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## WEATHER NOTE

# Powerline Breaks—Potential Aid in Tornado Identification and Tracking

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Electric power companies in each State maintain a continuous watch for breaks in transmission lines and log the times of such power interruptions when they occur. A knowledge of such breaks, when they are caused by severe weather, could be a valuable source of additional information for the meteorologist who is maintaining a watch on the severe weather. This note describes the use of such data in a post analysis of the Mississippi Delta tornado outbreak of February 1971, in which at least three tornadoes killed more than 100 persons.

Warnings are issued when severe storms or tornadoes are visually observed or indicated by radar (usually by the characteristic "hook" echo). Unfortunately, hook echoes are often not definitive and large gaps exist in the observational network in rural areas and during the nighttime hours. Electric powerlines criss-cross the countryside, however, and an immediate call from the power company to the National Weather Service (NWS), when a break occurs under potential severe weather situations, may give the first real indication of a tornado in progress. An exchange of information is possible since the NWS radar can be used to inform the power company of roughly *where* the break occurred.

Eight major transmission lines controlled by the Mississippi Power and Light Co. were broken on Feb. 21, 1971, some in more than one place. A company spokesman stated that tornadoes are generally the cause of such major breaks. While the time of a break is known immediately, the location is fixed exactly only after the break is located. Figure 1 contains this information as well as the time and location of tornadoes as determined by the NOAA Natural Disaster Survey Team (Peterson et al.

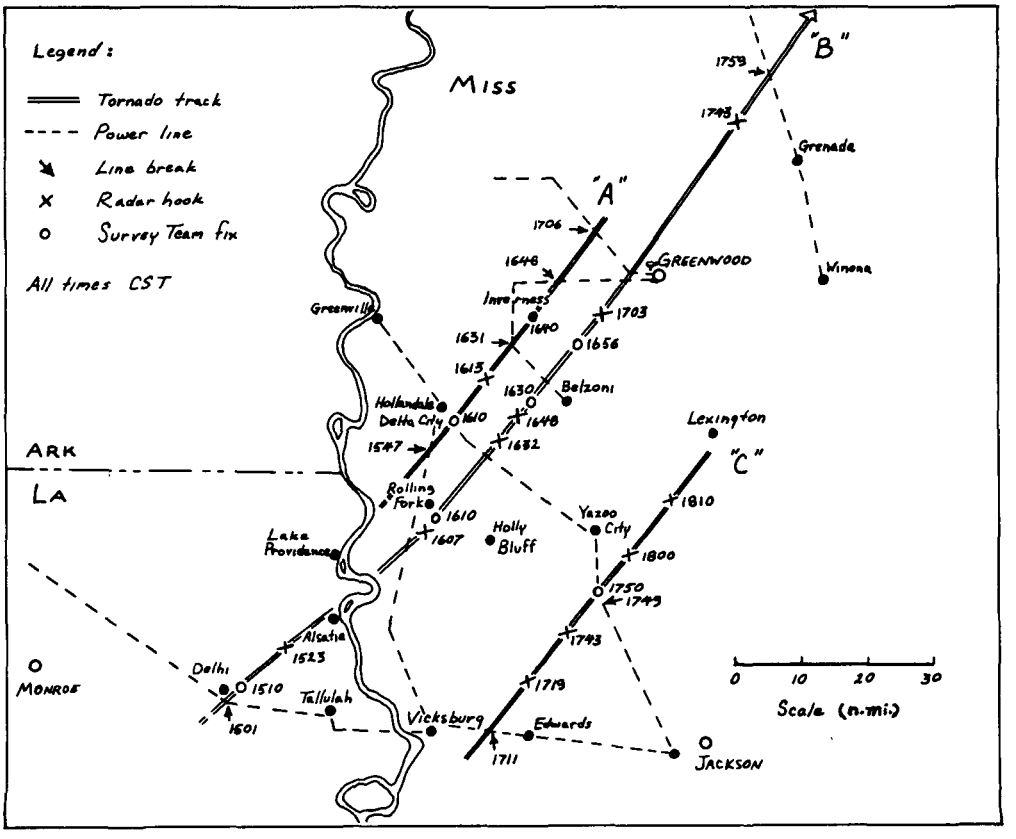


FIGURE 1.—Mississippi Delta tornadoes of Feb. 21, 1971.

1971) and by radar fixes of hook echoes (Jackson, Miss., WSR–57).

The tracks shown differ from those determined by the survey team in that the latter group identify tornado A as the same tornado which was reported near Delhi, La., about 1500 CST. We feel that two factors argue in favor of the tracks as presented here. First, the survey team's official report acknowledges that an aerial survey revealed uncertain damage patterns near and on the Louisiana side of the Mississippi River. In addition, the 1501 CST powerline break near Delhi and the 1547 CST break near Delta City, Miss., if caused by the same tornado, indicate a speed of about 65 kt—significantly faster than average speeds of 30–45 kt as derived for the three tornadoes from other breaks and reports. Additional information gleaned from reports by the survey team indicates a tornado near Alsatia, La., about 1530 CST that subsequently "jumped" across the river. This would seem to further substantiate a track as indicated for tornado B.

With the tracks reconstructed as shown, the survey team and powerline break data are consistent and indicate average speeds near 35 kt for tornado A, 45 kt for tornado B, and 40 kt for tornado C. While the radar hook observations are more or less consistent with other data, in some cases they suggest rapid accelerations (e.g., the 1648 CST hook observation ascribed to tornado B). These accelerations are not altogether removed by imposing an accuracy as gross as 5 n.mi. to such a fix. It is more likely that this is evidence of the confused situation on this afternoon during which over 20 hooks were observed on radar—certainly not all associated with the three tornadoes whose tracks are indicated.

The Hollandale–Yazoo City, Miss., powerline was broken by both tornadoes A and B. Neither of the times could be fixed, however, since the earlier break in the Greenville–Vicksburg line interrupted electric power in the northwestern half of this line as well. Note that tornado B crossed (and broke) four powerlines previously broken by tornado A. The interruption of power once a line is severed precludes the detection in real time of subsequent breaks. It is likely that the 1630 CST observation of tornado B west of Belzoni, Miss., resulted from some confusion with the 1631 CST power interruption in that area caused by tornado A farther to the northwest.

The fact that the tracks presented here differ slightly from those in the official report (Peterson et al. 1971) does not affect the report's finding that

> Three massive tornadoes remained in contact with the ground for periods in excess of 1 hour and for distances averaging 110 miles [90 miles in the present study]. The survey team believes that if some real-time, remote sensing method had been available to identify the location and movement of individual thunderstorm cells (some of which were associated with tornadoes) on a minute-by-minute basis, the warning service could have been further improved.

The real-time use of powerline break information may be such a method. Power companies maintain control engineers at central locations, and it should be possible to link these personnel with Weather Service Offices by direct line or radio communications for the relay, in real time, of power interruption information during threatening weather situations. Such information should be particularly valuable during the occurrence of unusually long-lived storms such as the Mississippi Delta tornadoes.

## REFERENCE

Peterson, Arthur C., Sadowski, Alexander F., Foltz, Harry P., Baker, George A., Reber, Carl A., and McCrabb, Harold S., "Mississippi Delta Tornadoes of February 21, 1971—A Report to the Administrator," *NOAA Natural Disaster Survey Report* 71–2, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Rockville, Md., July **1971**, 57 pp.

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