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[Abstract Title]

An integrated rainfall-runoff-inundation simulation model for spatial flood risk assessment

[Abstract]

From the viewpoint of system, rather than focusing only on a specific area, integrated flood risk management emphasizing the integrality of a river basin and the upstream–downstream and city–region relationships. Conventional simulation models treat upstream and downstream or city and region areas independently which fail to consider such relationships. Furthermore, separately implementing rainfall-runoff model or rainfall-inundation model to the whole river basin can lead to the consequence that either the resolution is too low or the calculation is too slow. In this research, a GIS-based visualized, integrated rainfall–runoff–inundation model for flood risk assessment is developed. Hydrological analysis was adopted in the river basin to simplify the process of runoff, which made calculation reasonable and faster. Then high resolution inundation simulation can be conducted in specific concerned areas. The GIS helped to build the model, which included mesh generation, data preprocessing, and result visualization. Shallow water equations with riemann solver constituted the calculation framework and c++ is taken as programming language. The runoff area was divided by hydrological analysis, and the 1D



shallow water equations was adopted according to sub-basins. The inundation area was simulated by a 2D model based on full shallow water equations. The integration of runoff and inundation was controlled by joining the runoff mesh and the inundation mesh, and time steps were coordinated by interpolation. The case studies in China and Japan were presented to demonstrate the flexibility of the model.

[Keywords]

Flood risk assessment, rainfall-runoff-inundation simulation, GIS