

ADAPTING TO A CHANGING ENVIRONMENT

As the global climate continues to rise, the frequency and severity of weather events will escalate in tandem. Though, these events are not merely an issue for the future. According to the National Centers for Environmental Information, from 2018-2022 there have been 90 severe weather events that have cost an average of over \$120 billion per year. These hazards can exact a considerable human and financial cost while threatening the national economy and homeland security. Due to severe weather's rapid development, these events require an array of detailed, real-time data to best equip emergency professionals for response. The objective of the Emergency Preparedness and Response to Weather Extremes initiative (EMPOWER) is the launch of a pioneering, regional pilot program to support these federal, state, and local emergency responders to weather-related disasters for the development and deployment of real-time stakeholder-driven decision support solutions.

THE EMPOWER INITIATIVE

The State University of New York at Albany proposed the development of EMPOWER. EMPOWER integrates advanced analytics, real-time localized high resolution mesonet-based weather data, critical infrastructure "lifelines", social vulnerability data, and novel visualization capabilities to provide rapid assessment of changing weather conditions and their potential impacts on communities and critical infrastructure. The New York State (NYS) Mesonet, a network of 126 weather stations across New York, is a critical piece in the weather-emergency response nexus, providing the necessary infrastructure for real-time monitoring and the collection of billions of datapoints for weather-related research and practical exploitation. While weather monitoring networks and data collection are incredibly important, EMPOWER addresses life-threatening deficiencies concerning the production, fusion, and communication of weather intelligence and weather hazard vulnerabilities. By leveraging state and federal computing investments, integrating existing state-of-the-art weather observational infrastructure and data pipelines, and providing capabilities for future integration of additional advanced sensor-based weather hazard monitoring networks, EMPOWER equips emergency responders with the tools and data needed to protect lives and property today and manage the emergencies of tomorrow.

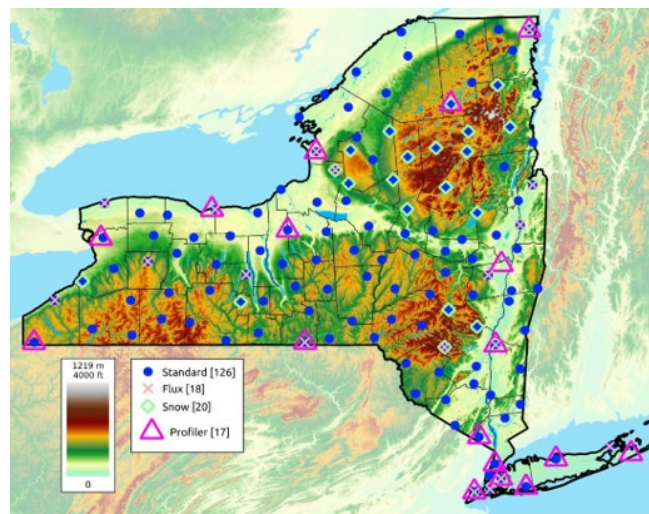


Fig. 1: Map of NYS Mesonet stations overlaying topography.

ALIGNMENT WITH DHS AND NATIONAL INITIATIVES

This program will make direct contributions to several Department of Homeland Security Science and Technology Directorate (DHS S&T) research priorities by improving first responder, emergency manager, and community stakeholder access to high-quality, relevant, and timely weather information. This supports the DHS S&T commitment to developing knowledge for improved incident management as well as first responder capabilities and critical infrastructure resilience. The initiative also aligns with the Federal Emergency Management Agency's (FEMA) Strategic Plan for 2022-2026 goal of "leading the whole community in climate resilience," President Biden's priorities outlined in the National Climate Task Force climate goals, and the 2022 FEMA National Preparedness Report's preparedness challenges.

INITIATIVE IMPACTS

The EMPOWER initiative will catalyze collaborative research and capability development with the responder community, national laboratories, industry, and DHS S&T international bilateral agreement partners such as Sweden and the Netherlands. Ultimately, this effort will contribute to the safety and security of the homeland against severe weather events through innovations in production and communication of weather intelligence, hazard vulnerability, and real-time weather monitoring.