Model Parameter Selection of 3Di for Urban Flood Warning System – Case Study in Taiwan

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3Di is a recently developed hydraulic modeling tool for urban flood modeling. With the embedded subgrid and quadtree techniques, this model is capable of simulating urban flood event in very short period of time (e.g. one minutes for an one hour event), and showing the results with vary high resolution (e.g. 1 m or 0.5 m). The quadtree technique allows the model to calculate water movement on fewer number of calculation grids; the subgrid technique allocates water from a calculation grid onto the finest resolution, which is determined by the terrain model. With these capabilities, the model not only can be used for hydraulic design, but can also be used for early flood warning in urban area. Taiwan as a populated Country, has been facing urban flood management and emergency response issues for a long time. Also, due to Climate Change, extreme rainfall has become more frequent, and the damage caused by flood has been increasing. Taiwan government invested significant budget and time on using flood modeling software for flood warning and emergency response. Efforts has been focused on applying parallel computing on hydraulic modeling softwares, or using the model that utilize GPU for faster computation. Among the models, 3Di is the one used the least computation resources and can still have reasonable accuracy. However, few studies show proper parameter selection for building a model for the flood warning system. To be specific, for flood warning, the simulation has to be finished within a reasonable period of time. In Taiwan, the rainfall forecast, which is considered accurate within 3hrs , is updated every 20 minutes. Hence, for keeping modeling accuracy, the flood simulation has to be less than 15 min, leaving some time for post processing, updating new forecast data and running model for next hour. This study will use 3Di to simulate multiple flood events at Tainan City and WenShan District, Taipei City, Taiwan, and will address the best procedure for choosing proper parameters for the model to simulate an 1hr event within 15 min, while still keeping modeling accuracy. The discussion will focus on how large a modeled area should be, how high the terrain model can be and the relations among these two main factors and other model parameters.