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Hydrology and Earth System Sciences Discussions

Interactive comment on "Coupling Green-Ampt infiltration method and two-dimensional kinematic wave theory for flood forecast in semi-arid catchment" *by* L.-L. Wang et al.

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The authors aimed to develop a Grid-GA-2D model by coupling the Green-Ampt infiltration method with the two dimensional kinematic wave model for flood simulation and forecasting in semi-arid catchments, taking into consideration the soil moisture redistribution at hillslope and depressions storing water's effect on surface flow process. The Grid-GA-2D model was applied to a middle-sized river basin with semi-arid climate in China, together with a comparison with the Grid-GA model and Shanbei model for investigating its applicability to semi-arid catchments for flood forecasting. It represents a major contribution to the literatures pertaining to flood forecasting models for arid or semi-arid catchments.

While the model performance of Grid-GA-2D is better than the other two models in general, there are some problems associated with the paper, which are needed to address.

1. The Grid-GA-2D model consists of a runoff generation component via infiltration excess and a grid-based flow routing component based on kinematic wave theory. Table 2 shows that the relative error of flood volume simulated by the Grid-GA-2D MODEL is 14.5% in average, which is the same as that one simulated by the Grid-GA model and the Shanbei model. As the component of runoff generation plays a crucial role in hydrological process simulation, the authors should concentrate on improvement of runoff generation and separation modeling. 2. GREEN-AMPT model is only suitable for simulating the precipitation-infiltration process. Taking into consideration that the redistribution of surface soil moisture during no-rainfall period will affect the initial soil water content of precipitation-infiltration process and the evapor-transpiration process, the authors should represent soil water accounting component when describing the Grid-GA-2D model. 3. Figs 6 and 7 suggest that the sub-surface runoff or interflow component cannot be ignored in the test catchment. So, the author should introduce an interflow routing module for further improvement of the Grid-GA-2D model. 4. Table 2 shows the statistics of fours measures (relative error of flood volume, relative error of flood peak, relative error of peak time and deterministic coefficient) of model performance in simulating 10 flood events. However, it's found that the mean value of each measure (e.g. relative error of flood volume) shown in the table is not equal to the averaged one of the 10 flood events. The authors shall have a check on the statistics of Table 2. 5. The soil data used for the case study should also described in the paper, and the soil parameters of the runoff generation component of the Grid-GA-2D model shall be listed in the paper for reference.

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