Extreme Weather Drivers during Power Outages in the United States

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Background/Objectives. Electric grid power outages often co-occur during extreme weather events such as high winds or low temperatures. The power system's susceptibility to outages and the variance in time for service restoration are highly dependent on where the outage is occurring and type of weather event. However, coupled analysis of power outages and weather events are oftentimes focused on the type of weather event and often overlook rigorous analysis of the underlying characteristics of the weather events themselves and the potential compound weather events. Therefore, more work is needed to improve our understanding of key attributes of weather events during power outages.

Approach/Activities. To address this gap, we performed an integrated assessment that explicitly couples power outage data with extreme weather data. To do so, open access county-level power outages and weather data for the United States for the period 2014-2019 are fused to create a composite time series panel. We will identify which types of extreme weather events co-occur during power outages and use statistics to conduct an exploratory analysis of associated weather variables during these events.

Results/Lessons Learned. Results from an analysis of county-level power outages across the continental United States will be presented. The distribution of power outages by extreme weather event type and the associated attributes will be shared. A comparison between national and regional trends by event will also be presented. These attributes will aid in our understanding of the extreme nature of weather events that coincides with power outages. The extreme weather event case studies presented in this talk will provide insights for power systems stakeholders on key characteristics during historical power outages. This will improve their understanding of the resiliency of power systems during diverse weather events.