Forecast Display System Priorities

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HFIP Display Systems

- HFIP has been supporting visualization of model output by providing model products display systems via its website - http://www.hfip.org/
- The HFIP experimental display systems have been effective to deliver the numerical forecasts to users.
- The HFIP experimental display systems are also used by forecasters and emergency managers.
- They may be used to assist NHC and WFO official guidance in assessing risks and may be useful for situation awareness.
NHC Display and Diagnostic System (Track and Intensity)

http://www.hfip.org/nhc-display/
Experimental Products

WARNING: These webpages contain some experimental analysis and forecast guidance of unknown accuracy and reliability. This guidance is not intended to replace official advisory, forecast, and warning products issued by the National Hurricane Center and your local National Weather Service Forecast Office. Outside of the United States, please also refer to products issued by your national meteorological service. For official forecasts consult the National Hurricane Center.

USA HFIP experimental forecast products are created June 1 through Nov 30
HFIP Experimental Forecast Display System (Track)

https://ruc.noaa.gov/tracks/
Various Products

Intensity Probabilities

Cross-section

Multi-model Diagnostics

NOAA Hurricane Forecast Improvement Project

Meeting the Nation’s Needs
https://storm.aoml.noaa.gov/basin/

AOML Hurricane Model Viewer

- Azimuthal mean radial wind
- Across-shear radial wind
- Intensity guidance
- Track trend
- Intensity trend

NOAA Hurricane Forecast Improvement Project
Meeting the Nation's Needs
Needs for Centralization

- Needs for a comprehensive display system that can
  - bring in all model and post-processed products along with observations on one single system
  - help forecasters understand underlying mechanism and aid decision making
  - serve as go-to system for monitoring and situation awareness
Display System Requirements

- To identify forecast products that are most useful for hurricane forecasters and community users
- To aid modeler to understand the end-user’s needs
- To document high priority products to improve hurricane model display systems and/or to guide a future unified display system
- To make display systems more relevant to operation

→ User survey
Overview of Survey Development

- Intended for operational users of HFIP products
  - Survey was sent to NHC HSU and CPHC

- Google form was used to develop and distribute survey

- Questions by category:
  - Model Variables - 23
  - Products - 12
  - New Features - 8
  - Optional - 1
Overview of Survey Results

Number of Responses

- NHC: 6 (85.7%)
- CPHC: 1 (14.3%)
Model Variables

Rankings by Average Score
5 - highest priority, 1 - lowest priority

Vorticity

<table>
<thead>
<tr>
<th>Average Rating</th>
<th>850 mb vorticity</th>
<th>700 mb vorticity</th>
<th>500 mb vorticity</th>
<th>200 mb vorticity</th>
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</table>

Wind

<table>
<thead>
<tr>
<th>Average Rating</th>
<th>200-850 mb wind shear</th>
<th>10 m wind</th>
<th>850 mb wind</th>
<th>700 mb wind</th>
<th>500 mb wind</th>
<th>200 mb wind</th>
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<tbody>
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</tbody>
</table>
Model Variables, Continued

Rankings by Average Score
5 - highest priority, 1 - lowest priority

- **Height**
  - 850 mb height
  - 700 mb height
  - 500 mb height
  - 200 mb height

- **Other Variables**
  - MSLP
  - 1000-850 mb thickness
  - 1000-500 mb thickness
  - 700 mb RH
  - A combined graphic with 850 vorticity, 500 height, 200 wind
  - Accumulated precipitation
  - Simulated satellite imagery
  - Simulated radar reflectivity
  - Potential temperature contours
Products

Rankings by Average Score
5 - highest priority, 1 - lowest priority

**Deterministic**

<table>
<thead>
<tr>
<th>Product</th>
<th>Average Rating</th>
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<tbody>
<tr>
<td>Track forecast plots</td>
<td>5</td>
</tr>
<tr>
<td>Intensity (wind) plots</td>
<td>5</td>
</tr>
<tr>
<td>Intensity (minimum pressure) plots</td>
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</tr>
<tr>
<td>RMW plots</td>
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<tr>
<td>Historical track plots</td>
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**Ensemble**

<table>
<thead>
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<th>Product</th>
<th>Average Rating</th>
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<tr>
<td>Ensemble and mean tracks</td>
<td>4.5</td>
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<tr>
<td>Mean tracks with intensity</td>
<td>3.5</td>
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<tr>
<td>Wind speed probability</td>
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<tr>
<td>TC Genesis probability</td>
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<tr>
<td>Probabilistic Rapid Intensification</td>
<td>5.0</td>
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<tr>
<td>Storm-based ensemble mean/scatter plots</td>
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</tr>
<tr>
<td>Multi-model SHIPS diagnostic plots</td>
<td>3.5</td>
</tr>
</tbody>
</table>
New Features

Rankings by Average Score
5 - highest priority, 1 - lowest priority

Capabilities to display multiple storms from different periods: 3.29
Intensity comparison from multiple storms: 3.43
  Zonal cross section: 4.14
  Meridional cross section: 4.00
Basin lows/pressures for genesis: 4.71
Ensemble-based rapid intensification probabilities: 4.86
Intensity distribution plots: 4.71

“What new features would you like to see?”

“a reliable way to display vertical wind shear in AWIPS using the same methodology as the UW CIMSS vertical wind shear analysis”

“generating graphics that have skill above and beyond what forecasters have access to already”

“Different methods used to calculate vertical wind shear”
# Websites

<table>
<thead>
<tr>
<th>Website</th>
<th>Mentions</th>
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</thead>
<tbody>
<tr>
<td>tropicaltidbits.com</td>
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<tr>
<td>weathernerds.org</td>
<td>6</td>
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<td><a href="http://tropic.ssec.wisc.edu">http://tropic.ssec.wisc.edu</a></td>
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<td><a href="https://www.fnmoc.navy.mil/tcweb">https://www.fnmoc.navy.mil/tcweb</a></td>
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<td>weathermodeled.com</td>
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<td><a href="https://www.nrlmry.navy.mil/TC.html">https://www.nrlmry.navy.mil/TC.html</a></td>
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<td><a href="http://moe.met.fsu.edu">http://moe.met.fsu.edu</a></td>
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<td>weather.cod.edu/satrad</td>
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<td>storm.aoml.noaa.gov</td>
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<tr>
<td><a href="http://ds.weatherflow.com">http://ds.weatherflow.com</a></td>
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<td><a href="https://www.cira.colostate.edu/">https://www.cira.colostate.edu/</a></td>
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<tr>
<td><a href="http://hurricanes.ral.ucar.edu/realtime/current/">http://hurricanes.ral.ucar.edu/realtime/current/</a></td>
<td>1</td>
</tr>
</tbody>
</table>
Summary of Results

- Top-ranked (most desired) by forecasters:
  - **Model Variables**: 850 mb vorticity, 10 m wind, 200-850 mb wind shear, 500 mb height, MSLP, 700 mb RH, “combined graphic with 850 vorticity, 500 height, 200 wind”, simulated satellite imagery
  - **Products**:
    - Deterministic: track forecast plot, intensity (wind) plot
    - Ensemble: mean tracks with intensity, TC genesis probability
  - **New Features**: ensemble-based rapid intensification probabilities, intensity distribution plots, basin lows/pressures for genesis, different method for analyzing/calculating vertical wind shear
  - **Websites**: Tropical Tidbits, Weathernerds

- Improved graphics related to **intensity forecasts (rapid intensification)**, **TC genesis**, and **vertical wind shear** should be emphasized for future HFIP display website intended for operational end users
Community Survey

- Survey intended for broader user community
  - https://forms.gle/9u7k1XUXu2o6YpGNA

- Questions by category:
  - Observations
    - satellite, radar, and surface obs
  - Model variables/products - 12
  - Additional Features - 8
  - Optional - 1

Also available on:
http://www.hfip.org/events/annual_meeting_nov_2020/index.php
Questions?