Roads Inundation Simulation using Weather Radar Rainfall in Urban area

S. Yoon

ABSTRACT

Over the past few years in South Korea, flooding inundation and landslide have been occurred at the part of mega city named Seoul occasionally, and which was caused by concentrated rainfall with climate change and by land use change along the rapid urbanization. If it is possible to predict the inundation area and to provide some warnings to citizen, social and economic damage may be reduced. To predict and prevent these disasters, the WISE (a next-generation Weather Information Service Engine) project division has been started in 1st June 2011, funded by Korean Meteorological Administration. Through scientific advances in high-resolution weather forecasting, urban flood prediction, road meteorology and urban carbon dynamics and new urban service systems, WISE project has represented an investment over eight years for efforts to resolve urban environmental issues for the minimization and mitigation of the impacts of natural disasters and climate change on urban dwellers in Korea. Especially, the roads inundation occurred by heavy rainfall at 2010 and 2012, e.g. inundated area around Samsung-subway station at 21st September 2010, and Gangnam-subway station at 27th July 2011. The rainfall duration of these rain events was too short to forecast for the disaster. And roads inundation has attracted more attention than traffic accidents, traffic congestion, and construction because it is caused travel delays and threatens driver safety, simultaneously. In order to prepare the countermeasures of roads inundation, we will develop the simulation method of roads inundation using weather radar rainfall through the WISE project. For this study, we will estimate the surcharge flow using Strom Water Management Model (SWMM) for considering the drainage network. The surcharge flow is used as inflow of two-dimensional diffusive overland-flow model which was developed to simulate inundation in urban roads. Moreover, we use the weather radar rainfall, because rain is occurred locally (within a few kilometers) during short time (less than 1 hour) in urban area. Hence, weather radar, which has 10 minute time resolution with 250m ~ 1km spatial resolution, is useful for forecasting of urban roads inundation. The radar rainfall in the near future is predicted by extrapolation method using radar QPEs. Finally, the result will be providing through the integrated weather service of WISE platform for Seoul area.