

Welcome!

Austin / Capital Area Integrated Warning Team Workshop



ROUND ROCK, TX
VON CASTOR



LIVE
FOX
WEATHER

ON THE PHONE: VON CASTOR | STORM TRACKER
TORNADO HIT ROUND ROCK, TX

TORNADO WARNING
UNTIL 11:35PM CT
TEXAS
GREGG, SMITH,
UPSHUR
POPULATION: 42,469

SEVERE ALERT MULTI-DAY SEVERE WEATHER OUTBREAK UNDERWAY IN THE SOUTH

Welcome from our Hosts!

Eric Carter

Chief Emergency Management Coordinator
Travis County

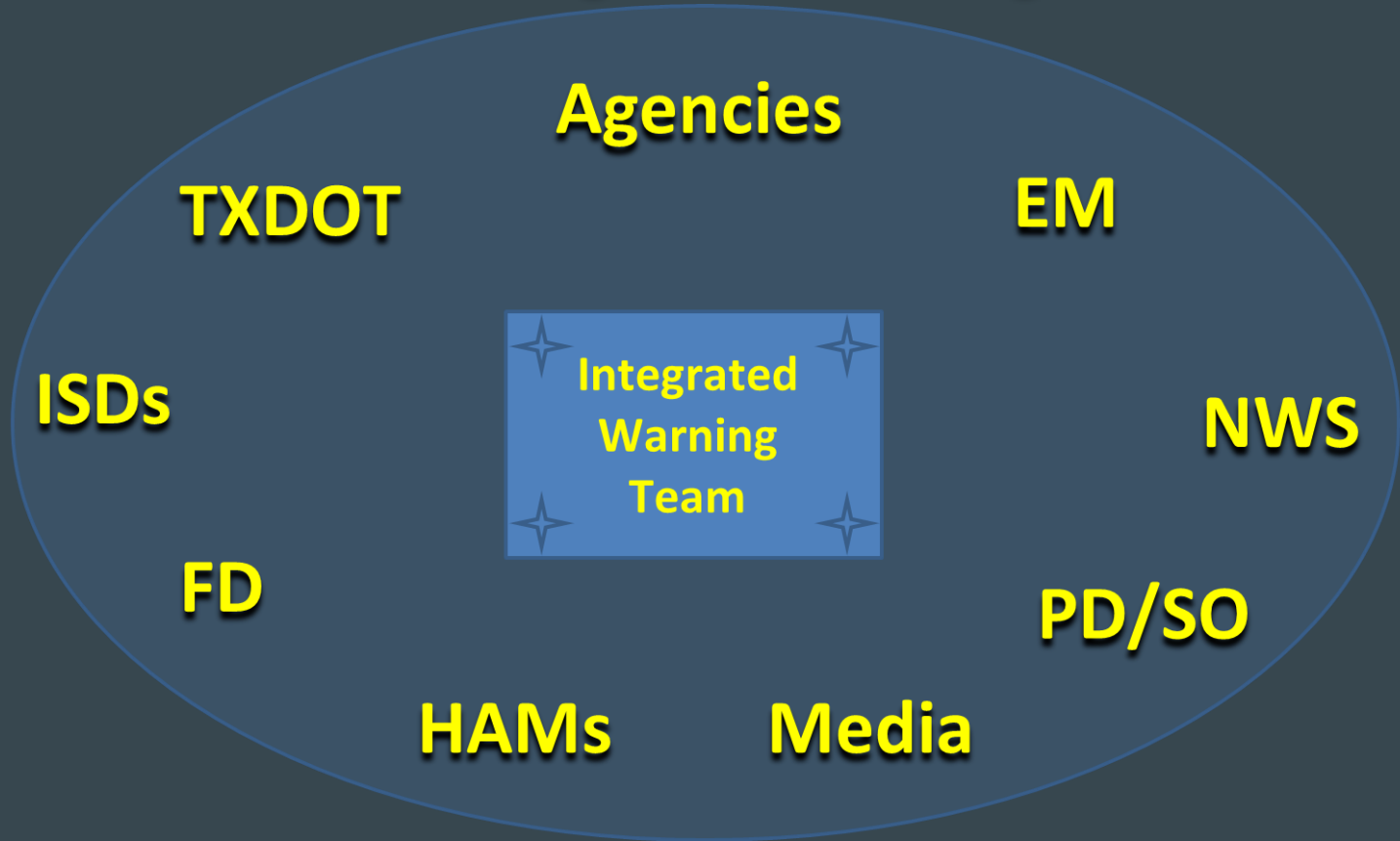
Juan Ortiz

Director – Homeland Security and Emergency Management
City of Austin

Welcome from Pat Vesper

Meteorologist-in-Charge
NWS Austin / San Antonio

What is an Integrated Warning Team?

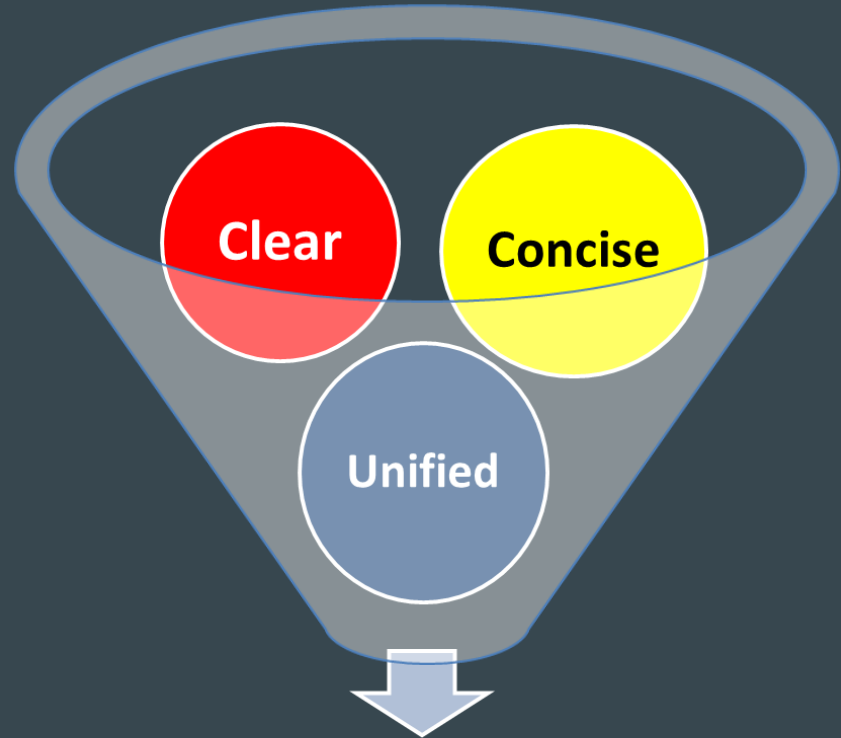


What is an Integrated Warning Team?



As a group, we combine our knowledge and resources through proactive communication to *effectively* create and disseminate a warning message.

The Information



Consistent Warning Message

Goals for this Spring 2023 IWT Workshop



Goals for this IWT Workshop

Understanding what an Integrated Warning Team (IWT) is

Building and developing relationships within the Austin/ Capital Area IWT

Identifying mechanisms for messaging coordination and how to handle inconsistent messaging - *clear and consistent messages are critical for effective public response*

Ground Rules

Participate

Judgment-free zone

Differing opinions are ok

Questions are encouraged

Make introductions to those you don't know

Silence electronic devices

Agenda

9:00-9:10 AM

Welcome & Facility Information

Eric Carter – Travis County OEM

Juan Ortiz – City of Austin HSEM

Pat Vesper – NWS

9:10-9:15 AM

Workshop Intro and Agenda Overview

Jason Runyen – NWS

9:15-9:20 AM

Introductions Around the Room

9:20-10:15 AM

Review of 2023 Ice Storm Messaging and Timeline

Paul Yura – NWS

All – Open Discussion

10:15-10:25 AM

Break

10:25-10:40 AM

Review of March 21st Tornado Outbreak

Nick Hampshire – NWS

10:40-11:10 AM

Messaging Aerial Threat, Timing, & Preparedness Ahead of Severe Weather

Jason Runyen – NWS

All – Open Discussion

11:10 AM - 12 PM

Situational Awareness, Coordination & Messaging During Severe Weather

NWS Representatives

Chikage Windler – CBS Austin

David Yeomans – KXAN

All – Open Discussion

12:00 PM

Conclusion/Wrap-Up

Time to Introduce Yourself to the IWT!

Review of 2023 Ice Storm Messaging and Timeline

Sunday
Morning
Jan 29.....

Stay Tuned!

Possible ice is
on the way,
mainly Hill
Country

Freezing Rain/Drizzle Possible Across The Hill Country

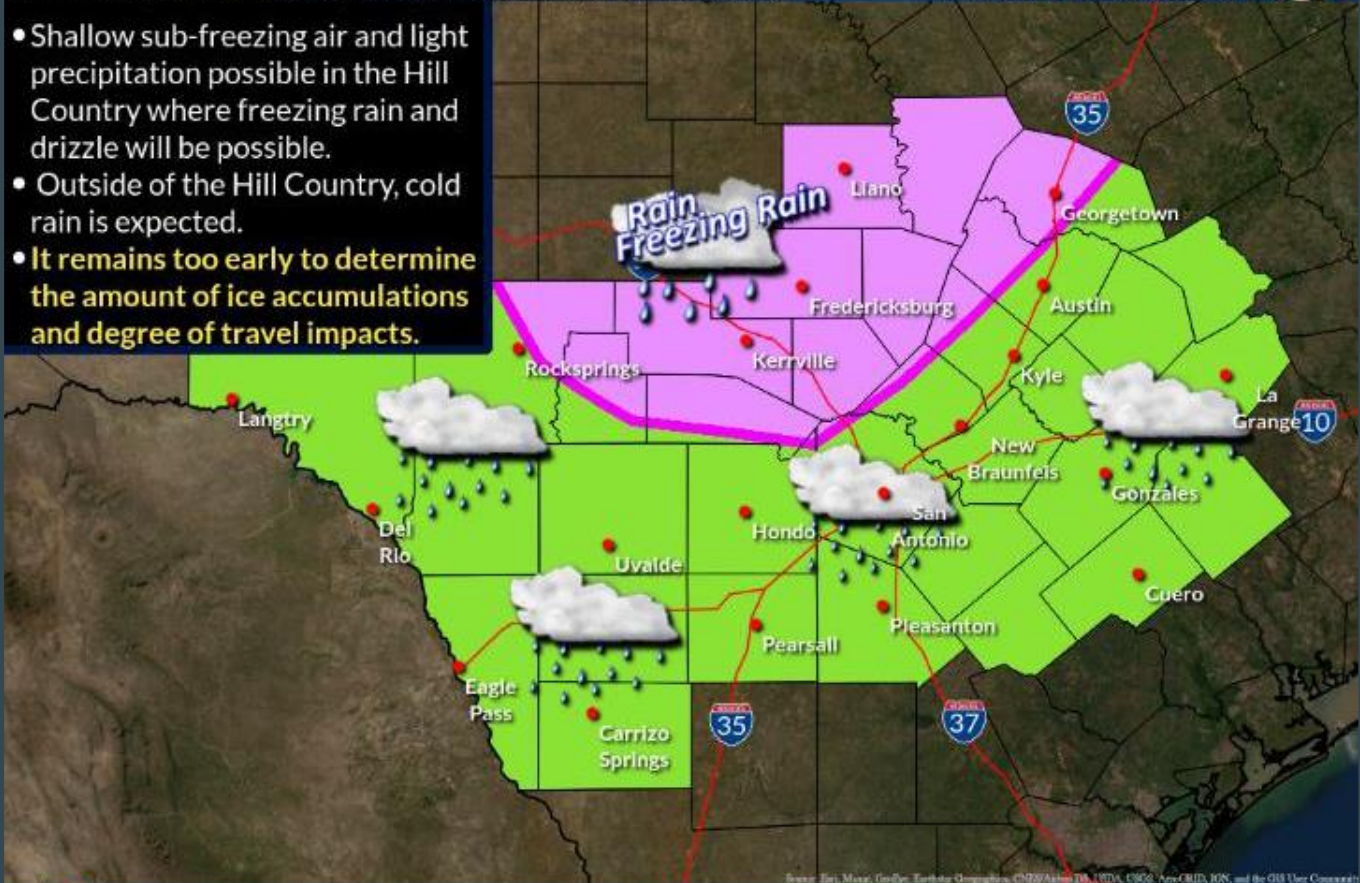
Weather Forecast Office
Austin/San Antonio, TX



From Monday Night into Tuesday and Again Tuesday night into Wednesday

Issued Jan 29, 2023 4:16 AM CST

- Shallow sub-freezing air and light precipitation possible in the Hill Country where freezing rain and drizzle will be possible.
- Outside of the Hill Country, cold rain is expected.
- **It remains too early to determine the amount of ice accumulations and degree of travel impacts.**



Sunday Afternoon... Winter Storm Watch issued

Mainly impacts
expected for the
Hill Country

Winter Storm Watch In Effect Noon Monday Through Noon Wednesday

Weather Forecast Office
Austin/San Antonio, TX

Issued Jan 29, 2023 2:35 PM CST



Freezing Rain Expected Over The Watch Area; Greatest Impacts Over Hill Country

- Greatest impacts and icing will be over Hill Country, where 0.10 to 0.25 inches of ice accumulation may occur
- Up to 0.10 inches of ice accumulation possible over western Travis and Williamson Counties
- NO winter impacts are anticipated in downtown Austin at this time



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Updated Winter Weather Headlines

Weather Forecast Office
Austin/San Antonio, TX

Issued Jan 29, 2023 9:53 PM CST



Sunday Night...

Winter Storm
Warnings issued
thru Wednesday

Winter Weather
Advisories issued

- Freezing rain possible from tomorrow morning through late morning Wednesday
- A Winter Storm Warning, has been issued, effective from 9 AM tomorrow through Noon on Wednesday
- A Winter Weather Advisory has been issued for Bastrop, Caldwell, Comal, Hays, and Lee Counties, effective from 9 AM Monday through Noon Wednesday
- Greatest icing potential continues to be expected during the overnight periods when temperatures are coldest, however, icing of elevated surfaces could begin by as early as tomorrow afternoon



Source: Eri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Updated Winter Weather Headlines

Weather Forecast Office
Austin/San Antonio, TX

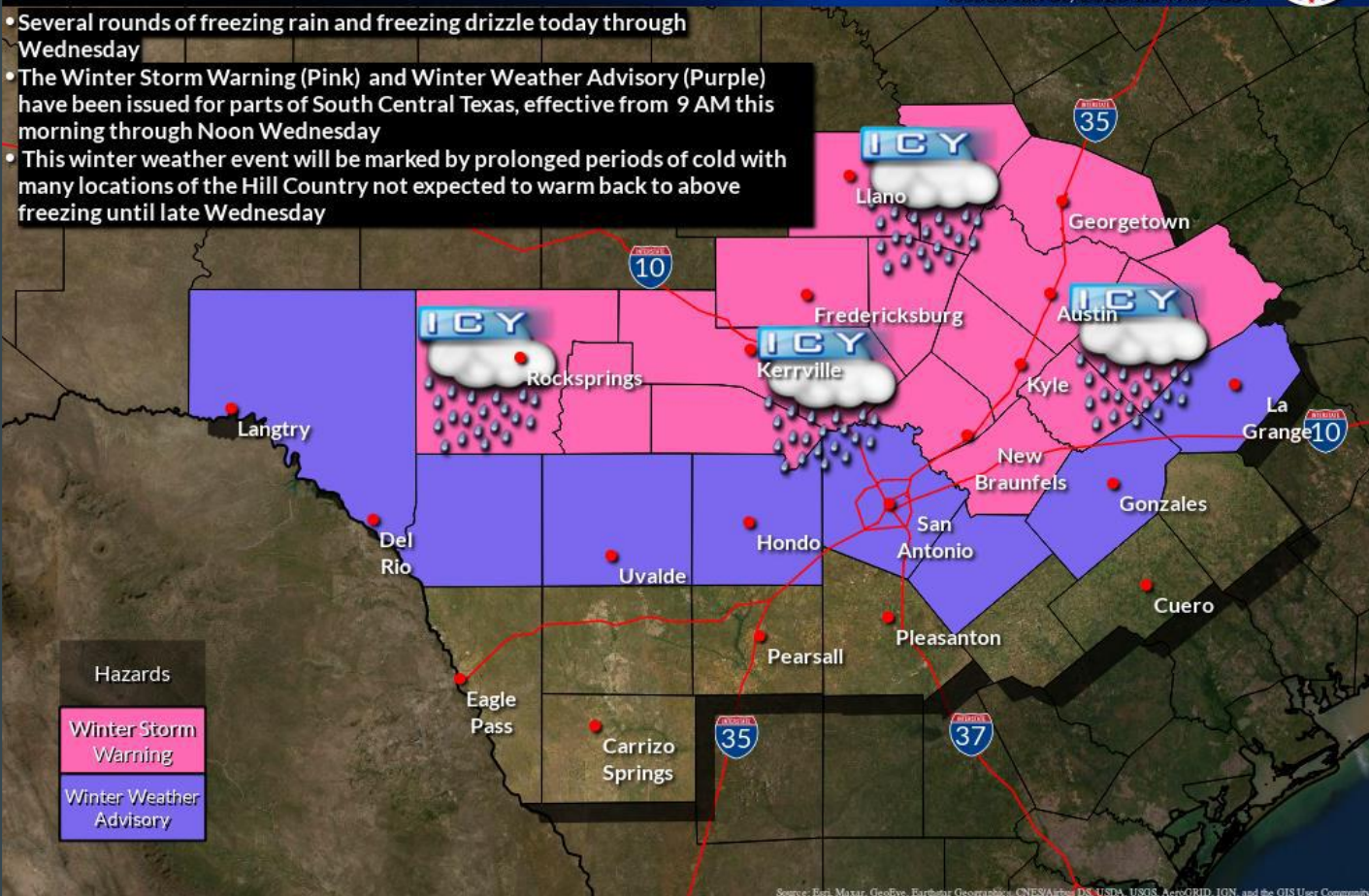
Issued Jan 30, 2023 1:54 AM CST



Early Monday morning...

Winter Storm Warnings expanded south and east.

- Several rounds of freezing rain and freezing drizzle today through Wednesday
- The Winter Storm Warning (Pink) and Winter Weather Advisory (Purple) have been issued for parts of South Central Texas, effective from 9 AM this morning through Noon Wednesday
- This winter weather event will be marked by prolonged periods of cold with many locations of the Hill Country not expected to warm back to above freezing until late Wednesday



Hazards

- Winter Storm Warning
- Winter Weather Advisory

Source: Earth Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Ice Accumulations Today thru Wednesday

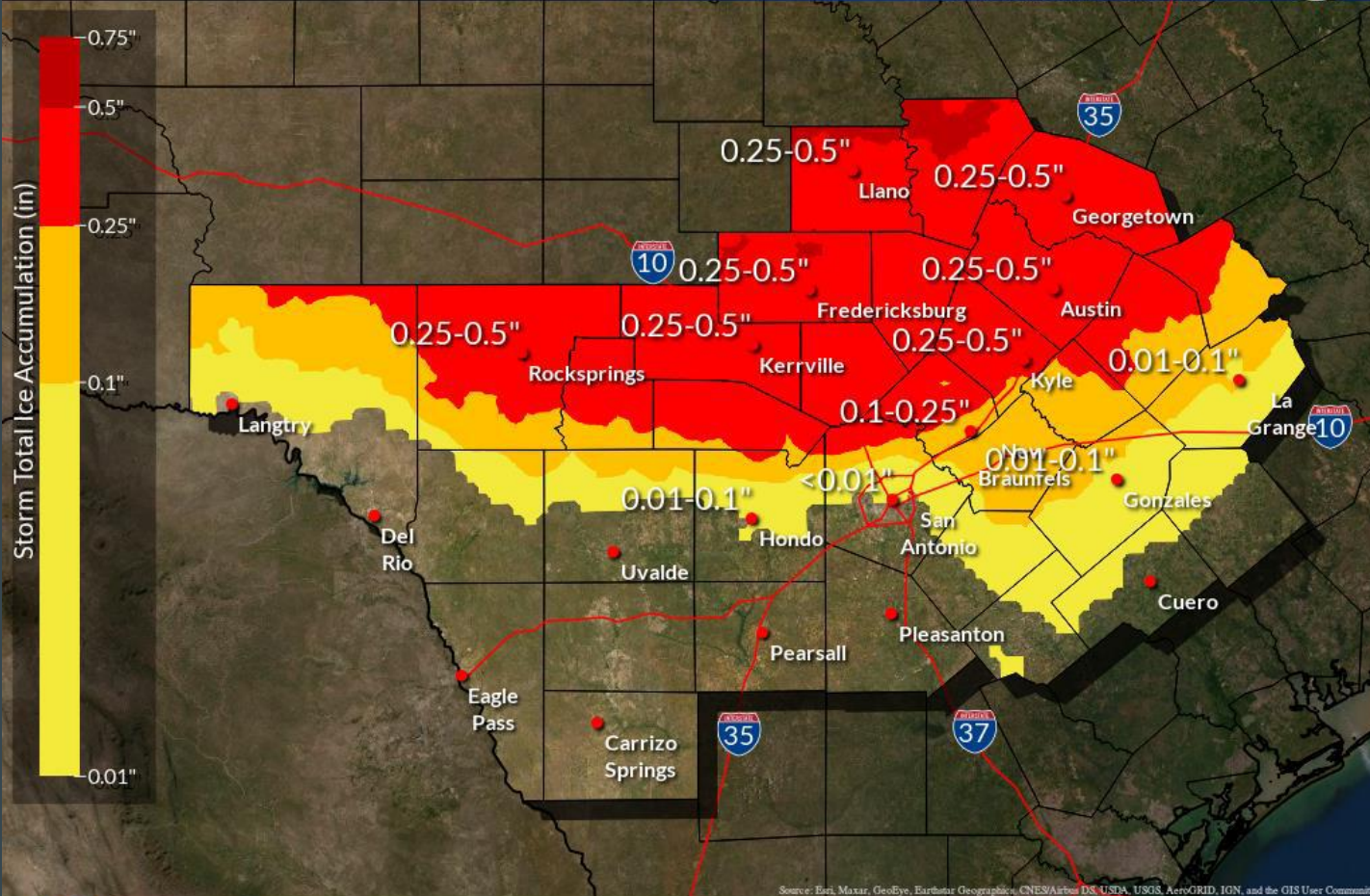
Weather Forecast Office Austin/San Antonio, TX

Issued Jan 30, 2023 1:24 AM CST



**Monday morning...
Ice accumulation map**

Multiple Rounds of freezing drizzle/rain expected



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Monday afternoon... Ice accumulation map

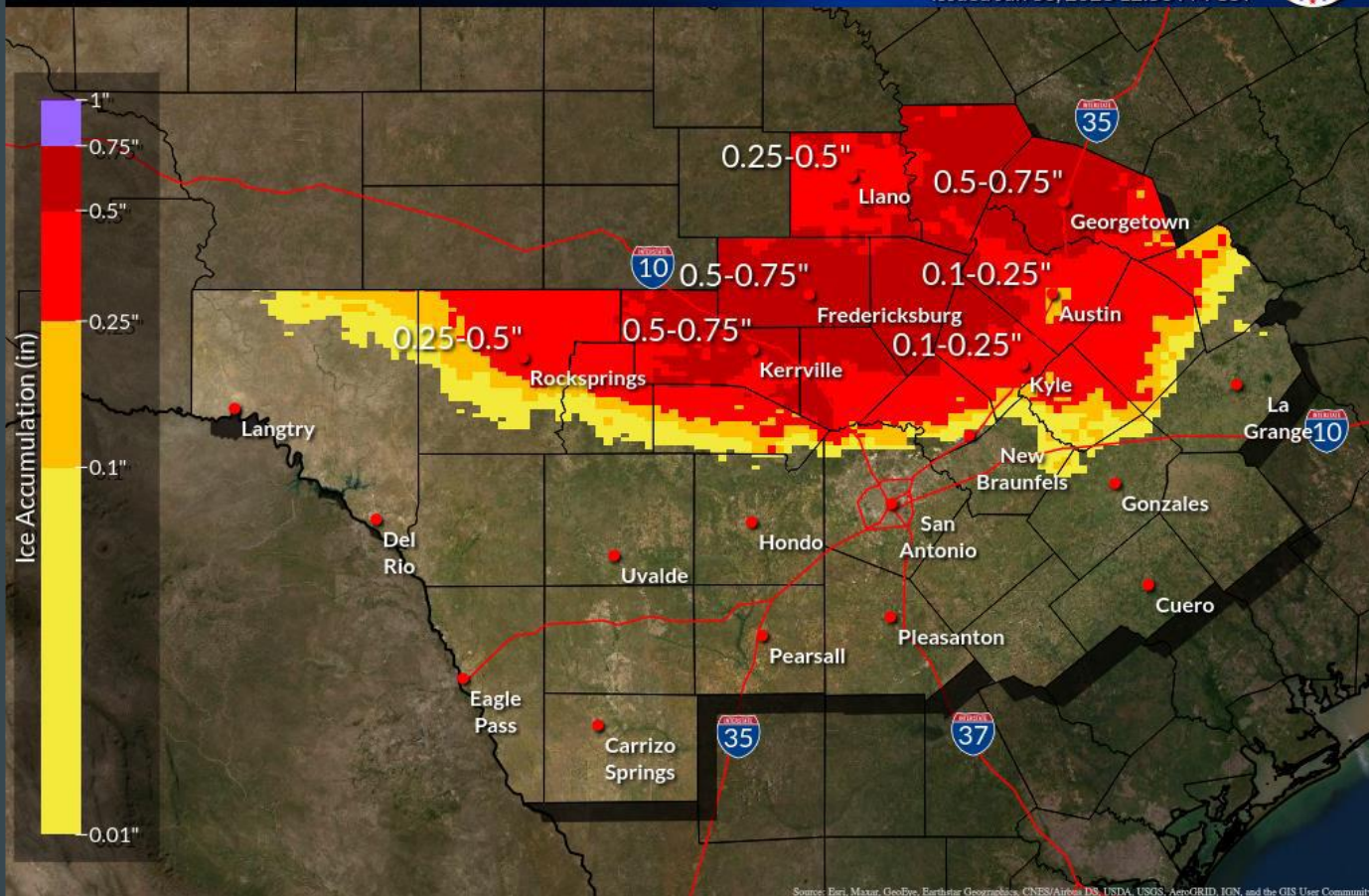
Ice Accumulations Today - Wednesday

Weather Forecast Office
Austin/San Antonio, TX
Issued Jan 30, 2023 12:56 PM CST



Accumulation Amounts

- Hill Country – ¼ to ¾ inches
- Austin area – up to ¼ inch
- San Antonio area – 0.10 to ¼ inch over areas north of 1604, far northern Bexar County.
- Highway 90 corridor – less than 0.10 inches, glaze possible



Source: Eri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Tuesday Morning...

Ice accumulations increasing

Winter Storm Warnings expanded

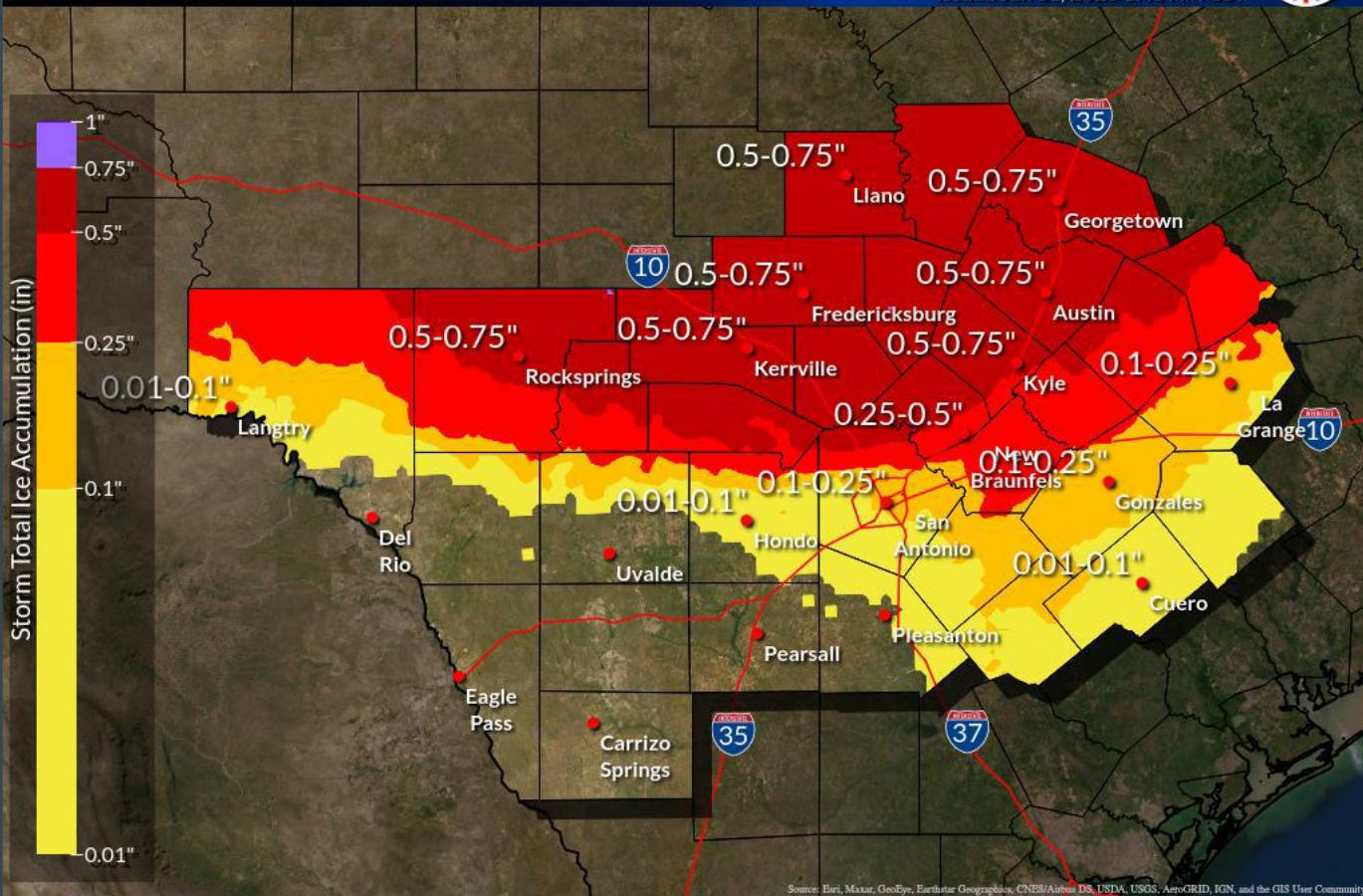
Winter Weather Headlines

* Several rounds of freezing rain through Thursday morning
* A Winter Storm Warning (Pink) and Winter Weather Advisory (Purple) are in effect for much of South Central Texas through Thursday morning
* This winter weather event will be marked by prolonged periods of cold temperatures with many locations in the Hill Country not expected to warm back to above freezing until Thursday



Ice Accumulations Today - Thursday

Weather Forecast Office
Austin/San Antonio, TX
Issued Jan 31, 2023 1:45 AM CST



Tuesday Afternoon...

Maps are now showing
"Additional"
accumulations
expected

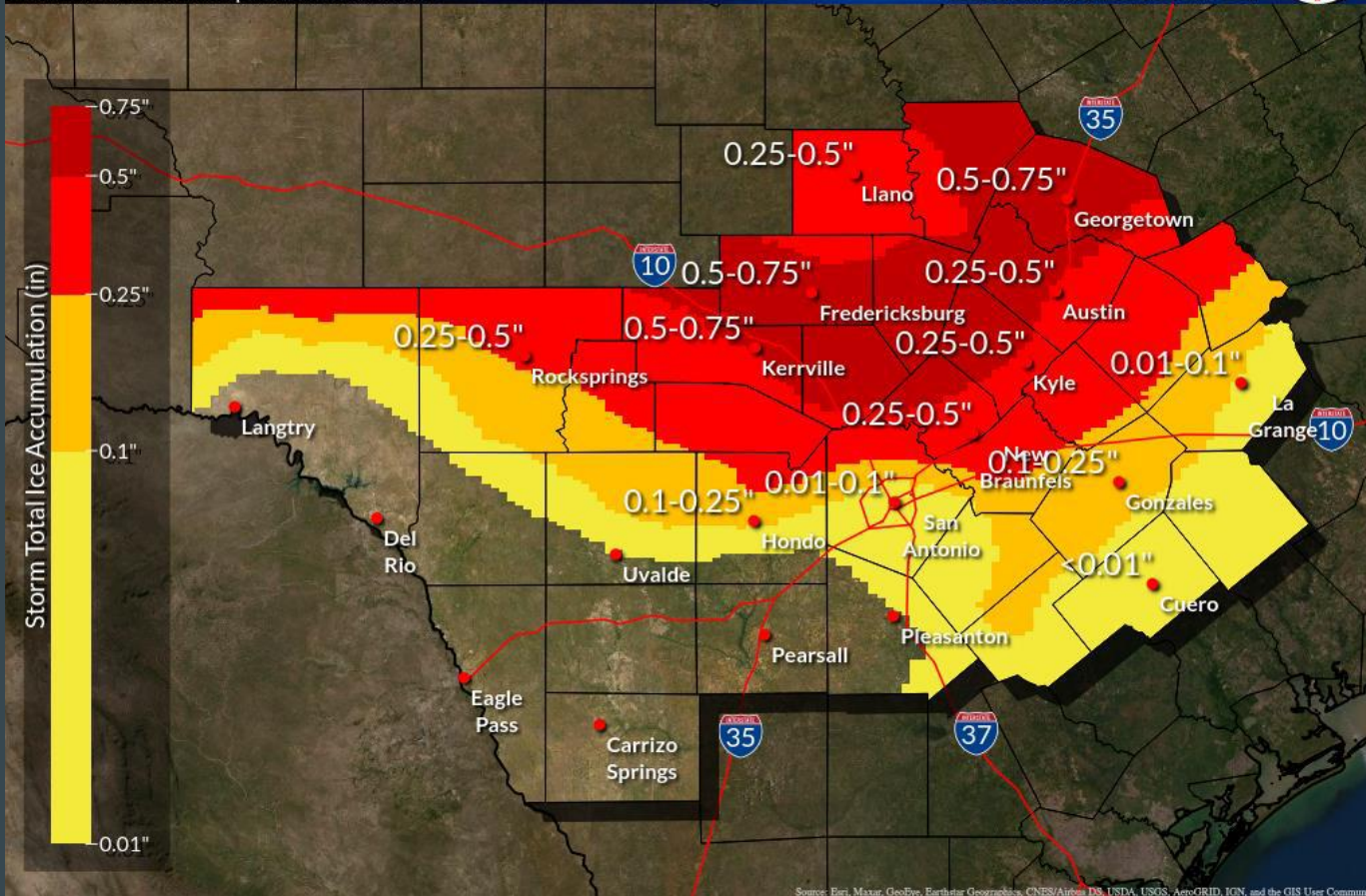
Additional Ice Accumulations Through Thursday Morning

Weather Forecast Office
Austin/San Antonio, TX



Does not account for past accumulations

Issued Jan 31, 2023 1:06 PM CST



Source: Eri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Wednesday Morning....

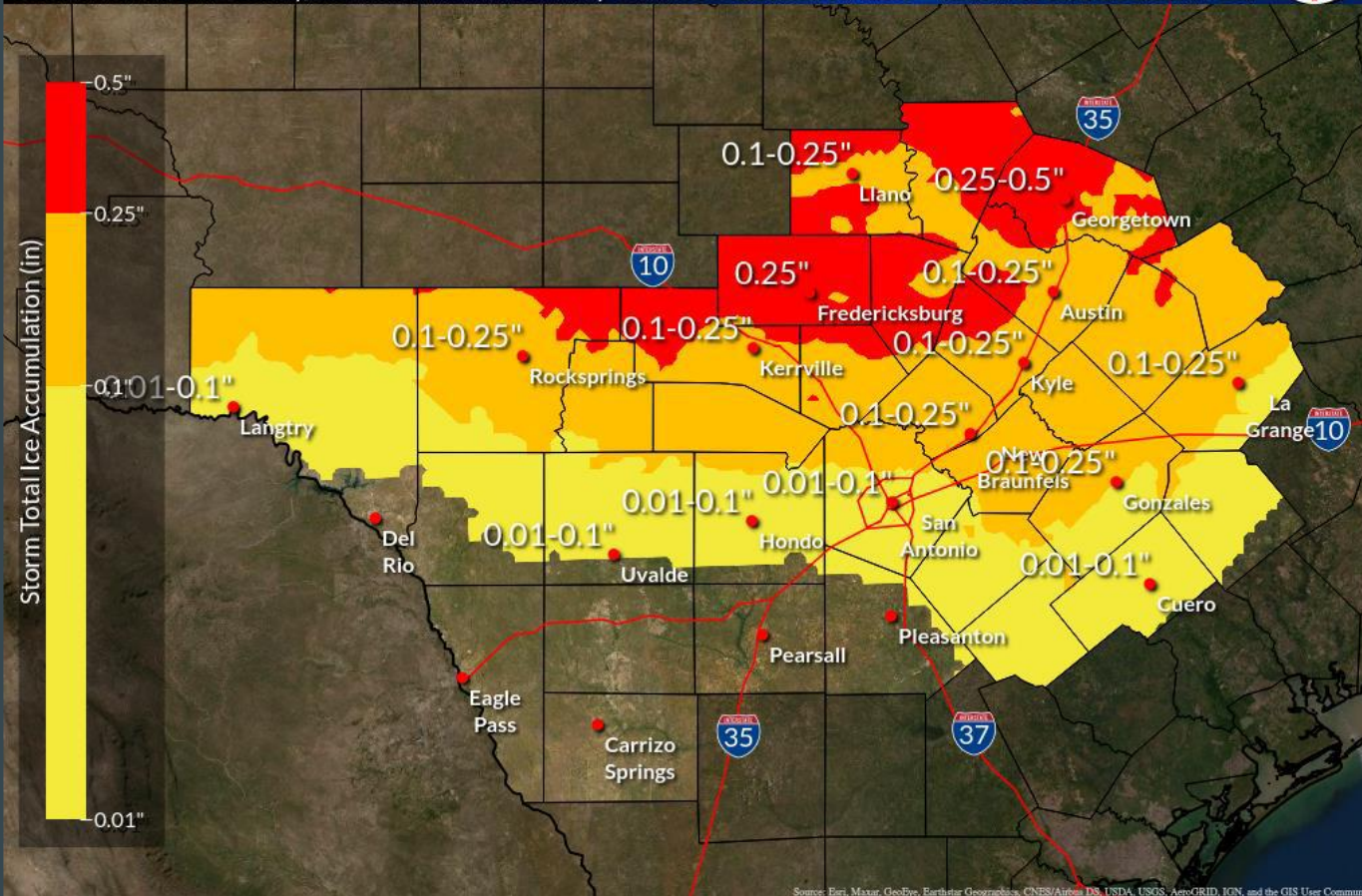
Additional Ice Accumulations Into Thursday Morning

Weather Forecast Office
Austin/San Antonio, TX



Outside from the Hill Country, Accumulations Will be Mainly Confined to Elevated Surfaces

Issued Feb 01, 2023 2:51 AM CST



Source: Eri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Wednesday Night....

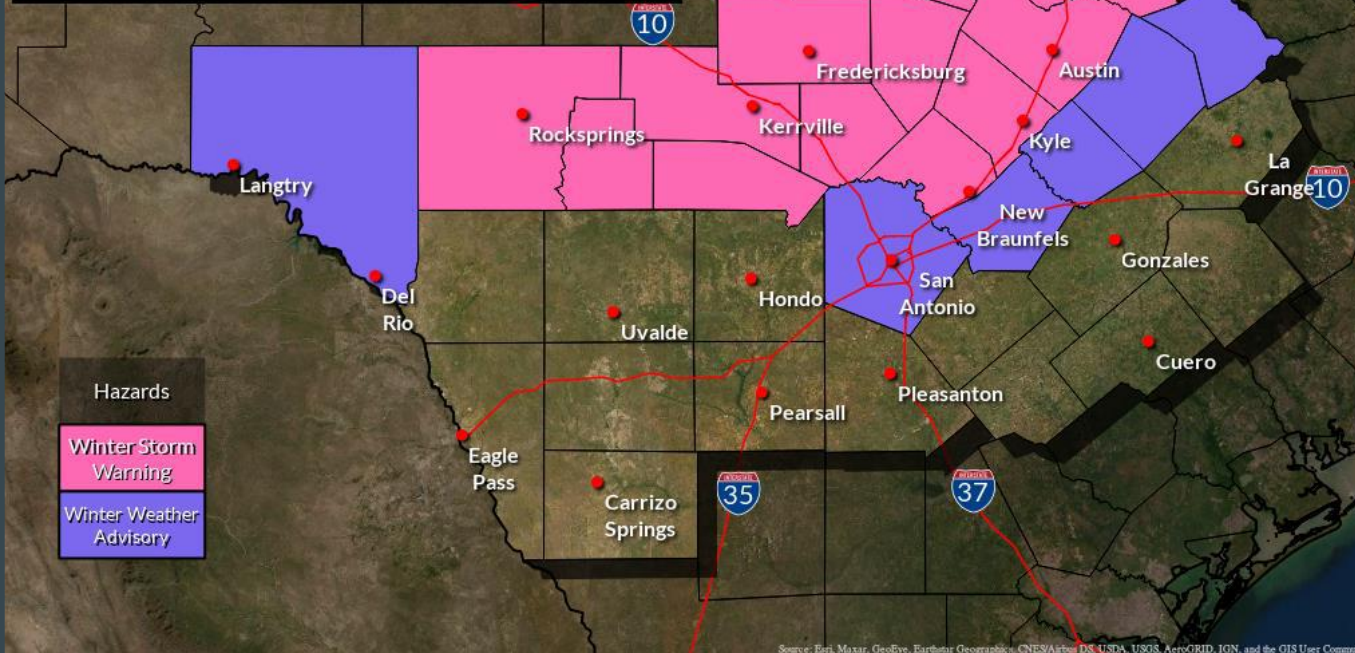
One more round of precipitation Wed night into early Thursday

Actually had lightning and thunder into early Thursday morning

Winter Weather Hazards

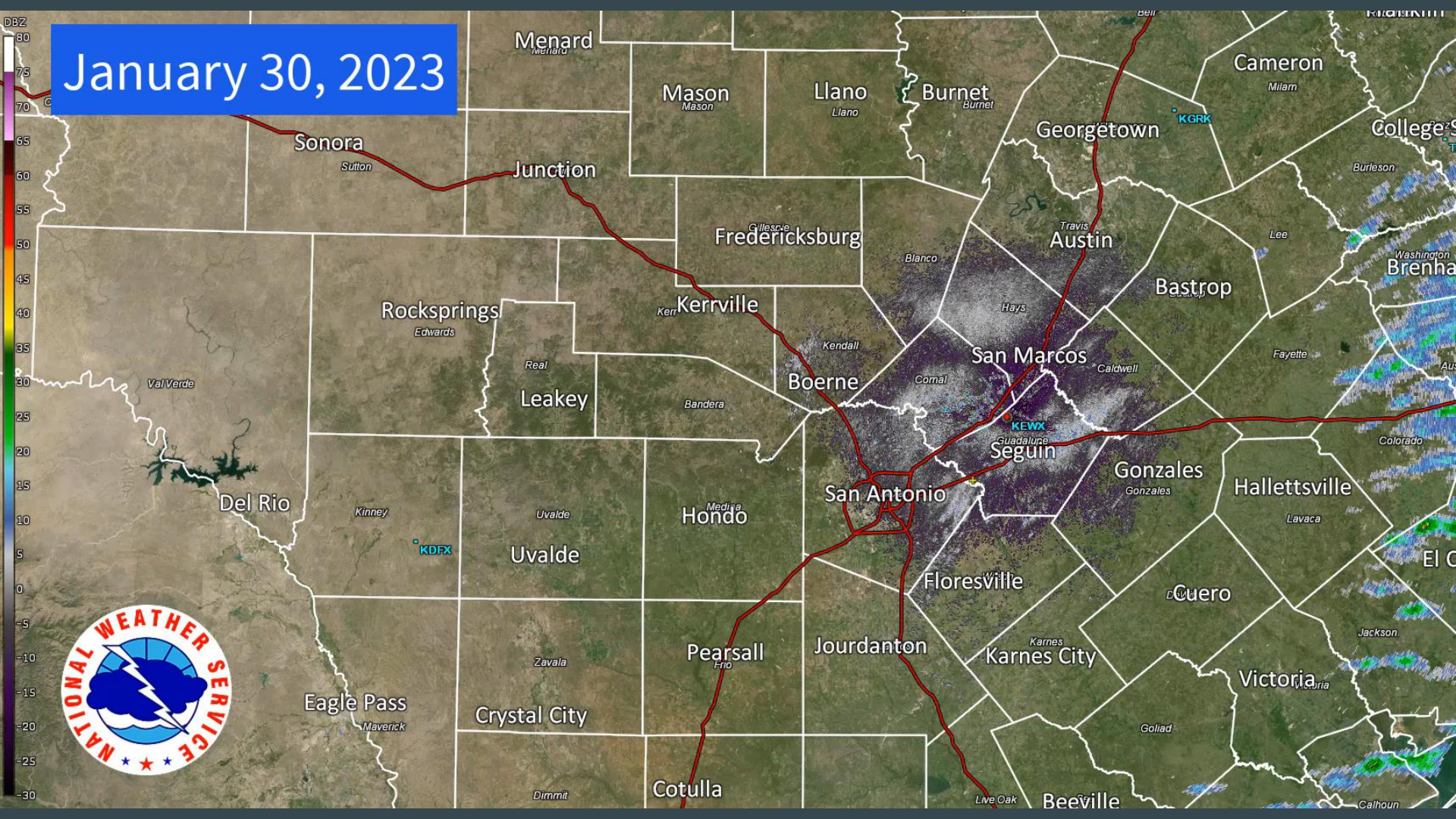
In Effect through 10 AM Thursday

Weather Forecast Office
Austin/San Antonio, TX
Issued Feb 01, 2023 8:47 PM CST



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

January 30, 2023



Ice accumulation 1/31/23-2/2/23

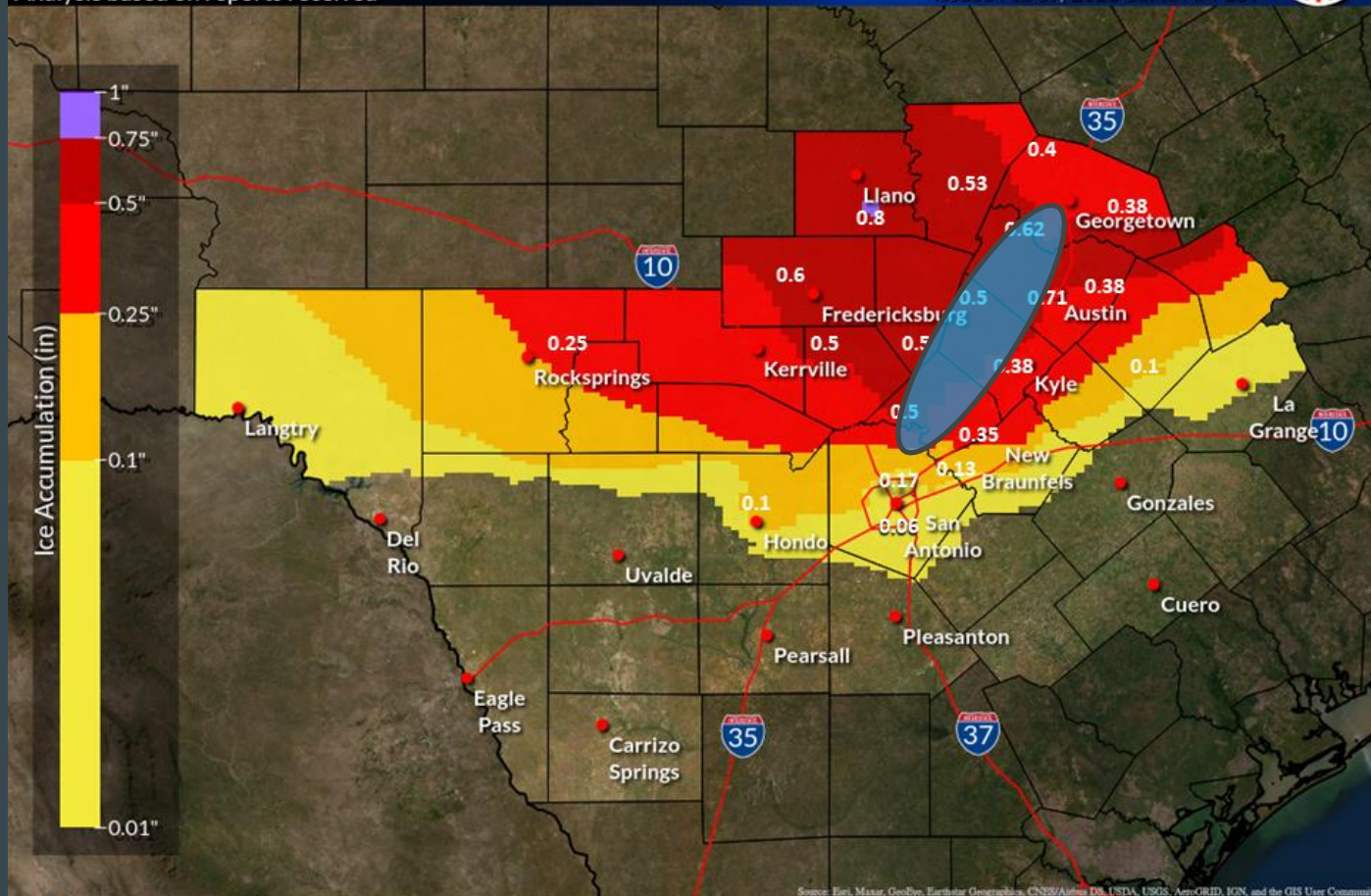
Analysis based on reports received

Weather Forecast Office
Austin/San Antonio, TX
Issued Feb 07, 2023 10:48 AM CST



Best Guess Ice Accumulation

Observations and
pictures



Source: Eiri, Masar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Large Group Discussion

1. Winter Storm Warning vs. Ice Storm Warning

Do we go down this road of creating Ice Storm Warning criteria?

2. How do we better message quick evolving Winter Storms

Do citizens know to check the forecast frequently?

3. What went well with regards to messaging, what needs to improve (the challenge of different precip types)

Break Time!

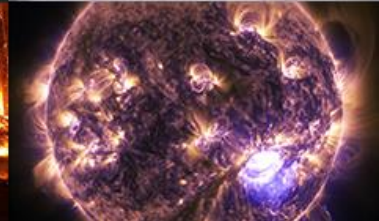
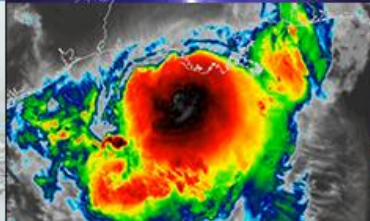


**NATIONAL
WEATHER
SERVICE**

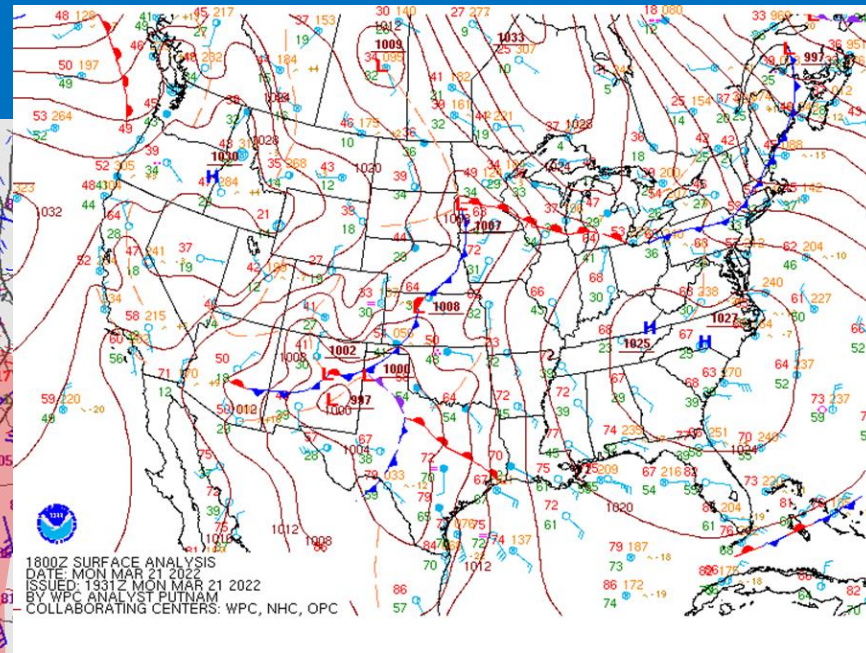
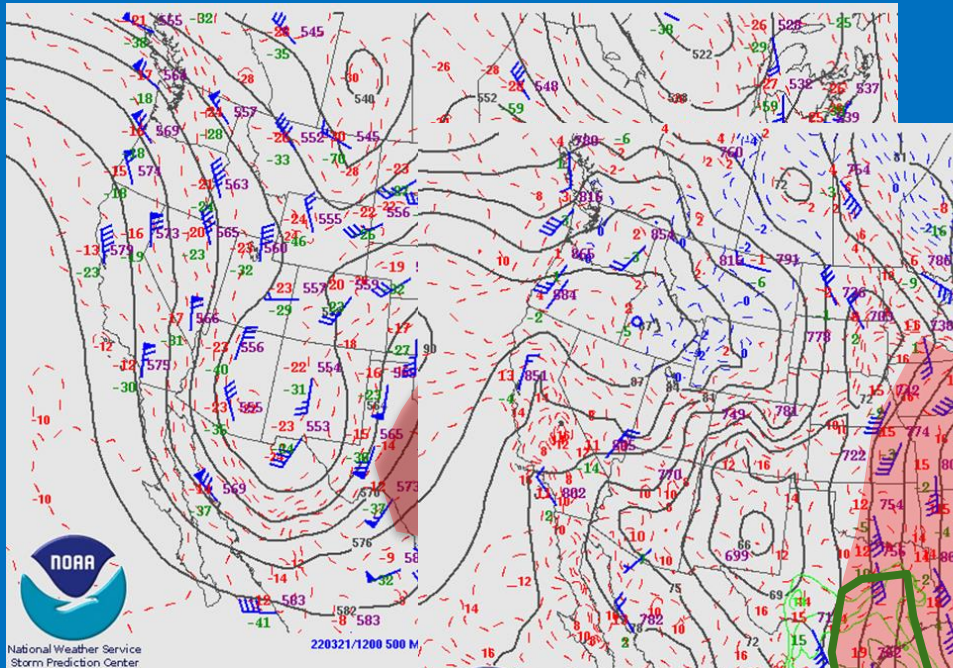
Review of the March 21, 2022 Tornado Outbreak

Austin IWT, March 29, 2023

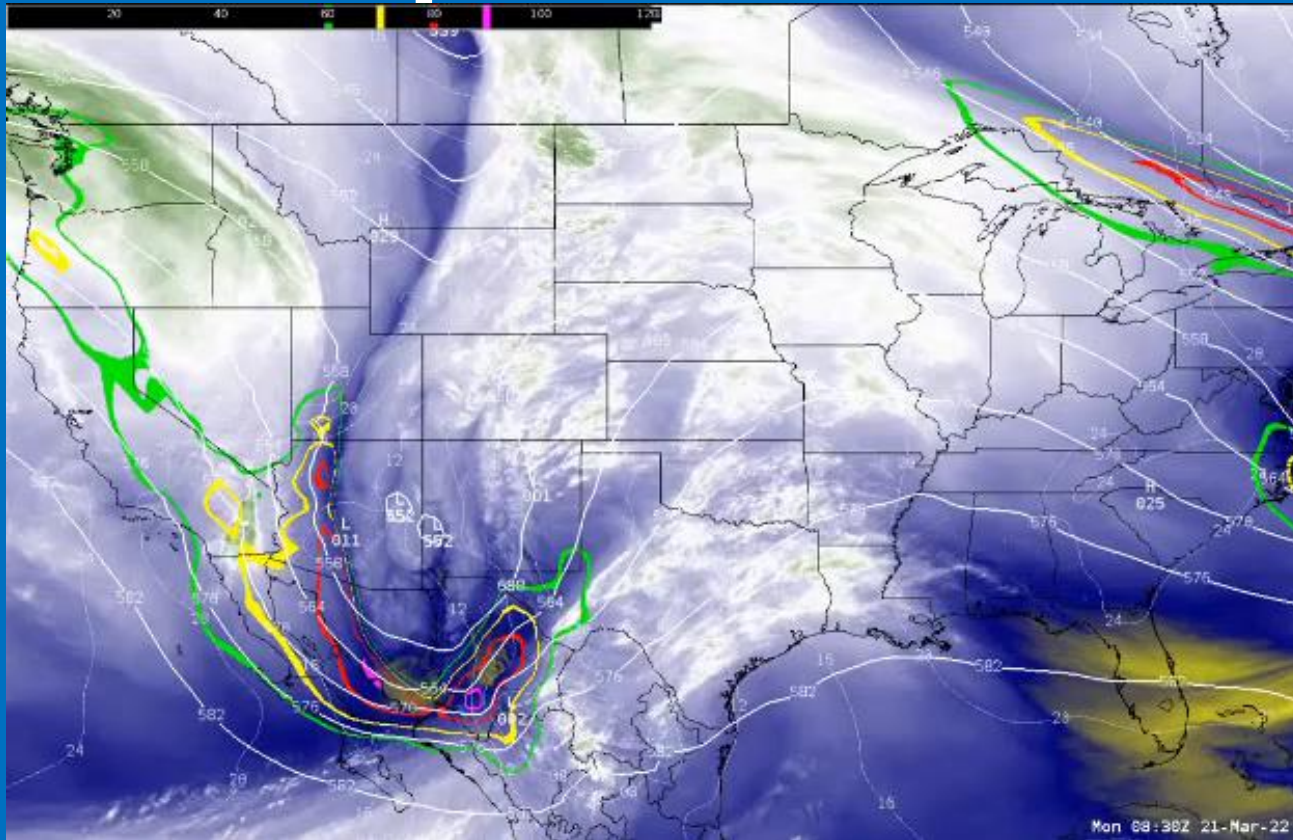
Presenter: Nick Hampshire, Senior Forecaster (WFO Austin)



Synoptic Pattern



Water Vapor



Day 3 Outlook and Sitrep

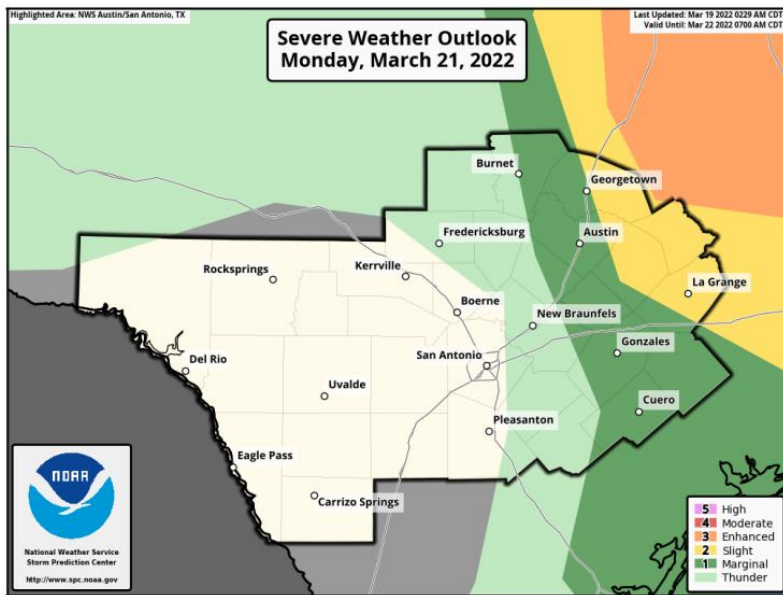


National Weather Service
Austin/San Antonio, TX

Situation Report

Saturday, March 19, 2022 5:55 AM

Additional Information



SPC Day 3 Outlook

- ✓ Marginal Risk (dark green) level 1 of 5
- ✓ Slight Risk (yellow) level 2 of 5.
- ✓ Two rounds of showers and thunderstorms Monday and Monday night. Severe weather is possible, but details on timing will need to be refined as we get closer to the event.
- ✓ All Severe types possible.



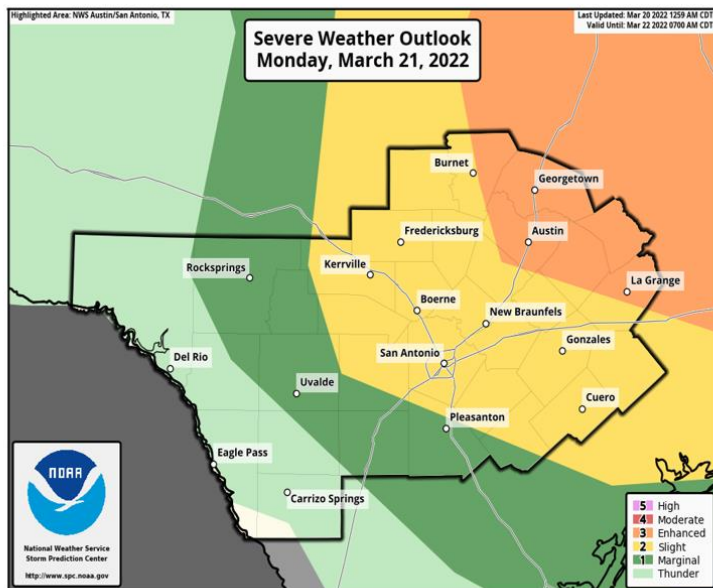
Day 2 Outlook and Sitrep



National Weather Service
Austin/San Antonio, TX

Situation Report
Sunday, March 20, 2022 5:30 AM

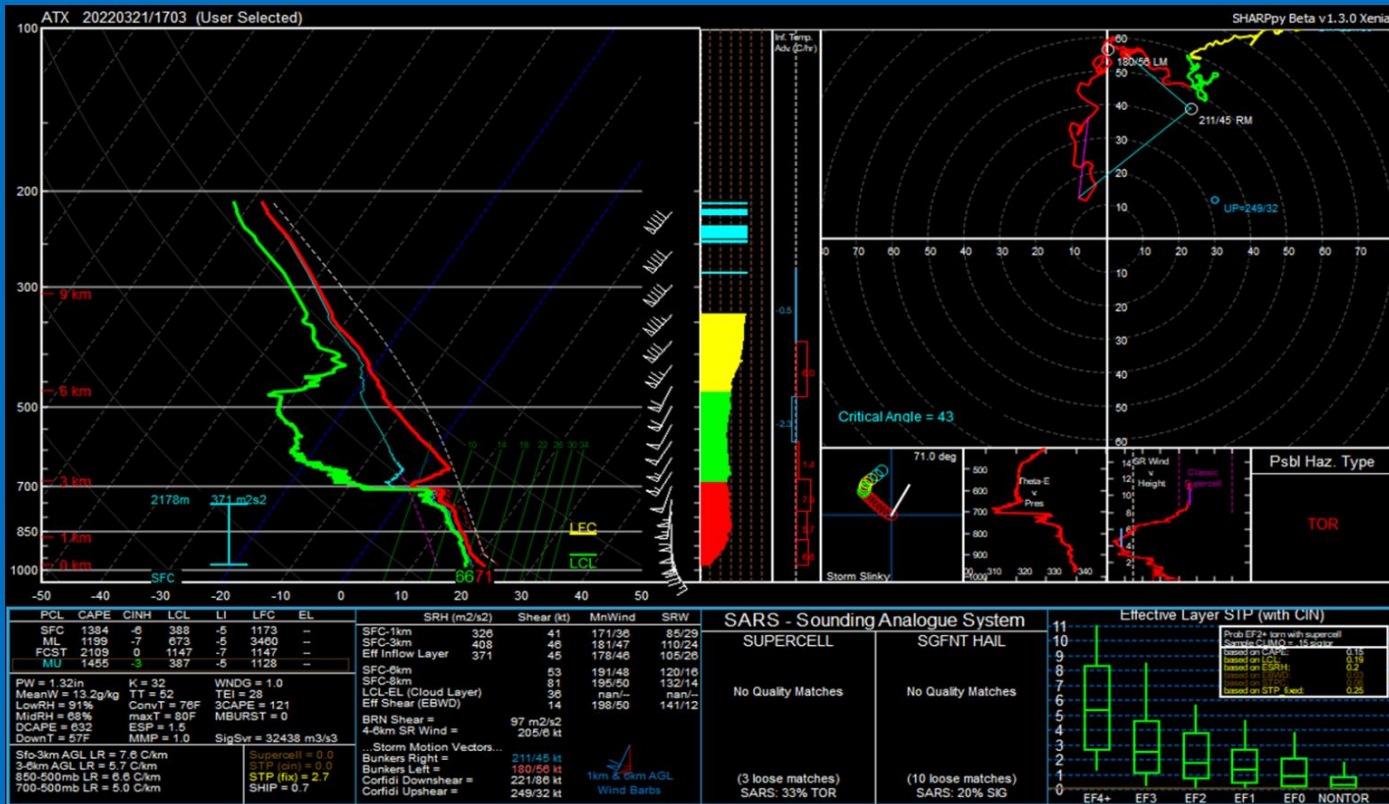
Additional Information



- ✓ Enhanced Risk (orange), level 3 of 5, east of line from Burnet to Buda to LaGrange, including Austin
- ✓ Slight Risk (yellow), level 2 of 5, east of line from Mountain Home to Sabinal to Karnes City, including San Antonio
- ✓ Marginal Risk (dark green), level 1 of 5, east of line from near Rocksprings to Uvalde to Dilley
- ✓ Showers and thunderstorms expected Monday and Monday night with the best chance of severe storms during the afternoon into evening and nighttime hours.
- ✓ Additional refinement of the details will continue as we get closer to the event.
- ✓ All Severe types possible (large hail, damaging winds, tornadoes)
- ✓ Locally heavy rains also possible

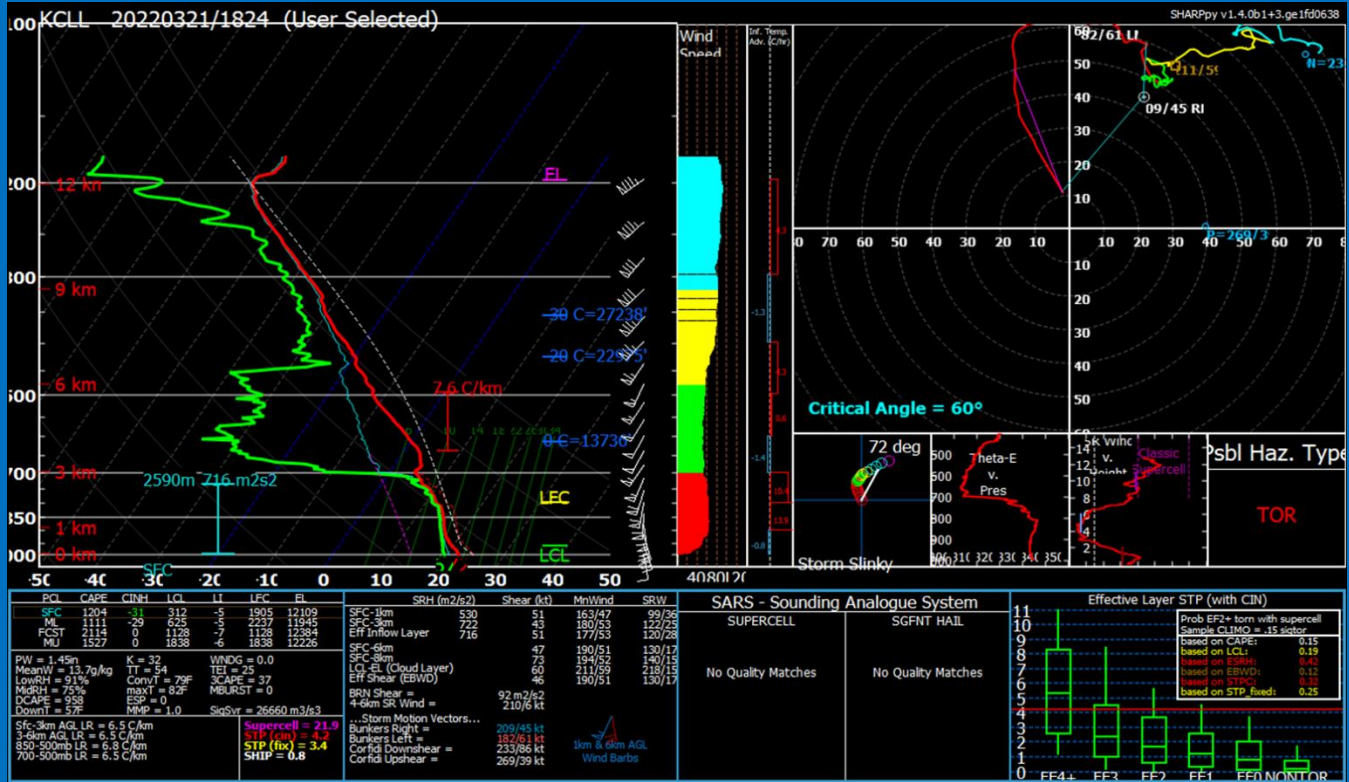


St. Edward's University 1730z Sounding

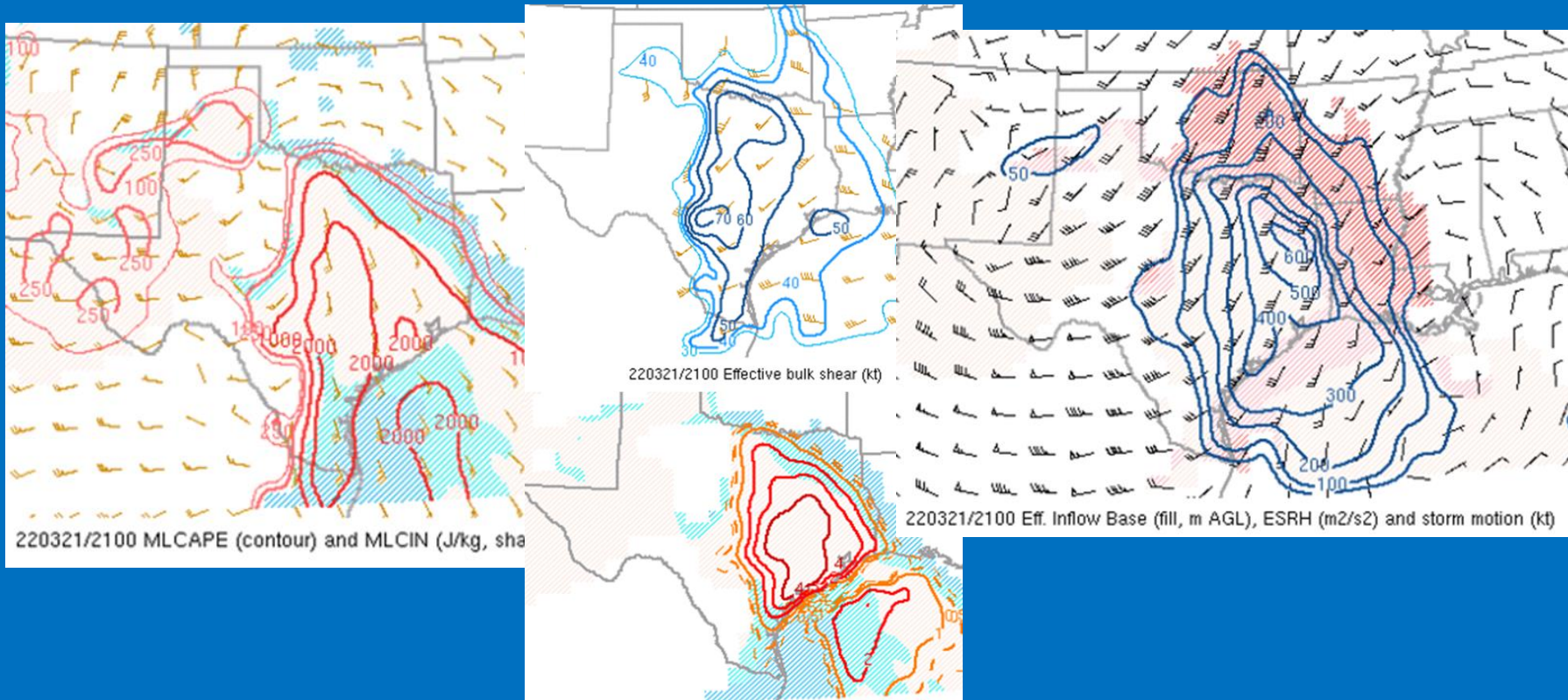




Texas A&M (whoop) 1730z Sounding



Environmental Details

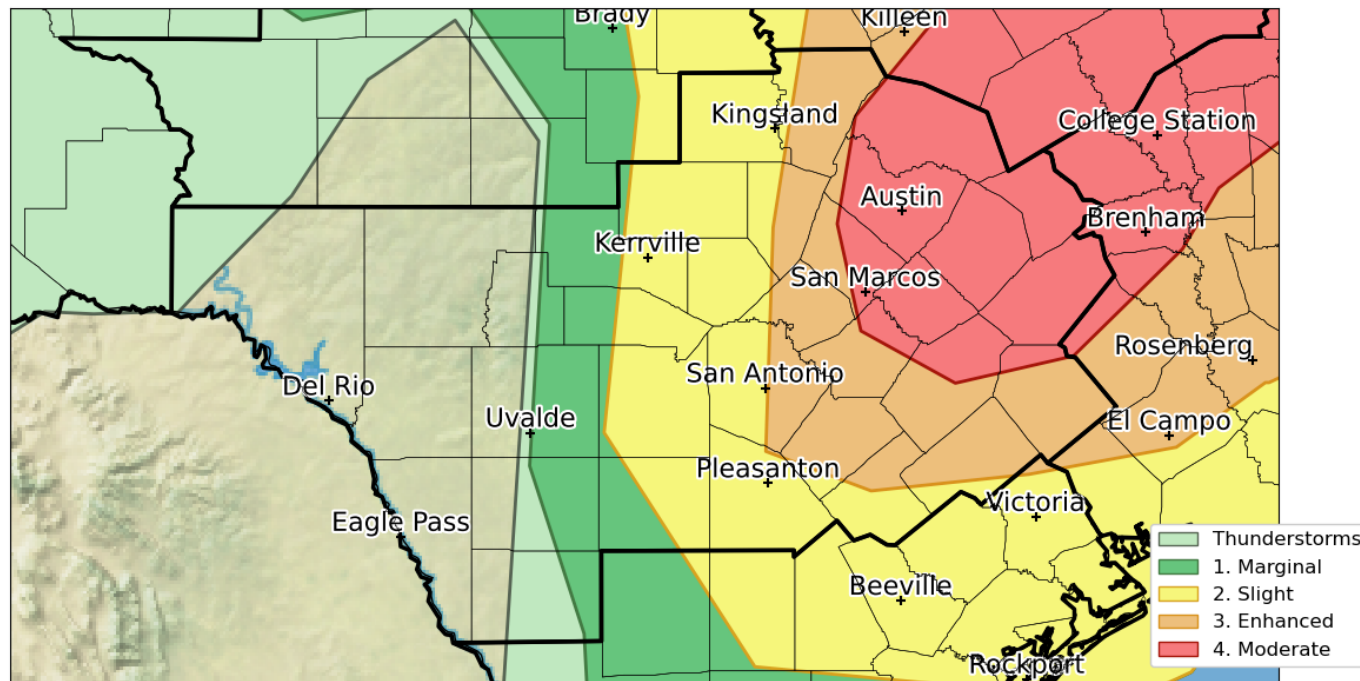


Convective Outlooks



March 21, 2022 Storm Prediction Center Day 1 Categorical Outlook

Issued: 2022-03-21 16:47 UTC | Valid: 2022-03-21 16:30 UTC | Expire: 2022-03-22 12:00 UTC



Generated at 18 Mar 2023 4:05 PM CDT in 8.18s

IEM Autoplot App #220

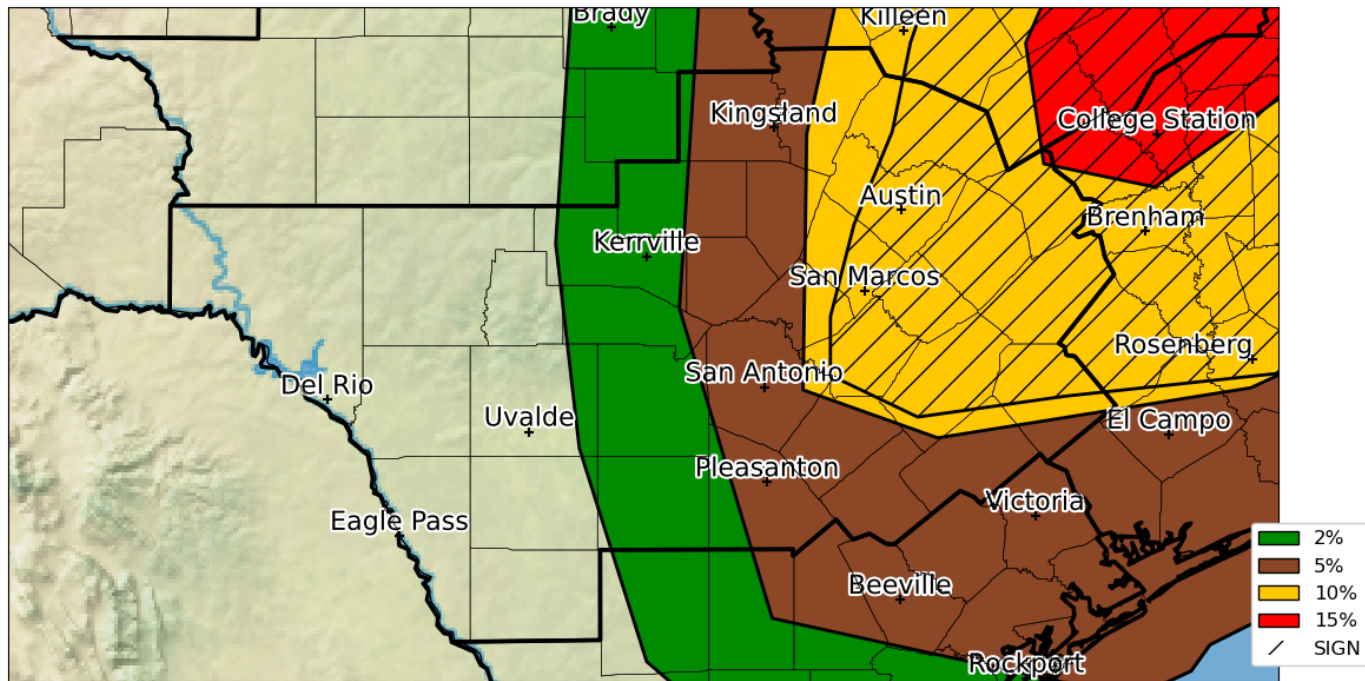


Tornado Outlook



March 21, 2022 Storm Prediction Center Day 1 Tornado Outlook

Issued: 2022-03-21 16:47 UTC | Valid: 2022-03-21 16:30 UTC | Expire: 2022-03-22 12:00 UTC

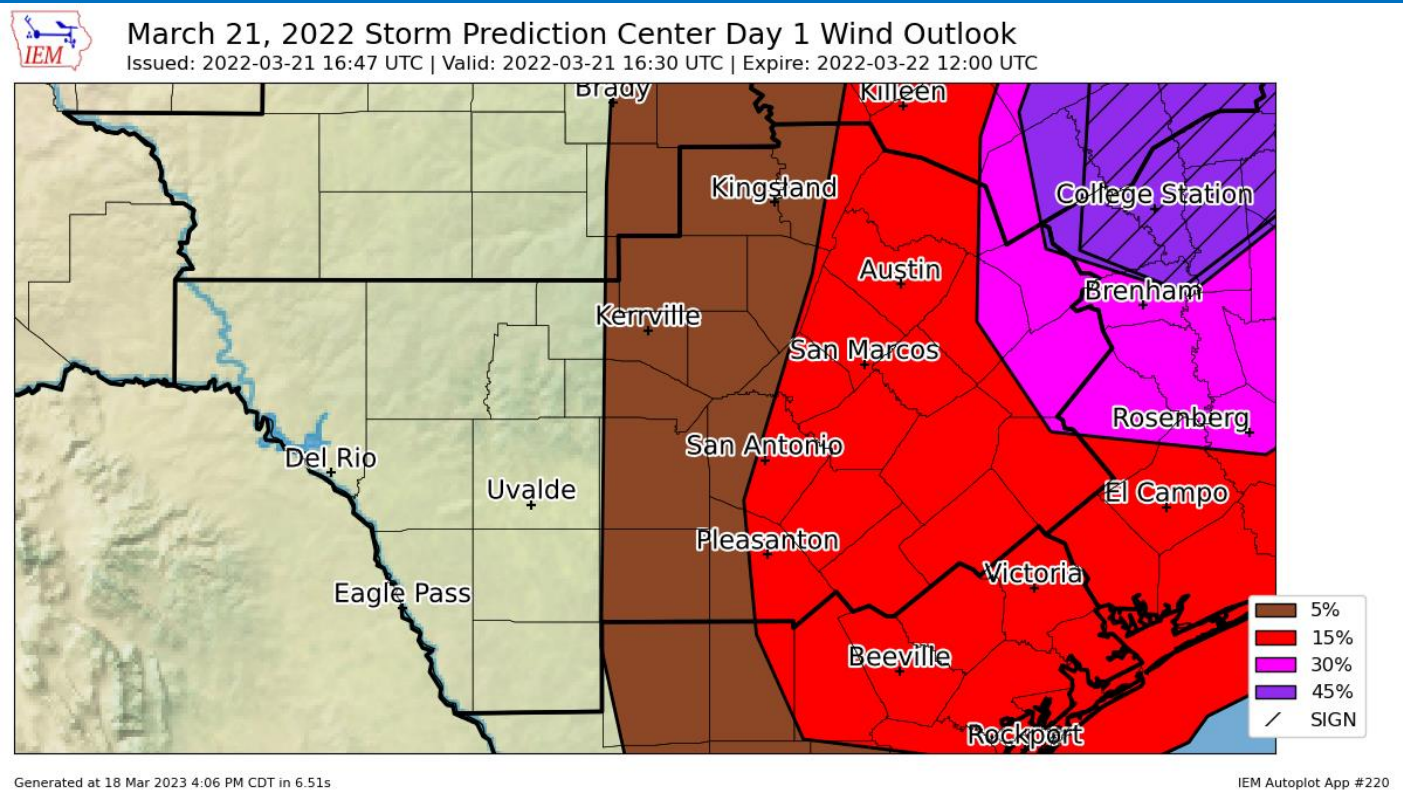


Generated at 18 Mar 2023 4:04 PM CDT in 6.84s

IEM Autoplot App #220



Wind Outlook

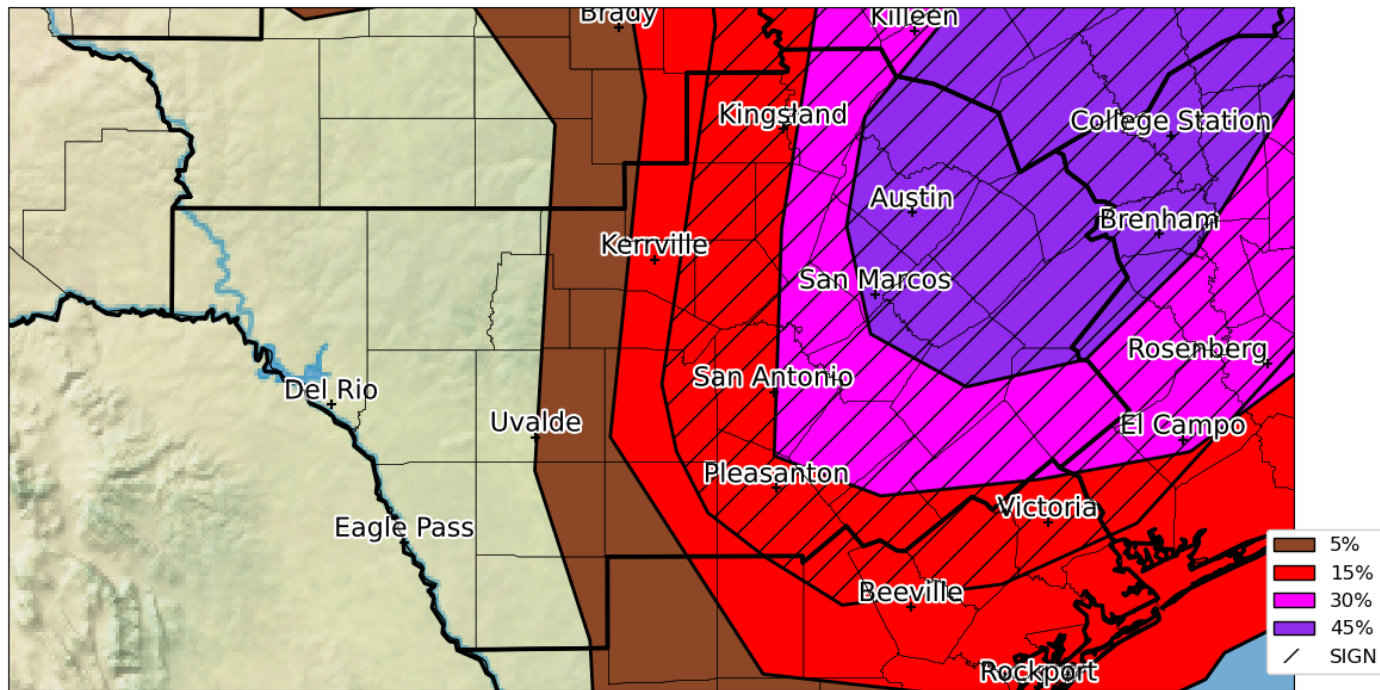


Hail Outlook



March 21, 2022 Storm Prediction Center Day 1 Hail Outlook

Issued: 2022-03-21 16:47 UTC | Valid: 2022-03-21 16:30 UTC | Expire: 2022-03-22 12:00 UTC



Generated at 18 Mar 2023 4:04 PM CDT in 6.51s

IEM Autoplot App #220



How to Message Upgrade?

Important Forecast Changes



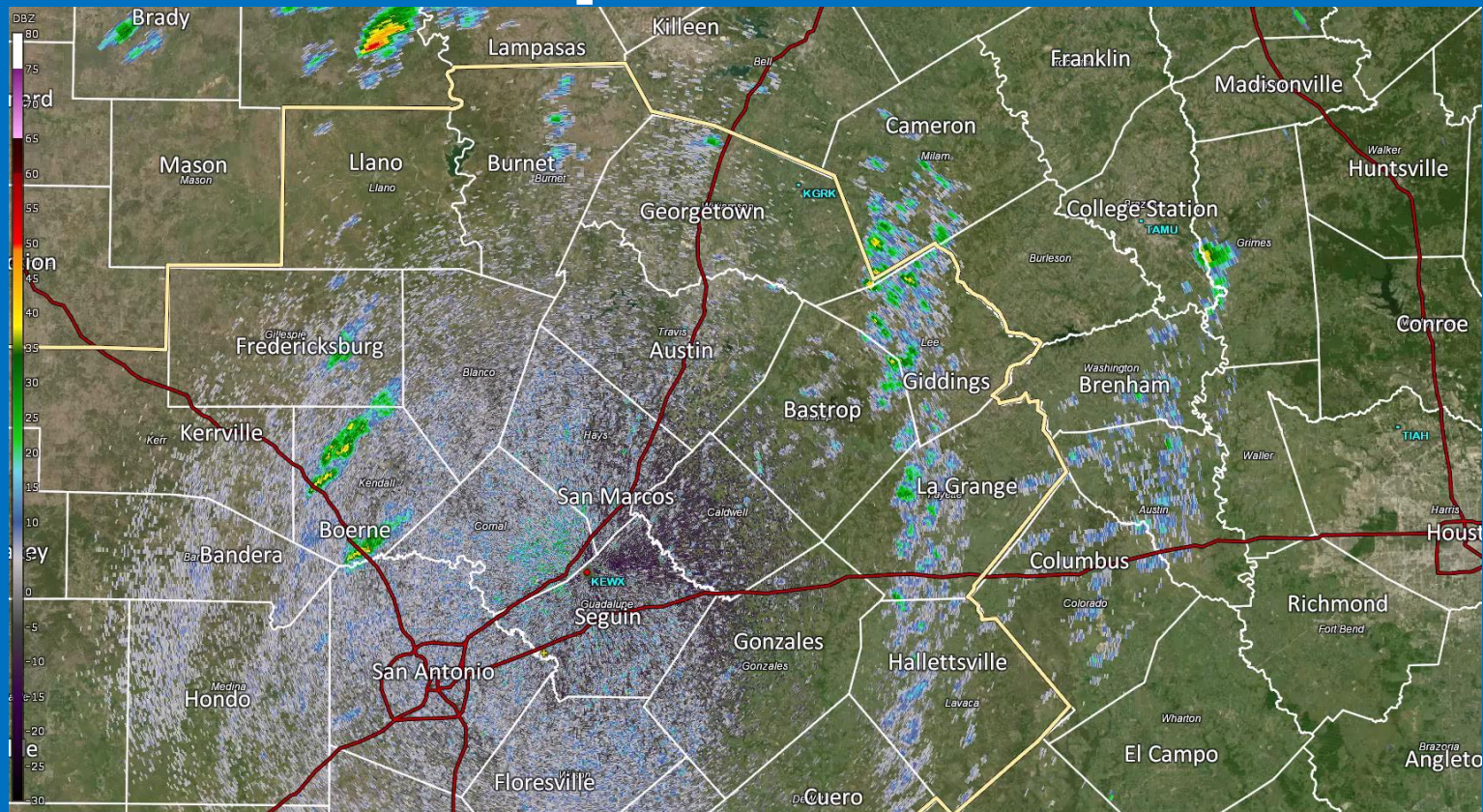
- The risk for large, damaging hail has increased for areas along and east of I-35 and north of I-10.
- Storm chances are slim west of US-281

Key Messages

- ✓ Morning showers are already tapering off. Thunderstorms will develop early to mid afternoon somewhere near U.S. Highway 281. The storms are likely to become severe as they move eastward through the afternoon and evening.
- ✓ All severe hazards may occur. The highest risk is for large hail, but tornadoes and damaging straight-line winds also possible.

Does that take away from tornado threat?

Radar Recap



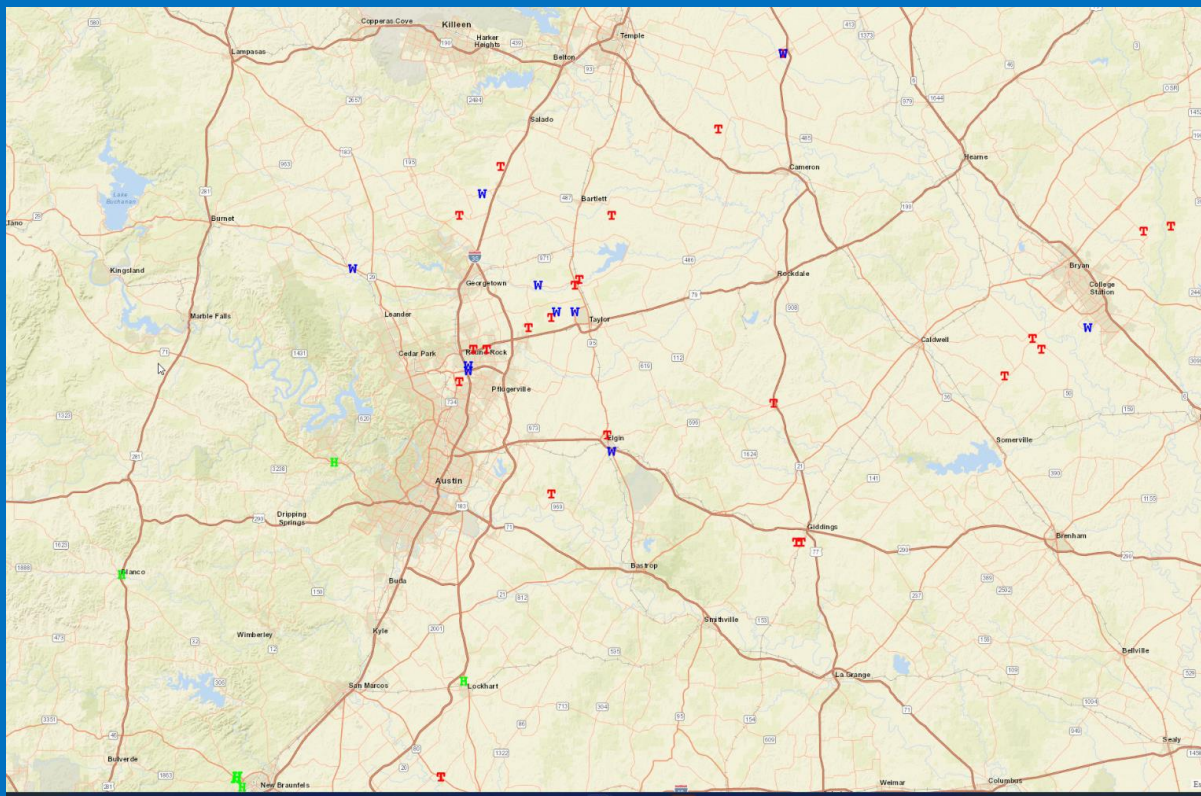
Live Cams and NWSChat



10:51 <nws-EWX WCM-paul.yura> Rotation is looking very good just west of Jarrell
10:54 <media-david.yeomans> Confirmed tornado in Sun City? Or radar indicated?
10:56 <media-david.yeomans> TORNADCO ON THE GROUND IN ROUND ROCK
10:56 <media-david.yeomans> WE HAVE IT ON CAMERA
10:57 <nws-andrew.quigley> Thank you David



Storm Reports



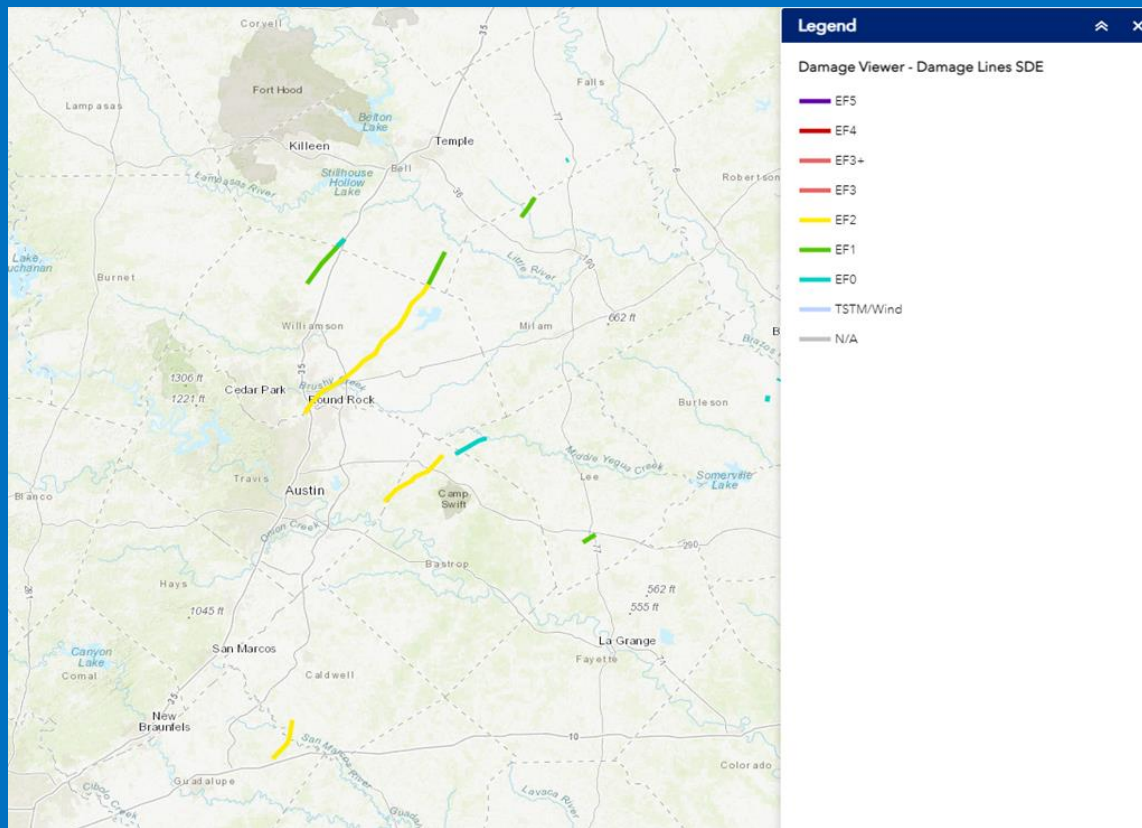
No Hail?

Or

Just Not
Reported Given
Ongoing
Tornadoes??



Tornado Survey Tracks



IWT Success Story



The person that lived here said they cleared their closet 4 days before March 21st when they saw the forecast on television.

On the afternoon of the 21st, they received the warning and the family went into the interior room.

The outside walls of the house were all gone when it was over.



Questions/Comments?



Next Up:



Messaging Timing and Aerial Risk Discussion



©Brandon Osterhout





Severe Weather Messaging

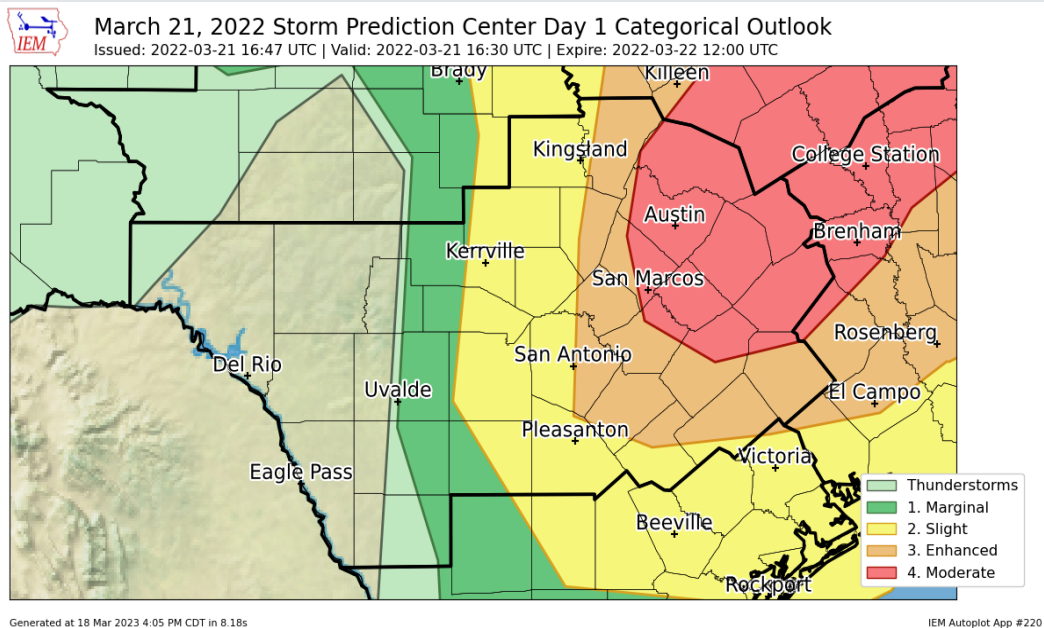
Aerial Threat, Timing, & Preparedness

+

Review of Storm Prediction Center Outlooks

Day 1 Outlook Probability to Category Conversion

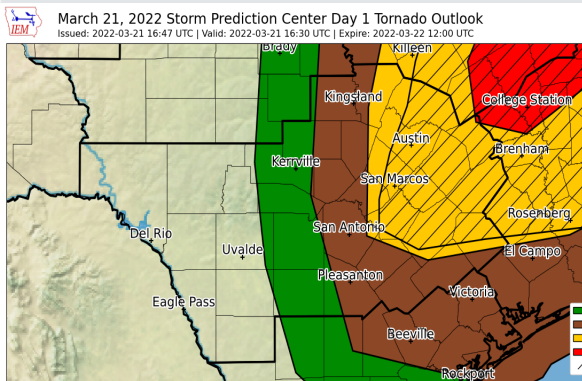
Day 1 Outlook Probability	TORN	WIND	HAIL
2%	MRGL	Not Used	Not Used
5%	SLGT	MRGL	MRGL
10%	ENH	Not Used	Not Used
10% with Significant Severe	ENH	Not Used	Not Used
15%	ENH	SLGT	SLGT
15% with Significant Severe	MDT	SLGT	SLGT
30%	MDT	ENH	ENH
30% with Significant Severe	HIGH	ENH	ENH
45%	HIGH	ENH	ENH
45% with Significant Severe	HIGH	MDT	MDT
60%	HIGH	MDT	MDT
60% with Significant Severe	HIGH	HIGH	MDT



The probabilities that you see on the graphics represent the probability of one or more events occurring within 25 miles of a point during the outlook period.

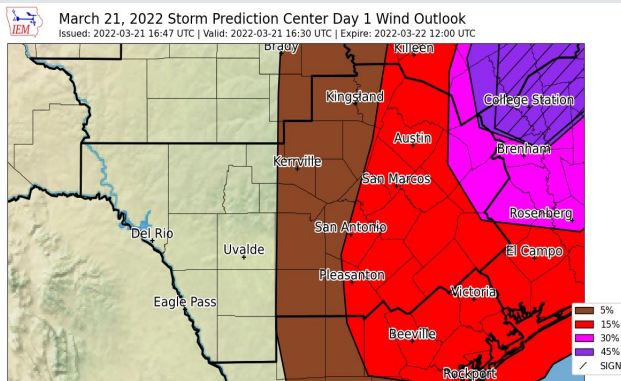
Review of Storm Prediction Center Outlooks

- + No two situations are alike, even within the same risk category!
- + This is why a probabilistic forecast and text discussion accompanies the categorical outlook.



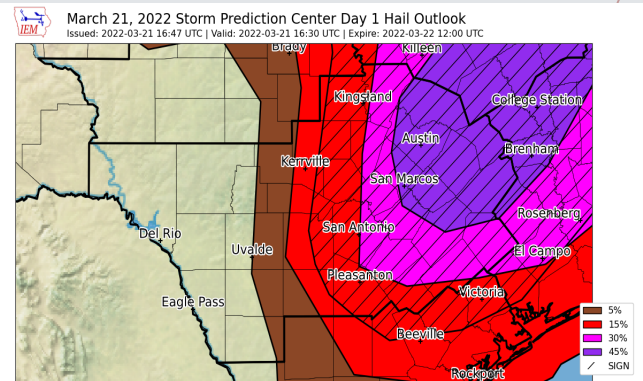
Generated at 18 Mar 2023 4:04 PM CDT in 6.84s

IEM Autopilot App #220



Generated at 18 Mar 2023 4:06 PM CDT in 6.51s

IEM Autopilot App #220



Generated at 18 Mar 2023 4:04 PM CDT in 6.51s

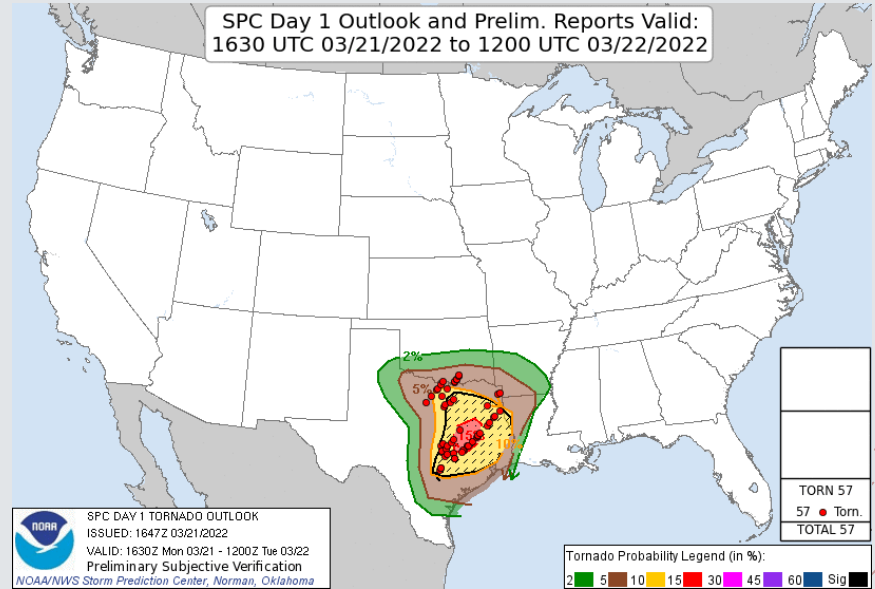
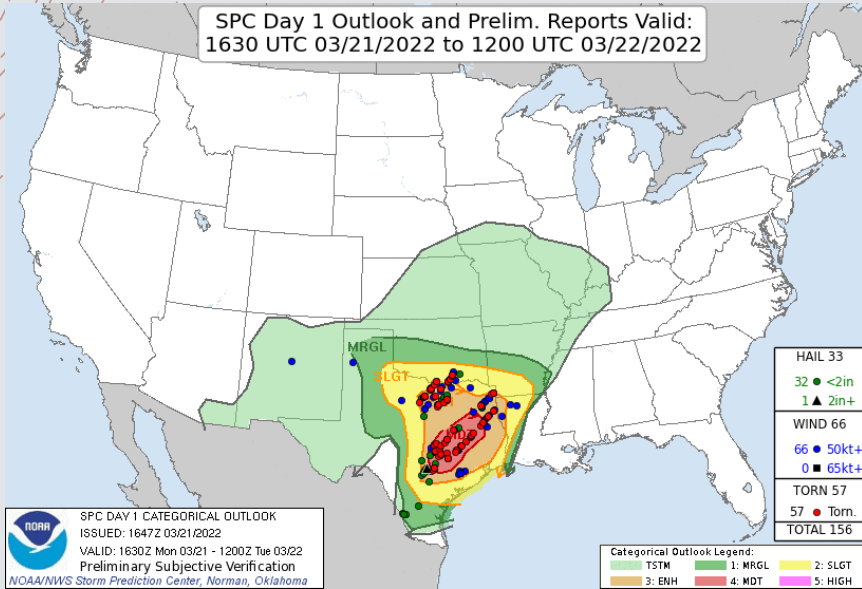
IEM Autopilot App #220

Storm Prediction Center Outlooks

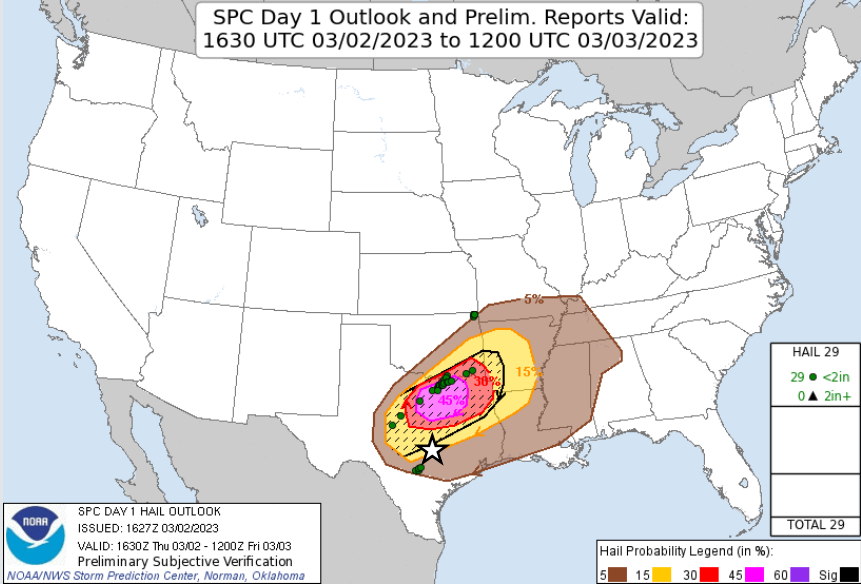
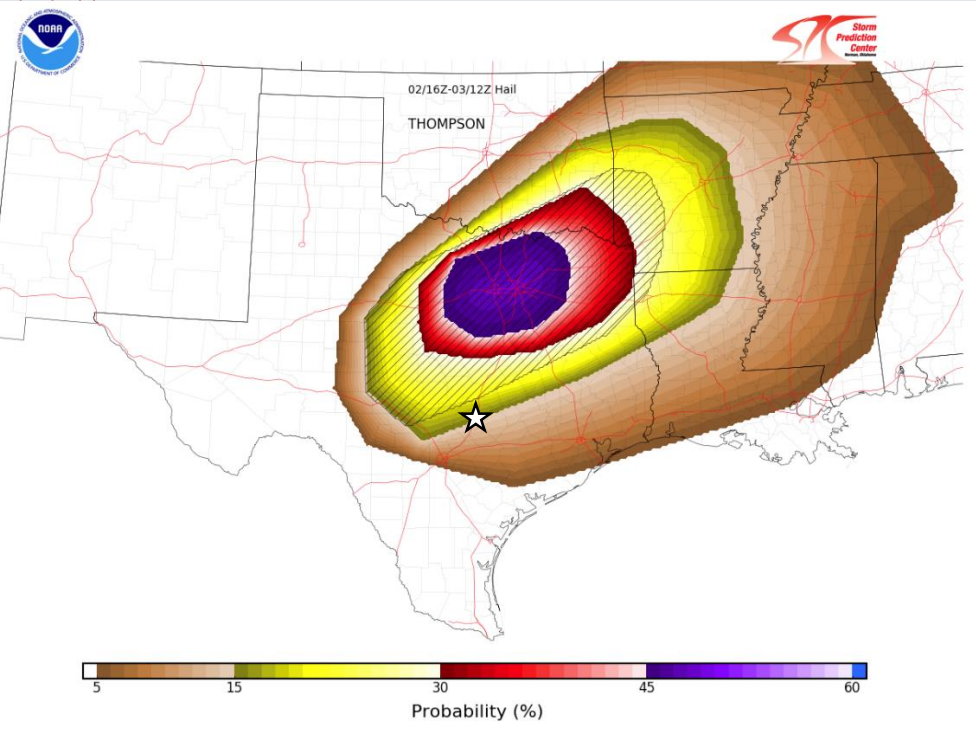
Storm Prediction Center:

*"We encourage all to message as appropriate for local DSS needs, and recognize **and convey** that **outlook lines are not rigid, hard boundaries, but instead part of a fuzzy gradient, as are most lines in operational meteorology.**"*

Case Example



Continuous Probabilities vs. Stair Stepped Outlooks



Evaluating Public Interpretation of the SPC Convective Outlook

Kenzie Krocak, Joe Ripberger, Sean Ernst

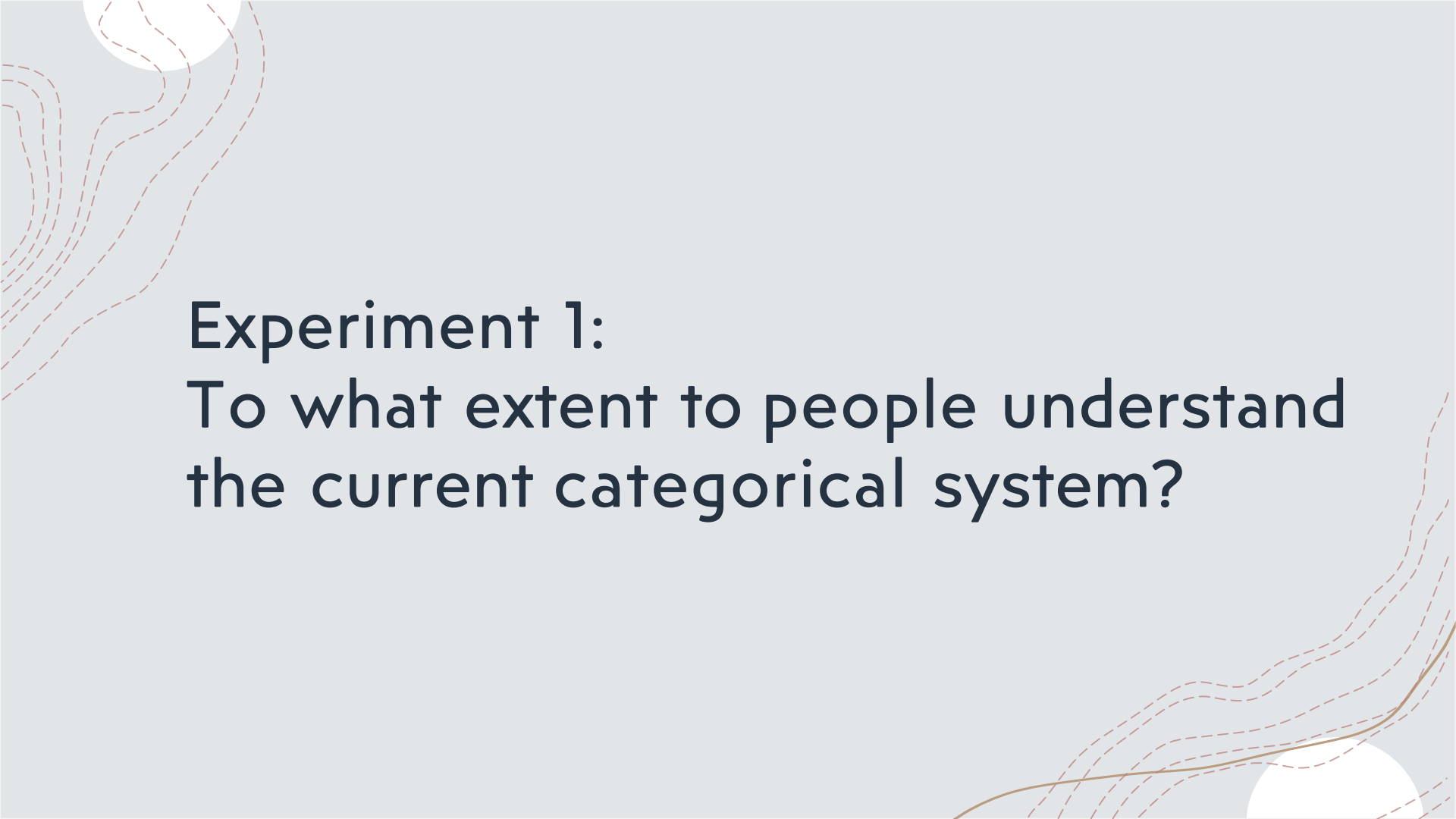
And many others!



What are we hearing?

There have been recent studies that document challenges with the convective outlook.

- Ordering the category names is very challenging (e.g. Ernst masters work, Forbes senior capstone)
 - Marginal/slight and enhanced/moderate are often switched
- People recognize inconsistencies in outlook displays (e.g. Williams)
 - They tend to trust/use the display with the highest risk category



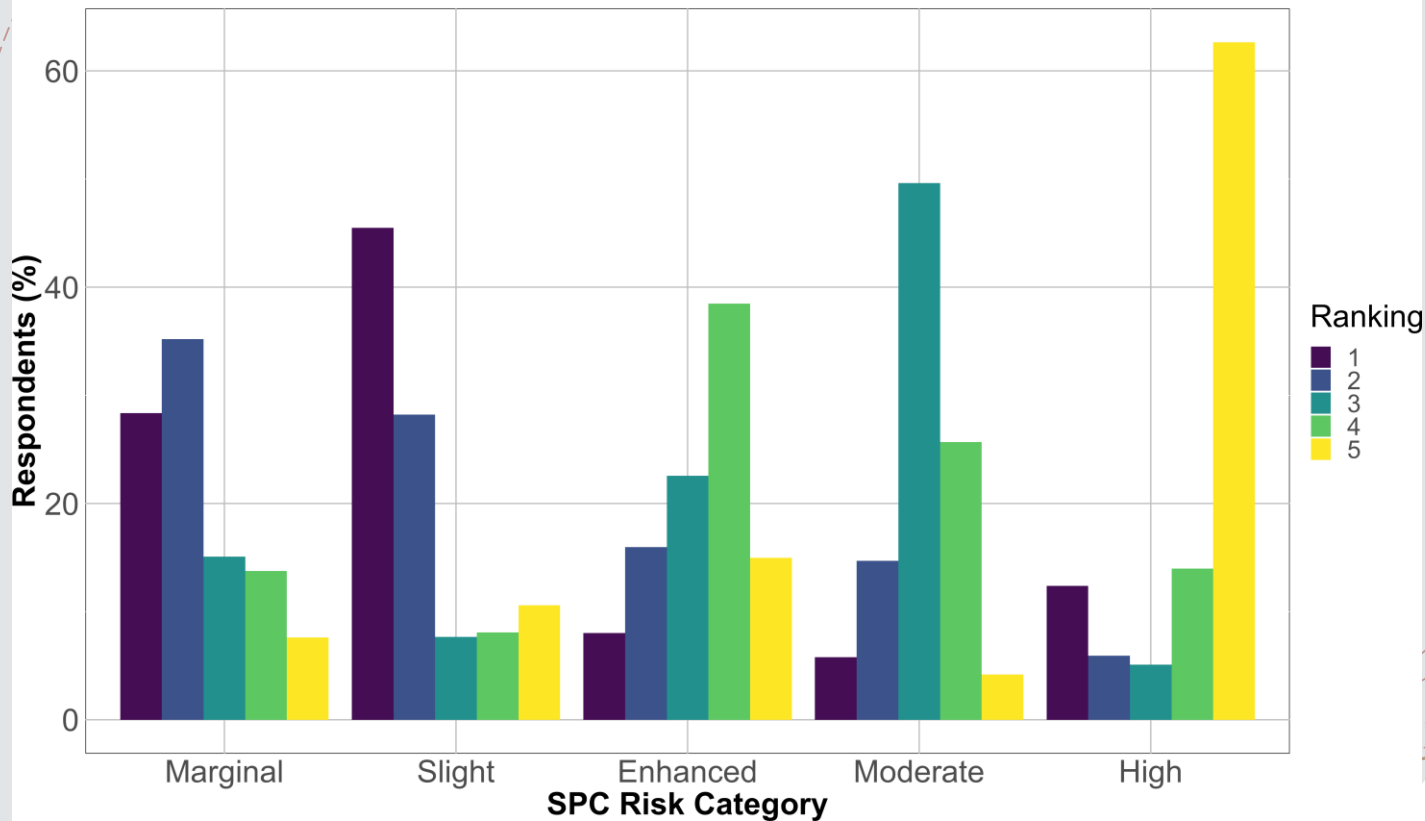
Experiment 1:
To what extent do people understand
the current categorical system?

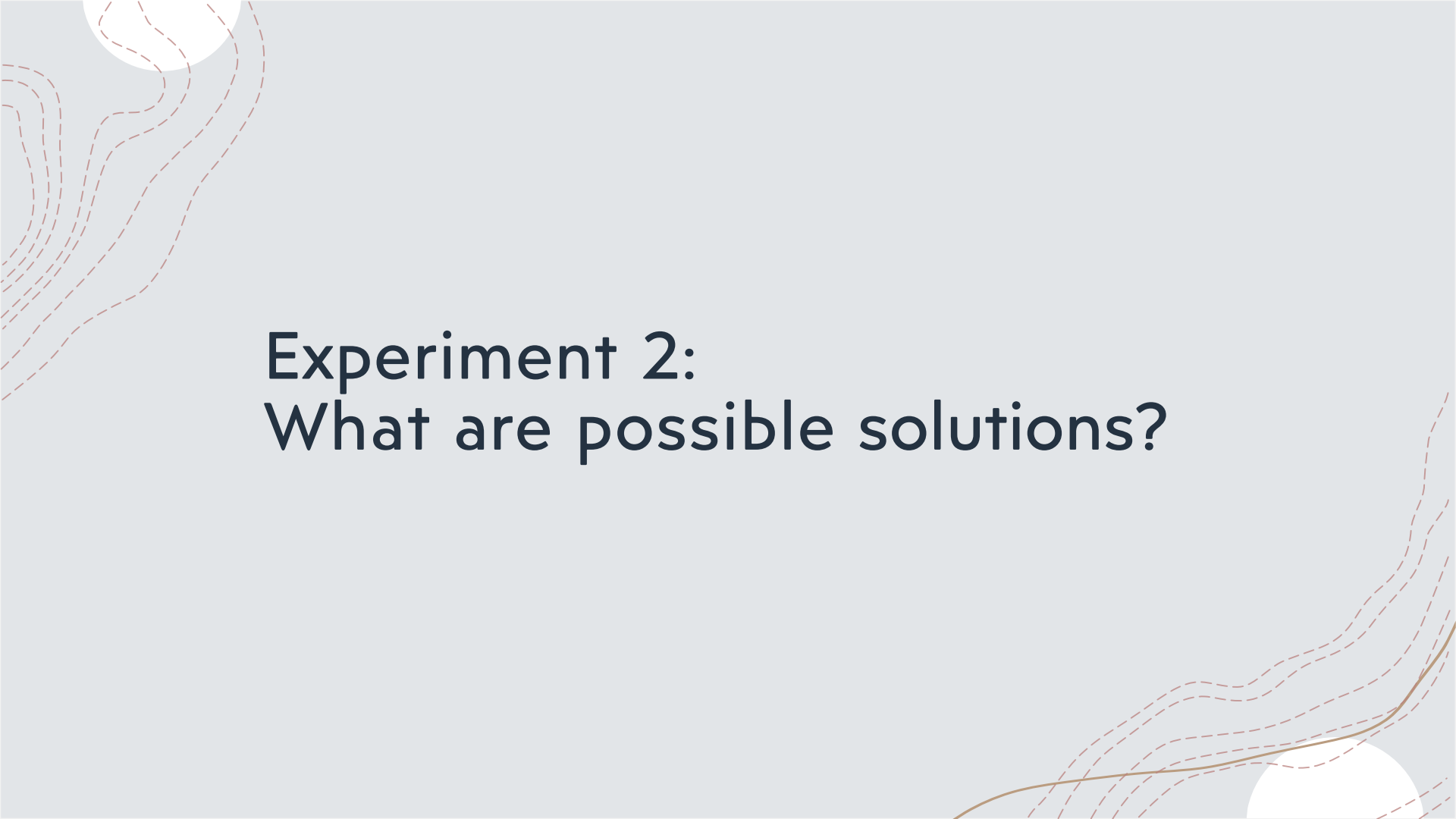
Experiment design

- *“The National Weather Service Storm Prediction Center uses the following phrases to describe the risk of severe thunderstorms and tornadoes. We want to know what these phrases mean to you. Can you rank them from one (lowest risk) to five (highest risk)?”*
 - Words: Marginal, Slight, Enhanced, Moderate, and High
 - Dropdown list of the words
 - The order of the words in the list was randomly assigned
- No information about colors or the convective outlook were shown

Word ranking

Can you rank these phrases from one (lowest risk) to five (highest risk)?





Experiment 2: What are possible solutions?

Experiment design

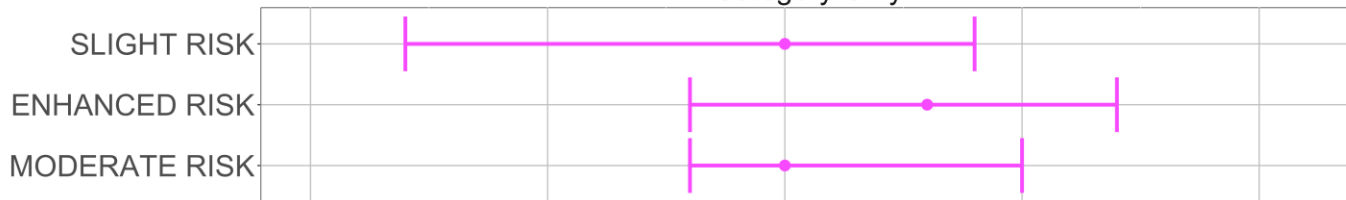
- Random assignment of a forecast phrase
- Asked respondents to rate their concern and likelihood of responding after receiving a certain forecast
- Forecast phrases contain info that SPC *already provides*:

Category only	A SLIGHT RISK	AN ENHANCED RISK	A MODERATE RISK
Level only	A LEVEL 2 of 5 RISK	A LEVEL 3 of 5 RISK	A LEVEL 4 of 5 RISK
Percent only	A 5% CHANCE	A 15% CHANCE	A 30% CHANCE
Category + Level	A SLIGHT RISK (LEVEL 2 of 5)	AN ENHANCED RISK (LEVEL 3 of 5)	A MODERATE RISK (LEVEL 4 of 5)
Category + Percent	A SLIGHT RISK (5% CHANCE)	AN ENHANCED RISK (15% CHANCE)	A MODERATE RISK (30% CHANCE)

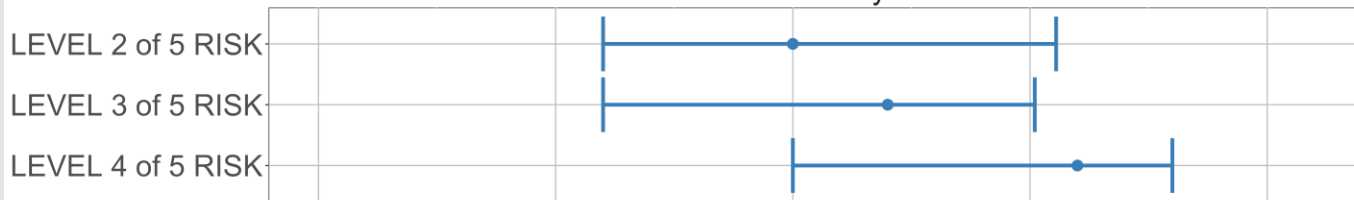
Concern ratings

How concerned would you be if you were to get this forecast?

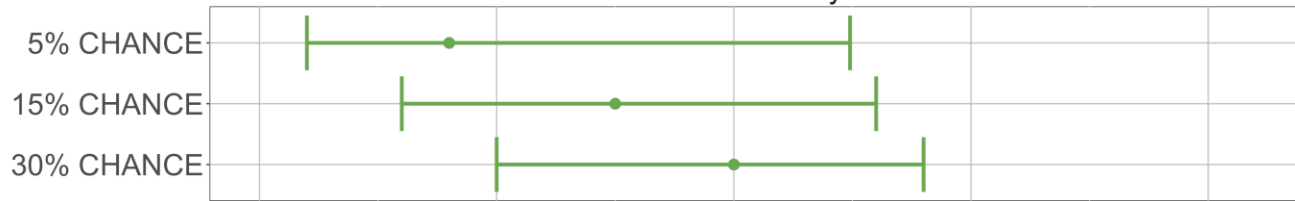
Category Only



Level Only



Percent Only



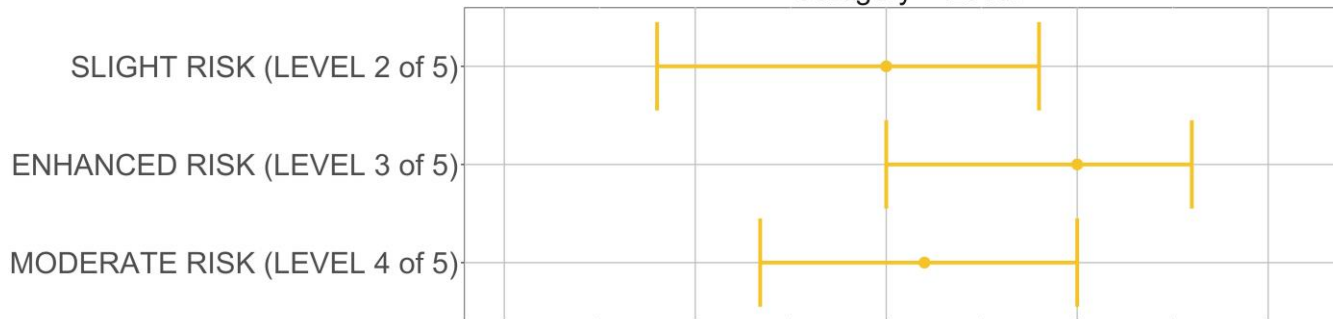
Not at all concerned

Extremely concerned

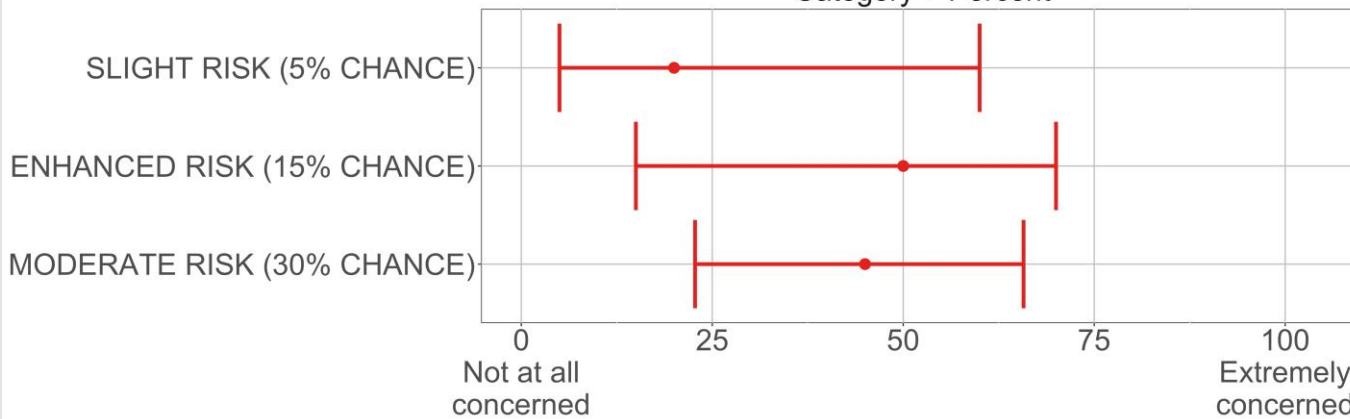
Concern ratings

How concerned would you be if you were to get this forecast?

Category + Level

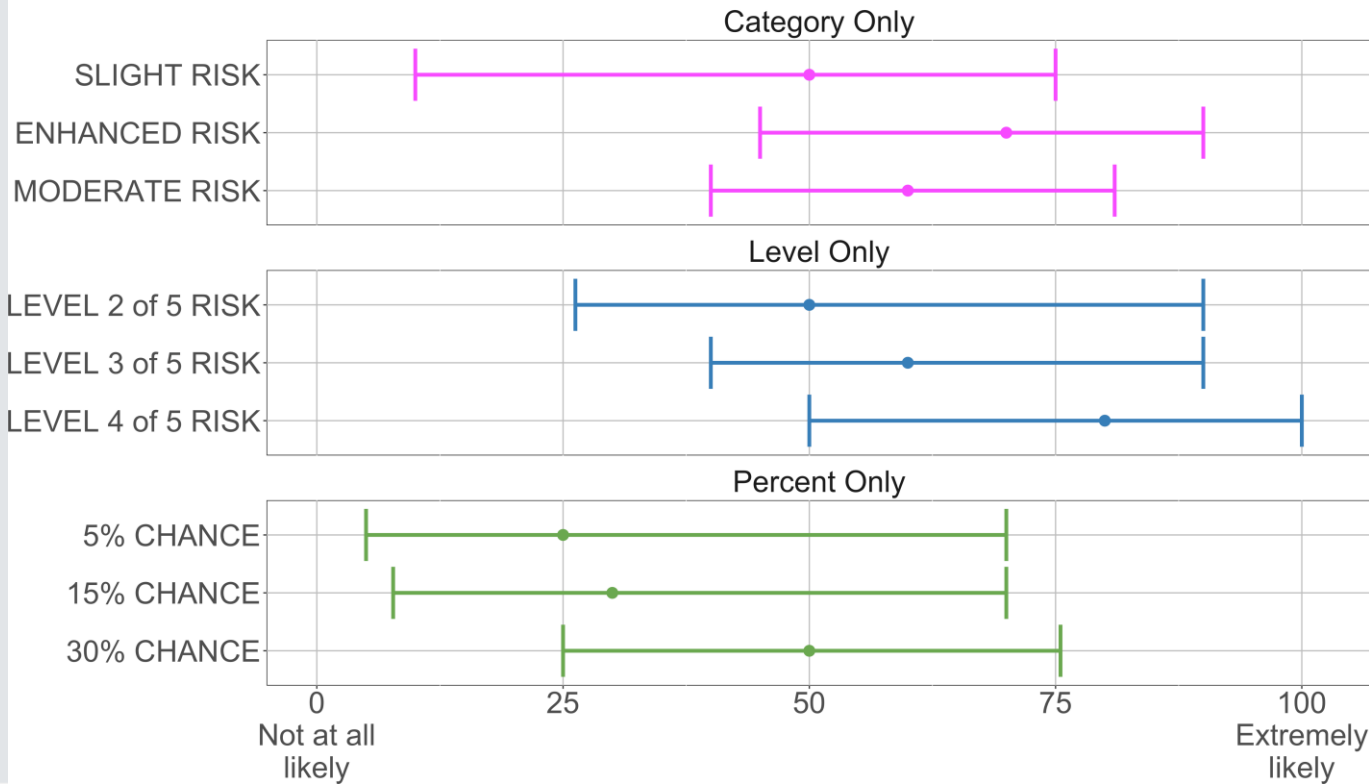


Category + Percent



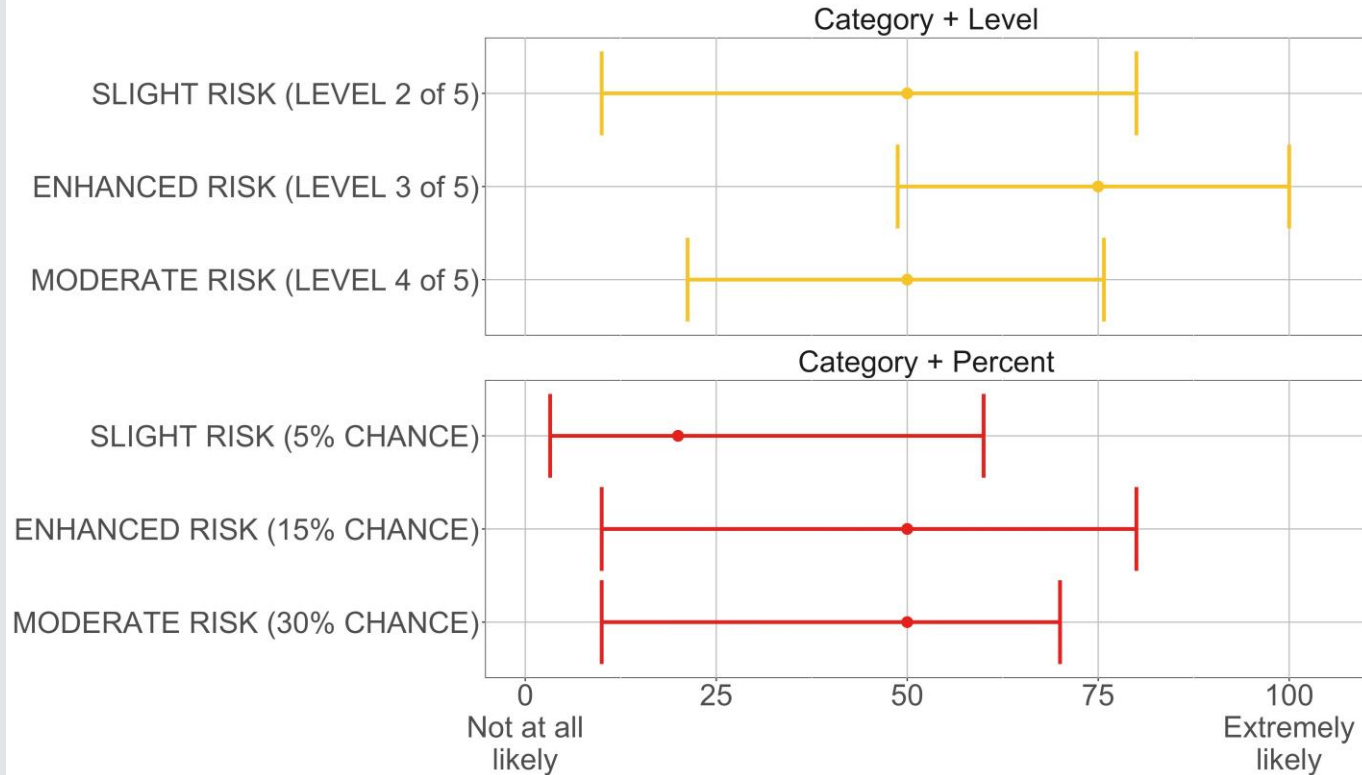
Response ratings


How likely is it that you would change your plans for the day if you were to get this forecast?



Response ratings

How likely is it that you would change your plans for the day if you were to get this forecast?

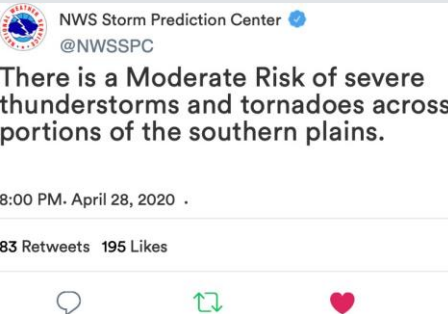


The background is a light gray color. In the top-left corner, there is a white circle partially cut off by the edge, with several dashed brown lines flowing downwards and to the right from it. In the bottom-right corner, there is another white circle partially cut off by the edge, with several dashed brown lines flowing upwards and to the left from it. The text is centered in the middle of the slide.

Experiment 3: Do graphics help?

What about graphics?

On a scale from 0 to 100, where 0 means no risk and 100 means extreme risk, how much risk does this forecast suggest for people in the southern plains?




NWS Storm Prediction Center
@NWSSPC

There is a Moderate Risk of severe thunderstorms and tornadoes across portions of the southern plains.

8:00 PM. April 28, 2020 ·


83 Retweets 195 Likes

Text only



NWS Storm Prediction Center
@NWSSPC

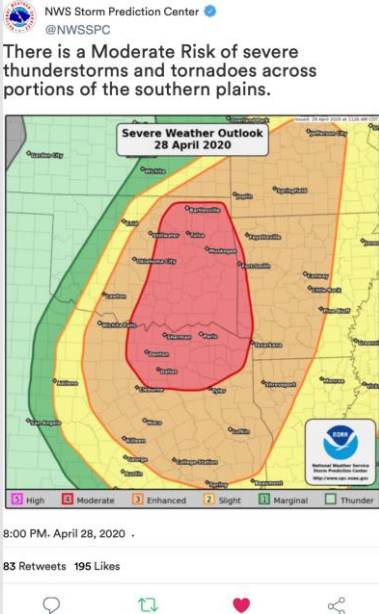
There is a Moderate Risk of severe thunderstorms and tornadoes across portions of the southern plains.



8:00 PM. April 28, 2020 ·

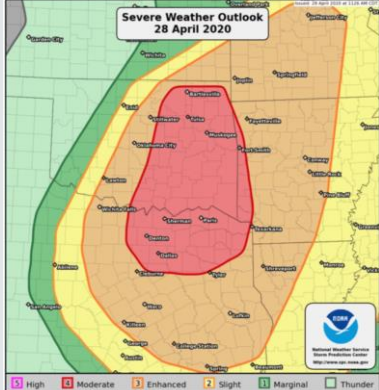
83 Retweets 195 Likes

Text and outlook



NWS Storm Prediction Center
@NWSSPC

There is a Moderate Risk of severe thunderstorms and tornadoes across portions of the southern plains.

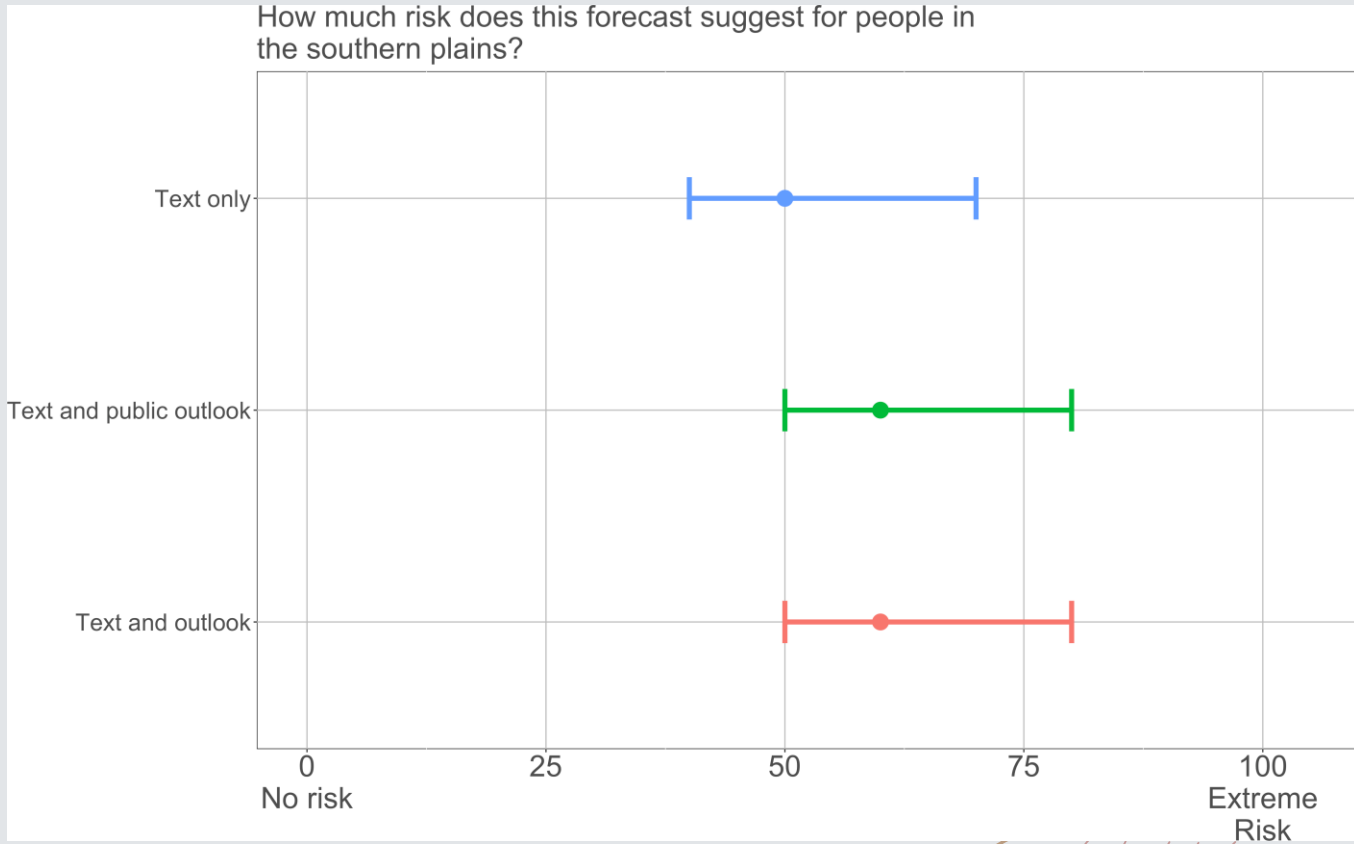


8:00 PM. April 28, 2020 ·

83 Retweets 195 Likes

Text and public outlook

What about graphics?



What does it mean?

- **The current categorical scale is often misunderstood by the general public**
 - The moderate category seems to be the most problematic
- **Use of levels and the underlying probabilities can lead to more consistent concern and response ratings**
 - The levels tend to have higher ratings than the probabilities
- **People anchor to the categories**
 - When categories and levels/probabilities are combined, ratings become less consistent
- **Graphics seem to help orient risk perceptions**

Examples

> THURSDAY SEVERE RISK

» STORM PREDICTION CENTER



WHEN
THURSDAY
3 PM - 10 PM

WHERE
HIGHEST RISK NORTH
BURNET-WILCO-MILAM

THREATS
DAMAGING WINDS 60+ MPH
ISOLATED TORNADO RISK
LARGE HAIL QUARTER SIZE



1 MARGINAL 2 SLIGHT 3 ENHANCED 4 MODERATE 5 HIGH



Example – NWS Austin/San Antonio Prototype

THREAT ASSESSMENT

HIGHEST LOCAL RISK

4

WHAT THIS MEANS:
WIDESPREAD severe storms *likely*

TIMING

3 pm to 3 am

PRIMARY THREATS

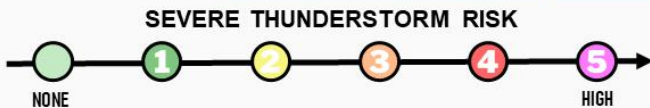
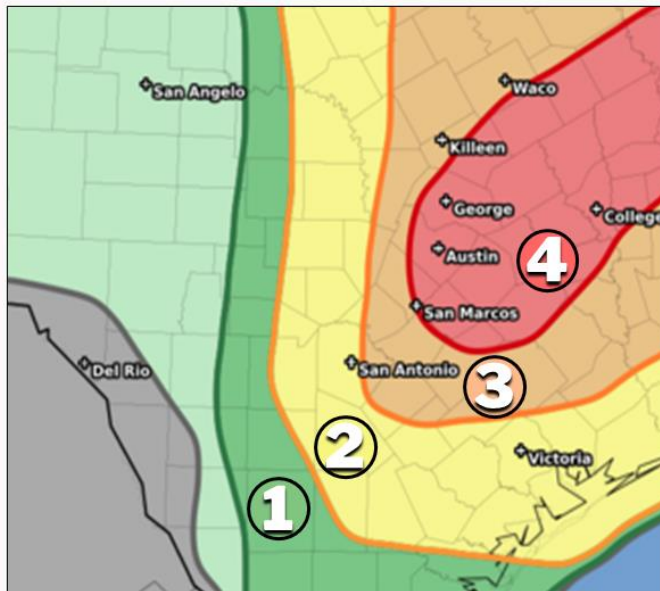
 **LARGE HAIL**

 **DAMAGING WIND**

 **TORNADOES POSSIBLE**

 **HEAVY RAIN**

Widespread **SEVERE THUNDERSTORMS** Today



What To Expect

- Storms develop in the mid afternoon (90% chance), **quickly becoming severe**
- Storms will gradually weaken into the early morning hours

What To Do?

- **Stay Weather Aware!**
- Be ready to take shelter indoors when storms approach
- Have multiple ways to receive warnings



INDOOR SHELTER



OUTDOOR PLANS?
STAY WEATHER AWARE



MULTIPLE WAYS TO
RECEIVE WARNINGS



Example – NWS Austin/San Antonio Prototype

THREAT ASSESSMENT

HIGHEST LOCAL RISK

4

WHAT THIS MEANS:
WIDESPREAD severe storms likely

THREAT LEVELS FOR HIGHEST RISK*

Up to ping pong sized
HAIL NONE HIGH

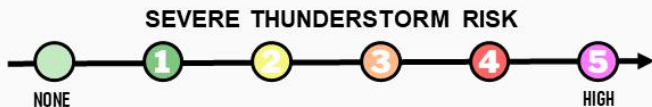
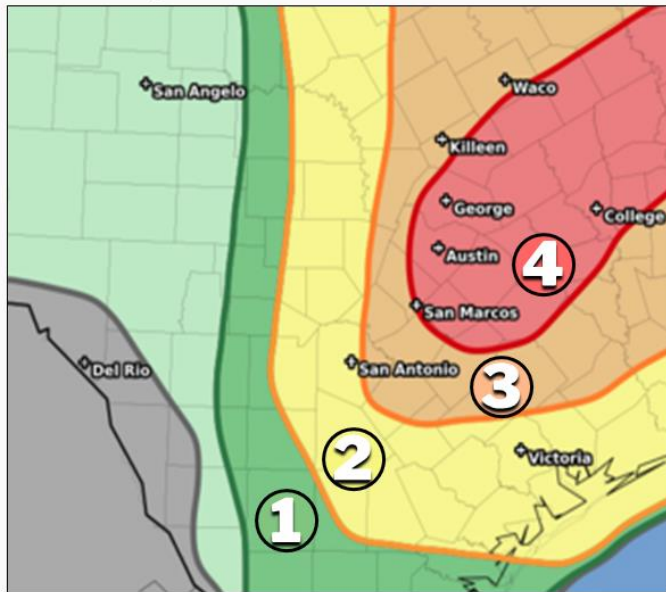
Gusts to 60 mph possible
WIND NONE HIGH

Tornadoes possible
TORNADO NONE HIGH

Urban/street flooding
FLOODING NONE HIGH

* Threat levels correspond to location with the HIGHEST RISK. Threats generally decrease away from the highest risk.

Widespread **SEVERE THUNDERSTORMS** Today



What To Expect

- Storms develop in the mid afternoon (90% chance), quickly becoming severe
- Storms will gradually weaken into the early morning hours

Timing

3 pm to 3 am

What To Do?



INDOOR SHELTER



OUTDOOR PLANS?
STAY WEATHER AWARE



MULTIPLE WAYS TO
RECEIVE WARNINGS



Questions for Room?

- + Agreement on focusing more on Category # Level vs Name?
- + How to handle multiple hazard threats - Separate graphics? Focus on the higher threat? Summarized on one graphic?

THREAT ASSESSMENT

HIGHEST LOCAL RISK


4


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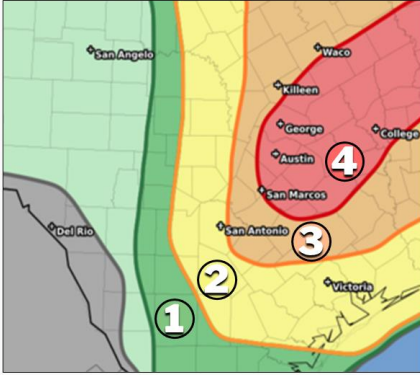

LARGE HAIL


DAMAGING WIND

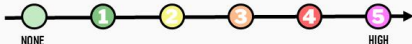

TORNADOES POSSIBLE


HEAVY RAIN

Widespread SEVERE THUNDERSTORMS Today



SEVERE THUNDERSTORM RISK





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INDOOR SHELTER


OUTDOOR PLANS?
STAY WEATHER AWARE


MULTIPLE WAYS TO
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THREAT ASSESSMENT

HIGHEST LOCAL RISK


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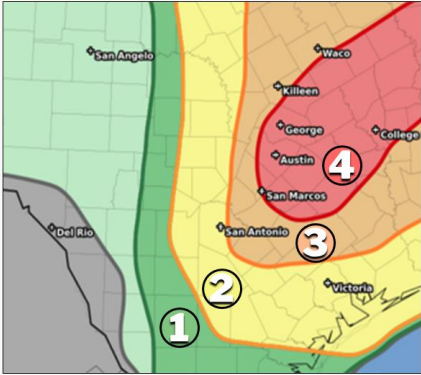

HAIL


Gusts to 60 mph possible



Tornadoes possible


Urban/intrastorm flooding

Widespread SEVERE THUNDERSTORMS Today



SEVERE THUNDERSTORM RISK



What To Expect


- Storms develop in the mid afternoon (90% chance), quickly becoming severe
- Storms will gradually weaken into the early morning hours


Timing


3 pm to 3 am


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INDOOR SHELTER


OUTDOOR PLANS?
STAY WEATHER AWARE


MULTIPLE WAYS TO
RECEIVE WARNINGS



Timing

- + NWS core partners, including those representing vulnerable outdoor populations, expressed a desire for impending significant weather arrival times to assist with proper risk assessments and safety decisions.
- + Recent studies have revealed that the timing information was considered the most critical in decision making on appropriate safety actions.

* Based on recommendations from NWS Service Assessment on July 19, 2018 Table Rock Lake, MO Derecho

Timing

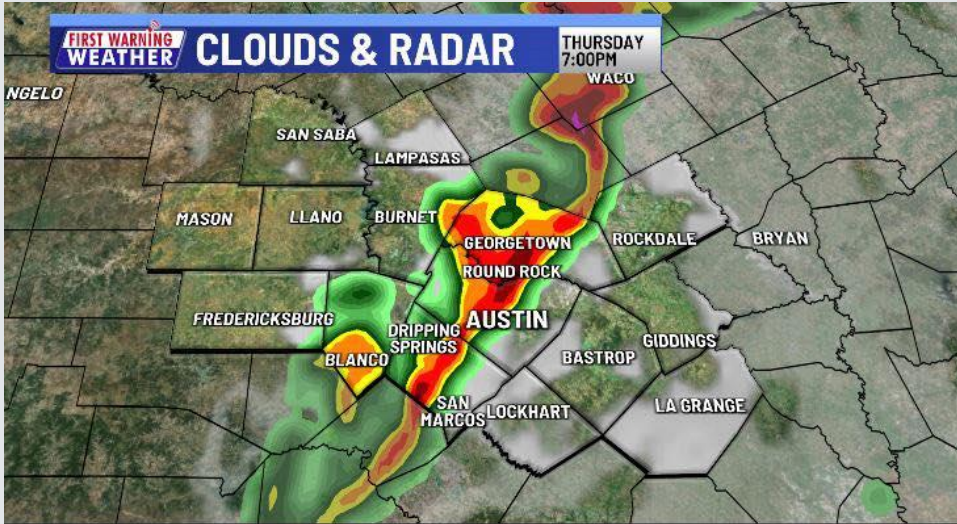
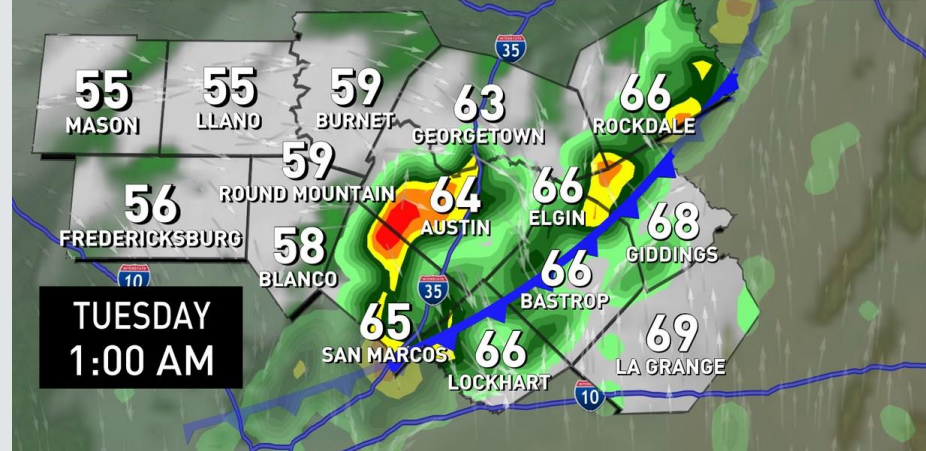
- + In the absence of arrival time information, timing information is often sought out from additional sources or their own arrival time estimations are made.
- + It has been found that core partners, such as emergency managers and media, are less concerned with the degrees of precision in pathcasts and recognized there were inherent “arrival windows”.

* Based on recommendations from NWS Service Assessment on July 19, 2018 Table Rock Lake, MO Derecho

Timing

> FUTURE CLOUDS & RADAR

» TUE 1:00 AM | CENTRAL TEXAS



Timing



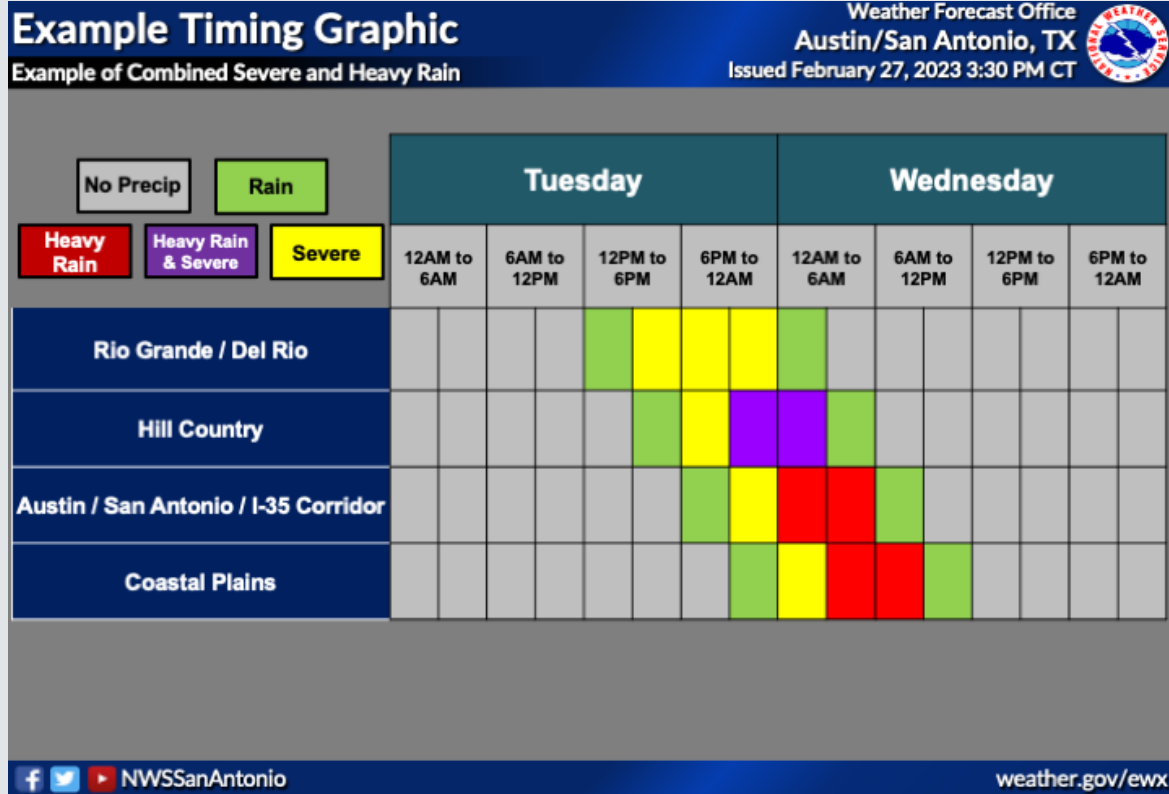
Afternoon Pre-Frontal Showers and Storms



Evening Storms Along Cold Front

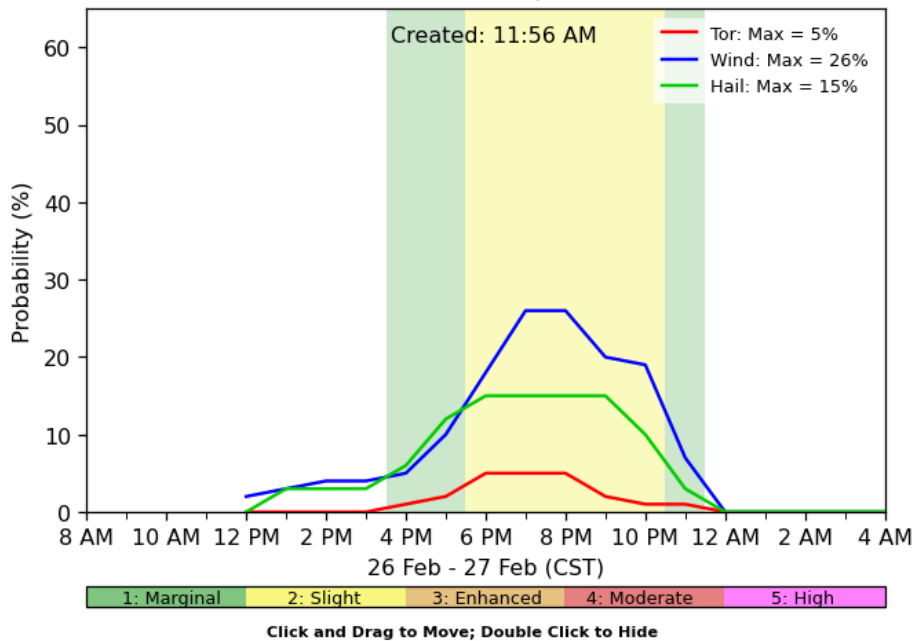
NOTE: This is one model solution (HRRR). Actual coverage and locations impacted may vary.

Timing

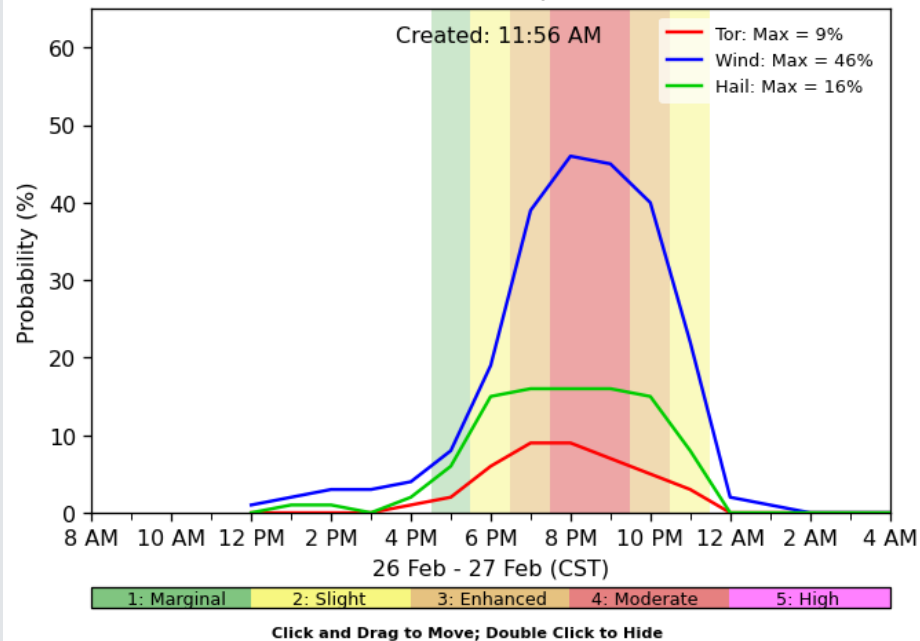


Timing

16Z 26 Feb 2023 SPC Outlook
Valid at 33.88,-98.48

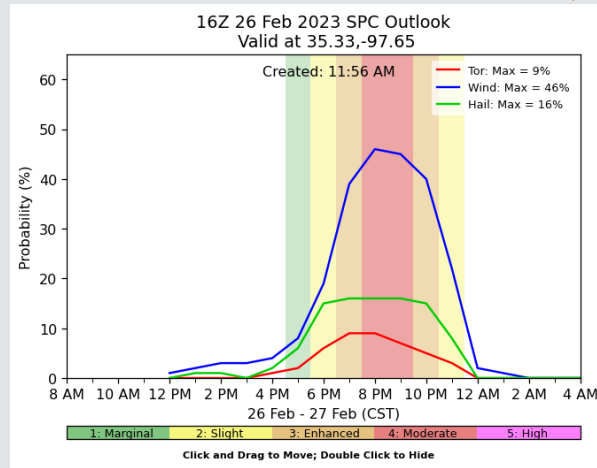
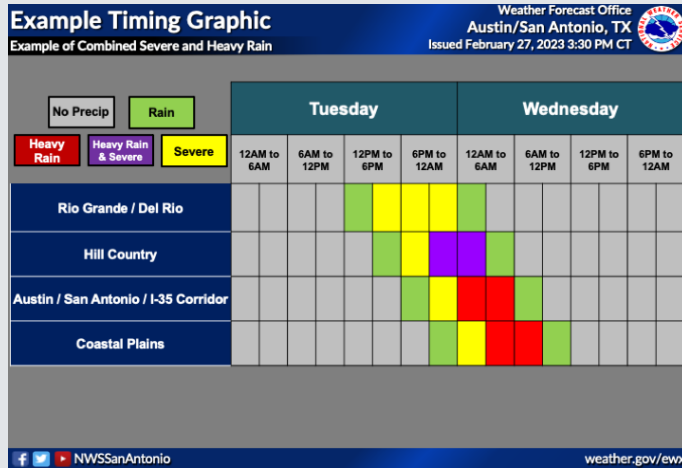
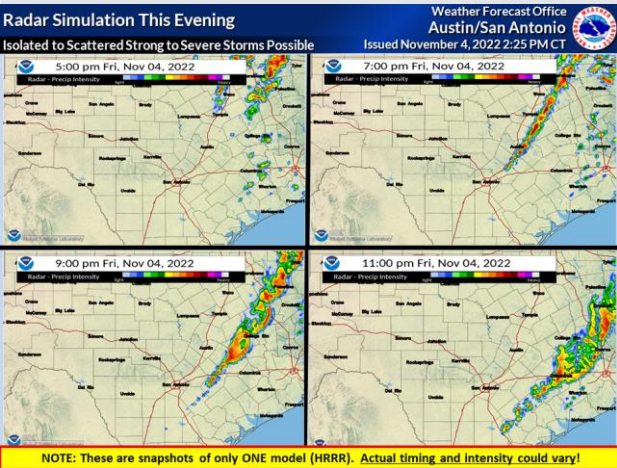


16Z 26 Feb 2023 SPC Outlook
Valid at 35.33,-97.65



Questions for Room

- + How critical is timing?
- + Is timing any more important than hazard risk?
- + What are the best ways to display timing?



Messaging Preparedness



Figure 1: From the University of Alabama Center for Advanced Public Safety survey

Messaging Preparedness

- + Within 48 hours, messaging to the public should focus more on preparedness actions versus primarily focusing on the Outlook Risk Category/Number.

* Based on recommendations from research conducted by the Center For Advanced Public Safety at the University of Alabama as well as NWS AAR from TN Tornado Outbreak Mar 2-3, 2020.

Messaging Preparedness vs Risk Example

“Please leave your phones and NOAA Weather Radio powered on overnight and be prepared to move to your safe space / shelter. NWS Nashville expects to be issuing tornado and severe thunderstorm warnings tonight.”

Versus

“A Slight Risk has been outlooked over a large portion of our area for tonight. Very large hail (2" or greater), tornadoes, and damaging winds are all possible, in addition to localized flooding.”

Messaging Preparedness



NWS Austin/San Antonio 
@NWSSanAntonio



One important note about tomorrow...models are initiating the storms along the I-35 corridor between 3-6pm. This is rush hour. As you go to bed tonight, begin to formulate a plan for your day tomorrow so you are not caught driving home in Severe storms!

TORNADOES AND ROAD SAFETY

WHAT TO DO

Get off the road. The best option is to drive to a designated shelter, basement or safe room.

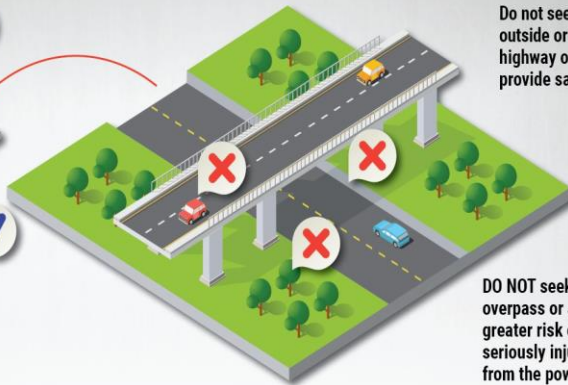


The next best option is a small, windowless room or hallway on the lowest floor of a sturdy building.



WHAT NOT TO DO

Do not seek refuge in a vehicle, outside or under an overpass. A highway overpass does not provide safety from a tornado.



DO NOT seek shelter under an overpass or a tree. This puts you at greater risk of being killed or seriously injured by flying debris from the powerful tornadic winds.

8:46 PM · Mar 20, 2022

Messaging Preparedness

www.weather.gov/safetycampaign

Flash flooding can escalate quickly.

Heavy rain can lead to sudden flash floods, whether you're on the road or at a campground. Will you be ready?

-  Set up a way to get weather warnings on your phone
-  When alerted to a flash flood, get to higher ground immediately
-  Never enter floodwaters in a vehicle or on foot



STORM PLANNING TIMELINE

A few days out

If the forecast calls for severe weather in a few days, start preparing now.

-  Make sure that you have emergency supplies
-  Know your safe places
-  Have a family communication plan

The day before

The day before, forecast accuracy continues to improve.

-  Adjust plans
-  Make sure your phone can receive WEAs
-  Ensure your shelter is clean and accessible

The day of

Remain vigilant and aware of any active Watches. A Warning may be issued at a moment's notice!




-  Remind your family of the communication plan
-  Know how to evacuate and/or get to safety from wherever you are
-  When a Warning is issued, you may only have seconds to take action!

weather.gov



Severe Weather can escalate quickly.

While the possibility of tornadoes can be forecast ahead of time, they can form in minutes, day or night. Will you be prepared?

-  Set up a way to get weather warnings any time of day
-  When alerted to a tornado, quickly get to a storm shelter or basement
-  If underground shelter isn't available, get to an interior hall away from windows





Severe Weather Messaging

Aerial Threat, Timing, & Preparedness

Thoughts & Questions?

+

Situational Awareness, Coordination, and Messaging During Severe Weather

Tools for you to use...Briefing Dashboard

<https://arcg.is/15G0GH>



South-Central TX Weather Briefing Page

National Weather Service Austin/San Antonio

- [Current Local Overview](#)
- [Radar Loop](#)
- [Weather and Hazards Viewer](#)
- [IDSS Forecast Points](#)
- [Hazardous Weather Outlook](#)
- [Severe Weather Outlooks](#)
- [Excessive Rainfall Outlooks](#)
- [Extreme Precipitation Monitor](#)
- [Snow and Ice Forecasts](#)
- [Winter Storm Severity Index](#)

NWS Austin/San Antonio

The map shows:

- Current Observations (Click the values on the map for details)
- Current Watches, Warnings and Advisories
- Latest Radar Image-Reflectivity (Updates every ~4 mins)

View other Layers (right side):

- SPC Convective Outlooks
- 6-hr Snow Forecast (in)
- Observed Daily Snow Depth (in) (updates once a day, around 7AM)

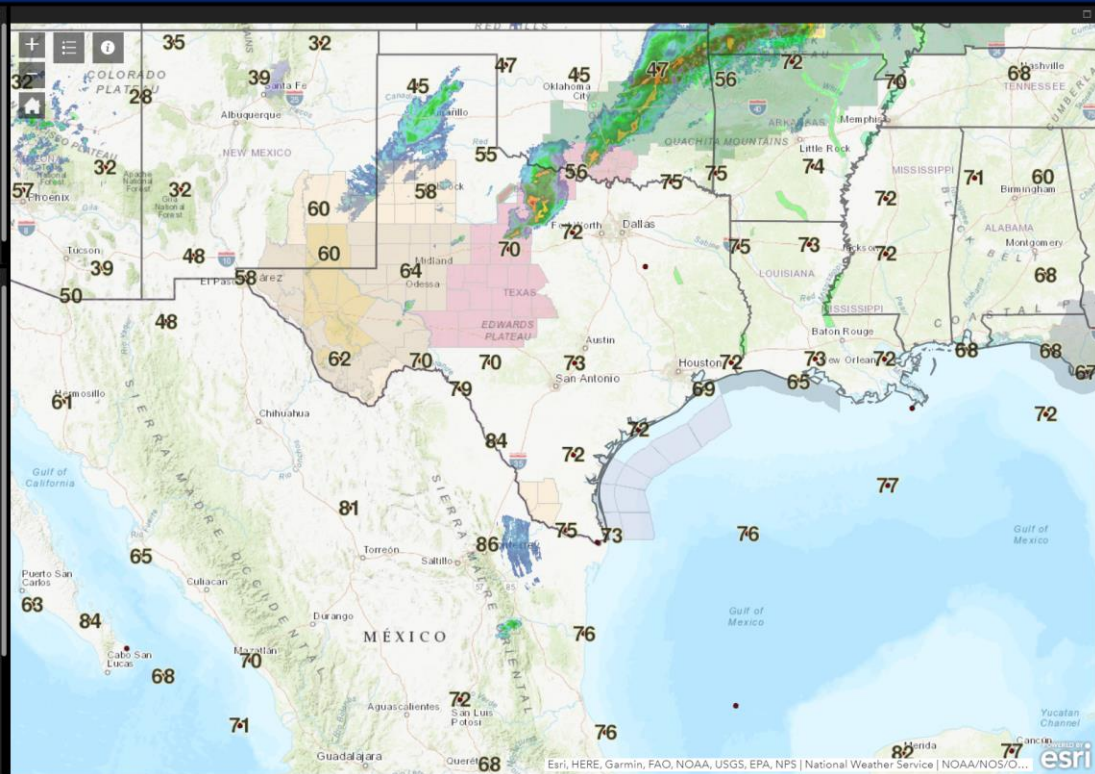
[Forecast Discussion, Satellite and Map Legend](#)

[Click Here for Weather Forecast Discussion](#)

24 Mar 2023 00:16Z - NOAA/NESDIS/STAR - SP - GEOCOLOR Composite

Weather Radar Legend: Base Reflectivity

Snowfall Amount



Layer List

Layers

- Map Notes
- USA State Overlay
- US_Cities
- Current Observations
- Road Layer
- Current Temperatures
- Watches, Warnings & Advisories - CONUS
- Long Duration Hazards
- Weather Radar Mosaic
- Storm Prediction Center Day 1 Outlook
- Storm Prediction Center Day 2 Outlook
- Storm Prediction Center Day 3 Outlook
- WPC - Excessive Rainfall Accumulation - Day 1
- WPC - Excessive Rainfall Accumulation - Day 2
- WPC - Excessive Rainfall Accumulation - Day 3
- 6-Hour Snowfall Forecast (inches)
- 24hr Total Snowfall (Observed)
- 24-hr Snowfall (inches)
- Daily Snow Depth (Updates once a Day)

Tools for you to use...Briefing Dashboard

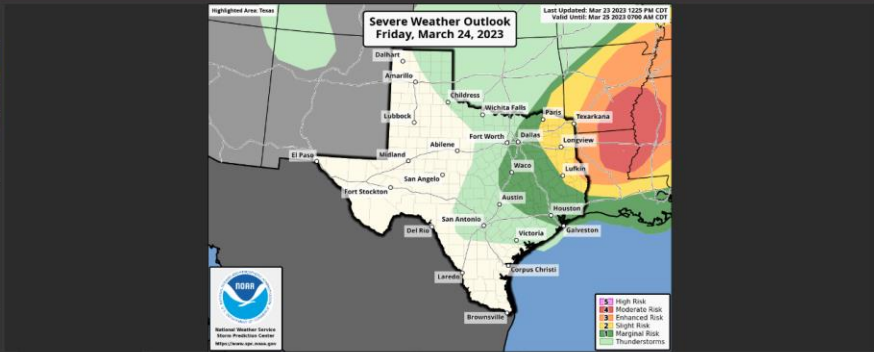
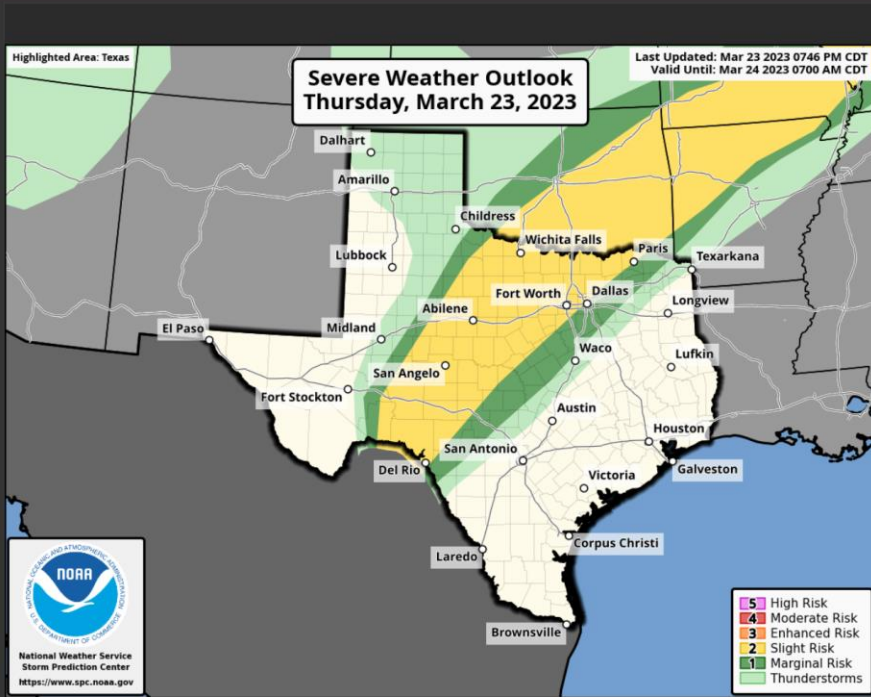
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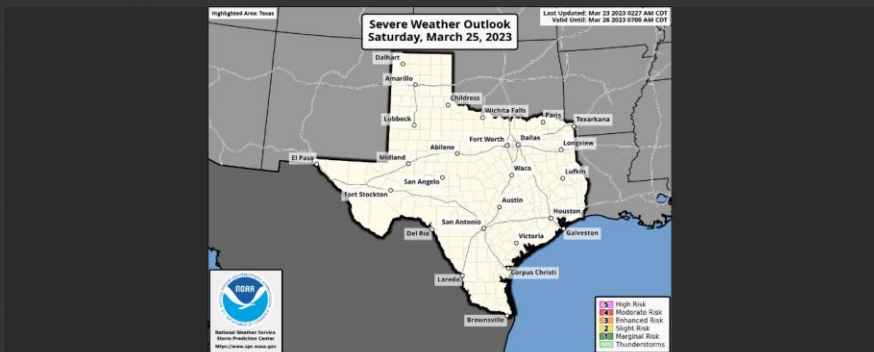
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- Severe Weather Outlooks**
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- Day 2 TX - Severe
- Day 2 EWX - Severe
- Day 2 - Tornado
- Day 2 - Wind
- Day 2 - Hail



- Day 3 Texas - Combined Severe
- Day 3 EWX - Combined Severe

- Day 1 TX - Severe
- Day 1 EWX - Severe
- Day 1 - Tornado
- Day 1 - Wind
- Day 1 - Hail

Tools for you to use...Briefing Dashboard

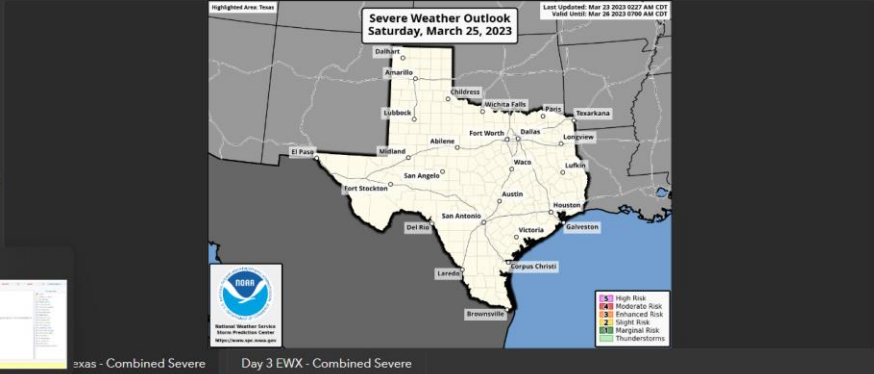
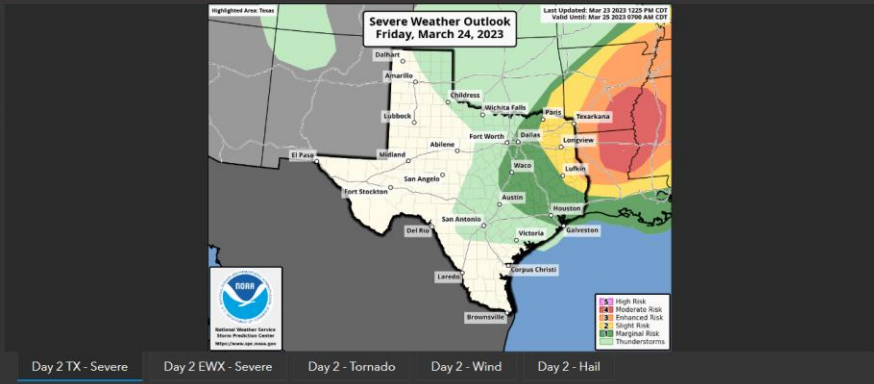
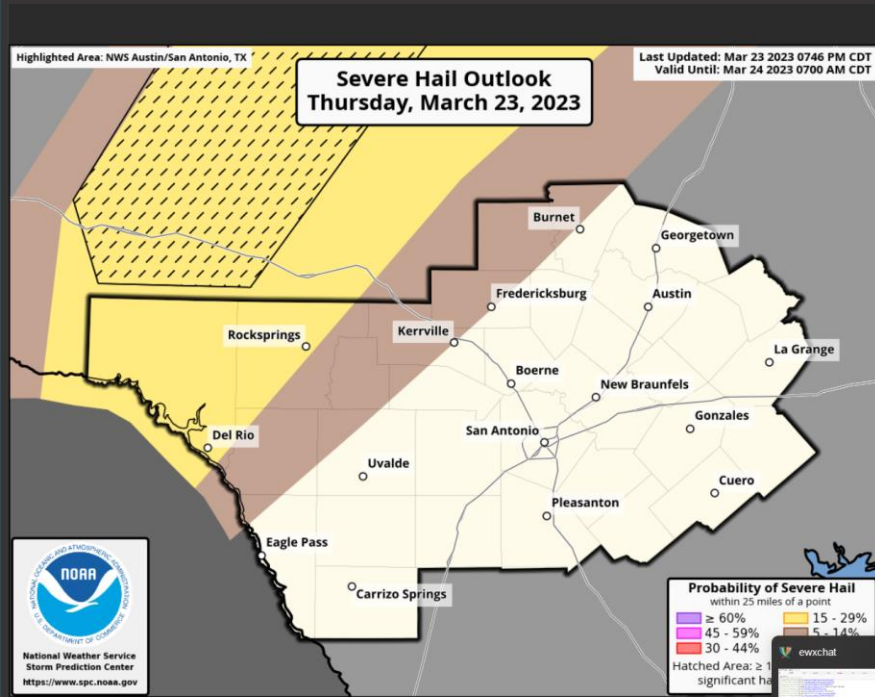
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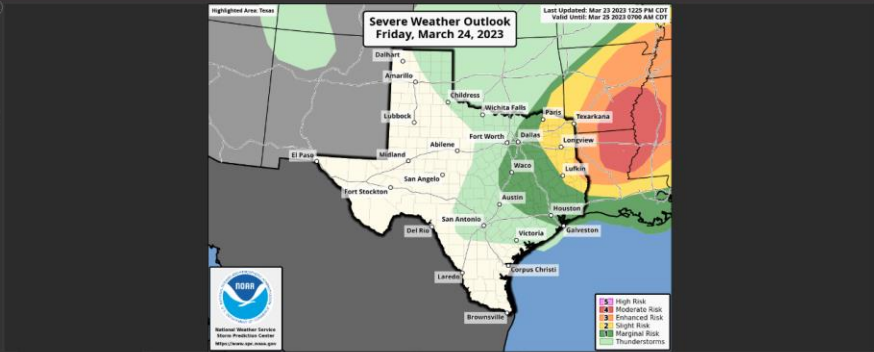
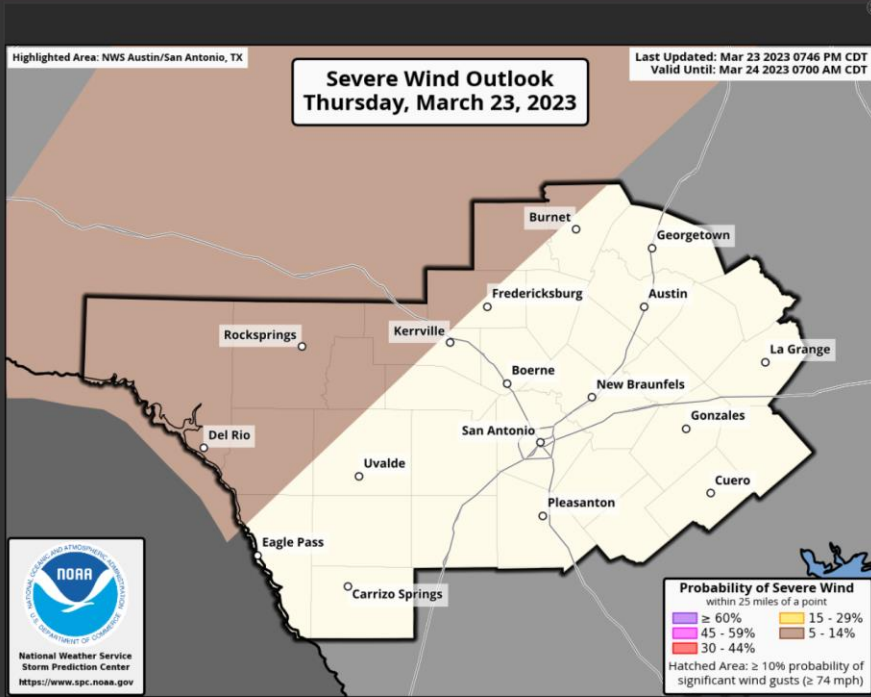


South-Central TX Weather Briefing Page

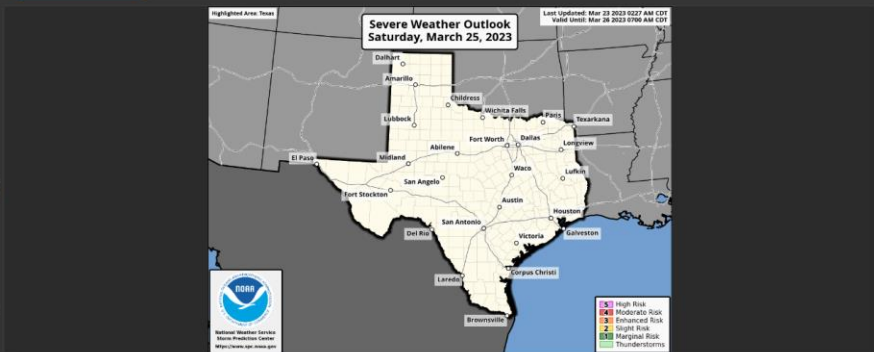
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- Day 2 TX - Severe
- Day 2 EWX - Severe
- Day 2 - Tornado
- Day 2 - Wind
- Day 2 - Hail



- Day 3 Texas - Combined Severe
- Day 3 EWX - Combined Severe

- Day 1 TX - Severe
- Day 1 EWX - Severe
- Day 1 - Tornado
- Day 1 - Wind
- Day 1 - Hail

Tools for you to use...Briefing Dashboard

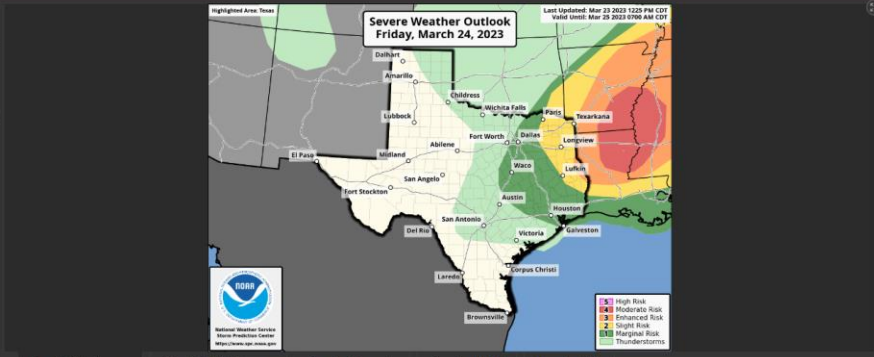
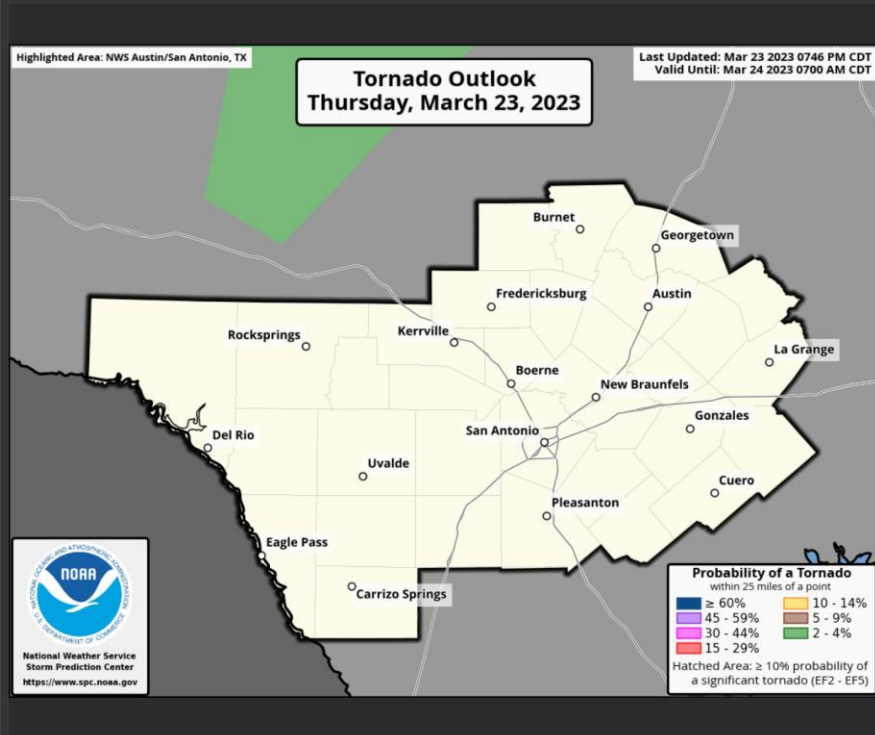
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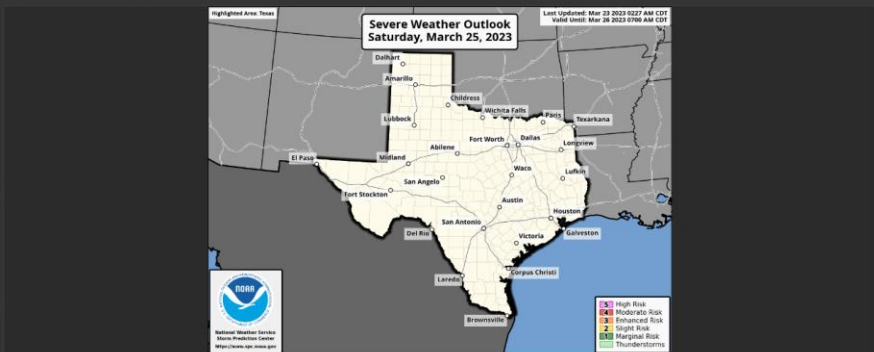
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- Day 2 TX - Severe
- Day 2 EWX - Severe
- Day 2 - Tornado
- Day 2 - Wind
- Day 2 - Hail



- Day 3 Texas - Combined Severe
- Day 3 EWX - Combined Severe

- Day 1 TX - Severe
- Day 1 EWX - Severe
- Day 1 - Tornado
- Day 1 - Wind
- Day 1 - Hail

Tools for you to use...Briefing Dashboard

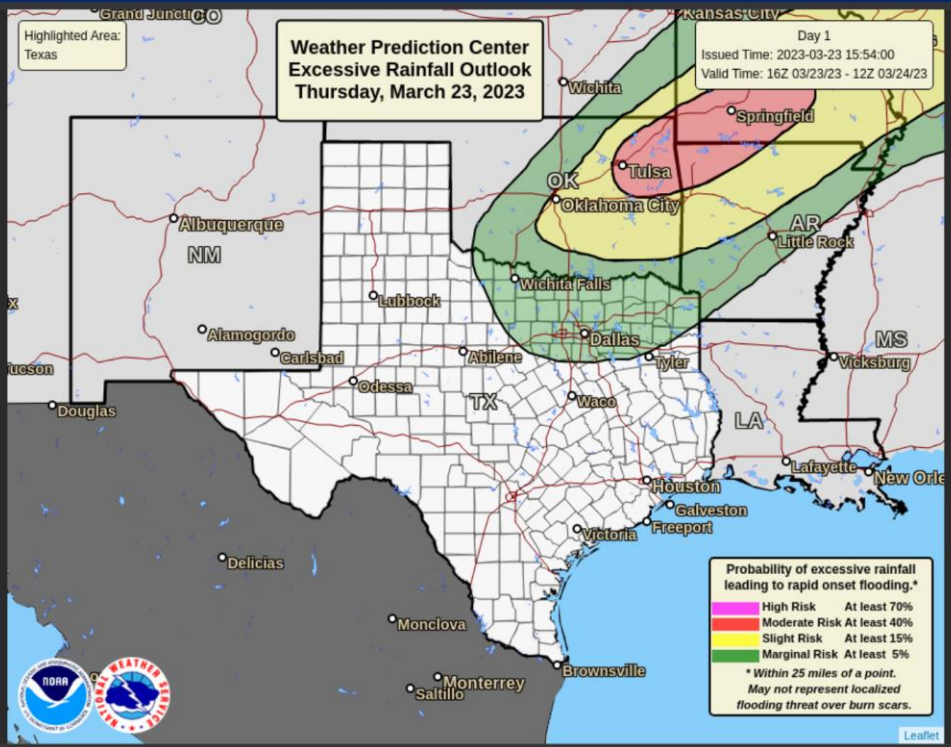
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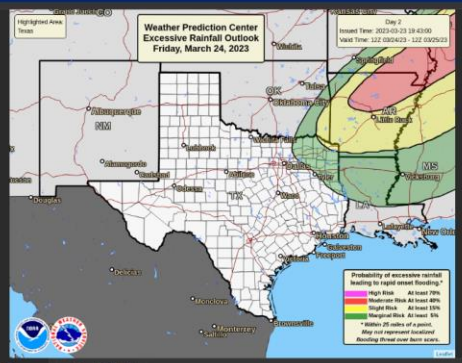
South-Central TX Weather Briefing Page

National Weather Service Austin/San Antonio

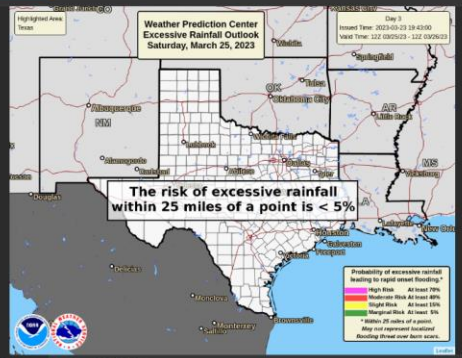
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Day 1 Texas Day 1 EWX



Day 2 Texas Day 2 EWX

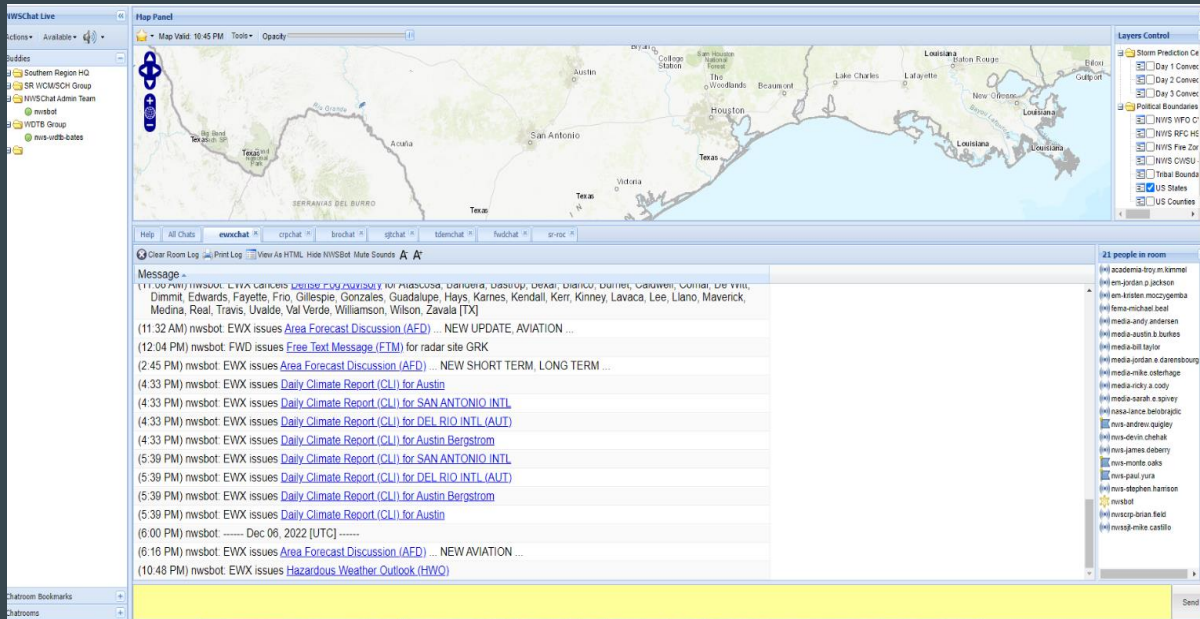


Day 3 Texas Day 3 EWX

Tools for you to use...NWSChat

nwschat.weather.gov

Chat with NWS
Meteorologists 24/7



The screenshot shows the NWSChat Live interface. At the top, there's a "Map Panel" with a map of Texas and surrounding areas. Below the map is a chat log with messages from "nwsbot" and other users. The chat log includes messages about forecast discussions, radar site GRK, and daily climate reports for various locations like San Antonio, Del Rio, and Austin. On the right side, there's a "Layers Control" panel with various map layers like "Storm Prediction Center", "Day 1 Convect", "Day 2 Convect", "Day 3 Convect", "Political Boundaries", "NWS WFO C", "NWS WFO H", "NWS Fire Z", "NWS CWU", "Trakl Bound", "US States", and "US Counties". At the bottom right, there's a list of "21 people in room" with their names and avatars.

NWS “Bot” shows warning products as they are issued

NWS provides mesoscale and forecast discussions, our real-time thinking during events

Share reports!

Coming in 2023...



NWSChat 2.0

Powered by Slack



NWSChat 2.0 = Slack



wfo-honolulu-hi

WxBot APP 6:14 PM
NWS Honolulu HI Issues: Flood Advisory
1 reply 23 days ago

WxBot APP 8:03 PM
NWS Honolulu HI Issues: Flood Advisory
1 reply 23 days ago

WxBot APP 9:08 PM
NWS Honolulu HI Issues: Flood Advisory
1 reply 23 days ago

NWS - Honolulu - Patrick Blood 10:26 PM
Test
1

Sunday, March 5th

MEDIA - Hawaii News Now - Ben Gutierrez 6:19 PM
Hi! Are ZFP's going to be issued by the weatherbot in the datafeed channel? I don't seem them, only AFD.
10 replies Last reply 4 days ago

MEDIA - Hawaii News Now - Ben Gutierrez 6:20 PM
(Sorry, been out of the office for a couple of days so haven't kept up with any announcements.)
I'll go back to 1.0 for now.

NWS - Honolulu - Jon Jelsema 9:55 PM
Hi Ben, sorry for the delay, I'm just getting on shift now. I'm not sure about the ZFPs being included in the weatherbot datafeed, but I'll pass along your question to John Bravender so that he can respond directly to you

Timeline...

April - May NWS employees
June - July Partners
August Full operational
 rollover to Chat 2.0

Tools for you to use...NWSChat

nwschat.weather.gov

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Success Story

Tools for you to use...NWSChat

nwschat.weather.gov

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Question?

What would you like to see more of in NWSChat?

Ways to Improve Gap in Information between Outlook/Watch and Warning Phase of an Event

Improving Outlook/Watch to Warning Gap Information

NWSChat

- 11:32 PM** <nwsewx-jason.runyen> Partners, In addition to TAMU's balloon launch at 3PM today in College Station, St. Edwards will also be launching a balloon at 3PM in Austin.
- 11:37 PM** <nwsewx-jason.runyen> We are planning on expanding the High Wind Warning eastward, to include Edwards, Real, Uvalde, Zavala and Dimmit counties. This should be out shortly.
- 2:51 PM** <nwsewx-jason.runyen> Good afternoon partners. A Severe Thunderstorm Watch was just issued to our northwest, across the San Angelo/Abilene region. We have coordinated with the Storm Prediction Center and will be assessing radar, supplemental weather balloon, and mesoanalysis data over the next few hours before any potential downstream watch into our area.
- 3:03 PM** <nws-matt.brady> Convective trends of note so far across western Texas; we are monitoring convection attempting to develop across Crockett and cumulus growth in western Val Verde county. Trends suggest dryline is slightly behind on timing compared to guidance.
- 3:56 PM** <academia-justin.spotts> TAMU sounding was launched at 2053z. Will send along the data once we have it.
- 3:58 PM** <nws-mack.morris> Thank you Justin. Sounds good
- 4:30 PM** <nws-matt.brady> Based on the latest run from experimental WoFs (Warn on Forecast System) guidance, models seem indicate that the timing for the severe weather into the heart of the I-35 corridor (for South-Central Texas) concentrates around 7 to 9 pm this evening.

Severe Thunderstorm Watch Issued at 508 PM CST

First Severe Thunderstorm Warning for Travis and Williamson Counties Issued at 615 PM CDT

Improving Outlook/Watch to Warning Gap Information

Area Forecast Discussion

.MESOSCALE UPDATE FOR SEVERE THUNDERSTORM WATCH 553 AND TORNADO WATCH 554...

Issued at 736 PM CDT Mon Oct 24 2022

Scattered strong to at times severe thunderstorms have developed across portions of Hill Country and the southern Edwards Plateau through the early evening hours. Activity has been triggered by an advancing cold front, as well as a remnant outflow boundary from earlier day showers and thunderstorms to our north. Recent radar trends have indicated some degree of supercellular and attendant mesocyclonic presentation to some of this activity, most recently with a storm riding the outflow boundary through portions of Burnet and Llano Counties. A tornado watch has been coordinated with the Storm Prediction Center in light of these trends, and is in effect until Midnight CDT. In addition to the isolated tornado threat, we anticipate straight line wind potential to emerge as convection organizes into a predominantly linear orientation and propagates into deeper moisture along and east of US 281 through the next several hours. Large hail exceeding quarter size will also be possible in the strongest updrafts. We will continue to monitor trends closely. Have a way of receiving warnings through the first half of tonight if you are in one of these watches.

Severe Thunderstorm Watch Issued at 725 PM CST
Tornado Warning for Williamson County Issued at 846 PM CDT

Improving Outlook/Watch to Warning Gap Information

Storm Prediction Center MCD Text and Graphics

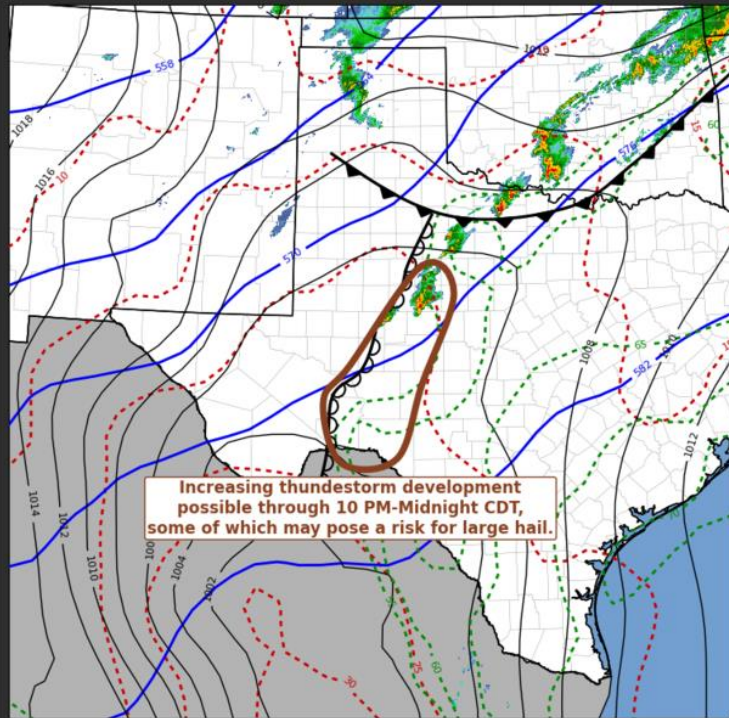
Mesoscale Discussion #316

Valid Until: 03/24/23 12:15 AM CDT

Concerning:
Severe Potential
Watch Possible
Watch Probability: 40%

Fields Plotted

0212Z MRMS RALA
012 500 mb Height (dam; blue),
850 mb Temperature (C, red),
Surface Pressure (mb; black),
and Surface Dewpoint (F, green)



Mesoscale Discussion 0316
NWS Storm Prediction Center Norman OK
0913 PM CDT Thu Mar 23 2023

Areas affected...Edwards Plateau into nearby Rio Grande Valley

Concerning...Severe potential...Watch possible

Valid 240213Z - 240515Z

Probability of Watch Issuance...40 percent

SUMMARY...Increasing thunderstorm development appears possible through 10 PM-Midnight, some of which may pose a risk for producing large hail. It is not yet certain that a severe weather watch will be needed, but trends are being monitored for this possibility.

DISCUSSION...Boundary-layer destabilization appears to be ongoing within a narrow corridor along the dryline, as the leading edge of cooling aloft begins to overtake it, east/southeast of Midland into the Rio Grande Valley to the northwest of Del Rio. One storm has already initiated and slowly intensified during the past hour or two, and additional development seems increasingly likely by 03-05Z, in response to further gradual height falls and cooling aloft associated with the approach of large-scale mid-level upstream troughing.

Although forecast soundings to the south of the initial storm suggest that warm, dry layers in the lower/mid troposphere are still suppressing convection, it appears that strengthening southerly flow (to 30+ kt around 850 mb) will be accompanied by further moistening in the next few hours. Coinciding with strengthening forcing for ascent, the environment may become supportive of at least scattered intensifying thunderstorms, including supercell structures posing a risk for large hail.

Improving Outlook/Watch to Warning Gap Information

Storm Prediction Center MCD Text and Graphics

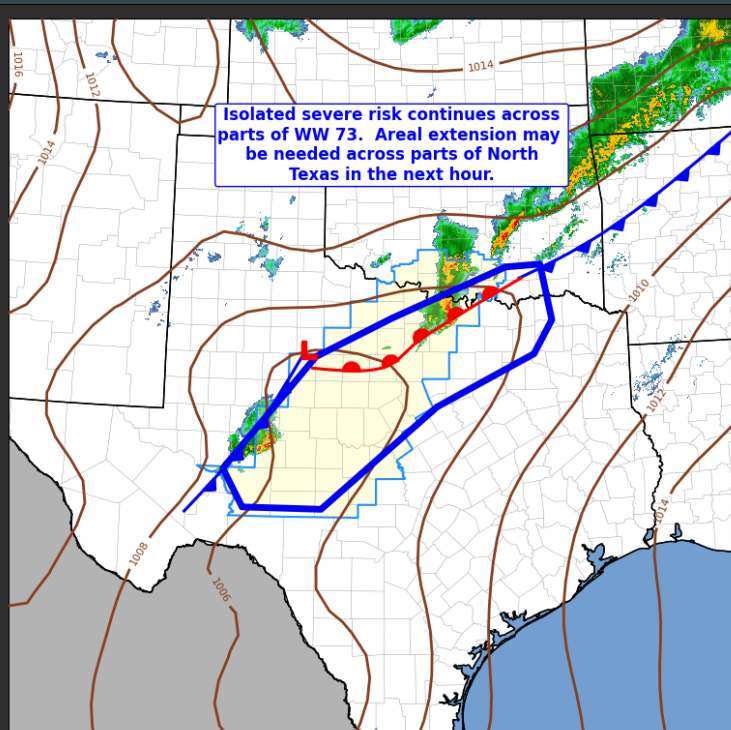
Mesoscale Discussion #318

Valid Until: 03/24/23 3:15 AM CDT

Concerning:
Severe Thunderstorm
Watch
#73

Fields Plotted

0610Z MRMS RALA
06Z Surface Pressure (mb, brown)



Mesoscale Discussion 0319
NWS Storm Prediction Center Norman OK
0346 AM CDT Fri Mar 24 2023

Areas affected...parts of central and northern Texas

Concerning...Severe Thunderstorm Watch 73...

Valid 240846Z - 241045Z



The severe weather threat for Severe Thunderstorm Watch 73 continues.

SUMMARY...Storms ongoing across parts of **WW 73** are expected to shift east-northeastward and eventually out of the existing watch boundaries. Limited severe risk expanding toward the DFW metroplex as these storms progress, will warrant consideration of WW issuance.


DISCUSSION...Latest radar loop shows a vigorous/locally severe band of storms moving east-northeastward across the Big Country of Texas, with its progression roughly coincident with the advance of the surface cold front.

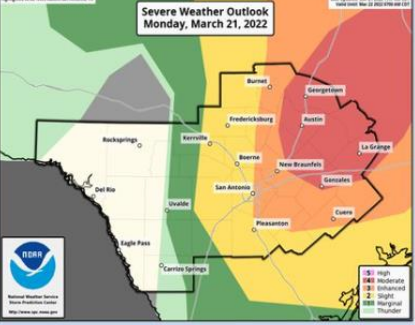
With a moist/amply unstable airmass just atop a weakly stable surface-based layer, expect the convection to persist. However, severity of the convection is uncertain, with the low-level stability tempering wind risk to some degree, and radar trends over the past hour or so suggestive of only marginal hail/wind. Without an apparent mechanism that would lead to a substantial increase in storm organization/intensity, severe risk will likely remain limited/isolated -- and thus need for a downstream WW remains uncertain at this time.

Improving Outlook/Watch to Warning Gap Information Social Media

 **NWS Austin/San Antonio** 
@NWSSanAntonio

Update: The risk for damaging hail has increased for locations along and east of I-35 and north of I-10. The tornado risk remains unchanged. Storms will be moving through the I-35 corridor during rush hour. Please stay weather aware and be prepared to take shelter if necessary!

Moderate Risk for Severe Storms Today  **Weather Forecast Office Austin/San Antonio**
Hail is the primary threat, but damaging winds and tornadoes also possible Issued March 21, 2022 11:52 AM CT



Severe Weather Outlook Monday, March 21, 2022

What:
Strong to severe storms may develop during the mid to late afternoon. All severe types (hail, damaging winds, tornadoes) are possible with the greatest risk from large hail, potentially of 2" or greater diameter.




Where:
Greatest risk in RED area.

When:
3 PM this afternoon to 3 AM Tuesday.



Threat Impact Levels:

	Min Threat	High Threat
Wind (60+ mph)		
Hail (>1.5")		
Tornadoes		
Flooding		

South Central Texas Threat Level
4 of 5

   [NWSSanAntonio](#) [weather.gov/ewx](#)

12:12 PM · Mar 21, 2022

 **NWS Austin/San Antonio** 
@NWSSanAntonio

IMPORTANT: While hail is the primary risk at the moment (2-3" at times), the risk for tornadoes is increasing. Please pay very close attention to warning information and be prepared to take shelter!

5:03 PM · Mar 21, 2022

**Poll for Our
EM, PIO, Transportation, School, Energy Partners
(Non-Meteorologists)**

How many read our text Area Forecast Discussion on a regular basis and make decisions based off of it?

How many read our text Hazardous Weather Outlook on a regular basis and make decisions based off of it?

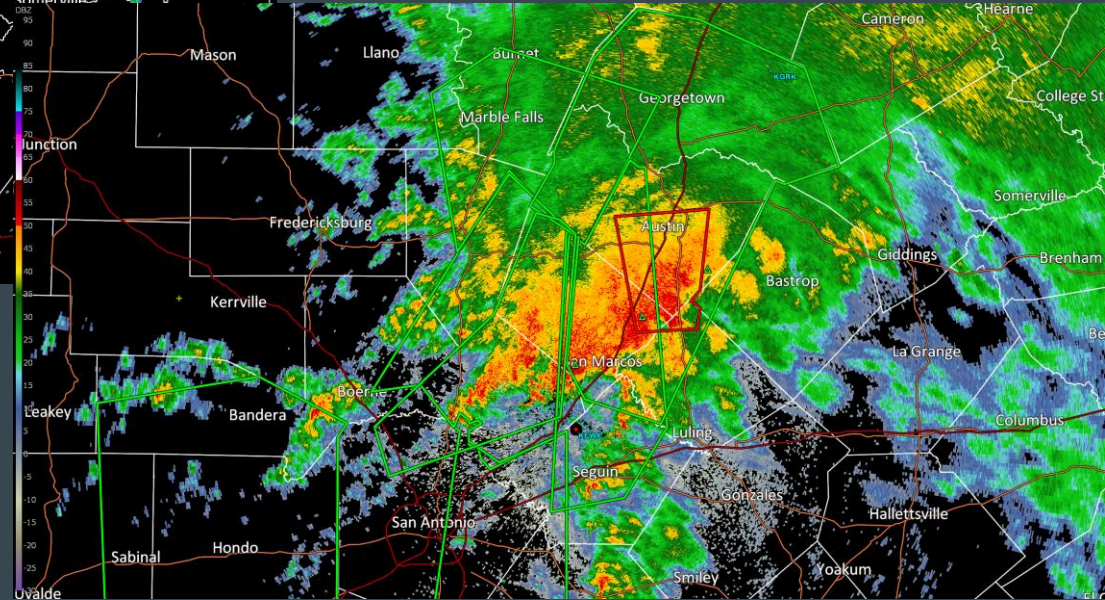
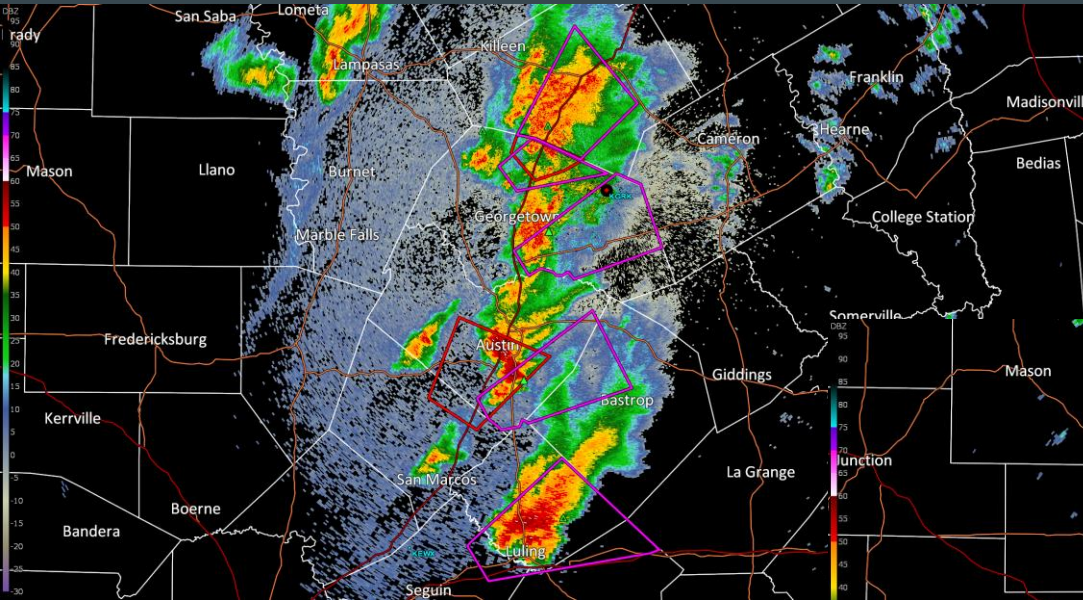
How many read our Situation Reports and make decisions based off of them?

How many follow our NWSChat room (ewxchat) ahead of and during a severe weather event?

Prioritizing Warnings

October 30, 2015

**Flash Flooding and Tornado Warning
at Same Time**

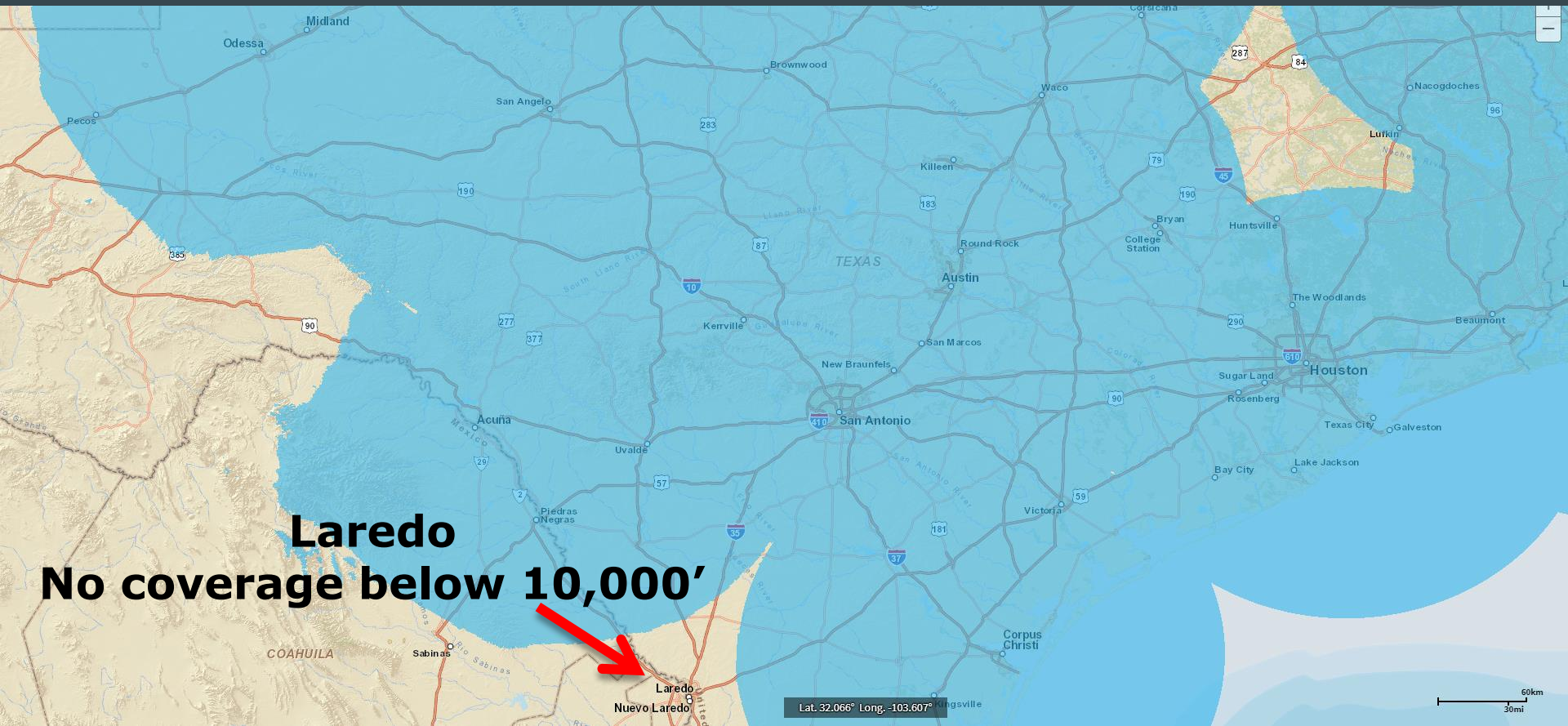


March 21, 2022

4 Tornadoic Storms at Same Time

Warnings in Poorer Radar Coverage

Radar Coverage Below 10,000 Feet



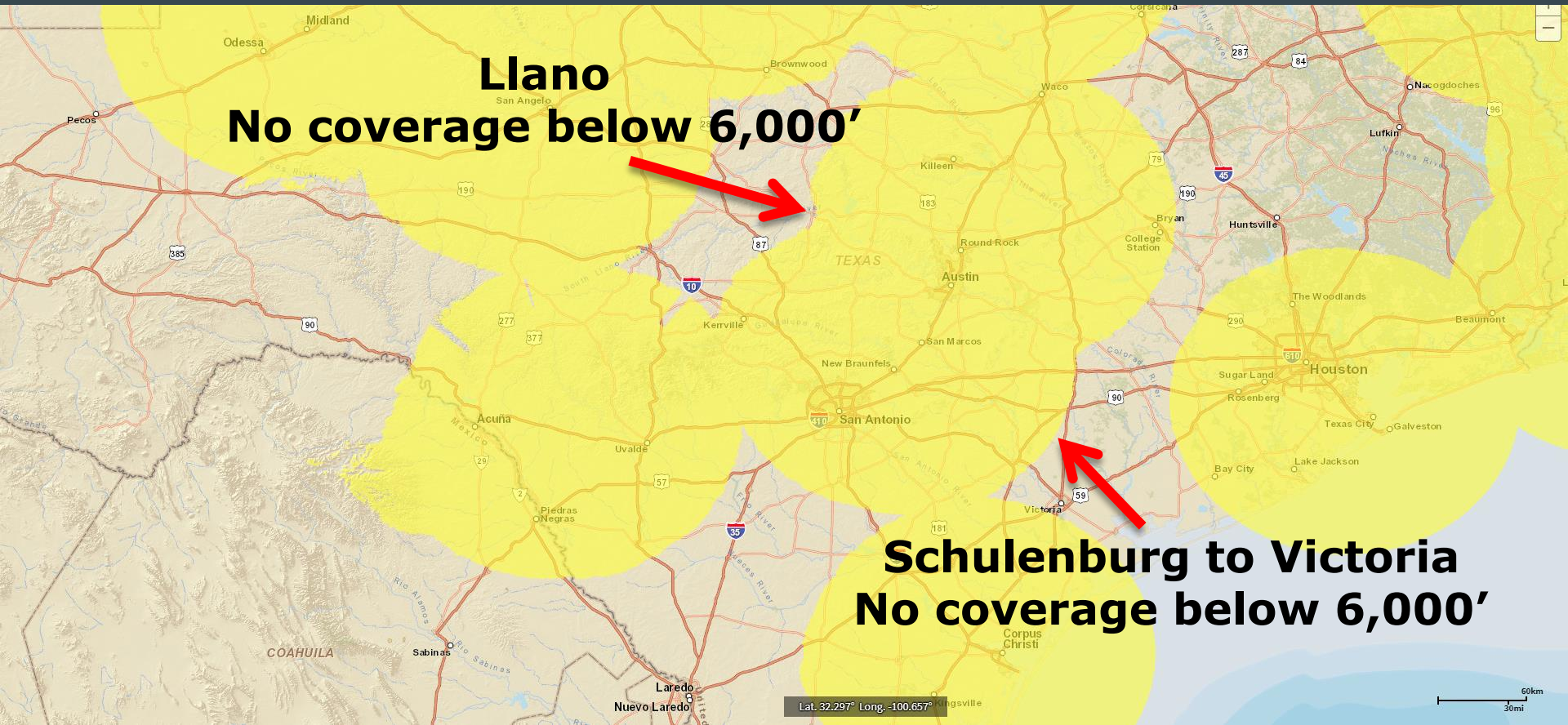
Laredo
No coverage below 10,000'

Lat. 32.066° Long. -103.607°

60km
30mi

Warnings in Poorer Radar Coverage

Radar Coverage Below 6,000 Feet

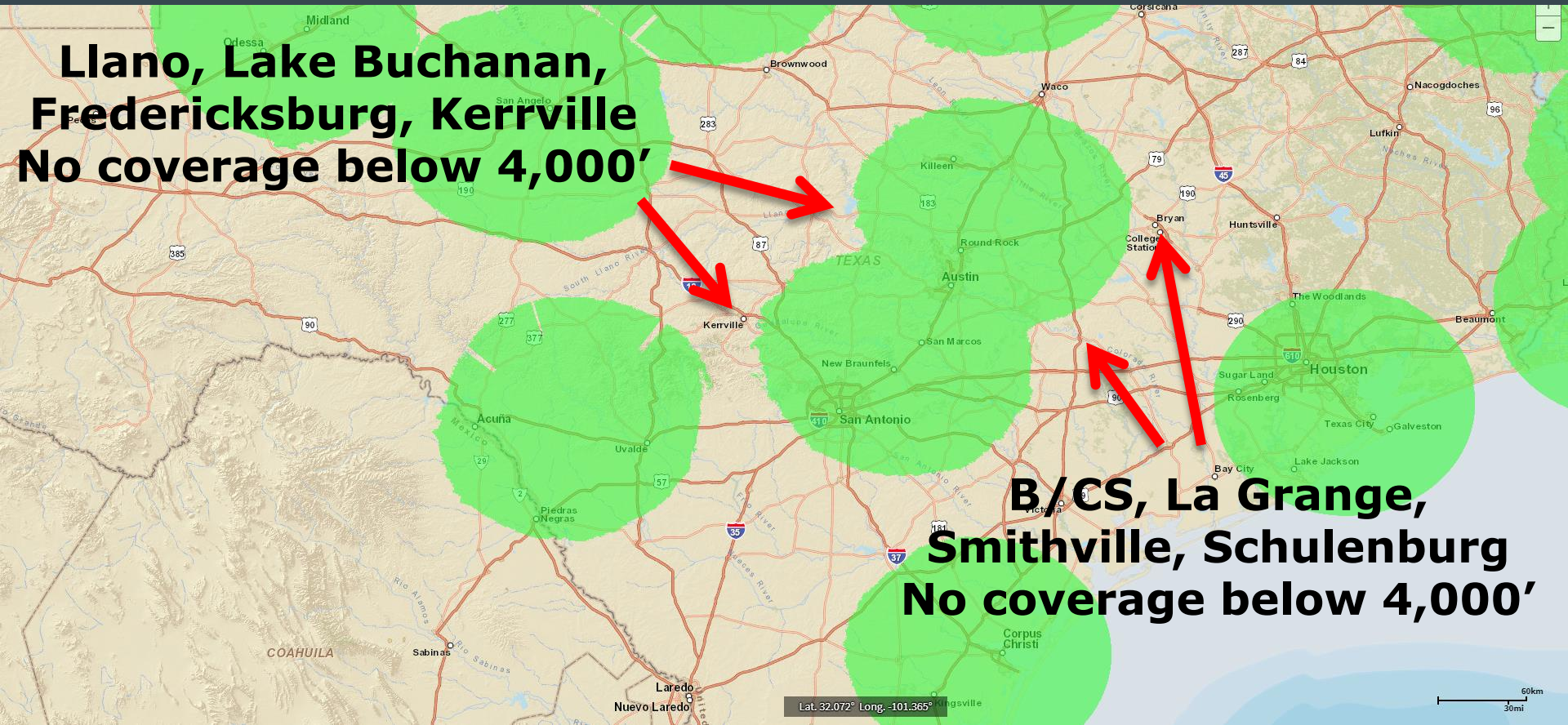


Llano
No coverage below 6,000'

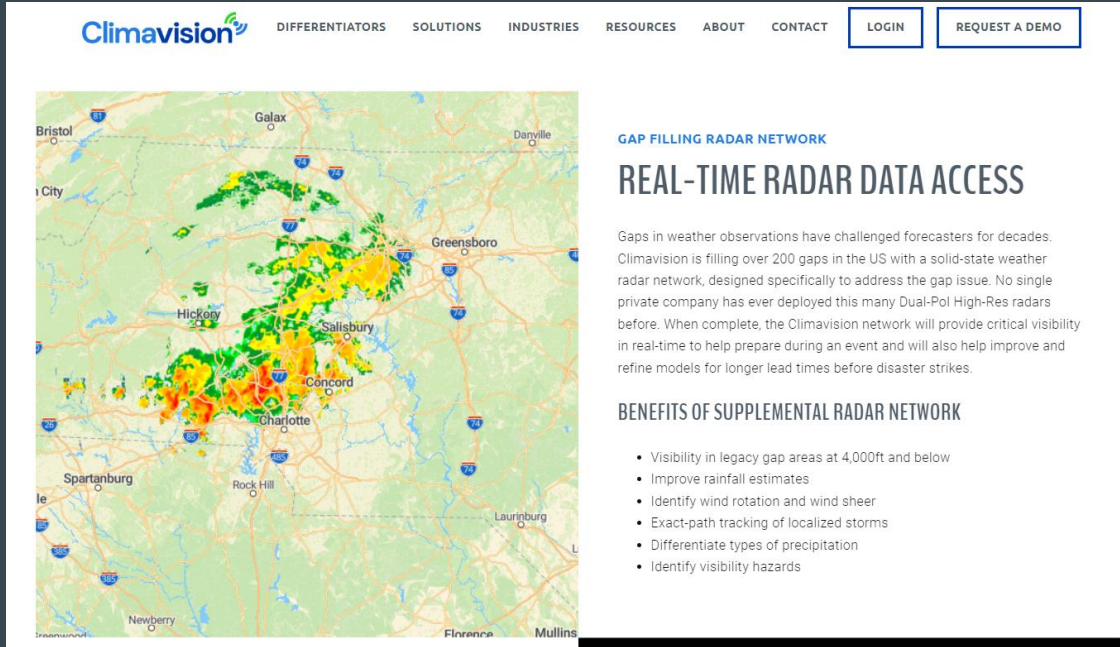
Schulenburg to Victoria
No coverage below 6,000'

Warnings in Poorer Radar Coverage

Radar Coverage Below 4,000 Feet



Climavision Radars



The screenshot shows the Climavision website interface. At the top left is the Climavision logo. To its right are navigation links: DIFFERENTIATORS, SOLUTIONS, INDUSTRIES, RESOURCES, ABOUT, CONTACT, LOGIN, and REQUEST A DEMO. The main content area features a radar map of the Southeastern United States, with color-coded precipitation intensity (green, yellow, orange, red) over a geographic map showing major cities like Charlotte, Greensboro, and Salisbury. To the right of the map is a text block titled "GAP FILLING RADAR NETWORK" and "REAL-TIME RADAR DATA ACCESS". Below this is a paragraph explaining the network's purpose and a list of "BENEFITS OF SUPPLEMENTAL RADAR NETWORK".

Climavision DIFFERENTIATORS SOLUTIONS INDUSTRIES RESOURCES ABOUT CONTACT LOGIN REQUEST A DEMO

GAP FILLING RADAR NETWORK

REAL-TIME RADAR DATA ACCESS

Gaps in weather observations have challenged forecasters for decades. Climavision is filling over 200 gaps in the US with a solid-state weather radar network, designed specifically to address the gap issue. No single private company has ever deployed this many Dual-Pol High-Res radars before. When complete, the Climavision network will provide critical visibility in real-time to help prepare during an event and will also help improve and refine models for longer lead times before disaster strikes.

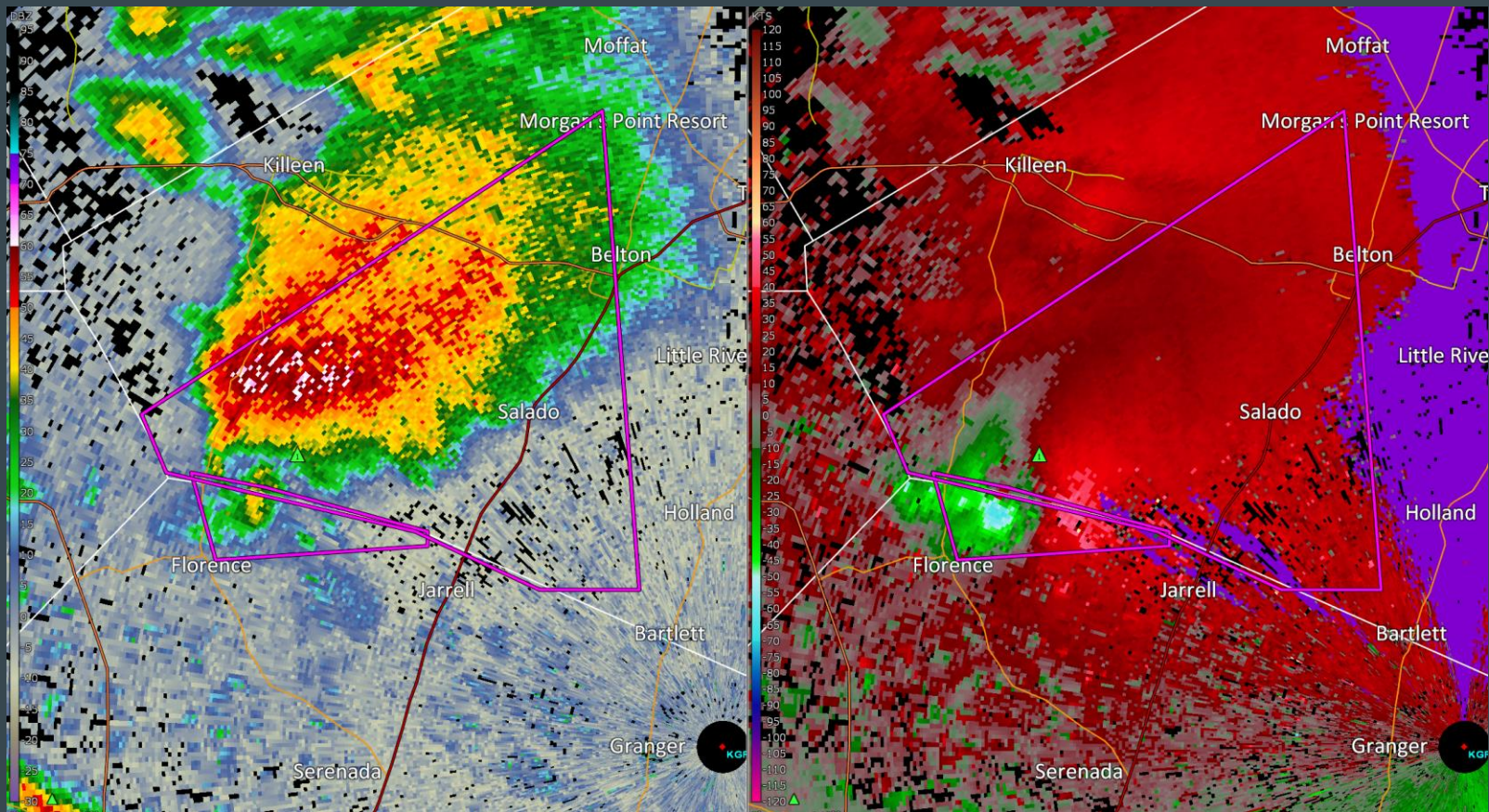
BENEFITS OF SUPPLEMENTAL RADAR NETWORK

- Visibility in legacy gap areas at 4,000ft and below
- Improve rainfall estimates
- Identify wind rotation and wind shear
- Exact-path tracking of localized storms
- Differentiate types of precipitation
- Identify visibility hazards

- Company that has its origins linked to the CASA projects in Norman OK, Dallas/Ft Worth
- Interacting with EMCs
- Actively installing X-band radars
- NWS does not currently have access to the data

Warnings Crossing Different NWS Area of Responsibilities

April 12, 2022



Relaying Real-Time Reports



Chikage Windler WX @Chikage... Mar 16

Del Valle Hail in the 10 o'clock hour - sub-severe, but those were some nasty storms. Thanks to Jimmy Wilson for the pic.

@NWSsanAntonio #ewxspotter #atx #atxwx



Kristen Currie @KristenCurrieTV Mar 2

More confirmed severe hail in Marble Falls & Fredericksburg from earlier this morning (3/2).

PHOTOS:
Scott Sanders (Marble Falls)
Heather Watson (Fredericksburg)

#ATX #ewxspotter



Avery Tomasco @averytomascowx Mar 2

Hail report from Northern Blanco County
#ewxspotter

roof. North of the Pedernales & JC Northern
Blanco county 1323/281



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10:57 <nws-andrew.quigley> Thank you David

02:00 <em-mark.chadwick> I am getting pea sized hail at 6018 Bear Canyon, San Antonio, TX

02:00 <media-alex.v.garcia> Dime to pea sized hail reported by viewer at Culebra and 1604

02:00 <em-michael.d.morlan> Pea sized hail near 1604 and Pue Road, time delay of 3 minutes

02:01 <media-alex.v.garcia> Viewer reports nickel sized hail - Potranco and 1604

NWSChat: **ewxchat**

Twitter: **#ewxspotter**

Email: **sr-ewx.alert@noaa.gov**

Final Thoughts and Going Forward

We will look for actionable items from this workshop and reach out to IWT members to assist with working on them

Keep messaging conversation continuing beyond today

Additional IWT workshops planned – next one possibly Fall 2023 or Winter 2023/2024

Workshop Resources

Presentations, notes, and resource links will be emailed and/or posted to:

www.weather.gov/ewx/iwt



Thank You!

Leave Plastic Name Tag Holders
at Your Table



ROUND ROCK, TX
VON CASTOR



LIVE
FOX
WEATHER

ON THE PHONE: VON CASTOR | STORM TRACKER
TORNADO HIT ROUND ROCK, TX

TORNADO WARNING
UNTIL 11:25PM CT
TEXAS
GREGG, SMITH,
UPSHUR
POPULATION: 42,469

SEVERE ALERT MULTI-DAY SEVERE WEATHER OUTBREAK UNDERWAY IN THE SOUTH