

Community Flood Response System

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Organizations such as cities, counties, states, and water authorities have the responsibility to provide flood emergency response services for local citizens when floods occur. The National Weather Service (NWS) supports this task by forecasting severe storms, providing flash flood warnings and forecasting discharge and stages on large streams, rivers and lakes. In order to meet the growing water challenges, the NWS and its federal water agency partners have established a new National Water Center (NWC) in Tuscaloosa, AL, to provide enhanced water information for the nation, including improved flood forecasting.

The NWC began functioning in May 2015 and will begin initial operational capabilities in May of 2016. During the past year the academic community of the United States, through the Consortium of Universities for the Advancement of Hydrologic Science, Inc (CUAHSI), conducted a National Flood Interoperability Experiment (NFIE) with the collaboration of the National Water Center to demonstrate what a new high spatial resolution, flood forecasting system for the United States could look like. The current NWS Community Hydrologic Prediction System (CHPS) provides forecasts at 3600 locations with an average basin size of 400 square miles, using 12 regionally operated versions of CHPS, which cover most but not all of the continental United States. The new forecast system demonstrated during the NFIE calculates forecasts using a single modeling framework operating on a continuous network of 2.7 million river and stream reaches that cover the continental United States from coast to coast, with an average local drainage for a stream reach of a little over one square mile. One cycle of this new flood forecast computation takes about 10 minutes at the Texas Advanced Computing Center in Austin and is being updated there every three hours. Thus, the NFIE indicates that an exponential increase in the spatial resolution and timeliness of flood forecasting is possible for the United States, which has the potential to complement the current NWS Community Hydrologic Prediction System.

Based on our experience in flood emergency response in Austin, Texas, and in anticipation of high resolution forecasts, the authors propose that communities, led by their emergency management officials, work with federal, state and local entities to create a *Community Flood Response System*, based on three components:

- A *flood response map book*, available to public safety officials, which shows for each stream reach the spatial extent of minor, moderate and major flooding according to NWS definitions, identifies impacts of that flooding on homes, businesses and road crossings, and lists response actions needed for each flood condition.
- A *personal flood response guide*, prepared for individual homes and businesses in flood affected reaches, which describes how to get flood forecast information during severe storms and what to do if local flooding is imminent.
- A web-based *flood emergency information system* that exists within the community's Emergency Operations Center, and receives decision support services from the local Weather Forecast Office incorporating model data at the individual stream reach level from the NWC.

It is anticipated that several versions of this new flood forecasting guidance for different forecast horizons will become internally operational at the NWC by May 2016. The NWS will then work to evaluate and characterize the model performance as a critical step to incorporate the new forecasts into its flood forecasting services. This information will guide the decision making processes of the emergency management community, and support better flood warning for citizen's homes and businesses, as well as for drivers passing through flood-affected areas.

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