

# MONTHLY WEATHER REVIEW.

Acting Editor: ALFRED J. HENRY.

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## INTRODUCTION.

The REVIEW for March, 1896, is based on 2,726 reports from stations occupied by regular and voluntary observers, classified as follows: 149 from Weather Bureau stations; 33 from U. S. Army post surgeons; 2,404 from voluntary observers; 32 from Canadian stations; 1 from Hawaii; 96 received through the Southern Pacific Railway Company; 11 from U. S. Life-Saving stations. International simultaneous observations are received from a few stations and used together with trustworthy newspaper extracts and special reports.

The WEATHER REVIEW is prepared under the general edi-

torial supervision of Prof. Cleveland Abbe. Unless otherwise specifically noted, the text is written by the Editor, but the statistical tables are furnished by Mr. A. J. Henry, Chief of the Division of Records and Meteorological Data, who has also acted as Editor during the present month. Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada, Mr. Curtis J. Lyons, Meteorologist to the Government Survey, Honolulu, and of Dr. Mariano Bárcena, Director of the Central Meteorological Observatory of Mexico.

## CLIMATOLOGY OF THE MONTH.

### GENERAL CHARACTERISTICS.

The month of March was characterized by an excess of pressure and a deficiency of temperature over the interior of the country. The precipitation was above the normal in New England and the southern Pacific Slope, and especially so in North Dakota and the northern Slope. It was below the normal in the South Atlantic States, and especially so in the southern Pacific Slope Region. Severe rainstorms prevailed in New England and central New York in the early part of the month, followed by heavy floods in the rivers.

### ATMOSPHERIC PRESSURE.

[In inches and hundredths.]

The distribution of mean atmospheric pressure reduced to sea level, as shown by mercurial barometers, not reduced to standard gravity, and as determined from observations taken daily at 8 a. m. and 8 p. m. (seventy-fifth meridian time), is shown by isobars on Chart IV. That portion of the reduction to standard gravity that depends on latitude is shown by the numbers printed on the right-hand border.

The mean pressures during the current month were high over a ridge extending from Athabasca and Manitoba southeastward to Georgia. The highest were: Helena, 30.15; Bismarck, 30.14; North Platte, Mobile, Atlanta, Savannah, and Charleston, 30.13. The mean pressures were low in Arizona, and lowest in the Gulf of St. Lawrence. The lowest were: Charlestown, 29.81; Chatham, 29.82; Eastport and Yarmouth, 29.83; Sydney, 29.84; Father Point, 29.85; Portland, Me., 29.86.

As compared with the normal for March, the mean pressure was in excess over the lower Lakes, the Mississippi, and the South Atlantic States. It was deficient in New Brunswick, southern California, and Arizona. The greatest excesses were: Toledo, 0.08; Indianapolis, 0.07; St. Johns, N. F., Buffalo, Erie, Detroit, Columbus, Ohio, Cincinnati, Spokane, and Charleston, 0.06. The greatest deficits were: Nantucket, 0.10;

Chatham, 0.08; Quebec and Portland, Me., 0.06; Father Point, Yarmouth, Yuma, and San Diego, 0.05.

As compared with the preceding month of February, the pressures reduced to sea level show a decided rise throughout the Mississippi and Missouri valleys, Alberta, and eastward to the Atlantic; but a decided fall on the Pacific Coast and Rocky Mountain Plateau. The greatest rises were: St. Johns, N. F., 0.28; White River and Saugeen, 0.19; Alpena, 0.18; Sault Ste. Marie and Toronto, 0.17; Port Stanley, Parry Sound, Buffalo, and Marquette, 0.16. The greatest falls were: Roseburg, 0.18; Salt Lake City and Eureka, 0.17; Winnemucca and Carson City, 0.16; Redbluff and Elpaso, 0.14.

### AREAS OF HIGH AND LOW PRESSURE.

By Prof. H. A. HAZEN.

During the month eight highs and ten lows have been definitely outlined on Charts I and II. The principal facts regarding the origin and disappearance, the continuance and velocity of these highs and lows are given in the accompanying table. While we speak of the motion of these highs and lows as of definite traveling conditions in the atmosphere, it should be noted that in no sense are we to suppose that there is a transport of columns or of masses of air from one region to another. It is well known that the velocity of the current increases markedly as one rises in the atmosphere and at about 6,000 feet, this velocity is about double that at the earth's surface. Moreover, it is also known that the direction of the current at 6,000 feet is often at right angles to the trajectory of the high or low. The cause of the apparent motion of highs and lows as they appear on our weather maps, has never been ascertained, but it is becoming quite common now to regard these conditions as in the nature of enormous waves in the atmosphere in which there is no motion of the air bodily in any direction. The following is a short description of the highs and lows noted during the month:

HIGH AREAS.

I.—First noted to the north of Montana a. m. of the 1st. Its motion was east-southeast, and it was last noted off the middle Atlantic Coast p. m. of the 6th.

II.—Like the last, was first noted to the north of Montana a. m. of the 5th. Its motion was southeast, and it reached the south Atlantic Coast p. m. of the 9th.

III.—This was the only high of the month that originated off the Pacific Coast. First noted a. m. of the 9th. It had a very slow motion eastward, and was last noted in the middle Plateau Region a. m. of the 11th.

IV.—First noted in Manitoba a. m. of the 10th. Its motion was at first south of east, and then north of east. It was last noted in the Gulf of St. Lawrence a. m. of the 16th.

V.—First noted to the north of Montana a. m. of the 13th. Its motion was first south-southeast, reaching Texas a. m. of the 16th; thence it moved northeast, disappearing off Nova Scotia a. m. of the 19th.

VI.—First noted in Montana p. m. of the 16th. Its motion was southeastward, and it was last seen off the south Atlantic Coast a. m. of the 22d.

VII.—Was first noted to the north of Montana a. m. of the 21st. Its motion was a little south of east, and it was last noted off the Massachusetts coast a. m. of the 25th. The severest cold wave of the month accompanied this high. A temperature fall of 42° in twenty-four hours was reported from Williston, p. m. of the 21st.

VIII.—First noted to the north of Montana a. m. of the 25th. This was the fifth high of the month that came from this region. The motion, at first a little southeast, turned to north of east, and it was last noted in the Gulf of St. Lawrence a. m. of the 30th.

LOW AREAS.

I.—This storm is a continuation of No. XIV of the February REVIEW. While its velocity in February was over 32 miles per hour, in this month it was but a little above 8 miles. This slowing up was due, in part, to an obstruction from a nearly stationary high over Newfoundland. The path from New York a. m. of the 1st, was a little east of north, and it was last noted a. m. of the 5th off Nova Scotia.

II.—Began a. m. of the 2d, off the middle Pacific Coast. Its path was a little north of east, and it was last noted over Newfoundland a. m. of the 9th.

III.—First noted off the north Pacific Coast, a. m. of the 5th. Its motion was east-southeast, and it was last noted p. m. of the 10th in Virginia.

IV.—This storm gave rise to Storm Bulletin No. 2 of 1896, and many important facts may be gleaned from that. It was first noted in south Texas a. m. of the 10th, where the lowest pressure was 29.78 inches. It developed very rapidly in intensity and moved with a velocity of over 40 miles per hour. In thirty-six hours the pressure at the center had fallen to 29.01, and the next morning there was a still farther fall to 28.90. The path was toward the northeast, and it was last noted on the Gulf of St. Lawrence p. m. of the 12th. Very heavy rains accompanied this storm. On the morning of the 11th, 3.20 inches had fallen at New Orleans and 5.08 at Pensacola in twenty-four hours. A wind of 72 miles per hour was reported from Block Island p. m. of the 11th.

V.—First noted in the southern Plateau Region a. m. of the 13th. Its path was first east, reaching the Mississippi Valley p. m. of the 15th; thence it moved northeast, disappearing in the Gulf of St. Lawrence p. m. of the 17th.

VI.—This storm originated to the north of Montana p. m. of the 15th. The path was first in a southeast direction, reaching Louisiana a. m. of the 18th; thence the direction was northeast, and it was last seen in the Gulf of St. Lawrence a. m. of the 21st. A rainfall of 3.52 inches was reported from

New Orleans p. m. of the 18th, and a wind velocity of 68 miles from New York p. m. of the 19th. This storm also gave rise to a special Storm Bulletin, No. 3, which gives many additional facts.

VII.—Was first noted to the north of Montana a. m. of the 19th. Its path was eastward, and it was last seen over Newfoundland p. m. of the 22d.

VIII.—Like the last two this storm was first noted to the north of Montana p. m. of the 23d. The path was eastward, disappearing in the Gulf of St. Lawrence p. m. of the 27th.

IX.—First noted to the north of Montana p. m. of the 25th. It had a very slow motion a little south of east, and disappeared to the north of Lake Superior p. m. of the 29th.

X.—First noted in north Montana a. m. of the 30th. It moved southeast and was central in Iowa p. m. of the 31st. Its further course will be described in the April REVIEW.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Length.	Duration.	Daily.	Hourly.
<b>High areas.</b>							<i>Miles.</i>	<i>Days.</i>	<i>Miles.</i>	<i>Miles.</i>
I.....	1, a. m.	54	116	6, p. m.	37	74	2,890	5.5	525	21.9
II.....	5, a. m.	51	115	9, p. m.	29	79	2,440	4.5	541	22.5
III.....	8, p. m.	43	125	11, a. m.	41	111	970	2.5	388	16.2
IV.....	10, a. m.	53	105	16, a. m.	47	60	3,300	6.0	550	22.9
V.....	13, a. m.	52	117	19, a. m.	46	59	4,050	6.0	675	28.1
VI.....	16, p. m.	48	112	22, a. m.	32	77	2,920	5.5	530	22.1
VII.....	21, a. m.	53	109	25, a. m.	41	69	2,480	4.0	620	25.8
VIII.....	25, a. m.	53	108	30, a. m.	46	59	3,410	5.0	683	28.5
Sums.....							22,460	39.0	4,512	18.80
Mean of 8 paths.....									564	23.5
Mean of 39 days.....									576	24.0
<b>Low areas.</b>										
I.....	1, a. m.	43	75	5, a. m.	45	60	800	4.0	199	8.3
II.....	2, a. m.	42	125	9, a. m.	48	56	4,090	7.0	576	24.0
III.....	5, a. m.	48	128	10, p. m.	38	79	2,960	5.5	539	22.5
IV.....	10, a. m.	27	99	12, p. m.	48	64	2,430	2.5	972	40.5
V.....	13, a. m.	37	111	17, p. m.	47	59	3,360	4.5	747	31.1
VI.....	15, p. m.	52	115	21, a. m.	49	60	4,130	5.5	751	31.3
VII.....	19, a. m.	53	116	22, p. m.	47	55	2,810	3.5	804	33.5
VIII.....	23, p. m.	52	113	27, p. m.	50	63	3,100	4.0	774	32.3
IX.....	25, p. m.	53	114	29, p. m.	50	85	1,830	4.0	459	19.1
X.....	30, a. m.	49	109	31, p. m.	42	92	1,310	1.5	872	36.3
Sums.....							26,760	42.0	.....	.....
Mean of 10 paths.....									669.3	27.9
Mean of 42 days.....									637.1	28.5

LOCAL STORMS.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

Atmospheric conditions favorable to the development of local storms obtained on the 18th, 28th, and 29th. On the first-named date three small frame houses and one frame church were demolished by the wind at Baton Rouge, La. Earlier in the day a schoolhouse was overturned and four dwellings were wrecked near Beaumont, Tex. Several people were injured, but no lives were lost.

On the 28th severe local storms were reported from Alton, Ill., near Westalton, St. Charles County, Mo., and Oregon, Ill. Some tornado characteristics were present, especially at Oregon, Ill. No lives were lost, and the property loss was comparatively small, \$6,000.

On the next day a severe storm was reported in the vicinity of Rural Retreat, Va. One life was lost, and the loss to standing timber, fences, and buildings was estimated at \$10,000.

The casualties during the month due to violent storms, lightning, and floods, were as follows: Violent storms, 1; lightning, 5; drowning, 8.

TEMPERATURE OF THE AIR.

[In degrees Fahrenheit.]

The mean temperature is given for each station in Table