

# INFRASTRUCTURE REQUIREMENTS FOR THE WEATHER RESEARCH AND FORECAST INNOVATION ACT

Improving Advance Lead Times in Tornado and Hurricane **Warning** Systems

AMS Washington Forum  
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## Need For Better Warning and Lead Times Identified

(Sec. 101) This bill requires the National Oceanic and Atmospheric Administration (NOAA) to prioritize weather research to improve weather data, modeling, computing, forecasts, and **warnings** for the protection of life and property and the enhancement of the national economy.

(Sec. 102) NOAA's Office of Oceanic and Atmospheric Research (OAR) must conduct a program to develop an improved understanding of forecast capabilities for atmospheric events and their impacts, **with priority given to the development of more accurate, timely, and effective warnings** and forecasts of high impact weather events that endanger life and property.

In carrying out the program, the OAR must collaborate with and support the nonfederal weather research community by making funds available through competitive grants, contracts, and cooperative agreements. Congress urges that at least 30% of the funds authorized for research and development be made available for this purpose.

## ... as it Relates to Tornadoes!

FACETs. Forecasting a Continuum of Environmental Threats:



Next-generation severe weather watch and warning framework that is modern, flexible, and designed to communicate clear and simple hazardous weather information to serve the public.

(Sec. 103) NOAA must establish a tornado warning improvement and extension program to reduce the loss of life and economic losses from tornadoes through the development and extension of accurate, effective, and timely tornado forecast, predictions, and warnings, including the prediction of tornadoes beyond one hour in advance.

## Severe Weather Warning Text

Warning text describes impacts and uses "tags" to make important information easier to find

Tornado Warning Tag	
TORNADO...RADAR INDICATED	Evidence on radar is supportive of a tornado, but there is no ground confirmation.
TORNADO...OBSERVED	Tornado is confirmed by spotters, law enforcement, etc.
Tornado Warning Damage Threat Tag	
No Tag	Used most of the time when tornado damage is possible.
TORNADO DAMAGE THREAT...CONSIDERABLE	Used rarely when there is credible evidence that a tornado is capable of producing considerable damage.
TORNADO DAMAGE THREAT...CATASTROPHIC	Used exceedingly rarely when a severe threat to human life and catastrophic damage from a tornado is occurring.
Tornado Tag In Severe Thunderstorm Warnings	
TORNADO...POSSIBLE	A severe thunderstorm has some potential to produce a tornado.

## Best Practices for the Dissemination of Weather **Warnings** to the Public

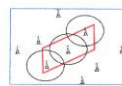
A Best Practice Statement of the American Meteorological Society (Adopted by the AMS Council 7 January 2018)

### Specific Best Practices:

1. Redundancy for Receiving Warnings
2. Robustness of the Core Computing Infrastructure
3. Reliability and Redundancy of the Core Computing Infrastructure
4. Reliability and Redundancy of Message Dissemination
5. Geolocation, Naming and Wording Fidelity: **When sending alerts that contain NWS warnings to the public, it is important that the consumer receives information that is consistent with the original warning and its intent. Warnings should only be sent to users who are physically within the geographic area (or just over wherever possible) as defined by the NWS warning.**

## Wireless Emergency Alerts (WEA)

**IMPORTANT NOTE:** Cell phone carriers have not committed to a common date to enable WEA for the storm surge and extreme wind warnings. They may be implemented by the carriers at different times



While efforts are underway to make WEA activations more targeted, there is still the potential for the message to be spread outside the intended warning area.

Note: Map is not drawn to scale and is for illustrative purposes only.

## ... as It Relates to Hurricanes!!

(Sec. 104) In collaboration with the U.S. weather industry and appropriate academic entities, and through the National Weather Service (NWS), NOAA must plan and maintain a project to improve hurricane forecasting, including: the prediction of rapid intensification and track of hurricanes, the forecast and communication of storm surges from hurricanes, and risk communication research to create more effective watch and warning products.



NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NOAA NEWS 2018 Tropical Product Changes NATIONAL WEATHER SERVICE

- Operational NHC Time of Arrival of Tropical Storm-Force Winds Graphics
- Clearer messaging in the Local Tropical Cyclone W/W (TCV) Product
- WFO Tropical Webpage
- Vortex Message format changes
- Addition of hurricane-force-wind radii forecast at 48 hours
- Expansion of the forecast discussion to 72 hours in the NHC Tropical Cyclone Public Advisory (TCP)
- Changes to the Local Post Tropical Cyclone Reports
- Changes to TCP from the Weather Prediction Center (WPC)
- Ability to issue CFW and SRF products during tropical events

## Maintaining USA As #1 When It Comes to Warnings

(Sec. 105) The OAR must issue a research and development and research to operations plan to restore and maintain U.S. leadership in numerical weather prediction (processing weather data with computer models) and forecasting.

(Sec. 106) NOAA must: (1) prioritize observation data requirements necessary to ensure weather forecasting capabilities to **protect life and property to the maximum extent practicable**; (2) evaluate observing systems, data, and information needed to meet those requirements; (3) identify data gaps in observing capabilities; and (4) determine a range of options to address those gaps.

## WHERE DO WE GO FROM HERE?

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