ASPECTS OF A HYDROLOGIC/HYDRODYNAMIC COUPLED MODEL SYSTEM WITH APPLICATION TO COASTAL INUNDATION IN NORTH CAROLINA

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ADCIRC (Advanced CIRCulation) is a 2D/3D hydrodynamic model based on the St. Venant equations subject to the standard Boussinesq approximation; applications over its 25-year history range from predicting the effects of coastal dredging to developing a tidal database to estimating the extent of hurricane storm surge inundation. In order to extend the capabilities of ADCIRC and improve its predictive ability in these and other applications, the development team has coupled ADCIRC to other models, either dynamically or one-way, depending on the physics of the problem. Herein, we discuss some numerical aspects of one such coupled system. In particular, 2D ADCIRC is dynamically coupled to the SWAN wave model, and loosely coupled the HL-RDHM hydrologic model, which provides fresh water inflows for major rivers and tributaries. The objective of this work is to generate a more holistic description of coastal flooding due to the combined effects of hurricane storm surge, tides, waves, and upland runoff. Moreover, it addresses NOAA's call for a "total water level" prediction system in a service gap area. The initial testing of the system is on the Tar-Neuse-Pamlico Sound basin in North Carolina. A real-time prototype of the system was applied during the 2010 and 2011 hurricane seasons; results will be shown from Hurricane Irene.