Air-Stagnation Cases in the Eastern United States During 1982

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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 1982 as a whole. Unlike the situation in 1981 when there were an above-average number of stagnation days in comparison with the period 1936–75, with unique occurrences of stagnation in a belt extending from Minnesota to Maine, the year 1982 seems quite typical with respect to both number and location of stagnation days.

1. Introduction

This is the second in a series of annual reviews of air-stagnation cases in the United States east of 100°W. Presented are maps showing, by month and for the year 1982 as a whole, the number of stagnation days in this region, as well as the average number of stagnation days during the period 1936–75. Comparison of the two sets of data allows one to estimate how typical a stagnation year 1982 was.

2. Procedures

The method used herein to delineate areas of stagnation basically involves determining those areas where, for at least four days, the surface geostrophic wind (as determined from the *Daily Weather Maps* of the National Weather Service) is less than 8 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 m s^{-1}. More details concerning the method used for evaluation of stagnation cases may be obtained from Korshover (1976) or the earlier paper in this series (Korshover and Angell, 1982).

In Figs. 1–7, the solid lines show the number of stagnation days (if any) per month, and for the year 1982 as a whole, in the region east of 100°W and between 20 and 50°N. For example, if in a given region there were two stagnation cases during a given month, one of four days duration and one of eight days duration, the total number of stagnation days during the month would be 12, and a 12–isopleth would enclose that region. The dashed lines in Figs. 1–7 show the *average* number of stagnation days for the month, or the year as a whole, based on evaluations for the period 1936–75. Comparison of the solid and dashed lines allows one to determine whether 1982 was a typical stagnation year with respect to both location and frequency.

3. Discussion

There were no stagnation cases, as defined here, in January, February, March and April of 1982. There was one case in May in the usual location in southeastern United States (Fig. 1). Stagnation occurred between 9 and 16 May as a High which had moved across the country behind a north–south oriented cold front stagnated to the east of the Mississippi River. A strong ridge developed at 500 mb separating a closed low over Nevada from one to the east of New York City. The winds at 500 mb were very light during the entire period, the direction varying from northwest to southwest as the ridge moved slowly eastward.

There was one stagnation case in June along the Gulf Coast, slightly south of the usual location (Fig. 2). Stagnation occurred between 7 and 11 June as a weak high settled in the Southeast following the movement of a low from Texas to New England. The approach of another cold front limited the area of stagnation to the Gulf Coast. During the early part of the period, there was a closed high at 500 mb over the Gulf, but this high weakened and light westerlies prevailed on 10 and 11 June.

There were no cases of stagnation in July, but there was one case in August centered in the lower Great Lakes, somewhat northwest of the usual location (Fig. 3). Stagnation occurred between 12 and 16 August as a high from central Canada moved southeast be-

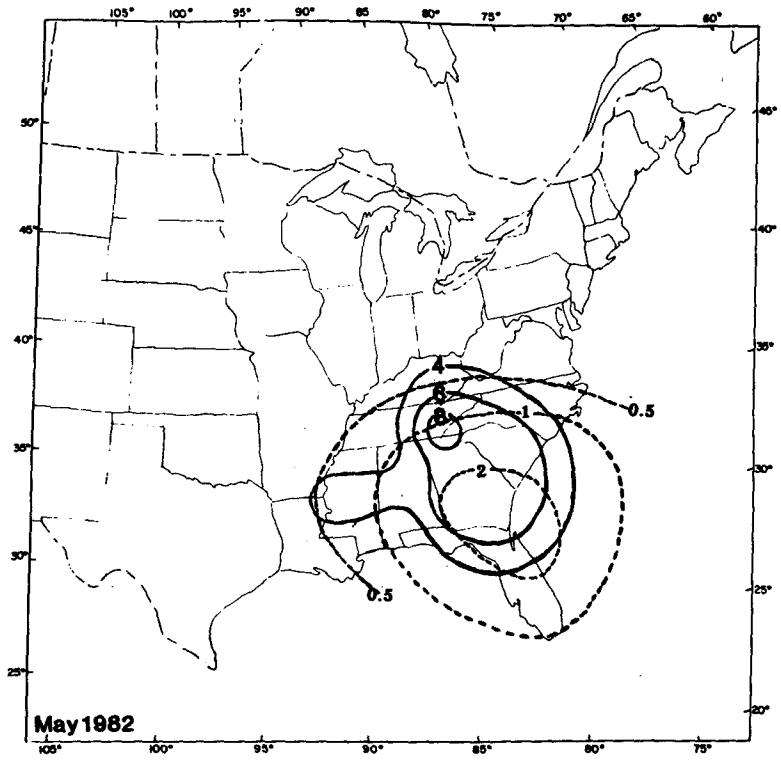

FIG. 1. Number of stagnation days in May 1982 (solid lines) in comparison with the May average of stagnation days during the period 1936–75 (dashed lines).

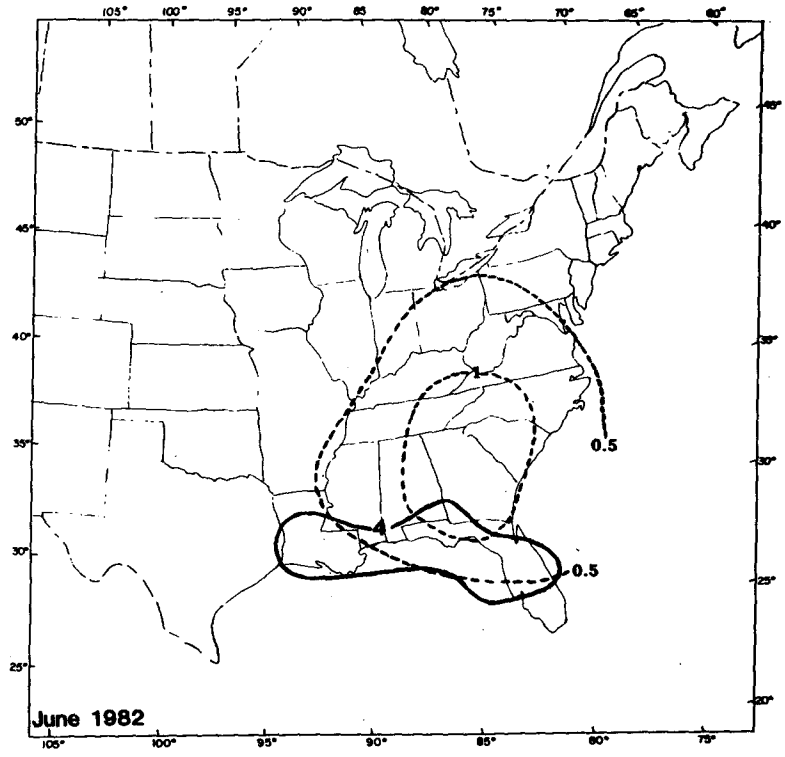

FIG. 2. As in Fig. 1, but for June.

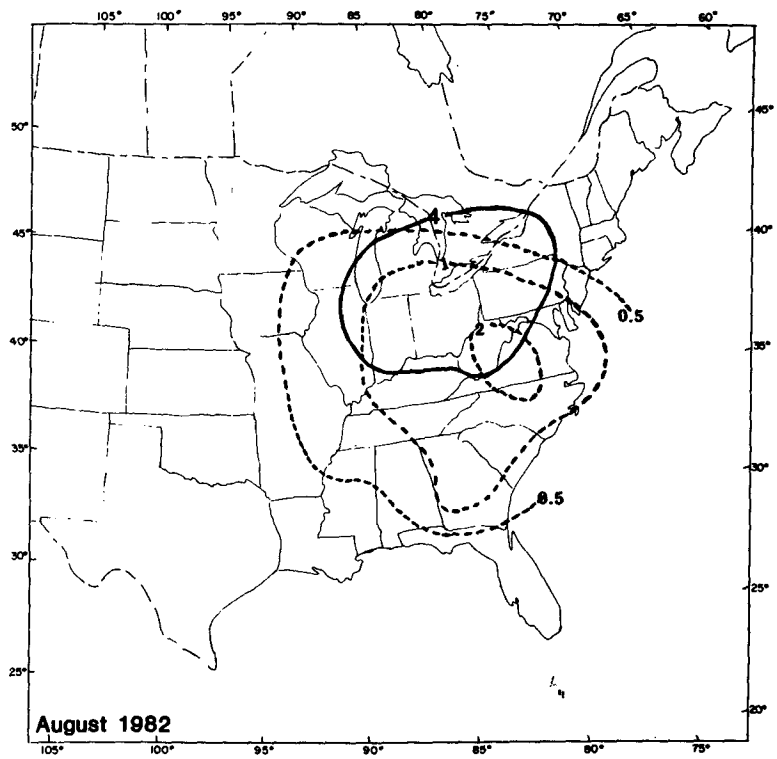

FIG. 3. As in Fig. 1, but for August.

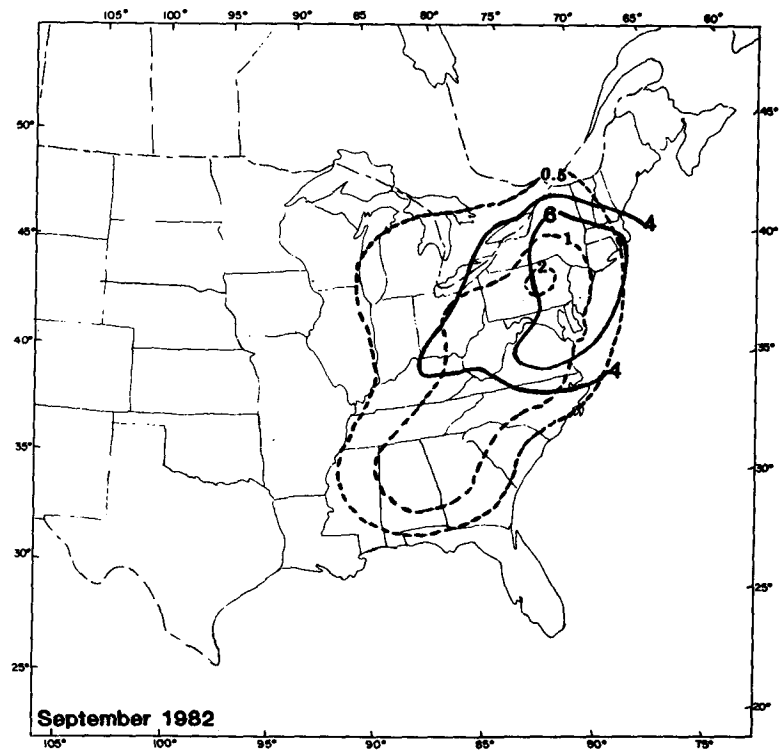

FIG. 4. As in Fig. 1, but for September.

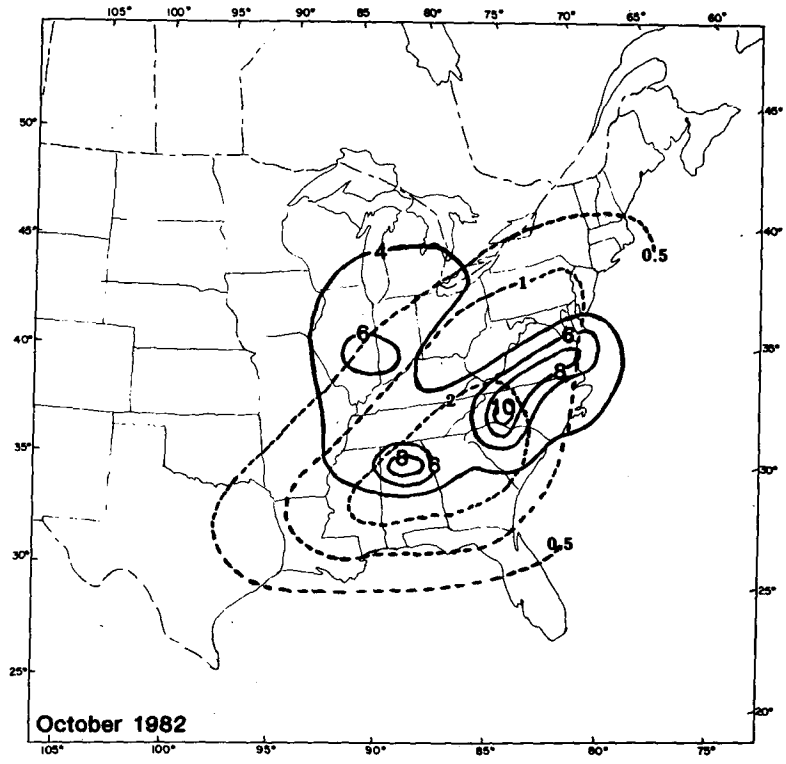

FIG. 5. As in Fig. 1, but for October.

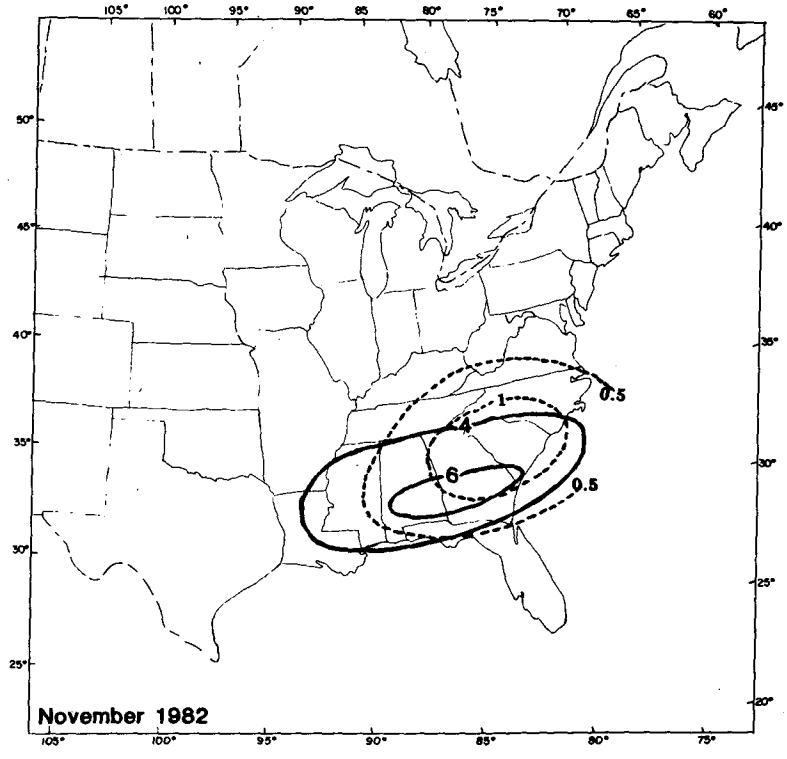

FIG. 6. As in Fig. 1, but for November.

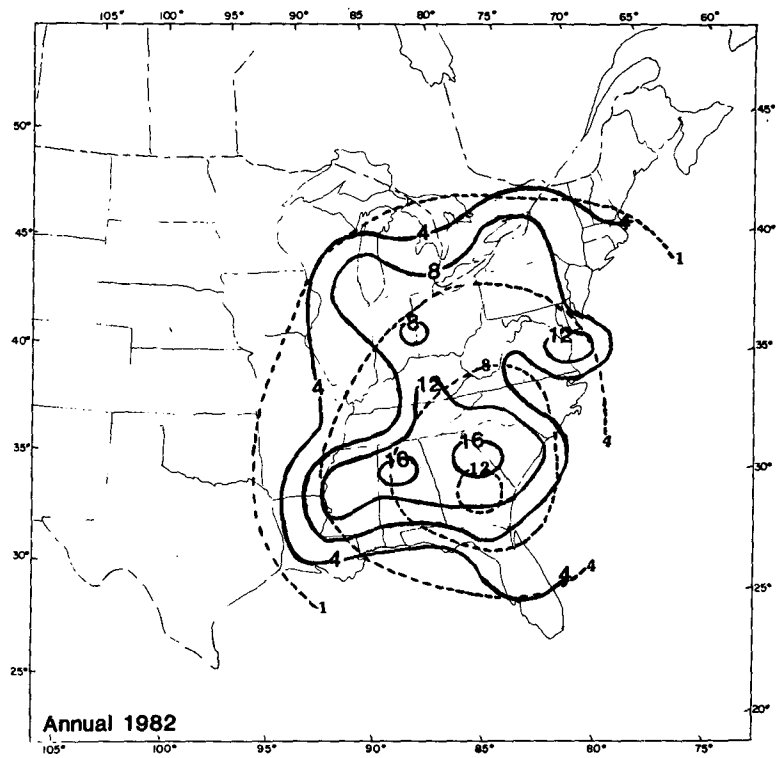

FIG. 7. Number of stagnation days in 1982 (solid lines) in comparison with the annual average of stagnation days during the period 1936–75 (dashed lines).

hind a cold front and became nearly stationary over the Ohio Valley. The 500 mb ridge associated with this high weakened during the period and light westerlies prevailed on 15 and 16 August as another cold front from Canada approached the area to end the stagnation episode.

The one stagnation case in September was centered on the Washington–Boston megalopolis corridor, a customary location (Fig. 4). Stagnation occurred between 9 and 15 September as a very strong (and cold) high which had moved southeastward from central Canada behind a cold front became nearly stationary off the East Coast. During this period the 500 mb flow was unusually perturbed for this time of year, with a closed low developing over the western United States and the southwesterly flow ahead of this low extending all the way from New Mexico to Labrador. The 500 mb winds were unusually weak through the eastern United States and southeastern Canada. This stagnation episode also ended with the approach of another cold front from Canada.

There were two stagnation episodes basically in October, one at the beginning of the month (29 September–3 October) and one at the end of the month (22 October–3 November). The latter episode was the most extended of 1982. The area of stagnation was centered in southern Appalachia as is customary for this month (Fig. 5), but with an anomalous extension into the southern Great Lakes region. The first period of stagnation was quite similar to that in September, being associated with the development of a closed low at 500 mb in western United States and an extensive ridge over eastern United States. The second episode was associated with the stagnation of a massive Polar Maritime high (from the Pacific Ocean) over eastern United States as a low moved up the East Coast from Florida to New England. At 500 mb the main belt of westerlies was displaced far to the north over Hudson Bay and light westerly winds were found over much of the United States.

There was one stagnation case in November in the usual location in the southeastern United States (Fig. 6). Stagnation occurred between 6 and 11 November as an extensive high in western United States and Canada moved eastward behind a cold front, a portion of it becoming stationary in the Southeast. The 500 mb flow was generally zonal, and the stronger winds to the north prevented the area of stagnation from extending further north. A cold front and accompanying squall line brought an abrupt end to the stagnation on 12 November. There were no stagnation cases in December.

4. Summary

In average for the year 1982, areas of stagnation were generally found in their customary location and the number of stagnation days was also near average (Fig. 7). Thus, 1982 was in contrast to 1981 when there was an above-average number of stagnation days with unique stagnation episodes in the northern United States and extreme southeastern Canada. The year 1982 must be considered a completely normal one as far as stagnation in the eastern United States is concerned.

REFERENCES

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