

[AGM] Weather Outage Prediction Model

Los Alamos Team: Donatella Pasqualini

Timeline: FY2019 – present

Challenge:

To date, there is no comprehensive model to describe how hazardous weather events of different types impact the electrical grid, with most work focused on hurricanes. The challenge in developing a comprehensive model for situational awareness is due to the difficulty of identifying extreme weather events that are not hurricanes. While quantifying impacts from tropical cyclones can easily be done both spatially and temporally, identifying winter storms is much more difficult. They are less predictable, less well spatially and temporally defined, and have more localized and diverse impacts than tropical cyclones. In addition, most of the existing models are customized for specific regions and power distribution systems and there is not model that can operate at national scale.

Technical Approach:

Our approach leverages existing capabilities developed for hurricane induced outages and the experience of our collaborators at the University of Connecticut and develops a new workflow that (1) identifies weather events that may damage the power system and (2) forecasts the geographical distribution of power outages. The effort employs climatic and weather-related data from the National Oceanic and Atmospheric Administration (NOAA) and historical power outages to train a statistical power outage forecasting model. The final deliverable of this effort is a decision-support tool that the electrical power utilities can use to forecast areas at risk for power outage.

Impact:

Under prior work, Los Alamos has supported the Department of Homeland Security's National Infrastructure and Simulation Analysis (NISAC) program by developing a set of statistical models, e.g., Electrical Power Outages Forecast models (EPoF), to predict at national scale electrical power outages due to hurricanes. EPoF uses the state-of-the-art statistical approach to forecast at national scale outages requiring as inputs a larger set of publicly available parameters. As a real-time situational awareness and emergency and mitigation planning tool, Los Alamos deployed EPoF as an automated workflow within a Web based geospatial visualization environment that is used by DHS to respond to extreme events. For DOE, this capability has been extended to support emerging OE outage prediction needs for extreme weather like ice and cold weather storms.

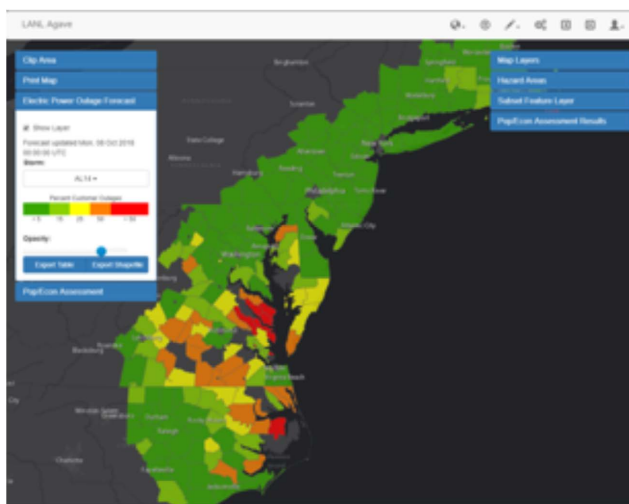


Figure 5-4: AGAVE, AWS cloud-based, Web application for real-time hurricane electrical power outages forecast.