

Techniques to Improve Flash Flood Warning Performance

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Flash flooding remains one of the more destructive natural hazards in the United States, resulting in numerous fatalities, as well as significant property damage and losses each year. Across the Northeastern United States (including Central New York and Northeastern Pennsylvania, which encompass the county warning area (CWA) of the Binghamton, NY Weather Forecast Office (WFO BGM)), a combination of urbanized, and other fast responding watersheds (that generally feature complex terrain), present many challenges.

One conventional strategy to assess the need for flash flood warnings has involved the comparison of radar estimated rainfall to Flash Flood Guidance (FFG) values for a particular drainage basin. Prior research (Kelsch, 2001 and Davis, 2000) suggests that trends in short-duration bursts of heavy rainfall may be a more important indicator of flash flood potential, than simply considering accumulated event total rainfall. The Flash Flood Monitoring and Prediction Program (FFMP) is an application utilized by National Weather Service (NWS) personnel to aid in flash flood warning decision making. One of the capabilities of FFMP allows warning meteorologists to monitor trends of instantaneous rainfall rates for a particular basin.

A number of significant flash flood events that occurred in the WFO BGM CWA were analyzed. For each event, accumulated rainfall totals, available FFG values, total rainfall/FFG ratios, and trends in instantaneous rainfall rates were tabulated. These figures were compared to issuance times of flash flood warnings, as well as onset times for the occurrences of significant flash flooding. These comparisons were made in order to test the hypothesis that the modulation/timing of instantaneous rates could be a meaningful flash flood indicator.

The effectiveness of FFMP as a tool is heavily dependent on accurate radar rainfall estimation, especially in rapidly changing environments. As they pertain to precipitation estimation, two topics that will be discussed briefly are Reflectivity/Rainfall (Z-R) relationship (Davis, 2000), and a locally developed concept (Maximum potential precipitable water, Arnott, 2007).

REFERENCES

Arnott, J., 2007: Maximum potential precipitable water - development and application for forecasting flash flood potential. <<http://www.erh.noaa.gov/bgm/research.shtml>>.

Davis, R. S., 2000: Detecting flash flood on small urban watersheds. Preprints, 15th Conference on Hydrology, Amer. Meteor. Soc., 233-236.

Kelsch, M., 2001: The relationship between intense, short-duration precipitation and flash floods. Preprints, Symposium on Precipitation Extremes: Prediction, Impacts, and Responses, Amer. Meteor. Soc., 124-128.

