Expressing Forecast Uncertainty

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NWS Jackson MS
WAS*IS II, March 2006
Expressing Forecast Uncertainty

Routine Temperature and Precipitation Forecasts at NWS Jackson

(a work in progress)
Process and Methods

1) Discussed at NWS Jackson staff meeting. Divergence of opinions (and passion) was much greater than anticipated

2) Formed a local team composed of two non-meteorologists, three forecasters, an intern, and myself to mold a plan
Process and Methods

3) Process took much longer due to difficulty meeting from shift work, etc.

4) Finally molded a plan that we will be trying out in the coming months.

5) Also had a mini-focus group with group of 8 Emergency Managers and 1 TV Meteorologist to discuss plan.
Process and Methods

6) Had a break out discussion group at Annual Emergency Manager/Media workshop at Grenada MS on expressing uncertainty in both routine and hazardous weather forecasts

This was Wed March 8\textsuperscript{th}, so results of that meeting are not compiled yet
Deliverables

• Changed focus from text product to graphical product

• Did some research to see what the typical error is in our forecasts High and Low Temperatures forecasts in Jackson forecast area.
Deliverables

• Found that it varied from just 1-3 degrees in July to 3-7 degrees in January. Error gets larger as time goes on in forecast period (chaos and predictability, as expected)

• Used that information to create “error bars” that increase with time
Definitions

• **Forecast Degree of Difficulty**

• *Think Diving Competition*

• Degree of spread from ensemble standard deviation from differing model solutions

• **Easy**: 0-1 degrees, 0-7%
• **Typical**: 2-3 degrees, 7-14%
• **Challenging**: 4+ degrees, 15+%
Deliverables (example)

Jackson MS Forecast High/Low Temperature and Uncertainty
Wed February 22nd through Wed March 1st 2006

Climatology

Forecast Degree of Difficulty: Easy Typical Challenging

°F

High

Low

Wed Ngt Thu Thu Ngt Fri Fri Ngt Sat Sat Ngt Sun Sun Ngt Mon Mon Ngt Tue Tue Ngt Wed

62 63 69 66 65 69 64 65 67 60 61 72 66 66

47 43 47 43 43 48 38 38 44 44 44

37 40 33 33 28 38 38 38
Jackson MS Forecast Probability of Precipitation and Uncertainty
Wed February 22nd through Wed March 1st 2006

Forecast Degree of Difficulty: Easy Typical Challenging
Feedback from Focus Group (EM)

- I, personally, very much appreciate the “honesty in forecasting” that the Jackson Office has always expressed. I think it enhances your credibility when you are up front about your uncertainty. This product would be another useful tool to me when advising local authorities, citizens, and others about weather events.

- To me, they are simple enough to be easily used. I guess you could “dumb it down” or confuse us with sophistication, but the presented examples seem adequate to me.

- At this point, I would go with what you have presented. Usefulness will evolve and adjustments can be made as time goes on and actual user feedback is given.

- Keep up the good work. I rely on you guys and gals for your expertise to provide me with information so that I may help protect the lives and property of the citizens of my County.
Feedback from Focus Group (Media)

- This is an interesting concept... I think what you have looks great, but might be a bit cluttered for public consumption. I get e-mails like "I'm getting married November 11th, what's the weather usually like?" a lot - and I give them the climo for that time of year, with the huge, bold font disclaimer that the observed daily weather and climo are often quite different. Sometimes this point gets missed by many.

Other than that, it looks great to me - I think this is a nice step towards a more "realistic" forecast. Many people tend to place too much stock in the exact details of a seven day forecast. While your point about retaining credibility is certainly valid, I think a graphical expression of uncertainty would help educate some about the pitfalls of the 5-7 day period (and in some cases, the 1-3 day period).
Feedback from Focus Group (EM)

- at first glance, I like it ... being something of a "weather nut" I see some real benefits from this concept.

- More later ...
Expressing Forecast Uncertainty

Hazardous Weather Probability Forecasts at NWS Jackson

(work already done)
Hazardous Weather Outlook

Click **HERE** for important details concerning this product!!

Hazardous Weather Links

- Probabilistic Graphical Hazardous Weather Outlook
  - Hazardous Weather Probabilities (MS Word)
  - Climatological Probabilities of Severe Weather (MS Word)

Day One Outlook - Click on an image for text and more detail

Click the **RELOAD** button to ensure that the **LATEST** maps are being displayed!!

- Thunderstorms
- Flooding
- Fire Danger

- Winter Weather
- Wind & Fog
- Seasonal Threats
### Hazardous Weather Grid Tables

**MSZ034-091511-**  
**WASHINGTON-**
**INCLUDING THE CITY OF...GREENVILLE**
**611 PM CST WED MAR 8 2006**

<table>
<thead>
<tr>
<th>Hazard Category</th>
<th>Probability</th>
<th>TONIGHT</th>
<th>TOMORROW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prob. of Convective Wind Damage and/or 58 mph gusts</td>
<td>0</td>
<td>45 (Extreme)</td>
<td></td>
</tr>
<tr>
<td>Prob. of Convective Wind &gt; 75 mph</td>
<td>0</td>
<td>20 (Extreme)</td>
<td></td>
</tr>
<tr>
<td>Prob. of Gradient Wind &gt; 25 mph</td>
<td>64 (High)</td>
<td>100 (Extreme)</td>
<td></td>
</tr>
<tr>
<td>Prob. of Gradient Wind &gt; 40 mph</td>
<td>0</td>
<td>13 (Low)</td>
<td></td>
</tr>
<tr>
<td>Prob. of Severe Hail</td>
<td>0</td>
<td>23 (Moderate)</td>
<td></td>
</tr>
<tr>
<td>Prob. of Hail &gt;= 1.75 in.</td>
<td>0</td>
<td>9 (Moderate)</td>
<td></td>
</tr>
<tr>
<td>Prob. of Tornadoes</td>
<td>0</td>
<td>11 (Low)</td>
<td></td>
</tr>
<tr>
<td>Prob. of Strong/Wicent Tornadoes</td>
<td>0</td>
<td>8 (Moderate)</td>
<td></td>
</tr>
<tr>
<td>Prob. of Flash Floodng</td>
<td>0</td>
<td>6 (Low)</td>
<td></td>
</tr>
<tr>
<td>Prob. of Fog 1/4 mile or less</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Prob. of .01 in. Freezing Rain/Sleet</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Prob. of .25 in. Freezing Rain/Sleet</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Prob. of 2 in. Snow</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Prob. of Temperature &lt; 20F</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Prob. of Temperature &lt; 32F</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Prob. of Heat Index 110 or greater</td>
<td>0</td>
<td>0</td>
<td></td>
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</table>
### Hazardous Weather Grid Tables

MSZ074-091511-
FORREST-
INCLUDING THE CITY OF HATTIESBURG
611 PM CST WED MAR 8 2006

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</thead>
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<tr>
<td>Prob. of Convective Wind Damage and/or 58 mph gusts</td>
<td>023(Moderate)</td>
<td>023(Moderate)</td>
</tr>
<tr>
<td>Prob. of Convective Wind &gt; 75 mph</td>
<td>011(High)</td>
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</tr>
<tr>
<td>Prob. of Gradient Wind &gt; 25 mph</td>
<td>2(Little)</td>
<td>100(Extreme)</td>
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<td>000</td>
<td>000</td>
</tr>
<tr>
<td>Prob. of .5 in. Snow</td>
<td>000</td>
<td>000</td>
</tr>
<tr>
<td>Prob. of Temperature &lt; 20°F</td>
<td>000</td>
<td>000</td>
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<td>000</td>
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<td>000</td>
<td>000</td>
</tr>
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Hazardous Weather Grid Definitions

**Convective Weather**

**Probability of Severe Hail (SvrHail)**
The probability within a particular county or parish of hail of penny size or greater (0.75") occurring during the 12 hour period.

**Probability of Hail >= 1.75" (Hail175)**
The probability within a particular county or parish of hail of golfball size (1.75") or greater occurring during the 12 hour period.

**Probability of Convective Wind Damage and/or 58 mph gusts (SvrWnd)**
The probability within a particular county or parish of damaging thunderstorm wind gusts of 58 mph (50 knots) or greater occurring during the 12 hour period.

**Probability of Convective Wind > 75 mph (DmgWnd75)**
The probability within a particular county or parish of damaging thunderstorm wind gusts of 75 mph (65 knots; approximately hurricane force) or greater occurring during the 12 hour period.

**Probability of Tornadoes (Tornadoes)**
The probability within a particular county or parish of a tornado occurring during the 12 hour period.

**Probability of Strong/Violent Tornadoes (StgTor)**
The probability within a particular county or parish of a strong or violent tornado (EF-2-EF-5 on Fujita Scale with winds of at least 113 mph) occurring during the 12 hour period.

**Probability of Flash Flooding (FlqFld)**
The probability within a particular county or parish of sufficient rainfall failing to produce flooding of highways, major roadways, streams, drainage ditches, etc. during the 12 hour period.

**Winter Weather, Wind, Fog, Temperature**

**Probability of >=.01" Freezing rain/Sleet (Ice01)**
The probability within a particular county or parish of measurable amounts of ice or glaze covering the ground during the 12 hour period.

**Probability of Ice Storm >= .25" Freezing rain/Sleet (Ice25)**
The probability within a particular county or parish of an ice storm occurring with ice or glaze accumulating at least a quarter inch thick on the ground during the 12 hour period.

**Probability of 2+" Snow (Snow2)**
The probability within a particular county or parish of at least two inches of snow accumulating on the ground during the 12 hour period.
Comments, Questions?

- Any ripe tomatoes to throw at me?
- Thanks for your interest and kind attention