

WEATHER AND CIRCULATION OF AUGUST 1976

Extremes of Wetness in the West and Dryness in the Midwest

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1. Mean circulation

A deep arctic low, surrounded by a set of strong, warm ridges, was a major feature of the mean 700 mb circulation this month (Figs. 1, 2 and 3). The most extreme mean height anomalies were in the arctic low and the ridge over Great Britain; departures in both cases were more than three standard deviations from the normal.

As was the case in July (Wagner, 1976), storms deepening in the strong baroclinic zone along the fringes of the Arctic (Fig. 3) helped maintain a circumpolar

belt of strong winds (Fig. 4). Mean 700 mb wind speeds exceeded normal by more than 5 m s^{-1} in this belt and were 14 m s^{-1} greater than normal over Iceland. This represented a substantial northward shift from normal of the principal 700 mb wind maxima over all of the Northern Hemisphere except the Pacific sector. Over the North Pacific the mid-latitude westerlies continued strong between the persistently deep Bering Sea low and central Pacific high.

Throughout most of the Northern Hemisphere the 700 mb wave phase during August was very similar to

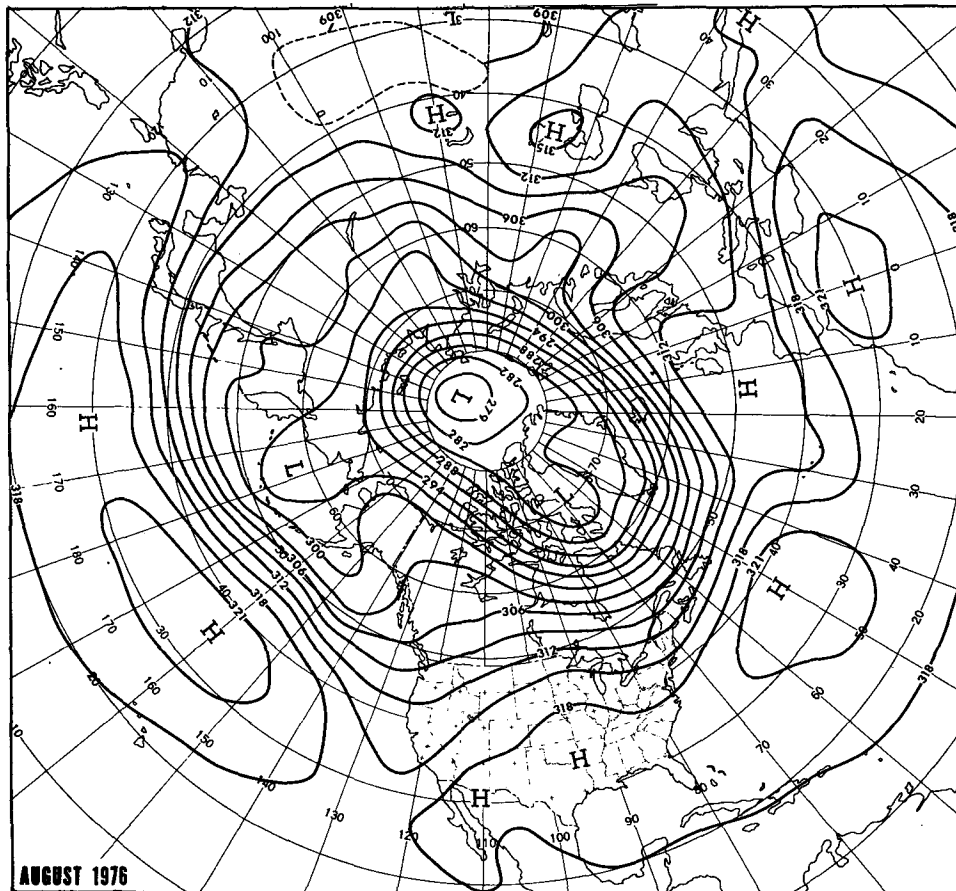


FIG. 1. Mean 700 mb contours (dam) for August 1976.

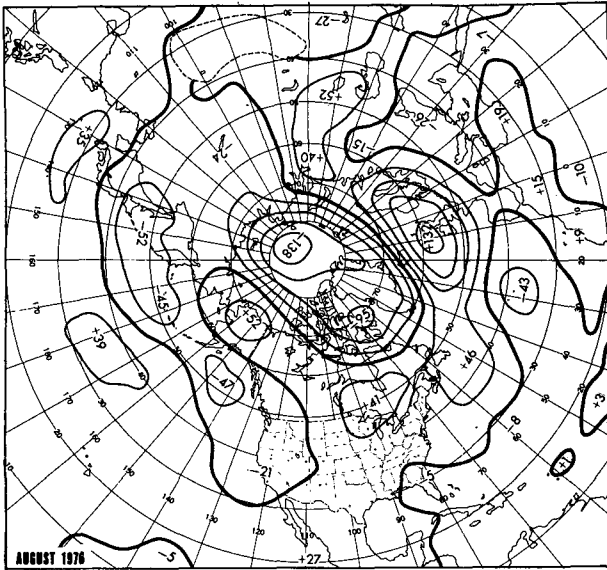


FIG. 2. Departure from normal of mean 700 mb height (m) for August 1976.

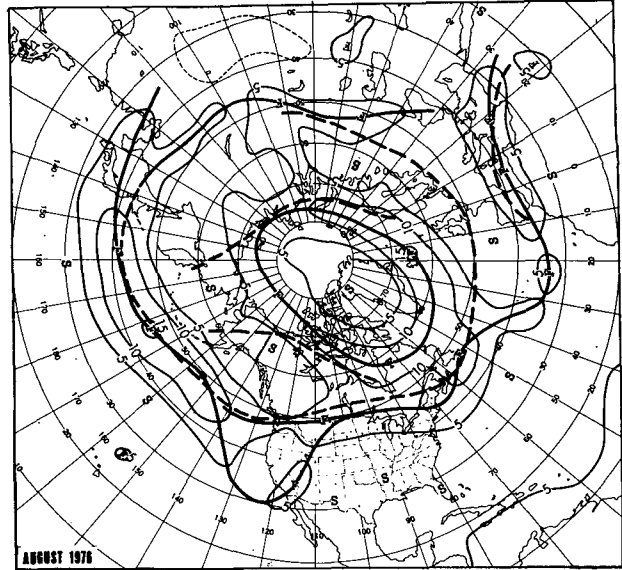


FIG. 4. Mean 700 mb geostrophic wind speed ($m s^{-1}$) for August 1976. Solid arrows indicate observed axes of maximum wind speed and dashed lines, the normal.

that of July (Wagner, 1976). In this connection a deep trough was observed along the west coast of the United States and a strong ridge over the Mississippi Valley. The positive height anomaly center associated with the latter feature was located north of the Great Lakes—an important consideration with respect to the associated weather. As the 700 mb westerlies increased over southeastern Canada, the mean trough along the United States east coast filled substantially.

The drought-producing mean 700 mb blocking ridge over western Europe moved little from July to August but strengthened markedly to the south of the intensi-

fying circumpolar wind maximum. The location of the mean 700 mb high center to the southwest of Great Britain was without precedent in the series of mean analyses beginning in 1948. Downstream from the blocking ridge, an amplified wave pattern was observed across Eurasia.

2. Temperatures

Enhanced westerly flow associated with the deep West Coast trough pushed cool, maritime air masses deep into the West this month (Fig. 5). A number of stations in that region reported one of the coldest Augusts of record (Table 1). Mean temperatures were also below normal over most of the East and South as strong ridges over western Canada and the north central United States combined to advect cold air masses

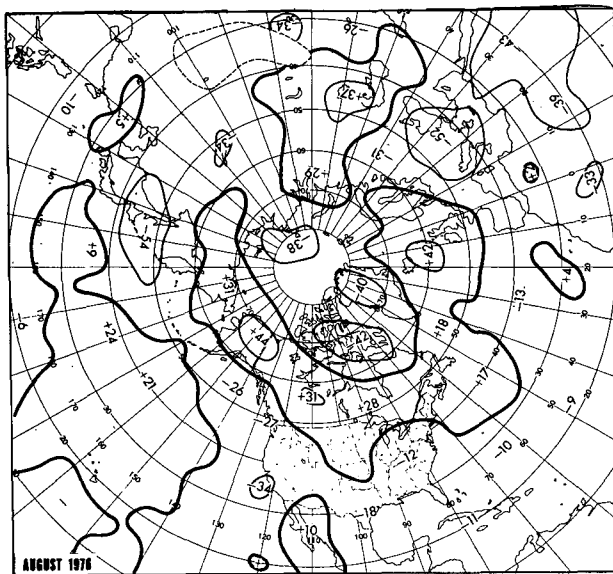


FIG. 3. Departure from normal of mean 1000-700 mb thickness (m) for August 1976.

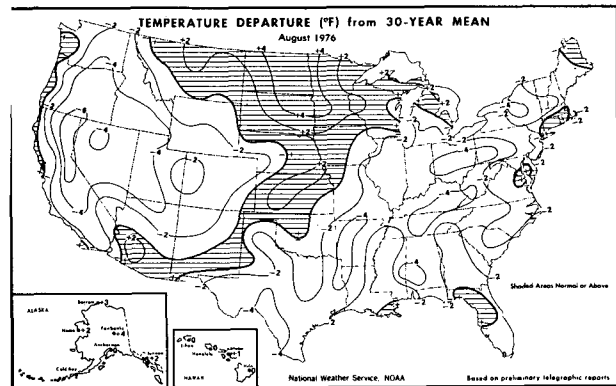


FIG. 5. Departure from normal of average surface air temperature ($^{\circ}F$) for August 1976 (National Oceanic and Atmospheric Administration and Statistical Reporting Service, 1976).

TABLE 1. Record and near-record monthly mean temperatures observed during August 1976.

Station	Temperature (°F)	Anomaly (°F)	Remarks
Fresno, Calif.	72.7	-5.6	Coldest August
Medford, Ore.	67.3	-3.1	2nd coldest August
Pendleton, Ore.	67.7	-3.8	2nd coldest August
Milford, Utah	68.6	-4.0	2nd coldest August

southward. Above normal mean temperatures were concentrated in the north-central states near and west of the positive 700 mb height anomaly center. Temperatures were generally above normal near the strong mean ridge observed over Alaska.

3. Precipitation

The deep West Coast trough brought greater than normal precipitation to much of the West (Fig. 6). In parts of California and Oregon monthly totals were more than five times the normal and record or near-record amounts were observed at several locations (Table 2). Spotty areas of above normal precipitation also occurred in the eastern half of the country, mainly in connection with the passage of cold fronts in the interior and two tropical storms along the coast.

Extensive areas of subnormal rainfall occurred in the vicinity of the strengthening mean 700 mb ridges in the southwestern and central portions of the Nation. It was one of the driest Augusts of record in the Midwest (Table 2), and the Crop Moisture Index at the end of the month indicated a moisture deficit from the Southwest to the Great Lakes.

It was also quite dry this month in Alaska under a strong mean ridge. Rainfall was subnormal at most of the available stations in Hawaii.

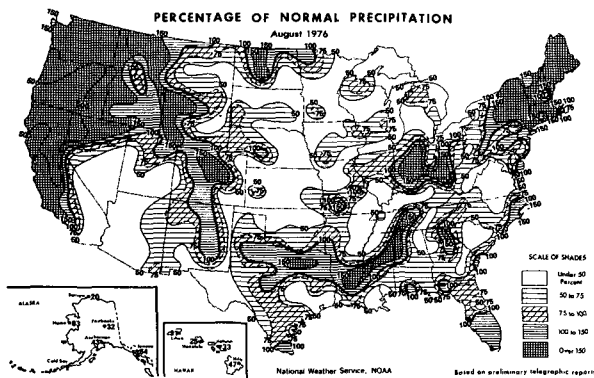


FIG. 6. Percentage of normal precipitation for August 1976 (National Oceanic and Atmospheric Administration and Statistical Reporting Service, 1976).

4. Weekly variability

a. 2-8 August

This was the coldest week of the month for the Nation as a whole (Fig. 7). While cool Pacific air dominated the

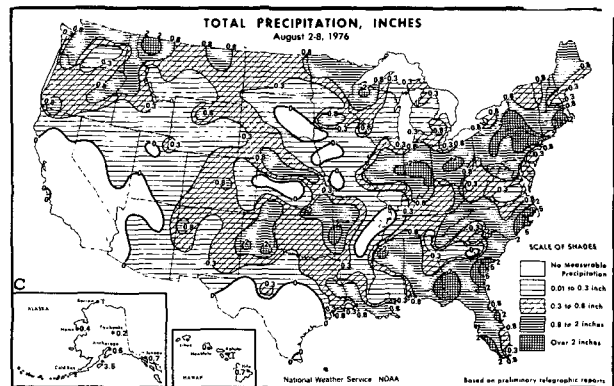
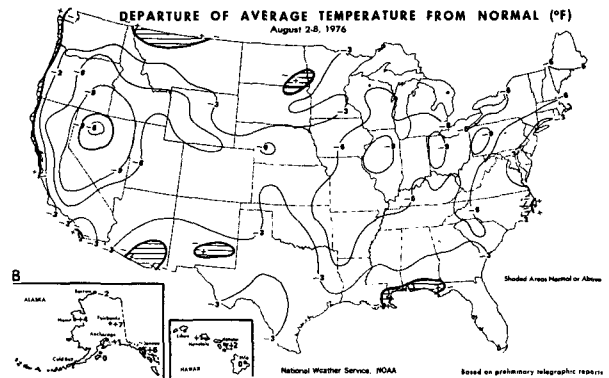
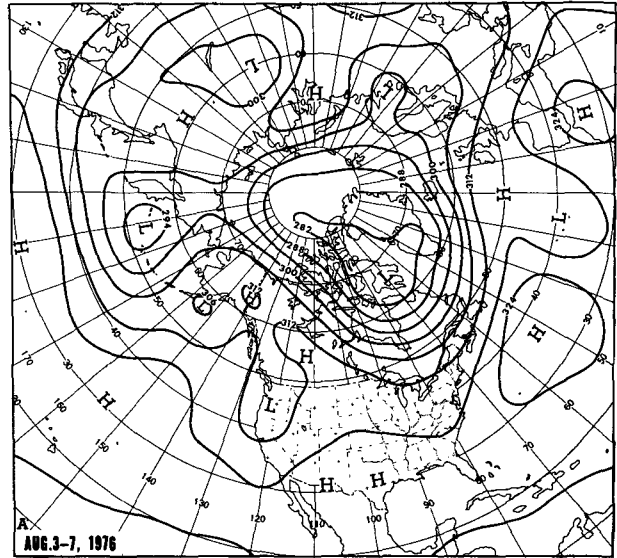


FIG. 7. (A) Mean 700 mb contours (dam) for 3-7 August 1976, (B) departure from normal of average surface air temperature (°F), and (C) total precipitation (inches) for week of 2-8 August 1976 (National Oceanic and Atmospheric Administration and Statistical Reporting Service, 1976).

TABLE 2. Record and near-record precipitation totals observed during August 1976.

Station	Amount (inches)	Anomaly (inches)	Remarks
Mt. Shasta, Calif.	2.55	+2.24	Wettest August
Milford, Ore.	2.83	+2.50	Wettest August
Kalispell, Mont.	3.78	+2.48	Wettest August
Stockton, Calif.	0.52	+0.49	2nd wettest August
Huron, S.D.	0.14	-1.84	Driest August
Chicago, Ill.	0.80	-2.34	Driest since 1894
Columbia, Mo.	0.21	-2.98	2nd driest August
Evansville, Ind.	0.24	-2.71	2nd driest August
Sioux City, Iowa	0.30	-2.65	2nd driest August
Omaha, Neb.	0.62	-3.35	3rd driest August
Marquette, Mich.	0.50	-2.51	3rd driest August
Charlotte, N.C.	0.90	-3.06	3rd driest August

West, a strong ridge over northwest Canada combined with a deep Baffin Island trough to drive cold air masses over most areas east of the Continental Divide.

Precipitation was widespread; it was related to the upper level mean trough in the West and to cold fronts and associated weak lows east of the Divide.

b. 9-15 August

The wave pattern over North America flattened this week, leading to a moderation of the extreme coolness of the previous week (Fig. 8). Diminution of the previously strong northerly flow near Hudson Bay was notable.

Most of the nation received some precipitation. Heaviest totals occurred from Hatteras to New England in connection with Hurricane Belle, which moved over Long Island and, with diminished strength, through New England.

c. 16-22 August

The wave pattern over North America had about the same phase as the previous week but amplified strongly as a trough deepened along the West Coast and a strong ridge built over the Great Lakes (Fig. 9). This continued the cold regime over the West but brought temperatures well above normal in north-central portions of the country. A slowly transforming cold surface high to the east of the upper level ridge kept most of the East and South cold.

This was a dry week near and to the east of the amplifying mean ridge. However, precipitation was widespread in advance of the West Coast trough, and weekly totals were fairly large in the easterly or north-easterly mean flow over the South. Tropical Storm Dottie, which formed from a depression over southern Florida and crossed the South Carolina coast, produced most of the rain in the Southeast.

d. 23-29 August

The flow pattern flattened and waves progressed this week (Fig. 10). Mean ridges moved to the East and

the intermountain region of the West, while a weak mean trough progressed to the Great Plains. This was the warmest week of the month and the first week with above normal mean temperatures in most of the eastern half of the Nation and in parts of the Southwest.

Heaviest precipitation occurred between the Great Plains trough and the eastern ridge where a bountiful supply of Gulf moisture was brought in.

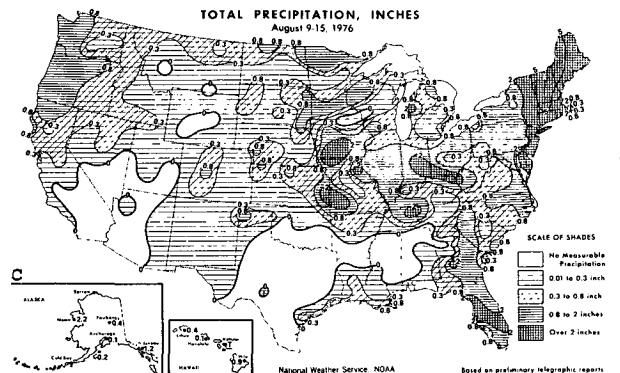
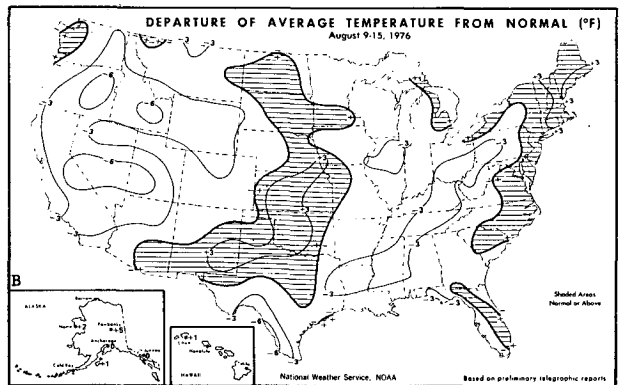
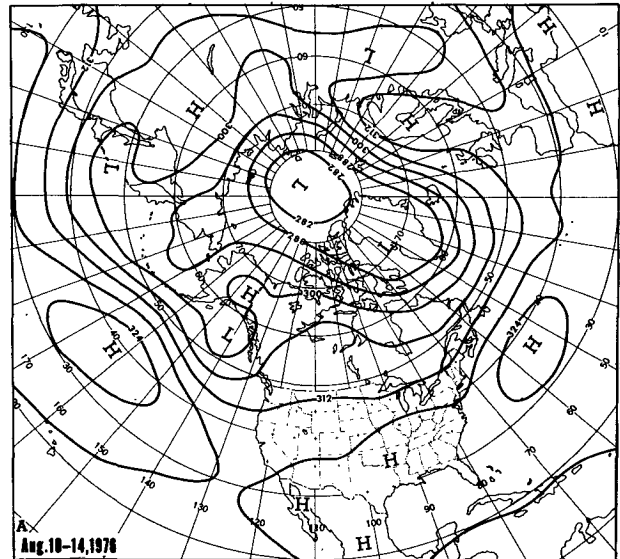


FIG. 8. As in Fig. 7 except for (A) 10-14 August 1976, and (B) and (C) week of 9-15 August 1976.

5. Tropical activity

This was a rather active month for tropical storms in the Atlantic with five named storms spread throughout the month. Tropical Storm Anna, which had formed on 30 July, rapidly declined to low status on 1 August.

Tropical Storm Belle formed on 7 August over the warm water east of the Bahama Islands, became a hurri-

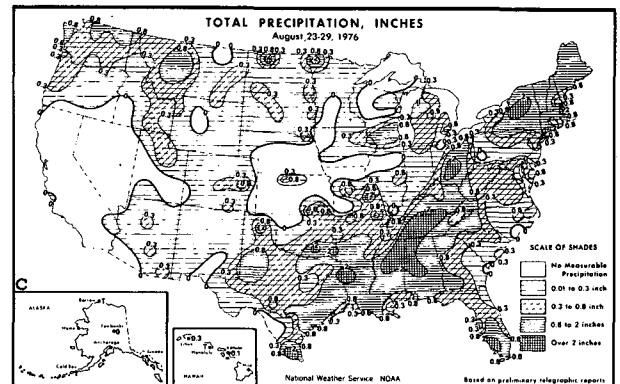
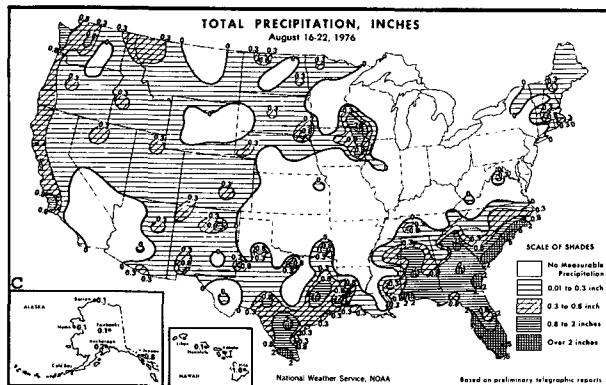
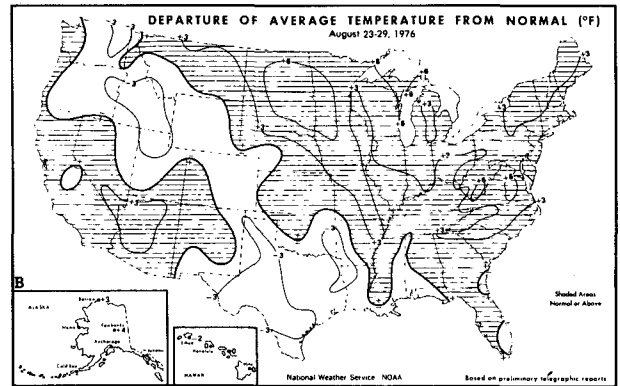
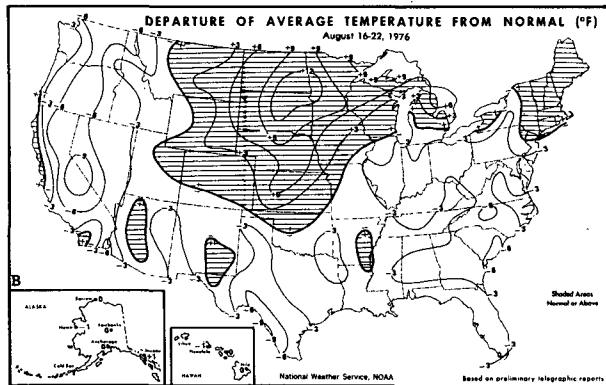
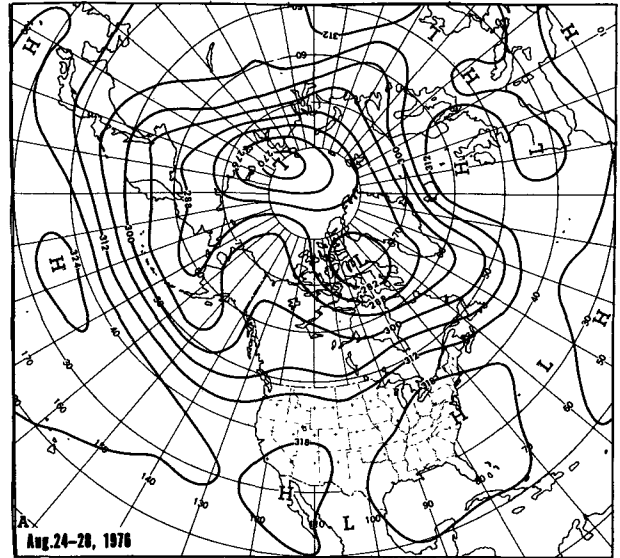
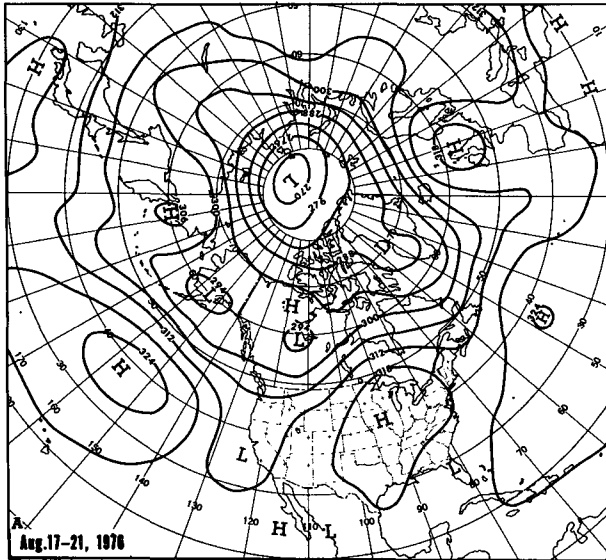


FIG. 9. As in Fig. 7 except for (A) 17-21 August 1976 and (B) and (C) week of 16-22 August 1976.

FIG. 10. As in Fig. 7 except for (A) 24-28 August 1976, and (B) and (C) week of 23-29 August 1976.

cane the following day and moved northward along the East Coast. It crossed Long Island near midnight on 9 August and weakened while crossing New England and bringing heavy rains to that area.

Tropical Storm Candice formed on 19 August about 10° east of Cape Hatteras. It moved slowly northeastward, became a hurricane unusually far to the north (near 41°N, 55°W) on 23 August, weakened to a tropical

storm east of Newfoundland on 24 August, and was downgraded the following day.

Emmy reached tropical storm intensity east of Puerto Rico on 23 August, and followed a serpentine path which led generally to the northeast. It was of hurricane intensity from 26–31 August. Tropical Storm Frances was first observed east of Puerto Rico on 29 August and became a hurricane the following day.

There were only three named storms in the eastern Pacific this August. Tropical Storm Gwen was long-lived (6–14 August) but never became a hurricane. Subsequent Tropical Storms Hyacinth and Iva formed on 8 and 26 August, respectively, and were each of hurricane intensity for several days. All of the storms moved westward.

Three tropical storms formed south of Japan this month and subsequently moved westward to the coast of China. These were Billie (4 August), Dot (19 August) and Ellen (21 August). Of these only Billie reached hurricane intensity. A fourth tropical storm, Clara, formed near the southern China coast on 6 August and dissipated the following day.

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- Wagner, A. James, 1976: Weather and circulation of July 1976—Wet in the Southwest but continued drought in the Northern Plains. *Mon. Wea. Rev.*, **104**, 1331–1338.