How can you get involved in NHWC?

Let us count the ways...

- Become a member,
- Submit articles to the newsletter,
- Attend our conferences and training sessions,
- Present a paper at a conference,
- Join a technical committee,
- Contribute to forums,
- Become a Board member,
- Spread the word about how NHWC helps you in your job, and
- Advertise in the newsletter.

These are just a few examples of how you can become a part of and support the ONLY national hydrologic warning organization in the United States.

New Narrowbanding Study Gets Underway

The National Weather Service Office of Climate, Water and Weather Services has retained Salo IT Solutions, Inc. (SaloITS) to undertake an analysis of the implications for the hydrologic warning system (HWS) community of the potential federal "very narrowband" (VNB) or "ultra-narrowband" requirement. Very narrowband operation requires radio frequency (RF) devices to operate within 6.25 kHz channel divisions. The HWS community recently completed upgrades to comply with an earlier narrowband requirement that RF devices operate within 12.5 kHz channel divisions. The contents of this study are expected to include:

- Status of federal VNB requirements
- Technical aspects of VNB operation including standards for VNB digital data transmission
- Availability of VNB radio equipment
- Hydrologic warning system and sensor system vendor plans for VNB operation
- Options and recommendations for the HWS community

The work will include field trials of narrowband and very narrowband RF equipment. These devices are expected to be commercial, off-the-shelf equipment and will include very narrowband (6.25 kHz) data radios and license-free spread-spectrum data radios.

The results of the analyses and field trials will be made available to the HWS community through reports and presentations.

For more information, contact Tim Salo at salo@saloits.com

Flood Prediction Technology Foretells Inundation

by

Susan Janek, City of Austin, Jean Vieux and Baxter Vieux, Vieux & Associates, Inc.

Remnants of Tropical Storm Hermine passed through Texas between the 6th and 9th of September 2010. The City of Austin was in the path of the storm with some locales experiencing nearly 13 inches of rain. A multi-year effort to develop and run real-time hydrologic models for basins throughout the City demonstrated value during this event by improving public protection from flood hazards.

The City uses a physics-based hydrologic model for flood prediction because it can accurately forecast peak flows in highly urbanized or predominantly rural basins. The model approach relies on GIS maps of land use, soils, digital elevations, and channel cross-sections and hydraulic rating curves. It simulates flow rates and stage at gauged and un-gauged locations, providing the basis for peak inundation maps.

Model configuration and calibration uses archived gauge-adjusted radar rainfall (GARR) and stream gauge data. The system performance during this recent event exceeded expectations by closely predicting the timing and magnitude of flooding in many locations. The benefits of utilizing the model included valuable information for road closure and evacuation routes, automated depth/duration frequency tracking that prioritized deployment of
San Diego 2011 Highlights

Keynote Speaker
Mary Glackin, NOAA
Undersecretary for Operations

Guest Speakers
Chris Dunn, USACE
Hydrologic Engineering Center Director

Mike Dettinger, USGS
Scripps Institute Climate Change Expert

Naomi Oreskes, Professor of History & Science Studies

WORKSHOPS
• Flood Inundation Mapping
• NIDIS Drought Warning
• Media Training
• Flood Frequency Bulletin 17B Updates
• Indirect Measurement Wizard
• Hands-On Vendor Instrumentation with:
  - Campbell Scientific
  - Design Analysis
  - Hach/HydroMet
  - High Sierra Electronics
  - Hydrolynx
  - OneRain, Inc.
  - SonTek/YSI
  - Sutron
• CFM Training & Exam
• Field trip with on-site training

emergency personnel, and helpful text notifications to dam safety officers of dangerous rainfall accumulations over high-hazard dam drainage areas. Several basins experienced out-of-bank conditions, many roads overtopped, and there were four swift-water rescues and one fatality.

For the first time, predictive inundation mapping on Shoal Creek ran operationally during a major flood event. The Shoal Creek model was setup by the City using its 5-m digital elevation data (LiDAR) to create a 60-meter finite element mesh of 9,426 cells, consisting of 8,786 overland cells and 640 channel cells. The 13 square mile basin includes residential, greenbelt, industrial and urban land uses. The model continuously calculates infiltration and soil moisture at each cell within the basin. The overland and channel runoff is routed through the drainage network using the kinematic wave approximation. The City's GIS server creates inundation prediction maps using the resultant real-time stage predictions. Figure 1 presents the sequence of actual inundation maps produced during the event along with the dialog between the emergency manager in the field and Flood Early Warning System (FEWS) personnel.

Time: 09/08/2010 12:45 AM
FEWS: “We’ve been keeping a close eye on our predictive floodplain maps and it looks like we have a situation in lower Shoal creek in downtown Austin.”
Emergency Manager: “So, FEWS – Tell us what you see.”

Time: 09/08/2010 12:30 AM
FEWS: “Well, what we are seeing is that over the last 45 minutes, our predictive models are showing that we will have flooding along Lamar Blvd around 10th Street. We’ve checked our gauges and they are supporting what our models are predicting. Can we get some eyes on the ground out here?”

Time: 09/08/2010 12:45 AM
FEWS: “We think that the flooding will peak in approximately one hour.”
Emergency Manager: “We’ll request that an officer be sent there to take a look and standby.”

Figure 1: Shoal Creek peak inundation prediction maps and emergency management dialog.

Taking advantage of the spatial and temporal variability of rainfall as captured with high-resolution GARR is a distinctive feature of this model. Every 15 minutes, rainfall is updated and the model’s forecasts are produced, maintaining timely information availability. In this rainfall event, storm cells tracked from south to north producing extreme rainfall variation, as shown in Figure 2, for the basins affecting the City of Austin. Icons, shown in this figure as color-coded triangles, circles and squares; serve as visual notification of elevated stage observations and forecasts. These icons change color as

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EPC NOTES

Here’s the latest news from the NHWC Executive Program Committee.

Almost all sub-committees have gained approval of their charters by the NHWC Board of Directors. Each is establishing work goals for the 2011 calendar year, including development of products and factsheets.

The Data Collection group is focusing their efforts on two topics: Maintenance & Operation of Data Systems, lead by David Gardner of the Flood Control District of Maricopa County, and Data Uncertainty, lead by Eylon Shamir of the Hydrologic Research Center in San Diego. If you have an interest in helping out, visit their group’s page.

The Hazard Communications & Public Awareness Sub-Committee appointed Sally Pavlow as vice-chair and Mariana Leckner as liaison to develop the conference sessions. Two Technical Working Groups are being formed to survey the landscape to create an inventory of hazard warning systems and another to focus on flood response plans.

(stream stage increases. rainfall data, processed at 1x1-km resolution, consists of 4,483 grid cells covering the City.

The prediction lead time is dependent upon the hydrologic and hydraulic response of each basin. Figure 3 shows an evolving hydrograph during the referenced event. The vertical blue line indicates the last GARR model input time, and the hydrograph to the right of the line indicates the predicted stage at this location in Shoal Creek. Discrete red symbols represent observed stage from a USGS stream gauge. Even in this small basin, 15-60 minutes of lead-time enabled first responders to take emergency actions. Stream gauges report past observations, however, predictive models achieve lead-time that allows time for taking action based on future stream stage. By prediction of travel time and peak, time to take action is gained. Susan Janek explains, “FEWS uses predictive modeling on watersheds that have a time of concentration as short as 2 hours, to those with a time of concentration as long as 6 hours. On watersheds that have a 2-hour time of concentration, forecasting improves lead-time as much as 45 minutes. On larger watersheds, lead time can be [as] much as 3 hours.” The modeling approach is applicable to small and large basins since a gridded-based representation of the basin and physics translate flow from one grid to the next.

In Figure 4, the final hydrograph for the event shows multiple peaks with remarkable agreement between simulated and forecast stage as successive storm cells passed over the basin. The predictive hydrographs and peak inundation maps for Shoal Creek gave City personnel insight into where and when specific structures and intersections would become inundated or impassable.

Forecasts at more than a dozen additional watch points in ten other basins also showed excellent agreement with observed stage. Given the utility of real-time peak inundation maps for this event, expanded use by the City for emergency operations is expected.)