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Development of a multi-sensor based urban discharge forecasting system using remotely sensed data: A case study of extreme rainfall in South Korea

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Extreme weather due to changing climate is a main source of water-related disasters such as flooding and inundation and its damage will be accelerated somewhere in world wide. To prevent the water-related disasters and mitigate their damage in urban areas in future, we developed a multi-sensor based real-time discharge forecasting system using remotely sensed data such as radar and satellite. We used Communication, Ocean and Meteorological Satellite (COMS) and Korea Meteorological Agency (KMA) weather radar for quantitative precipitation estimation. The Automatic Weather System (AWS) and McGill Algorithm for Precipitation Nowcasting by Lagrangian Extrapolation (MAPLE) were used for verification of rainfall accuracy. The optimal Z-R relation was applied the Tropical Z-R relationship (Z=32R1.65), it has been confirmed that the accuracy is improved in the extreme rainfall events. In addition, the performance of blended multi-sensor combining rainfall was improved in 60mm/h rainfall and more strong heavy rainfall events. Moreover, we adjusted to forecast the urban discharge using Storm Water Management Model (SWMM). Several statistical methods have been used for assessment of model simulation between observed and simulated discharge. In terms of the correlation coefficient and r-squared discharge between observed and forecasted were highly correlated. Based on this study, we captured a possibility of real-time urban discharge forecasting system using remotely sensed data and its utilization for real-time flood warning.

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