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Key component of highly urbanized watershed flood hydrological process

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In the past decades, the world has observed rapid urbanization, and many watersheds have been highly urbanized, particularly those small watersheds close to the urbanized areas. These highly urbanized watersheds usually are data poor watersheds. Flooding in these watersheds is usually serious, and strengthened due to the increased impervious surface induced by the land use/cover changes. As there is no or less observation to the hydrological processes, effective flood forecasting faces great challenges. Traditional lumped hydrological model could not be used due to the lack of long series hydrological data to calibrate model parameters, newly emerged physically based distributed hydrological model is the only choose as it derives model parameters physically based on the terrain properties, but the uncertainty related to this practice is high. In this study, a procedure to identify the key hydrological processes of the highly urbanized watershed flood hydrological process and the sensitive model parameters related to the key hydrological processes is proposed, which helps to control parameter uncertainty. This procedure has four steps, including collecting latest LUC information or estimating it with satellite remote sensing imageries, analyzing LUC spatial pattern and identifying dominant LUC types and their spatial structure, choosing distributed hydrological model as the forecasting tool and set up it and determine initial model parameters, identifying key hydrological processes and the sensitive model parameters by using parameter sensitive analysis. A highly urbanized watershed called Shijinhe River in the Pearl River Delta Area is selected to do the case study. This study finds that runoff production processes related to dominant land use/cover, runoff routing process on urban land are key hydrological processes, and the soil water content at saturated condition and soil water content at field condition, and the roughness of urban land are sensitive parameters. The sensitive model parameters are further adjusted by referencing to local runoff coefficient experiences to reduce the parameter uncertainty.