DEVELOPMENT OF REAL TIME FLOOD PREDICTION CAPABILITIES IN PUERTO RICO TO EVALUATE UNCERTAINTIES

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Abstract

Due to the complex terrain and the tropical influence, Puerto Rico is characterized by small watersheds, high rainfall intensity and spatial variability. The rainfall anomalies are produced by orographic-convective type storms, tropical storms and hurricanes, producing flash flooding in susceptible areas. An important source of uncertainty in hydrologic modeling in Puerto Rico is associated with the rainfall. There is typically not enough rain gauge density to calculate the associated bias, and to obtain spatial variability of point rainfall at scales below level III radar-based (NEXRAD) products (2x2 kilometers). Another challenge to hydrologic prediction occurs when high slopes exist, and soil and land use characteristics change over short distances. Hydrologic models average the hydrologic parameters and topography in lumped, semi-distributed and distributed models to simplify and/or reduce computational time. The lumping process (i.e., grid up-scaling) may lead to a loss in flash flood prediction accuracy. However, it is unknown how much lumping can be tolerated before accuracy of flood prediction degrades beyond an acceptable level. These uncertainty sources are being addressed within a 4 km x 4 km test-bed watershed, monitored with a network of 28 rain gauges and a stream flow gauge at the watershed outlet, high resolution topography (DEM 10 x 10 meters) and remotely sensed data.

Keywords: uncertainties, radar, spatial variability, distributed modeling.