The Future of Hydrologic Modeling

David B. Radell
NOAA/National Weather Service, Eastern Region Headquarters
Scientific Services Division
Bohemia, NY

Abstract

In conjunction with its external partners, NOAA's National Weather Service (NWS) continues to advance hydrometeorological science and transition the research of water resource predictability into improvement of operational forecasts and warnings. At present, the hydrologic models currently used in support of water resource forecasting are limited in their scope and flexibility. For example, many models assimilate only a subset of available surface data in real-time for soils, topography, vegetation and land cover; are uncoupled from operational meteorological/land surface forecasting packages; or are calibrated for specific watersheds and/or climate conditions. Further, they often do not contain the necessary quantification of uncertainty required by users in both initial conditions and forecasts, and do not provide guidance for such elements as groundwater storage, low flow, and water quality. These are fundamental quantities for the future of water resource forecasting. Recent model advances in the Community Hydrologic Prediction System (CHPS), the Kinematic Runoff and Erosion Model (KINEROS) and the Meteorological Model-based Ensemble Forecast System (MMEFS) help to address some of these shortcomings. The next generation of hydrologic model will incorporate high resolution, remotely sensed data and include physically based hydrologic processes in an effort to improve model calibration, initial conditions, and forecasting in ungauged watersheds. This talk will highlight the current research thrusts of the NWS, including the use of physically based high resolution hydrologic models, verification of deterministic and ensemble forecasts, and use of new observed data sets in support of expansion of water resource forecast elements.