

WEATHER AND CIRCULATION OF NOVEMBER 1975

Near-Record Warmth over the Northeastern Quarter of the Nation

ROBERT R. DICKSON

National Meteorological Center, National Weather Service, NOAA, Washington, D. C. 20233

1. Mean circulation

The mean 700 mb circulation in November was characterized by low-amplitude wave patterns around most of the Northern Hemisphere (Figs. 1 and 2). At middle latitudes positive mean height anomalies were observed near normal November trough locations along the east coasts of Asia and North America and over Europe

while the western North American ridge was weaker than normal from Nevada to northwest Canada.

Weakness of the usually-dominant November troughs was linked to the occurrence of relatively deep mean troughs east of the Ural and Rocky Mountain ranges and over the central Atlantic. Enhanced southwesterly flow in advance of each of these mean troughs contrib-

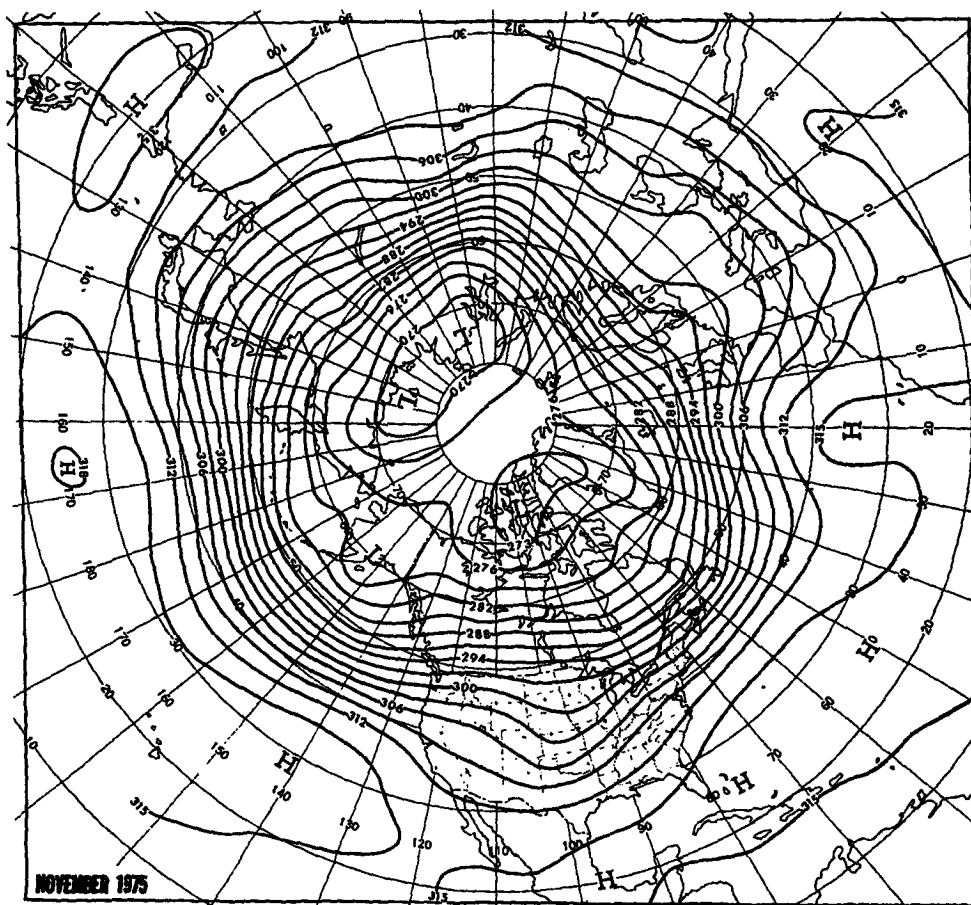


FIG. 1. Mean 700 mb height contours (dekameters) for November 1975.

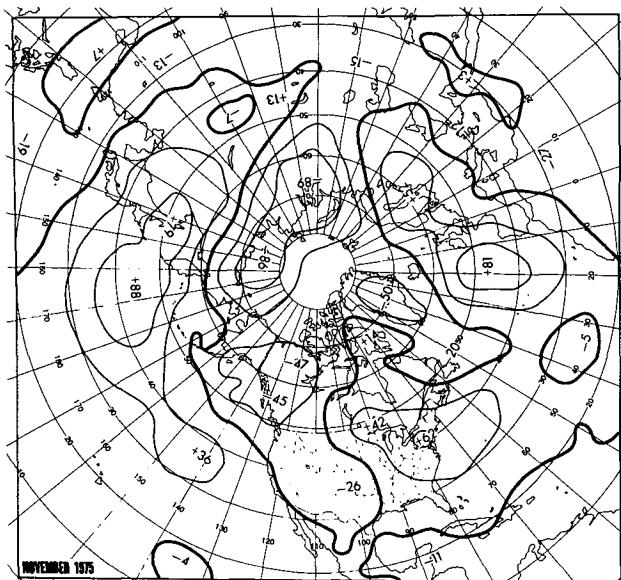


FIG. 2. Departure from normal of mean 700 mb height (m) for November 1975.

uted to the prevailing warmth and diminished baroclinic zones found along the coasts of Asia and North America and over Europe (Fig. 3). With energy conversions reduced in both coastal troughs, the westerlies were sub-normal south of 50°N along the coast of Asia and south of 40°N along the coast of North America. The axis of the mean 700 mb westerlies was displaced north of normal around most of the Northern Hemisphere (Fig. 4) and coincided with a band of stronger than

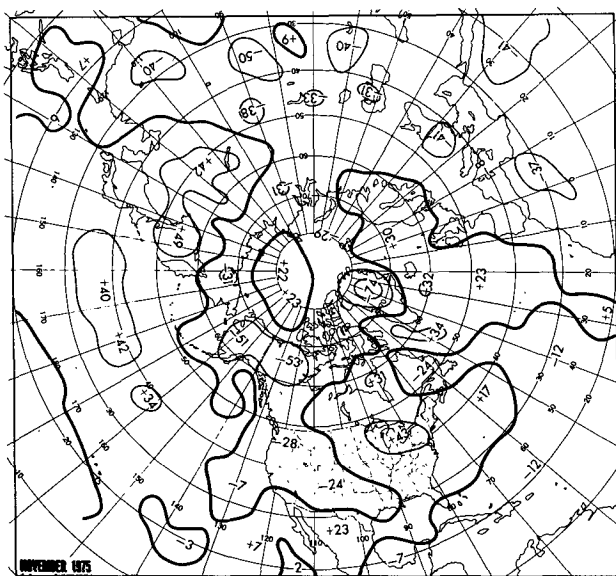


FIG. 3. Departure from normal of mean 1000 to 700 mb thickness (m) for November 1975.

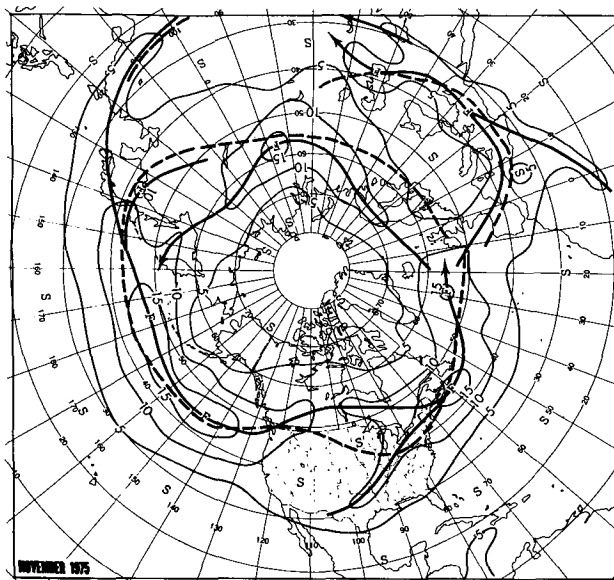


FIG. 4. Mean 700 mb geostrophic wind speed ($m s^{-1}$) for November 1975. Solid arrows indicate observed axes of maximum wind speed and dashed lines, the normal.

normal winds. While strongest mean 700 mb flow was connected with the central Pacific trough and its associated baroclinic field, the greatest excess of mean wind speeds above normal occurred in the secondary wind speed maximum over northeastern Asia.

A notable circulation change from October (Wagner, 1976) was the southward extension of the central Pacific trough. This trough assumed a positive tilt, in contrast to its predecessor of October, and was associated with a northward displacement of the axis of maximum winds along the west coast of North America.

2. Temperature

Mean temperatures exceeded normal in the eastern half of the Nation (Fig. 5), with record or near record

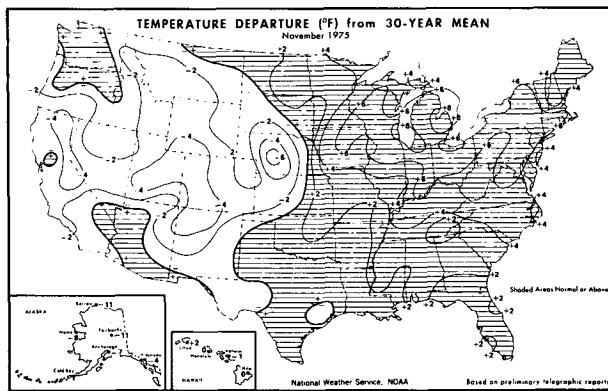


FIG. 5. Departure from normal of surface air temperature ($^{\circ}F$) for November 1975 (from National Oceanic and Atmospheric Administration and Statistical Reporting Service, 1975).

values for November observed over the northeastern quarter. Youngstown, Ohio, reported the warmest November of record while Lansing, Mich., Trenton, N.J., and Scranton, Pa., observed their second warmest. Hartford, Conn., as well as Boston and the Blue Hills Observatory in Massachusetts had their warmest November in at least seven decades. For many other locations it was the warmest November since 1931 or 1948.

This unusual warmth was favored by two circulation anomalies. Strong southwesterly flow between the Great Plains trough and the strong western Atlantic mean ridge advected warm air over the area in question. In addition, the very weak mean ridge over western Canada and accompanying fast westerlies over Canada tended to contain cold air masses in Canada and limit their excursions over the eastern United States. Below normal mean temperatures were observed over much of western half of the Nation, where mean 700 mb heights were below normal.

Temperatures averaged below normal in most of Alaska this month as a deep Gulf of Alaska trough minimized warm air advection there. Mean temperatures in Hawaii were generally near normal.

3. Precipitation

Precipitation exceeded normal over much of the area from the Rocky Mountains to the East Coast (Fig. 6) in connection with vorticity maxima or storm systems moving into the Great Plains trough from the east Pacific and thence eastward and northeastward. The dry zone from Ohio to Delaware occurred under and east of a strong upper level mean ridge. This was the wettest November of record at Duluth, Minn., second wettest at Rochester, Minn., and fifth wettest at both Topeka, Kan., and Sioux City, Iowa.

Alaska, shielded from warm air incursions, was quite dry this month. Anchorage received only 10% of its normal November precipitation. Although precipitation in Hawaii was generally not far from normal, Honolulu

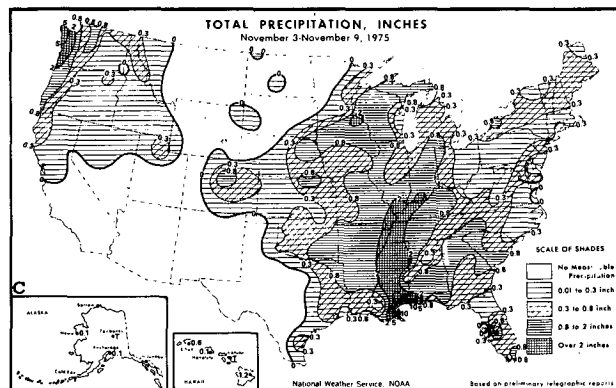
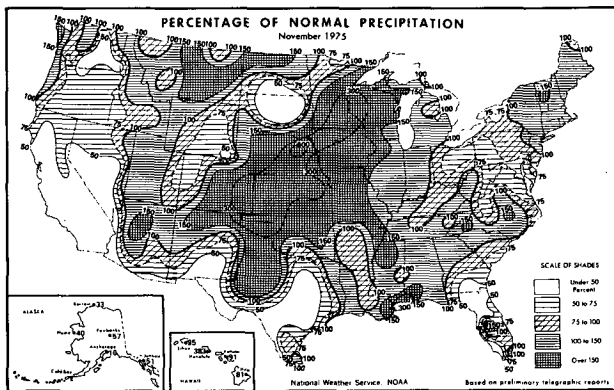
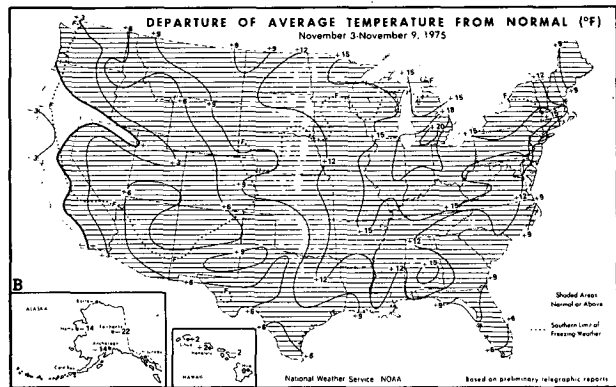
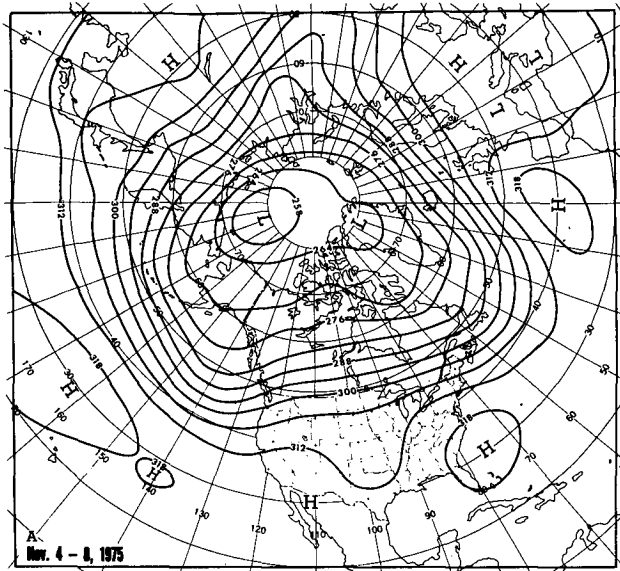


FIG. 6. Percentage of normal precipitation for November 1975 (from National Oceanic and Atmospheric Administration and Statistical Reporting Service, 1975).

FIG. 7. (A) Mean 700 mb contours (dam) for 4-8 November 1975; (B) departure from normal of average surface air temperature (°F) and (C) total precipitation (inches) for week of 3-9 November 1975 (from National Oceanic and Atmospheric Administration and Statistical Reporting Service, 1975).

reported nearly four times its normal November amount. Almost all of this occurred during a 4-day period (24–27 November).

4. Variability within the month

a. 3–9 November

A strong circumpolar vortex was observed this week with fast westerlies at upper middle latitudes around the Hemisphere (Fig. 7). In North America deep troughs over the Gulf of Alaska and Newfoundland combined with a strong ridge over the eastern United States to give fast westerlies across Canada.

This largely excluded polar continental air and brought record warmth to an unusually large portion of the country. Highest temperatures for so late in the season were equalled or exceeded in the Pacific Northwest on the 3rd and subsequently across the northern half of the country, reaching the middle and north Atlantic Coast States on the 8th, 9th or 10th. The record high temperature for the month was equaled on the 3rd at Lewiston, Idaho, and on the 4th at Williston, N.D., while new record highs were established on the 5th at Havre, Mont. (78°F), Great Falls, Mont. (76°F), and Montgomery, Ala. (87°F).

Greatest precipitation totals were found along the northwest coast in advance of the Gulf of Alaska trough and over the lower Mississippi Valley, east of the southern Great Plains trough.

b. 10–16 November

The mean flow pattern amplified around the Hemisphere this week (Fig. 8). Near North America, the Gulf of Alaska trough deepened and extended southward, a ridge grew from the southwestern United States to central Canada, and a mean trough progressed to the East Coast and deepened.

Although the changing long-wave pattern moderated the extreme warmth of the previous week, the influence of the deep Gulf of Alaska Low was still apparent—warm weather prevailed over most of the Nation. Precipitation continued heavy along the northwest coast and in advance of the progressive eastern trough. A rapidly deepening storm system moving out of the central Great Plains brought strong winds to the Great Lakes on the 10th and resulted in the sinking of an ore ship in eastern Lake Superior.

c. 17–23 November

Most mean waves around the Hemisphere retrograded from their position the previous week (Fig. 9). Strong mean ridges were found along the east coast of the United States and from just off the west coast of the United States to northwestern Canada while a mean trough occurred over the central United States.

The resulting advective field brought subnormal tem-

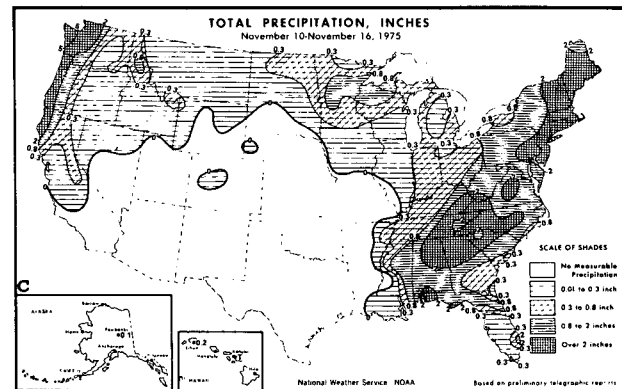
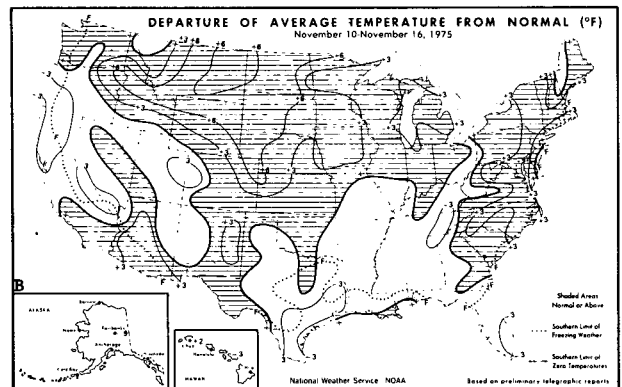
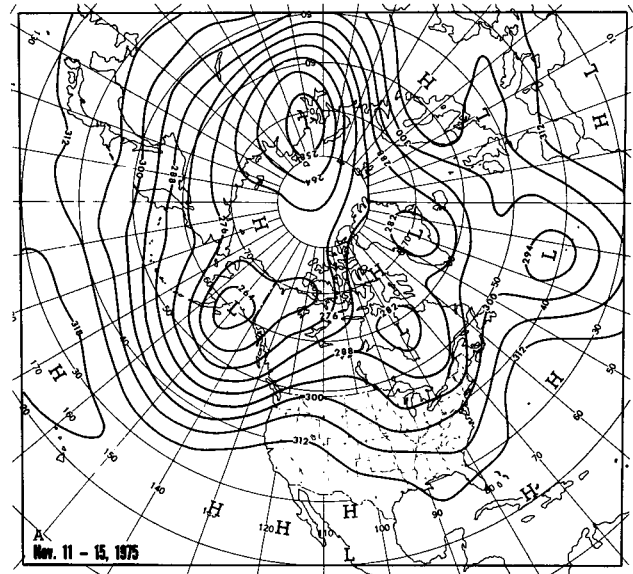
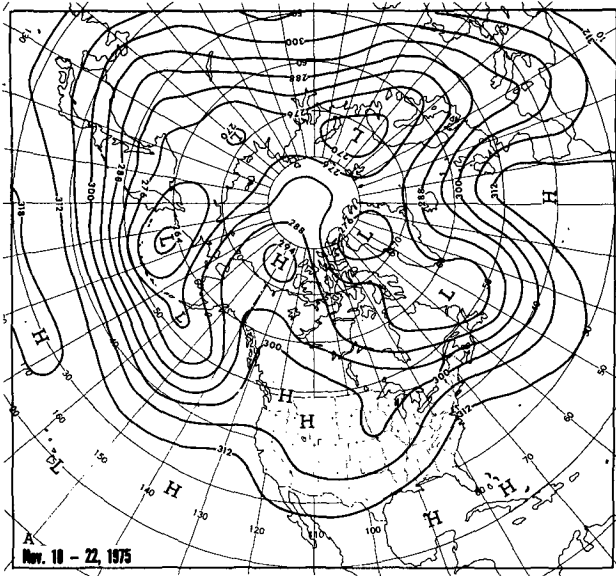


FIG. 8. As in Fig. 7: (A) for 11–15, November 1975; and (B) and (C) for week of 10–16 November 1975.

peratures to the West and warm weather to most of the East. Toward the end of the week, cool air spread over the South. Heaviest precipitation amounts occurred



d. 24-30 November

A retrograding mean ridge, interacting with deep troughs over eastern Asia and the south-central Pacific,

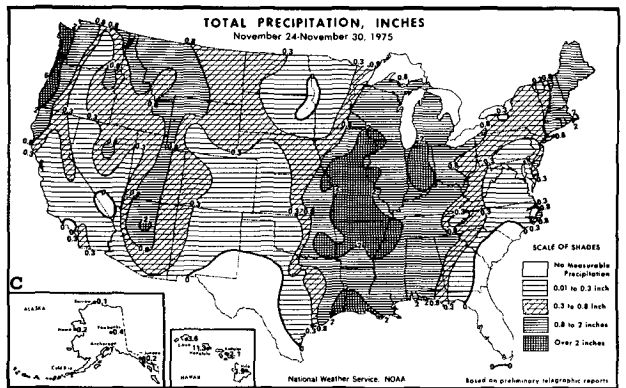
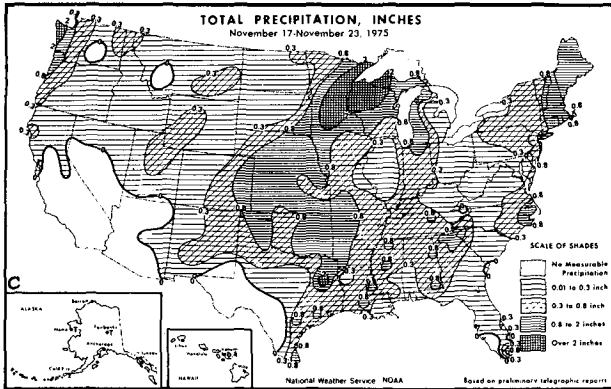
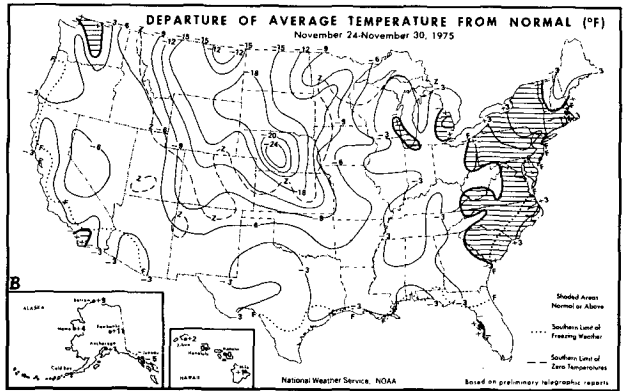
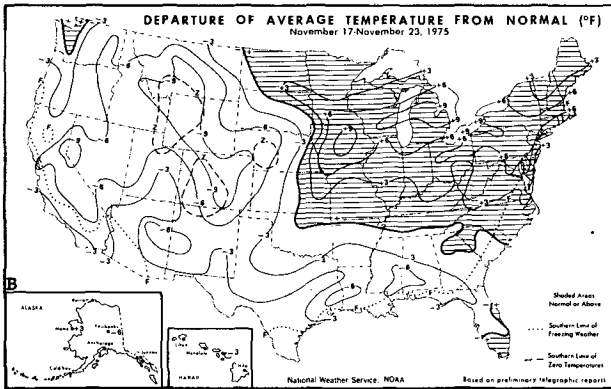
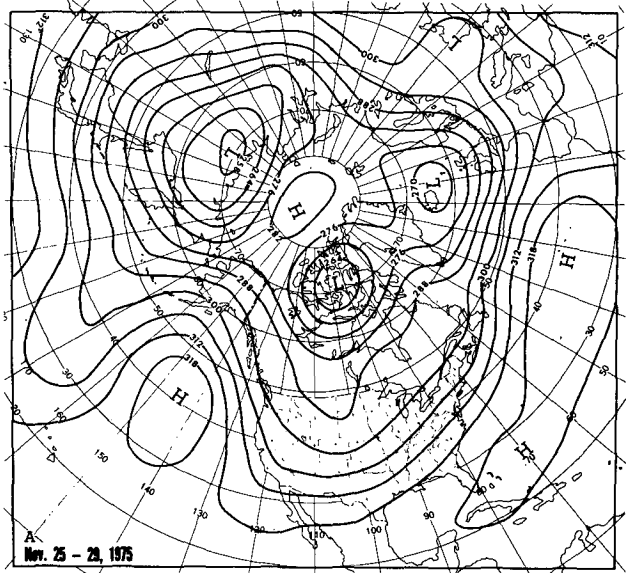


FIG. 9. As in Fig. 7: (A) for 18-22 November 1975; and (B) and (C) for week of 17-23 November 1975.

FIG. 10. As in Fig. 7: (A) for 25-29 November 1975; and (B) and (C) for week of 24-30 November 1975.

near the central trough. A deepening storm associated with this trough gave blizzard conditions to parts of the northern and central Great Plains on the 19th and 20th.

developed strongly over the eastern Pacific and Alaska this week (Fig. 10). Strong northwesterly flow between this ridge and a deep mean trough from north-central Canada to the southwestern United States drove very cold air southward over most of the United States. The widespread cold weather of this week was in striking contrast to the record-breaking warmth early in the month. Lowest temperatures for so early in the season were observed at Wichita, Kan., on the 26th and at Fort Smith, Ark., on the 27th. The latter temperature (13°F) was a record low for November. A record November low temperature (26°F) was also observed at Fresno, Calif., on the 29th while the minimum temperature at Stockton, Cal., on that day (26°F) tied the previous low for November.

Storm systems and vorticity maxima dropping into the western trough gave widespread precipitation as did storms moving out of the mean trough and traversing the Great Lakes. The relatively dry area east of the central and southern Rocky Mountains was a rain shadow effect where fast westerlies crossed the mountains.

The deep trough west of Hawaii brought the first winter-type storm of the season to that area. This storm gave 11.34 of the 11.54 inches of rainfall observed this month at Honolulu.

5. Tropical activity

This was an active November for tropical storms in the west Pacific. Tropical Storm Grace formed south of Japan on the 1st, became a frontal wave the next day and then moved rapidly across the Pacific to the coast of British Columbia on the 7th. Vigorous deepening as an extratropical wave was delayed until the storm

reached the enhanced baroclinic zone south of the Aleutians on the 5th. The mean trough along the east coast of Asia was quite weak this week with the main belt of 700 mb westerlies located over northeastern Siberia (Fig. 7A).

Tropical Storm Helen formed east of Vietnam on the 4th, but was downgraded the following day.

Tropical Storm Ida formed on the 7th southeast of Japan, became a typhoon 3 days later, and a frontal low east of Japan on the 12th. While this low became slow moving and ill-defined in the central Pacific on the 13th, a peak of the warm sector wave deepened and moved rapidly to the coast of British Columbia by the 15th. As was the case earlier in the month, the Asiatic coastal trough remained very weak.

Tropical Storm June, final storm of the month, formed near 6°N, 142°E on the 17th and became a strong typhoon the following day. The storm recurved south of Japan on the 22nd, became extratropical east of Japan the following day and deepened while moving northward to northeastern Siberia on the 25th.

Only one tropical storm, Priscilla, was observed in the eastern Pacific this month. It formed on the 5th near 14°N, 104°W and dissipated on the 8th. No tropical storms were observed in the North Atlantic.

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