Fall 2007 Graduate Seminar Series and MORE Science Program

Friday, November 9, 2007

University of Texas at San Antonio

Environmental Engineering and Environmental Science

Main Building MB 0.224; 4:00-4:50pm

Guest Speaker: Dr. Phil Bedient

Civil and Environmental Engineering, Rice University, Houston, TX

Radar Based Flood Warning Systems with Floodplain Map Library for the Gulf Coast of Texas

Houston continues to face flood problems of a serious nature due to its location along the Gulf coast and its rapid urban expansion. Until more permanent solutions are found accurate and timely flood warning systems are vitally needed to provide the early warnings that public and private entities are demanding. The current Rice University/TMC Flood Alert System (FAS2) began to utilize high-resolution Level II NEXRAD radar data (1 x 1 km) that is calibrated against local rain gauges by the end of 2004, with the real-time hydrologic model (RTHEC-1) to provide important data for predicting flood levels along Brays Bayou. The finer resolution of Level II radar rainfall data provides significantly greater details with respect to the spatial variability of rainfall. FAS2 has been tested for more than 30 events including three recent events in 2006 season with excellent performance. It has been found from 2006 season that the average difference in peak flows is 8.8%; the average difference in terms of volumes is 14%.

The floodplain map library (FPML) as a new hydraulic prediction tool has been developed based on the radar-based FAS2 and is being integrated into FAS2 to provide inundations maps in near real time. The development of FPML includes three stages: designing rainfall based on historical rainfall data over the watershed, delineating 99 maps based on design rainfalls, and designing an algorithm to link real-time NEXRAD radar rainfall to appropriate maps. The enhance system can be a prototype for other flood-prone areas along the Gulf coast and in Texas, and will improve emergency personnel's ability to initiate evacuation strategies at many levels.

The Severe Storm Prediction, Education and Evacuation from Disaster (SSPEED) Center will incorporate university-related talents in geographically important locations along the Gulf Coast such as Houston, Galveston, and Brownsville under one umbrella to help mitigate the effects of severe storm natural disasters. The technology to predict inland flooding linked with storm surge offshore will be developed, modified, and integrated, and the results deployed to users up and down the Gulf Coast. The SSPEED Center was approved by the Texas legislature in May 2007 and signed by the Governor.

BIO: Dr. Philip B. Bedient is the Herman Brown Professor of Engineering in the Dept of Civil and Environmental Engineering at Rice University. He teaches and performs research in surface and ground water hydrology and flood prediction systems. He has directed 50 research projects written over 180 articles in journals and conference proceedings over the past 30 years. He has worked on surface water problems including major floodplain studies, water quality assessments, and hydrologic modeling for a number of watersheds in Texas, Florida, and Louisiana. He has been actively involved in the area of hydrologic analysis for flood prediction and warning, and recently developed a real-time flood alert system for the Texas Medical Center, based on the use of NEXRAD radar data. Dr. Bedient is organizing the Houston testbed for the Center for Collaborative Adaptive Sensing of the Atmosphere (CASA), a National Science Foundation Engineering Research Center led by UMass Amherst, and the University of Oklahoma. CASA will focus on revolutionary sensing technology that will enable earlier and more accurate forecasts of weather emergencies and other atmospheric phenomena. Dr. Bedient has also performed research in areas of groundwater contamination and modeling for the Environmental Protection Agency and U.S. Air Force sites across the country. He is currently heading up the 2007 SSPEED Center for Severe Storm Prediction, Education, and Evacuation from Disaster at Rice (hydrology.rice.edu/speed), which includes 8 universities working with private and public sector agencies to address issues along the Gulf Coast.