COMMITTEE ON
SCIENCE, SPACE
AND TECHNOLOGY
CHAIRMAN BRIAN BABIN

FULL COMMITTEE

HEARING CHARTER

"Innovation in Disaster Prevention: Advancing Technology for Prediction and Response"

Tuesday, September 15, 2026
10:00 a.m.
2318 Rayburn House Office Building

Purpose

This hearing will examine emerging research and technologies that can strengthen the nation's ability to predict, prepare for, and respond to natural disasters. The Committee will explore cutting-edge developments in artificial intelligence, autonomous systems, advanced sensing, commercial remote sensing capabilities, data analytics, and next-generation communications and how continued investment in this research can translate into faster, more actionable information for emergency managers, first responders, infrastructure operators, and the public.

While forecasting and alerting capabilities have advanced significantly in recent years, communities continue to face challenges translating warnings into timely protective action. This hearing will examine the research pipeline behind these technologies, from early-stage development to real-world deployment, and identify where continued federal investment, streamlined regulatory processes, and public-private partnerships can accelerate the next generation of warning systems. The Committee is particularly interested in understanding what emerging research shows promise, what barriers slow the translation of research into deployable tools, and how the United States can maintain global leadership in disaster prediction and response technology.

Witnesses

- **Mr. John Gale**, Federal Affairs Director, Pano AI
- **Ms. Melissa Roberts**, Founder and Executive Director, American Flood Coalition
- **Dr. Ali Mostafavidarani**, Founder and CEO, Resilitix AI
- **Dr. Mike Falkowski**, Lead Scientist, Earth Fire Alliance

Background

Natural hazards are naturally occurring processes or phenomena—such as earthquakes, floods, hurricanes, wildfires, or volcanic eruptions—that have the potential to adversely impact human life and property. In 2025, the National Weather Service recorded 645 fatalities, 1,038 injuries, roughly $4.66 billion in property damage, and $275.46 million in crop damage from natural hazards across all 50 states, Puerto Rico, Guam, and the Virgin Islands.[1] One of the most effective tools for minimizing loss of life and property has been the development and deployment of increasingly sophisticated warning systems. Advances in forecasting have substantially increased warning times, allowing people to seek shelter or evacuate in response to threats from floods, landslides, hurricanes, tornadoes, and wildfires. As seen in Figure 1, natural hazards are experienced across the country.

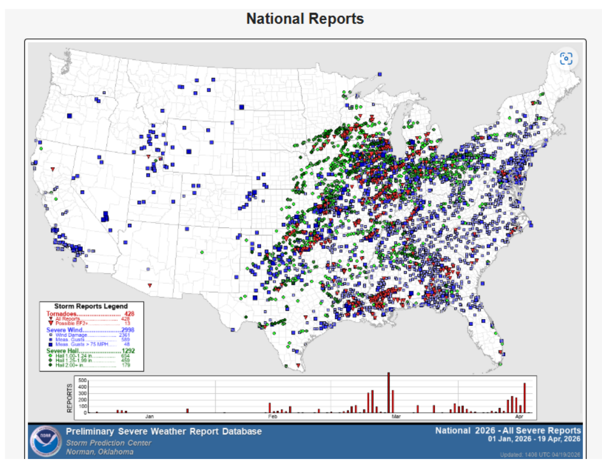

Figure 1: Total number of tornado, damaging wind, and damaging hail reports across the United States from 1/1/2026 to 4/19/2026. [2]

A new generation of emerging technologies creates opportunities to improve disaster resilience, including:

- Advanced computing and data analytics to identify patterns and support decisions;
- New sensing capabilities to monitor hazards and infrastructure conditions;
- Improved modeling and simulation tools to understand potential impacts;

[1] National Weather Service (NOAA), "Summary of Natural Hazard Statistics for 2025 in the United States," https://www.weather.gov/media/hazstat/sum25.pdf.

[2] National Weather Service (NOAA), "Very Active Start to 2026 Severe Weather Season," NWS Chicago — https://www.weather.gov/lot/2026_ActiveSevereStart

- Autonomous and automated systems to support emergency operations;
- Enhanced communications technologies to maintain connectivity; and
- Advanced platforms that integrate information from multiple sources in real time.

These technologies are being developed by universities, research institutions, government partners, and private-sector companies.

The Public Alert and Warning System

Public hazard warnings in the United States are delivered through a patchwork of systems, including the Wireless Emergency Alerts (WEA) system,[3] the Emergency Alert System (EAS),[4] NOAA Weather Radio,[5] opt-in mass-notification platforms operated by state and local governments, and an expanding array of private-sector applications and services. While these systems have measurably improved public safety, gaps remain in message clarity, translation and accessibility, alert fatigue, geographic precision, and the ability to reach populations with limited connectivity. State and local emergency managers typically select, configure, and operate the last-mile technology that determines whether a warning reaches the public and is acted upon.[6]

The consequences of gaps in this system were on display during the catastrophic Texas Hill Country flooding of July 4, 2025, in which the Guadalupe River rose more than 20 feet in a matter of hours and more than 130 people were killed, including dozens of children at riverside summer camps.[7] Subsequent legislative hearings revealed that earlier applications for state and federal funding had been denied through a nationally competitive grant process.[8]

In response to the tragedy, the State of Texas invested millions of dollars in new flood-warning infrastructure, including river gauges, outdoor sirens, and a real-time flood warning system intended to give downstream communities up to three hours of additional lead time.[9] When floods occurred in the summer of 2026, county officials reported that the new system, including

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[3] FCC, "Wireless Emergency Alerts (WEA)" — https://www.fcc.gov/consumers/guides/wireless-emergency-alerts

[4] FCC, "Emergency Alert System (EAS)" — https://www.fcc.gov/eas

[5] NOAA, "NOAA Weather Radio All Hazards" — https://www.weather.gov/nwr

[6] Federal Emergency Management Agency (FEMA), "Best Practices for Alerting Authorities Using Wireless Emergency Alerts," https://www.fema.gov/emergency-managers/practitioners/integrated-public-alert-warning-system/public-safety-officials/alerting-authorities/best-practices

[7] "Guadalupe River Flood Tragedy," VEDA Dashboard, NASA Earthdata, https://www.earthdata.nasa.gov/dashboard/stories/tx-flood.

[8] Emily Foxhall, Hayden Betts, and Paul Cobler, "Plans for flood warning system floundered before Hill Country floods, witnesses tell legislative flood committee," The Texas Tribune, July 23, 2025, https://www.texastribune.org/2025/07/23/texas-hill-country-floods-legislative-committee-hearing/.

[9] Dominic Anthony Walsh, "New Texas flood warning system could give Hill Country communities hours to prepare," Houston Public Media, May 5, 2026, https://www.houstonpublicmedia.org/articles/news/texas/2026/05/05/551044/new-texas-flood-warning-system-could-give-hill-country-communities-hours-to-prepare/.

its backup, performed as intended and no fatalities were reported.[10] This case illustrates both the human cost of gaps in hazard-warning technology and the speed with which modern sensing and modeling tools, once deployed, can improve outcomes.

Multi-hazard Data Integration and Situational Awareness

Applied research increasingly focuses on developing platforms that support situational awareness across multiple hazards, rather than a single disaster category. AI-based digital-twin technology that draws on publicly available data, sensor feeds, and satellite imagery provides emergency responders with near real time situational awareness during storms, floods, and other disasters.[11] Developed with support from the National Science Foundation, this technology was initially tested during Hurricane Beryl in 2024, when it was used to monitor evacuation patterns, power outages, and disruptions to community food and medical resources across the Houston metropolitan area in near real time.[12]

This line of research has since expanded into a broader suite of AI tools spanning the full disaster lifecycle across multiple hazard types, including evacuation forecasting, automated post-disaster damage assessment using satellite imagery, power-outage prediction, and recovery-progress tracking.[13] The integration of data across multiple sources and hazards as part of a single operating picture aims to reduce the cost and complexity of maintaining separate, hazard-specific systems for fire, flood, and severe weather response.

Wildfire Detection and Response Technology

Wildfire detection technology has advanced rapidly toward AI-driven analytics paired with both terrestrial and satellite imaging networks.

Ground-based systems such as high-resolution cameras can scan continuously from cell towers and mountaintops, and machine-learning algorithms review the imagery around the clock, searching for smoke during daylight hours and heat signatures at night.[14] Such systems detected more than 900 fires in 2025 before they were reported by the public.[15] Satellite technology has also advanced to provide near real time, high-resolution infrared imagery capable of identifying

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[10] Dominic Anthony Walsh, "New Texas flood warning system could give Hill Country communities hours to prepare," Houston Public Media, May 5, 2026, https://www.houstonpublicmedia.org/articles/news/texas/2026/05/05/551044/new-texas-flood-warning-system-could-give-hill-country-communities-hours-to-prepare/.

[11] National Science Foundation, "Resilitix supports Beryl emergency response efforts with NSF-supported digital twin technology." https://www.nsf.gov/news/resilitix-supports-beryl-emergency-response-efforts-nsf.

[12] *Id.*

[13] Texas A&M University College of Engineering, "Putting AI on the Front Lines of Hurricane Preparedness," June 2025, https://engineering.tamu.edu/news/2025/06/putting-ai-on-the-front-lines-of-hurricane-preparedness.html.

[14] "Research & Technology," ALERTCalifornia, University of California San Diego, https://alertcalifornia.org/technology/

[15] Peter O'Dowd, "AI is watching for wildfires across the drought-stricken West," WBUR Here & Now, May 21, 2026, https://www.wbur.org/hereandnow/2026/05/21/ai-wildfire-drought

fires as small as a shipping container.[16] According to the global nonprofit coalition, Earth Fire Alliance's website, it launched a demonstration satellite in March 2025 that successfully detected fires invisible to other commercial on-orbit satellite systems.[17] After this successful proof of concept, three operational satellites were launched in July 2026.[18] The Alliance is seeking to expand this constellation to more than 50 satellites with a global refresh rate of every 20 minutes by 2030.[19] This kind of satellite data has the potential to give federal, state, and local fire agencies earlier, more precise information to support faster response decisions.

Flood and Landslide Detection and Response Technology

Advancements in flood detection and response technology have yielded a new generation of low-cost, durable flood sensors that can measure water levels in real time at low-water crossings, streams, and drainage infrastructure. These data can then be paired with automated alerting and infrastructure controls, such as gates or barriers that close automatically once flood conditions are detected.[20] Cutting-edge flood information systems now fuse live sensor readings with public weather and river-gauge data, historical trends, and local infrastructure information into a single real-time operating picture for both responders and residents.

Landslides, which occur in all 50 states, are a closely related hazard, including debris flows that frequently follow intense rainfall or wildfire. They share many of the same detection, sensing, and warning challenges as flooding. Landslide early warning systems typically combine rain-gauge networks, soil-moisture and pore-pressure sensors, and empirical rainfall thresholds to estimate when saturated slopes are likely to fail. Wildfire can strip vegetation and alter how a watershed absorbs rainfall, elevating the risk of dangerous post-fire debris flows during subsequent severe storms. Federal hazard assessments routinely model this risk following major wildfires to help guide evacuation planning in the following rainy season.[21] This connection between fire, rainfall, and slope failure illustrates how sensor networks, rainfall modeling, and alerting infrastructure built for one hazard can be integrated and applied to other associated hazards.

Earthquake and Hurricane Forecasting

Advancements in earthquake hazard reduction measures such as earthquake-resistant construction, materials science, and a greater understanding of the effects of earthquakes have all contributed to a reduction in loss of life.

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[16] Earth Fire Alliance, "About FireSat," https://earthfirealliance.org/about-firesat/.
[17] *Id.*
[18] *Id.*
[19] Muon Space, "Muon Space Deploys First Three Operational FireSat Satellites for Earth Fire Alliance," July 2026, https://www.muonspace.com/muon-space-deploys-first-three-operational-firesat-satellites-for-earth-fire-alliance/.
[20] Simplicity Integration, "About Simplicity," https://simplicityintegration.com/about/.
[21] U.S. Geological Survey, "Landslide Hazards – Data & Tools" (postfire debris-flow hazard assessments), https://www.usgs.gov/programs/landslide-hazards/data.

The U.S. Geological Survey's ShakeAlert system, the nation's only public earthquake early warning system, detects the fast-moving but less damaging P-wave of an earthquake and issues an alert before the slower, more destructive S-wave arrives. This early warning system is capable of providing a window of seconds to tens of seconds for people to take protective action.[22] The National Earthquake Hazards Reduction Program Reauthorization Act of 2025 was approved by the House Committee on Science, Space, and Technology in July 2026.[23] This legislation reauthorizes NEHRP through fiscal year 2031 and modernizes federal efforts on earthquake monitoring, early warning capabilities, hazard mapping, and seismic resilience.

AI offers significant potential to advance the prediction and tracking of hurricanes. New AI weather prediction models analyze enormous amounts of historical data to identify patterns and relationships among variables such as pressure, wind, and temperature. Once trained, real-time data can be fed into the models to generate weather forecasts. While the National Weather Service has been conducting thorough testing and verification of AI-based models, the 2025 hurricane season marked the first time these models were integrated into forecast guidance alongside traditional physics-based models used to prepare official forecasts.[24] These examples illustrate that the technology and data challenges facing fire and flood response—particularly the challenge of translating raw sensor and model output into fast, trusted, actionable guidance—are shared broadly across hazard types.

Barriers to Deployment

As technology advances, it is imperative to bridge gaps among individual technologies and develop a scalable, multi-hazard, integrated approach at the federal, state, and local levels. While each of these technologies has demonstrated success in pilot programs or during individual events, barriers to broader deployment remain. These barriers include lengthy and inflexible federal and state contracting processes, fragmented or duplicative funding streams spread across more than a hundred separate federal programs, and a lack of standardized pathways for integrating new sensor, satellite, and AI-based data into the systems emergency managers already use.

[22] U.S. Geological Survey, "Earthquake Early Warning: Overview," https://www.usgs.gov/programs/earthquake-hazards/science/earthquake-early-warning-overview.
[23] "Full Committee Markup of H.R. 3168, H.R. 8437, and H.R. 9326," House Committee on Science, Space, and Technology, July 2026, https://republicans-science.house.gov/2026/7/full-committee-markup-of-h-r-3168-h-r-8437-and-h-r-9326.
[24] National Weather Service, "AI in Hurricane Forecasting at the National Hurricane Center: A Q&A with NHC Science Operations Officer Wallace Hogsett," February 12, 2026, https://www.weather.gov/news/261102-AI-Hurricane-Forecasting.