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Application of Grid-Xinanjiang Model to Chinese small mountain Watersheds for Flash Flood Warning

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Abstract In this study, a new Grid-Xinanjiang model, which considering the spatial variability of grid cell topographical information and soil moisture storage capacity, was developed to simulate the flash flood for small mountain watersheds. The soil moisture storage capacity of each grids was calculated by using the Curve Number of SCS-CN (Soil Conservation Service) model. The model was performed at 90m grid cells, which highlights the well representing of the sub-grid variability. The developed model was applied to three typical small mountain watersheds in different provinces of China for flash flood simulations. The performance of the Grid-Xinanjiang model was compared with that of the commonly used HEC-HMS model. The results show that the Grid-Xinanjiang model performs a little better than the HEC-HMS model in terms of the estimates of streamflow and the model efficiency coefficient. All of the qualified ratios relative to runoff depth, peak flow, and peak time for the Grid-Xinanjiang model in the applied watersheds are more than 95%. Combining the critical discharge and the antecedent soil moisture condition, the newly developed Grid-Xinanjiang model can be used to calculate the flash flood warning critical rainfall for Chinese small mountain watersheds.

Key words Grid-Xinanjiang model; topographical information; flash flood; mountain watersheds