circ} 25'$ N., lon. $37^{\circ} 42'$ W., hard gale and high sea; lat. $49^{\circ} 18'$ N., lon. $22^{\circ} 19'$ W., fresh NNW. gale; lat. $50^{\circ} 18'$ N., lon. $13^{\circ} 28'$ W., fresh SW. gale; Mabow, C. B., gale during night. 14th, lat. $46^{\circ} 09'$ N., lon. $46^{\circ} 18'$ W., strong W. gale, very high sea; lat. $51^{\circ} 24'$ N., lon. $14^{\circ} 47'$ W., fresh SW. to NW. gales; lat. $50^{\circ} 06'$ N., lon. $28^{\circ} 39'$ W., SW. storms, high sea. 14th and 15th, lat. 44° N., lon. 54° W., gale. 17th, lat. $49^{\circ} 29'$ N., lon. $33^{\circ} 12'$ W., strong SW. gale. 16th and 17th, midnight, about lat. $26^{\circ} 0'$ N., lon. $64^{\circ} 30'$ W., hurricane. 17th, $30^{\circ} 19'$ N., lon. $56^{\circ} 45'$ W., hurricane from E. veering to W., with terrific sea, lasting 24 hours and moderating to SW. 17th, steamship State of Texas, lat. $27^{\circ} 50'$ N., lon. $89^{\circ} 56'$ W., fresh SW. gales and heavy seas. 18th, 2 a. m., steamship State of Texas encountered gale 360 miles from Galveston; noon, lat. $27^{\circ} 53'$ N., lon. $91^{\circ} 10'$ W., heavy SW. gales and seas; 4 p. m. wind hauled to north. On the 19th, lowest barometer was 29.65, about 160 miles SE. of Galveston. 18th and 19th, about lat. $26^{\circ} 0'$ N., lon. $64^{\circ} 30'$ W., hurricane from S. W.; 19th, lat. $49^{\circ} 09'$ N., lon. $31^{\circ} 04'$ W., SW. storm; 20th brig Woodcock, at Halifax, N. S., Sept. 23d, from Inagua, reports: 20th, midnight, on northern edge of Gulf Stream, severe E. N. E. gale, veering to N. W., lasting 48 hours; lat. 33° N., lon. 50° W., heavy S. S. W. gale, lasting 24 hours; 21st, Northwest Shoals, off coast of Massachusetts northerly gale; off Whitehaven, N. S., gale; St. Paul's Island, C. B., perfect hurricane, lasting 15 hours; Straits of Florida, violent gale; 22nd, Barbadoes and St. Vincent, NE. storms and hurricane; Steamer Alhambra, from Charlottetown to Halifax; September 23rd, off Nova Scotia, severe storm, steward washed overboard, boats smashed, also on the 22d, lat. $40^{\circ} 22'$ N., lon. $70^{\circ} 52'$ W., fresh NNW gale; lat. $41^{\circ} 21'$ N., lon. $66^{\circ} 16'$ W., fresh NNW gale; lat. $40^{\circ} 20'$ N., lon. $70^{\circ} 50'$ W., heavy NW gales and sea. 23d, lat. $43^{\circ} 13'$ N., lon. $57^{\circ} 08'$ W., heavy W. gale; lat. $42^{\circ} 15'$ N., lon. $58^{\circ} 19'$ W., fresh W. to NW. gale; lat. $49^{\circ} 19'$ N., lon. $42^{\circ} 08'$ W., heavy SSW. gale. 23d and 24th, lat. $36^{\circ} 59'$ N., lon. $74^{\circ} 50'$, heavy NE. gale. 24th, Mount Hope Bay, R. I., gale; lat. $46^{\circ} 48'$ N., lon. $39^{\circ} 49'$ W., fresh E. gale. 25th, lat. $45^{\circ} 38'$ N., lon. $41^{\circ} 56'$ W., severe N. gale, lasting 27 hours; lat. 49° N., lon. 17° W., heavy gale. 26th, lat. $45^{\circ} 36'$ N., lon. $50^{\circ} 35'$ W., fresh NE. gale. 28th, off Hog Island, heavy ESE. gale. 29th, off Cape Hatteras, cyclone from NE.

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INTRODUCTION.

The present REVIEW for the month of October depends upon official data received up to the 14th of November from the Canadian Meteorological Office; the United States Navy; the Army Post Surgeons; the Voluntary and Regular Observers of the United States Signal Service. The most interesting features of the month have been: *First*, The severe storms Nos. I and VII. *Second*, The general excess of rain-fall, especially, in the Gulf States. *Third*, The continuation of high temperatures and low pressures, except in Canada. *Fourth*, The very low water in the upper Ohio and Mississippi. *Fifth*, The heavy snows and early winter at Pike's Peak and other high stations in the Rocky Mountains. *Sixth*, Infrequency of thunder and lightning and auroras. *Seventh*, The absence of frosts and the remarkably mild autumn weather, allowing second crops to ripen in some localities. *Eighth*, Almost entire absence of solar spots.

BAROMETRIC PRESSURE.

In General.—The general distribution of atmospheric pressure for the month is shown by the isobars on map No. II, from which it appears that the area of highest pressure, or that included within the isobar of 30.05, covers the Middle and South Atlantic and interior of the Gulf States, and the area of lowest pressure is in the extreme Northwest. In the Octobers of 1873, 1874, 1875 and 1876, the highest mean pressure existed in the Lower Mississippi valley, but for October of this year it is found extending over eastern Tennessee and the Carolinas. On the average the pressures are below the normal in all sections, except in Canada and the northern portions of the Lake region and New England.

Barometric Ranges.—The general range of pressure (as reduced to sea-level,) is shown by the following table, which gives the highest and lowest pressures at the centres of high and low areas, and from which it appears that for the whole country a range of 1.42 inches has been recorded:

LOW AREAS.				HIGH AREAS.			
No.	Location.	Date	Minimum Pressure	No.	Location.	Date	Maximum Pressure
I	St. Lawrence valley.....	Oct. 1st, 7:35 a. m.....	29.73	I	Middle Atlantic coast.....	Oct. 1st, 7:35 a. m.....	30.25
II	Northern Florida.....	Oct. 3rd, 7:35 a. m.....	29.49	II	Gulf of St. Lawrence.....	Oct. 3rd, 7:35 a. m.....	30.27
III	Canada.....	Oct. 4th, 7:35 a. m.....	29.45	III	Cape Breton.....	Oct. 9th, 7:35 a. m.....	30.61
IV	Lake Huron.....	Oct. 8th, 4:35 p. m.....	29.63	IV	Eastern Tennessee.....	Oct. 9th, 7:35 a. m.....	30.24
V	Lake Huron.....	Oct. 10th, 4:35 p. m.....	29.66	V	East Tennessee & N. C.....	Oct. 15th, 7:35 a. m.....	30.40
VI	Kansas.....	Oct. 12th, 4:35 p. m.....	29.50	VI	Canada.....	Oct. 17th, 7:35 a. m.....	30.32
VII	Cape Breton.....	Oct. 22nd, 11 p. m.....	29.51	VII	Manitoba.....	Oct. 19th, 7:35 a. m.....	30.58
VIII	Dakota.....	Oct. 23rd, 4:35 p. m.....	29.44	VIII	North Carolina coast.....	Oct. 29th, 7:35 a. m.....	30.28
IX	Dakota.....	Oct. 25th, 4:35 p. m.....	29.31	IX	Oregon.....	Oct. 29th, 7:35 a. m.....	30.48
X	North Carolina coast.....	Oct. 26th, 11 p. m.....	29.61				
XI	St. Lawrence valley.....	Oct. 29th, 4:35 p. m.....	29.32				
XII	Canada.....	Oct. 31st, 7:35 a. m.....	29.65				

The local barometric ranges have been as follows: *Large Ranges*--Atlantic City, 1.22; Barnegat, 1.23; Bismarck, 1.27; Fort Whipple, 1.25; Washington, 1.21. *Small Ranges*--Brackettville, 0.65; Cheyenne, 0.52; Corsicana, 0.70; Denison, 0.69; Denver, 0.59; Eagle Pass, 0.65; Fort Gibson, 0.67; Fort Sill, 0.69; Galveston, 0.52; Indianola, 0.53; Key West, 0.35; La Crosse, 0.69; Memphis, 0.65; Mason, 0.65; Nashville, 0.70; Pikes Peak, 0.63; Red Bluff, 0.36; St. Paul, 0.68; Salt Lake City, 0.50; Santa Fé, 0.48; Shreveport, 0.61; Sacramento, 0.33; San Antonio, 0.53; Vicksburg, 0.70; Visalia, 0.36; Winnemucca, 0.45.

Areas of Low Pressure in General.—During the month of October twelve areas of low pressure existed within the limits of our stations, eleven of which followed the courses shown by the tracks on chart No. II. Seven of these originated or first appeared in the region between the Rocky Mountains and the Mississippi valley; three of which travelled eastward to the Atlantic, and three others after moving southward to the Mississippi valley, moved northeastward into Canada. Two (Nos. VII and X) possibly originated in the Southwest and moved northeastward. No. I was the Gulf cyclone. Three of them (Nos. I, VII and X) were accompanied by heavy rains and two (Nos. I and VII) by hurricane winds.

Areas of Low Pressure.—No. I.—From information subsequently received, it appears that the hurricane mentioned in the September Review as occurring at St. Vincent and Grenada on September 21st, and the cyclone of the 27th in the Caribbean Sea, relate to the same storm, whose track was about, approximately, as follows: On the 21st it passed over or near to Barbadoes, St. Vincent and Grenada. On the midnight of the 22-23rd it is reported to have passed about 250 miles south of Porto Rico. On the 23rd it passed over Buen Ayre and Curacao. The report of the United States Consul at the latter place states that the damage to property is estimated at \$2,000,000, and that the loss of life was undoubtedly large. In the city of Curacao the most solid buildings were swept down by the waves, and throughout the island planters suffered largely. Much damage to shipping is also reported. On the 25th the Bark Herald was wrecked at the mouth of Milk river, Jamaica, in a southwest hurricane, at which time the vortex was probably 200 miles distant in a SSW. direction. On September 27th and 28th Schooner Alice Vane, at Hog Island, on the coast of Honduras, experienced a hurricane, at which time the vortex was probably passing northwestward about midway between the Honduras coast and the west end of Cuba. (Two reports by the Schooners Wm. R. Knighton and Wm. Thompson, of hurricanes experienced by them on the 23rd, while they were in harbor, respectively, at Roatan and Bonacco, must refer, if there be no mistake, to a previous hurricane, possibly that numbered XI in the September Review.) The present cyclone was encountered by the Schooner Wm. Fisher on the 25th, while off Cap. San Antonio, Cuba, the wind being from SSE; she continued within the area of hurricane winds and completely in the power of the storm until the 4th of October, when she was stranded on Anclote Keys, lat. 28°, coast of Florida, by which time, as the track on chart No. I shows, the centre of lowest pressure had passed northward to Chesapeake Bay. On the 2nd, at 11 p. m., the vortex of the storm struck the coast of Florida, near St. Marks, whence it follows that its progress from the 28th to the 2nd had been very slow. Other reports of the storm have been received as follows: the steamship San Antonio, September 29th, 200 miles south of New Orleans, reports a northeast hurricane in the evening, and by the evening of the 30th wind had veered to east, but during the whole of October 1st again experienced a northeast hurricane; on October 2nd, 3. a. m., being about 150 miles south of New Orleans the wind backed to a violent hurricane from the Northwest; the lowest barometer, 29.15, occurred about 5 a. m. Steamship S. B. Souder, September 30th, about 20 miles north of Tortugas, reports barometer falling during the day, with a high southeast wind, apparently in the northeast section of a cyclone moving northwestward. Schooner Sarah Hall, (from Peasacola, September 26th, for Egmont Key Light.) reports at noon, September 30th, lat. 27° 37' N., long. 84° 17' W., expecting hurricane; at 6 p. m. hurricane commenced, wind ENE., with heavy rain, and continued until 4 a. m., October 1st, when wind moderated; at noon of the same day, lat. 27° 32' N., long. 84° 03' W. and at 5 p. m., terrific hurricane from south, continuing until October 3rd, noon, lat. 29° 22' N., long. 85° 14' W. Steamship Cochrane, (Cedar Key, October 1st for Key West,) reports, October 2nd to 4th, between Egmont Keys and Anclote Keys, heavy SW. cyclone; lowest barometer, 29.68. Schooner Georgietta reports struck a cyclone October 1st., lat. 26° 30' N., long. 84° W., off Egmont Key Light, wind ENE., gradually veering to WSW., blowing heavily until midnight of the 3rd. During the 1st and 2nd the observations at the Signal Service stations along the Gulf coast gave decided indications of the approaching cyclone, cloudy, threatening and rainy weather prevailing in the East Gulf and South Atlantic States, with brisk easterly winds veering to south and southwest in southern Florida; east and northeast winds from northern Florida to North Carolina, and northeast and north winds in Alabama and Mississippi. The Signal Service observer at St. Marks reports gale set in at 9:30 p. m., of the 2d, wind SE., heavy rain since morning. At 2 a. m., 3d, the tide rose above the level of the rain-gauge, up to which time over seven inches of rain had fallen since the morning of the 1st. The wind reached a velocity of 66 miles per hour at 5:15 a. m., of the 3rd, and the tide rose 12 feet above the mean; considerable damage was done throughout the adjacent country. Barometric readings were taken every fifteen minutes by the observer at St. Marks, and show a gradual decline until 6:15 a. m., of the 3rd, when the barometer read 29.17, the lowest reading recorded, wind SE.; after this the barometer gradually rose, the wind veering to SW. At Jacksonville, Fla., on the 2nd, the tide rose higher than it had been since the flood of 1871. During the 3d the storm passed northeastward over Georgia, the barometer reading 29.35 at 11 p. m., at Augusta, light rain and a calm prevailing. Heavy freshets were reported along the Altamaha and Savannah rivers, doing considerable damage to rice and cotton crops. Thence, during the night of the 3d and morning of the 4th, it passed over the Carolinas and Virginia, southeast gales prevailing along the coast, during which the Steamship Magnolia foundered off Cape Hatteras; the storm is reported as being terrific in the vicinity of Albemarle Sound, the attending floods carrying away

all bridges, and wharves, and seriously damaging crops there and along the James river. During the afternoon of the 4th it passed centrally northward across Chesapeake and Delaware bays, where several wrecks occurred. Bark Arcturas, off Delaware breakwater, on the 4th, reports SE. gale, veering at 8 p. m. to NNW. hurricane. From Maryland to Connecticut the rainfall was specially severe, and very serious damage was done throughout this section of the country. In southeastern Pennsylvania, northern New Jersey and along the Hudson river, passenger trains were wrecked by washouts, resulting in great loss of life and damage to property. On Long Island and in the Sound the storm was also very severe, several wrecks occurring, among which may be mentioned the Steamer Massachusetts, which went ashore shortly after midnight, on the 4th, about five miles east of Horton's Point on the north shore of Long Island. On the morning of the 5th the storm centre was probably about two degrees southeast of Cape Cod, and at midnight of the 5th, four or five degrees southeast of Cape Breton.

Storms at Sea.—The following notes have come to hand relative to storms at sea: On the 1st, hurricane at $27^{\circ} 32' N.$ and $84^{\circ} 3' W.$; also, $26^{\circ} 30' N.$ and $84^{\circ} W.$ 2d, hurricane, $29^{\circ} 22' N.$ and $84^{\circ} 14' W.$; gale, $49^{\circ} 11' N.$ and $37^{\circ} 48' W.$ 3d, gale, $53^{\circ} 23' N.$ and $30^{\circ} 03' W.$; terrific gale at $34^{\circ} 53' N.$ and $56^{\circ} 30' W.$ 4th, violent gale, $40^{\circ} 27' N.$ and $69^{\circ} 43' W.$; hurricane at $44^{\circ} 30' N.$ and $69^{\circ} 20' W.$; gale, $51^{\circ} 45' N.$ and $34^{\circ} 50' W.$ 5th, gale, $35^{\circ} 40' N.$ and $69^{\circ} W.$; 6th, storm, $40^{\circ} 32' N.$ and $69^{\circ} 20' W.$ 7th, gale, $42^{\circ} N.$ and $58^{\circ} 05' W.$ 8th, gale, $41^{\circ} 36' N.$ and $61^{\circ} 10' W.$ 12th, gale, $47^{\circ} N.$ and $46^{\circ} 55' W.$ 14th, hurricane off Irish coast. 15th, gale, $55^{\circ} 29' N.$ and $11^{\circ} 20' W.$ 17th, gale, $33^{\circ} 30' N.$ and $50^{\circ} 57' W.$; hurricane, $39^{\circ} 14' N.$ and $56^{\circ} 8' W.$ 19th, gale, $51^{\circ} 32' N.$ and $40^{\circ} 36' W.$ 20th, violent storm, $45^{\circ} 14' N.$ and $39^{\circ} 17' W.$ 21st, gale, $48^{\circ} 08' N.$ and $34^{\circ} 10' W.$ 22d, gale, $47^{\circ} 29' N.$ and $39^{\circ} 31' W.$ 24th, strong gale, $47^{\circ} 54' N.$ and $45^{\circ} 06' W.$; gale, $48^{\circ} 38' N.$ and $45^{\circ} 30' W.$ 25th, hurricane, $49^{\circ} 38' N.$ and $39^{\circ} 42' W.$; furious gale, $48^{\circ} 35' N.$ and $28^{\circ} 40' W.$ 27th, furious gale, $48^{\circ} 09' N.$ and $24^{\circ} W.$ 28th, furious gale, $48^{\circ} 04' N.$ and $36^{\circ} 10' W.$ 29th, heavy gale, $49^{\circ} 31' N.$ and $35^{\circ} 26' W.$ 31st, strong gale, $47^{\circ} 44' N.$ and $43^{\circ} 46' W.$

MONTHLY WEATHER REVIEW,

NOVEMBER, 1877.

WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTION.

The present REVIEW for the month of November depends upon all official data received up to the 15th of December from the Canadian Meteorological Office; the United States Navy; the Army Post Surgeons; the Voluntary and Regular Observers of the United States Signal Service. The most interesting features of the month have been: *First*, The three severe storms that occurred the first nine days of the month. *Second*, The excess in pressure in the Middle States, Lower Lake region and New England. *Third*, The general excess of rain-fall, except in the Northwest. *Fourth*, The general continuation of high temperature, except in the Gulf States. *Fifth*, The unusually large number of Cautionary Signals displayed. *Sixth*, The unusually large number of earthquakes.

BAROMETRIC PRESSURE.

In General.—The general distribution of atmospheric pressure for the month is shown by the isobars on chart No. II, from which it appears that the area of highest pressure, or that included within the isobar of 30.10, includes the Gulf, South Atlantic and Middle Atlantic States. The area of lowest pressure on the chart lies in Dakota. The general distribution of pressure agrees very nearly with the mean since 1872, with the exception of a marked excess in the Middle and New England States. The pressure on the Pacific coast has been about the mean.

Barometric Ranges.—The general range of pressure (as reduced to sea-level) is shown by the following table, which gives the highest and lowest pressures at the centre of high and low areas respectively, and from which it will appear that for the whole country a range of 1.76 inches has been recorded:

LOW AREAS.				HIGH AREAS.			
No.	Location.	Date.	Minimum Pressure.	No.	Location.	Date.	Maximum Pressure.
I	Father Point.....	Nov. 3rd, 7:35 a. m.....	28.92	I	Nova Scotia.....	Nov. 2nd, 7:35 a. m.....	30.15
II	St. Paul.....	Nov. 1st, 11 p. m.....	29.50	II	Middle States.....	Nov. 4th, 7:35 a. m.....	30.43
III	Cape Breton.....	Nov. 6th, 4:35 p. m.....	29.48	III	Lower Missouri valley.....	Nov. 5th, 7:35 a. m.....	30.62
IV	Bismarck.....	Nov. 6th, 11 p. m.....	29.50	IV	Indian Territory.....	Nov. 10th, 7:35 a. m.....	30.60
V	Toledo and Detroit.....	Nov. 8th, 4:35 p. m.....	29.47	V	New England.....	Nov. 20th, 11 p. m.....	30.68
VI	Parry Sound.....	Nov. 16th, 4:35 p. m.....	29.82	VI	Indian Territory.....	Nov. 29th, 11 p. m.....	30.59
VII	Cape Breton.....	Nov. 19th, 7:35 a. m.....	29.33				
VIII	Lynchburg.....	Nov. 23rd, 11 p. m.....	29.63				
IX	Bismarck.....	Nov. 20th, 4:35 p. m.....	29.55				
X	Bismarck.....	Nov. 23rd, 4:35 p. m.....	29.31				
XI	Escanaba.....	Nov. 27th, 4:35 p. m.....	29.22				
XII	Halifax.....	Nov. 29th, 11 p. m.....	29.11				

The *local barometric ranges* have been as follows: *Large Ranges.*—Albany, 1.51; Burlington, 1.54; New Haven and Eastport, 1.46; Rochester, 1.44; Buffalo, 1.45; Boston, 1.42. *Small Ranges.*—Sacramento, 0.52; Santa Fe, 0.51; San Francisco, 0.56; Los Angeles, 0.45; Denver, 0.66; Jacksonville, 0.61.

No. XII.—This is probably the storm reported by the Princess Beatrice as being near the Leeward Islands on the 23rd, 24th and 25th. On the afternoon of the 28th, in the South Atlantic States, there was a decided fall of pressure, and this fall taken in connection with the wind directions on that coast indicated a storm centre of considerable energy in or near the Gulf Stream and east of Florida. The fall of the barometer, and the backing of the wind along the Atlantic coast, shows that on the 28th and 29th this storm pursued a track slightly to the east of north until it is found at midnight of the 29th, central near Halifax. The next day it disappeared beyond Nova Scotia.

INTERNATIONAL METEOROLOGY.

Storms at Sea.—The following notes of storms have come to hand: 13th, $26^{\circ} 22' N.$, $58^{\circ} 55' W.$; hurricane 15th, $27^{\circ} 02' N.$ $81^{\circ} W.$, hurricane lasting until 7 a. m. of the 16th. 16th, $27^{\circ} N.$ $52^{\circ} W.$; hurricane. 22d, Haitou Island, Formosa Channel, China; typhoon. 28th, N. E. to S. E. hurricane, $34^{\circ} 02' N.$ $76^{\circ} 20' W.$ 6th off Cape Finisterre, S. W. hurricane. Nov. 2d, W. hurricane $50^{\circ} 05' N.$, $20^{\circ} 45' W.$ 6th, terrific northwest to southeast gale, $41^{\circ} N.$ $04^{\circ} W.$; northwest hurricane, $49^{\circ} 02' N.$ $32^{\circ} 01' W.$; hurricane $49^{\circ} 33' N.$ $36^{\circ} 47' W.$; violent gales with hurricane squalls, $49^{\circ} 15' N.$ $39^{\circ} 02' W.$; $47^{\circ} 21' N.$ $43^{\circ} 34' W.$; $46^{\circ} 23' N.$ $35^{\circ} 18' W.$; $47^{\circ} 45' N.$ $33^{\circ} 35' W.$; $49^{\circ} 38' N.$ $39^{\circ} 53' W.$ 9th, violent gales with hurricane squalls, $49^{\circ} 04' N.$ $29^{\circ} 48' W.$; $47^{\circ} 19' N.$ $33^{\circ} 38' W.$; $49^{\circ} 18' N.$ $41^{\circ} 19' W.$ 10th, hurricanes; $46^{\circ} 56' N.$ $43^{\circ} 19' W.$; $49^{\circ} 33' N.$ $22^{\circ} 82' W.$; $48^{\circ} 28' N.$ $33^{\circ} 28' W.$; gales, with hurricane squalls, $49^{\circ} 14' N.$ $25^{\circ} 37' W.$; $47^{\circ} 43' N.$ $36^{\circ} 10' W.$; $54^{\circ} 36' N.$ $30^{\circ} 08' W.$; $49^{\circ} 50' N.$ $16^{\circ} 41' W.$; $50^{\circ} 45' N.$ $19^{\circ} 42' W.$; (fire ball exploded close to ship with loud report); $43^{\circ} N.$ $26^{\circ} W.$ 12th, hurricane, $37^{\circ} 30' N.$ $18^{\circ} 40' W.$ 22nd, British Isles, gales, high tides and floods. 25th, British Isles, strong NE gale and floods.