

WEATHER AND CIRCULATION OF NOVEMBER 1979 A Month with Strong Temperature Contrasts

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1. Mean circulation

The strong ridges which had dominated high latitudes during early fall (Taubensee, 1979; Wagner, 1979) gave way to increased cyclonic activity, enhanced temperature gradients and strengthened westerlies in November (Figs. 1-4). Strongest hemispheric westerlies at 700 mb were found over both oceans where deep, cold troughs surmounted strong, warm ridges.

Downstream from the maximum in the Pacific

westerlies, a blocking ridge developed over western Canada. The characteristic split westerlies and omega configuration of the 700 mb height contour field are evident. The long waves over the United States and the western Atlantic were west of their October locations and this produced a major change in the weather over the United States. As has been the case for several months the subtropical westerlies near the southwestern United States were stronger than normal.

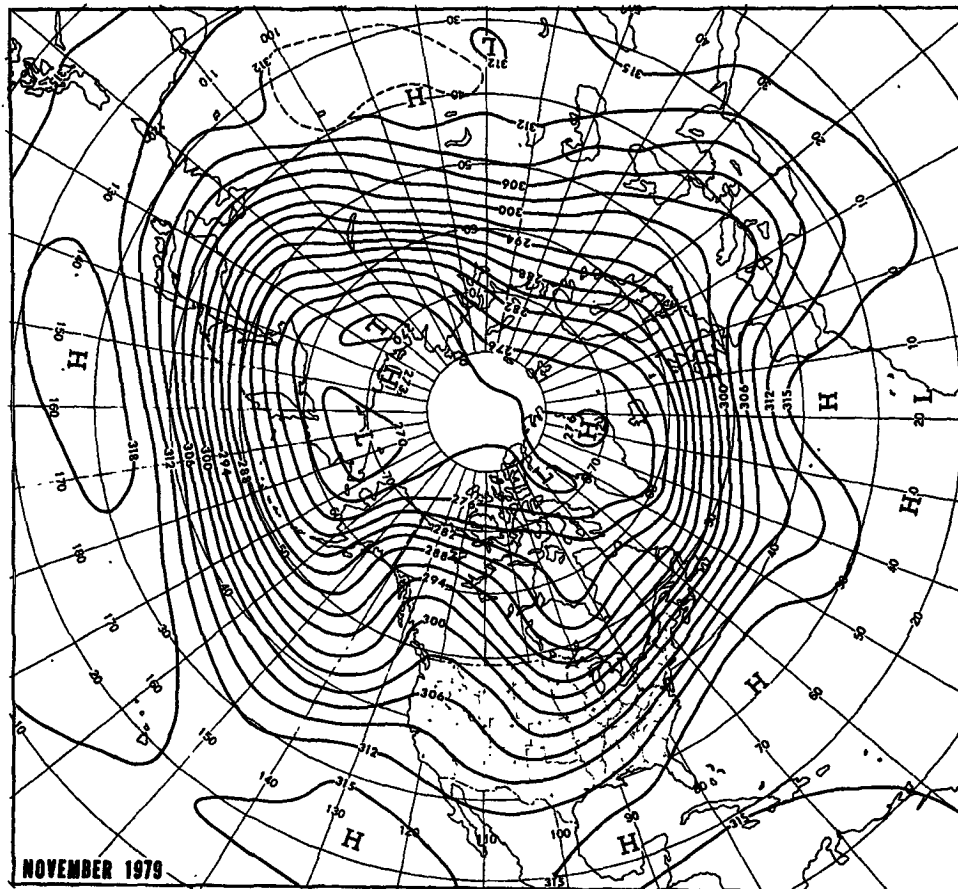


FIG. 1. Mean 700 mb height contours (dam) for November 1979.

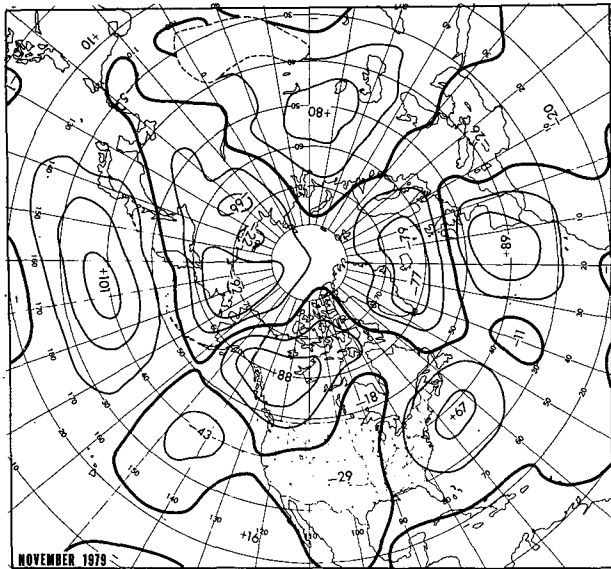


FIG. 2. Departure from normal of mean 700 mb height (m) for November 1979.

Downstream from the maximum in the Atlantic westerlies, this current split into two segments. One moved north of a strong 700 mb ridge over the Urals while the other plunged into a deep trough over the Mediterranean.

2. Temperature

A strong blocking ridge over western Canada coupled with a deep mean trough in the central United States produced subnormal mean temperatures over most of the western two-thirds of the

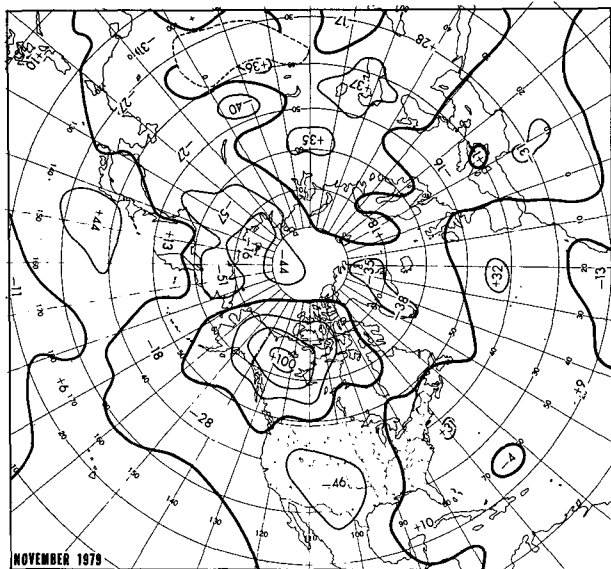


FIG. 3. Departure from normal of mean 1000-700 mb and thickness (m) for November 1979.

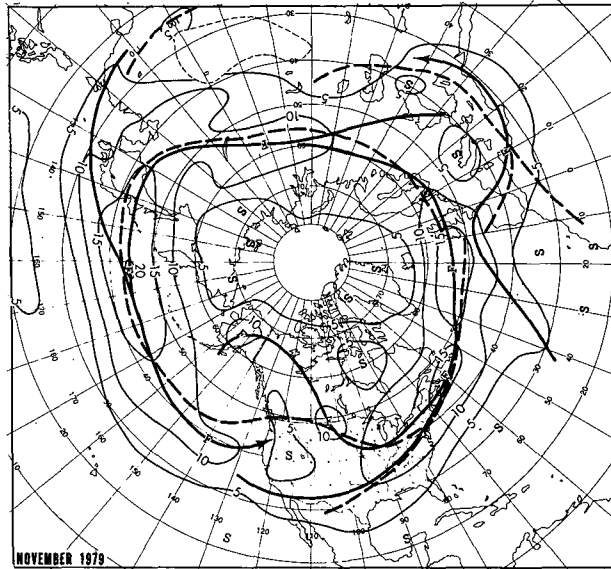


FIG. 4. Mean 700 mb geostrophic wind speed ($m s^{-1}$) for November 1979. Solid arrows indicate observed axes of maximum wind speed and dashed lines, the normal.

country (Fig. 5). Warm weather prevailed, however, over the eastern quarter of the country between the deep trough and the strong Atlantic ridge. It was the second coldest November of record at Grand Junction, CO, third coldest at Casper, WY, and coldest since 1959 at Boise, ID. On the other hand, it was the warmest November of record in New York City (Central Park) and seventh warmest at Norfolk, VA.

Strong southwesterly flow over Alaska continued the warm regime there. Temperatures in Hawaii were generally near normal.

3. Precipitation

Precipitation exceeded normal over most of the area between the deep central trough and the strong Atlantic ridge (Fig. 6). Relatively heavy precipitation also occurred in parts of the West and over the central Great Plains—areas affected by Pacific storms either directly or on regeneration. The blocking ridge over northwest Canada largely eliminated the Alberta storm track and precipitation along the northern border from Washington to Minnesota was generally light. Relatively strong northwest flow over the Southwest kept that area fairly dry. Colorado Springs, CO reported the snowiest November of record (19.1 inches); in contrast, it was the first November of the century without snow at Albany, NY.

Most of Alaska reported greater than normal precipitation under strong southwesterly flow aloft. Stations in Hawaii, west of a mean trough, generally experienced subnormal rainfall.

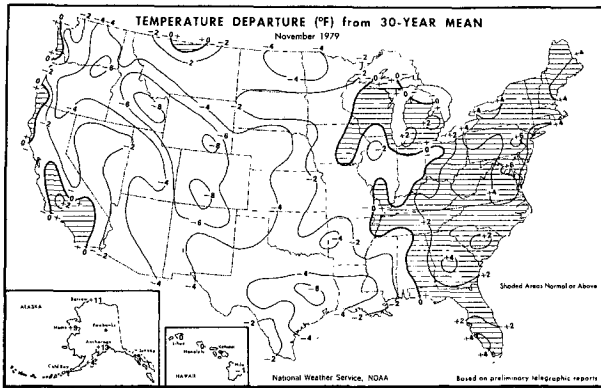


FIG. 5. Departure from normal of average surface air temperature (°F) for November 1979 (from National Oceanic and Atmospheric Administration and Economics, Statistics and Cooperatives Service, 1979).

4. Variability within the month

a. 20 October–4 November

By early November, the long-wave pattern at 700 mb around much of the Northern Hemisphere had changed to the state which was to characterize the month (Fig. 7A). The advective field resulting from a blocking ridge over western Canada and a deep trough over the Great Plains brought cold weather to most of the western half of the nation (Fig. 7B). Temperatures were generally above normal in the strong southwesterly flow to the east of the trough.

Greatest precipitation amounts were concentrated under and in advance of the central mean trough (Fig. 7c). An intensifying storm system moving from the Great Basin through the northern Mississippi Valley gave heavy snow to parts of the southern Rocky Mountains and western Great Plains and heavy rain further east.

b. 5–11 November

The blocking ridge amplified and retrograded to the Gulf of Alaska as the western Pacific trough

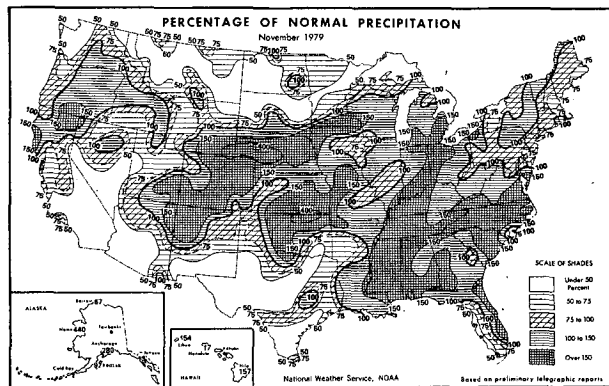
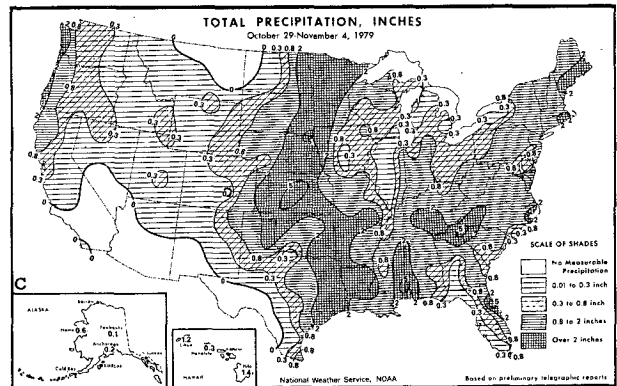
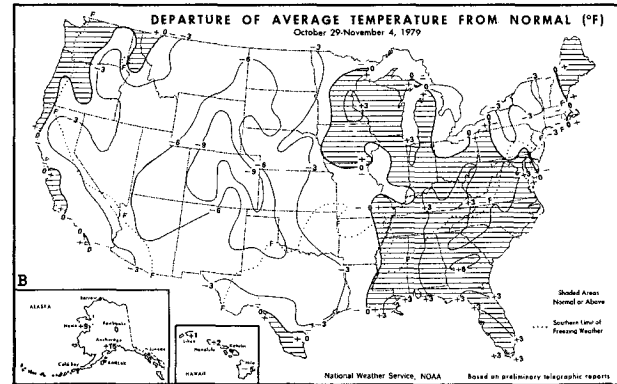
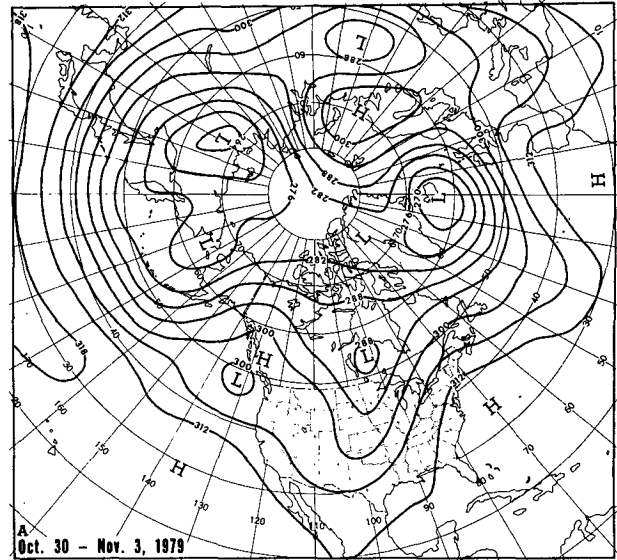


FIG. 6. Percentage of normal precipitation for November 1979 (from National Oceanic and Atmospheric Administration and Economics, Statistics and Cooperatives Service, 1979).

FIG. 7. (A) Mean 700 mb contours (dam) for 30 October–3 November; (B) departure from normal of average surface air temperature (°F) and (C) total precipitation (inches) for week of 29 October–4 November 1979 (from National Oceanic and Atmospheric Administration and Economics, Statistics and Cooperatives Service, 1979).

deepened strongly (Fig. 8A). Increasing northwesterly flow east of the block and the intensification of the west coast trough at lower latitudes both

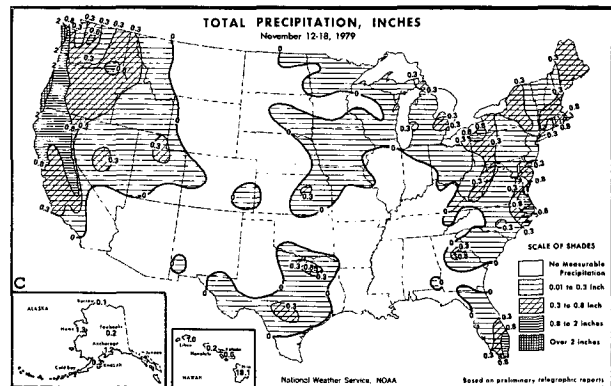
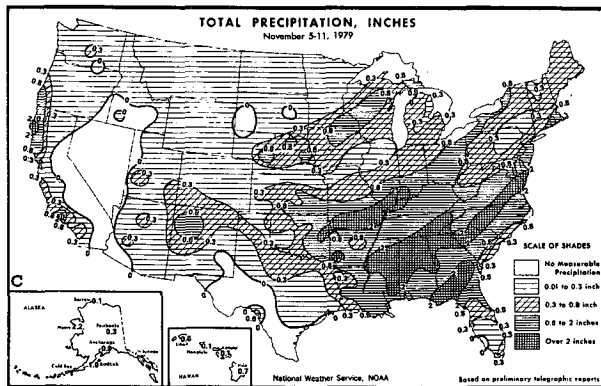
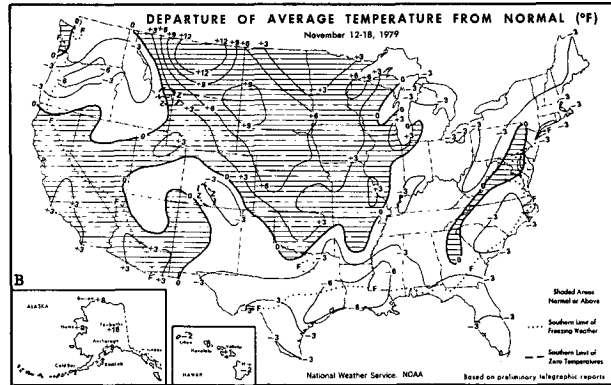
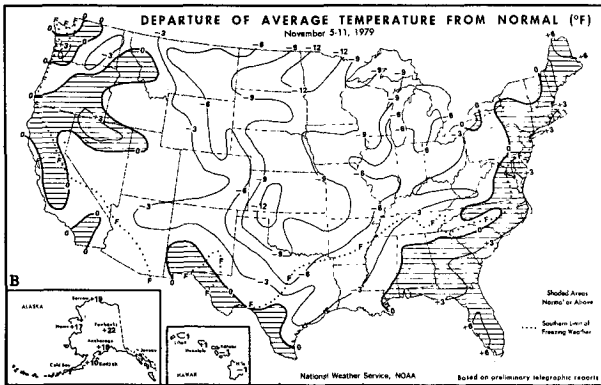
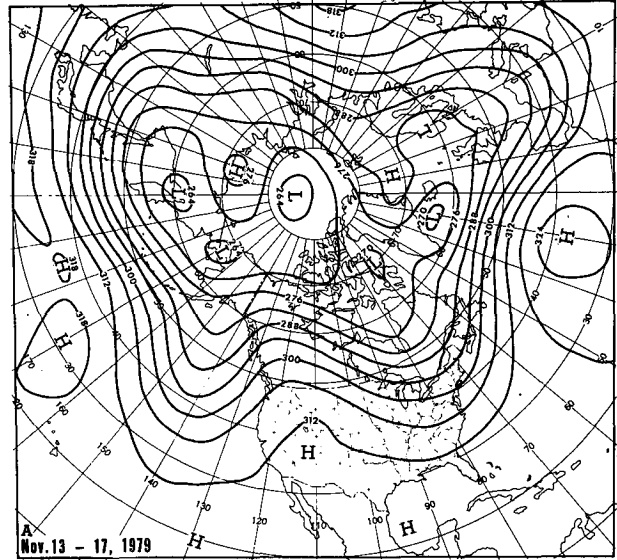
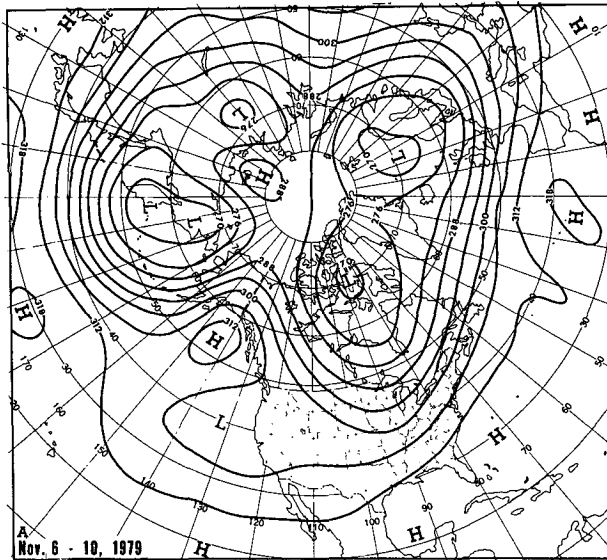


FIG. 8. As in Fig. 7 except for (A) 6-10 November, 1979 and (B) and (C) week of 5-11 November 1979.

FIG. 9. As in Fig. 7 except for (A) 13-17 November 1979, and (B) and (C) week of 12-18 November 1979.

contributed to the progression of the central United States trough.

The cold air spread eastward and intensified in degree as the outflow of cold air from northern Canada increased (Fig. 8B). The area of heaviest precipitation moved eastward with the mean trough although a relative maximum extended westward

along a storm track (Fig. 8C). Rainfall along the middle and south Pacific Coast increased as the west coast trough strengthened.

c. 12-18 November

The midlatitude westerlies increased and most long-wave features progressed this week (Fig. 9A).

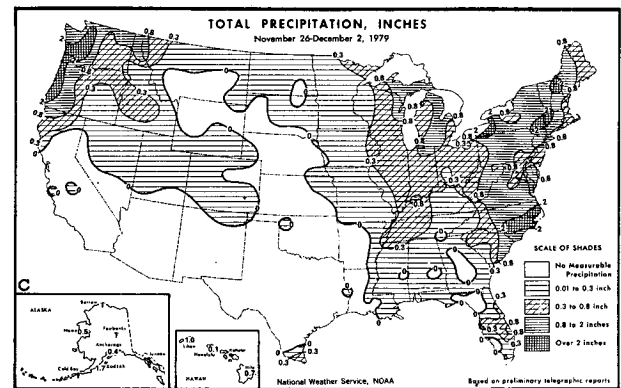
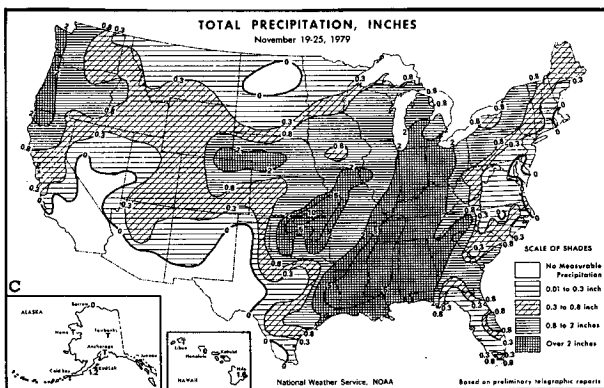
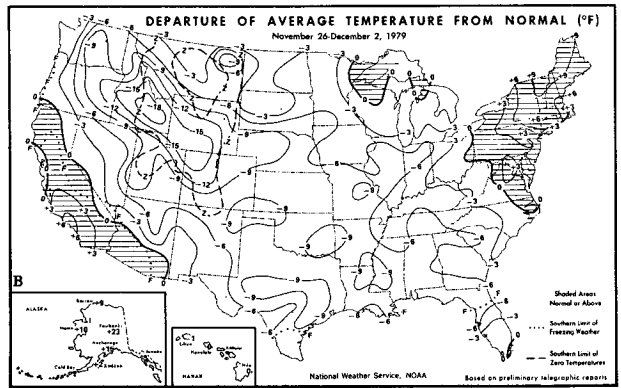
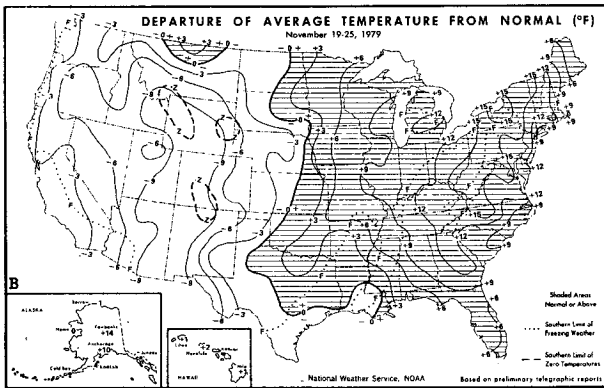
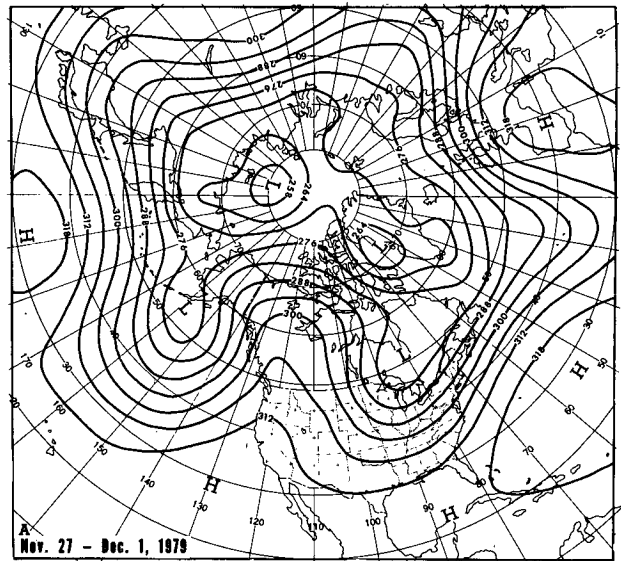
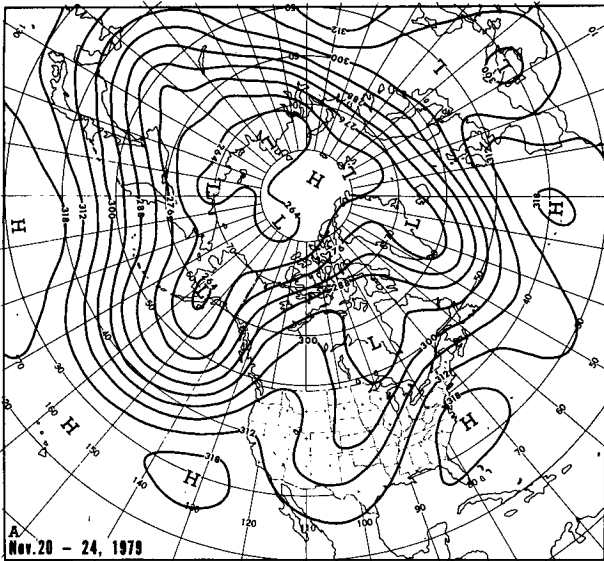


FIG. 10. As in Fig. 7 except for (A) 20–24 November 1979 and (B) and (C) week of 19–25 November 1979.

FIG. 11. As in Fig. 7 except for (A) 27 November–1 December 1979 and (B) and (C) week of 26 November–2 December 1979.

The blocking ridge weakened, moved eastward, and phased with a ridge building from the south over the Rocky Mountains as the mean trough moved to the East Coast.

The flattening flow pattern over North America

spread warm air over most of the central United States (Fig. 9B)—a striking contrast to the previous week. Below normal temperatures were largely peripheral to the warm mean ridge.

Precipitation was light between the western ridge

and the east coast trough (Fig. 9c). Heaviest amounts were found in advance of the west coast trough.

d. 19–25 November

Long waves amplified over the Pacific and North America bringing a deep trough to the east Pacific and a strong blocking ridge to western and central Canada (Fig. 10A). The westerlies again split over North America with the southern component moving into a deep trough over the southern Great Plains and thence through a strong east coast ridge.

The circulation regime over North America was very similar to that of the first week described (Fig. 7A) and the associated distributions of temperature anomaly and precipitation were also quite similar (Figs. 10B and 10C). As was the case in the earlier week, a storm moved out of the Great Basin bringing heavy snow to parts of the Rocky Mountains and the central Great Plains. With a blocking ridge to the north, this storm and its associated fronts were slow movers bringing heavy precipitation amounts and extreme warmth as the cold front edged eastward. A record 24 h snowfall for November, 19.8 inches, occurred at Cheyenne, WY. Highest temperatures for so late in the season were observed at several locations in the Northeast as temperatures rose into the upper sixties or lower seventies.

e. 26 November–2 December

As the blocking ridge strengthened and retrograded to western Canada, the trough over the United States strengthened to the north and progressed (Fig. 11A). The result was a strong flow of extremely cold air from Canada which affected most

of the United States and gave weekly mean temperatures as much as 19°F below normal in Idaho (Fig. 10B). The California area and the Northeast were the only substantial areas of warm weather and the latter experienced near-record warmth early in the week.

Heaviest precipitation was largely confined to the Northwest Coast and to areas in advance of the eastern trough (Fig. 11C). Snow accumulations up to 2 or 3 ft were observed along the southern shores of the lower Great Lakes. Buffalo, NY reported 20 inches of snow in one 24 h period.

5. Tropical activity

Tropical Storm Vera formed in the west Pacific south of a strong subtropical ridge on 2 November. The storm reached typhoon intensity the next day, struck the northern Philippines on 6 November and was downgraded to a tropical depression on 7 November. Tropical Storm Wayne was found east of the Philippines on 9 November and dissipated two days later.

Tropical Storm Jimena formed over the tropical east Pacific on 2 November and dissipated the next day.

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