

# + Technology for Public Safety

## The Issue

The most predictable fact about North Carolina weather is how unpredictable it can be. Flash floods caused by tropical storms, icing caused by winter storms, and dangerous lightning from severe storms are three weather phenomena that threaten public safety. Better prediction through new technologies can help emergency managers prepare for, and respond to, these events and keep North Carolinians out of harms way.

## RENCI Projects

Brunswick County in southeastern North Carolina is vulnerable to flooding caused by storm surge and tropical storm rainfall. Often the flooding blocking critical transportation routes used for evacuation occur well before the hurricane landfall. RENCI engineered and installed a flood sensor network along the county's key evacuation routes to give advanced notice that road flooding is probable. RENCI installed seven water level sensors and five weather sensors to be the eyes for meteorologists and managers about rainfall and water levels in critical areas of the county. Each sensor site includes water level sensors and a base station with communications equipment that transmits data back to RENCI in Chapel Hill, where it can be easily accessed by emergency managers through a public website.

Further west, winter icing, which can bring down power lines and create dangerous driving conditions, is an annual threat that can shut down parts of the state for weeks. RENCI deployed Micro Rain Radars (MRR) to help provide advance notice of conditions that often lead to icing. This advance warning allows emergency managers and power company repair teams to properly deploy resources to threatened areas before a storm hits. The MRR is a vertically pointed radar that detects precipitation in the atmosphere and the freezing line—the point at which precipitation freezes. The freezing lines proximity to the ground determines whether precipitation falls as rain, freezing rain, sleet or snow.

Lightning is a threat that typically kills more people than all other acts of nature combined and can cause house and wildfires. Giving notice to emergency responders that approaching thunderstorms are producing dangerous lightning can prevent serious injury, and shorten the response time if a dangerous lightning strike occurs. RENCI deployed a network of lightning detectors across the state to gather real-time lightning strike information and displays it for emergency managers through its NC-FIRST weather data portal.

## The Expertise

RENCI engineers reprogrammed the water level sensors to be able to upload their data to communication devices that transmit the data to a RENCI database, where it can be easily accessed through the web. RENCI technological expertise also makes data from the MRR and lightning sensors easily accessible to planners, first responders and others who need it. RENCI expertise in data storage, analysis and management means the data from these tools will become part of a larger network of weather-related data available for research, analysis, planning and emergency decision making.

## The Partners

Brunswick County Emergency Services division  
National Weather Service  
UNC Wilmington  
Duke Energy  
Guilford, Orange, Montgomery, Duplin, Martin, Yadkin, and Rutherford counties.

## The Impact

Before the Brunswick County Flood Sensor Network, county officials monitored rising flood waters by sending an officer to flood-prone sites to report back, a system that is costly, time consuming, often dangerous and less accurate. More timely and accurate flood warnings are now possible as is traffic rerouting based on real conditions. The MRR is now used by the National Weather Service to monitor changing conditions that could lead to icing events. Their advance notice will help power companies put repair trucks in place before icing takes down power lines, a strategy that could save lives and time and money for the companies. Public safety officials can now monitor the frequency of lightning to determine if notices need to be disseminated to fire stations, schools or other groups.