Extreme Precipitation Forecasts from the Weather Prediction Center

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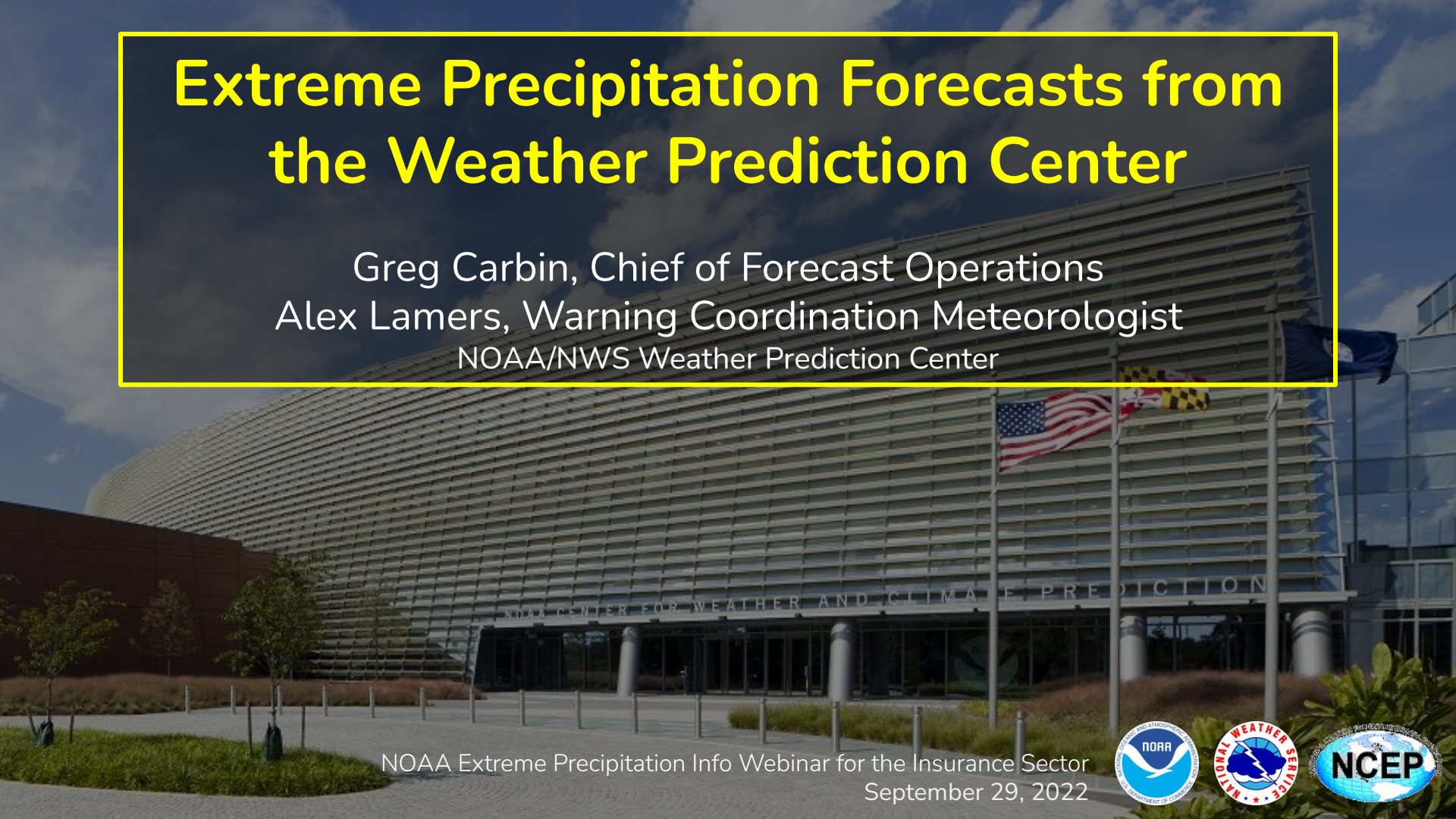
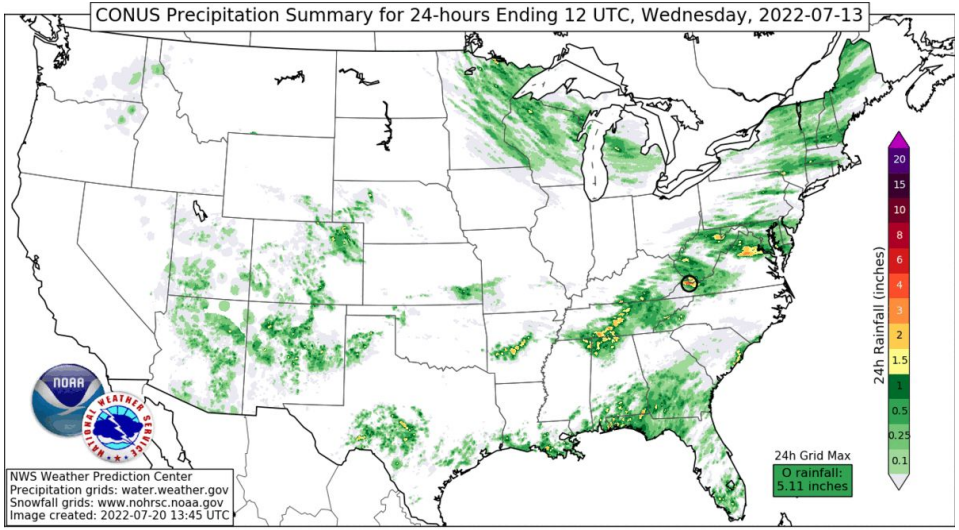


NOAA Extreme Precipitation Info Webinar for the Insurance Sector
September 29, 2022

Summer of Extreme Rainfall Incidents



- This summer across the CONUS we have seen frequent but localized extreme events ***(62 prelim flood fatalities since June)***
- Slight Risk on the ERO somewhere in the CONUS on 94% of the days from 12 July to 13 September (*animation to left; 60 out of 64*)
- Lack of many large, organized systems (*e.g. tropical cyclones, cutoff low, large MCS*). Rainfall has been more localized and random.

June 2022

SUN	MON	TUE	WED	THU	FRI	SAT
			1 SLGT	2 MRGL 1	3 MDT 1	4 MDT
5 MDT	6 SLGT	7 SLGT 4	8 SLGT	9 SLGT	10 SLGT	11 MRGL
12 SLGT	13 SLGT	14 SLGT	15 SLGT	16 SLGT	17 SLGT	18 MRGL
19 MRGL	20 SLGT	21 MDT	22 SLGT	23 MRGL	24 SLGT	25 SLGT 1
26 SLGT	27 SLGT	28 MRGL	29 MRGL	30 SLGT		

July 2022

SUN	MON	TUE	WED	THU	FRI	SAT
					1 SLGT	2 SLGT
3 SLGT	4 SLGT	5 SLGT	6 MDT	7 MDT	8 MDT 2	9 MDT
10 SLGT	11 SLGT	12 SLGT	13 SLGT	14 SLGT	15 SLGT	16 MRGL
17 SLGT	18 SLGT	19 SLGT	20 SLGT	21 MRGL 3	22 MRGL	23 MDT
24 SLGT	25 SLGT	26 MDT 1	27 MDT 1	28 MDT 38	29 MDT	30 SLGT
31 MDT 1						

August 2022

SUN	MON	TUE	WED	THU	FRI	SAT
	1 SLGT	2 MDT	3 SLGT 1	4 SLGT	5 SLGT	6 SLGT
7 MDT 1	8 SLGT	9 SLGT	10 SLGT	11 SLGT 2	12 SLGT	13 SLGT
14 SLGT	15 SLGT	16 SLGT	17 SLGT	18 SLGT	19 MDT 1	20 MDT
21 MDT	22 MDT	23 MDT 1	24 MDT	25 SLGT	26 SLGT	27 SLGT
28 MRGL	29 SLGT 2	30 SLGT	31 MDT			

September 2022

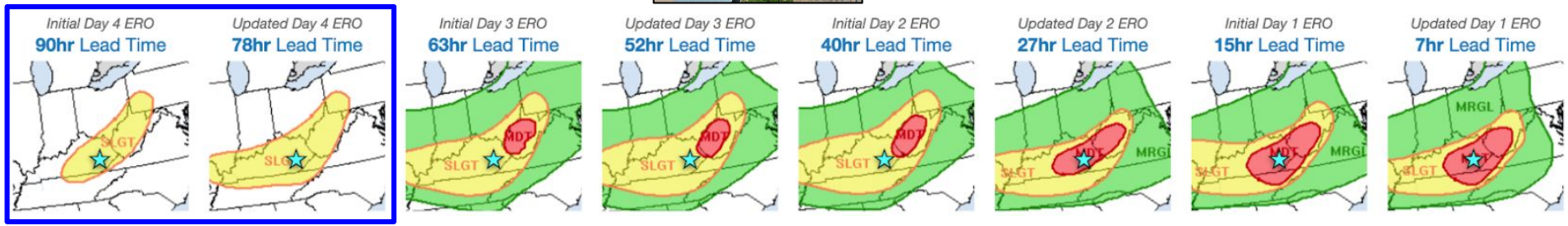
SUN	MON	TUE	WED	THU	FRI	SAT
				1 MDT	2 SLGT	3 SLGT 1
4 MDT	5 MDT	6 SLGT	7 SLGT	8 SLGT	9 MDT	10 SLGT
11 SLGT	12 SLGT	13 MDT				

n = number of flood fatalities (preliminary)

Immediate Benefits from ERO Extension

NEW THIS YEAR: ERO extended to Day 4 and 5, extra lead time for big events

Example below shows the progression for the devastating Kentucky floods in late July

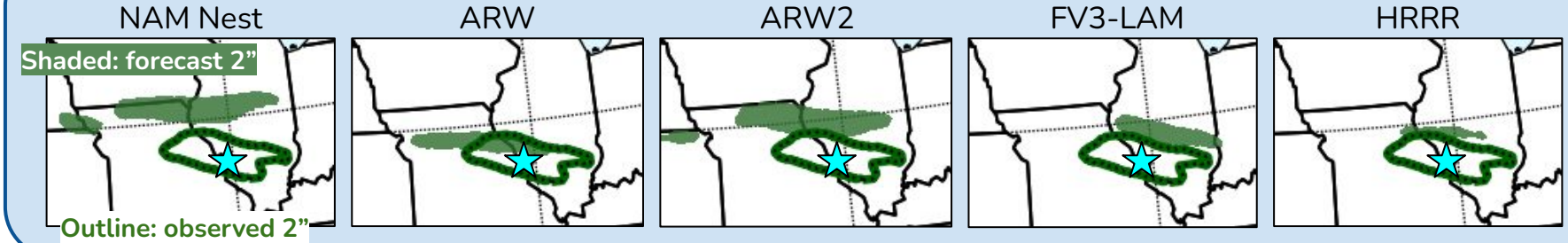


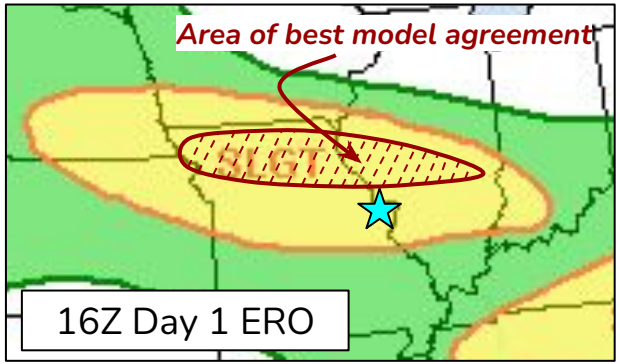
- Need to evaluate verification data to assess some key questions before next steps:
  - Should we include Marginal Risks (being practiced internally) beyond Day 3?
  - Should we test an extension further out to Day 7? What is the skill at those lead times?

- Example: Marginal Risk was outlined in advance of June Yellowstone flooding on Day 5
  - Low probabilities can be meaningful, especially at longer lead times in sensitive areas

ERO Case Study: St. Louis Event

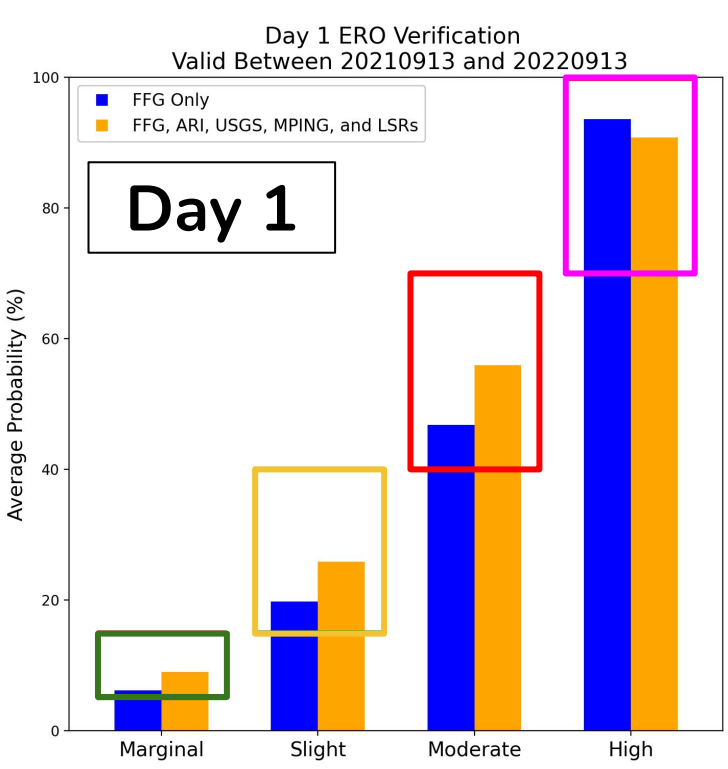
What do you do when the models agree on an extreme event, but not the location?

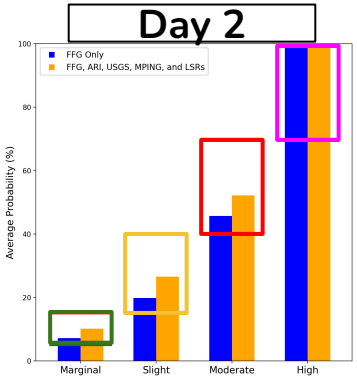


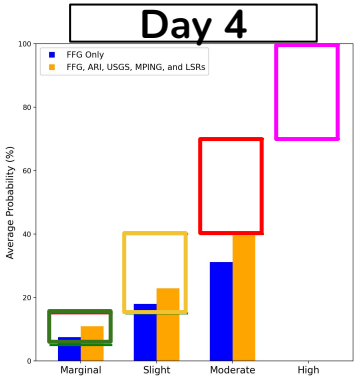


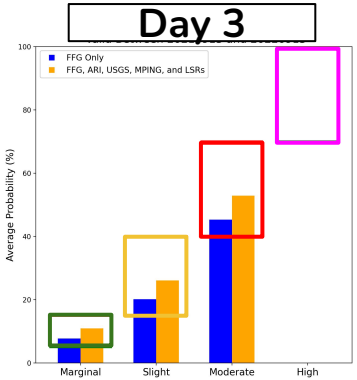
- Forecaster used experience and their understanding of atmospheric and statistical uncertainty to draw a broader risk area that crucially DID include St. Louis.
- Many hi-res models had some degree of error to the north
- Overfitting the risk to the hi-res signal likely would have “overwarned” areas too far north, potentially “underwarned” STL

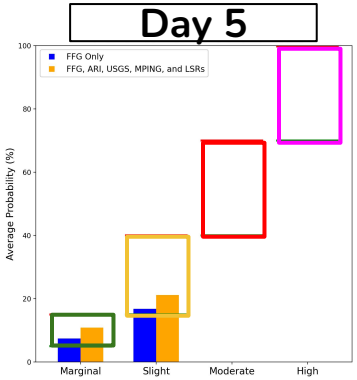
ERO: How Are We Doing?











We are generally hitting the revised probability ranges

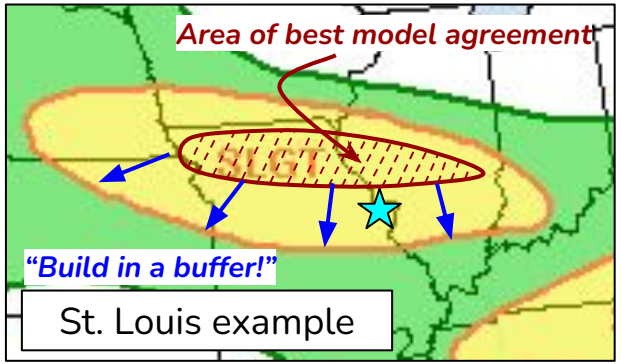
This is true even out on Day 4 and 5, suggesting that we are fairly well calibrated and reliable, BUT...

...a lower frequency bias at Day 4 and 5 suggests we are more selective about when we draw risk areas at longer lead times.

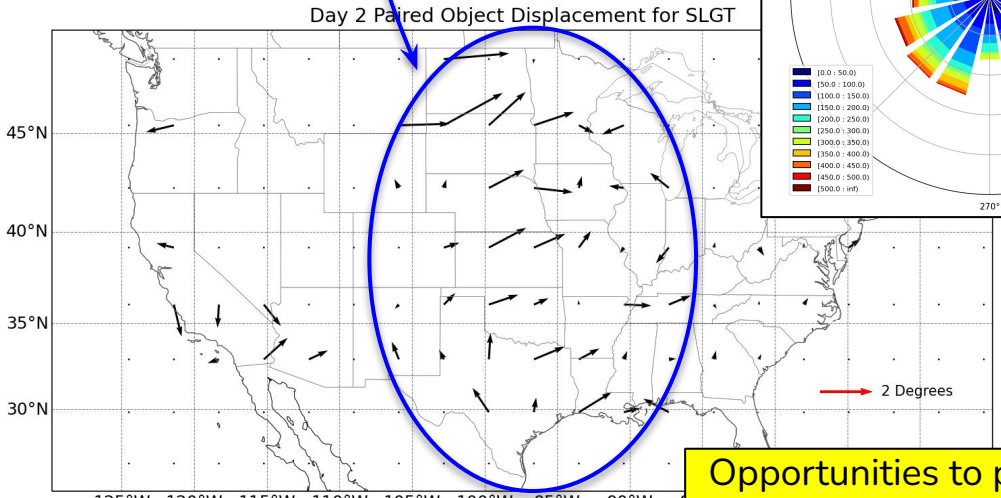
Verification → Knowledge → Application

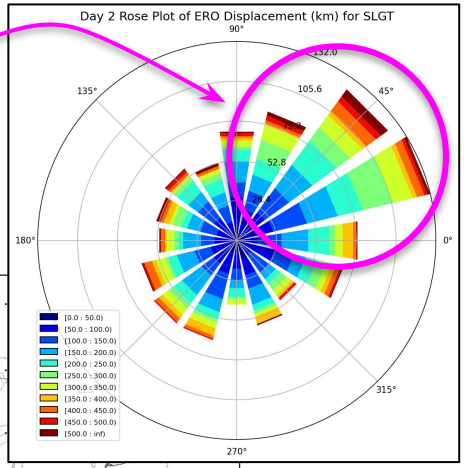
Northeastward placement bias is the most common error for our ERO Slight Risk areas across the entire country, and especially over the Central U.S.

Knowledge of this common statistical error and conceptual models can factor into forecaster decisions. Sometimes we have to draw the risk areas bigger than we'd like.



St. Louis example





Day 2 ERO verification plots here

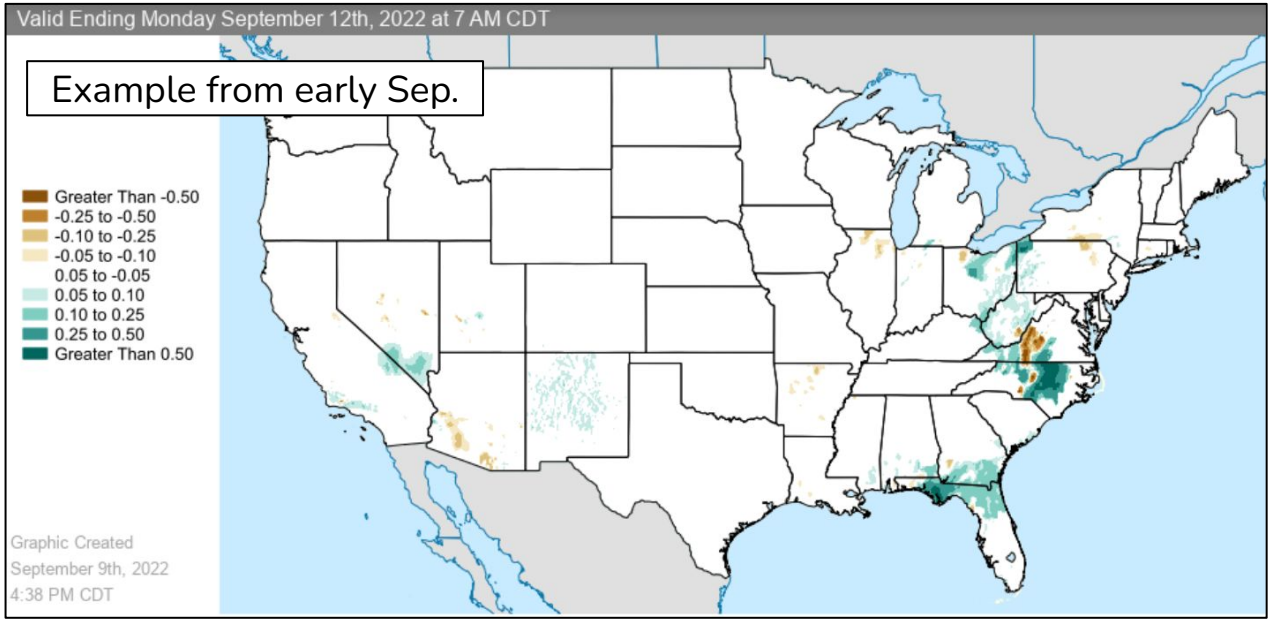
Opportunities to partner with others on unique verification?

Collaborative Forecast Process (CFP)

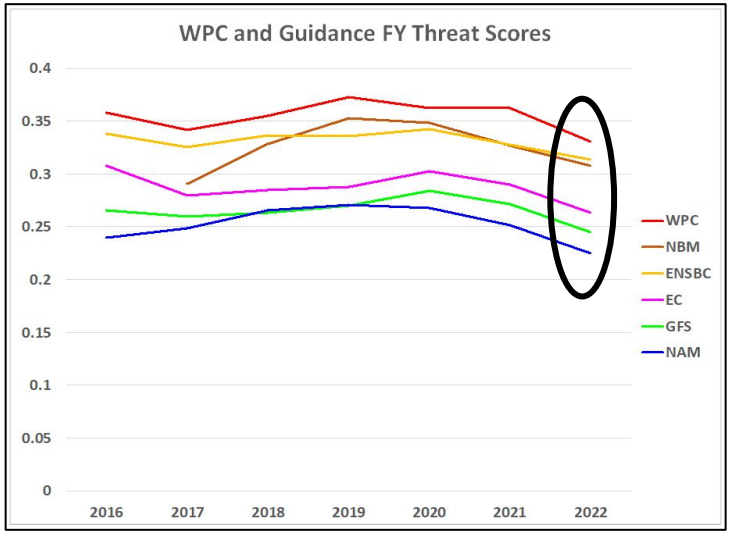
- QPF CFP demonstration started in August
- The goal is “one NWS QPF”
- Still noticing some edits after defined collaboration window; some occasional big edits as well
- How does this fit in the hydro workflow? Let’s talk.
- Yet to see how this will work in winter when small changes in QPF can make big differences in snow/ice

Culture change takes time. Still seeing some post-collaboration editing.

Below map shows NDFD-WPC Day 2-3 QPF. Green = NDFD higher. Brown = WPC Higher.



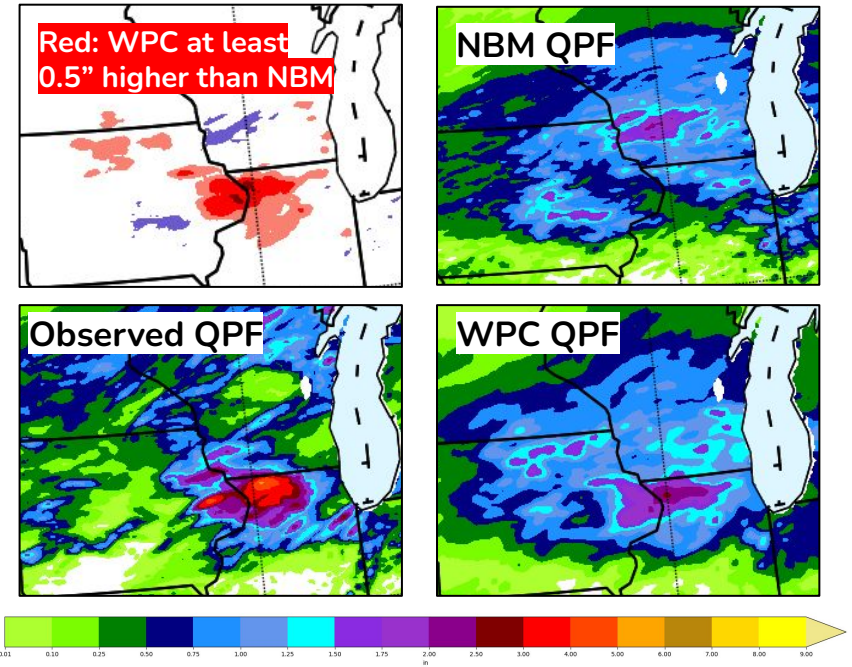
Lack of Large Systems = QPF Challenges



- Threat scores are down this year across the board, not just human forecasts
- Very likely due to a systematic atmospheric cause – lack of widespread rain events

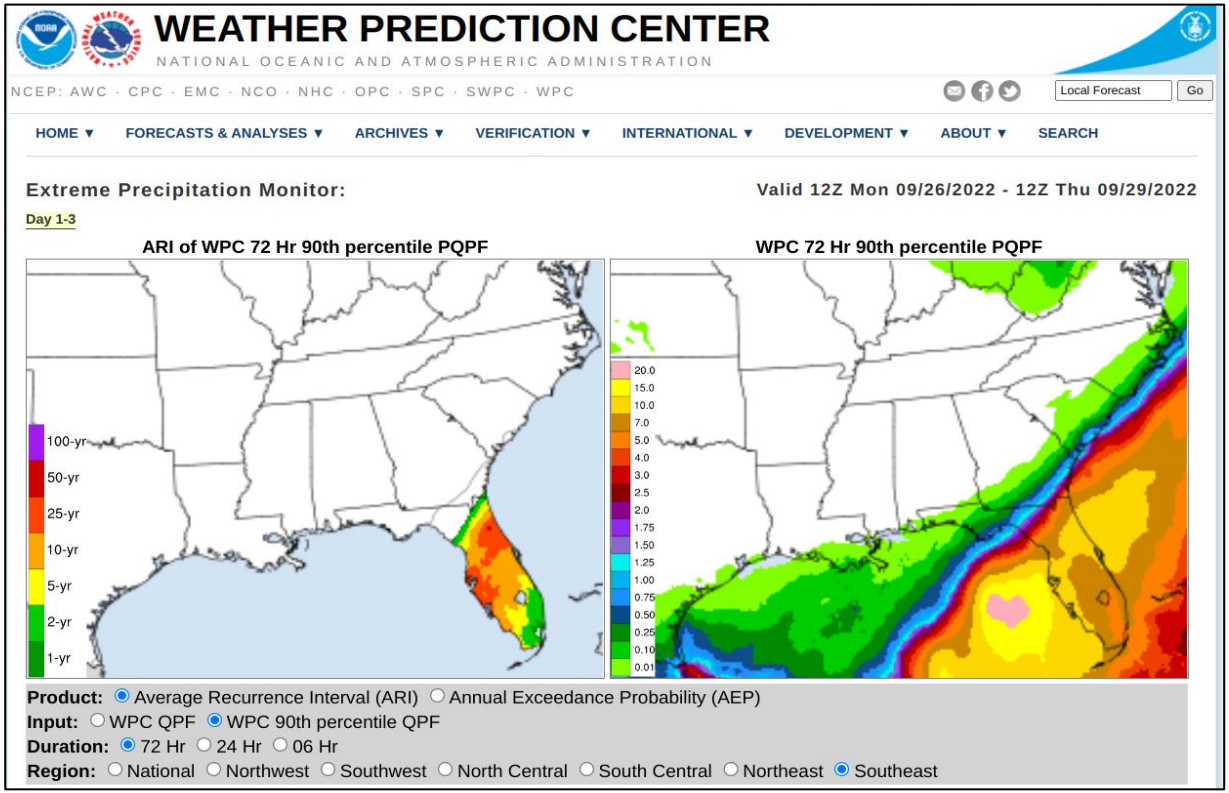
Still have seen some successful CFP edits to NBM

Example: 12Z August 7 to 12Z August 8 below



Extreme Precipitation Monitor

- Utilizes Probabilistic QPF (PQPF) at upper percentiles
- “Reasonable worst case?”
- AEI and ARI output
- Useful for tropical regimes where rainfall efficiency may exceed deterministic forecasts
- Caveat! Percentiles are grid based, not area coverage



Thank you and I'm happy to answer any questions you may have.

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