WEATHER AND CIRCULATION OF NOVEMBER 1974

Biweekly Amplification of the Circulation Pattern

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1. Mean circulation

As was the case in the previous month (Wagner, 1975), increasing 700-mb zonal westerlies during November were accompanied by the progression of most mid-latitude circulation features from the coast of Asia through North America to the Atlantic Ocean (Figs. 1, 2, and 3). Greatest acceleration of the westerlies occurred over central and western portions of the Pacific Ocean where quite cold air from Asia, coupled with persistent warmth to the south, produced strong thermal contrasts (Fig. 4).

The flow pattern over the Atlantic Ocean and Europe flattened markedly this month and the westerlies returned to a more normal location (Fig. 3). At high latitudes, however, a strong ridge continued north of Scandinavia, and a deep trough with extremely cold air developed to its southeast. The previously strong ridge north of the Bering Strait weakened decidedly and retrograded this month.

Over North America a mean ridge progressed to the Great Basin replacing a trough which moved to the Mississippi Valley and took on a strong positive tilt. To the north, anticyclonic curvature and above-normal heights developed north of Hudson Bay.

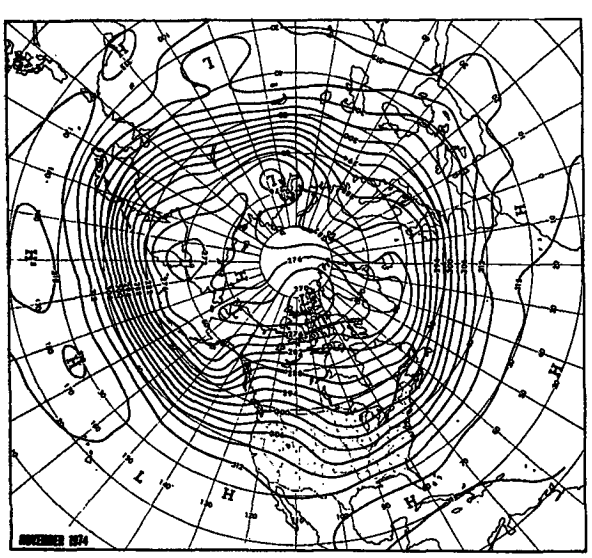


FIG. 1. Mean 700-mb height contours (dakameters) for November 1974.

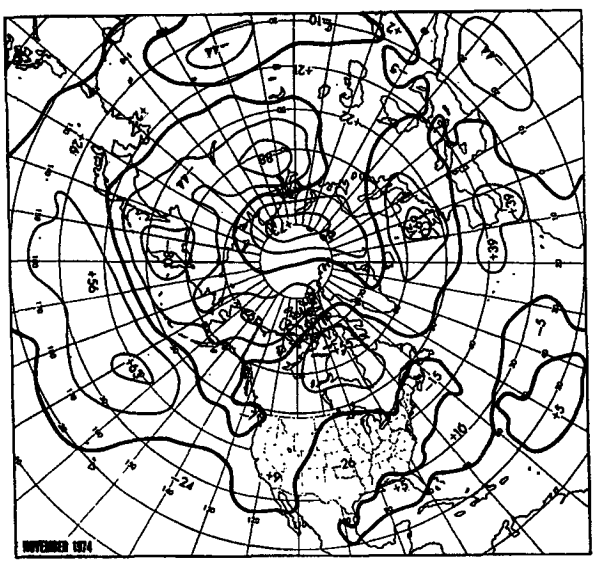


FIG. 2. Departure from normal of mean 700-mb height (m) for November 1974.

2. Temperature

Temperatures averaged above normal over most of the country during November (Fig. 5). Greatest positive departures were observed under and near the amplified western ridge. The general lack of cold air in the United States was related to the weakness of the northwesterly flow over western Canada. While stronger than normal northerly flow and below-normal heights brought below-normal temperatures to northern and western Alaska, southeastern portions, affected by enhanced southwesterly flow, were warmer than normal.

3. Precipitation

Precipitation exceeded normal over much of the area under and in advance of the mean trough that extended from the Southwest to the Great Lakes (Fig. 6). A notable exception was the middle and north Atlantic Coast, to the lee of the Appalachian Mountains, where precipitation was less than one-half of the November normal. In this area, Boston reported the driest November in over 20 years.

Precipitation was also substantially less than normal near the western ridge as well as to its east over the northern Great Plains. The driest November in several

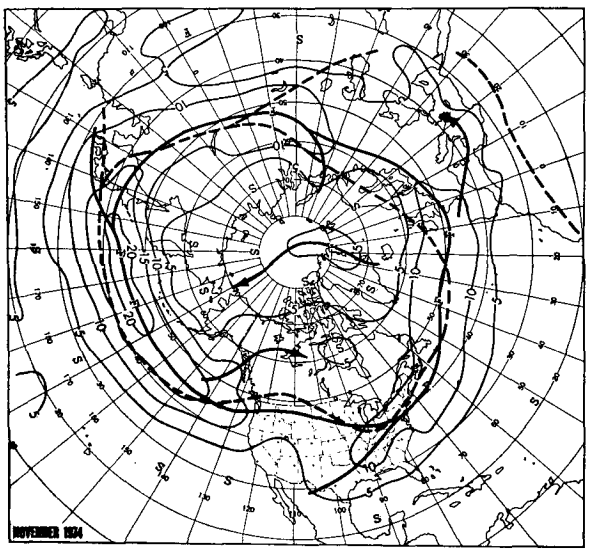


FIG. 3. Mean 700-mb geostrophic wind speed (m/s) for November 1974. Solid arrows indicate observed axes of maximum wind speed and dashed lines, the normal.

years was reported at Mt. Shasta, Calif., Billings, Mont., and Rapid City, S. D.

Precipitation over Alaska was positively correlated with temperature this month with the north and west generally receiving less than normal precipitation and the southeast, more than normal. Rainfall totals in Hawaii were generally near normal.

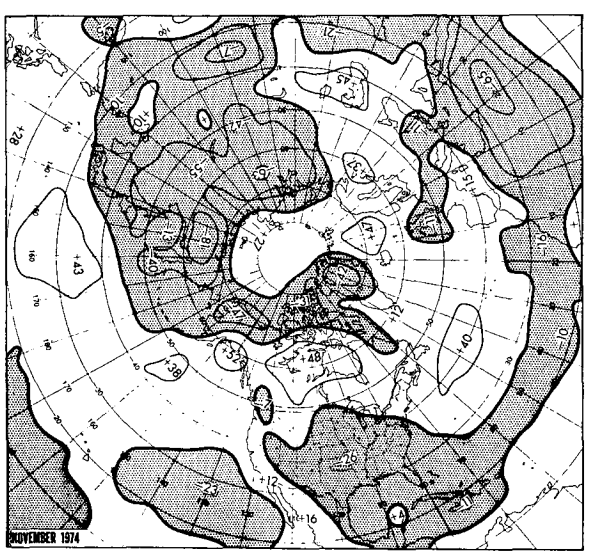


FIG. 4. Departure from normal of mean 1000- to 700-mb thickness (m) for November 1974.

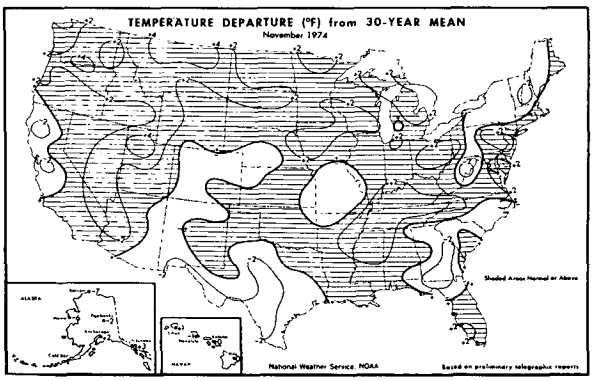


FIG. 5. Departure from normal of average surface temperature (°F) for November 1974 (from National Oceanic and Atmospheric Administration and Statistical Reporting Service, 1974).

4. Weekly variability: Weekly alternations between relatively flat and amplified flow patterns over North America

a. November 4–10

Circulation features in the vicinity of North America progressed and deamplified this week. A mean ridge moved to the northern Rocky Mountains, and the deep trough that had been over the Southwest at the end of October (Wagner, 1975) weakened and sheared. Low latitude portions remained stationary, while the mid-latitude trough progressed (Fig. 7). A variety of synoptic systems associated with this mean trough brought widespread precipitation to the eastern half of the country and to parts of the Southwest. The strong Pacific westerlies drove several rain-producing fronts across the Pacific Northwest.

The relatively flat flow pattern over North America yielded above normal temperatures in the North and East. Elsewhere, both upper level heights and surface

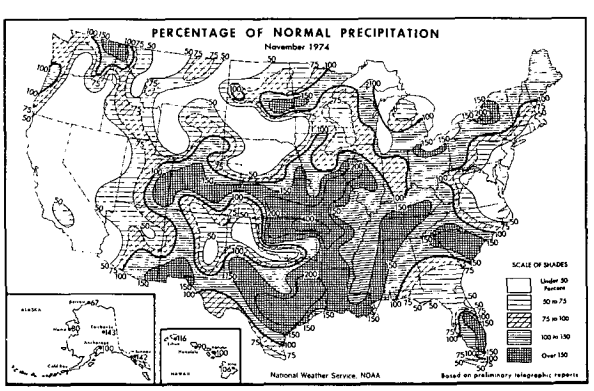


FIG. 6. Percentage of normal precipitation for November 1974 (from National Oceanic and Atmospheric Administration and Statistical Reporting Service, 1974).

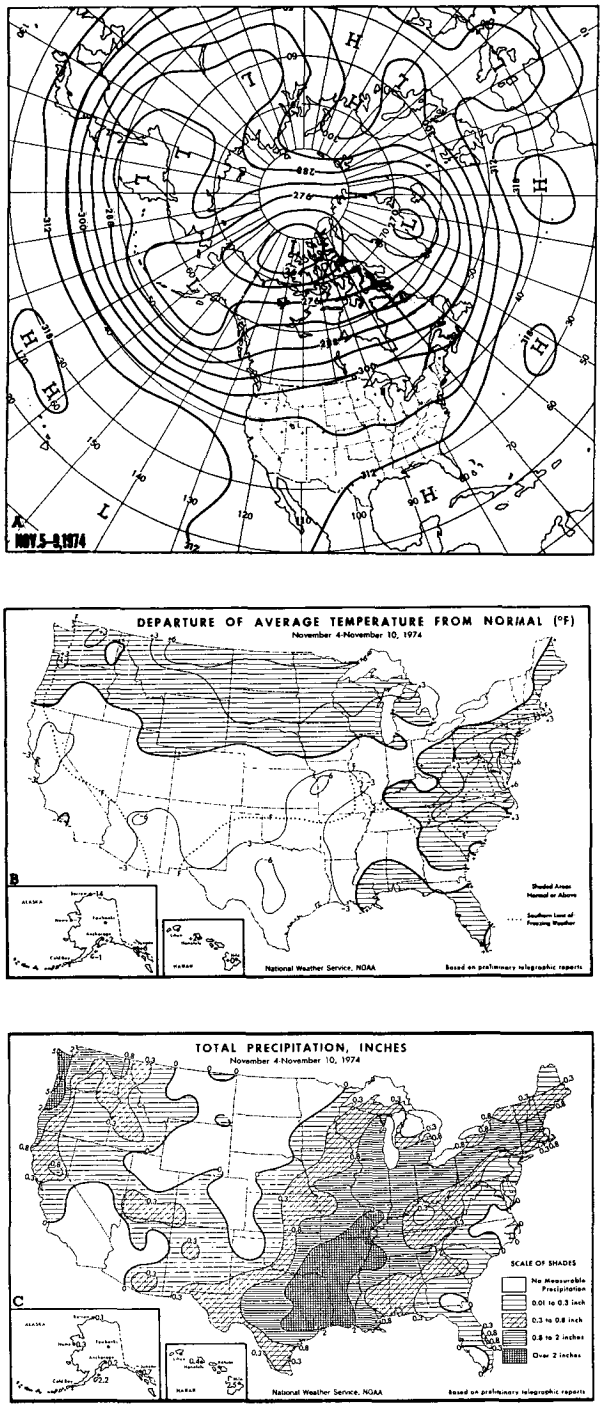


FIG. 7. (a) Mean 700-mb contours (dam) for 5–9 November 1974; (B) departure from normal of average surface temperature (°F); and (C) total precipitation (inches) for week of 4–10 November 1974 (from National Oceanic and Atmospheric Administration and Statistical Reporting Service, 1974).

temperatures were below normal. The highest maximum temperature for so late in the season was reported at Washington, D. C., on November 4 (84°F).

b. November 11–17

The circulation pattern amplified this week over much of the Northern Hemisphere; included was the development of a strong ridge over western portions of North America and a deep trough from Hudson Bay to the southern Mississippi Valley (Fig. 8). This con-

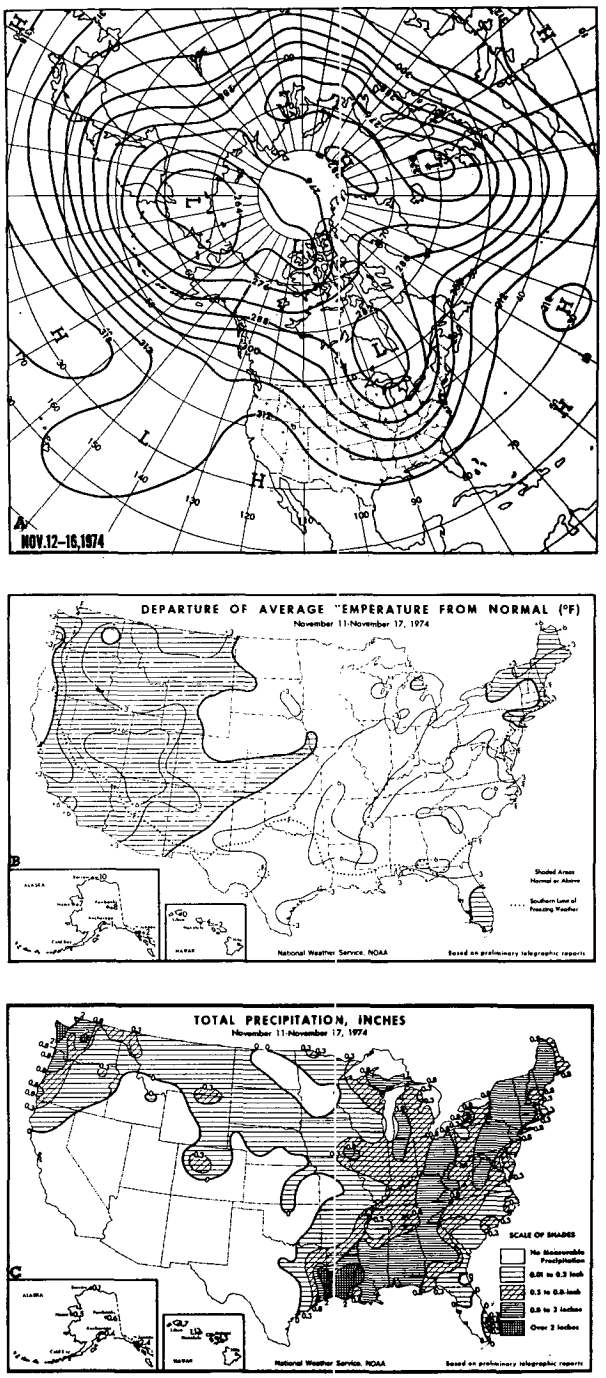
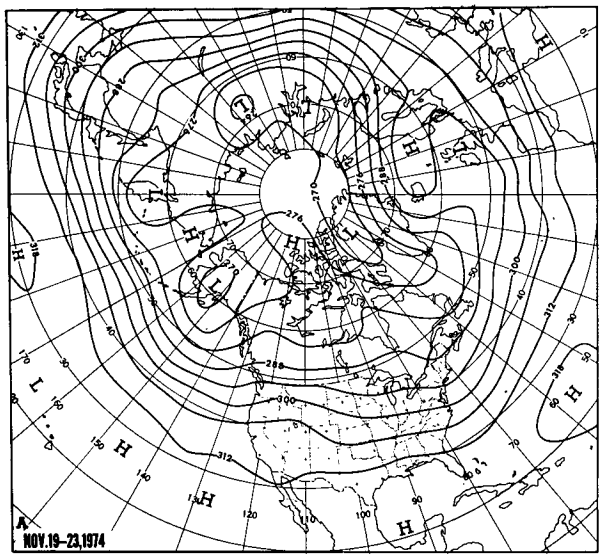
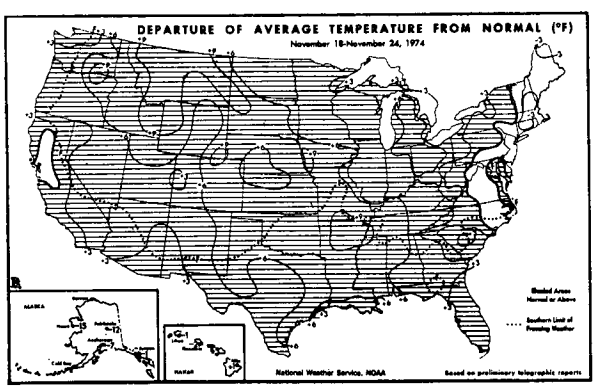


FIG. 8. Same as Fig. 7: (A) for 12–16 November 1974, (B) and (C) for week of 11–17 November 1974.

figuration led to increased advection of cold air masses over the eastern half of the United States, while the West warmed. The temperature at San Diego rose to 91°F—highest for so late in the season—on November 12th.

The deep mean trough brought precipitation to most of the eastern half of the country, but totals in the cooler and dryer air were considerably smaller than the previous week over the Mississippi Valley. With diminished onshore flow, totals in the Pacific Northwest also dwindled.





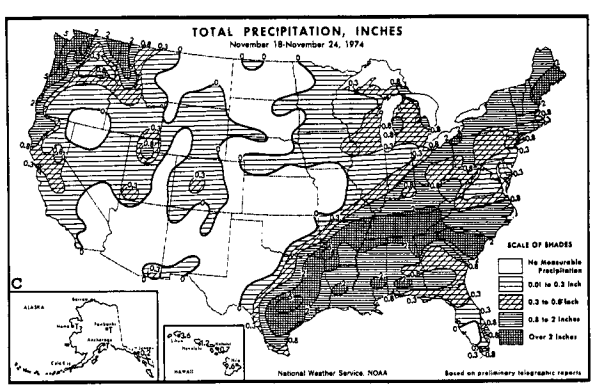
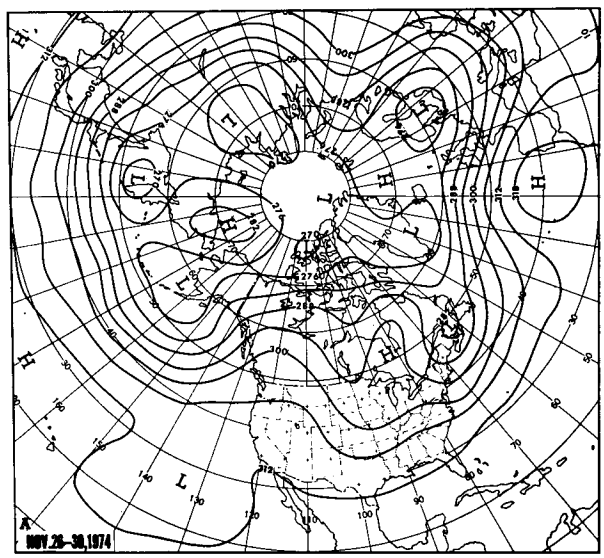
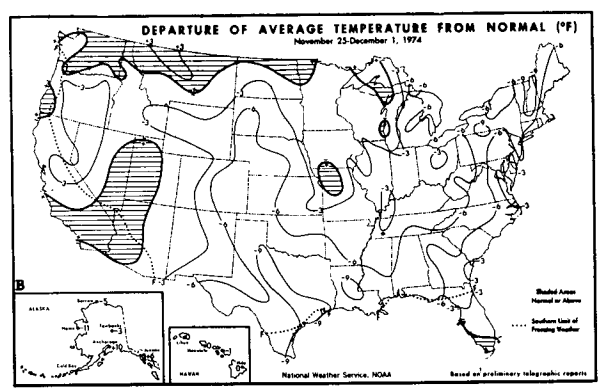


FIG. 9. Same as Fig. 7: (A) for 19–23 November 1974, (B) and (C) for week of 18–24 November 1974.





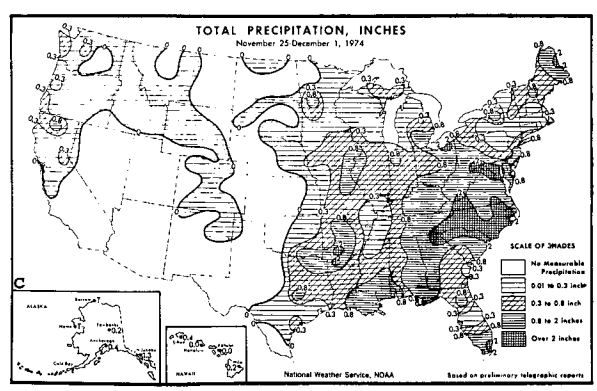


FIG. 10. Same as Fig. 7: (A) for 26–30 November 1974, (B) and (C) for week of 25 November–1 December 1974.

c. November 18–24

A mean trough progressed to the Gulf of Alaska, bringing increasing mid-latitude westerlies and a flattening flow pattern to North America this week (Fig. 9). The influx of maritime air masses produced the warmest week of the month. Highest temperature for so late in the season was observed at Huron, S. D., on 22 November (69°F) and at Pendleton, Ore., on 24 November (74°F).

Traveling waves in the westerlies produced frequent precipitation occurrences in the Northwest and over the eastern half of the country, while a rain shadow was observed just east of the Continental Divide.

d. November 25–December 1

As was the case two weeks earlier, the wave pattern amplified this week with a strong ridge developing in western North America and a deep complex of troughs forming east of the Continental Divide (Fig. 10). This again brought below-normal temperatures to most areas east of the Divide, while temperatures under the western ridge varied from a few degrees above to a few degrees below normal.

Precipitation was again observed over the eastern half of the country. Greatest totals occurred along the East Coast in the eastern edge of the cold air mass where a deep storm developed at the week's end. Little precipitation occurred under and immediately east of the western ridge.

REFERENCES

National Oceanic and Atmospheric Administration, U. S. Department of Commerce, and Statistical Reporting Service, U. S. Department of Agriculture, 1974: *Weekly Weather and Crop Bulletin*, **61**, Nos. 46–50; 12, 19, and 26 November 1974, and 3 and 10 December 1974.

Wagner, A. James, 1975: Weather and circulation of October 1974—Record early fall cold over the eastern half of the United States. *Mon. Wea. Rev.*, **103**, 78–85.