

Urban Flash Flood Modeling Framework Using Weather RADAR and Advanced Geospatial Technologies

Short Abstract

In recent years, the frequency of flash floods in urban regions has increased all over the world. Flash floods in cities creates a water logging situation to devastated water related catastrophes. These events are sequence of meteorological systems with a specified hydrological condition in a watershed. The forecasting of such type of events can reduce the fatality rate, property damage and helps to design flood mitigation preparedness system. To forecast flashfloods, efficient early warning system is to be designed for urban landscapes. In this thesis, it has attempted to design an early warning flash flood forecasting framework. This framework is designed by considering the key elements such as precipitation, topography and hydrological modeling, which influence the flood forecasting conditions in the cities. In this research it has designed a machine learning based precipitation nowcasting system after retrieving the rainfall rate from weather radar reflectivity using developed gravity-based gravity-based Z-R relationships. In this research, a new methodological framework is also designed to select appropriate topographic models which can be used in urban hydrological models. In this it is also developed a simple numerical solving scheme to simulate the surface runoff, water depths and flow velocities in urban landscapes. This study is quite relevant to local scale to large city scale studies, and the designed model can be applicable to any cities in an international level.

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