J15.1 CHALLENGES IN COMMUNICATING TWO CONSECUTIVE HIGH IMPACT WEATHER EVENTS

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1. INTRODUCTION

Effectively communicating the threat from weather phenomena is very important for the National Weather Service (NWS) to fulfill its mission of protecting lives and property. Various methods can be used to accomplish this such as conference calls, webinars, media partnerships, and NOAA All Hazards Weather Radio. In addition to these services, NWS products typically convey site-specific hazard information for specific time periods. As conditions or threats warrant, enhanced wording such as 'Flash Flood Emergency' may be used to further heighten awareness and convey especially dangerous conditions.

On two consecutive weekends, 23-24 April and 30 April-2 May 2010, severe thunderstorms with tornadoes affected the Mid-South area near Memphis, Tennessee and the Tennessee River Valley including Huntsville, Alabama. There were several fatalities and numerous injuries reported during these high impact events. Of the two events, the NWS Huntsville, Alabama, County Warning Area (CWA) was most affected 23-24 April, while the NWS Memphis, Tennessee, CWA was most affected 30 April-2 May. These two CWAs adjoin each other. The NWS Memphis CWA covers 56 counties across east Arkansas, the Missouri Bootheel, north Mississippi, and west Tennessee, while the NWS Huntsville CWA covers 14 counties across north Alabama and south middle Tennessee (Fig. 1). This study examined the communication methods and wording of products from the NWS Memphis and NWS Huntsville Weather Forecast Offices in advance of and during these events.

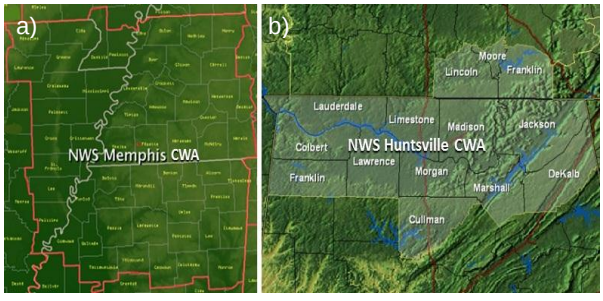

Figure 1. NWS Memphis CWA (a) and NWS Huntsville CWA (b).

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2. OVERVIEW OF THE 23-24 APRIL AND 30 APRIL-2 MAY 2010 EVENTS

On 23-24 April 2010, an outbreak of severe thunderstorms with large hail, damaging winds, and tornadoes occurred across the southeast U.S. This event was well forecast and anticipated by the NWS. The NWS Storm Prediction Center (SPC) issued a high risk for severe thunderstorms across much of Mississippi and Alabama (Fig. 2a). With this event, the NWS Huntsville CWA was much harder hit than the NWS Memphis CWA as four tornadoes EF-2 or greater on the Enhanced Fujita Scale occurred during the nighttime hours of 24 April 2010.

The following weekend, 30 April-2 May 2010, another outbreak of severe thunderstorms with large hail, damaging winds, tornadoes, and heavy rain occurred across the Mid-South which was centered over the NWS Memphis CWA. The SPC issued a high risk for severe thunderstorms across east Arkansas, north Mississippi, west Tennessee, and the Missouri Bootheel (Fig. 2b). With this event, the NWS Memphis CWA was much harder hit than the NWS Huntsville CWA as 13 tornadoes occurred. Not to mention, 120-485 mm (5-19 in) of rain fell across the NWS Memphis CWA which caused significant flash flooding and river flooding across west Tennessee.

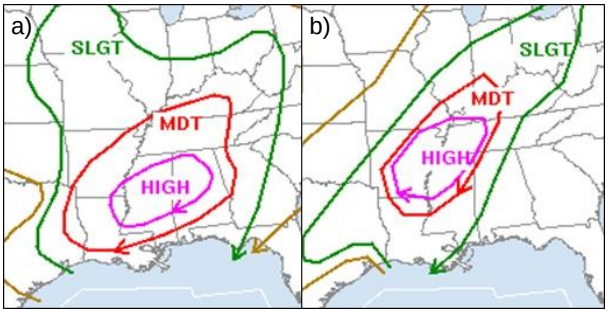

Figure 2. NWS SPC Day 1 Outlooks issued a) 0557 UTC 24 April 2010 and b) 1256 UTC 1 May 2010.

3. PANOPLY ARTS FESTIVAL RESPONSE TO THE 23-24 APRIL 2010 EVENT

Each spring, the city of Huntsville, Alabama hosts Panoply Arts Festival at Big Spring Park which recognizes and celebrates music, dance, theatre, and the visual arts (Fig. 3). This festival typically runs Friday, Saturday, and Sunday, bringing in thousands of people from Alabama and Tennessee.

The City of Huntsville and Panoply Arts Council does not have a plan in case of inclement weather. Their current strategy is to close the festival and let the adults find their children and then seek shelter. However, there are not many shelters to choose from. Due to the expected severe weather outbreak, Panoply 2010 was cancelled on Friday 23 April. The reason for cancelling this event was that the Panoply Arts Council purchased insurance in the case of inclement weather to help cover costs.

Figure 3. Image from Panoply Arts Festival.

4. BEALE STREET MUSIC FESTIVAL RESPONSE TO THE 30 APRIL-2 MAY 2010 EVENT

Each May, the city of Memphis, Tennessee hosts large events throughout the month. This is known as Memphis in May. These events include the Beale Street Music Festival and the World Championship Barbecue Cooking Contest. Typically, the Beale Street Music Festival generates more than $40 million in revenue to the city. Thousands of people travel from all across the nation to see the numerous musical acts the Beale Street Music Festival has to offer. Memphis in May is also referred to as "Memphis in Mud" as May is generally a very active and wet weather month in the Mid-South.

Prior to the weekend of 30 April-2 May 2010, organizers of the Beale Street Music Festival decided to go ahead and host the event as planned to generate revenue. However at 0230 UTC (930 pm CDT) 2 May 2010, the Beale Street Music Festival was abruptly stopped two songs into the Hall & Oates set as the development of a nearby supercell thunderstorm prompted the issuance of a tornado warning for Memphis, Tennessee. As a result, all persons attending the Beale Street Music Festival were ordered to leave the premises of the festival. However, this meant that thousands of persons were forced to evacuate without any indoor shelter. In fact, thousands of people congregated outdoors onto Beale Street in downtown Memphis when severe weather was imminent from the approaching storm (Fig.4).

5. SERVICES PROVIDED BY THE NWS HUNTSVILLE AND NWS MEMPHIS FORECAST OFFICES

Numerous briefings and conference calls were given days prior to both high impact events on 23-24

Figure 4. Photograph of thousands of people on Beale Street in downtown Memphis, Tennessee.

April and 30 April-2 May 2010 by both NWS Huntsville and NWS Memphis. NWS Huntsville provided local emergency management with the right tools to make informed decisions to help The City of Huntsville and Panoply Arts Council officials choose to cancel Panoply 2010. An example of a conference call slide from NWS Memphis on 29 April is illustrated in Figure 5. On-site decision support services were provided by NWS Memphis to the local emergency management agency in Shelby county, Tennessee for the Beale Street Music Festival, though these services had to be altered and curtailed due to NWS Memphis' need for additional personnel to handle the heavy workload during the long-duration 30 April-2 May event.

Additional services were provided by NWS Huntsville and NWS Memphis. Graphicasts depicting what, where, and when weather hazards were expected were updated and placed on the front page of NWS Huntsville's website. NWS Memphis used "Flash Flood Emergency" in Flash Flood Statements to illustrate life threatening conditions near Millington, Tennessee where 380-485 mm (15-19 in) of rainfall caused levees to break and flood the city. Live phone interviews with The Weather Channel occurred at both NWS Memphis and NWS Huntsville. These interviews were effective in communicating the severity of both events.

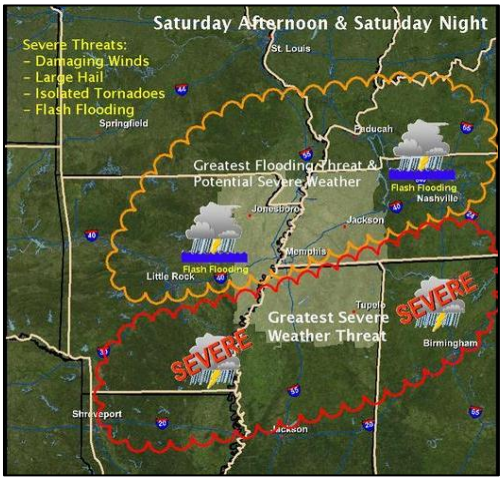

Figure 5. Illustration used on NWS Memphis conference call on 28 April 2010.

6. CUSTOMER FEEDBACK

After both events, NWS Huntsville and NWS Memphis received customer feedback which was generally positive. The Area Forecast Discussion product was the number one used product, though some customers stated that more updates were recommended to keep them informed during the quickly evolving high impact events. The Hazardous Weather Outlook and Special Weather Statement products were heavily used. The older and more traditional Zone Forecast Product was not heavily used. Some customers mainly in the NWS Memphis CWA were surprised how quickly the risk for severe thunderstorms escalated during 30 April-2 May event as many believed heavy rainfall and flooding were going to be the main concerns. A customer near Memphis stated that too many false alarms occurred for Shelby county, Tennessee which included the Memphis metropolitan area as nine tornado warnings were issued while only two later verified and were justified. This may have led to customer complacency to act and respond to warnings.

7. COMMUNICATING THE NIGHTTIME TORNADO THREAT

During these two events, both NWS Huntsville and NWS Memphis experienced significant tornadoes of EF-2 or greater on the Enhanced Fujita Scale during the nighttime hours, which resulted in fatalities. The NWS SPC issued Public Weather Outlooks stressing the potential for nighttime tornadoes prior to and during both events. Both NWS Memphis and NWS Huntsville used wording to emphasize this potential as well. Highlighting the potential for nighttime tornadoes is crucial in both NWS Huntsville and NWS Memphis CWAs as the Mid-South and Tennessee Valleys have been shown to have the highest nighttime tornado rates and killer tornado events (Fig.6) (Ashley 2007).

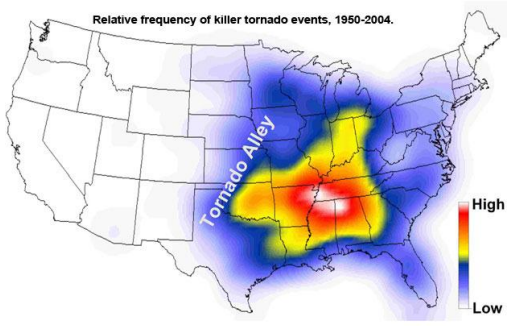

Figure 6. Relative frequency of killer tornado events (Ashley 2007).

8. FUTURE PLANS AND IMPROVEMENTS

After these high impact events on 23-24 April and 30 April-2 May 2010, NWS Huntsville and NWS Memphis came up with future plans and improvements. One, encourage and participate with local city and county officials in developing severe weather action plans and locate available indoor shelters during outdoor events. This would have been valuable for the Beale Street Music Festival where thousands of concertgoers were ordered to leave the concert area, but not directed to go take shelter in a safe secure location. Two, utilize “Tornado Emergency” and “Flash Flood Emergency” wording more often in Tornado and Flash Flood Warnings and Statements. This enhanced wording can emphasize that a significant tornado has occurred with damage or that life-threatening flooding is happening and can be expected. Third, educate local and state officials as well as the public on the dangers of nighttime tornadoes as well as flooding.

9. CONCLUSIONS

Severe weather occurred during back to back weekends on 23-24 April and 30 April-2 May 2010 in the NWS Huntsville and NWS Memphis CWAs. The potential for these high impact weather events was discussed several days in advance of both the NWS Huntsville and NWS Memphis Forecast Offices. Various methods were used to communicate the severe thunderstorm and flooding threats including conference calls to emergency managers and the media, enhanced wording in products, special product issuances, telephone interviews with the media, and direct briefings to federal, state, and local agencies as well as the general public. Overall, customer feedback suggested that these two offices performed well during these events. However, some improvements and suggestions were noted as well.

10. REFERENCES

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11. ACKNOWLEDGEMENTS

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