



**More than Meets the Eye;**  
**Decision Making in the Face of Weather Hazards**

**NATIONAL TORNADO SUMMIT**



Dr. Kevin Kloesel  
OU Office of Emergency Preparedness  
longhorn@ou.edu

@texasembassy



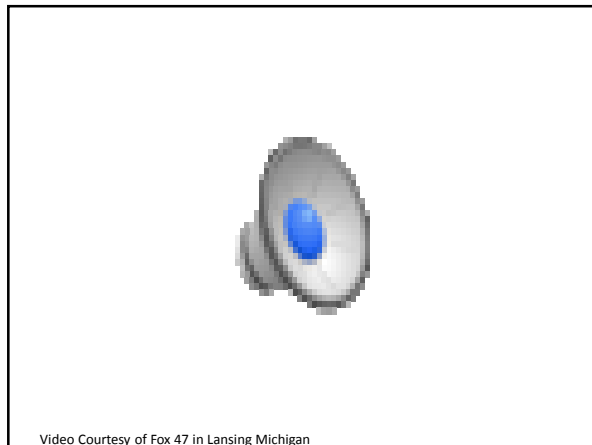
**More than Meets the Eye;**  
**Decision Making in the Face of Weather Hazards**

**NATIONAL TORNADO SUMMIT**



Dr. Kevin Kloesel  
OU Office of Emergency Preparedness  
longhorn@ou.edu

@texasembassy



**What did we learn from the video?**

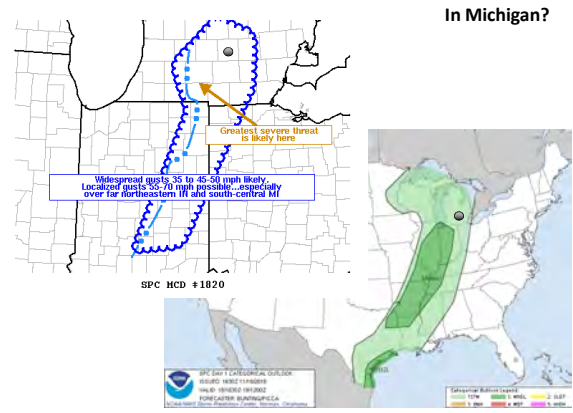
- Event w/ entire population "crammed" in a small area
- Think about scenarios
- "No threat"
- Planning for what could happen
- Practice Drills
- Safe, Enjoy the Weather, "Shorts"

**NATIONAL TORNADO SUMMIT** National Tornado Summit February 2017 Oklahoma City OK

**The threats to our venues worldwide are numerous and real.**



**But... if someone tells me "Warm," "Shorts"? In November? In Michigan?**




SPC HCD +1820

SPC DAY 7 CATEGORICAL OUTLOOK  
ISSUED: 08:00 PM EDT  
VALID: 08:00 PM EDT  
FORECASTER: WJH/MLG/CA

Severe Weather Outlook  
Color Key: 1-5  
1. 1-20%  
2. 21-40%  
3. 41-60%  
4. 61-80%  
5. 81-100%

**What other questions should you be asking?**

Emergency Operations Plan needs to include the threats mentioned in the video. But what else?



National Tornado Summit February 2017 Oklahoma City OK

**What other questions should you be asking?**


Emergency Operations Plan needs to include the threats mentioned in the video. But what else?

What is the most likely weather threat?


What would climatology/history suggest as the most likely threat? (November in Michigan)

Does climatology at this point in our history do much for us?

We have to think more broadly about weather threats!



National Tornado Summit February 2017 Oklahoma City OK



Video Courtesy of Fox 47 in Lansing Michigan


**What was the weather plan for this event?**

What was the weather risk?

What is your APP (Actionable Proactive Protective) against the risk?

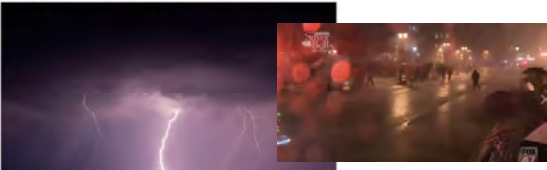
- Shelter in place?
- Shelter in shelter? (Do you have enough space?)
- Can you move the event?
- Can you postpone/reschedule event?
  - And if so, by what time?
- Cancel the event? (cost/loss projections)

**Professional Meteorologist to monitor risk**  
**APP decision trigger chart to assign decisions/comms**




National Tornado Summit February 2017 Oklahoma City OK

Severe Thunderstorm cancels Silver Bells Festivities




**“Line of severe storms headed east at 55mph”**

**“Emergency management Chief did not call for an evacuation because once the rain got heavy, most of the crowd left quickly.”**




National Tornado Summit February 2017 Oklahoma City OK



**57 cloud-to-ground lightning strikes between 7:12pm EST and 7:37pm EST.**

**5 cloud to ground lightning strikes occurred downtown in vicinity of the event between 7:18pm EST and 7:20pm EST**

**Storms moving at 55mph will move 8 miles (safety radius) in 9 minutes**



National Tornado Summit February 2017 Oklahoma City OK

## The Most Important Climate Change May Be the Legal One

After storm, a dad's death at Wood Dale fest is lamented, will be litigated




"The true tragedy to this situation is that matters such as this are not only potentially predictable, they are preventable with prudent caution and control of events in the face of available meteorological information,"



**NCEP Operational Forecast Skill**  
36 and 72 Hour Forecasts @ 500 MB over North America  
(100 \* (1-S1/70) Method)



**Dallas Cowboys employees settle lawsuit over 2009 practice facility collapse**



**Daytona 500 rain delay gambled with fans' lives**

News, mainly from grandstands after a fan died in a lightning strike at Pocono, track officials at Daytona International Speedway exhibited a similar pattern of negligence & failure of external communication between the NWS, NASCAR and track officials, public warnings issued by NWS-MetService and warnings systems installed between track officials and spectators shows that track officials aware an hour to communicate the threat of severe weather to fans, putting the lives of more than 100,000 fans at risk. — **Daytona 500 Despite Warnings, Track Officials Waited an Hour Before Evacuating Fans from Dangerous Weather**

**Family of boy struck by lightning seeks \$10 million in lawsuit**

**Inmate's death by lightning is state's fault, lawsuit says**

**Families of 2 hit by lightning sue Boy Scouts of America**

Three separate wrongful death suits have been filed in connection with weather incidents which occurred in various parts of the nation

**NEW JERSEY WIFE FILES SUIT OVER HUSBAND'S LIGHTNING STRIKE DEATH**

**Archives: \$50M settlement reached in State Fair stage collapse**

**Pocono Raceway sued over lightning death**

**NATIONAL TORNADO SUMMIT** National Tornado Summit February 2017 Oklahoma City OK



Dr. Cavilli, lived a few months ago, is likely to need surgery to fix "a couple of broken vertebrae" in his lower back but is expected to recover, said Jay Kucharz, Dan Reaves, the longtime NFL coach.

"There isn't any luck out to be passed on," said Reaves. The coach was being transported to a hospital wearing a neck brace.

**Dallas Cowboys employees settle lawsuit over 2009 practice facility collapse**

Cowboys assistant owner Bill Belton underwent surgery and left several level 6 spinal-cord injuries at Parkland Memorial Hospital, according to ESPN.com's Matt Murray.


Others with serious injuries included a person with a head injury, two with air splays fractures below the knee and someone who was trapped with a car, said Thomas Gonzalez, Irving's city manager.



Two Dallas Cowboys employees seriously hurt in the 2009 collapse of the team's Valley Ranch practice facility have settled another part of the lawsuit over their injuries and will receive a combined \$34 million, their attorney announced Monday.

**NATIONAL TORNADO SUMMIT** National Tornado Summit February 2017 Oklahoma City OK

**Declan Sullivan's Death Could Cost Notre Dame \$30 Million**



**Declan Drumm Sullivan**  
Holy fuck holy fuck this is terrifying  
5 hours ago via Twitter  
5 comments

**Declan Drumm Sullivan**  
Guests of wind up to 60mph wall today will be fun at work... I guess I've lived long enough :-/  
5 hours ago via Twitter

**Student dies in video tower collapse**

**Marquette Sports Law Review**  
Volume 24 Issue 1 Fall Article 8

**The Duty of Care College Football Coaches Owe to Student Staff Members: Analyzing the Tragic Death of a Student Videographer at Notre Dame**

**This past July in Colorado...**

**Three Injured in lightning strike at El Paso County Fair**

general public 2016 - 2016 via CO.gov  
reported 2:04 am on 7/20/16  
By Zach Traxler CONNECT



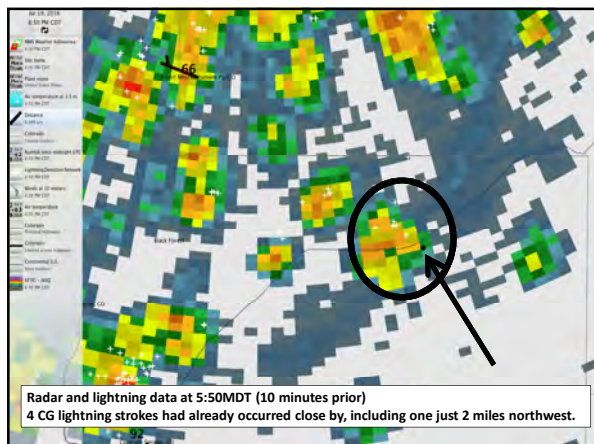
One woman took a direct hit while two other people were also injured in a lightning strike Tuesday evening at the El Paso County Fair in Cañon.

"This lightning bolt sort of came out of nowhere," said El Paso County spokesperson Dawn Roda. The woman was walking out of the Information Building on the north side of the fairgrounds when she was hit by the bolt, Roda said. A man walking beside her was also injured. "It got hit by a softball who was close enough to not know exactly what the heck," Roda said. "She did say though one of the victims was hit, in her words, either directly or pretty close to a direct hit."

Fair goers and fair managers say there was a thunderstorm to the north of the fairgrounds, about 600 yds, but not nearly close enough to cause problems for the safety of fair attendees.

**"There was a thunderstorm north of the fairgrounds, around 6pm, but not nearly close enough to cause concern."**

**"The lightning bolt sort of came out of nowhere."**



### Insane Lightning Strike Surprises High School Football Halftime Show

459 SHARES

It happened in an instant. Lightning hit a star during the Okemune University High School game's halftime show.

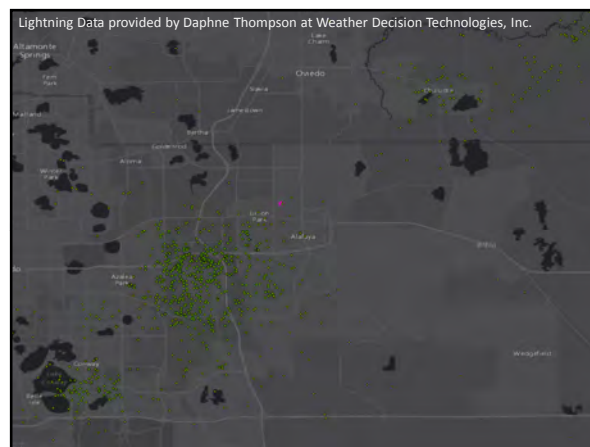
The shock occurred that a 2000-watt street lighting pole was toppled in about 30 seconds. The pole was among the marching band's halftime show — that you saw just lighting strikes.

What the video shows is a 2000-watt street lighting pole being struck by lightning. The pole was among the marching band's halftime show.

**NATIONAL TORNADO SUMMIT** National Tornado Summit February 2017 Oklahoma City OK

No warning?  
Really?

These two bolts occurred in the 3 minutes prior to the "insane" bolt.



**Important things we know!!!!**  
Lightning doesn't always strike the tallest object.  
Lightning doesn't always strike the best conductor.  
Lightning isn't always preceded by rain.

**NATIONAL TORNADO SUMMIT** National Tornado Summit February 2017 Oklahoma City OK

### And Lightning is DEADLY

7 hospitalized after lightning strike at Tampa Bay's Raymond James Stadium after Buccaneers' NFL game

Florida's lightning capital killed two other women, ages 44 and 36, after full night of rain. The women were in a car when lightning struck the car. The car was damaged by lightning. The women were hospitalized.

Lightning Kills Kent Student  
47 Others Fell Off Hockey Field

One dead after "unusual" lightning strike in city, two critical

**NATIONAL TORNADO SUMMIT** National Tornado Summit February 2017 Oklahoma City OK

**What else do we know?**

**A lot can change in one hour!  
Storms are dynamic and evolving.  
Would you have anticipated this?**

**Professional meteorologists are available and armed with sophisticated tools for weather hazard detection and monitoring.**

**NATIONAL TORNADO SUMMIT** National Tornado Summit February 2017 Oklahoma City OK

**Professional meteorologists also have the expertise to identify the more subtle threats to life and property.**

**NATIONAL TORNADO SUMMIT** National Tornado Summit February 2017 Oklahoma City OK

**WSR-88D Radar from Indianapolis at 8:44pm August 13, 2011**

**Just curious... what time did you likely receive this 8:44pm radar image?**

**NATIONAL TORNADO SUMMIT** National Tornado Summit February 2017 Oklahoma City OK

SEVERE WEATHER STATEMENT  
NATIONAL WEATHER SERVICE INDIANAPOLIS IN  
858 PM EDT SAT AUG 13 2011

INC011-057-063-097-109-133-140145-  
/O.CON.KIND.SV.W.0293.000000T000Z-110814T0145Z/  
BOONE-HAMILTON-HENDRICKS-MARION-MORGAN-PUTNAM-  
858 PM EDT SAT AUG 13 2011

...A SEVERE THUNDERSTORM WARNING REMAINS IN EFFECT FOR SOUTHEASTERN BOONE...HAMILTON...HENDRICKS...MARION...NORTHERN MORGAN AND EAST CENTRAL PUTNAM COUNTIES UNTIL 945 PM EDT...

AT 853 PM EDT...TRAINED WEATHER SPOTTERS REPORTED A LINE OF SEVERE THUNDERSTORMS PRODUCING DESTRUCTIVE WINDS IN EXCESS OF 70 MPH. THESE STORMS WERE LOCATED ALONG A LINE EXTENDING FROM NOBLESVILLE TO 12 MILES NORTHWEST OF MARTINSVILLE...MOVING EAST AT 25 MPH.

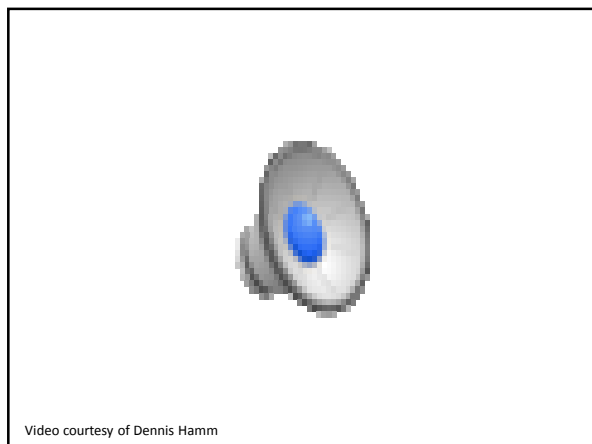
A TRAINED WEATHER SPOTTER MEASURED A WIND GUST OF 77 MPH IN PLAINFIELD 858 PM.

SEVERE THUNDERSTORMS WILL BE NEAR...  
MONROVIA...NOBLESVILLE AND CARMEL AROUND 905 PM EDT...  
INDIANAPOLIS INT'L AIRPORT...WYNNEDEALE...WILLIAMS CREEK AND SPRING HILL AROUND 910 PM EDT...  
CENTERTON...CAMBY...BROAD RIPPLE AND MOORESVILLE AROUND 915 PM EDT...  
INDIANA STATE FAIRGROUNDS...CASTLETON...BROOKLYN AND BETHANY AROUND 920 PM EDT...

**WSR-88D Radar from Indianapolis at 8:53pm August 13, 2011**

**What is going on at the venue at this time?**

**NATIONAL TORNADO SUMMIT** National Tornado Summit February 2017 Oklahoma City OK



**From the Investigator's Report by Witt and Associates, Inc.**

*But the weather near the Indiana State Fairgrounds was starting to get dicey. Backstage, State Police special operations commander Brad Weaver was watching an ugly storm moving in on radar via his smartphone. He and fair Executive Director Cindy Hoye decided it was time to evacuate the crowd.*

*But a minute later, when WLHK program director Bob Richards addressed the crowd, the word was that the show would go on, and that the crowd should be prepared to find shelter if things change. Some of the crowd sensed the danger and left without further won. But the majority remained.*

**Your radar 'thin line' arrives at 8:53pm (and you probably received the image on your app at 8:57pm or so)**

**The "storm" was expected at 9:15-9:20pm**

*Gov. Daniels was choked up as he began talking about emergency response.*

*"What you saw last night was a display of best qualities, both public and private, of Hoosiers," Daniels said.*

*Bursten updated previous injury numbers that 45 people were taken to the hospital last night. He said the early indication is it was an "isolated significant wind gust" and the midway and other areas on the ground weren't damaged as severely.*

*Daniels said he stands by the State Fair's preparedness measures, citing that this was an unexpected occurrence -- the storm was expected at 9:15, but arrived 30 minutes earlier.*

**NATIONAL TORNADO SUMMIT** National Tornado Summit February 2017 Oklahoma City OK

**From the Investigator's Report by Witt and Associates, Inc.**

*But the weather near the Indiana State Fairgrounds was starting to get dicey. Backstage, State Police special operations commander Brad Weaver was watching an ugly storm moving in on radar via his smartphone. He and fair Executive Director Cindy Hoye decided it was time to evacuate the crowd.*

*But a minute later, when WLHK program director Bob Richards addressed the crowd, the word was that the show would go on, and that the crowd should be prepared to find shelter if things change. Some of the crowd sensed the danger and left without further won. But the majority remained.*

**Your radar 'thin line' arrives at 8:53pm (and you probably received the image on your app at 8:57pm or so)**

**The "storm" was expected at 9:15-9:20pm**

**But the stage collapsed at 8:46pm!**

*Gov. Daniels was choked up as he began talking about emergency response.*

*"What you saw last night was a display of best qualities, both public and private, of Hoosiers," Daniels said.*

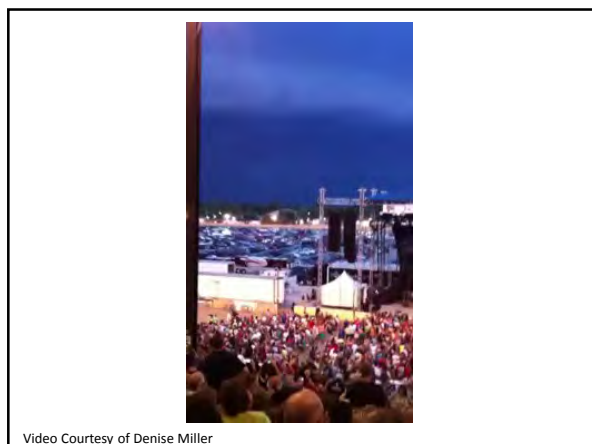
*Bursten updated previous injury numbers that 45 people were taken to the hospital last night. He said the early indication is it was an "isolated significant wind gust" and the midway and other areas on the ground weren't damaged as severely.*

*Daniels said he stands by the State Fair's preparedness measures, citing that this was an unexpected occurrence -- the storm was expected at 9:15, but arrived 30 minutes earlier.*

**NATIONAL TORNADO SUMMIT** National Tornado Summit February 2017 Oklahoma City OK

**Radar Image Echoes are at BEAM HEIGHT! NOT THE GROUND!**

**NATIONAL TORNADO SUMMIT** National Tornado Summit February 2017 Oklahoma City OK

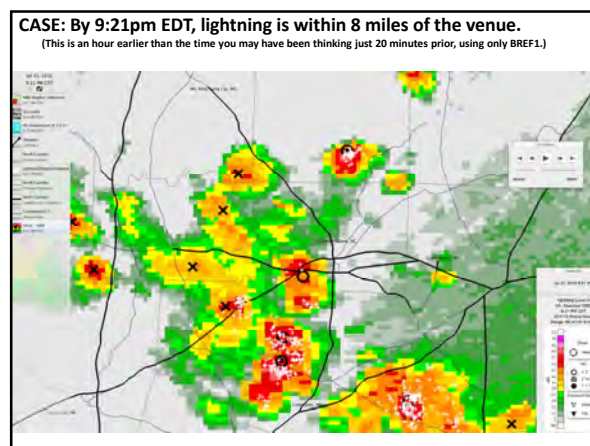
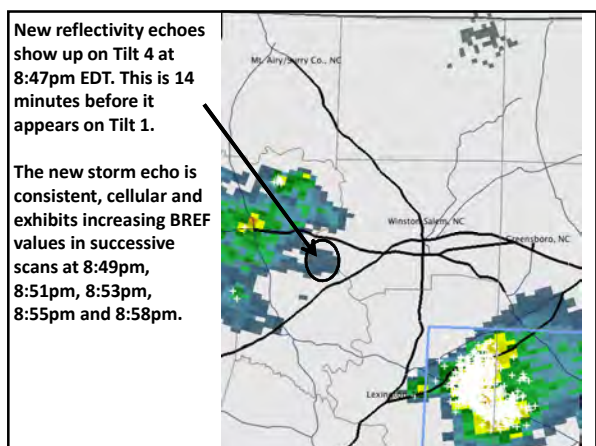
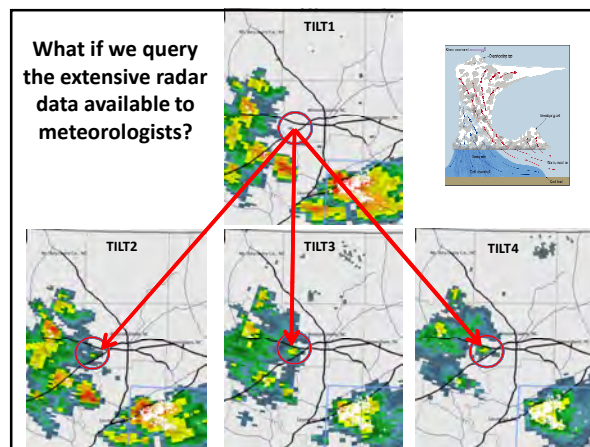
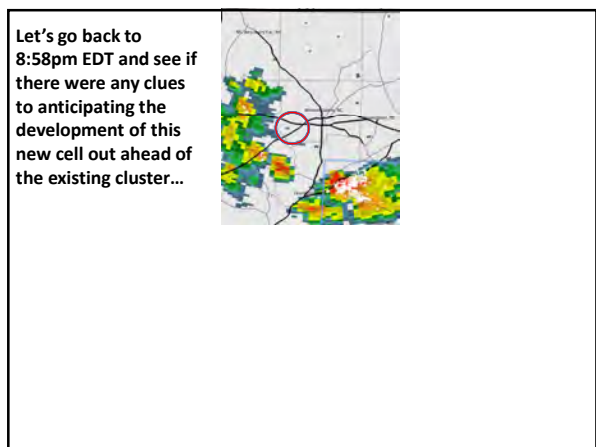
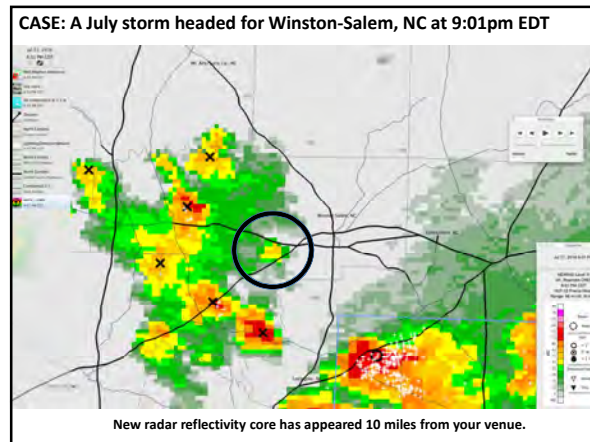
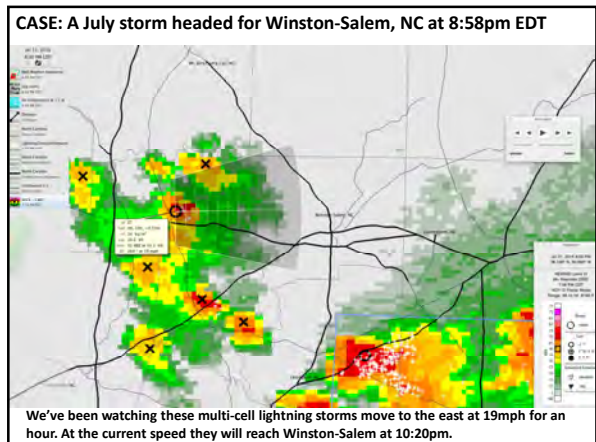


**IMPORTANT "TAKE AWAY"**

**Although radar is a great tool, the limitations of radar demand that you use these data in concert with other datasets and a fundamental knowledge of atmospheric processes.**

**Having radar data or a warning alert function on an app or a laptop does not magically enhance your ability to assess weather risk. In fact, in many cases, it can lead you to misrepresent or completely miss the actual risk.**

**NATIONAL TORNADO SUMMIT** National Tornado Summit February 2017 Oklahoma City OK



At 9:10pm, (11 minutes prior to lightning threat) an evacuation of the seating areas began at the venue.



## Access to meteorological expertise can save lives.

Lightning storms, including those with potential for damaging winds and tornadoes develop VERTICALLY. In most cases, precipitation sized particles (and hail) develop aloft! Therefore, upper tilts will provide earlier clues to risk than the most popular BREF1 scan. (TV ONLY uses BREF1! – and for that matter, on any app you do too!)

## “Hope” is NOT a Plan!

Decisions must be made in advance. They must be ACTIONABLE, PROACTIVE and PROTECTIVE!

That’s the “APP” you NEED!

### VENUE SPECIFIC WEATHER ACTION PLAN

SAFE SHELTER = BUSES						
THREAT	ALERT METHOD	VIDEO	AUDIO	LIGHTING	FOH	CONCOURSE
FORECASTED WINDS GREATER THAN 40MPH	REDUCER IS (RACK)	POWER OFF & SHELTER	POWER OFF & SHELTER	POWER OFF & SHELTER	POWER OFF & SHELTER	POWER OFF & SHELTER
FORECASTED SIGNIFICANT RAINS	REDUCER IS (RACK)	POWER OFF CONCOURSE UP	POWER OFF CONCOURSE UP	POWER OFF CONCOURSE UP	POWER OFF CONCOURSE UP	POWER OFF CONCOURSE UP & SHELTER
FORECASTED WINDS GREATER THAN 30 LESS THAN 40	RADIO ALERT	TO THE ROOF	TO THE GROUND	TO THE ROOF	COVER AND SHELTER	SHELTER
FORECASTED WINDS GREATER THAN 15 LESS THAN 30	RADIO ALERT	MONITOR	MONITOR	VERY NO ONE IN THE AIR	PREPARE	STRIKE TENT'S OR KILL SHIRT
LIGHTING INSIDE 8 MILES TRACKING TOWARD SITE	RADIO ALERT	POWER OFF COVER & SHELTER	POWER OFF COVER & SHELTER	SPOT ORS TO GROUND COVER & SHELTER	POWER OFF COVER & SHELTER	POWER OFF COVER & SHELTER
LIGHTING STORM TRACKING TO SITE WITHIN 20 MILES	RADIO ALERT	POWER OFF COVER & SHELTER	SECURE AND COVER GEAR	SECURE AND COVER GEAR	POWER OFF COVER & SHELTER	POWER OFF COVER & SHELTER
CLEAR TO RESTORE	TRACER ALERT	DRY POWER & STRUCTURAL INTEGRITY	DRY POWER & STRUCTURAL INTEGRITY	DRY POWER & STRUCTURAL INTEGRITY	DRY POWER & STRUCTURAL INTEGRITY	DRY POWER & STRUCTURAL INTEGRITY
SEPTEMBER 6, 2014	COMMON SENSE IS KEY - PROTECT YOURSELF AND YOUR FAMILY THE SHOW CAN BE RESCUE!					

## Communicate! Communicate! Communicate!



Video Credits:  
Fox 47 Lansing Michigan  
Dennis Hamm  
Denise Miller

Dr. Kevin Kloesel  
longhorn@ou.edu  
@TexasEmbassy