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## SECTION VII.—WEATHER AND DATA FOR THE MONTH.

## THE WEATHER OF DECEMBER, 1917.

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## PRESSURE AND WINDS.

The distribution of the mean atmospheric pressure over the United States and Canada, and the prevailing direction of the winds for December, 1917, are graphically shown on Chart VII (XLV—118), while the means at the several stations, with the departures from the normal, are shown in Tables I and III.

During the first 15 days of December, 1917, high pressure persisted over the north-central districts, while in the Gulf and Atlantic coast regions pressure was more or less comparatively low. As a result, cold northerly or westerly winds prevailed to an unusual extent over the eastern and southern districts.

For a few days after the middle of the month, there was a reaction to lower pressure in northern districts, and a change to southerly winds brought some moderation in the cold. Near the beginning of the third decade, however, high pressure again advanced into the Northwest, and during the remainder of the month the anti-cyclonic conditions were unusually pronounced over the greater part of the region from the Rocky Mountains eastward. On the morning of the 27th sea-level pressure measured nearly 31 inches to the northward of Montana, and by the following morning this strong high area had penetrated to the Dakotas and Minnesota. In the adjoining Canadian Provinces pressure was above 31.10 inches, the highest of the winter up to that date. This unusual pressure drifted southeastward, and cold northerly winds were experienced during the remainder of the month over most central and southern districts from the Rocky Mountains to the Atlantic and Gulf coasts.

For the month, as a whole, the pressure was unusually high over all central and northern districts from the Rocky Mountains eastward; in fact, save for a small area in the Rocky Mountains district from Wyoming to northern Idaho, the pressure averaged higher than the normal over all parts of the United States, and in Canada as far northward as observations were available. The pressure was particularly high in the Canadian districts, the averages exceeding the normal by from 0.20 to 0.30 inch. Over more southern districts and along the Pacific coast the departures were less pronounced.

The distribution of HIGHS and LOWS resulted in general northerly winds over the Atlantic and Gulf States, and over much of the Ohio Valley and from the upper Lakes Region westward to the Dakotas. Elsewhere variable winds prevailed.

## TEMPERATURE.

At the beginning of the month the temperature was generally above the normal. During the next few days cold weather advanced into the Dakotas and gradually moved eastward and southward. The temperature of the first week of December averaged from normal to 7° above in the region west of the Rocky Mountains, the

Central Plains, and the Cotton States, but in the central valleys and northeastern districts, and from the upper Lakes to Montana it was colder than usual. About the beginning of the second decade severe cold prevailed in the Lakes region, the Ohio Valley, and southward; killing frosts occurred at numerous points near the Gulf coast, and in northern Florida. Near the middle of the month colder weather overspread the Central Plains and districts to the east, particularly New England. The 10 days ending December 17 were warmer than normal in the far Southwest and in the central and northern districts west of the Rocky Mountains; but eastward the period was colder than normal. During the next few days there was a general change to warmer weather in central and northeastern districts and the week ending the 24th was warmer than normal in nearly all parts of the country, except the extreme Southwest, where it was cooler, and over the Middle and North Atlantic States, where it was normal.

At the beginning of the last week of the month a marked cold wave advanced southeastward from the Canadian Northwest, affecting practically all districts east of the Rocky Mountains. After a few days of slightly warmer weather, a second cold wave from the Northwest overspread the same area, being felt with special severity east of the Mississippi River, in southern Texas, and in Florida. At many points in New England and in eastern New York, the lowest temperature readings since the establishment of Weather Bureau stations were recorded. Meanwhile, west of the Rockies warm weather continued, and by the end of the month it was growing milder over most of the Plains region. The last week of the month averaged very cold east of the Rockies and warm to the westward.

For December as a whole, the region west of the Rocky Mountains was remarkably warm, while in Montana and the States eastward, and generally between the 100th Meridian and the Atlantic coast the month was decidedly cold. The temperature deficiency for the month averaged 12 degrees, or more, in parts of the Northwest and in the Ohio Valley; and in numerous Eastern States it was the coldest December of record. On the other hand an excess temperature was nearly as marked west of the Rocky Mountains as the deficiency was to the eastward. In portions of Oregon and Idaho the excess was 12 degrees or more, and over large portions of the Plateau region and the North Pacific States the excess amounted to 5 to 10 degrees.

The contrast in temperature between the northern districts east of the Rocky Mountains and those immediately to the west was one of the marked features of the weather of this December. While many eastern sections experienced almost unprecedented cold, heavy snow, and disagreeable weather during practically the entire month, in the far West temperatures were abnormally high, and snowfall was unusually light. In southern Idaho and the eastern portions of Washington and Oregon, leaf buds were swelling at the close of the month, and in some localities fruit buds were ready to burst into bloom; the temperature during the last 20 days of the month did not fall as low as the freezing point.

## PRECIPITATION.

During the early days of December generally fair weather prevailed, except light to moderate rain fell in portions of the Atlantic and North Pacific States. About the end of the first week moderate to heavy precipitation occurred in most eastern districts except the South Atlantic States; near the middle of the month considerable rain fell in the North Pacific States and snow from the Central Plains eastward, with heavy falls at many points in Pennsylvania and to the northward and eastward. During the next week rather heavy rain fell over the North Pacific States, but elsewhere little precipitation occurred. During the last week of the month moderate to light rain or snow fell in many sections, especially in the northern part of the country.

For the month as a whole the precipitation was light in most sections, and especially in southern districts, where, from the Plains States westward to the Pacific coast, large areas received no precipitation during the entire month, while the Great Plains, portions of the Mississippi Valley and of the Southeastern States received but small amounts.

In portions of the Ohio and lower Mississippi Valleys considerable precipitation occurred during the month, and along the Atlantic coast from the Carolinas northward there were moderate amounts, mostly in the form of snow. Snowfall was particularly heavy in the Ohio Valley, over portions of the Atlantic coast districts, and at points in the Lakes region.

In western Montana, and generally over Idaho, Washington, and Oregon, the precipitation was equal to, or above the normal; and occurred mostly as rain, save in the more northern portions and the higher mountains. A few sections of northern California had considerable rain or snow, but generally over that State the precipitation was markedly deficient, and the absence of any appreciable snow on the mountains at the close of the month was most unusual.

**Snowfall.**—Heavy snows occurred in portions of Pennsylvania, New York, and the New England States, and in general more snow fell east of the Rocky Mountains than is usual for December. In the far western mountains there was comparatively little snow; on the western slopes of the Rockies the amounts were generally light, and on the Sierra Nevada scarcely any snow fell, a condition probably unprecedented for December.

## RELATIVE HUMIDITY.

The relative humidity for the month as a whole was above the normal in the Great Central Valleys, the northern Plains States, the far Northwest, the Lakes Region, New York, New England, and the Carolinas. Elsewhere there was relatively less moisture in the atmosphere than usually prevails in December, the deficiency being specially marked in the central and southern Plateau States.

## GENERAL SUMMARY.

The unusually low temperature during most of the month in the districts to eastward of the Rocky Mountains allowed of little farm activity, and the heavy snow covering in portions of the Ohio Valley and eastern districts at times greatly hampered the transportation lines, and much inconvenience and actual suffering resulted from a lack of fuel and other necessary supplies.

In the southern districts severe cold caused more or less damage to winter oats and vegetables already above ground, and delayed the early planting of the usual outdoor truck crops.

In the far western districts the weather was unusually favorable for the first winter month. Outdoor work was possible during the greater part of the month, and winter vegetation made rapid growth. Pasturage of cattle was possible over considerable areas in the central and northern districts of this region, but in the southwest continued absence of moisture caused short and dry ranges, and much feeding was necessary.

A moderate covering of snow over the States east of the Mississippi during the greater part of the month afforded much needed protection to winter wheat, but there was little snow cover for this crop in the States between the Mississippi River and the Rocky Mountains, particularly over the more southern areas where wheat is grown.

In the far Northwest warm weather greatly favored the growth of wheat and the outlook for that crop was most promising.

## Average accumulated departures for December, 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.
New England.....	21.5	-8.7	-25.7	2.64	-0.80	-3.90	3.8	-2.4	74	-2
Middle Atlantic.....	28.1	-9.1	-22.5	1.93	-1.00	-4.50	5.7	-0.1	67	-8
South Atlantic.....	38.6	-8.5	-10.9	1.85	-1.60	-12.40	5.4	+0.5	78	+1
Florida Peninsula...	62.3	-3.6	-4.7	0.70	-1.30	-11.40	4.0	-0.6	78	-4
East Gulf.....	43.0	-6.1	-9.3	1.81	-2.70	-8.80	5.2	-0.3	75	-2
West Gulf.....	44.3	-4.8	-2.9	0.49	-2.40	-15.50	4.8	-0.4	74	0
Ohio Valley and Tennessee.....	26.4	-10.2	-29.6	1.50	-1.90	+0.30	6.5	+0.1	77	0
Lower Lakes.....	19.3	-9.1	-33.9	1.90	-1.00	-0.70	7.7	-0.1	80	+1
Upper Lakes.....	18.3	-8.2	-33.9	1.46	-0.60	-3.50	7.3	0.0	82	0
North Dakota.....	1.0	-10.8	-18.4	0.70	+0.10	-9.10	8.4	+2.8	86	+5
Upper Mississippi Valley.....	18.4	-8.9	-32.6	0.55	-1.10	-4.60	6.3	+0.3	81	+2
Missouri Valley.....	19.0	-7.9	-15.6	0.52	-0.50	-6.00	6.4	+1.1	80	+4
Northern slope.....	22.5	-1.5	-11.7	1.97	+1.10	-0.70	7.4	+2.1	74	+1
Middle slope.....	30.5	-2.4	-5.3	1.43	-0.60	-7.70	5.0	+0.8	68	0
Southern slope.....	42.3	-1.5	+7.2	0.02	-0.80	-8.90	2.5	-2.0	53	-15
Southern Plateau.....	50.4	+4.7	+3.7	T.	-0.60	-3.30	1.1	-2.1	40	-11
Middle Plateau.....	38.1	+6.8	-14.6	0.17	-0.80	-3.50	4.8	-0.3	57	-15
Northern Plateau.....	41.4	+9.3	+1.5	2.50	+0.80	-1.50	8.4	+1.5	74	-6
North Pacific.....	46.6	+4.5	+1.3	12.29	+4.90	-6.10	9.0	+1.2	89	-2
Middle Pacific.....	52.0	+3.5	+4.2	0.88	-0.40	-9.80	4.4	-1.1	74	+5
South Pacific.....	57.6	+4.5	+14.1	0.09	-2.00	-6.30	2.9	-1.4	64	-4

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## WEATHER CONDITIONS OVER THE NORTH ATLANTIC OCEAN DURING DECEMBER, 1916.

The data presented are for December, 1916, and comparison and study of the same should be in connection with those appearing in the REVIEW for that month.

Chart IX (xlv-120) shows for December, 1916, the principal storm tracks, the pressure, temperature, and prevailing direction of the wind at 7 a. m., 75th meridian time (Greenwich mean noon). Notes on the locations and courses of the more severe storms of the month are included in the following general summary.