NATIONAL WEATHER SERVICE

Ensemble Fluency

Diving Deeper Into Using Ensemble Output

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Graphics shown on this page are the official NWS forecast as well as those generated/derived from the NWS National Blend of Models (NBM) version 4.1. They are broken down into three parts:

- **Expected** - these are the official NWS Forecast temperatures and rainfall.
- **Percentile** - these graphics are generated/derived from the NWS NBM and represent the 10% and 90% percentiles for the temperature and rainfall. They depict the coolest/warmest possible temperatures and least/greatest possible rainfall amounts.
- **Probability of Exceedance** - these graphics are generated/derived from the NWS NBM and represent the probability that the temperature will exceed a certain value.

Click on an image below for an interpretation of the different types of graphics.

Expected Temp (Forecast)

90% Percentile Temp (High End)

10% Percentile Temp (Low End)

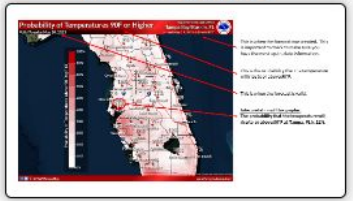
Probability of Exceedance

Expected Rain (Forecast)

90% Percentile Rain (High End)

10% Percentile Rain (Low End)

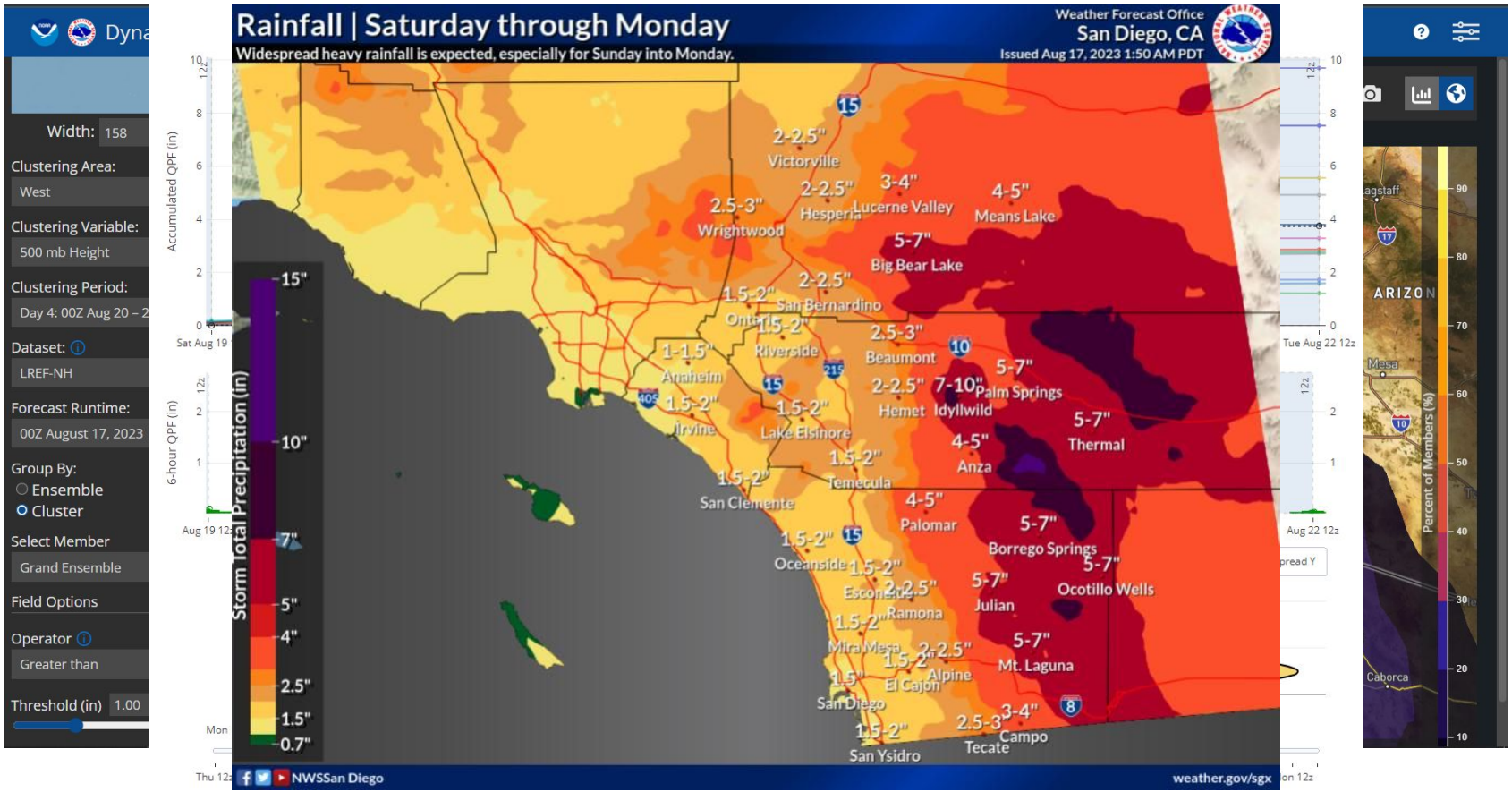
Probability of Exceedance



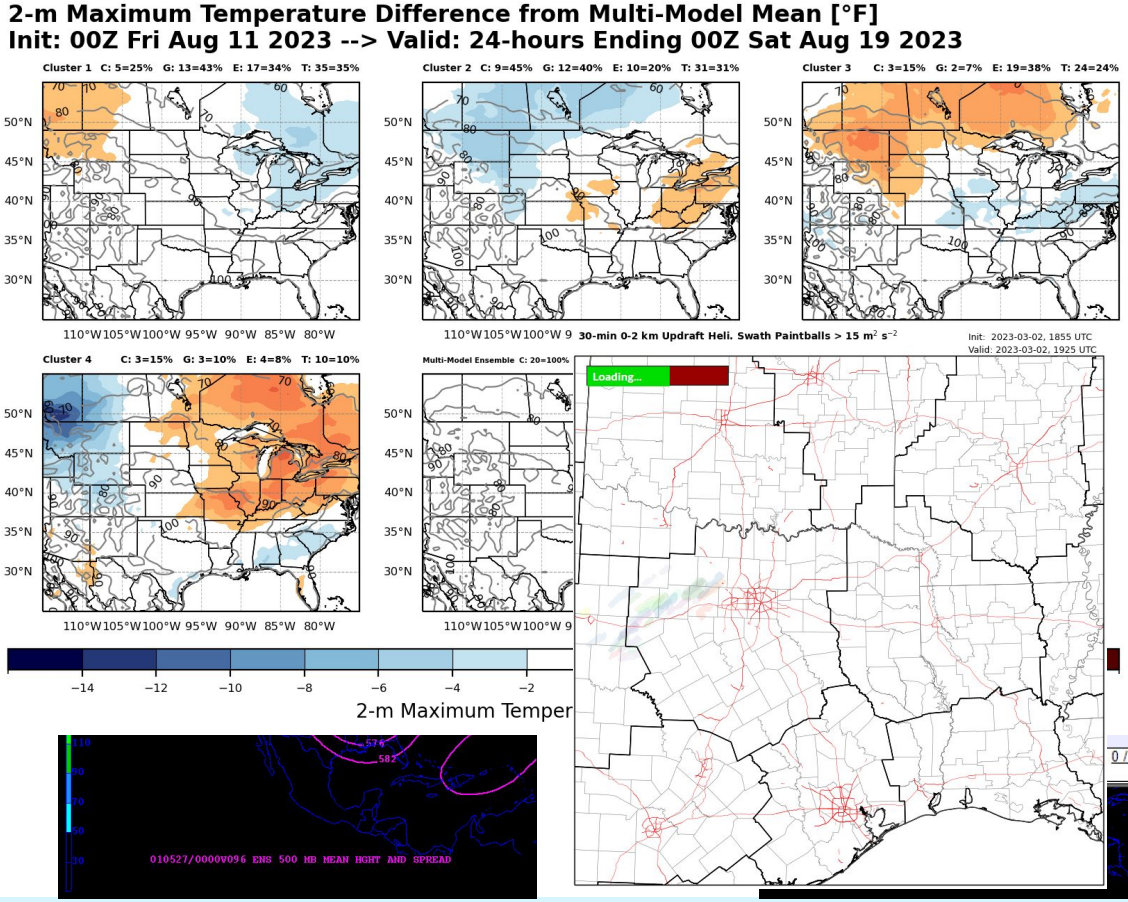
The graphics on these pages are updated at least twice per day, shortly after 4 AM/4 PM.

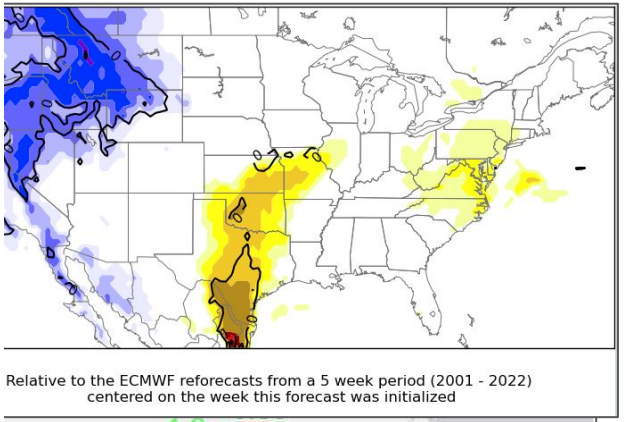
More detailed information about the NWS National Blend of Models (NBM) can be found here.

Where we Want to Move Towards

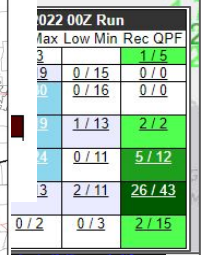


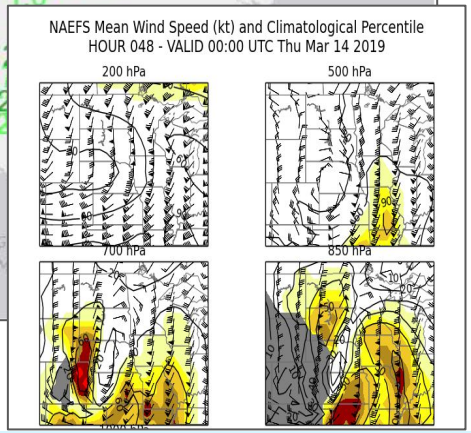
How do we Incorporate All of This?





Relative to the ECMWF reforecasts from a 5 week period (2001 - 2022) centered on the week this forecast was initialized





Ensemble Fluency: Background and Purpose

- **Short term goal of Ken's 10 Probabilistic IDSS team**
  - Curate existing materials and develop limited new materials to bring all meteorologists and hydrologists up to a baseline working understanding of ensembles
  - **Expected to be nationally-required for all meteorologists and hydrologists**
  - Target release date: **January 2024**

- **Our Definition of Ensemble Fluency:**
  - The ability to ask the right questions of the datasets/distributions you have available to you to understand the meteorological reasoning behind each grouping of members
  - Providing realistic forecast probabilities around the distribution of ensemble members within the context of meteorological events

“Ensemble Fluency” Training

Primary learning objectives

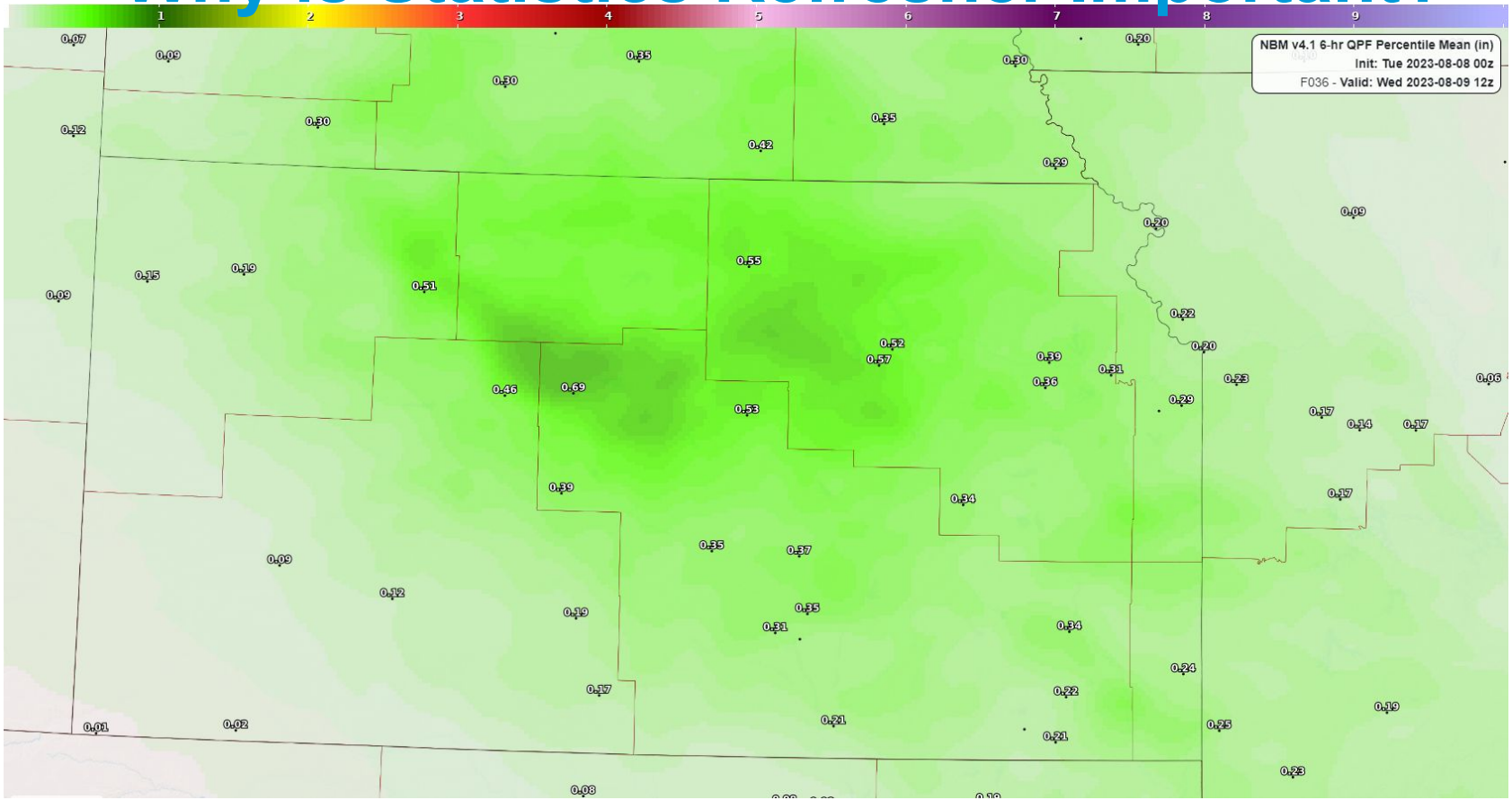
Statistics/probabilities basics

- Appropriate distributions: Gamma vs. Gaussian, etc.
- Visualizations: Violin plots vs. box/whiskers, etc.

Understanding resolvability

- Comparing characteristics of ensemble systems with temporal & spatial scales of potential hazards
- Blending techniques strengths/weaknesses

Why is Statistics Refresher Important?



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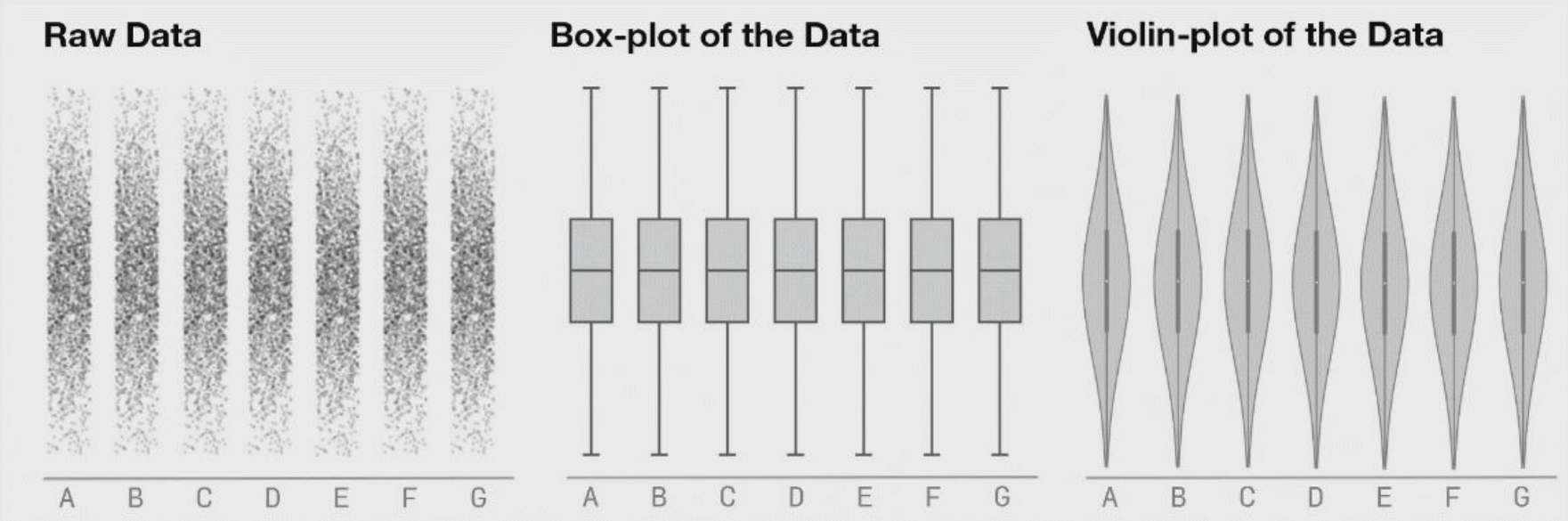
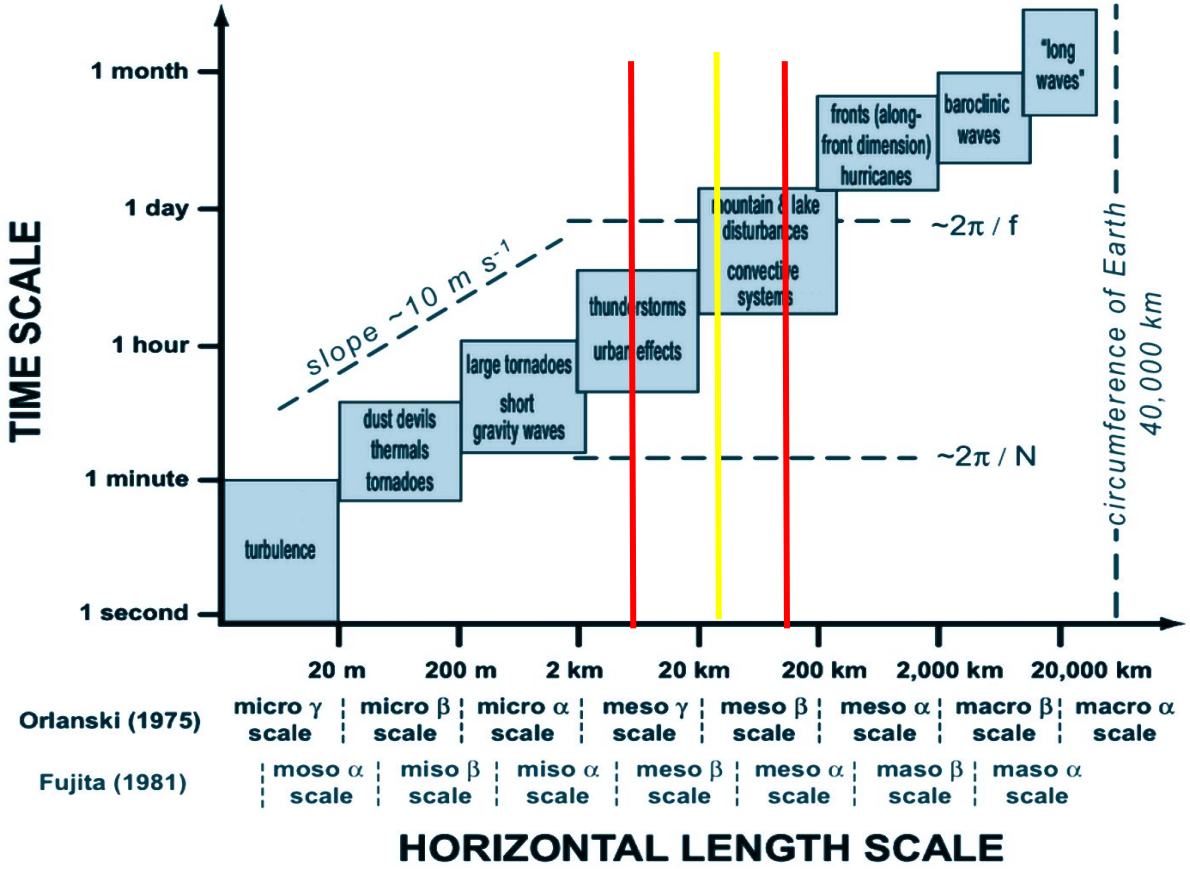
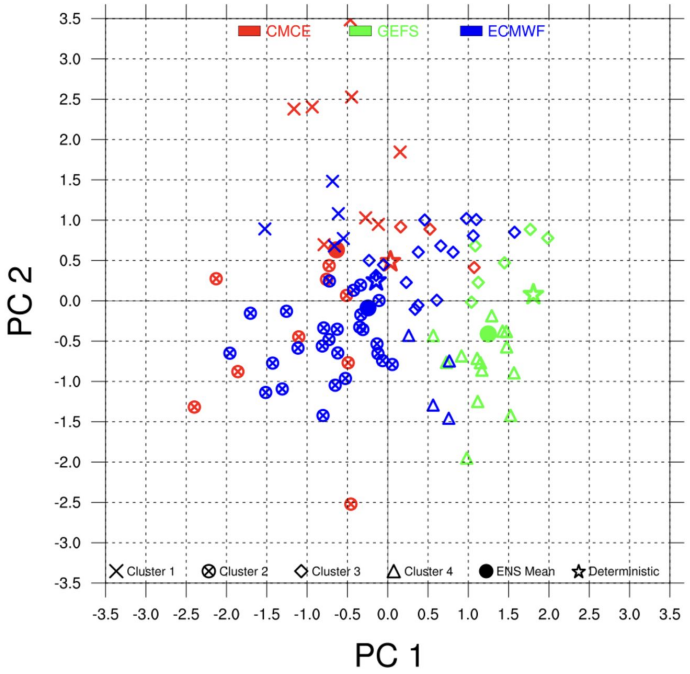


Image from Same Stats, Different Graphs, Justin Matejka, https://www.research.autodesk.com/publications/same-stats-different-graphs/

Why is Resolvability Important?



“Ensemble Fluency” Training



Primary learning objectives, cont’d

Tools and visualizations

- M-climate tools like EFI/SOT
- When to use products like LPMM vs. percentiles
- Ensemble Agreement Scale
- Situational Awareness Table
- Cluster analysis basics - strengths/weaknesses

“Ensemble Fluency” Training

Primary learning objectives

Introduction and Conclusion

- Help NWS Workforce understand WHY fluency is important to their workflow
- Goal is to give the workforce basic tools to provide the best information for Decision Support Services
- Emphasize this is just the start!
  - Cost/Loss analysis
  - Words of Estimated Probability

Where does the Ensemble Community Fit?

Keep us in the loop…with lead time!

Modeling Changes

- Resolution changes = resolvability changes
- How will this impact post-processing (9 km vs 24 km)

Climatology-based Suites

- Lots of success with M-Climate EFI/SoT from ECMWF
- Again, more Reanalysis/Reforecast!

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Questions?

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