Evaluation of QPE for the Rainfall-Runoff Analysis in Urban Area

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The occurrence of local torrential rainfall has been increased. The local torrential rainfall resulted huge casualties and property damage from 2010 to 2012 in Seoul, Korea. Especially, the southern areas (Gangnam area) of Seoul incurred huge damages due to flash floods that occurred on September 21, 2010 and July 27, 2011. In this study, runoff analysis was performed focus on a significant area around Gangnam Station. For these, five drainage basins near Gangnam Station including one each in Nonhyun, Yeoksam and Seocho 3, 4, 5 were selected as target areas. The areas of these basins are 1.8 km^2, 1.9 km^2, 1.8 km^2, 1.1 km^2 and 0.8 km^2, respectively. The drainage system of these basins consists of 4,170 manholes and total 200,698 km-length of pipelines. To obtain input data for runoff analysis, the Seoul drainage network map was used. In total, 773 manholes, 1,059 pipes, and 772 sub-catchments were used for the SWMM (Storm Water Management Model) as input data. The average area of sub-catchments was 0.01 km^2. The average slope, calculated by using 5-m resolution DEM (Digital Elevation Model), was 1.801%. Also, CN (Curve Numbers) and impervious ratio were determined by using the Seoul Biotope Map, and the distribution were 47∼95 and 10.6∼100%, respectively. This analysis was performed for six rainfall events that occurred on July 2, 4, 12∼14, 15, 22, and 23, 2013. There are two AWS (Automatic Weather Station) around this area, however, QPE rain fields were used to consider spatial distribution of local rainfall. Rainfall input data was constructed by MAP (Mean Areal Precipitation) for each sub-catchments estimated by using four types of QPE rain fields. The four QPEs were determined by 190 AWS data and radar data in Seoul, and the QPEs have 10min/250m resolution. To calibrate and evaluate the analysis, water depth data in manhole were collected for July 2013. There are six water depth gauge in the study area, three of them were used for the calibration and evaluation. The analysis accuracy was evaluated by REPD (Relative Error of Peak Depth) and RMSE (Root Mean Square Error). As a result, when QPE2 and QPE4 which were determined by using all AWS data were input for the analysis, the accuracy for water depth was the highest followed by QPE1 and QPE3.