

On the Relationship Between Weather and Widespread Power Outages in the United States

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Disruptions to electric power grids have far-reaching consequences for society, impacting transportation, communication, running water, and the heating and cooling of homes. In the United States, the two most common causes for power outages are equipment failure and weather, but only weather related incidents are strongly associated with widespread, long duration outages. In the present study, meteorological data were collected and related to corresponding power outage events as a way to determine relationships between weather and widespread power outages. Seasonal variability was found in weather related outages, with higher outages reported in the summer and winter months. Additionally, a regional analysis of the data showed that the South receives the largest number of damaging power outages, while an analysis by weather type showed that tropical systems are the cause of most of the property damage and affect the largest number of customers, with their associated wind gusts being the major cause. Ice storms tend to be associated with the longest lasting power outages with the impact related to the amount of ice accretion. While thunderstorms were found to be the most frequent cause of power outages, they also were shown to be among the least disruptive of storm types. Our results thus agree with prior findings that weather is the main cause of major US power outages and their associated impact on society. We were able to add to this general finding by determining particular storm types that are associated with greater outage impacts and by identifying regions most at risk for experiencing disruptive outages.