

of the West continued covered with snow throughout the month, which necessitated much feeding of stock.

At the close of the month the prospective water supply from the snow in the western mountain districts continued good in most central and northern districts, where large amounts of well-packed snow had accumulated. However, in New Mexico and portions of some adjoining States the accumulated depths of snow were below the averages, and the outlook for water was less promising.

RELATIVE HUMIDITY.

The relative humidity for the month as a whole was generally above the normal in the Rocky Mountain region and to the westward, also to the eastward in much of the northern third of the country. On the other hand the atmosphere was drier than usual for the season over most of the central and southern portions of the Rocky Mountains.

GENERAL SUMMARY.

The cold wave during the first few days of the month did much damage to truck crops in the Gulf and South Atlantic States, and also to peach buds in the Ozark district, in Arkansas, as well as in the Lakes Region and parts of the Ohio Valley. Much grape fruit was injured in the Southern States, and probably 50 per cent of the pineapples were destroyed in Florida. Citrus trees in northern and central Florida were defoliated, and the fruit was frozen on the trees, while many young trees were killed to the bank, but no general damage resulted in the southern part of the State.

The planting of corn, cotton, and sugar cane in portions of Florida, southern Texas, and the lower Mississippi Valley, and the replanting of truck crops in the Gulf and South Atlantic States made good progress under the warm and favorable weather during the latter part of the month, although it was too dry in much of Florida and too wet in some other Southeastern States for rapid advancement.

Winter wheat was considerably damaged from the Ohio Valley eastward because of the absence of snow cover, and there was a decided lack of moisture from the central and lower Missouri Valley southwestward to northern Texas, where the growth was poor. However, the northern part of the winter-wheat belt had a good snow cover and there was little or no damage. The crop was benefited by rain in California, but the condition was unsatisfactory in Washington.

Cold weather and snow caused some loss of stock in the Dakotas, Montana, Wyoming, and Utah, but stock was in good condition in Colorado, Idaho, and California. The conditions were favorable for ice harvest in all northern and central districts, and a plentiful supply was available for storage.

SEVERE LOCAL STORMS.

The following notes of severe storms have been extracted from reports from officials of the Weather Bureau:

*California.*—A storm of marked intensity prevailed over the entire State on February 24 and 25, 1917, and was accompanied by torrential rains and destructive winds, being most severe along the immediate coast. At Point Reyes Light a maximum wind velocity of 101 miles an hour was recorded, and at San Francisco windows and telephone wires were broken. At San Jose the storm was the indirect cause of the loss of three lives and

an extraordinary amount of damage resulted from the wind and water, while at San Diego several buildings were unroofed. Railroad transportation was delayed by the excessive precipitation causing snowslides in the high Sierra and landslides in the Coast Range. At Helen Mine, Lake County, the total precipitation for the three days, February 23 to 25, amounted to 16.73 inches, and of this amount 10.35 inches fell within a period of 24 hours.

*Alabama.*—On the afternoon of February 23, 1917, tornadoes and severe local storms occurred at numerous places throughout central Alabama, doing considerable damage to property and killing several people. One of the most severe of the tornadoes originated about 1 p. m. near Whitsitt, Hale County, and passed north-northeastward over Rosemary and thence northeastward over the northwestern portion of Perry County, killing six persons. Another destructive tornado, moving northeastward, struck Stewartsville, Coosa County, and Hollins, Clay County, about 3:30 p. m. of the same day, killing 10 persons. The paths of these storms ranged from two or three hundred feet to nearly a mile in width.

Average accumulated departures for February, 1917.

Districts.	Temperature.			Precipitation.			Cloudiness.		Relative humidity.	
	General mean for the current month.	Departure for the current month.	Accumulated departure since Jan. 1.	General mean for the current month.	Departure for the current month.	Accumulated departure since Jan. 1.	General mean for the current month.	Departure from the normal.	General mean for the current month.	Departure from the normal.
	° F.	° F.	° F.	In.	In.	In.	0-10.	P. ct.		
New England.....	21.5	-4.2	-3.3	2.40	-1.10	-1.40	5.7	+0.3	73	-1
Middle Atlantic.....	30.3	-2.6	-0.1	1.99	-1.20	-1.50	6.0	+0.5	68	-5
South Atlantic.....	47.1	-0.7	+4.9	2.49	-1.50	-2.30	4.6	-0.6	71	-4
Florida Peninsula.....	65.2	-1.6	+3.3	0.40	-1.60	-4.00	2.9	-1.3	74	-6
East Gulf.....	51.0	+0.2	+6.3	4.93	+0.20	+0.70	4.9	-0.6	71	-4
West Gulf.....	51.6	+2.2	+6.4	1.27	-1.40	-2.90	4.6	-0.3	67	-7
Ohio Valley and Tennessee.....	32.4	-3.2	-0.4	2.17	-1.40	+0.10	6.3	+0.1	71	-4
Lower Lakes.....	19.0	-5.7	-5.9	1.39	-1.10	-1.10	6.9	+0.1	80	0
Upper Lakes.....	10.5	-8.7	-10.9	0.89	-0.90	-1.60	5.9	-0.4	83	+2
North Dakota.....	-0.6	-7.6	-9.6	0.66	+0.10	+0.10	5.3	+0.8	86	+5
Upper Mississippi Valley.....	18.1	-5.5	-6.4	0.48	-1.20	-1.40	5.4	+0.1	75	-4
Missouri Valley.....	21.9	-2.5	+0.5	2.68	-0.80	-0.80	4.8	-0.4	72	-4
Northern slope.....	19.4	-2.1	-3.8	1.04	+0.20	+0.10	6.5	+1.3	73	0
Middle slope.....	33.8	+1.4	+4.2	0.32	-0.40	-0.80	4.3	-0.2	59	-8
Southern slope.....	47.6	+3.0	+5.3	0.40	-0.50	-0.80	3.6	-0.9	45	-17
Southern Plateau.....	43.5	-1.3	-4.1	0.35	-0.30	-0.20	3.1	-0.5	52	+4
Middle Plateau.....	28.7	-4.3	-16.0	0.80	-0.30	-0.70	5.0	-0.2	70	+3
Northern Plateau.....	30.5	-1.6	-5.4	1.28	-0.10	-0.70	7.8	+1.4	77	+2
North Pacific.....	40.3	-1.0	-2.2	3.86	-1.40	-4.10	5.1	+0.9	75	-7
Middle Pacific.....	48.7	-0.3	-3.5	4.68	+0.40	-1.80	8.1	-0.5	71	-6
South Pacific.....	53.3	+0.7	-1.7	3.60	+1.20	+0.90	4.4	0.0	70	-1

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WEATHER CONDITIONS ON THE NORTH ATLANTIC DURING FEBRUARY, 1916.

The data presented are for February, 1916, and comparison and study of the same should be in connection with those appearing in the REVIEW for that month. Chart IX (xiv-18) shows for February, 1916, the averages of pressure, temperature, and the prevailing direction of the wind at 7 a. m., 75th meridian time (Greenwich mean noon), together with notes on the locations and courses of the more severe storms of the month.

## PRESSURE.

The distribution of the average monthly pressure, as shown on Chart IX, was unusual in some respects. The North Atlantic HIGH was central over the Azores, with a crest of 30.40 inches, somewhat higher than usual, while the Icelandic LOW was apparently near the normal in both intensity and position. The continental HIGH was too far west to exert much influence in the vicinity of the North American coast, where the average pressure varied from 29.9 inches, in the north, to 30.2 inches, near the central Gulf coast, which closely approximated the conditions as shown on the normal chart.

The lowest average barometric pressure for any 5-degree square was 29.61 inches, between latitudes 55°-60° and longitudes 5°-10° W., where the lowest individual reading was 28.76 inches on the 4th and the highest 30.50 inches on the 23d. The highest average pressure was 30.40 inches, in the square that includes the Azores, the lowest reading being 29.90 inches on the 23d and the highest 30.72 inches on the 8th. As the average pressure over the eastern part of the ocean, south of the 40th parallel, was slightly above the normal the gradients toward the higher latitudes were steeper than usual, while over the western divisions they were practically normal. Over the northern regions the pressure was considerably lower during the first decade of the month than during the second, while the mean for the last 9 days was higher. In the 5-degree square adjacent to the west coast of Scotland, where the lowest average monthly pressure occurred, the mean for the first decade was 29.32 inches; for the second, 29.47 inches; and for the last 9 days, 30.09 inches; the monthly average being 29.61 inches. In the square between latitudes 50°-55° and longitudes 25°-30°, the average for the first decade was 29.64 inches; for the second, 29.84 inches; for the last 9 days, 30.12 inches; and the monthly average, 29.86 inches. In the square between latitudes 35°-40° and longitudes 25°-30°, the figures were as follows: First decade, 30.44 inches; second, 30.58 inches; last 9 days, 30.15 inches; and the monthly average, 30.40 inches. In the square between latitudes 40°-45°, longitudes 65°-70°, they were: First decade, 30.07 inches; second, 29.99 inches; last 9 days, 29.71 inches; and monthly average, 29.93 inches. In southern waters there was, as usual, comparatively little change in the pressure during the month, although in the Gulf of Mexico the average for the last 9 days was somewhat below that for the first two decades.

## GALES.

Gales were more frequent than usual over the steamer routes, although no winds of exceptionally high velocity were reported during the month. The greatest number of gales was encountered in the 5-degree square between latitudes 45°-50°, and longitudes 35°-40°, where they occurred on 14 days, a percentage of 48, while the normal percentage for that locality is 29. Eight of these gales occurred in the first decade, 5 in the second, and only 1 in the last 9 days. East of the 40th meridian in the vicinity of the steamer routes, nearly all of the heavy winds were encountered during the first 20 days of the month. There was also a marked decrease in the number toward the south, as in the square between latitudes 45°-50°, longitudes 15°-20°, they were observed on 12 days, while in the square adjoining it on the south, only one was reported during the month. In the western division the gales were more equally distributed, in the square between latitudes 30°-35°, longitudes 70°-75°, the first decade was entirely free, while 3 occurred in the

second, and the same number in the last 9 days. The waters adjacent to Cape Hatteras had somewhat stormier weather than usual, as gales were reported from that region on 8 days, a percentage of 28, while the normal is 21.

On February 2 a well-developed depression was central near latitude 55° N., longitude 27° W., and winds of gale force, with hail, extended over the south and southwest quadrants. The movement of this disturbance toward the east was slight during the next 24 hours, although the storm area had increased in extent, reaching the steamer routes east of the 40th meridian, and accompanied by hail and snow. On the 4th the center of this LOW was near Stornaway, Scotland, where the barometer read 28.70 inches, and winds of from 40 to 60 miles per hour prevailed over practically the entire ocean north of the 40th parallel, while snow was reported from the western division and hail from the eastern. On the 5th and 6th the general conditions of wind and weather were about the same as on the 4th, although the center of the LOW was indeterminate on account of lack of observations.

On the 8th a LOW surrounded Newfoundland while moderate gales, with hail and snow, were encountered as far south as the 40th parallel, and similar conditions were recorded by a number of vessels in the central and north-eastern part of the ocean. From the 9th to the 13th no unusual weather prevailed, although a few gales were encountered in widely scattered localities.

On the 14th a narrow tongue of low pressure extended in a northeasterly direction from a point near latitude 43° N., longitude 56° W. The weather conditions between this point and the American coast were extremely variable, moderate to strong gales prevailing off Hatteras, while moderate winds with fog, as well as snow and hail, were reported near the 40th parallel. On the same day a second LOW of 29 inches existed between Scotland and the Shetland Islands, while a HIGH, with a crest of 30.60 inches, covered a large area between the Spanish coast and the Azores. The steep gradient between these two areas was responsible for heavy westerly and south-westerly winds in mid-ocean and along the European coast. On the 15th, a shallow LOW of 29.95 inches (I on Chart IX) was central near the Bermudas. Gales of from 40 to 50 miles prevailed over a limited area between the 70th meridian and the American coast, and one vessel reported fog in the northwest quadrant. Over the eastern division of the ocean the positions of both the high and low areas, together with the general conditions of wind and weather, had changed but little since the previous day. Low No. I moved rapidly in a northeasterly direction, and on the 16th was near latitude 41°, longitude 56°. The second LOW of 28.70 inches now covered a large portion of the North Sea, while the HIGH remained practically stationary in both intensity and position. Gales still persisted over the greater part of the steamer lanes, although there was a limited area between the 20th and 35th meridians, where light to moderate winds prevailed.

On February 17 the approximate center of LOW No. I was near latitude 50° N., longitude 40° W., although reports were too scattering to plot its position accurately. Gales covered a large part of the area between the 40th and 50th parallels and the 30th and 45th meridians, while the winds over the eastern division had moderated to a marked extent. From the 19th to the 21st a well-developed LOW existed over eastern Canada and the adjacent waters. On the 19th heavy winds, attended by hail and snow, extended along the American coast as far south as the 30th parallel, and one vessel recorded both snow and fog. On the 20th, gales prevailed over a narrow area in the vicinity of the 40th parallel, between the

50th meridian and the American coast, but only winds of from light to moderate velocity were reported from the eastern section of the ocean.

On Chart III, "Tracks of Centers of Low Areas, February, 1916" (XLIV-14), published in the MONTHLY WEATHER REVIEW for that month, a low (II on Chart IX, XLV-18), is shown that first appeared in eastern Colorado on the evening of February 21. This low moved in an easterly direction, and on the morning of the 25th was central near Norfolk, Va. As a rule, the winds in that vicinity were from light to moderate, although one vessel reported a southerly gale of 48 miles an hour. On the 26th the center was near Boston, where the barometric reading was 28.80 inches. A number of vessels between that point and the 35th parallel encountered northwesterly gales of from 40 to 55 miles an hour, while southeasterly winds of about the same velocity were recorded near the 40th parallel, between the 55th and 60th meridians. On the same date a few vessels in the vicinity of latitude 48°, longitude 28°, reported moderate northwest gales, while the barometric readings ranged from 30 inches to 30.20 inches.

These vessels were in the northwest quadrant of a well-developed high, with a crest of 30.50 inches and central near latitude 40°, longitude 36°. On the 27th the center of the low (II on Chart IX) was near Chatham, Canada; the weather was unusually stormy along the American coast as far south as Florida, the storm area extending to the 65th meridian. On the 28th this low covered the Gulf of St. Lawrence, while moderate to strong gales, with snow, occurred over a limited territory between the 39th and 43d parallels. On the 29th the center of this disturbance was near St. Johns, Newfoundland; a number of vessels in the southwest quadrant recorded westerly and northwesterly gales, with snow, and heavy southwest winds prevailed along the American coast between the 30th and 35th parallels. This low increased in extent but decreased in intensity, and during the next 24 hours its easterly movement was only about 4 degrees of longitude. By March 1 the conditions of wind and weather had moderated considerably. The disturbance then changed its course toward the southeast, and on March 2 the center was near latitude 50° N., longitude 45° W., although it was impossible to locate it accurately on account of lack of observations.

Winds of 50 mis./hr. (22.4 m./sec.), or over, during February, 1917.

Station.	Date.	Wind.		Station.	Date.	Wind.		Station.	Date.	Wind.		Station.	Date.	Wind.	
		Veloc-ity.	Direc-tion.			Veloc-ity.	Direc-tion.			Veloc-ity.	Direc-tion.			Veloc-ity.	Direc-tion.
Atlanta, Ga.	4	63	nw.	Devils Lake, N. Dak.	16	60	n.	Mount Tamalpais—Continued.				Portland, Me.—Continued.			
Bismarck, N. Dak.	4	52	nw.	Duluth, Minn.	4	56	w.	Do.	24	54	se.	Do.	24	53	nw.
Do.	16	54	nw.	Do.	17	57	w.	Do.	25	73	w.	Do.	5	59	nw.
Block Island, R. I.	2	66	nw.	Do.	18	63	w.	Nantucket, Mass.	5	70	sw.	Do.	10	60	w.
Do.	3	60	nw.	Erie, Pa.	23	50	se.	Nashville, Tenn.	4	58	nw.	Do.	20	57	w.
Do.	5	72	w.	Do.	26	52	s.	New York, N. Y.	1	51	nw.	Do.	4	52	nw.
Do.	9	58	w.	Grand Forks, N. Dak.	17	54	n.	Do.	2	56	nw.	Do.	17	52	nw.
Do.	10	60	w.	Hatteras, N. C.	2	50	nw.	Do.	3	61	nw.	Do.	2	60	n.
Buffalo, N. Y.	3	74	sw.	Do.	5	66	nw.	Do.	5	70	nw.	Do.	3	63	w.
Do.	4	54	sw.	Do.	9	51	nw.	Do.	9	66	nw.	Do.	5	66	w.
Do.	5	58	w.	Huron, S. Dak.	4	52	nw.	Do.	10	60	nw.	Do.	9	56	w.
Do.	6	56	sw.	Jacksonville, Fla.	2	55	nw.	Do.	16	55	nw.	Do.	10	58	w.
Do.	7	60	sw.	Kansas City, Mo.	4	53	nw.	Do.	18	53	nw.	Do.	10	56	w.
Do.	8	54	w.	Key West, Fla.	2	50	nw.	Do.	22	53	nw.	San Francisco, Cal.	24	52	s.
Do.	16	50	w.	Lander, Wyo.	24	64	sw.	Do.	4	62	nw.	Savannah, Ga.	2	60	nw.
Do.	19	60	sw.	Lexington, Ky.	4	60	sw.	Do.	5	60	nw.	Do.	4	52	nw.
Do.	20	54	sw.	Do.	26	52	sw.	Do.	2	56	se.	Do.	5	54	nw.
Do.	26	54	sw.	Lincoln, Nebr.	4	50	nw.	Do.	15	54	nw.	Do.	9	50	w.
Burlington, Vt.	17	50	s.	Little Rock, Ark.	4	52	nw.	Do.	16	60	nw.	Do.	1	52	nw.
Do.	23	64	s.	Louisville, Ky.	4	60	w.	Do.	18	60	nw.	Do.	4	69	nw.
Do.	26	60	s.	Memphis, Tenn.	4	60	nw.	Do.	4	54	n.	Do.	23	52	s.
Charlotte, N. C.	4	55	nw.	Modena, Utah.	25	51	sw.	Do.	4	55	nw.	St. Louis, Mo.	4	52	nw.
Chattanooga, Tenn.	4	52	nw.	Mount Tamalpais, Cal.	16	68	nw.	Do.	12	51	nw.	St. Paul, Minn.	17	52	nw.
Cheyenne, Wyo.	1	50	w.	Do.	17	67	nw.	Do.	16	101	nw.	Sand Key, Fla.	2	60	n.
Do.	3	60	w.	Do.	19	65	sw.	Do.	17	84	nw.	Sandy Hook, N. J.	3	63	w.
Do.	4	53	nw.	Do.	20	53	sw.	Do.	18	54	nw.	Do.	5	66	w.
Do.	16	61	w.	Do.	21	53	sw.	Do.	21	74	se.	Do.	9	56	w.
Do.	25	53	w.	Do.	23	62	sw.	Do.	23	73	se.	Do.	5	52	w.
Do.	26	55	nw.	Do.	24	62	sw.	Do.	24	90	se.	Do.	9	53	nw.
Columbus, S. C.	4	52	w.	Do.	21	62	sw.	Do.	25	71	se.	Do.	20	50	sw.
Columbus, Ohio.	4	56	w.	Do.	23	54	se.	Do.	10	60	sw.	Do.	25	52	sw.

TEMPERATURE.

The average temperature of the air over the ocean during February, 1916, was somewhat above the normal except in the vicinity of the west coast of Scotland and over the southern part of the Gulf of Mexico, where negative departures of 1 degree occurred. Over the waters adjacent to the American coast the averages were somewhat higher than usual, although they were slightly below the normal at a number of Canadian and United States Weather Bureau stations along the coast, as shown in the following table:

	° F.		° F.
St. Johns, N. F.	-0.8	Norfolk, Va.	-0.7
Svidney, C. B. I.	+0.1	Hatteras, N. C.	+0.6
Halifax, N. S.	-0.1	Charleston, S. C.	+0.3
Eastport, Me.	-2.0	Key West, Fla.	-1.2
Portland, Me.	-3.2	Tampa, Fla.	+0.8
Boston, Mass.	-2.5	New Orleans, La.	+0.3
Nantucket, Mass.	-2.8	Galveston, Tex.	+2.7
Block Island, R. I.	-3.1	Corpus Christi, Tex.	+2.7
New York, N. Y.	-3.0		

The lowest individual temperature reading of the month was 16° F., and occurred on the 12th and again on the 15th, in the 5-degree square that includes the east coast of Labrador. The highest temperature for the same square was 34° on the 2d, while the monthly mean was 24°.

FOG.

The amount of fog was considerably above the normal between the 40th and 45th parallels, and the 50th meridian and the American coast. In the eastern part of this region it was observed on 11 days, a percentage of 38, while the normal percentage is 20. Off the Newfoundland Banks the amount was slightly below the normal, and the steamer lanes were comparatively free.

SNOW AND HAIL.

Between the 40th and 45th parallels and the 50th and 70th meridians snow was reported on from 4 to 8 days, while for the same region hail was not reported on more than 3 days from any one 5-degree square. Over the western portion of the steamer routes hail was more frequently encountered than snow, while both were comparatively rare in mid-ocean.