Hydrometeorological Prediction Center Utilization of Mesoscale Probabilistic Prediction

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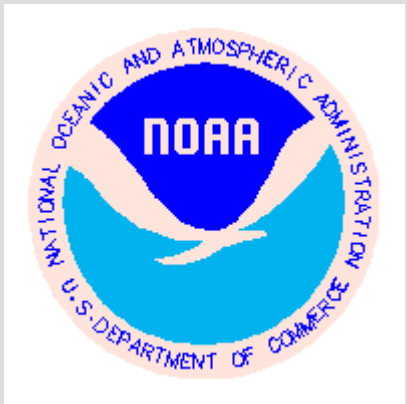

Overview of HPC *Manual* Products

Operational Desk	Projection Range	Product Content	Characterization	Available Formats
Winter Weather	24—72 hrs @ 24 h	24-h Snow & Ice Accumulations	Probabilistic (categorical)	Graphical
Day 1 QPF & Day 2—3 QPF	6—72 hrs @ 6 h	6-h Precipitation accumulations	Deterministic	Graphical & Gridded
Short Term Weather	6—60 hrs @ 6 h	Fronts, MSLP, scattered/broken precipitation	Deterministic	Graphical
Medium Range	72—168 hrs @ 12 h	Fronts, MSLP, max/min temps, PoP	Deterministic & Probabilistic (PoP)	Graphical &/or Gridded
Alaska	96—192 hrs @ 24 h	Fronts, MSLP, max/min temps, PoP	Deterministic & Probabilistic (PoP)	Graphical &/or Gridded

Forecasters often create products using a poor man's ensemble approach treating ensemble means as a “member” in the blend.

Current HPC *Derived* Products

- Primary products:
  - Prototype QPF confidence interval guidance
  - Probabilistic Heat Index Products
  - Gridded NDFD elements for days 3—7; days 4—8 for AK Desk
  - Web content (images, KML, GIS)
- Generation methods:
  - Transform the human forecast
  - Combine the human forecast with multiple model and ensemble forecasts
- Future derived products are planned

These products are created automatically, but are based on a human forecast.

Value of Probabilistic Guidance

- Human forecasters can make effective use of uncertainty information in creating deterministic forecasts.
- Human forecasters cannot create probabilistic forecasts in a timely and efficient way using only deterministic guidance. They must have a first guess probabilistic forecast to guide them. (my experience and my opinion)

Useful Types of Mesoscale Probabilistic Guidance

- ✔ Probability of exceeding a threshold
- ✔ Percentile quantities
- ✔ "Spaghetti" plots
- Confidence intervals (e.g., ensemble max - min)
- Event characterization probabilities:
  - Precipitation type
  - Convective mode
  - Multi-variate conditional probabilities

√ Denotes guidance most readily available to HPC forecasters.

Future Trend: Decision Support for High-Impact Events

- Need reliable probabilities of occurrence for mesoscale phenomena
  - orographic effects
  - boundaries
  - precipitation bands
- May need more output fields to enable computation of probabilities of various impacts
- Need more detail (spatial and temporal) at longer lead times

Future Role of Mesoscale Probabilistic Guidance for HPC

- Improve deterministic human forecasts
- Improve existing probabilistic human forecasts
- Improve existing automated probabilistic forecasts
- Expand suite of automated probabilistic forecasts:
  - Prototype Probabilistic QPF (FY10)
  - Probability of Freezing Rain (FY10)

HPC “WISH” List for SREF

- Increase the resolution of SREF members (high-impact events)
- Calibrate the SREF output, including QPF
- Improve the forecast accuracy of the individual members (calibration alone is not enough)
- Consider technical improvements:
  - Provide “on cycle” run times (00, 06, 12, and 18 UTC)
  - Improve data access (more of a WFO issue)
  - Provide verification for specific phenomona (e.g., cyclones, precipitation bands)
  - Expand available archive of past forecasts

Summary

- HPC human forecasters depend on mesoscale probabilistic guidance (primarily SREF):
  - To create deterministic products
  - To create probabilistic products
- HPC automated processes depend on mesoscale probabilistic forecasts:
  - To create guidance for forecasters
  - To create derived products
- HPC foresees a growing need for decision support for high-impact events, requiring improved mesoscale probabilistic guidance