

## ANNUAL SUMMARY

## Air Stagnation Cases in the Eastern United States during 1985

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## ABSTRACT

The number and location of stagnation days within the eastern United States, as estimated mainly from a surface geostrophic-wind criterion, is presented by month and for the year 1985. The number of "grid-point days" of stagnation was exactly the same in 1985 as in 1984, a year with relatively little stagnation. However, the stagnation in 1985 occurred mainly over the mid-Atlantic states, whereas in 1984 it occurred mainly over the Southeast.

## 1. Introduction

This is the fifth in a series of annual reviews of air stagnation cases in the United States east of 100°W, all published in *Monthly Weather Review*. Presented are maps showing, by month and for the year 1985 as a whole, the number of stagnation days in this region, as well as the average number of stagnation days during the interval 1936–75. To facilitate interannual comparison, a table gives the number of "grid-point days" of stagnation by month and year for years 1981 through 1985.

## 2. Procedures

The method used to delineate areas of stagnation basically involves determining those areas where, for at least four days, the surface geostrophic wind (as estimated from the daily weather maps of the National Weather Service) is less than  $8 \text{ m s}^{-1}$ . Areas of stagnation, so obtained, were eliminated if fronts crossed through the region, there was a trace or more of precipitation, or the wind at 500 mb exceeded  $13 \text{ m s}^{-1}$ . More details concerning the method used for evaluation of stagnation cases may be obtained from the first paper in this series (Korshover and Angell, 1982).

## 3. Discussion

Table 1 gives the dates of stagnation cases in 1985, and Figs. 1–6 show by month the number and location of stagnation days in 1985 (solid lines) in comparison with the average number and location of stagnation days based on the interval 1936–75 (dashed lines). There were no stagnation cases, as defined here, in January, February, March, May, November and December of 1985.

Stagnation during 18–24 and 26–29 April occurred in the usual location in southeastern United States (Fig.

1). The first episode resulted from the amalgamation of the westward extension of the Bermuda High with a southward plunging polar high from Canada. At 500 mb a closed low was located over the Southwest, and the strong ridge along the East Coast extended north into Hudson Bay. The second episode was also associated with a 500 mb low over the Southwest, with stagnation occurring to the south of a nearly stationary cold front extending from west to east through the center of the country.

Stagnation during 26 May–7 June and 21–24 June occurred adjacent to the Gulf Coast, south of the usual location (Fig. 2). The first episode (of unusual duration) resulted from a polar maritime high becoming stationary over the Southeast after moving sluggishly eastward across the central United States. Southward displacement of the 500 mb jet, as well as a west–east cold front through the center of the country, limited the northward extension of the area of stagnation. The second episode was similar in nature.

Stagnation during 17–21 July was slightly northeast

TABLE 1. Cases of stagnation in the eastern United States during 1985.

Dates	Duration (days)
18–24 April	7
26–29 April	4
26 May–7 June	13
21–24 June	4
17–21 July	5
2–6 August	5
13–16 August	4
2–8 September	7
14–21 September	8
28 September–1 October	4
7–10 October	4

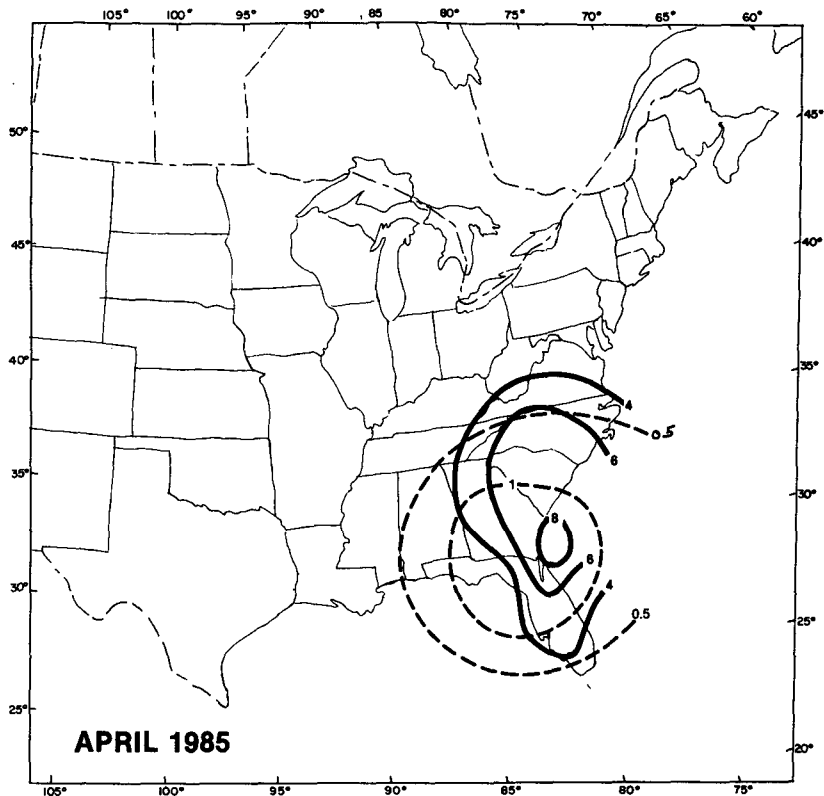


FIG. 1. Number of stagnation days in April 1985 (solid lines) in comparison with the April average of stagnation days during the interval 1936-75 (dashed lines).

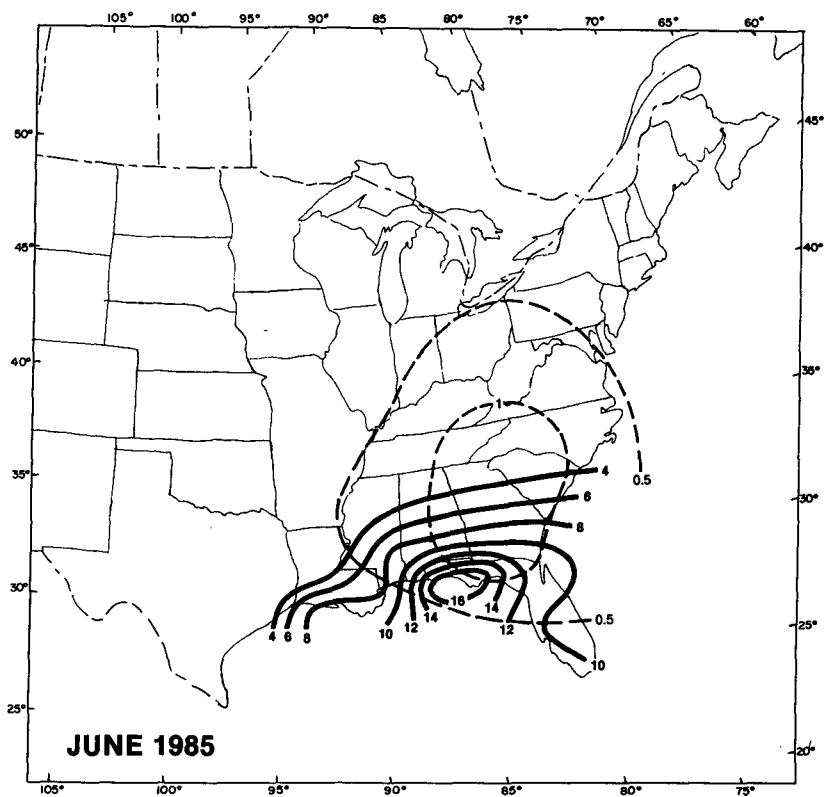


FIG. 2. As in Fig. 1 but for June.

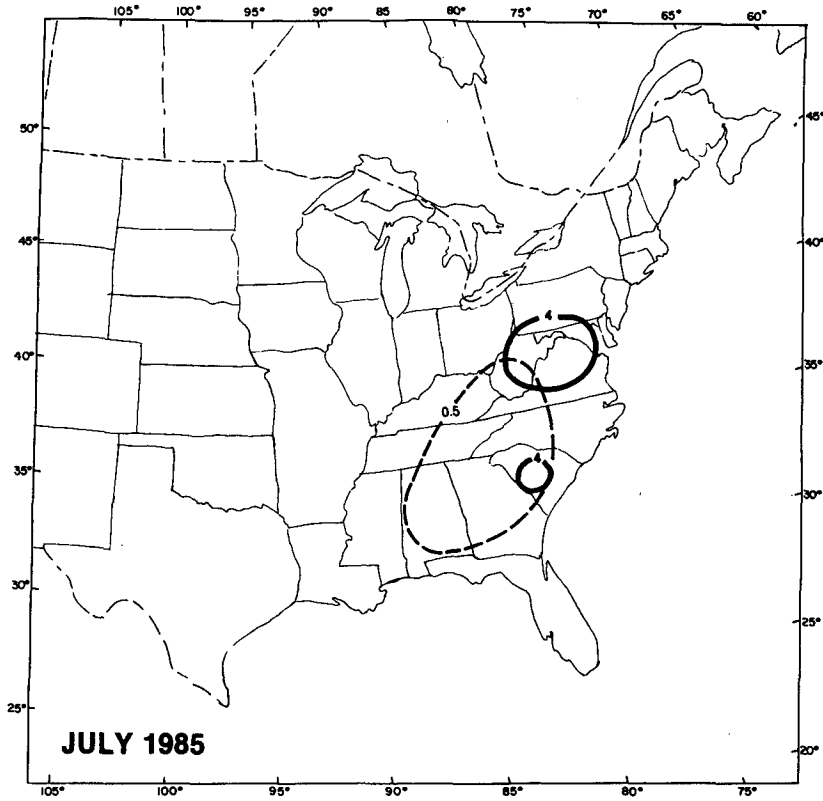


FIG. 3. As in Fig. 1 but for July.

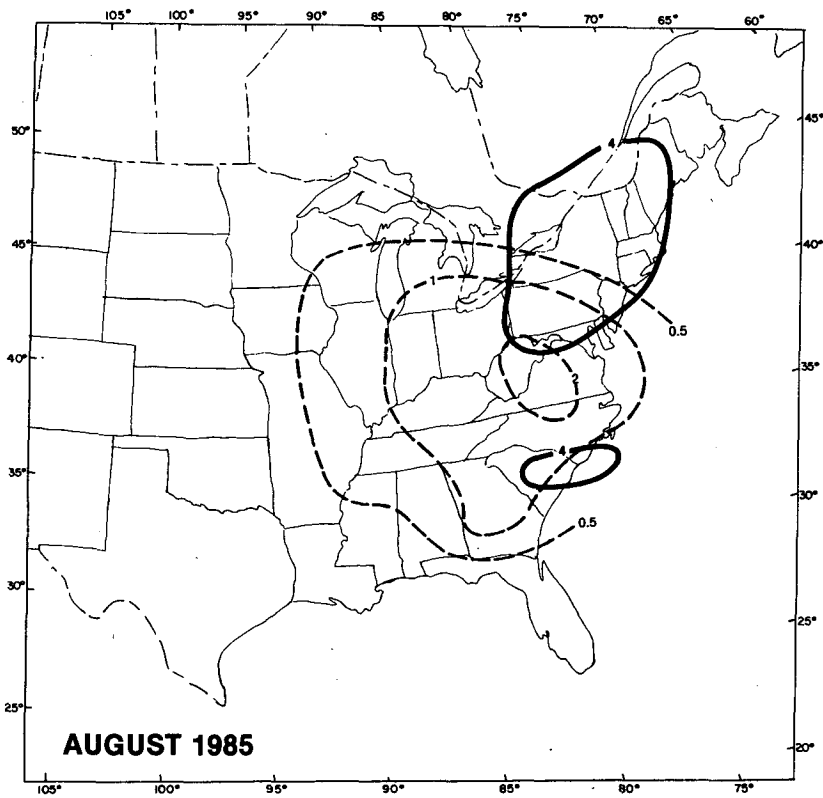


FIG. 4. As in Fig. 1 but for August.

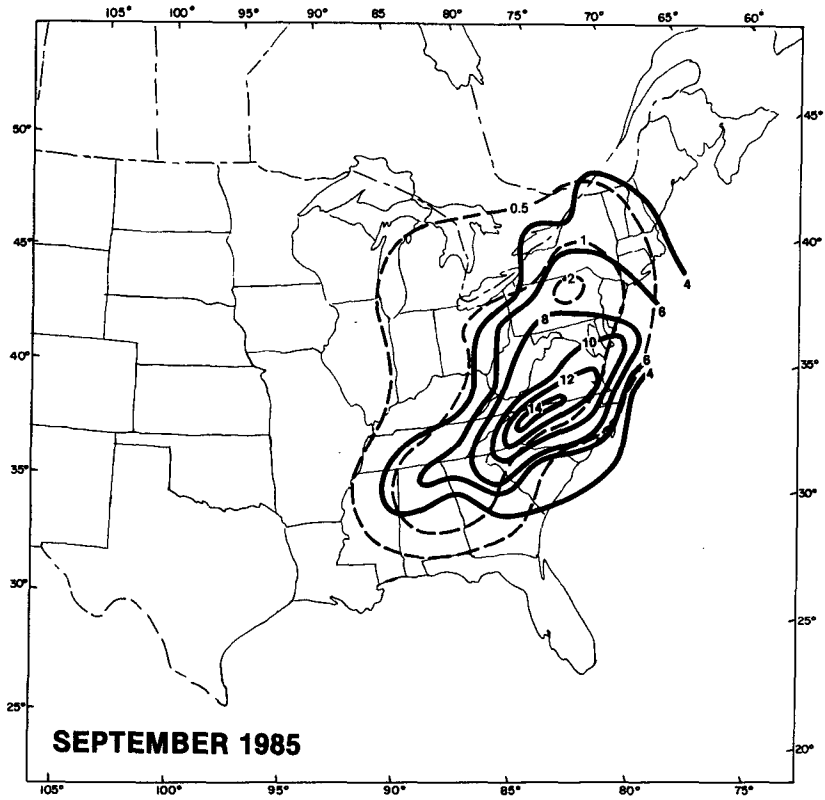


FIG. 5. As in Fig. 1 but for September.

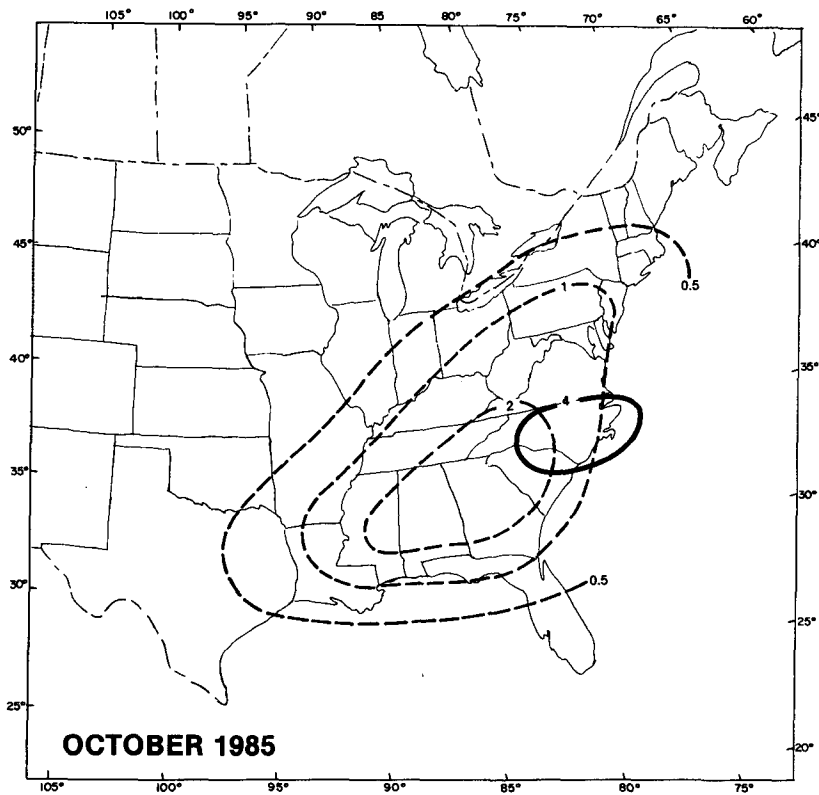


FIG. 6. As in Fig. 1 but for October.

of its usual location, but of limited extent (Fig. 3). This episode resulted from a polar maritime high moving slowly eastward across the Great Lakes and becoming stationary over the mid-Atlantic states.

Stagnation during 2–6 and 13–16 August also occurred generally northeast of its usual location, though there was a small area of stagnation near the Carolina Coast (Fig. 4). The first episode again resulted from a polar maritime high becoming stationary near the East Coast after moving slowly eastward across the Great Lakes. In the second episode, stagnation occurred along the East Coast after Hurricane Danny moved ashore near New Orleans. At 500 mb a closed high was found over the mid-Atlantic states at this time.

September was the big stagnation month of 1985, with stagnation along much of the East Coast, but centered in North Carolina, somewhat south of the usual location (Fig. 5). The episode of 2–8 September occurred after Hurricane Elena moved ashore near New Orleans following its meanderings in the Gulf. The 500 mb jet was well north over Canada and the Bermuda High extended westward into the mid-Atlantic states. The episode of 14–21 September resulted from a gigantic polar maritime high becoming stationary near the East Coast after moving slowly southeastward across the Great Lakes. At 500 mb a closed low was located over the Southwest. The episode of 28 Septem-

ber–1 October followed the passage of Hurricane Gloria up the East Coast to Labrador (note that three of the stagnation episodes were associated with hurricanes). A weak high located over the Great Plains moved northeastward behind the hurricane and strengthened as it became stationary over the mid-Atlantic states. Again a 500 mb low was located over the Southwest.

Stagnation during 7–10 October occurred just east of the usual location but was of limited extent (Fig. 6). A high moved northeastward from Texas and its westward extension became stationary over the mid-Atlantic states. Once again a closed 500 mb low was located over the Southwest (note that five of eleven stagnation episodes were associated with closed lows at 500 mb over the Southwest).

#### 4. Summary

Figure 7 shows that the pattern of stagnation in the eastern United States during 1985 (solid lines) was fairly typical of the 40-year mean (dashed lines), though in 1985 the region of maximum stagnation at the North Carolina–South Carolina border was slightly northeast of the mean location in central Georgia and the stagnation pattern was elongated northeast–southwest, similar to the pattern observed in 1984.

Table 2 presents by month and year the number of

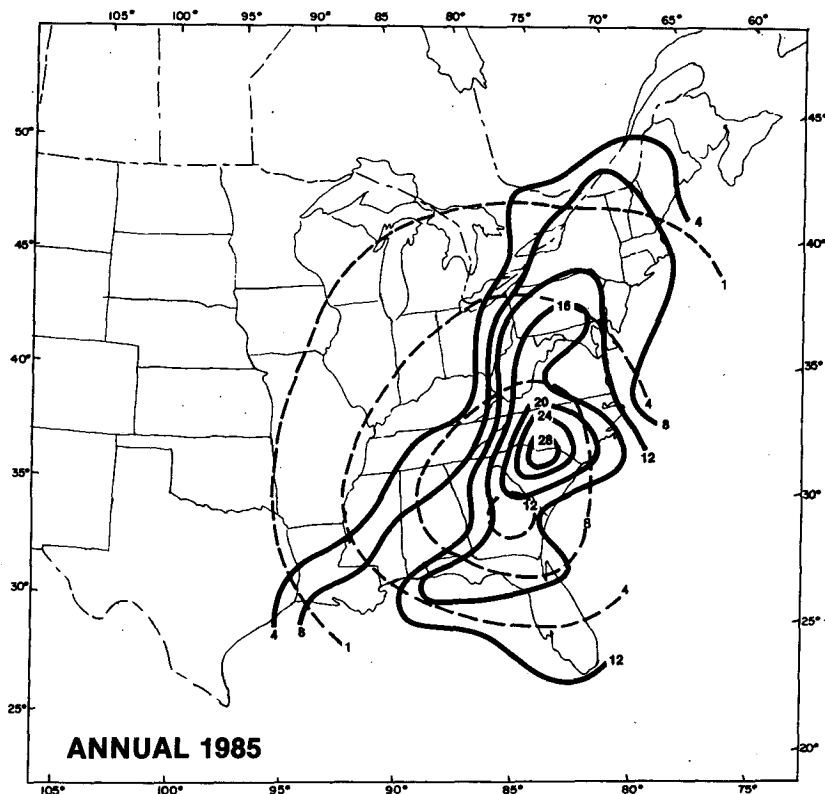


FIG. 7. Number of stagnation days in 1985 (solid lines) in comparison with the annual average of stagnation days during the interval 1936–75 (dashed lines).

TABLE 2. Number of grid-point days of stagnation by month for the years 1981–85, obtained by summing the number of days of stagnation at 2° lat by 2° long grid points.

	1981	1982	1983	1984	1985
January	0	0	0	0	0
February	0	0	0	0	0
March	0	0	0	0	0
April	22	0	58	0	84
May	89	100	0	98	0
June	40	42	127	145	167
July	45	0	80	0	28
August	412	104	136	12	114
September	222	114	317	156	226
October	180	151	119	128	28
November	104	70	28	37	0
December	0	0	0	71	0
Year	1114	581	865	647	647

“grid-point days” of stagnation obtained by summing over the eastern United States the number of days of stagnation at 2° lat by 2° long grid points during years 1981–85. Coincidentally, the number of stagnation days in 1985 was exactly the same as the number in 1984, considerably less than the number of days in 1981 and 1983. Thus, 1985 must also be considered a year of below-average stagnation. In general, there was a tendency for the stagnation to occur earlier in the year in 1985 compared to other years.

#### REFERENCE

- Korshover, J., and J. K. Angell, 1982: A review of air stagnation cases in the eastern United States during 1981—Annual summary. *Mon. Wea. Rev.*, **110**, 1515–1518.