

# Messaging Safety to Vulnerable Populations

**Dr. Kim Klockow-McClain**

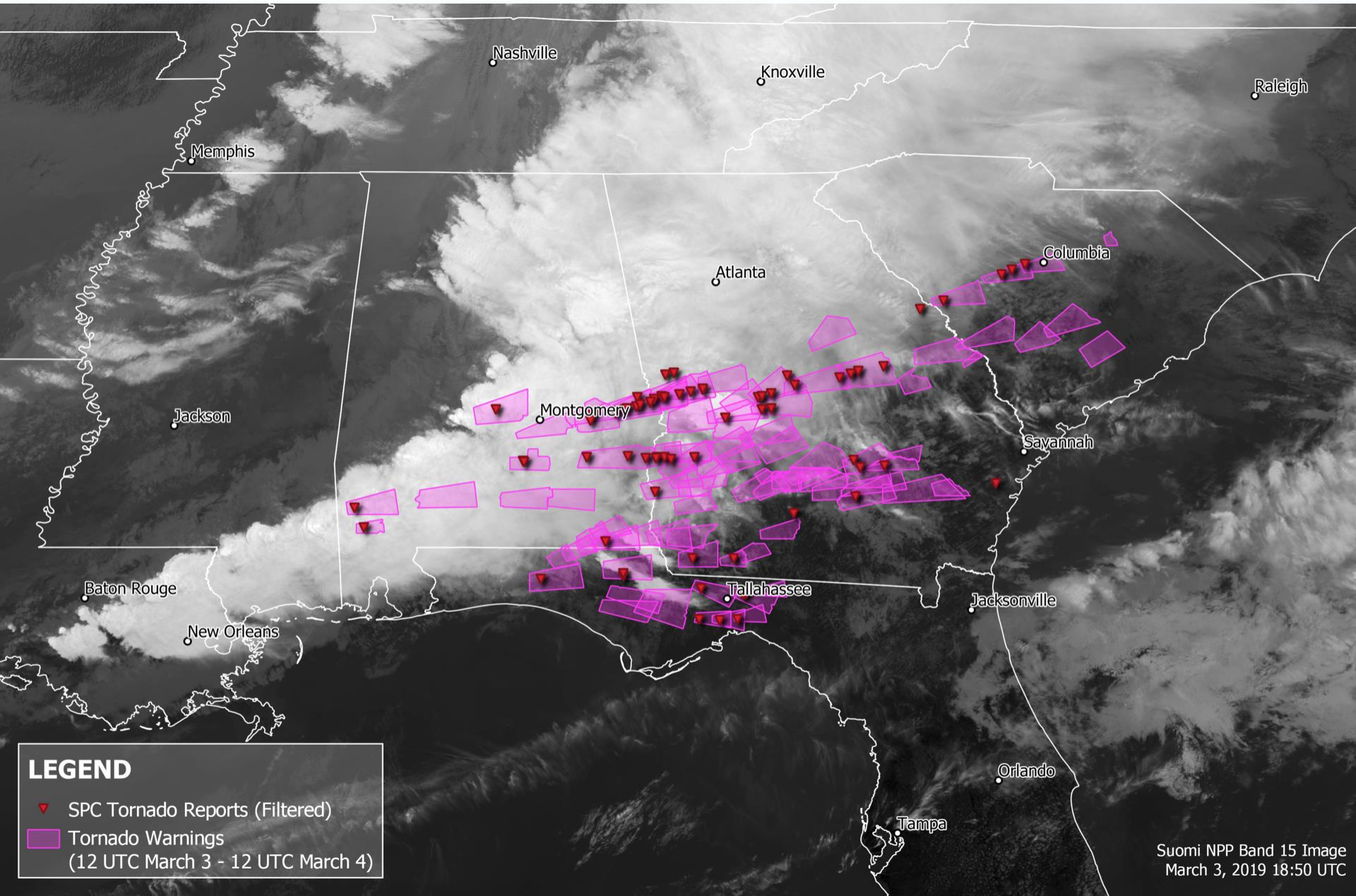
Atlanta IWT

12/10/2019

# March 3, 2019



Questions always arise. How could we have done better?  
23 fatalities, most deadly tor since Moore EF5 in 2013



**LEGEND**

- ▼ SPC Tornado Reports (Filtered)
- Tornado Warnings  
(12 UTC March 3 - 12 UTC March 4)

Suomi NPP Band 15 Image  
March 3, 2019 18:50 UTC



Capital Weather Gang

# A great forecast but a deadly tornado tragedy in Alabama. What went wrong?

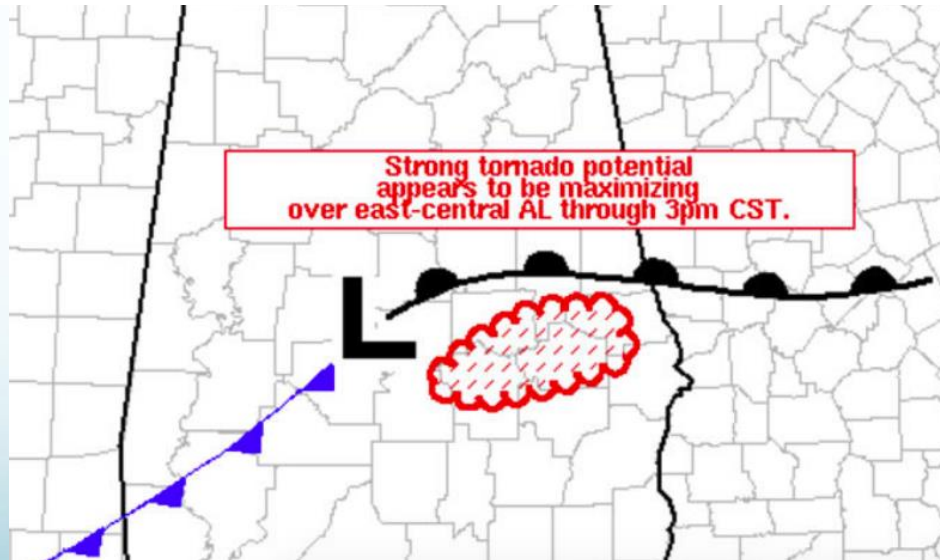
Tornado Forecasting Improves, But Still Deaths Keep Coming

By Seth Borenstein

Published Mar 6, 2019 at 8:33 AM

## Plenty of Warning

The Storm Prediction Center issued an outlook 24 hours in advance of the tornado that was dead on. They issued a Watch more than 2 hours before the storm and they deserve credit for what I would almost label an eerily accurate forecast. Most residents had at least 9 minutes under a Tornado Warning before the monster cloud with 170 mph winds developed at 2 PM CST last Sunday.



-Dan Satterfield



**Stephen M. Strader** @StephenMStrader · 21h

We are 99.9% sure on these stats/locations. 19 of 23 of fatalities in the Beauregard tor occurred in mobile/manufactured homes (MH). 12 of 14 homes were MH and the two permanent homes (PH) where fatalities occurred were weak-framed housing w/structural integrity comparable to MHs

Beauregard, AL Tornado Fatalities and Housing Type Beauregard, AL Tornado Fatalities and Housing Type







## A Tornado Warning Gave Alabamians 12 Minutes to Prepare. 23 People Died Anyway.

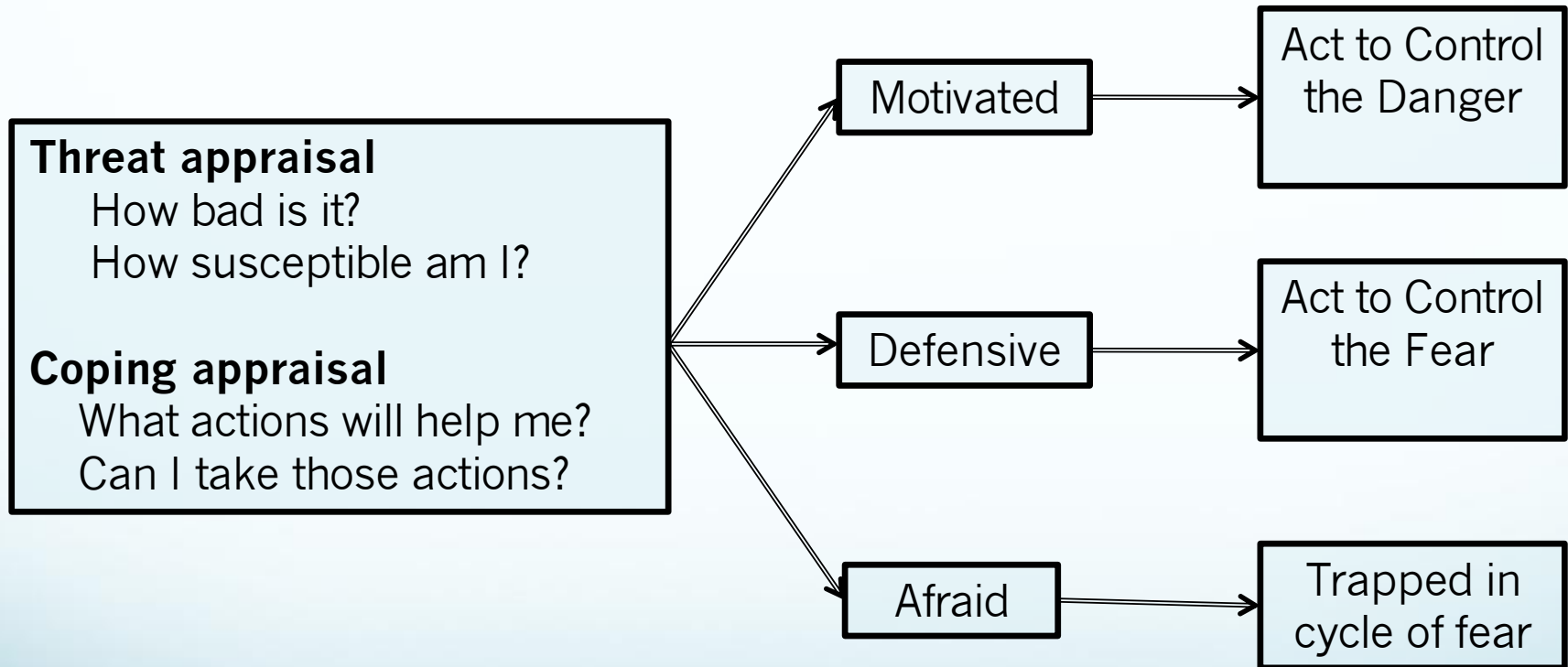
A warning for the ferocious tornado was issued quickly. But in a place with widespread poverty and few places to hide, it could not save everyone.

-New York Times

We always focus on making sure as many people as possible hear a tornado warning the moment it's issued. But all of the advanced warning in the world can only go so far in preparing people for one of nature's strongest forces. Sunday's tornado was at least an EF-3 and probably stronger than that. The storm was moving at 60 MPH. Many of the residences in its path appear to have been mobile or modular homes. A human being simply cannot survive that kind of storm without being underground or deep within a much stronger structure. Many people in weaker homes out in the country simply have nowhere to go to ride out a storm like that. A tornado warning is only as good as your ability to act on it.

-Dennis Mersereau

# Behavioral Science: The Extended Parallel Process Model (EPPM)



# Path to Improvement

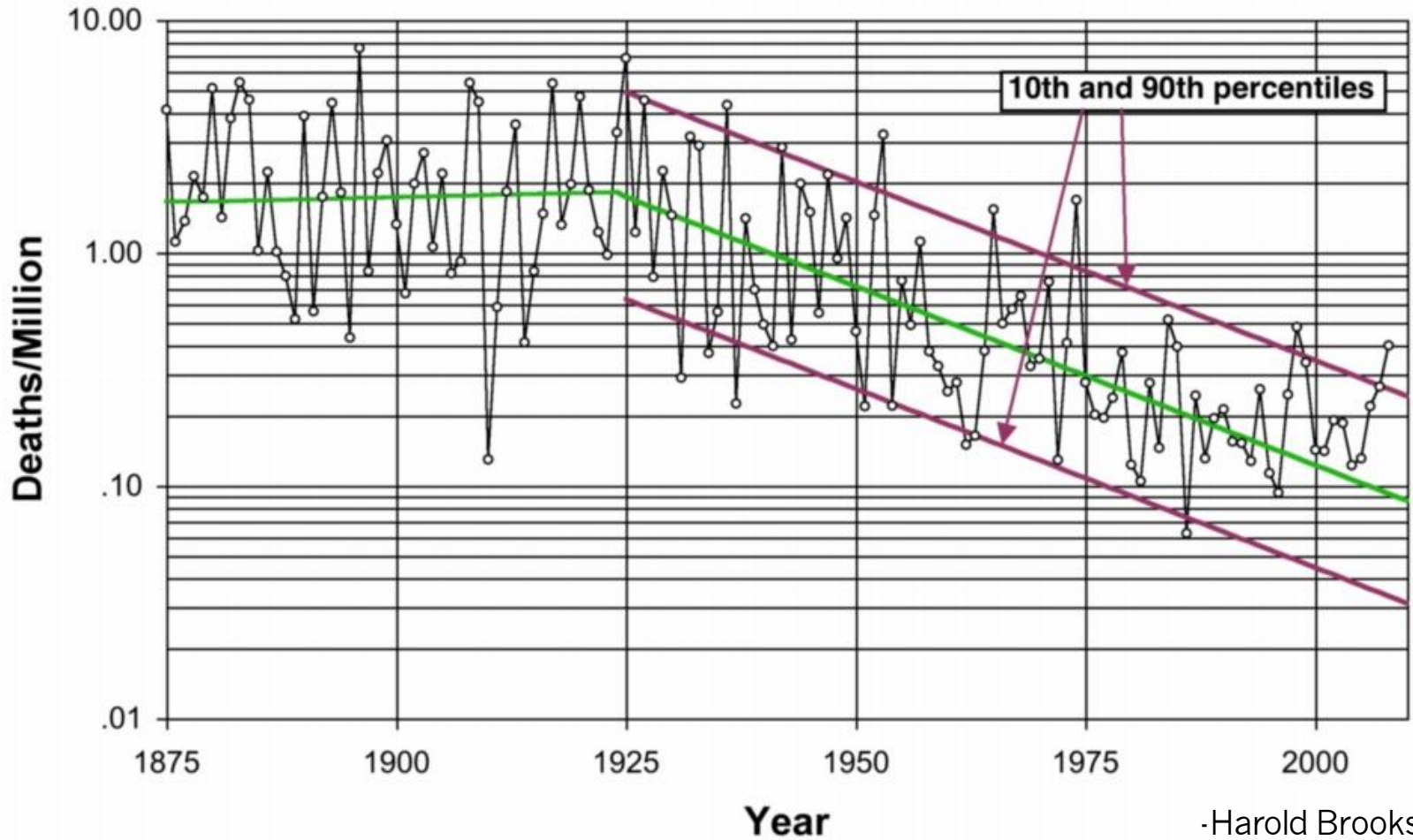
Behavioral Goal: **Informed Decision-Making**

- *Not* just appeals to fear, command/control
- Message in ways that reach the audience, are understood
- Improve technology: offer more lead-time
- Assure access to **adequate** response options
- Targeted audiences doing optimal things



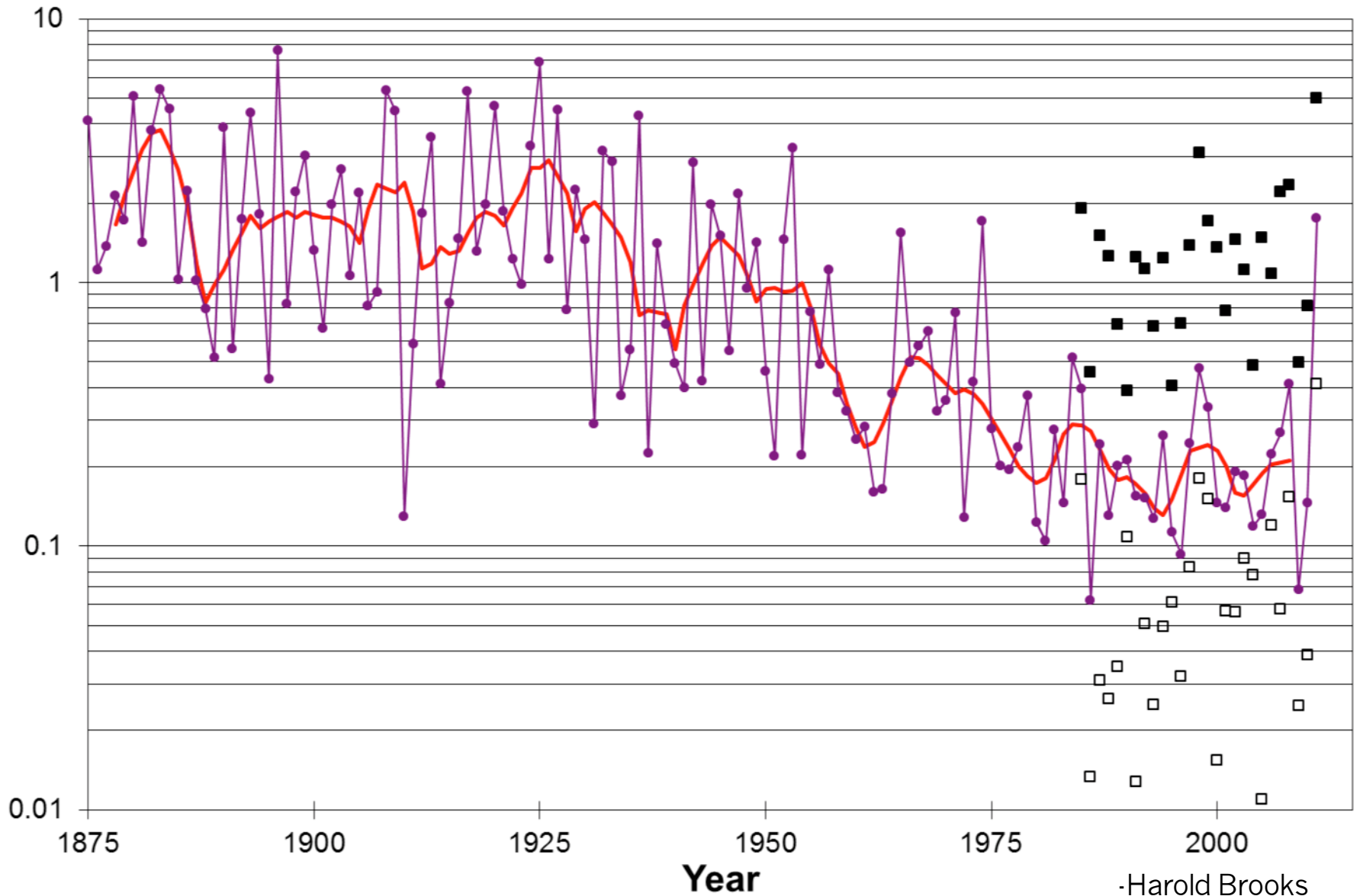
Do we have evidence that improvements in the warning system are having an impact?

# US Tornado Deaths/Million People



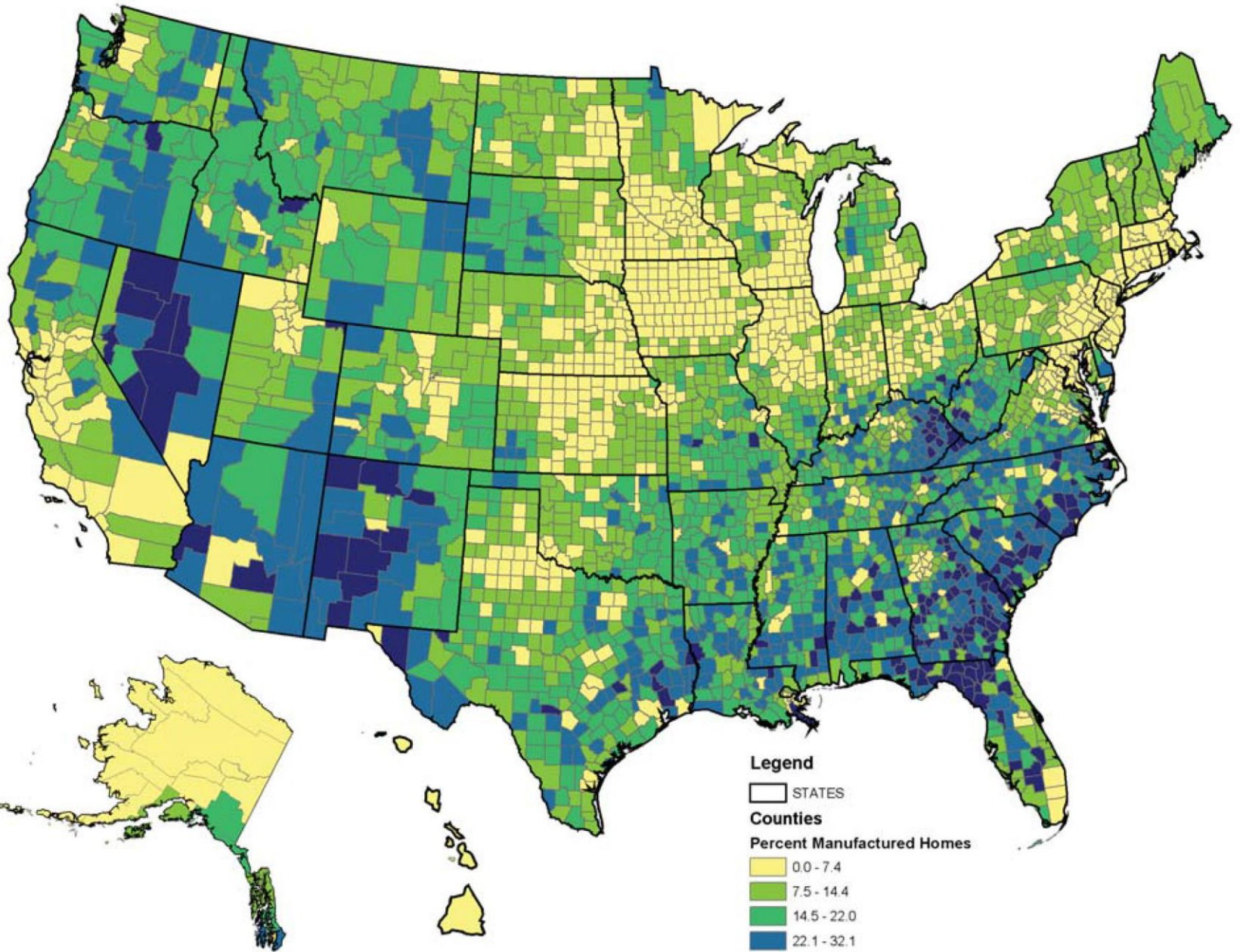
-Harold Brooks

# US Tornado Deaths/Million People



-Harold Brooks





**Legend**

STATES

**Counties**

**Percent Manufactured Homes**

0.0 - 7.4

7.5 - 14.4

14.5 - 22.0

22.1 - 32.1

32.2 - 61.3

# Emergent Questions

- Do people know what kinds of structures are safe from tornadoes?
  - This includes meteorologists, emergency managers – key communicators
  - We need to get on the same page
- Do the most vulnerable people have the means to seek safe shelter?
- What are members of the IWT doing to try to help?
- What gaps/barriers are experienced by members of the IWT?

- **Where residents are located when they receive a warning:**

<b>Location</b>	<b>MH Resident</b>	<b>FH resident</b>
Home	73%	79%
Work	9%	5%
Car/vehicle	5%	5%
Other	5%	5%
School	5%	4%
Store	1%	1%
Outdoors	1%	<1%



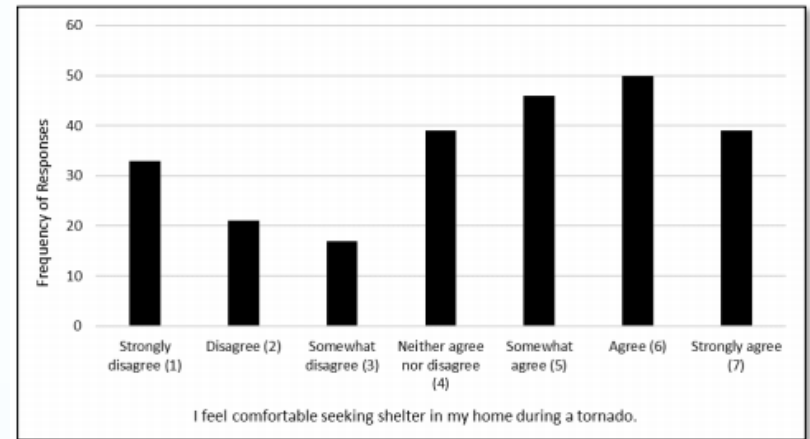
Action	FH	MH	FH	MH	FH	MH	FH	MH	FH	MH	FH	MH
	Work	Work	School	School	Home	Home	Store	Store	Car	Car	Outdoors	Outdoors
Shelter inside home	6.8%	-	11.6%	0.0%	20.7%	13.9%	9.5%	-	3.1%	<1%	-	-
Contacted family and friends	4.7%	<1%	6.3%	<1%	5.7%	3.5%	4.8%	-	9.3%	<1%	-	-
Went outside to view the storm	2.0%	<1%	1.1%	-	2.8%	3.0%	-	-	1.0%	-	-	-
Went to window to view the storm	8.1%	1%	2.1%	-	7.8%	6.4%	-	-	3.1%	<1%	-	-
Confirmed storm through other source	9.5%	-	10.5%	<1%	7.7%	5.4%	9.5%	-	4.1%	-	5.9%	<1%
Gathered supplies	3.4%	-	7.4%	<1%	6.1%	5.7%	9.5%	-	2.1%	<1%	11.8%	-
Attempted to get home	16.1%	<1%	17.9%	1.2%	5.9%	2.2%	14.3%	-	29.9%	1.5%	5.9%	-
Attempted to shelter away from home	14.8%	1%	6.3%	<1%	9.2%	8.4%	9.5%	-	14.4%	1.0%	17.6%	-
Checked social media	1.3%	-	1.1%	-	0.9%	<1%	-	-	1.0%	<1%	-	-
Checked on neighbors	0.7%	-	3.2%	-	1.3%	1.2%	4.8%	-	2.1%	<1%	-	-
Prayed	7.4%	1.2%	7.4%	<1%	9.0%	13.4%	-	-	6.2%	<1%	-	-
Brought children inside	4.7%	<1%	7.4%	<1%	7.7%	4.5%	4.8%	-	7.2%	<1%	11.8%	-
Charged mobile devices	2.7%	<1%	6.3%	-	4.2%	3.2%	19%	<1%	4.1%	<1%	5.9%	-
Locked pets inside	0.7%	-	3.2%	-	2.7%	2.7%	-	-	-	-	17.6%	-
Moved vehicles out of debris paths	2.0%	-	2.1%	-	1.1%	-	4.8%	-	1.0%	-	-	<1%
Put away outside belongings	0.7%	-	-	-	1.6%	-	4.8%	-	2.1%	-	5.9%	-
Other	14.1%	1.0%	6.3%	-	5.7%	3.0%	4.8%	-	9.3%	-	17.6%	-

-Brooke Liu/START

# Mobile & Manufactured Home (MMH) Resident Perceptions of Safety

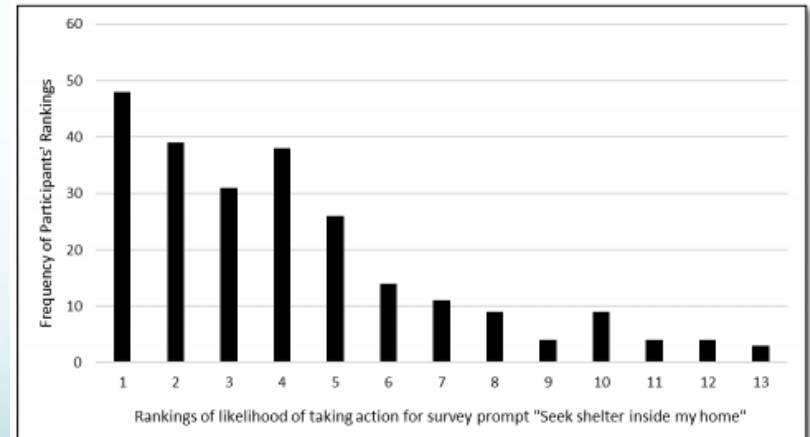
Egnoto and Ash 2019:

- Over half of MMH residents surveyed feel their home is a sufficient shelter
- People who had higher perceptions of structural integrity of their home were the most likely to shelter in place during warnings



Rouche 2019:

- There are questions about whether MMH residents understand issues relating to structural integrity; even those with anchoring can experience failure due to corrosion (prevalent issue in Lee Co. tornado)



Egnoto and Ash 2019

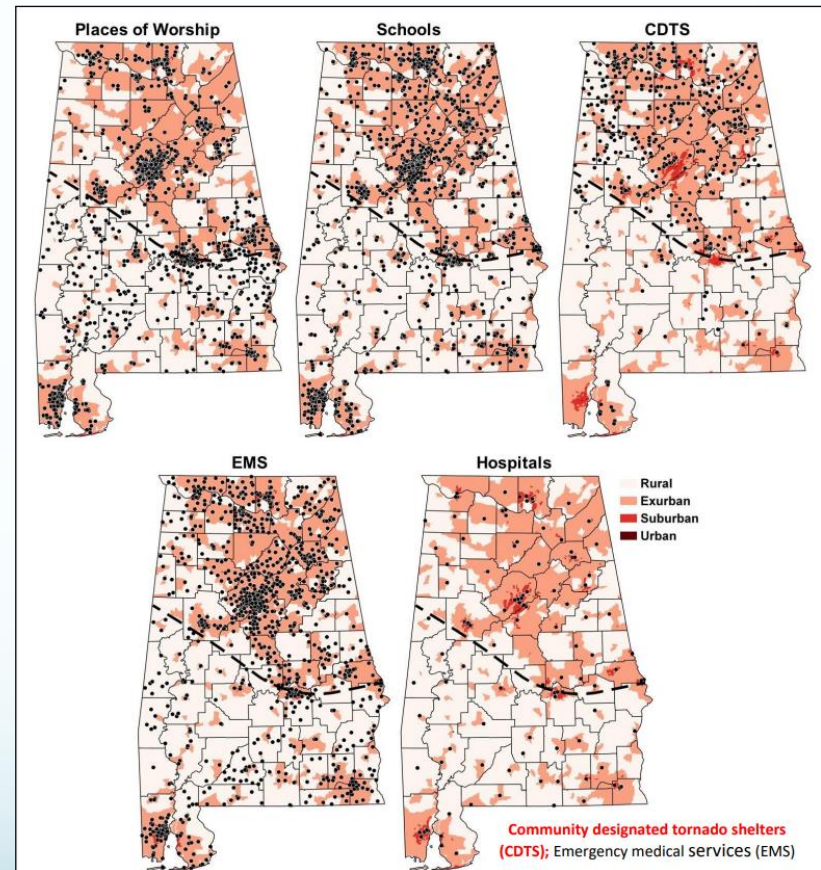
# MMH Resident Sheltering Outside the Home

Egnoto and Ash 2019:

- Those who **do** want to seek alternate shelter require a place to go, and frequently, a car.
- People in urban MMH parks have less access to cars than people living in MMHs in rural settings.
- MMH residents with the most means to evacuate tend to be the ones who feel safe in their home
  - Paradox – those with the means don't evacuate as often, and those with more accurate perceptions of weakness often don't have the means to evacuate

Strader 2019:

- Drive times/access is lower in the so-called Black Belt of So AL, likely similar in GA
- More rural, fewer public shelters & other kinds of public facilities
- Greater distance to nearest permanent home as well



From Strader 2019



# IWT Communication to MMH Populations

## Broadcast Meteorologists

- One met felt it is **not their job** to message to this population
  - “I don’t want to provide an inconsistent message.”
- Another: “They’re a “black box population”
  - Don’t get many questions about them, nor do they receive info about them.
  - They’re so busy & resource-strapped, they can’t go searching academic literature to find any nuggets that do exist.
- A few mets: do a lot to try to message to MMHs, especially well ahead of time.
  - During events, some **become concerned** about asking people to leave, fearing they won’t have enough time/may drive into storms.
  - Some report not knowing where people will go, don’t know what to recommend
- Several mets report attempting to communicate in ways that motivate response
  - A few: “get out or don’t survive”
- Several mets go to schools/engage in social learning as a primary means of conveying “don’t be there”

## Emergency Managers

- Some EMs report their job is to message to “everyone,” **not this population** in particular
- A few EMs in rural counties with small MMH clusters/parks: more direct outreach/phone calls to MMH populations ahead of time
  - “I know where they’d all be going.”
- Message through social media and other networks, like church groups
  - **Warnings are a social process, not a technology**
- EMs in better-resourced EOCs: More reliance on Code Red/app systems for distributing NWS warnings
  - Some report difficulty of no product between watch and warning to push
- One GA EM: Would love their **broadcasters** to talk about people getting out ahead of the warning (2-3 counties ahead)
- One GA EM: Unsure what to tell people to do/**concern for litigation** if recommendation leads to injury

# IWT Communication to MMH Populations

## NWS Forecasters

- Great awareness of the vulnerability of this population
- Report some reliance on EMs to know their publics and reach them, and on broadcasters to message safety
  - “Already so much to cover”
  - Interest in what other IWT members *\*are\** doing
- Considering IWT move to be closer to concentrated MMH populations/improve access
- One office noted lack of public school funding has reduced education in this area, they are trying to step in
  - Difficult to cover all needed ground from WFO, especially since many MMH dwellers live far away from WFO
- **Across IWT:**
  - No single point that consistently feels messaging to MMH populations is their responsibility
    - Each IWT member type was observed attempting to innovate in this space

# Recommendations & Discussion

- Don't tell people they **won't** survive unless they're in a perfectly safe situation
  - You can encourage safe behaviors without going too far
- Don't be afraid to tell people to aim for something just a little better
  - Don't let perfect be the enemy of good
- **IWT needs to organize**
  - What do you think should be done?