

Probabilistic Thinking & Forecast Communication

...East TX/OK to the Lower Mississippi Valley...
Have upgraded to a tornado-driven Moderate risk cent
Ark-La-Tex to central AR with the potential for sever
occur within this region late today through tonight.

Middle 60s surface dew points are prevalent from cent
Ark-La-Tex and should be diurnally maintained ahead o
across eastern OK and most of AR. A swath of 50+ kt 8
... yielding increasing boundar
ning beneath an elevated mix
volume of MLCAPE from 1500-25
conjunction with confluent
storms developing in the M
ex through central AR. Mor
ould also develop along t
level hodographs, which sho
g, will support all hazar
transition to predominate
al for a several hour
the Ark-La-Tex to cent
the possibility of sev

expected to develop during the late afternoon, from the 30
south along the dryline. Elongated straight-line hodograph
likely yield splitting supercells with very large hail the
hazard. Rather warm surface temperatures in the 80s and dr
aloft should tend to support outflow-dominated supercells.
the tornado threat may become maximized in a narrow corrid
the warm front across southwest IA. Storm intensity will n
wane in the mid/late evening.

..Grams/Goss.. 04/13/2018

Day 4-8 Convective Outlook
N&S Storm Prediction Center Norman OK
0345 AM CST Mon Dec 12 2022

Valid 151200Z - 201200Z

...DISCUSSION...

Medium-range models agree on a cold front moving through the
5/Friday -- during which Florida may see severe weather
across Georgia/the Carolinas. The cold front will continue to
diverge with respect to the location of the cold front
across the upper Great Lakes/upper Mississippi valley vicinity.

On Day 4/Thursday, as the cold front crosses Georgia and the coastal
Carolinias, and shifts southward into Florida, some severe weather
potential is expected continue through the Florida panhandle through
the start of the period. With the cold front moving southward
along with favorable shear for supercell development, there is
potential for damaging winds aloft through the Florida panhandle
and perhaps southern parts of South Carolina through the day, before
storms move offshore through late afternoon/early evening.

Farther south, storms ongoing ahead of the southeastward-moving cold
front will should cross the Florida panhandle through the day, before
winds a possibly a tornado or two may develop through the Florida
should diminish overnight, and then will likely be replaced by
5/Friday, with the front expected to cross/closethrough the Florida
Florida and the Keys through the first half of the Day 5 period.

Beyond Day 5, while model solutions diverge, the general
severe-weather threat should remain generally low through most if not
all of the period.

...Goss..

Day 1 Convective Outlook
N&S Storm Prediction Center Norman OK
1500 PM CST Mon Nov 07 2022

Valid 081200Z - 091200Z

...OF SEVERE THUNDERSTORM AREAS FORECAST...

Thunderstorms are unlikely across the continental
...
... will move inland across northern California
southwesterly across much of the western half
er-level ridge will remain in place across the
surface, high pressure will dominate from the
eward to the Atlantic Coast. Out west, a
l move into northern California and central
Nevada by afternoon. Widespread large-scale ascent, associated with
the upper-level system, will make thunderstorm development possible
today across much of California and the Intermountain West. Isolated
to scattered thunderstorms will also be possible today from Oklahoma
north-northeastward into the upper Mississippi Valley, along and
near a corridor of strong low-level flow. Isolated to scattered
thunderstorms may also develop in parts of south Texas and across
the Florida Peninsula. No severe threat is expected today or tonight
across the continental United States.

..Broyles/Thornton.. 11/08/2022

ISK OF SEVERE THUNDERSTORMS FROM PARTS OF
THE EASTERN TEXAS PANHANDLE TO WESTERN AND

oes, some potentially long-track and violent,
to this evening over portions of northwest Texas
... Oklahoma. More isolated but still
...er, including tornadoes and
...ible surrounding parts of
... and Texas.

forecast to unfold this afternoon and evening
central OK. Moisture
region, with dewpoints in
...PE values of 3000-5000
...ar profiles are also rapidly increasing as a
low-level jet strengthens across the area. This
continuation of extreme instability and large
... region.

...ing, all signs point to
cells this afternoon across
that persists in this
ornadoes, very large hail,
stent concern, including a
lest tornadoes, will extend
tern and central Oklahoma.

ected to affect these areas,
r west TX and spreading
... These storms will
winds, and isolated
f.

ver New England and eastern
e air mass is present.
pected to form in this area,
nd coast during the late
ates and westerly flow aloft
nds and some hail in the

...SUMMARY...
Severe thunderstorms capable of producing tornadoes, very large
hail, and a few severe wind gusts are expected this afternoon into
the overnight period across parts of the lower to mid Mississippi
Valley and parts of the Southeast. A few strong tornadoes will
be possible.

...Synopsis...
Surface low will deepen while tracking from Kansas to
Lakes today, accompanied by an eastward advancing upper
strong mid-level jet stream will overspread an intense
across the OH/TN Valleys into the Southeast. As such,
deep-layer flow and shear will overlap with a moisture
destabilizing stream from late morning to early
lower MS Valley east-northeastward. Several strong
thunderstorms are expected to organize and produce
robust severe threat, particularly across the MS
regionally higher instability should reside.

...Portions of the Lower MS Valley today into
Strong warm-air advection should be underway
Valley at the start of the period (12Z)
moisture being transported northward
low-level jet. Through the day, at
should support surface temperatures
upper 60s F dewpoints within the
increase in thunderstorms in the
west-southwesterly 500 mb
widespread the lower MS
early afternoon, continue
adequate in support

Storms should evolve
layer during the
deep-layer an
overlapping
Large, curv
will support
2Z/12Z
with 10-15
instability
possible
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...Parts of the OH/TN Valley into early evening...
strong surface cold front should sweep across the OH/TN valleys
through the late afternoon and evening hours as the deepening
surface low tracks across the Great Lakes. Strong convergence along
the cold front should force a low-topped band of convection. Ambient
tropospheric wind fields will be strong, with 15+ kts of flow likely
just 1 km AGL. Downward momentum transport within this line may
foster strong, occasionally damaging gusts, with a couple of severe
gusts also possible, warranting the introduction of Category
1/Marginal probabilities this outlook.

..Squittieri/Darrow.. 11/29/2022

Probabilistic Forecasting

How do we think probabilistically?

Consider the Following:

Can you predict the outcome of when
you roll a die?



Probabilistic Forecasting



How do we think probabilistically?

Consider the Following:

Can you predict the outcome of when you roll a die?

Theoretically: Yes - *if* you know all of the initial conditions precisely (nearly impossible)

In practice: No, we can only describe the outcome in terms of probabilities.

Probabilistic Forecasting

How do we think probabilistically?



Key insight: We must be able to describe the range of all potential outcomes for a given forecast space.

So for a 20 sided die:

- 50% chance of landing on an even number
- 30% chance of landing on a number divisible by 3
- 5% chance of landing on any particular number

Probabilistic Forecasting

How do we think probabilistically?

How can we determine the range of possible outcomes for the weather?

Example: It's late February, how do you know it won't be 100 F tomorrow?

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Probabilistic Forecasting

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- Multiple Model Runs - How many deterministic models show 100 F?

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- Ensembles - How many ensemble members show 100 F?

Probabilistic Forecasting

How do we think probabilistically?

How can we determine the range of possible outcomes for the weather?

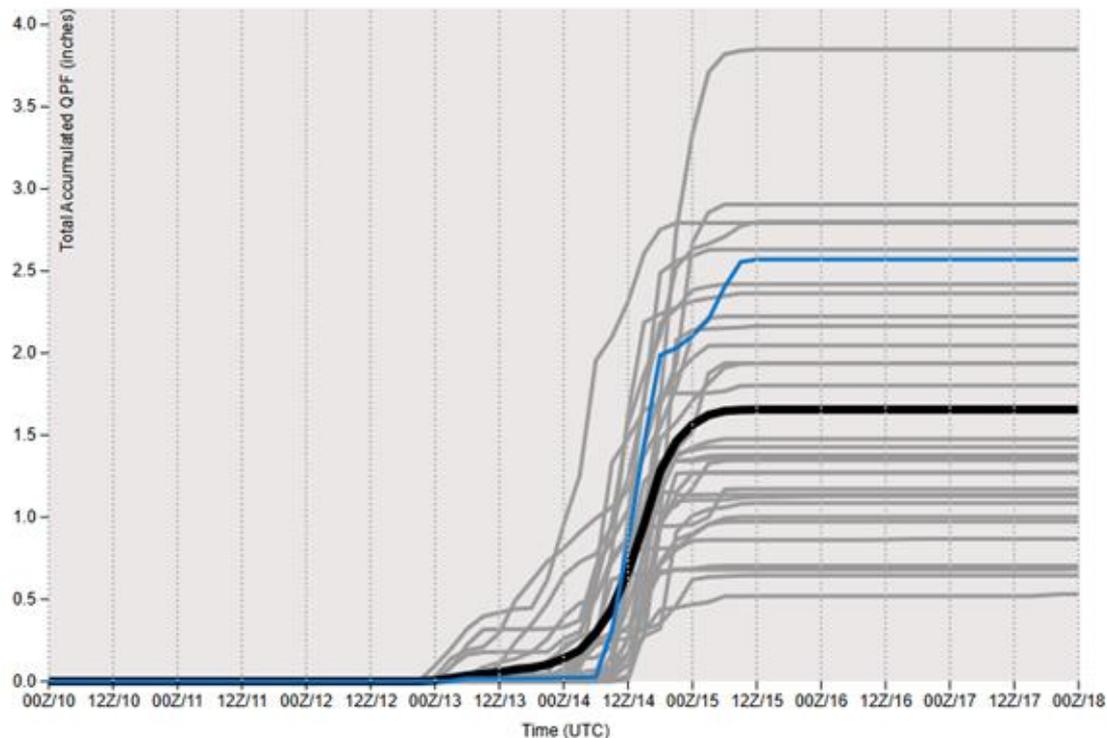
Example: It's late February, how do you know it won't be 100 F tomorrow?

- Climatology - How many times has 100 F occurred in the past?
- Multiple Model Runs - How many deterministic models show 100 F?
- Ensembles - How many ensemble members show 100 F?

All of these help us describe the forecast probability space.

Probabilistic Forecasting

EMC's GEFS plumes for: KOKC
00 UTC 10 February 2026 cycle



Note the distribution of rainfall amounts.

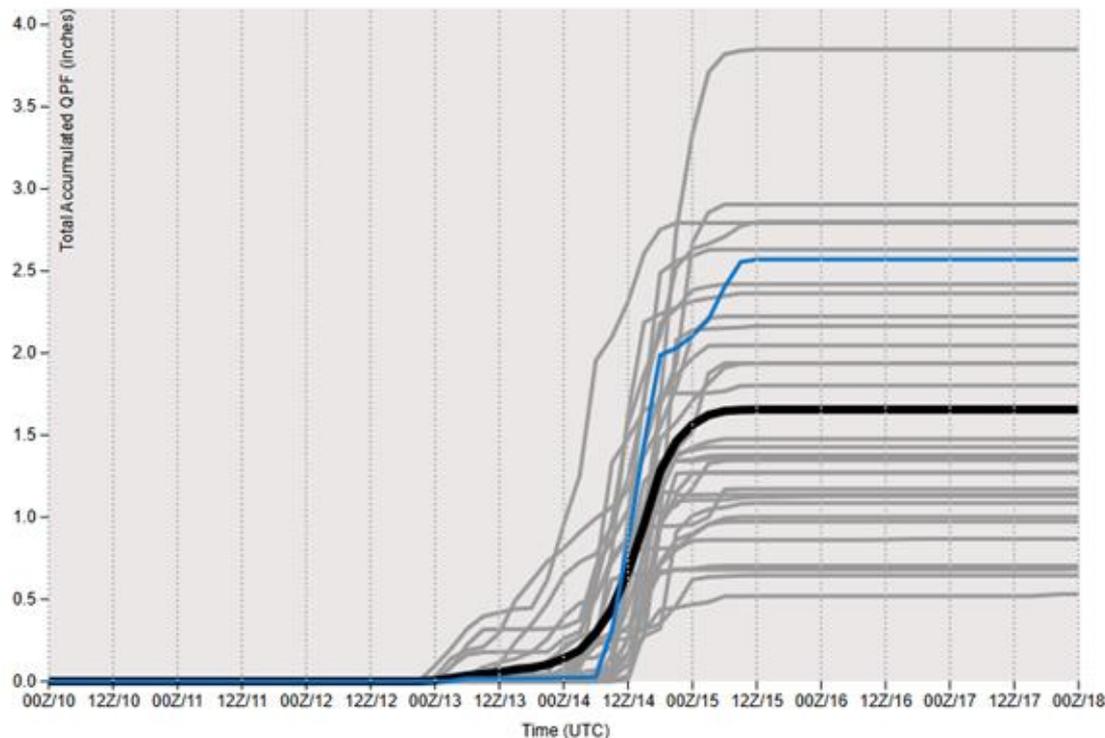
How would you describe:

- The potential for > 1" of rain?
- The potential for > 3" of rain?
- The most likely rainfall amounts?

These questions can't be answered with a single deterministic model!

Deterministic vs. Probabilistic Forecasting

EMC's GEFS plumes for: KOKC
00 UTC 10 February 2026 cycle

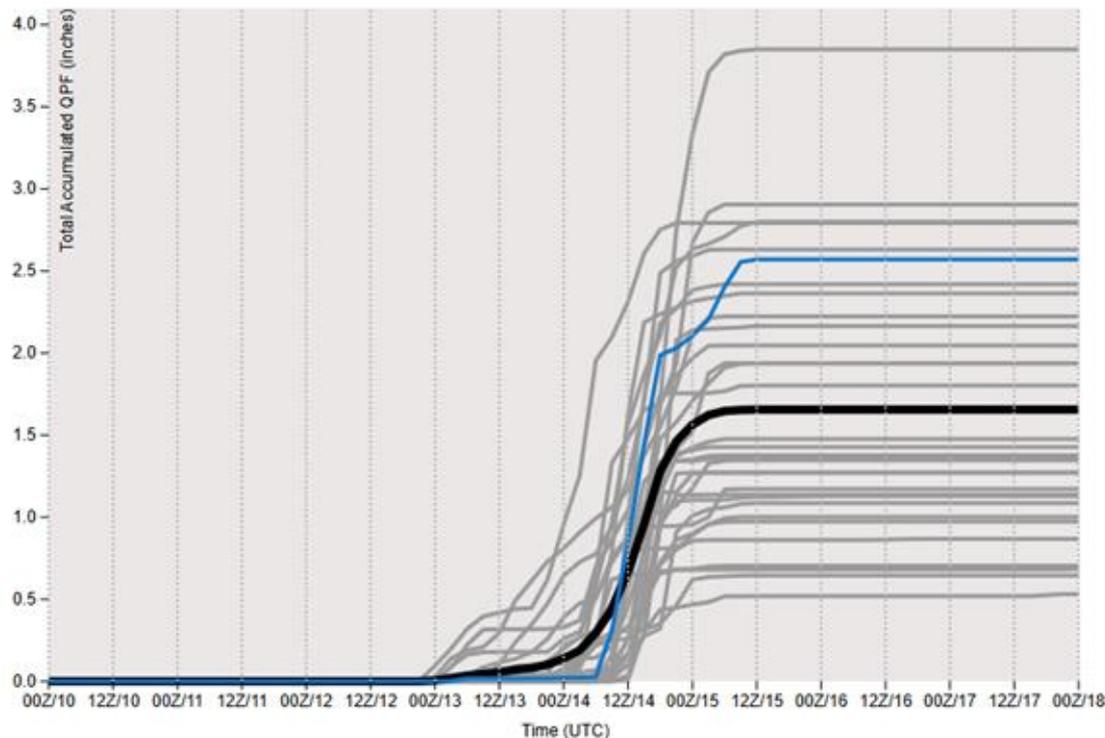


Deterministic: “Latest GFS shows OKC receives 2.5 inches of rainfall later this week.”

Probabilistic: “Most ensemble members show rainfall amounts between 1 to 1.5 inches, though higher amounts appear possible.”

Deterministic vs. Probabilistic Forecasting

EMC's GEFS plumes for: KOKC
00 UTC 10 February 2026 cycle

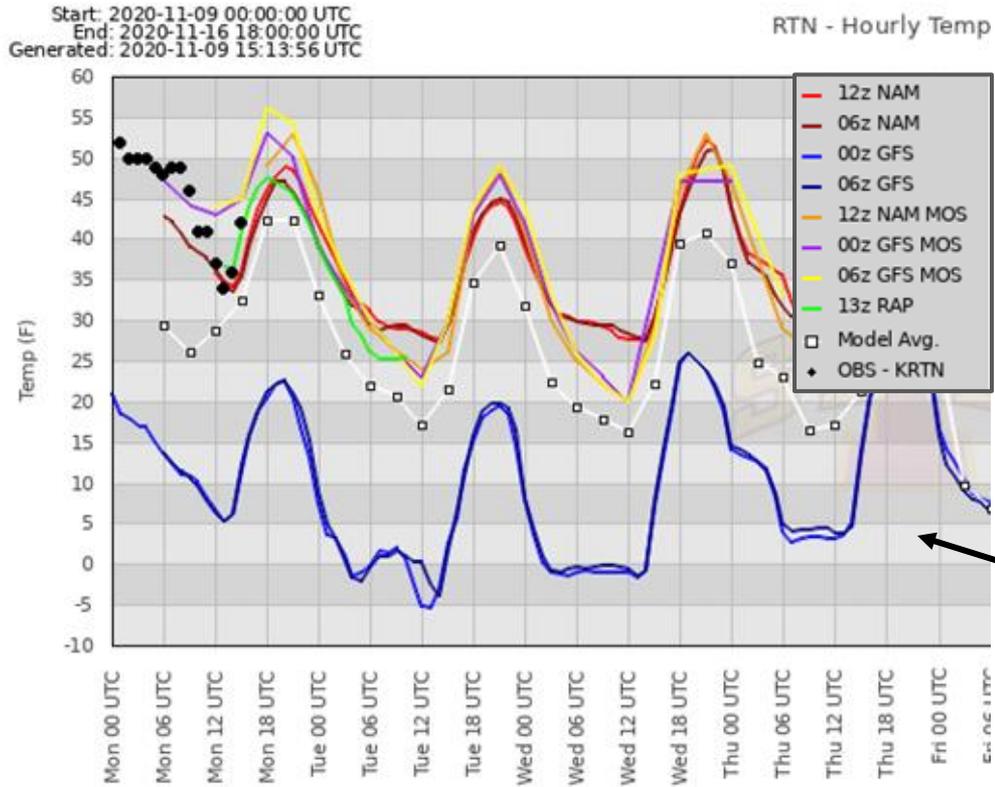


Probabilistic: “Most ensemble members hint at rainfall amounts between 1 to 1.5 inches, though higher amounts appear possible.”

Why is this a better option?

- Gives most likely outcome.
- Acknowledges the potential for a high-end event.
 - And...

Deterministic vs. Probabilistic Forecasting



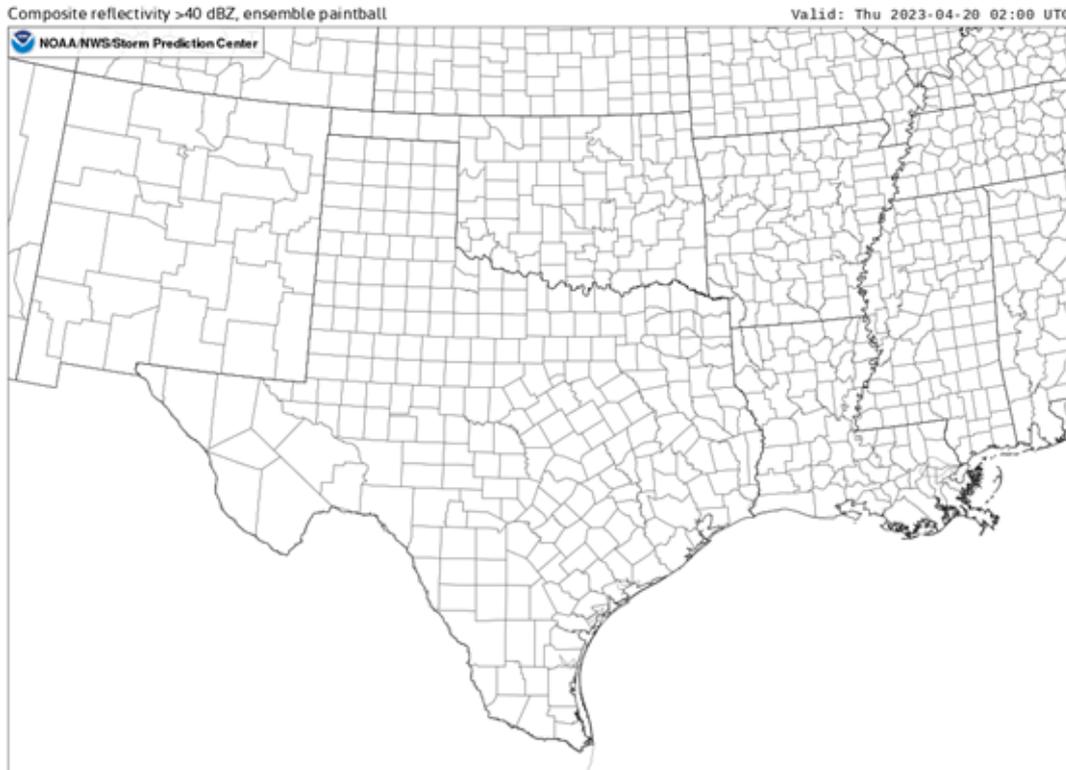
Probabilistic: “Most ensemble members hint at rainfall amounts between 1 to 1.5 inches, though higher amounts appear possible.”

Why is this a better option?

Allows for the possibility that the GFS is simply wrong!

Deterministic vs. Probabilistic Forecasting

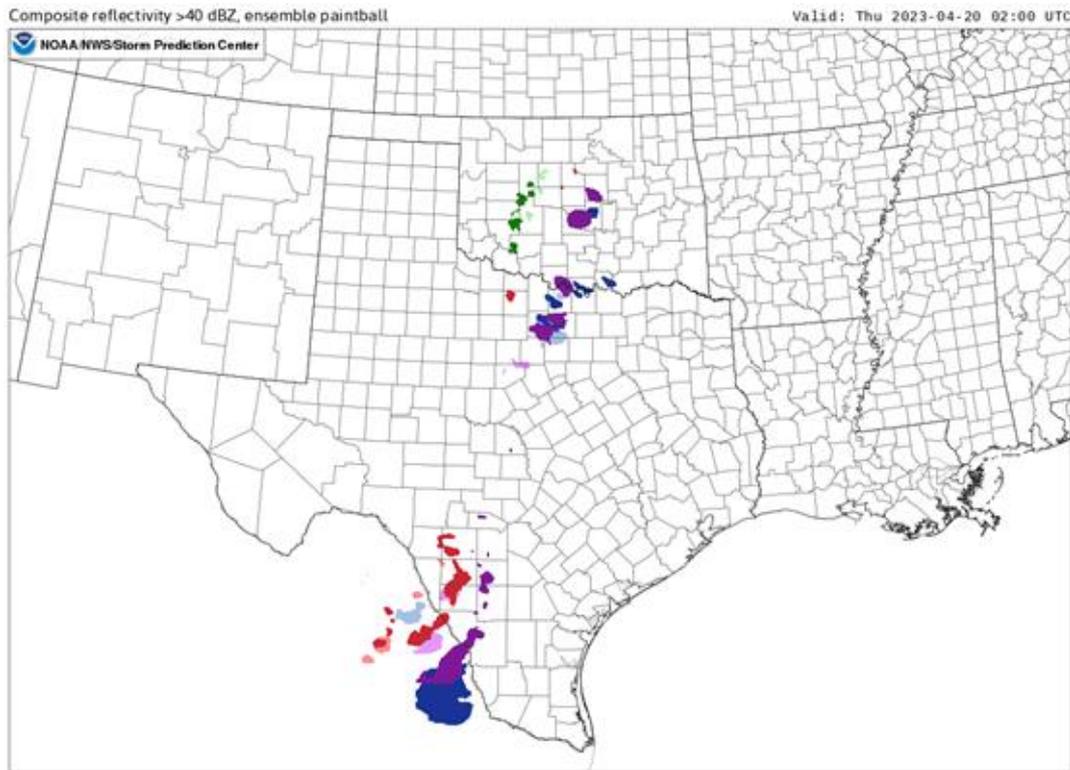
HRRR



Deterministic: “Latest HRRR says that no thunderstorms will occur this evening.”

Deterministic vs. Probabilistic Forecasting

HREF All Members

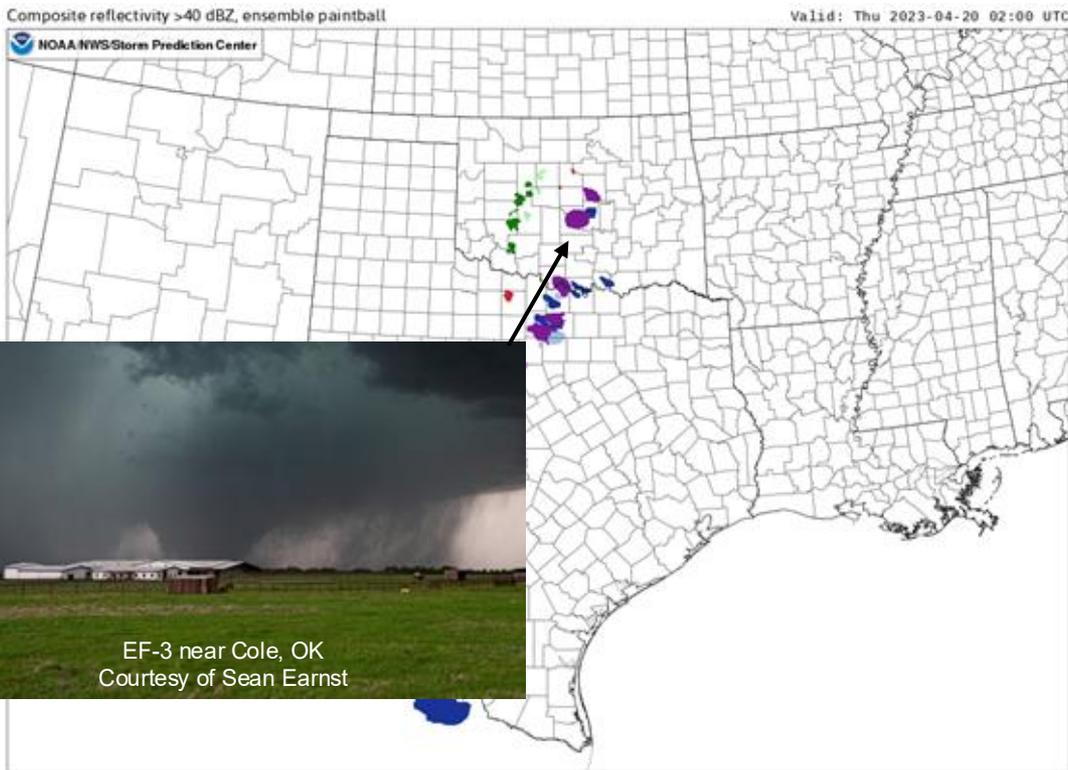


Deterministic: “Latest HRRR says that no thunderstorms will occur this evening.”

Probabilistic: “HREF members suggests that isolated thunderstorms are possible this evening.”

Deterministic vs. Probabilistic Forecasting

HREF All Members



Deterministic: “Latest HRRR says that no thunderstorms will occur this evening.”

Probabilistic: “HREF members suggests that isolated thunderstorms are possible this evening.”

HRRR forecast = More precise but wrong

HREF forecast = Less precise but conveys potential for bad outcome!

Which should you convey?

Probabilistic Forecasting

Multi-model Ensemble

- Consists of different dynamic model cores
- (e.g. HREF, REFS)
- Different cores have different biases, results in better dispersion and a more accurate forecast.
- Can still hold value even if one model initializes poorly.

Single-model Ensemble

- Consists of same dynamic core but with different physics engines and perturbed initial conditions.
- (e.g. GEFS, ECENS)
- Same model core means same model bias. Underdispersion can lead to false high confidence.
- Have a much higher number of members that often better resolve the probability distribution.

Probabilistic Forecasting

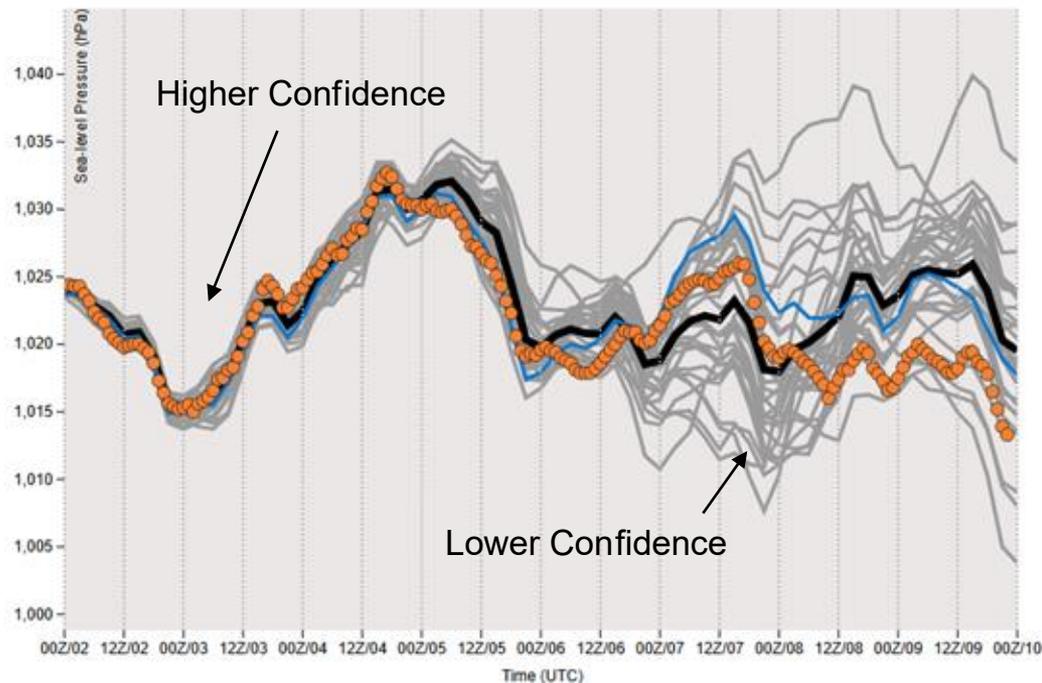
Single-model Ensemble

Notice the spread towards the end of the forecast period.

The deterministic GFS and ensemble mean were off the mark, but...

There was enough ensemble members and enough dispersion to capture the correct outcome!

GEFS Mean Sea Level Pressure Forecast



Probabilistic Forecasting

Single-model Ensemble

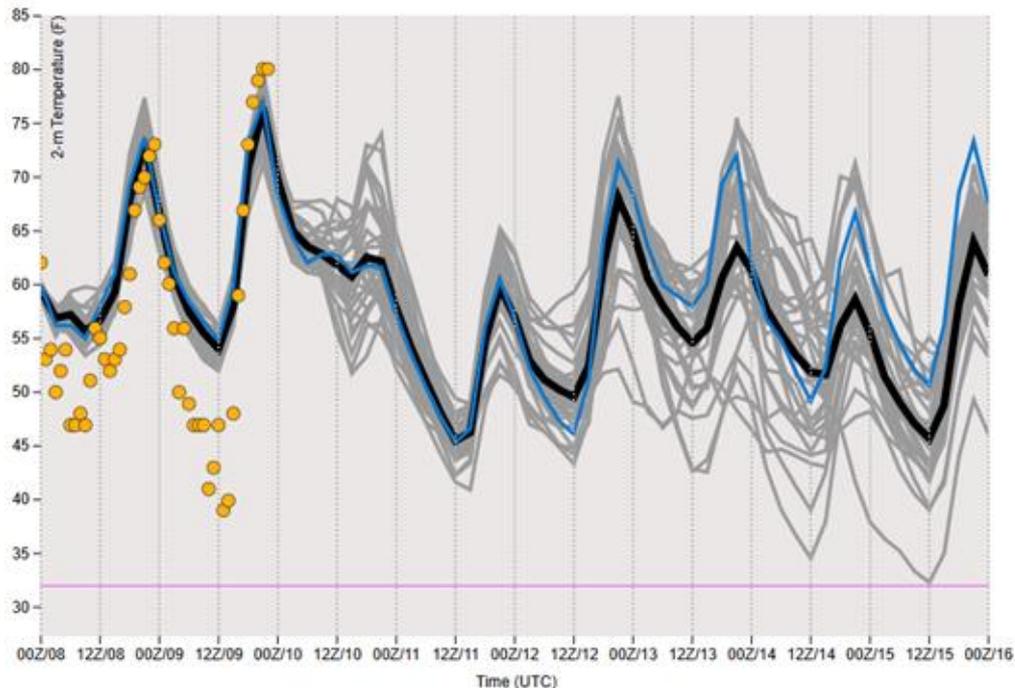
Notice the tight ensemble clustering.

This implies high forecast confidence, but...

Model biases did not capture nocturnal cooling trends well

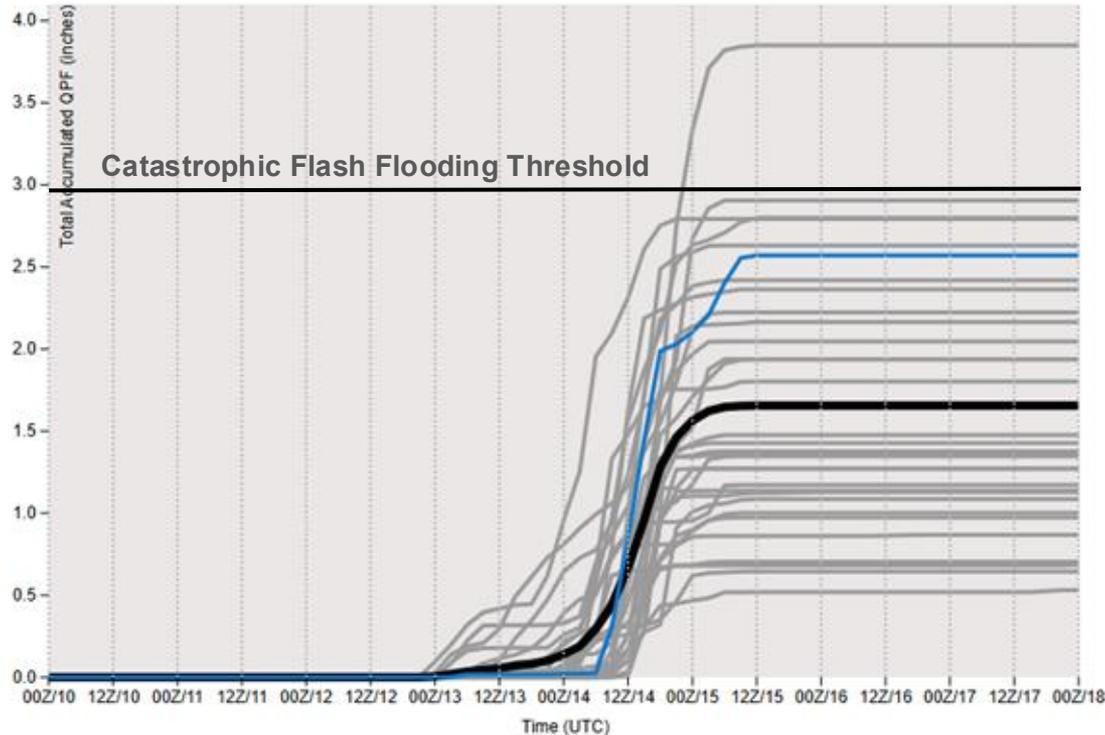
Result = poor forecast due to the same model bias in all members!

GEFS 2-m Temperature Forecast



Probabilistic Communication

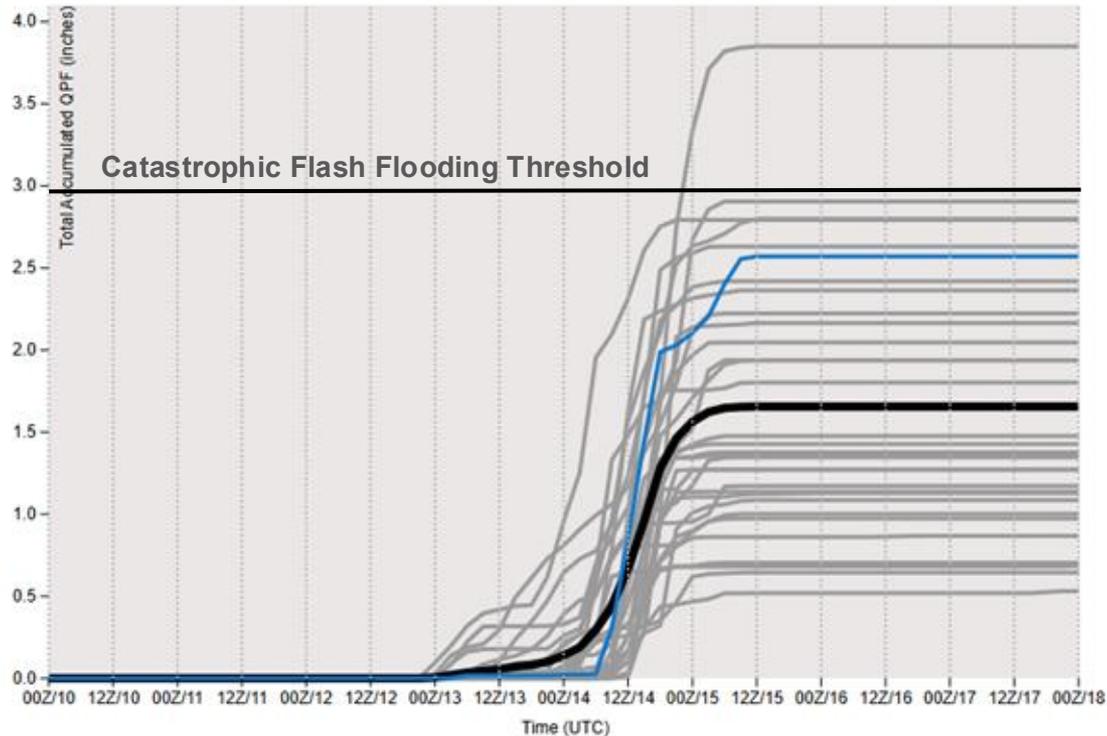
EMC's GEFS plumes for: KOKC
00 UTC 10 February 2026 cycle



Should you mention the potential for catastrophic flooding?

Probabilistic Communication

EMC's GEFS plumes for: KOKC
00 UTC 10 February 2026 cycle



Should you mention the potential for catastrophic flooding?

Who are you talking to?

Probably not

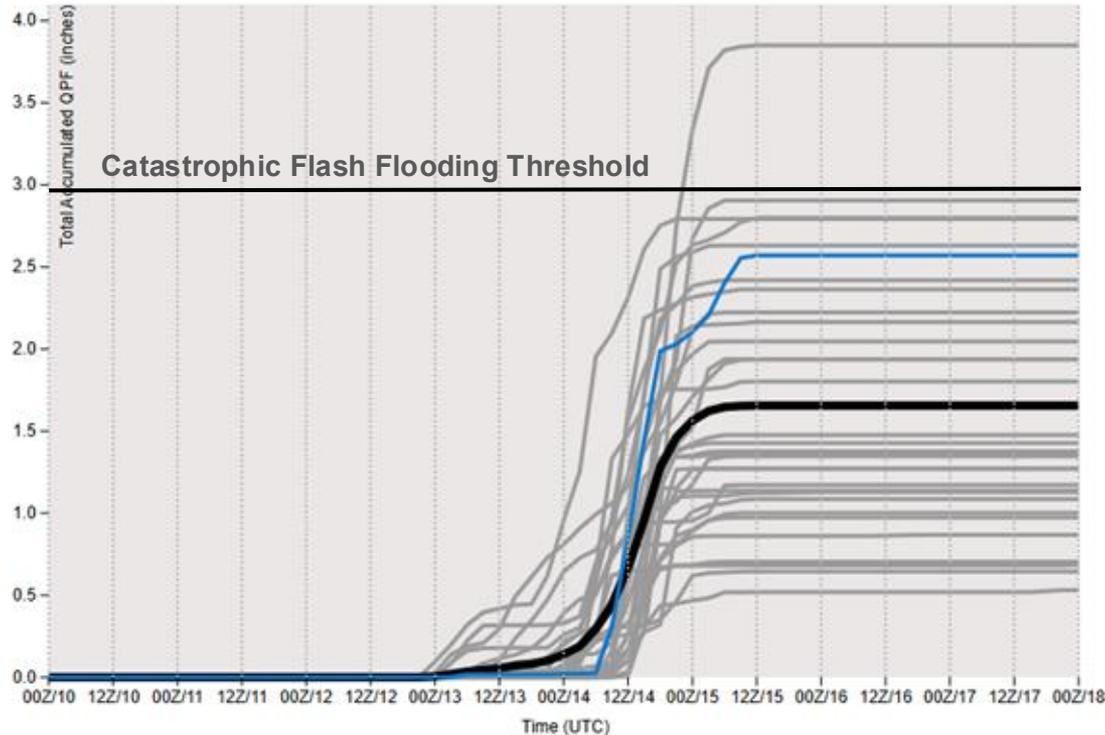


Yes!



Probabilistic Communication

EMC's GEFS plumes for: KOKC
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How would you characterize the potential for catastrophic flooding?

- A) Very low
- B) Minimum
- C) Virtual none
- D) Highly unlikely

Probabilistic Communication

“... a combination of words and numbers may be ideal for increasing understanding of probability.” - Lenhardt et al. 2020

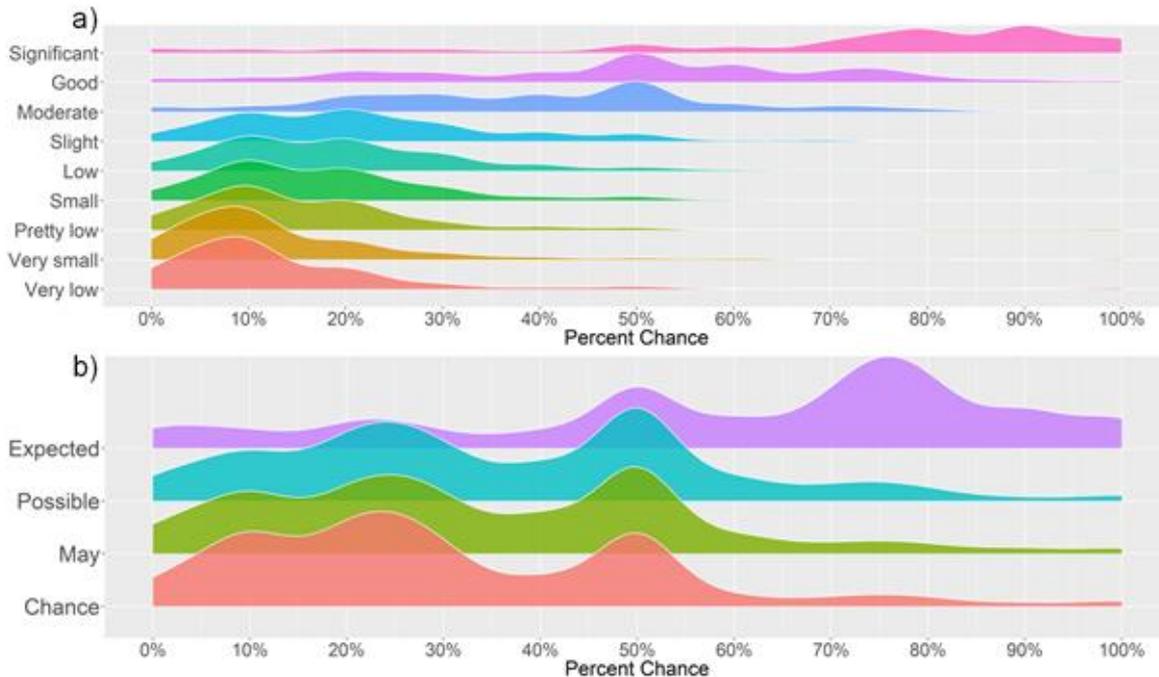


Fig. 5 from Lenhardt et al. 2020

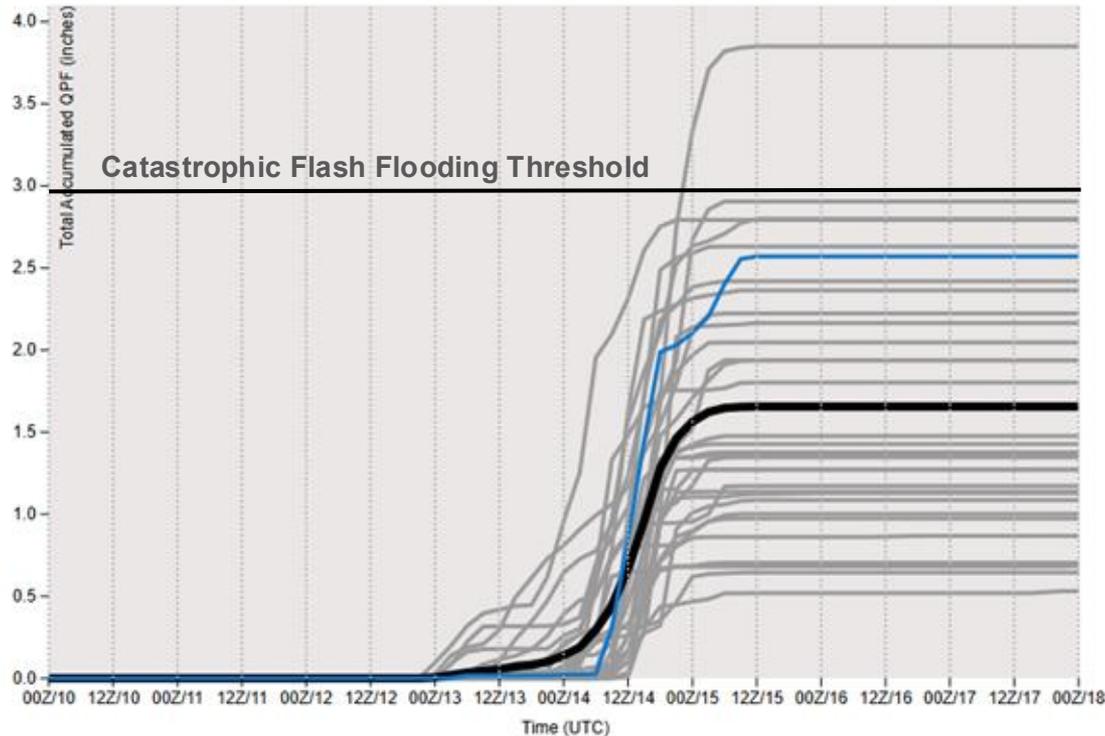
People associate numeric values to certain words.

However, interpretation can vary widely for different words!

Example: “Expected”
can be interpreted to mean
45% to 80%
based on surveys

Probabilistic Communication

EMC's GEFS plumes for: KOKC
00 UTC 10 February 2026 cycle



How would you characterize the potential for catastrophic flooding?

- A) Very low
- B) Minimum
- C) Virtual none
- D) Highly unlikely
- E) Very Low (3%) Chance**



Probabilistic Forecasting

Quick Recap

- Probabilistic forecast allows you to assess the likelihood of an outcome or range of outcomes.
- Climatology and ensembles help you quantify the range of outcomes.
- A combination of words and numbers can help you clearly convey potential outcomes.
- Be aware of ensemble limitations and biases.



There are so many graphics
these days...

Why do we still bother with forecast
discussions?

Highlighted Area: N05 Jackson, MS
Tornado Outlook
Saturday, March 15, 2019



Highlighted Area: Louisiana
Tornado Outlook
Tuesday, December 13, 2022



Graphics are great, but they can't convey all of the forecast information

All of this text is needed to just explain the SPC Convective Outlook Graphic.

We can't expect the public to know these details or the nuance of each forecast.

This nuance is best conveyed via the forecast discussion.

Understanding Severe Thunderstorm Outlook Categories								
LEVEL	CATEGORY	DETAILS	SUMMARY	How many severe storms are possible?		How bad could the worst storms be?		DEFINITIONS
	General Thunderstorm	Although severe weather is not expected, all thunderstorms can produce deadly lightning, gusty winds, and small hail.	No severe thunderstorms expected			Similar to storms your area experiences many times per year		Severe Storm Any storm that contains at least one of the following: Wind gusts of at least 58 mph Hail at least one inch in diameter Tornado
1	Marginal (MRGL)	Some storms could be capable of damaging winds and severe hail. Localized tornado threat could develop.	Isolated severe storms possible			Similar to storms your area may experience several times per year		
2	Slight (SLGT)	Increased confidence that some storms will contain damaging winds, severe hail, and/or tornado potential. <i>A few severe storms could be significant</i>	Isolated to scattered severe storms expected			Similar to storms your area may experience a few times per year		
3	Enhanced (ENH)	High confidence that several storms will contain damaging winds, severe hail, and/or tornadoes. <i>Several severe storms likely to be significant</i>	Scattered to numerous severe storms expected			Similar to intense storms your area may only experience once or twice per year		Significant Severe Any of the following hazards: Wind gusts of at least 75 mph Hail at least two inches in diameter Tornado of at least EF-2 rating
4	Moderate (MDT)	High confidence that many storms will contain damaging winds, severe hail, and/or tornadoes. <i>Several severe storms likely to be significant</i>	Scattered to numerous severe storms expected			Similar to intense storms your area may only experience once per year or less		
5	High (HIGH)	High confidence that an outbreak of storms will contain tornadoes, damaging winds, and/or severe hail. <i>Tornado outbreak and/or widespread damaging winds</i>	Numerous severe storms expected			Very intense storms your area may only experience once or twice in a lifetime		

Anatomy of a Forecast Discussion

Summary/Bottom Line Up Front

Summarizes the main/most important point of the discussion. Ask yourself “If people take one thing away from my discussion, what is it?”

Example: “Strong to severe thunderstorms are possible after 3 PM today for central Oklahoma.”

Synopsis/Feature Identification

Discusses main synoptic features and how they should evolve over the forecast period. Example: “The surface low is forecast to deepen as it moves east into AR.”

Detailed Forecast Information

Goes into more regional-focused detail regarding the severe weather potential. Discusses how the convective environment should evolve, convective modes, trends, main hazards, etc...

Confidence Communication

Conveys confidence in the forecast outlined above. Should include the most likely scenario as well as best/worst case potential outcomes and conditional risks.

Example: “A severe storm or two is possible *if* convection can initiate along the dryline before sunset.”

Anatomy of a Forecast Discussion

Summary/Bottom Line Up Front

...THERE IS AN ENHANCED RISK OF SEVERE THUNDERSTORMS ACROSS PARTS OF THE MID MISSISSIPPI VALLEY...

...SUMMARY...

Scattered severe thunderstorms should develop across the Mid Mississippi Valley late Sunday afternoon. Hail, wind, and some threat for a few tornadoes will spread toward central Illinois during the evening hours.

...Mid Mississippi Valley...

Late-evening model guidance suggests upper ridge will build across the southern Plains and strengthen during the day1 period. This feature will force a notable short-wave trough currently located over WY to top the ridge over eastern SD/NE around 18z before it turns southeast and digs toward the OH Valley by 19/12z. As a result, broad height rises will be noted across much of the western/central US during the first half of the period.

Early this morning, thunderstorm clusters continue across southern IA with more isolated activity into eastern KS. This activity is likely being sustained by a focused LLJ that should move little over the next 136hr, aside from veering toward central IL Sunday evening. Remnants of this convection are expected to be ongoing at the beginning of the period from southeast IA into central IL. Latest guidance suggests weakening is likely after sunrise, though it may not completely dissipate as it propagates southeast. While marginally severe hail/wind could occur with this early-period convection, the primary concern for more significant severe will occur later in the afternoon/evening as influence of the aforementioned short wave approaches.

Strong boundary-layer heating is forecast once again across KS where surface temperatures may approach 100F in the central part of the state. Readings into the low-mid 90s are possible across northwest MO. If this occurs convective temperatures may be breached around 22z. There is some concern that isolated convection could develop along the boundary shortly after peak heating but large-scale forcing will not be particularly focused before sunset. However, as the short wave digs southeast, scattered convection will likely develop near the boundary over central IA. Forecast soundings favor supercells, which should mature and dig east-southeast toward a very unstable air mass with MUCAPE in excess of 4000 J/kg. Very steep lapse rates and favorably forced/sheared environment suggest very large hail with the stronger storms. Additionally, while these updrafts may be slightly elevated, low-level shear appears favorable for some risk of tornadoes. Latest HREF guidance supports this scenario with a cluster of supercells evolving over IA and growing upscale as they spread toward central IL during the late evening. Damaging winds may also occur, especially if storm mergers and bow-type features evolve.

Synopsis/Feature Identification

Detailed Forecast Information

Confidence Communication

Example discussion from 06Z Day 1 Sept 18, 2022



Content of a Forecast Discussion

Use words to paint a picture of the severe weather forecast!

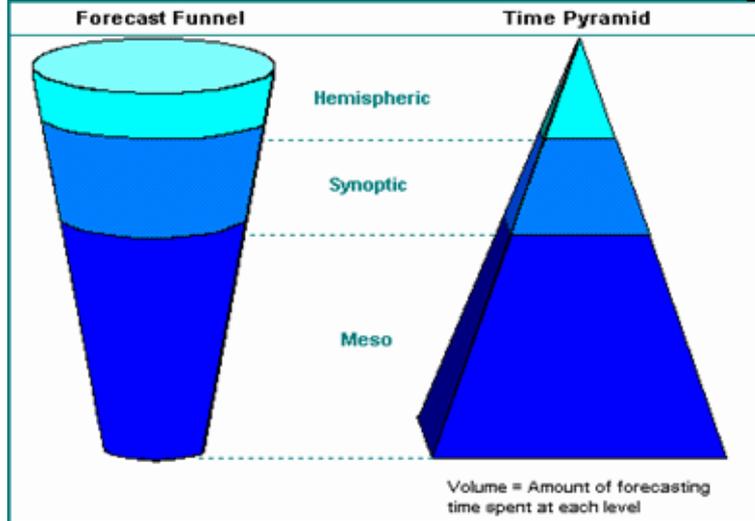
Each point you make should serve the purpose of adding to the overall picture.



Content of a Forecast Discussion

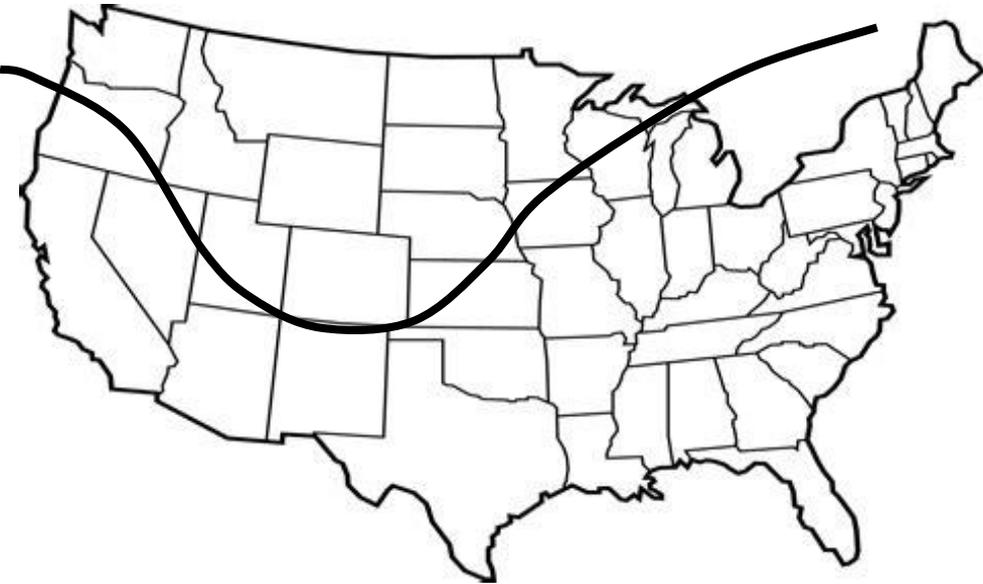
Use the forecast funnel to structure your discussion.

Start at the synoptic scale and work down!



Content of a Forecast Discussion

A 500 mb trough will move east...



Use words to paint a picture of the severe weather forecast!

Each point you make should serve the purpose of adding to the overall picture.



Content of a Forecast Discussion

A 500 mb trough will move east...

Which will help deepen a low over NE...



Use words to paint a picture of the severe weather forecast!

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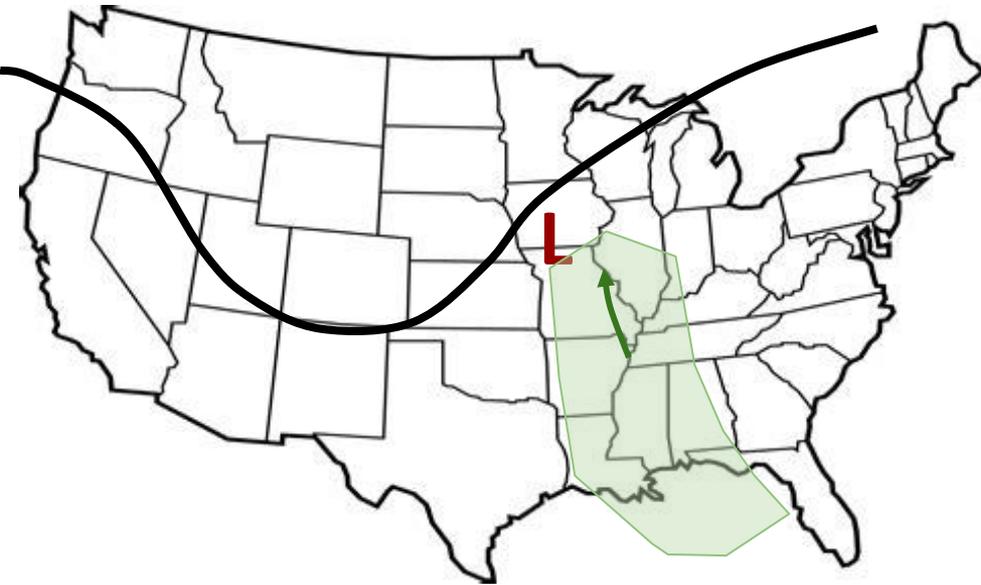


Content of a Forecast Discussion

A 500 mb trough will move east...

Which will help deepen a low over NE...

In response, southerly winds will increase and draw moisture northward into MO...



Use words to paint a picture of the severe weather forecast!

Each point you make should serve the purpose of adding to the overall picture.



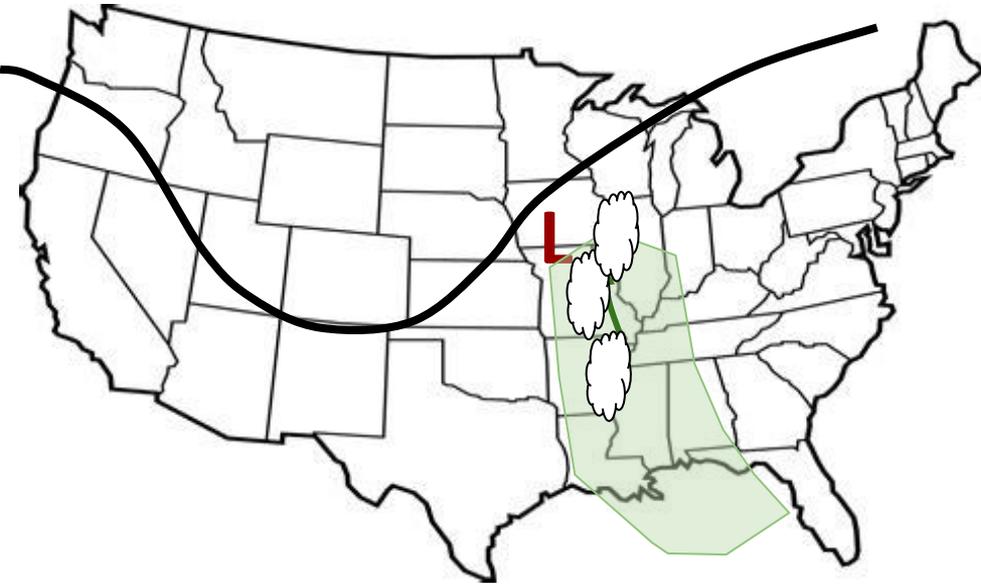
Content of a Forecast Discussion

A 500 mb trough will move east...

Which will help deepen a low over NE...

In response, southerly winds will increase and draw moisture northward into MO...

The additional moisture and sunny conditions will help increase CAPE by late afternoon...



Use words to paint a picture of the severe weather forecast!

Each point you make should serve the purpose of adding to the overall picture.



Content of a Forecast Discussion

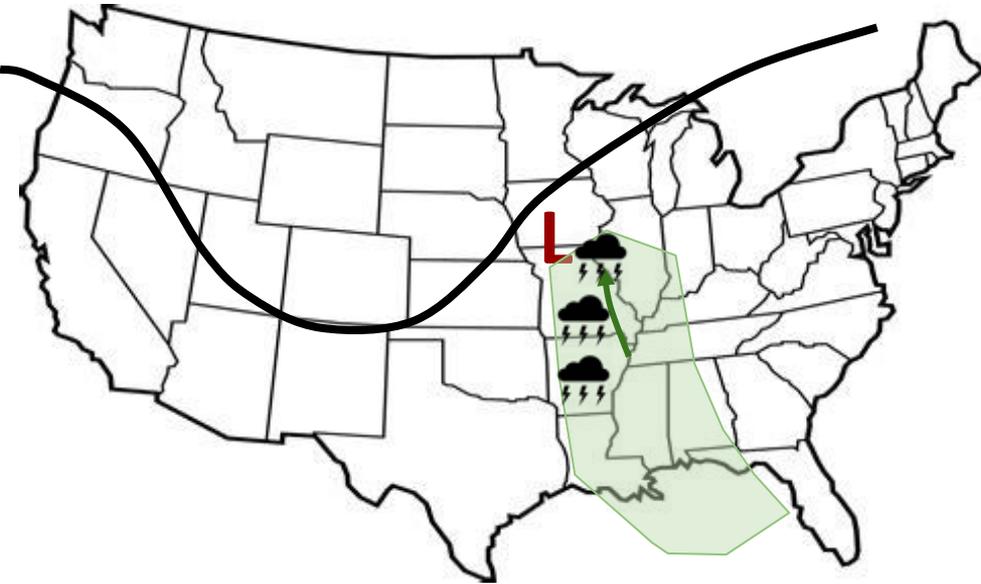
A 500 mb trough will move east...

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In response, southerly winds will increase and draw moisture northward into MO...

The additional moisture and sunny conditions will help increase CAPE by late afternoon...

This will increase our thunderstorm chances by 4 PM.



Use words to paint a picture of the severe weather forecast!

Each point you make should serve the purpose of adding to the overall picture.



Content of a Forecast Discussion

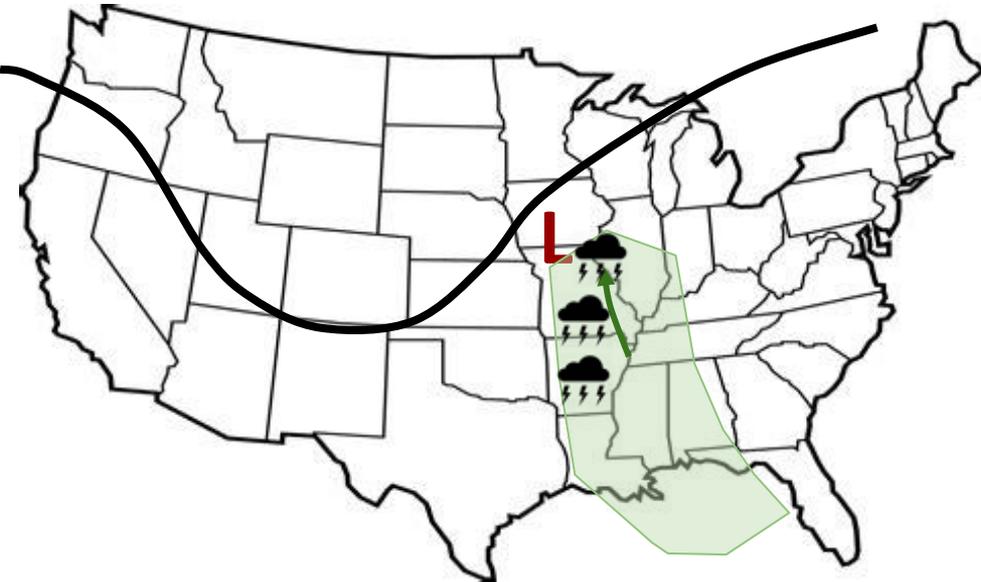
A 500 mb trough will move east...

Which will help deepen a low over NE...

In response, southerly winds will increase and draw moisture northward into MO...

The additional moisture and sunny conditions will help increase CAPE by late afternoon...

This will increase our thunderstorm chances by 4 PM.



Excellent Work!

Notice how nicely the discussion flows. Each line builds on the previous sentence and supports the next sentence, leading to main point!



Content of a Forecast Discussion

Keep in mind:

Use only as many words as necessary!

Calm weather = fewer words.

Impactful weather = more words.



Valid 201200Z - 301200Z

...THERE IS A MODERATE RISK OF SEVERE THUNDERSTORMS ACROSS FAR EAST-CENTRAL LOUISIANA INTO CENTRAL MISSISSIPPI...

...SUMMARY...
 Severe thunderstorms capable of producing tornadoes, very large hail, and a few severe wind gusts are expected this afternoon into the overnight period across parts of the lower to mid Mississippi Valley and parts of the Southeast. A few strong tornadoes will be possible.

...Synopsis...
 A surface low will deepen while tracking from Kansas to the Great Lakes today, accompanied by an eastward advancing upper trough. A strong mid-level jet stream will overspread an intense low-level jet across the OH/IN valleys into the Southeast. As such, strong deep-layer flow and shear will overlap with a moistening, destabilizing stratus from late morning to early evening from the lower MS Valley east-northeastward. Several strong to intense thunderstorms are expected to organize and promote a relatively robust severe threat, particularly across the Southeast, where regionally higher instability should reside.

...Portions of the Lower MS Valley today into early tonight...
 Strong warm-air advection should be underway across the Lower MS Valley at the start of the period (12Z), with rich boundary-layer moisture being transported northward by a 40-50 kt southwesterly low-level jet. Through the day, at least modest surface heating should support surface temperatures rising into the lower 70s F and upper 80s F depicets within the warm-air advection regime, where an increase in thunderstorms is also expected. 50-70 kts of west-southwesterly 500 mb flow and 6.5+ C/km lapse rates will overspread the lower MS Valley and the warm-air advection regime by early afternoon, contributing up to 1500 J/kg MLCAPE, which is adequate in supporting a severe threat.

Storms should eventually root into a gradually deepening boundary layer during the afternoon, taking advantage of the strong deep-layer and low-level speed/directional shear provided by the overlapping southwesterly low-level and westerly mid-level jets. Large, curved low-level hodographs with mid/upper-level elongation will support well over 50 kts of effective bulk shear, and 300-400 m/s² effective SBR. Supercell structures are expected initially, with large hail, tornadoes, and a few severe gusts all likely. A few instances of 2+ inch diameter hail and/or strong tornadoes are possible with the more robust supercells. Should a more dominant supercell develop, remain discrete, and traverse an axis of locally stronger surface heating/buoyancy, a long-tracked and intense tornado may occur. The latest high-resolution guidance consensus suggests this scenario would be most likely across central MS, where a Category 4/Moderate risk is in place. Later at night, storms should grow upscale into more linear segments as the surface cold front and greater low-level convergence approaches. Damaging gusts should then become the main threat, though a few tornadoes remain possible.

...Parts of the OH/IN Valley into early evening...
 A strong surface cold front should sweep across the OH/IN valleys through the late afternoon and evening hours as the deepening surface low tracks across the Great Lakes. Strong convergence along the cold front should force a low-topped band of convection. Ambient tropospheric wind fields will be strong, with 55+ kts of flow likely just 1 km AGL. Downward momentum transport within this line may foster strong, occasionally damaging gusts, with a couple of severe gusts also possible, warranting the introduction of Category 1/Marginal probabilities this outlook.

..Squittier1/Darrow.. 11/29/2022



NOAA SPC DAY 1 CATEGORICAL OUTLOOK
 ISSUED: 0550Z 11/08/2022
 VALID: 1200Z Tue 11/08 - 1200Z Wed 11/09
 FORECASTER: BROYLES/THORNTON
 NOAA/NWS Storm Prediction Center, Norman, Oklahoma

Day 1 Convective Outlook
 NWS Storm Prediction Center Norman OK
 1150 PM CST Mon Nov 07 2022
 Valid 081200Z - 091200Z

...NO SEVERE THUNDERSTORM AREAS FORECAST...

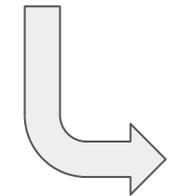
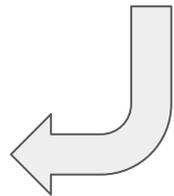
...SUMMARY...
 Organized severe thunderstorms are unlikely across the continental U.S. today and tonight.

...DISCUSSION...
 At upper-levels, a low will move inland across northern California today as flow remains southwesterly across much of the western half of the nation. An upper-level ridge will remain in place across the eastern U.S. At the surface, high pressure will dominate from the Mississippi Valley eastward to the Atlantic Coast. Out west, a dual-centered low will move into northern California and central Nevada by afternoon. Widespread large-scale ascent, associated with the upper-level system, will make thunderstorm development possible today across much of California and the Intermountain West. Isolated to scattered thunderstorms will also be possible today from Oklahoma north-northeastward into the upper Mississippi Valley, along and near a corridor of strong low-level flow. Isolated to scattered thunderstorms may also develop in parts of south Texas and across the Florida Peninsula. No severe threat is expected today or tonight across the continental United States.

..Broyles/Thornton.. 11/08/2022

High Impact

Low Impact



But wait!

This sounds deterministic!

Aren't we supposed to use probabilities to convey the forecast?

We can still incorporate probabilistic language while describing the forecast evolution.

Try to convey confidence as you go.



Building a Forecast Discussion

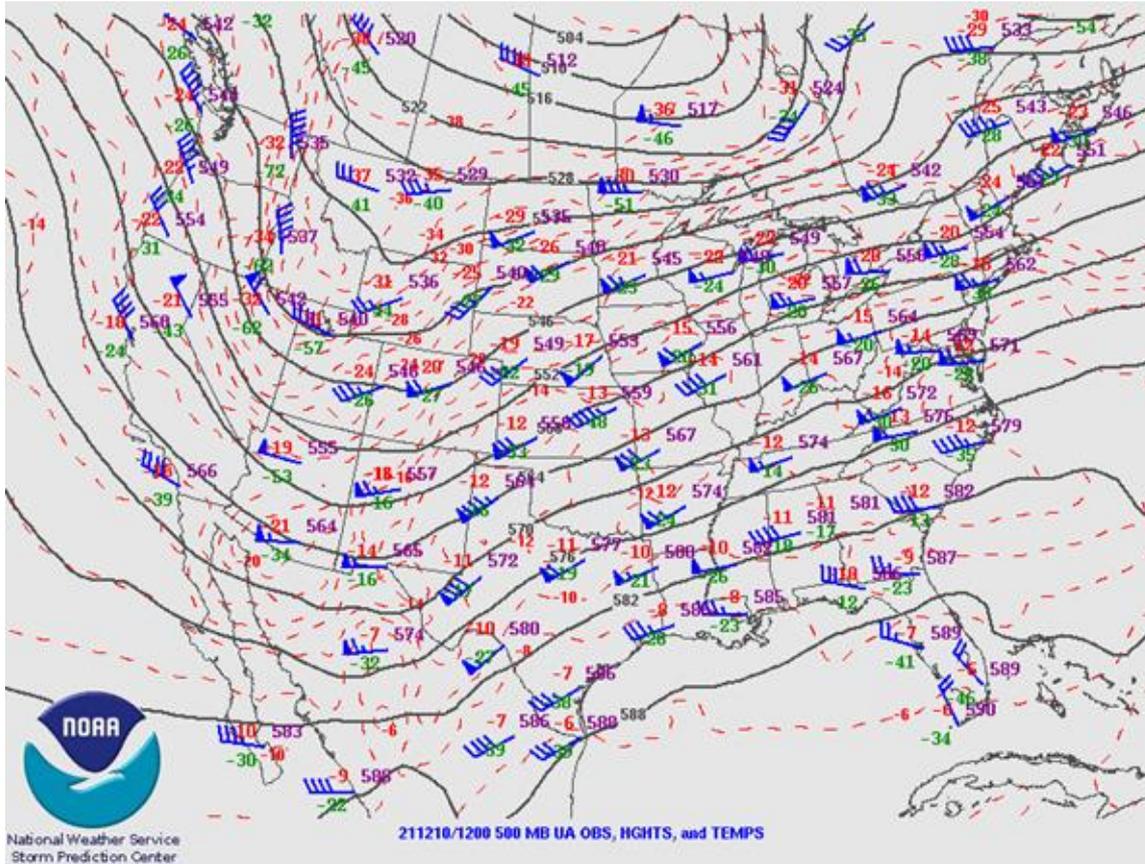
Synopsis:

Consider the 500 mb chart to the left...

In one to two sentences describe the upper air pattern.

Example:

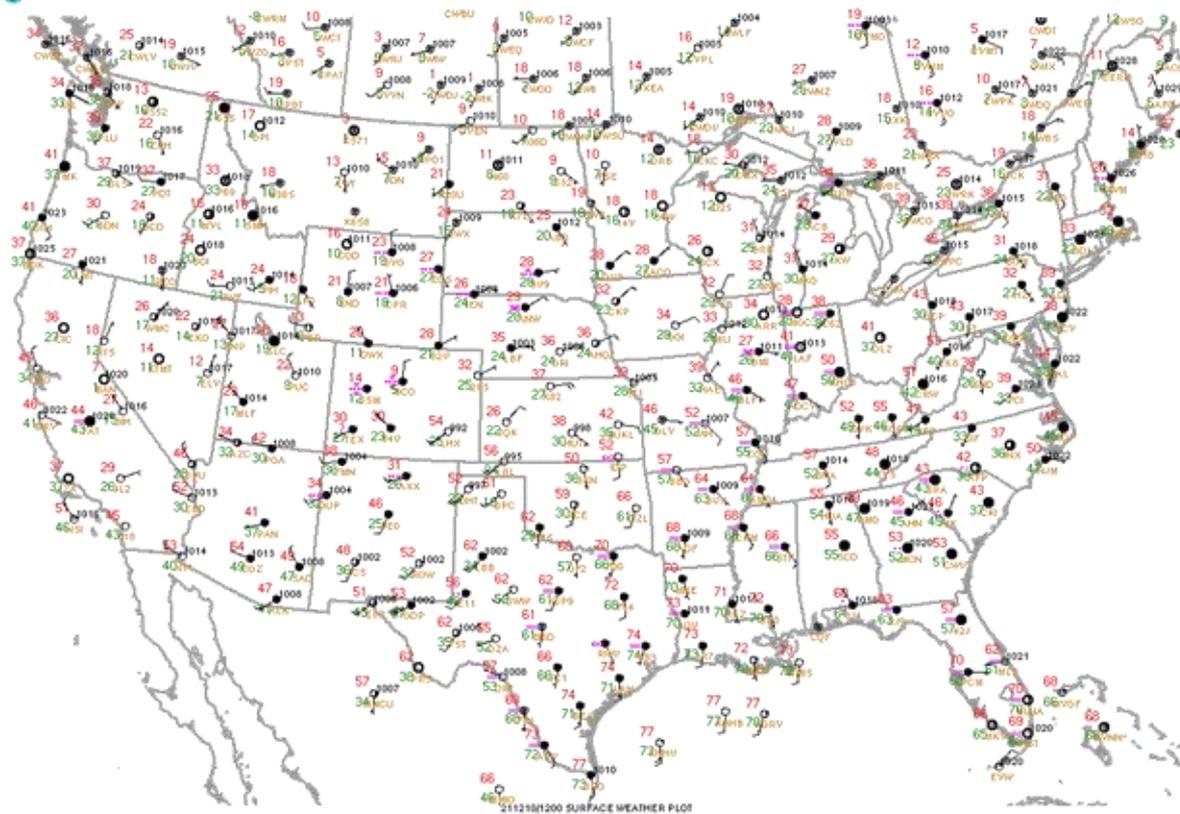
“12 UTC 500 mb analysis shows a broad upper trough over the Four Corners region with strong south westerly flow over the central CONUS.”



Building a Forecast Discussion

NOAA/NWS/Storm Prediction Center

Mesoscale Analysis Data



Synopsis:

Consider the surface chart to the left...

In a few sentences describe the surface pattern, including notable features such as fronts, drylines, etc....

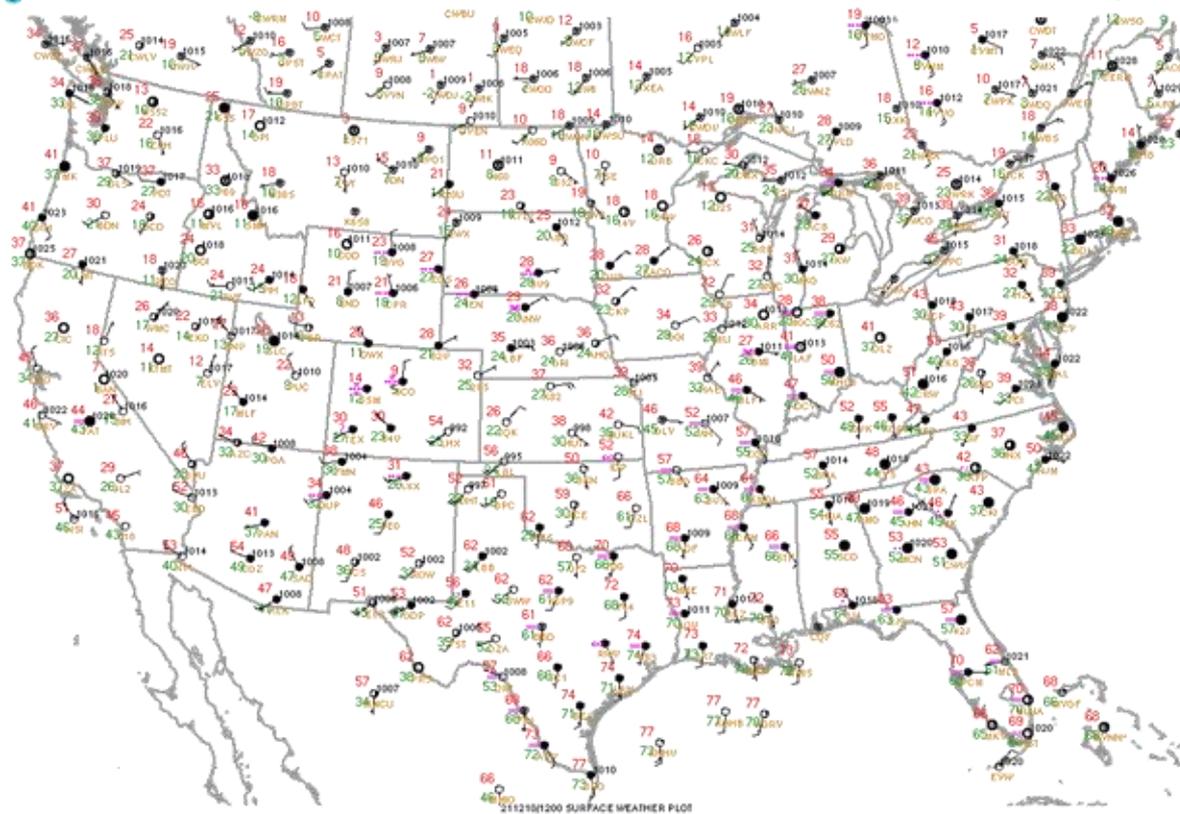
Example:

“12 UTC surface observations reveals a surface low over southwest KS with a warm front extending eastward into the OH River Valley. To the south of this front, mid-60s dewpoints are spreading north.”

Building a Forecast Discussion

NOAA/NWS/Storm Prediction Center

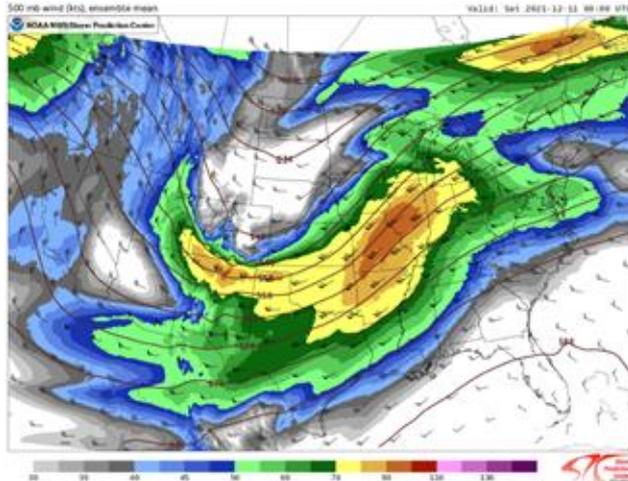
Mesoscale Analysis Data



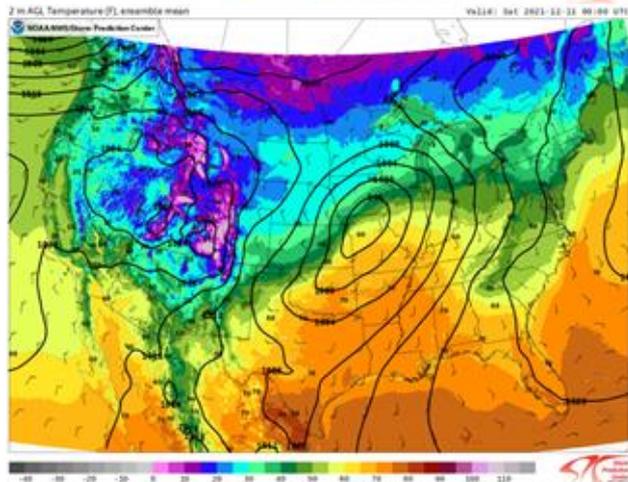
Synopsis so far:

“12 UTC 500 mb analysis shows a broad upper trough over the Four Corners region with strong south westerly flow over the central CONUS. Surface observations reveals a surface low over southwest KS with a warm front extending eastward into the OH River Valley. To the south of this front, mid-60s dewpoints are spreading north.”

Building a Forecast Discussion



500 mb forecast
valid 00 UTC



Surface
temperature
forecast
valid 00 UTC

Forecast Information:

Consider the two forecast plots on the left...

In a few sentences, describe the evolution of the primary synoptic features through the day.

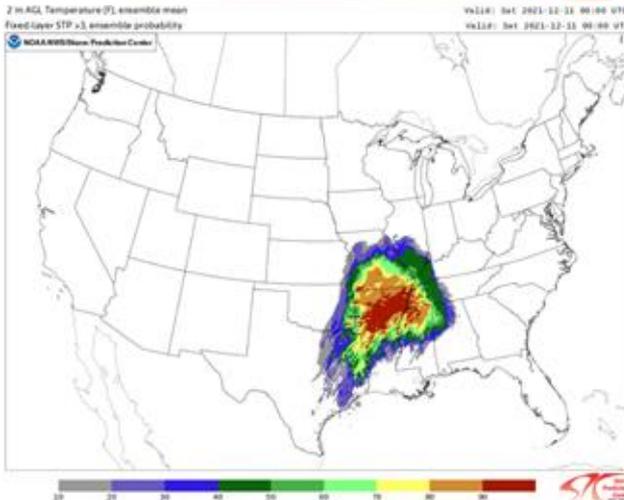
Example:

“The upper trough is expected to translate east through this evening. As this occurs a surface cyclone will continue to intensify and shift east along the warm frontal zone.”

Building a Forecast Discussion



Probability of
SBCAPE > 1000 J/kg
at 00 UTC



Probability of
STP > 3
at 00 UTC

Forecast Information:

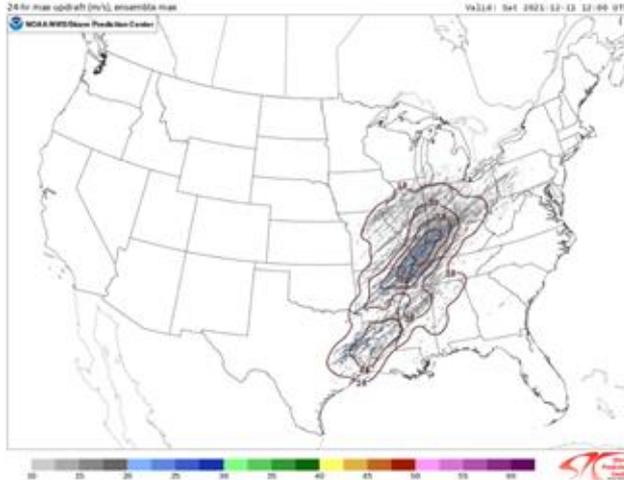
Consider the two forecast plots on the left...

In a few sentences, describe the potential for a convective environment favorable for severe weather.

Example:

“Ensemble guidance shows very high (90%) probability for SBCAPE exceeding 1000 J/kg. Additionally, favorable wind profiles will support a corridor favorable for tornadoes across parts of Arkansas where there is high confidence (80% chance) in STP values above 3.”

Building a Forecast Discussion

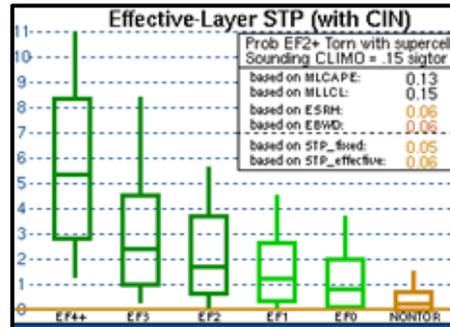


24-hour max
updraft speed (fill)

Probability of updraft
speed > 20 m/s
(contour)



HREF ensemble
mean STP



Forecast Information:

Consider the two forecast plots on the left...

In a few sentences, describe the potential for long-lived, intense thunderstorms.

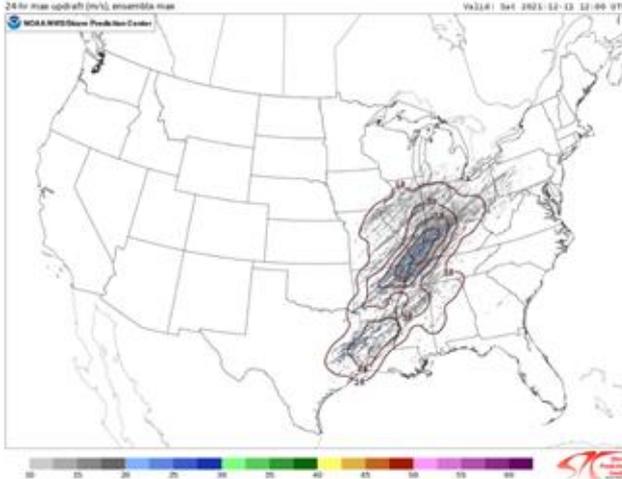
Example:

"Intense thunderstorms are probable based on latest ensemble guidance. HREF mean STP values of 8 suggest that the environment could support strong to violent tornadoes, and a strong (70%) signal for robust updrafts is noted in proximity to the STP maximum."

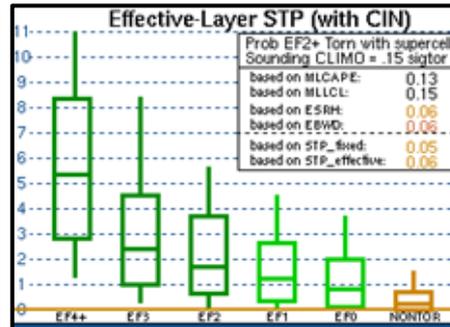
Building a Forecast Discussion

24-hour max
updraft speed (fill)

Probability of updraft
speed > 20 m/s
(contour)



HREF ensemble
mean STP



Overall confidence assessment:

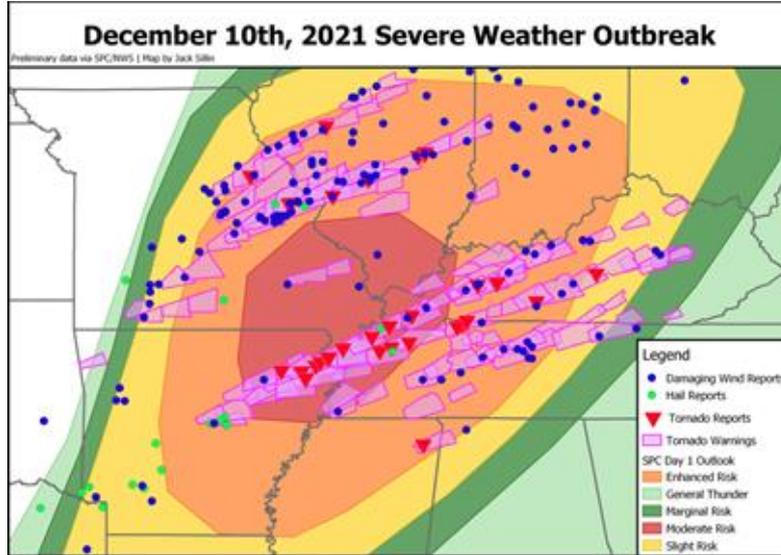
Consider all of the previous observations
and forecast data....

Write one or two sentences regarding
your confidence in high-impact
thunderstorms.

Example:

“All signs lend high confidence in the
occurrence of numerous severe
thunderstorms, including the possibility
of high-impact hail, wind, or tornado
event.”

Building a Forecast Discussion



Forecast Discussion:

The upper trough is expected to translate east through this evening. As this occurs a surface cyclone will continue to intensify and shift east along the warm frontal zone.

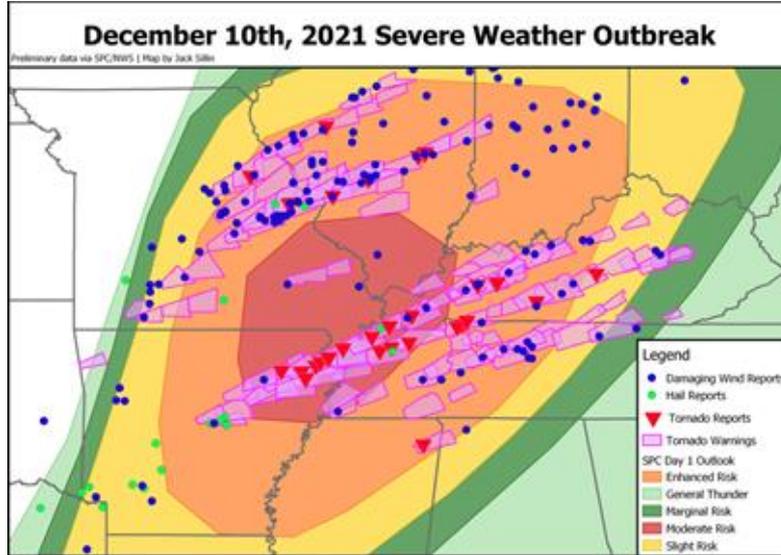
Ensemble guidance shows very high (90%) probability for SBCAPE exceeding 1000 J/kg. Additionally, favorable wind profiles will support a corridor favorable for tornadoes across parts of Arkansas where there is high confidence (80% chance) in STP values above 3.

Intense thunderstorms are probable based on latest ensemble guidance. HREF mean STP values of 8 suggest that the environment could support strong to violent tornadoes, and a strong (70%) signal for robust updrafts is noted in proximity to the STP maximum.

All signs lend high confidence in the occurrence of numerous severe thunderstorms, including the possibility of high-impact hail, wind, or tornado event.



Building a Forecast Discussion



Important Takeaways:

- Described the overall forecast evolution starting from observations.
- Assessed the likelihood that the environment would support severe thunderstorms.
- Described the probability that a favorable tornado environment would emerge.
- Highlighted the potential for a high-impact event based on the probability that a high-end environment would be in place and that storms would occur in this environment.
- Did not give a deterministic “this will happen”, but described confidence level in the potential for a high-impact event.

Note: This still left the door open for a “bust” event!



A Few Pointers

- Avoid spelling and grammar mistakes.
 - Poor spelling and grammar reflects poorly on your office and erodes your credibility.
- Avoid using subjective descriptions.
 - Instead of saying “insanely high MLCAPE” say “4000-5000 J/kg MLCAPE”. Keep it scientific!
- Always have someone else proofread your discussion.
- Read more discussions!
 - The more you read, the better you’ll write!
- Know your audience!

Keep these in mind!



One last important concept:

Know your audience

Writing for other meteorologists:

- **WHAT**
- **WHERE**
- **WHEN**
- **WHY**
- **CONFIDENCE**
- **POTENTIAL IMPACTS**



Gives mets the scientific information they need to craft their local message to public/partners.

Writing for decision makers and/or public:

- **WHAT**
- **WHERE**
- **WHEN**
- **WHY**
- **CONFIDENCE**
- **POTENTIAL IMPACTS**



Allows decision makers and the public to make informed decisions and take action. They don't necessarily care about "why" an event is occurring.

Forecast Journals

Your task:

- Use observations and short/long range models to create a series of SPC-style Day 1 convective outlooks.

- Each journal will have three parts:
 1. An SPC-style outlook graphic (categorical only, no individual hazards required)
 2. A Day 1 forecast discussion.
 3. Post event verification and discussion

- Your forecast journal will NOT be graded on forecast accuracy, but WILL be graded on:
 - Meteorological concepts and consistency
 - Incorporation of various observation networks (no model-only forecasts)
 - Spelling and grammar

Please see the online rubric for further instructions and expectations.