

## WEATHER AND CIRCULATION OF AUGUST 1975 Record Rainfall Over the Central Great Lakes

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### 1. Mean circulation

The mean 700 mb circulation during August displayed two strong, well defined westerly wind belts, one about the Polar Low and the other at mid-latitudes (Figs. 1, 2, and 3). Greatest advection of cold air out of the Arctic was over northern Europe and Asia where a moderately strong baroclinic zone was maintained (Fig. 4). Another enhanced baroclinic zone occurred in the east Pacific and western North America.

Although the mean 700 mb wave pattern over the Pacific was similar to that of July (Wagner, 1975), strengthening of the east Pacific ridge and weakening

of the western Canadian ridge accompanied increasing zonal westerlies and progression over the United States. This brought a mean ridge to the East and a mean trough south of Newfoundland.

The wave pattern over eastern North America and the Atlantic displayed several out of phase relationships. However, the mean ridge over Scandinavia amplified substantially as did the trough to its east.

### 2. Temperature

Increased advection of maritime air masses brought below normal temperatures to most of the West this

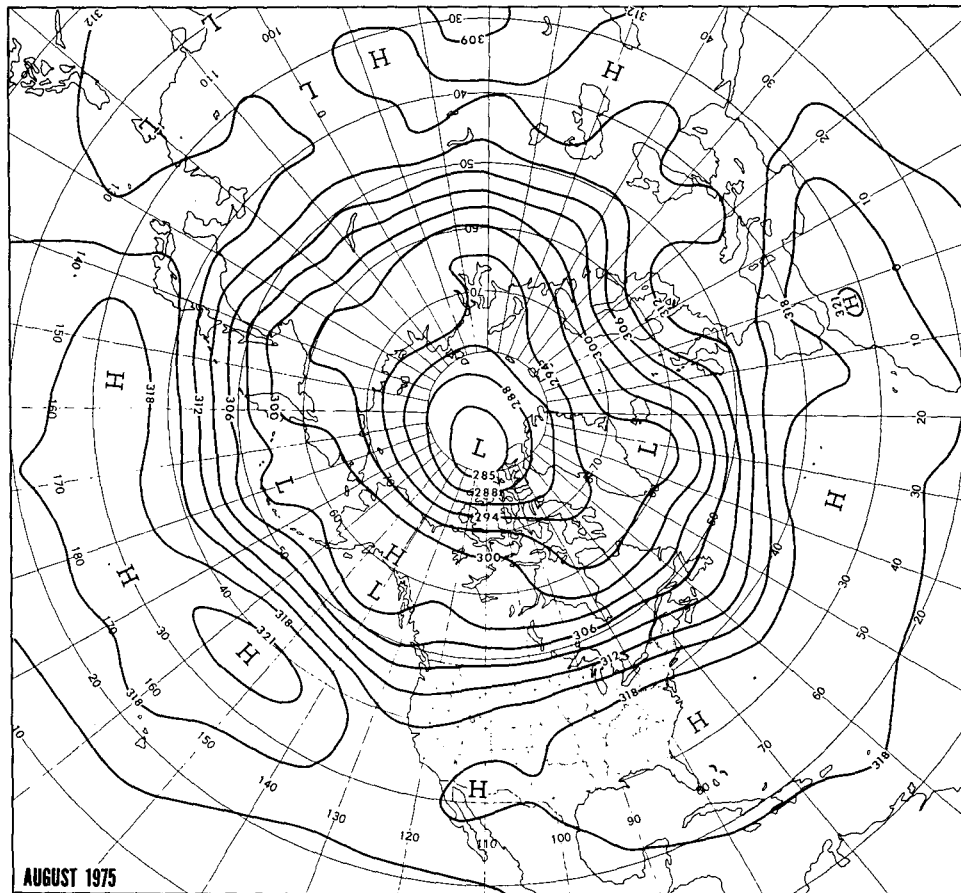


FIG. 1. Mean 700 mb height contours (dekameters) for August 1975.

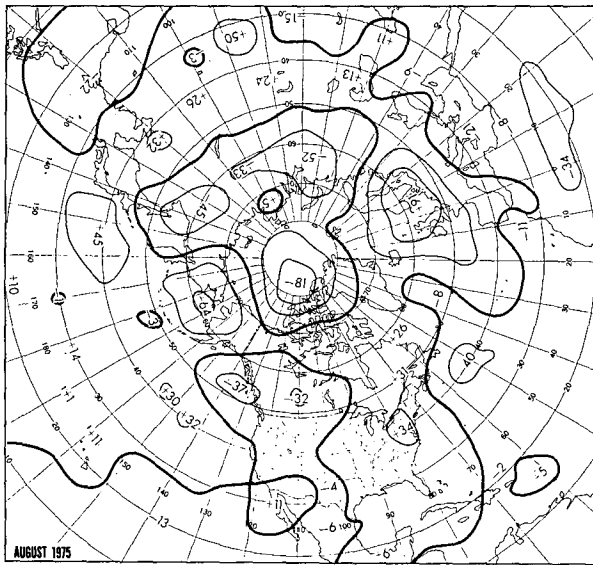


FIG. 2. Departure from normal of mean 700 mb height (m) for August 1975.

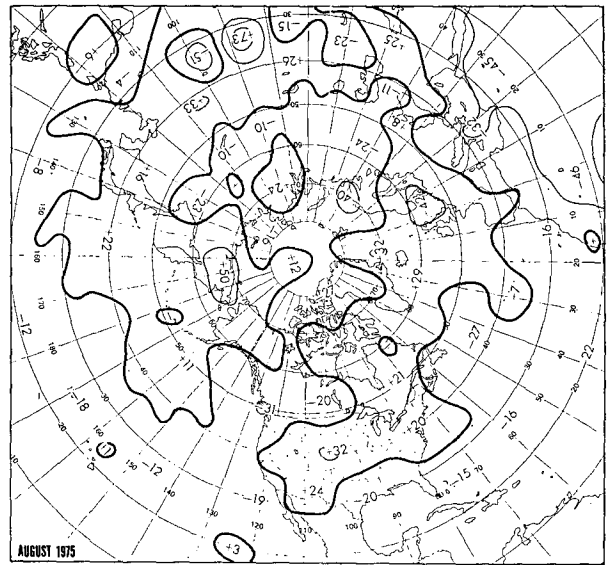


FIG. 4. Departure from normal of mean 1000 to 700 mb thickness (m) for August 1975.

month while progression of the mean ridge to the East gave above normal temperatures to much of that area (Fig. 5). Temperatures persisted above normal in parts of the upper and middle Mississippi Valley and adjacent Great Plains—an area of July drought (Wagner, 1975). Temperatures were below normal for the third consecutive month over the southern Great Plains and lower Mississippi Valley. This was one of the coldest Augusts of record at Fresno, Cal., Helena, Mont., and Spokane, Wash.; while Beckley, W. Va. had its warmest August of record and the mean temperature at Wilmington, N. C. equalled the record high set in 1900.

Alaska, located between two strong westerly wind maxima, experienced relatively warm temperatures except for the north and south coast. Sea ice conditions along the Alaska north coast were reported to be more severe than usual. Temperatures in Hawaii generally averaged below normal.

3. Precipitation

The belt of strong westerlies extending from the east Pacific across the northern border of the United States brought frequent rain producing systems into the far West and along the northern border (Fig. 6). Greater than normal precipitation was also observed over much of the area between the Rocky Mountains and the mean 700 mb ridge in the East. A notable exception, however, was the dry area east of the Rocky Mountains. Relatively dry conditions also prevailed along the East Coast near the mean ridge.

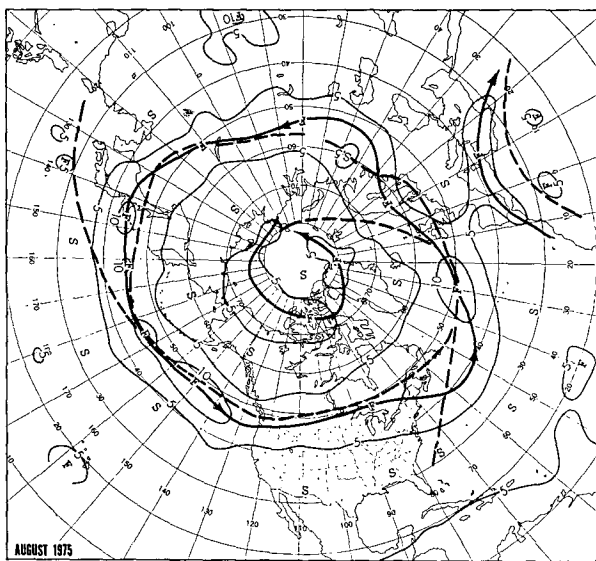


FIG. 3. Mean 700 mb geostrophic wind speed for August 1975. Solid arrows indicate observed axes of maximum wind speed and dashed lines, the normal.

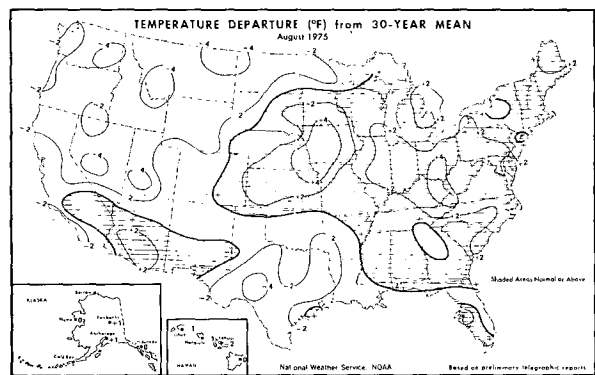


FIG. 5. Departure from normal of average surface air temperature (°F) for August 1975 (from National Oceanic and Atmospheric Administration and Statistical Reporting Service, 1975).

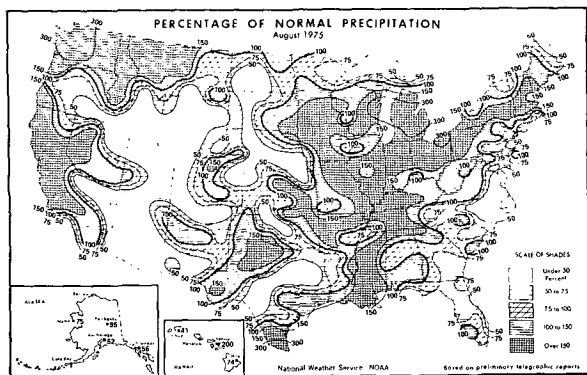


FIG. 6. Percentage of normal precipitation for August 1975 (from National Oceanic and Atmospheric Administration and Statistical Reporting Service, 1975).

This was the wettest August of record at Detroit, Houghton Lake, Muskegon and Lansing, Mich., as well as Cleveland, Ohio, and the second wettest at Fort Wayne, Ind., and Olympia, Wash. It was the eighth consecutive wet month at Helena, Mont., making the first eight months of the year the wettest on record there. On the other hand, this was one of the driest Augusts on record for Pocatello, Id., Grand Junction, Col., and Tuscon, Ariz.

Stronger than normal northerly wind components arising from deep mean troughs over both the Canadian archipelago and the east Pacific brought relatively dry conditions to Alaska. Precipitation was also generally less than normal in Hawaii.

**4. Weekly variability**

*a. 4-10 August*

The extremely hot weather of late July and early August in the north central and northeastern states (Wagner, 1975) gave way to more normal temperatures this week (Fig. 7) as the flow pattern across North America flattened and air mass alternations returned to the affected area. Below normal temperatures were observed near and west of the eastern mean trough while warm temperatures returned to much of the West, now dominated by a strong mean ridge.

Precipitation this week was largely associated with the progressive eastern trough.

*b. 11-17 August*

The mean waves over the Pacific progressed and amplified this week, bringing a deep mean trough to the central Pacific and a strong mean ridge to western Canada and Alaska (Fig. 8). This was accompanied by progression of a mean trough to the central United States and a mean ridge to the East. Cold air masses advected southward by the strong western Canadian ridge brought below normal temperatures to the Great Plains while the Northwest and the East were dominated by warm ridges.

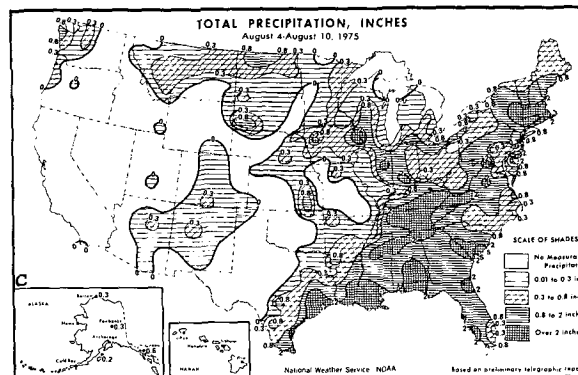
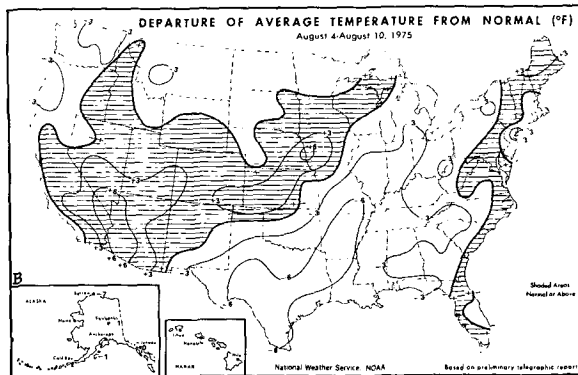
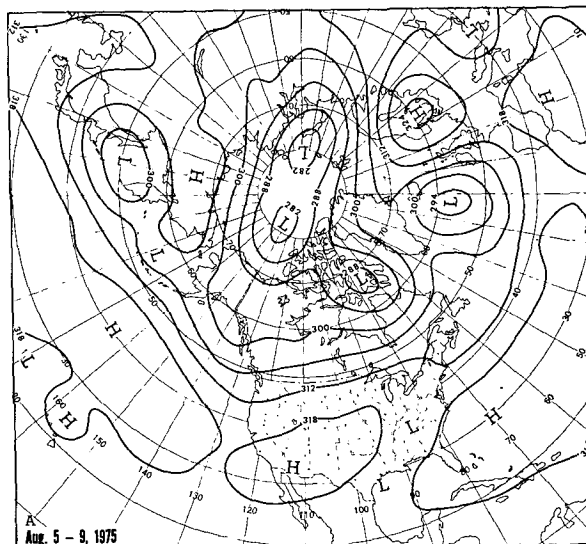
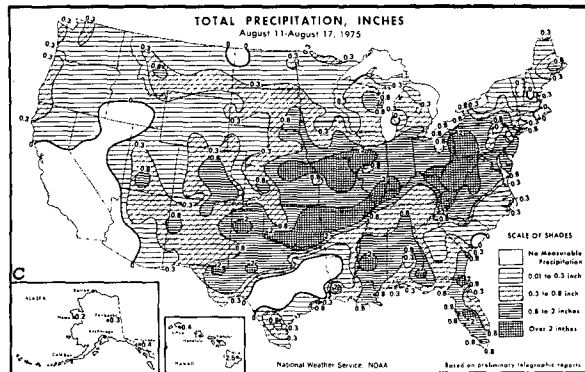
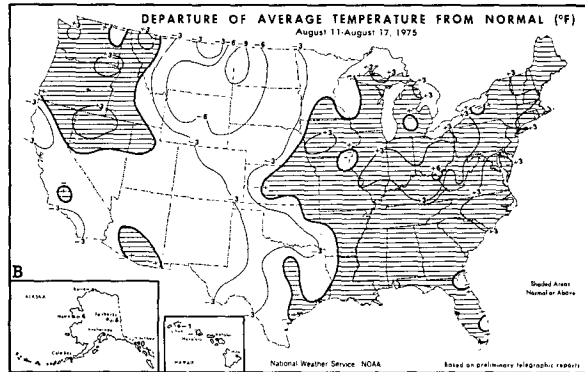
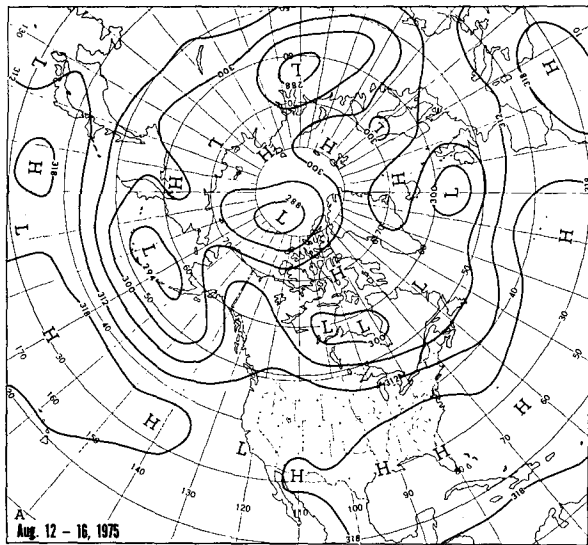


FIG. 7. (A) Mean 700 mb contours (dam) for 5-9 August; (B) departure from normal of average surface air temperature (°F), and (C) total precipitation (inches) for week of 4-10 August 1975 (from National Oceanic and Atmospheric Administration and Statistical Reporting Service, 1975).

Heaviest precipitation occurred between the central United States trough and the eastern ridge. Lakeland, Fla. observed a record hourly rainfall total of 3.41 inches on August 14.



Newfoundland trough and along the northern border. The remainder of the nation experienced above normal temperatures under the strong mean ridge. The temperature rose to 98°F at Tampa, Fla. on August 22, setting a record high for August and equalling the all time high.

As was the case in the previous week, the progressive nature of the mean circulation features brought wide-

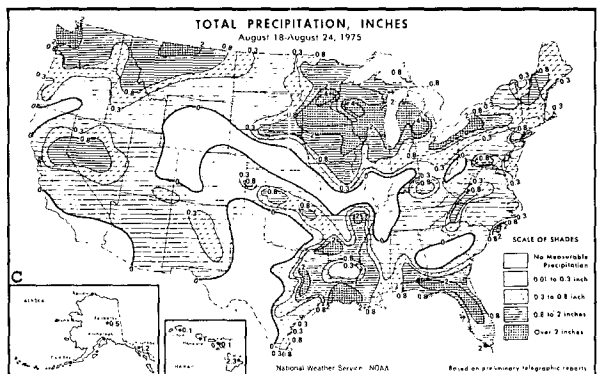
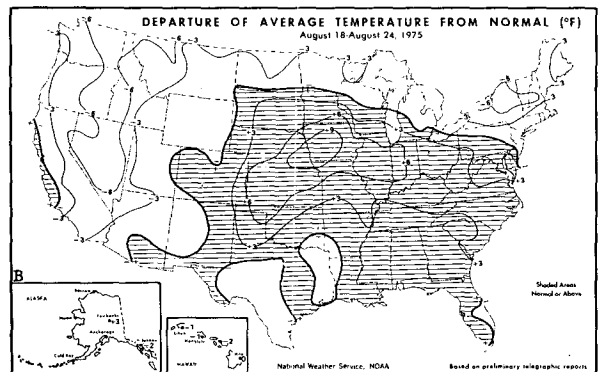
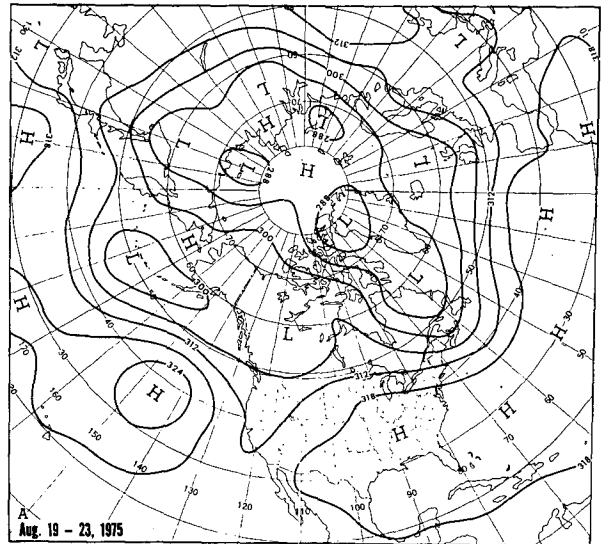


FIG. 8. Same as Fig. 7: (A) for 12-16 August 1975; (B) and (C) for week of 11-17 August 1975.

c. 18-24 August

Continued progression of the long waves brought deep troughs to the western United States and Newfoundland and a strong ridge to the upper Mississippi Valley (Fig. 9). The latter feature amalgamated with a retrograding mean ridge at lower latitudes. Mean temperatures were below normal near the western trough, to the rear of the

FIG. 9. Same as Fig. 7: (A) for 19-23 August 1975; (B) and (C) for week of 18-24 August 1975.

spread precipitation to the United States. Greatest precipitation occurred in the northern Mississippi Valley which was affected by several weak surface lows moving through the northern portion of the mean ridge.

d. 25-31 August

The mean wave pattern, as well as the temperature regime over the United States this week (Fig. 10) was

similar to that of the previous week. Greatest precipitation amounts occurred west and north of the mean ridge where transient waves interacted with a bountiful moisture supply.

5. Tropical activity

Tropical storm activity in the North Atlantic was concentrated at the month's end. Tropical Storm Caroline formed over the western Gulf of Mexico on the 29th, reached hurricane strength the following day, and struck the coast of Mexico south of Brownsville, Texas, on the 31st causing coastal flooding. Also on the 31st Hurricane Doris formed in the mid-Atlantic near 34°N, south of a surface High.

In contrast to the Atlantic this was an active month for tropical storms over the eastern Pacific. As has been the case in recent Augusts (Dickson, 1975), this was associated with relatively high mean 700 mb heights over the Gulf of Mexico (Fig. 2).

Georgette, first storm of the month, reached tropical storm intensity on 12 August, but weakened the following day. It was followed by Hilary (13 August), Ilse (18 August), Jewell (26 August) and Katrina (29 August). Of these tropical storms only Ilse and Katrina reached hurricane intensity. Ilse was a rather durable storm; it was of tropical storm or hurricane intensity from 18-26 August.

There were five tropical storms in the west Pacific, beginning on 1 August and scattered throughout the month. Three of these reached typhoon intensity. Nina, first storm of the month, became a typhoon on 2 August east of the northern Philippines. It subsequently moved across Taiwan and dissipated in southern China on the fifth.

Typhoons Phyllis and Rita moved across southern Japan within a week's time, causing very heavy damage. Phyllis reached typhoon intensity east of the Philippines on 14 August, struck southern Japan on 17 August and was downgraded to depression status east of Korea the following day. Rita became a typhoon just south of Japan (near 29°N) on 21 August, crossed southern Japan on 22 August, and then moved northward along the west coast of Japan still as a typhoon. It diminished to tropical storm strength near the northern tip of Honshu the next day and subsequently moved across the Bering Sea to the Arctic Ocean on 26 August.

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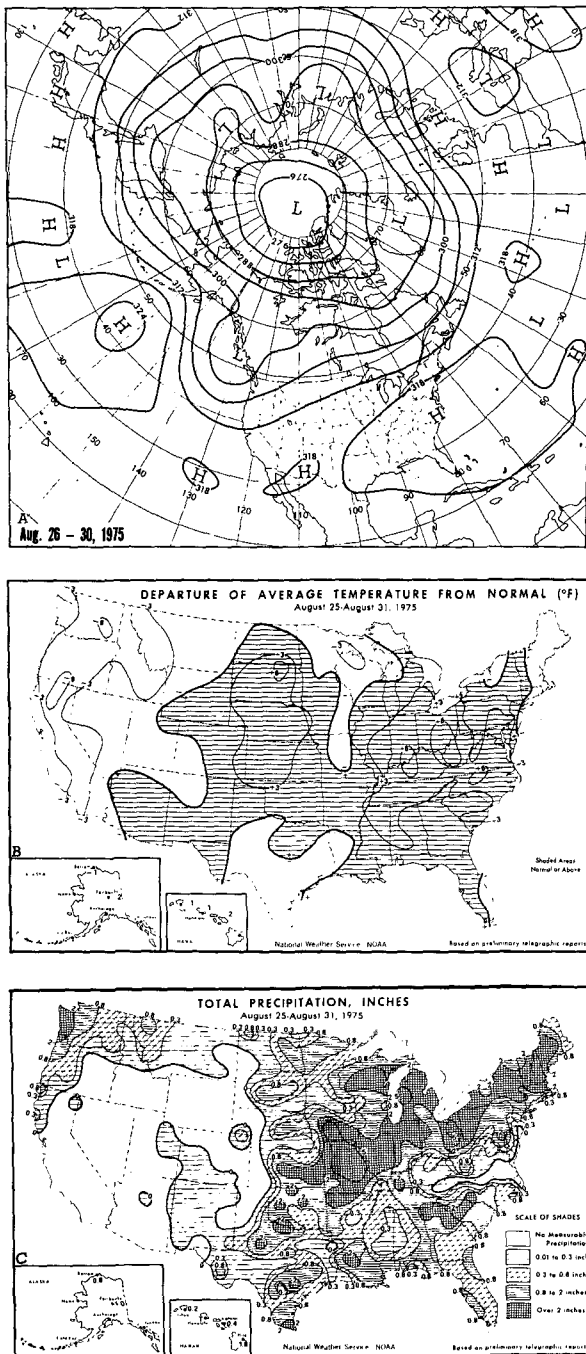


FIG. 10. Same as Fig. 7: (A) for 26-30 August 1975; (B) and (C) for week of 25-31 August 1975.