Weathering the Storm: Predictive Models for Outage Risk and Grid Vulnerability

BIOGRAPHY

Dr. Jay Shafer is the Director of Utilities at Disaster Tech, where he serves as an intrapreneur leading the integration of advanced science and engineering into practical tools for resilience and disaster preparedness. A lifelong meteorologist, Dr. Shafer holds a B.S. in Meteorology from Plymouth State University and both an M.S. and Ph.D. in Atmospheric Sciences from the University of Utah. Prior to his industry work, Dr. Shafer spent two decades teaching the art and science of weather forecasting to early-career meteorologists in the Vermont State College system, with a particular focus on complex and winter weather systems. He later bootstrapped Northview Weather, a startup dedicated to extreme weather analytics and predictive solutions for utility storm preparedness. Dr. Shafer is the inventor of a GIS-based impact prediction technology that connects high-resolution weather data to likely grid failures, enabling utility companies to anticipate and respond to storm-driven outages with greater precision. At Disaster Tech, he plays a central role in leading science and technical strategy across a range of complex projects, applying AI-driven solutions to domains such as contested logistics and extreme weather impact prediction. His current work centers around the development of decision-support technologies within Disaster Tech's Pratus platform, enabling users to synthesize complex data and make informed decisions in time-critical, high-stakes environments.

ABSTRACT

As extreme weather events intensify due to a changing climate, power systems are increasingly at the front line of disaster impacts. The majority of large-scale power outages are driven by physical damage from hurricanes, ice storms, derechos, and other high-impact weather systems. These disruptions not only halt economic activity but also endanger lives by cascading through critical lifelines defined by FEMA—such as transportation, healthcare, and emergency services.

This seminar explores the compounding risks posed by aging grid infrastructure, increasing electrification demands, and a pace of innovation that often outstrips readiness. This presentation examines why power outage prediction remains an ambiguous and technically difficult problem, often hindered by legacy utility data, inconsistent geospatial resolution, limited expertise, and poor data calibration.

Attendees will learn about fragility-based relationships that quantify the probabilistic relationships between weather variables and physical damage to grid assets. Several past storm events will be analyzed to highlight how predictive models have informed preparedness and restoration strategies. This presentation will also explore chronic outage patterns and the use of black-swan storm simulations to inform long-term infrastructure investment decisions and system resilience.

The seminar concludes with real-world forecast examples, assessing the accuracy of power outage prediction models and showcasing their potential for transforming how we plan for, respond to, and recover from high-impact events.