Water Resources Research Institute of The University of North Carolina

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Progress Energy Water Resources Seminar

CI-FLOW: A prototype total water system for forecasting inland and coastal flooding in Eastern North Carolina

1:30-3:30 pm, Friday, November 20, 2009
Jane S. McKimmon Center, NC State University

Kevin Kelleher
Deputy Director
National Severe Storms Laboratory (NSSL)

&

Rick Luettich, Ph.D.
Professor and Director
UNC Institute of Marine Sciences

CI-FLOW (Coastal and Inland FLood Observation and Warning project) is a multi-agency project to evaluate and test new technologies to produce accurate and timely identification of inland and coastal floods in the Tar-Pamlico and Neuse river basins of coastal North Carolina.

CI-FLOW was initiated in response to devastating human and economic losses caused by storm-surge and coastal flooding from Hurricanes Floyd and Dennis in 1999. Flooding is the number one hazardous weather-related killer in the U.S.

This seminar is free and open to the public. Registration is not required.
WRRI will offer 1 Professional Development Hour (PDHs)
for engineers and surveyors who attend the event.

Hosted by the Water Resources Research Institute, NC State University

ABSTRACT

CI-FLOW: A prototype total water system for forecasting inland and coastal flooding in Eastern North Carolina

Kevin Kelleher, Deputy Director, National Severe Storms Laboratory (NSSL)

Rick Luettich, Ph.D., Professor and Director, UNC Institute of Marine Sciences

Since 2000, the National Severe Storms Laboratory (NSSL) has led a collaborative effort with NOAA Sea Grant Programs, Universities and National Weather Service Forecast Offices in the Carolinas to develop a capability to help improve flood detection and monitoring in coastal areas. This project, called the Coastal Inland FLood Observation and Warning project (CI-FLOW), couples a high resolution quantitative precipitation information system with riverine flood and coastal/ocean surge models. This initial effort is under development in the Tar and Neuse River Basins of North Carolina, where catastrophic flooding from Tropical Storm Dennis and Hurricane Floyd affected the area ten years ago.

The collaborative nature of the CI-FLOW project produces a unique inter-disciplinary partnership between several NOAA agencies and universities. The project goals include delivering automated precipitation estimates, advanced hydrologic and estuary modeling, and ultimately improved forecasts of storm surge and flooding. The tools and products created from CI-FLOW are being designed to benefit weather forecasters, emergency managers, water resources managers and ultimately the potential victims of flooding.

The UNC Chapel Hill Institute of Marine Sciences and the Renaissance Computing Institute have been collaborating with the CI-FLOW group since 2008 to provide the coastal/ocean surge modeling capability using the ADCIRC coastal circulation and storm surge model. ADCIRC is capable of generating high resolution results in the near shore and onshore (potential flooding) regions and has been configured specifically for hurricane related operations in the Gulf of Mexico and North Carolina coast.

The seminar will include a brief history of Project CI-FLOW, an overview of the components of the coupled model system including the ADCIRC model, the current overall status of CI-FLOW as it prepares for a real time test, and future directions of the project.

BIOGRAPHIES

Kevin Kelleher

Kevin Kelleher is Deputy Director and Chief Information Officer of the NOAA National Severe Storms Laboratory in Norman, Oklahoma. He is responsible for the day to day management of the laboratory, long term planning and budgeting, and information technology. His interests include high performance computing and networking, radar based hydrometeorology, and scientific project management.

Originally from Rhode Island, Kevin earned a Bachelor of Science degree in Meteorology from the State University of New York in 1979. He earned Master's Degrees in Meteorology and Computer Science from the University of Oklahoma in 1983 and 1992. In 2001, Kevin completed the Senior Executive Fellows program at the JFK School of Government, Harvard University.

His career at the National Severe Storms Laboratory began a graduate research assistant in 1979. In 1983, Kevin took a job in Saudi Arabia in the computing field, including a position as the chief of data processing for a hospital. Four years later, he returned to work at the NSSL as manager of the computing group and Chief Information Officer (CIO). In 1997-1998, Kevin completed a 15-month temporary assignment establishing the CIO position for NOAA Research at NOAA headquarters in Silver Spring, Maryland. He was promoted to deputy director in January 2001.

Kevin has received numerous awards for his work. In May 2004, he received the NOAA Technology Transfer Award for his role in making high-resolution radar data available to private industry over the Internet. Kevin also received the NOAA Bronze Medal Award in 2001 for his outstanding work in leading the high performance networking enhancements for the NOAA/Norman Weather Partners and for fostering a strong collaboration between the University of Oklahoma and the NOAA Weather Partners with the NOAA Advanced Research Network. He was recognized as a 2001 NOAA Research Employee of the Year and was given awards for the best use of high performance technology at NOAATECH 2002, 2004 and 2006. In 1995, Kevin served as a technical consultant to the movie Twister.

Kevin currently serves as President of the Norman Kiwanis Club. He has previously served on the Boards of the American Red Cross, the Norman United Way Campaign Cabinet, and the Board of Directors for Cleveland County Aging Services. He is a 2000 graduate of Leadership Norman.

Rick Luettich

Rick Luettich has an undergraduate and masters degree in civil engineering from Georgia Tech and a doctor of science from MIT. He is Professor of Marine Sciences and Environmental Sciences and Engineering at the University of North Carolina at Chapel Hill and serves as the Director of UNC's Institute of Marine Science, which is comprised of approximately 75 residential faculty, staff and students located on the coast in Morehead City, North Carolina.

Dr. Luettich also serves as Director of the recently formed UNC Center for Natural Hazards and Disasters and lead-PI on the Department of Homeland Security Center of Excellence in Natural Disasters, Coastal Infrastructure and Emergency Management. He has published over 100 scientific papers and reports on modeling and observational studies of physical processes in coastal systems. His modeling has emphasized the development and application of unstructured grid numerical methods that are optimized for geometrically complex systems such as sounds, estuaries and tidal inlets. He has been one of the two principal developers of the ADCIRC coastal circulation and storm surge model and has overseen applications that have ranged from hindcasts and forecasts of tidal circulation and storm surge/inundation along the US coast to interdisciplinary studies such as physically mediated migration and larval dispersal. ADCIRC has been a cornerstone of recent US Army Corps of Engineers and FEMA storm surge studies that include forensic studies in the aftermath of Hurricanes Katrina and Rita, planning studies for a new hurricane protection systems for the Northern Gulf of Mexico coastline and remapping studies of the 100 year inundation levels in coastal areas of the US for the National Flood Insurance Program.

Luettich has served on two recent National Academy/National Research Council committees – one reviewing the Army Corps of Engineers IPET study into the factors that led to the catastrophic damage to New Orleans by Hurricanes Katrina and Rita and the second reviewing the Army Corps' LACPR program which evaluated options for a new hurricane protection system for Southern Louisiana. Luettich's observational studies have included moored and shipboard sampling to characterize physical processes in coastal systems and have often been oriented toward understanding the role of physical processes in areas of water quality (e.g., algal blooms, dissolved oxygen depletion) and fisheries recruitment. He has actively contributed to the national Integrated Coastal Ocean Observing Systems (IOOS) programs and is presently collaborating on real time observing and modeling systems in coastal North Carolina.