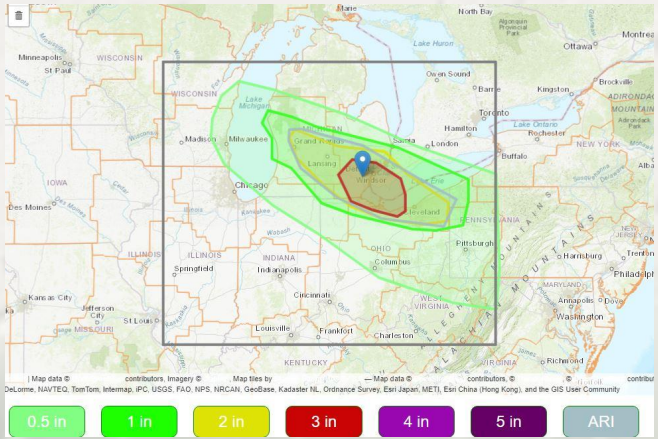
How to be FFaIR

FFaIR - the Flash Flood and Intense Rainfall experiment



June 5 - 9 (virtual)
June 12 - 16 (virtual)
June 26 - 30 (hybrid)
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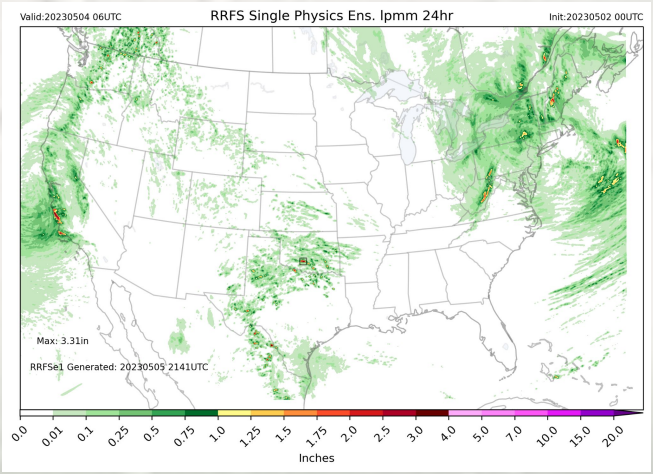


Sarah Trojniak - FFaIR Facilitator

James Correia - Testbed Coordinator

James Nelson - Testbed Manager

Kirstin Harnos - Testbed Liaison

Massey Bartolini - WWE Facilitator

The Hydrometeorology Testbed at the Weather Prediction Center (HMT-WPC)

Mission: to accelerate the assessment and implementation of new technology, research results, and other scientific advancements from the research and development communities to enhance WPC and NWS products and services, focusing on precipitation.

Our Testbeds:

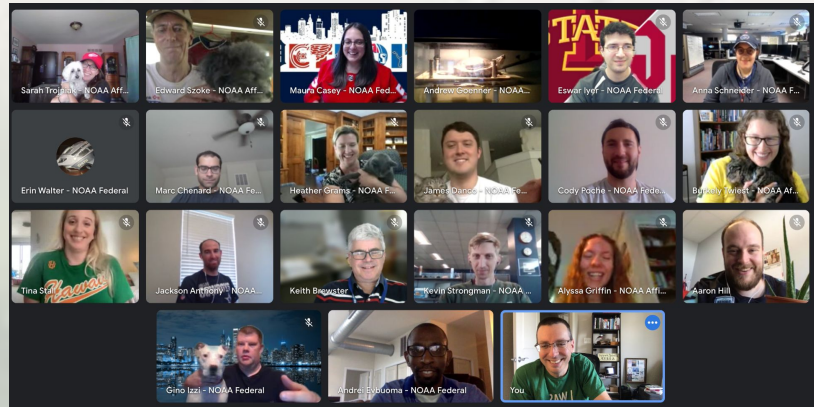
- Flash Flood and Intense Rainfall (FFaIR) Experiment
  - Mid June to mid July
- Winter Weather Experiment (WWE)
  - Feb and March
- Extended Range Forecasts (Year round)

Roles:

- Test new forecasting products, tools and techniques
- Sit at the intersection between Research and Operations (R2O2O)
- Test new ways to identify regions of concern and communicate risk
- Evaluation of deterministic and ensemble models

Collaborators:

- Other NOAA Testbeds and forecasters
- Research and Academic Institutions
- Model Developers



Relaying Findings to Model and Product Developers

R2O2R

- **CSU First Guess ERO MLPs**
  - Original GEFS-based version implemented into operations in 2020 and 2021 (paper: Schumacher et. al. 2021).
  - New GEFS-based recommended for transition (FFaIR 2022).
  - Updates to HRRR-based version.
- **TPW and ALPW Satellite products (CSU-CIRA)**
  - Total PWAT and advected layer PWAT currently being transitioned into operations.
  - New products being evaluated this year.
- **Deterministic and Ensemble models**
  - Testing of HRRRv4 and HREFv3
  - RRFS configurations since 2018 (OU-CAPS provided 2 configurations in 2018).
  - New mean products: PMM, LPMM, and SAMs

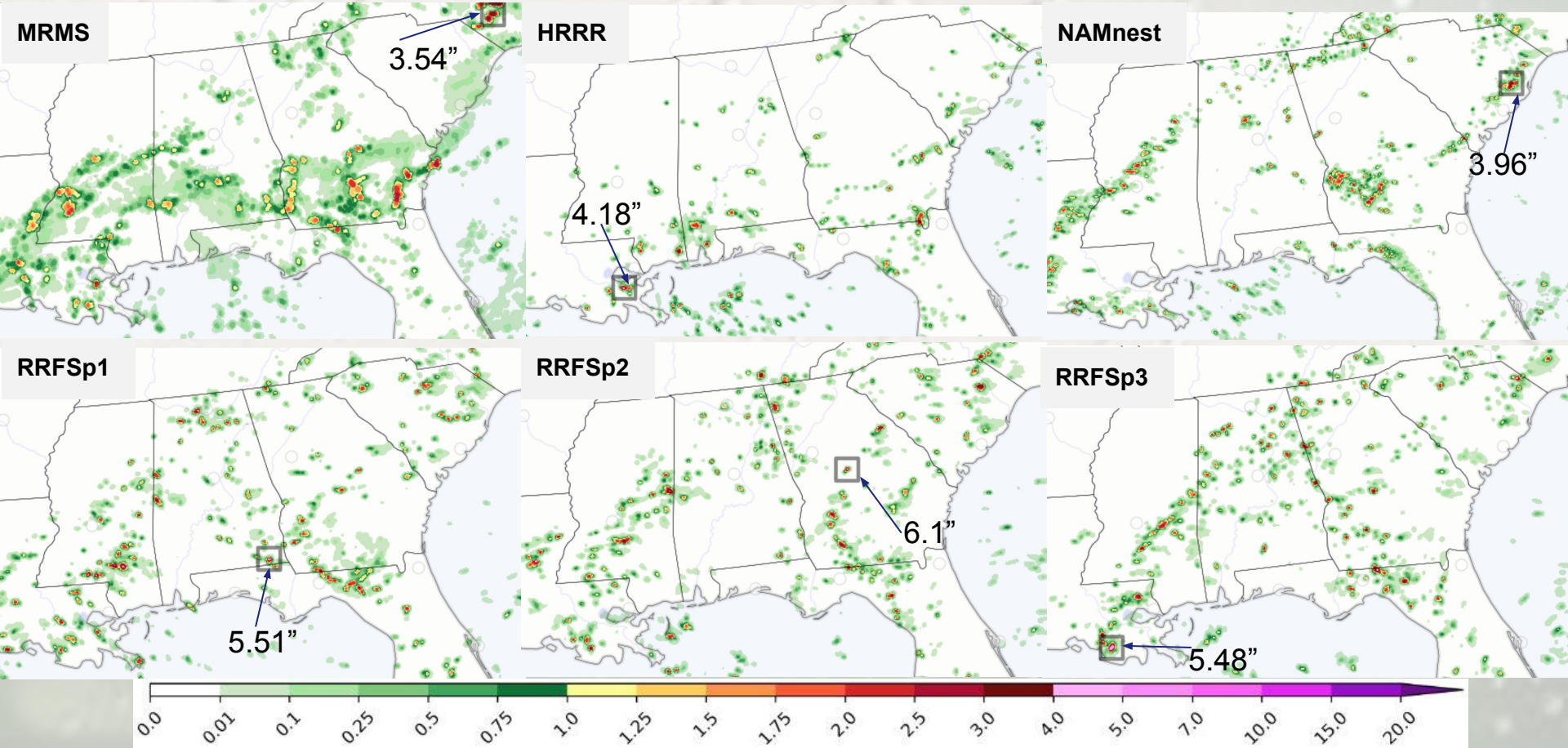
RRFS Development from 2020 to now in FFaIR

- **2020 evaluation of Nested vs Stand-alone CAM**
  - Testing to move RRFS from nested in GFS.
- **Wet bias**
  - Noted in results of FFaIR 2019 and continued through FFaIR 2022.
  - Often wetter than the NAMnest
  - In FFaIR 2022, participants said that overall the precipitation was looking more realistic than in past years, but that they don't trust the amounts
- **Grid-point (popcorn) convection**
  - First noted in FFaIR 2020 that popcorn/weakly forced convection had high hourly totals in nearly every cell forecasted
  - Reminded participants and FFaIR team of grid-point storms
- **High precipitation rates**

*from FFaIR 2022 MEG Presentation

Pop Pop, up goes the storms in the RRFSp#

June 29 F21 1h Precip



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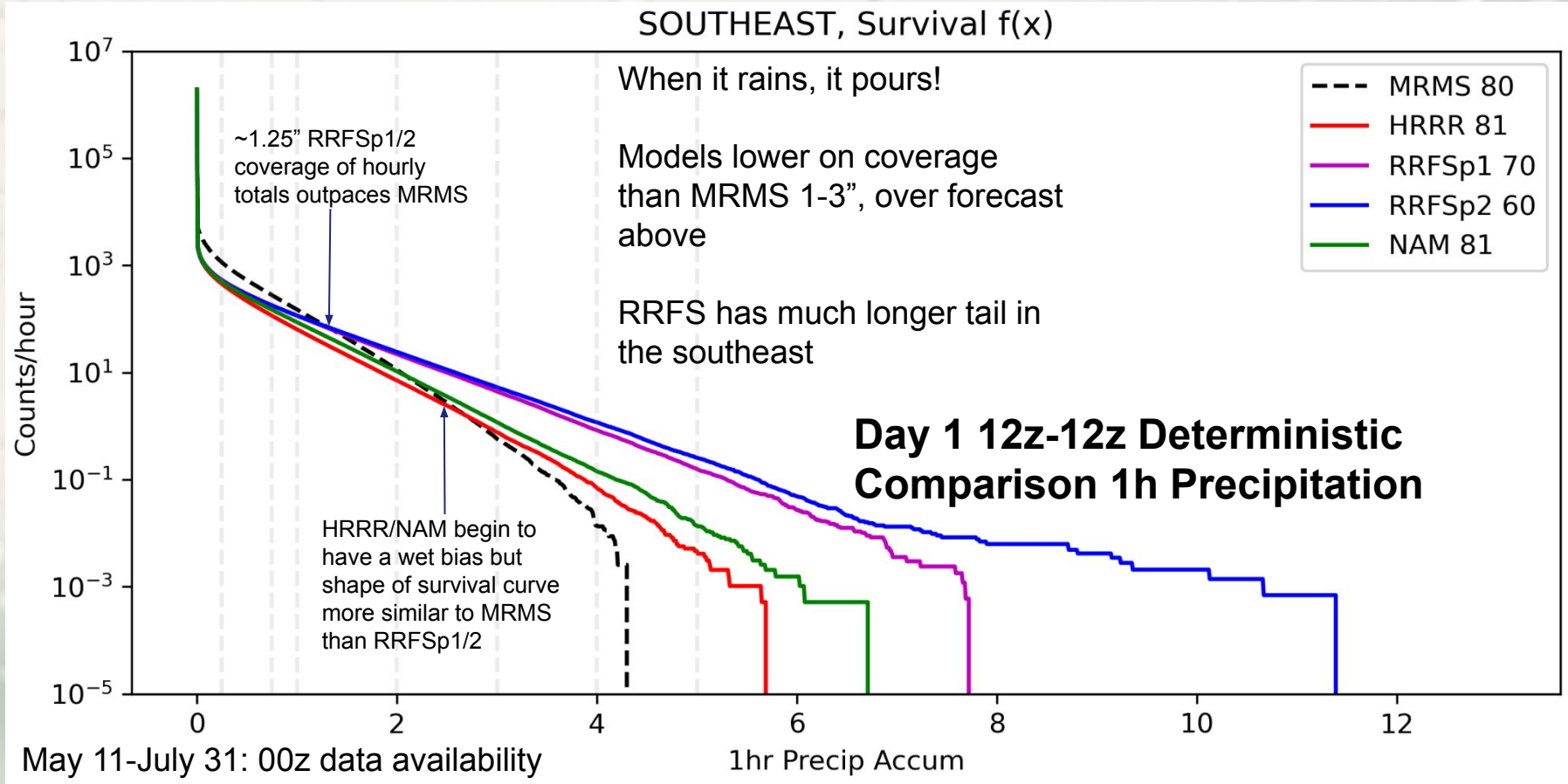
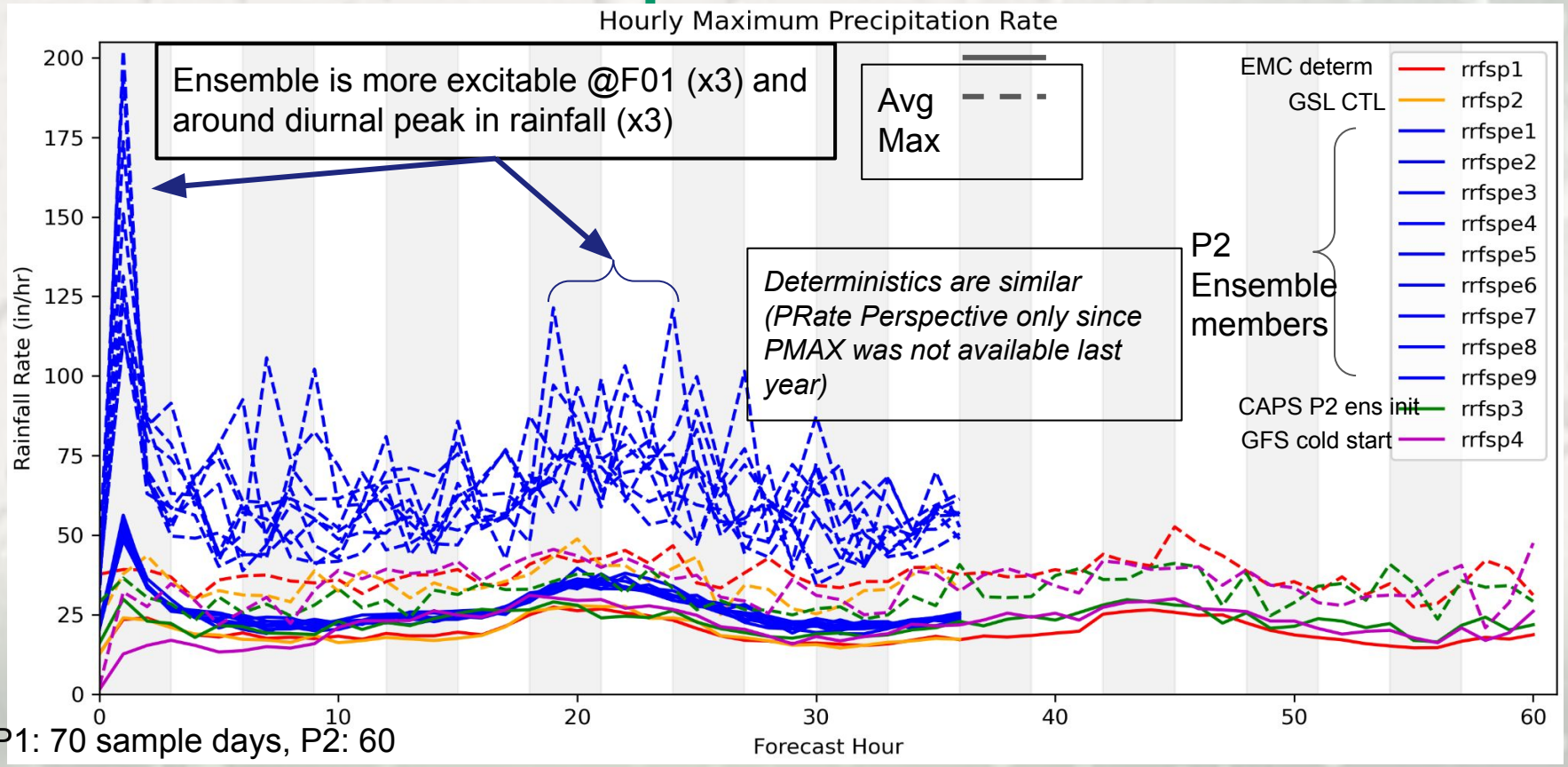
Precipitation: Statistical Perspective



*from FFaIR 2022 MEG Presentation

Precipitation Rate



P1: 70 sample days, P2: 60

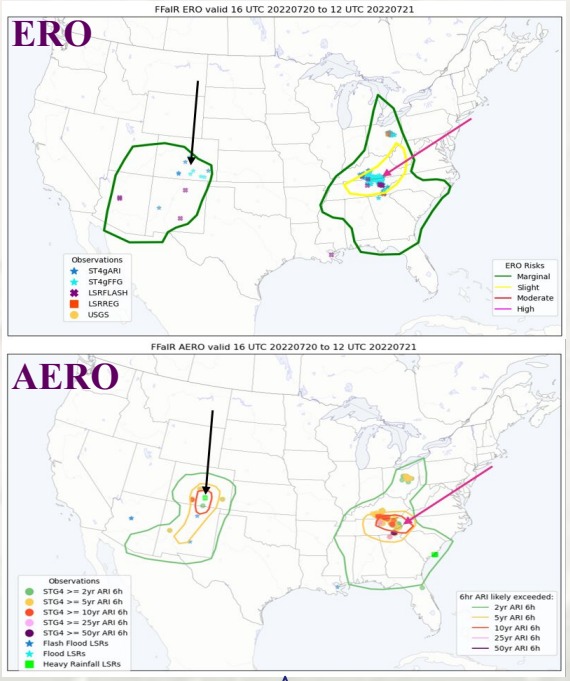
P3: 10 sample days, P4: 14

May 11-July 31: 00z real-time data availability Daily Max over the CONUS and near shore waters domain

FFaIR - 2 1/2 parts

Forecasting Activities

- **ERO**
  - Day 1 collaborative and individual conus forecast: Test new guidance products.
- **AERO** (ARI-based ERO)
  - Explore what an excessive rainfall product based on intensity rather than coverage could look like.
- **MRTP** (Maximum Rainfall and Timing Product)
  - Identify the forecast precip extremes for Day 1 and 2, MPD style: timing, magnitude, extent, confidence.



Verification Activities

- **Rapid Refresh Forecast System**
  - Help provide verification feedback to what will become the new NWS suite of models and ensembles.
  - Get a first hand look at how time-lagged ensembles compare to non-lagged ones and mixed physics compare to perturbations.
- **Machine Learning Products**
  - Can ML methods improve ensemble probs?
  - How do CSU's newly trained ML ERO products compare to the operational ones?
- **CIRA Satellite products**
  - Provide direct feedback to the development team about their new TPW/ALPW products.

Science Seminars

Science Seminars

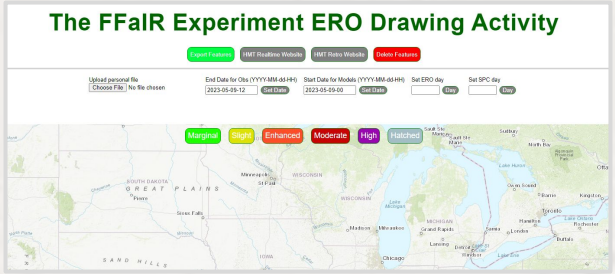
meet.google.com/eqm-sxcy-qdt

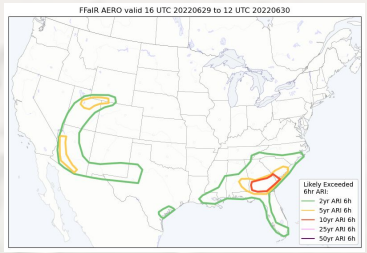
Seminar Date	Name(s)	Topic/Title	Affiliation
Tues. May 30	Sarah Trojniak and Jimmy Correia	How to be FFaIR	CIRES/CIESRDS@ WPC-HMT
Thurs. June 1	Peggy Lee	An overview of the NWC's experimental products: the FHO, AHD, and NHD	NWC
Tues. June 6	Andrew Osborne	MRMS Machine Learning QPE	OU-CIWRO @ NOAA/OAR NSSL
Thurs. June 8	Jane Marie Wix	"A Recap of the July 2022 Eastern Kentucky Flooding"	WFO Jackson, KY
Tues. June 13	Erik Nielsen and Jen Henderson	"Current Knowledge about TORFFs in both the social and physical science realms"	TTU
Thurs. June 15	Jacob Carley	"The Status of the First Version of the Rapid Refresh Forecast System"	EMC
Tues. June 27	Aaron Hill and Russ Schumacher	"Progress towards medium range excessive rainfall forecasts with the CSU-MLP"	CSU
Thurs. June 29	Kristie Franz	"QPF driven ensemble streamflow predictions using three different hydrologic models"	ISU
Tues. July 11	Marc Chenard	"WPC Excessive Rainfall Outlook: Overview, recent verification, and a look ahead"	WPC
Thurs. July 13	Janice Bytheway and Diana Stovern	"Characterization of extreme precipitation in the HREF"	PSL
Tues. July 25	Keith Brewster and Nate Snook	"FV3-LAM & HREF CAM Ensemble Consensus and Machine Learning Products for FFaIR"	OU CAPS
Tues. August 1	JJ Gourley	Flash Flood Flashiness	NSSL
Thurs. August 3	Brenda Philips	Flash Flood Response	UMass
Tues. August 8	Mark Glaudemans	"Water Model Geospatial tools and Inundation Maps"	NWS
Thurs. August 10	Steve Martinaitis	"Initial Work on Precipitation Nowcasting within MRMS"	OU-CIWRO @ NOAA/OAR NSSL

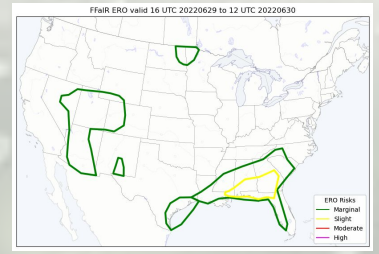
Forecasting

ERO and AERO - valid Day 1

These are the morning activities and are done in break-out groups. This year, everyone will draw their own product depending on their group as well as help create a collaborative product.

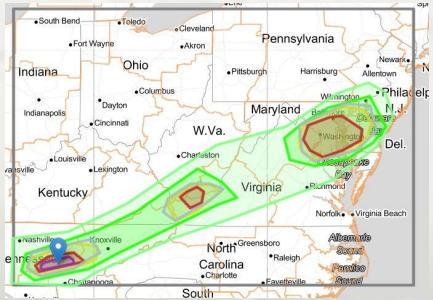


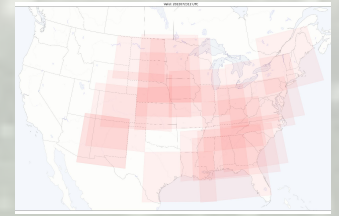




MRTP - 6h forecast

Collaborate with the group to pick a 6h window between 21 and 12 UTC and the region in which you think the heaviest rainfall/greatest rainfall coverage will occur. Then create your own forecast to verify the following day.





Websites

Use our realtime website to look at operational and experimental guidance and products and our interactive drawing tools to forecast.

Realtime Site - https://www.wpc.ncep.noaa.gov/hmt/hmt_webpages/hmt_webpage.php

ERO Site - https://www.wpc.ncep.noaa.gov/hmt/hmt_webpages/drawingtools/ero.html#

AERO Site - https://www.wpc.ncep.noaa.gov/hmt/hmt_webpages/drawingtools/aero.html#

MRTP Site - https://www.wpc.ncep.noaa.gov/hmt/hmt_webpages/drawingtools/MRTP.html#

Retro Site - https://www.wpc.ncep.noaa.gov/hmt/hmt_webpages/hmt_retro.php

Verification

RRFS

What does the 24h/6h QPF look like compared to MRMS-GC?

Do the precip rates seem reasonable?

Does the RRFS seem to have enough spread? Do the probabilities seem reasonable?

Impact of DA?

OU ML Ens. Probs.

Does applying training to the ensemble members help create a better 6h QPF probability of exceedance?

CSU ML EROs

How do the various training methods compare to one another?

How do they compare to the ERO you drew?

Discussion and feedback to developers.

Your forecast!

How well did your AERO/ERO do? What about compared to the collaborative ones?

How did your MRTP do? Where you the closest to the maximum rainfall observed in the group?

Use the drawing tools to upload your forecast and compare to LSRs interactively.

Verification Websites

Verification -
https://www.wpc.ncep.noaa.gov/hmt/hmt_webpages/verification/ffair/

MODE
https://origin.wpc.ncep.noaa.gov/hmt/hmt_webpages/mode/ffairmode.php

MRTP -
https://www.wpc.ncep.noaa.gov/hmt/hmt_webpages/verification/mrtp/

Dashboards -
https://www.wpc.ncep.noaa.gov/hmt/hmt_webpages/drawingtools/dashboardv2.html
https://www.wpc.ncep.noaa.gov/hmt/hmt_webpages/drawingtools/ensemble_dash.html

Questions/Comments?

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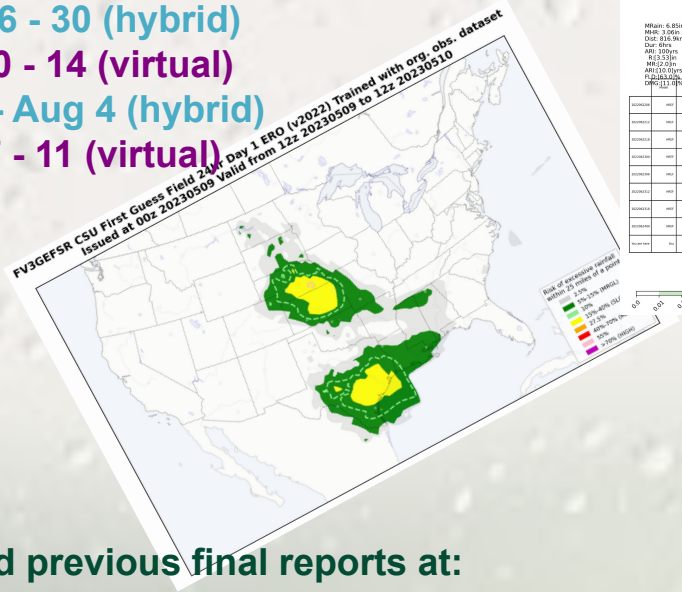

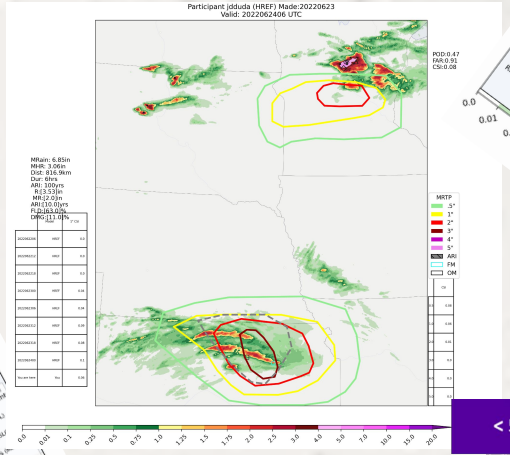

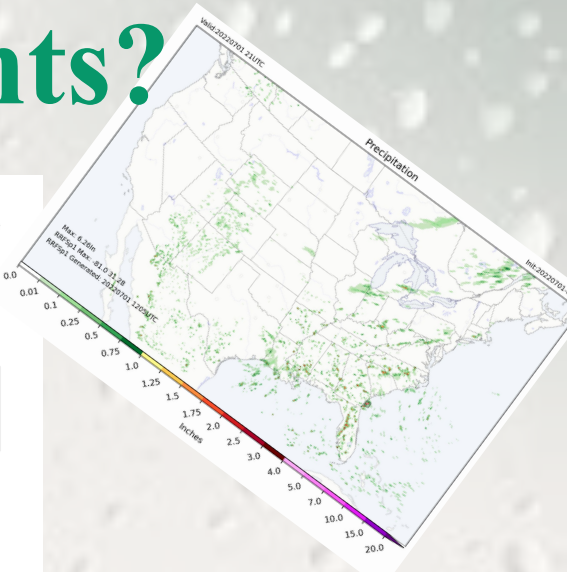

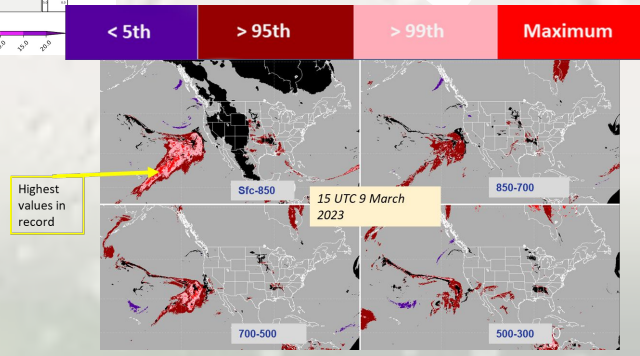

Find previous final reports at:
https://www.wpc.ncep.noaa.gov/hmt/experimentsummaries.shtml

MEG recording for 2022 FFaIR:
https://drive.google.com/file/d/1xHkT-I_1xTogi7PkTAVxeH_ggd-s_Mqz/view?usp=share_link

CONTACT US!

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