FEMA Map Modernization Plan and Updates to NOAA/NWS Rainfall Frequency Atlases

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FEMA Map Modernization Program

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FEMA is entering into a new era in all-hazard mapping. In line with Presidential goals, the current flood hazard mapping program is undergoing a great change. The Map Modernization initiative is evolving into a citizen centered, results-oriented, and market based program. In addition, the data and systems developed will result in the foundation and backbone of a seamless, all-hazards risk management program. Furthermore, new E-Government strategies to make government more accessible and responsive to its citizens are being called for in all government agencies, including the Department of Homeland Security, into which FEMA has recently been incorporated. Using partnering programs with other government entities as well as partnerships with States and local administrators, FEMA will utilize existing framework data layers as identified by the Federal Geographic Data Committee and deliver the information using the Internet.

FEMA's vision is "A Nation Prepared", and the primary goals of Map Modernization are to reduce the loss of life and property, minimize suffering and disruption caused by disaster, and better prepare the Nation to address the consequences of flooding and other hazards. One of the key features of the new FEMA Map Modernization Contract is a requirement for new Flood Insurance Studies (FISs) to be initiated, studied, delineated, mapped, and become effective within 36 months. In the

past, a five-year timeline was more typical. FEMA plans to achieve this through the Map Modernization process and automated tools being developed for FEMA. These include:

- Tools and standards to assist in developing floodplain models and storing all the supporting data in standard GIS formats.
- Tools to move supporting data and modeling results into FEMA DFIRM GIS databases.
- Tools to automate creation of Flood Insurance Rate Maps directly from DFIRM databases.
- Delivery and retrieval systems to maintain a National repository linked to locally maintain digital databases supporting the floodplain mapping.

Mapping partners can expect a large amount of technology to be deployed to kick off this program. DFIRM database development and FIRM Creation tools, as well as Internet tools to support submittal, storage and retrieval of Letters of Map Amendment and Letters of Map Change are already available. A host of other applications are coming to mapping partners. To learn more about these tools and see examples, start with:

http://www.esri.com/news/arcuser/1002/fema1of2.html
http://www.directionsmag.com/pressreleases.php?press_id=6786

To learn more about Map Modernization go to:
http://www.fema.gov/fhm/tsdindex.shtm .

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Recent Updates to NOAA/NWS Rainfall Frequency Atlases

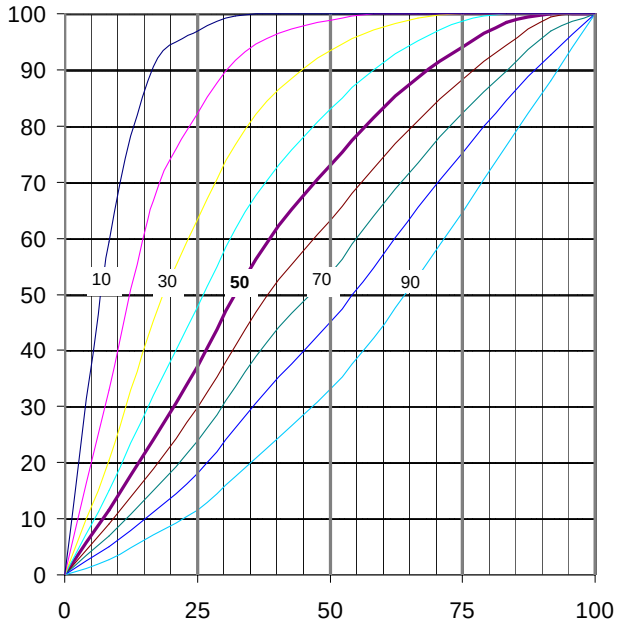
The Hydrometeorological Design Studies Center located within the Office of Hydrologic Development of NOAA's National Weather Service is updating precipitation frequency estimates for the semiarid southwest (Nevada, Utah, New Mexico, Arizona, Southeast California), the Ohio River basin and surrounding states (Tennessee, Kentucky, Illinois, Indiana, Ohio, Pennsylvania, New Jersey, Delaware, Maryland, Virginia, West Virginia, North and South Carolina), Puerto Rico and the Virgin Islands, and the Hawaiian Islands. The new semiarid southwest data will be available at www.nws.noaa.gov/oh/hdsc by the end of July. It will be followed by the Ohio project update in late summer, and Hawaii and Puerto Rico in summer of 2004. The updates will include estimates for durations of 5 minutes to 60 days and return periods of 2 to 1000 years. For the first time they will be accompanied by estimates of the uncertainty associated with the rainfall depth and intensity estimates and new probabilistic estimates of rainfall temporal distributions. Updates of depth-area reduction factors will also be published. The studies improve on previous work by using a longer period of rainfall observations, state-of-the-art statistical methods and methods of spatial interpolation, and the results will be delivered via the Internet. The work of the Hydrometeorological

Design Studies Center is performed at the request of, and using funds provided by, a variety of federal, state, and local agencies.

Hosking and Wallis (1997), describe regional frequency analysis using the method of L-moments. This general statistical methodology stems from work in the early 1970's. It only began seeing full implementation for rainfall frequency estimation in the 1990's but is now accepted as the state of the practice. The National Weather Service is using Hosking and Wallis, 1997, as its primary reference for the statistical approach in its current studies. The method of L-moments (or linear combinations of probability weighted moments), provides great utility in choosing the most appropriate probability distribution function to describe the rainfall frequency distribution. It also provides tools for estimating the shape (higher order statistical moments) of the distribution and the uncertainty associated with the estimates.

The so-called "regional approach" recognizes that different observing stations can be assembled into groupings of similar climatic regimes (regions). It takes advantage of the similarity by assuming that stations within similar regions share the shape (not scale) of their rainfall frequency distribution curves. This assumption allows estimation of the shape parameters from the combination of data from all observing stations in a climatic region rather than from each station individually, vastly increasing the sample data set used in the estimate. This produces much better estimates of the shape of the distribution and extends reliable extrapolations to more extreme events. While the method derives the shape of underlying probability distribution function from groupings of observing sites, the mean of the distribution is estimated separately at each station

The updates provide temporal distributions for heavy rainfall in a manner similar (but not the same) to the work by Huff at the Illinois State Water Survey. The information is provided for durations of 6-, 12-, 24- and 96-hours and at probability levels ranging from 10% to 90%. The distributions apply specifically for heavy rainfall and do not necessarily apply to all rainfall.



Rainfall frequency statistics are extracted for the specific locations of the rainfall gauges where the data were collected. Traditionally the estimates have been manually contoured taking subjective account of the terrain and climatology. Oregon State University's Spatial Climate Analysis Service has developed PRISM, a hybrid statistical-geographic approach to

mapping climate. PRISM is seeing growing acceptance as an effective tool for spatial interpolation of climatic variables and is being used by the National Weather Service to spatially interpolate the rainfall frequency estimates. While the is referred to as a "regional" approach, the resulting estimates are unique at each observing site and at each point in the spatially interpolated grids. They are unique best estimates at each geographic location.

The National Weather Service has developed the Precipitation Frequency Data Server for web-based delivery of precipitation frequency estimates. It will be used as the primary vehicle for product delivery. The documents themselves, including tables and maps, will be available in Portable Document Format (PDF). For more tailored information, the system allows a user with a standard web browser to download a variety of tables and graphs of precipitation frequency estimates. The estimates will be available for any user-selected point location in the United States and will also be available for user-selected areas up to 1000 km^2. The maps of precipitation frequency estimates will be prepared from grids of the estimates with a 30 arc-second grid resolution. These base grids will also be made available for download over the Internet. A variety of developers plan to incorporate the base grids directly into their own software.

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New HEC-HMS Guide Released

For those that use HEC-HMS in their flood control work, HEC has announced the release of a new Applications Guide. The Applications Guide for the Hydrologic Modeling System (HEC-HMS) is now available from the HEC website (http://www.hec.usace.army.mil/). It completes the basic documentation set for the program which also includes the User's Manual and Technical Reference Manual. The new Applications Guide takes a different approach from previous guides produced by HEC. Instead of giving step-by-step instructions of program use, it illustrates how to use the program to complete different kinds of hydrologic studies. Each chapter describes a particular type of study and describes the typical goals, data needs, and problems usually encountered. A case study is then used to show how the program is used from data collection to final reporting in order to obtain the results necessary to meet study goals.