E-13

COMPARISON AND ANALYSIS OF EXTREME FLOOD EVENT PREDICTION BY HYDROLOGICAL MODELS

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Process-based models describe the physical processes themselves and, therefore, can be used to understand the interaction between each of the processes better. In a humid watershed such physical processes are conceptualized to include, saturation excess runoff generation mechanism, saturated unsaturated subsurface flow mechanism and flow routing. Two hydrological models based on these conceptualizations are used to analyze the blind prediction capability of an extreme event in Kamishiiba catchment (a humid catchment in Japan, 210 km^2). One of these used models is a fully distributed Kinematic Wave Model that is conceptualized in terms of Darcy's equation to produce saturated and unsaturated flows. The other one is the TOPMODEL, a semi-distributed hydrological model. TOPMODEL is a saturation excess runoff model with a distributed surface runoff production mechanism and a lumped base flow which are conceptualized also in terms of Darcy's equation.

After identifying a set of parameters for each model that showed good agreement for several past flood events, the models are applied to make an extreme flood event blind prediction of 2005 september typhoon event in the Kamishiiba catchment. The correctness of the blind prediction in this research is assumed to be based on the extent of the matching of the blind prediction outcomes of the models with each other, provided that the models are proved to be a good representative of the catchment hydrologic response. This could be a method to judge the predicted outcome when no discharge data is available for the specific event of interest. The simulated hydrograph via both the models has matched quite well with each other in Figure 1. Thus we conclude that the blind prediction should be close enough with the actual flood data of the extreme event. This encouraged the authors to use the models as transferable hydrological models.

Setting a minimum similarity condition like humidity and topography, the models are used for annual daily simulation in Likhu catchment (830 km^2 in Nepal) with the same parameters that was used in Japan. The prediction results turned out to be satisfactory with some pros and cons in both the models' prediction. Analyzing these pros and cons in terms of the simulated base flow and peak flow, this research presents a new concept to divide the subcatchment in terms of the process description.

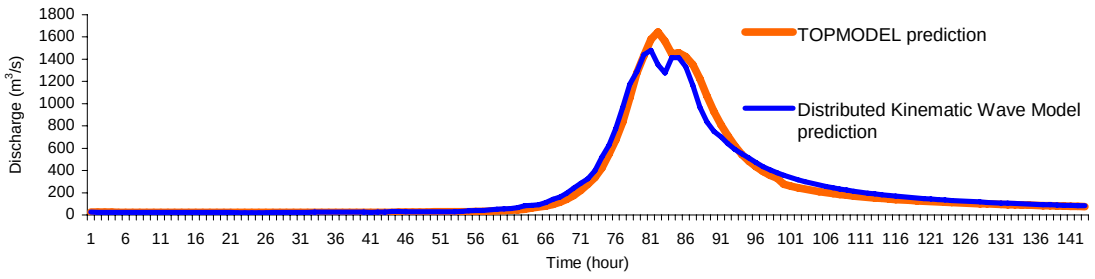

Figure 1. Comparison and analysis of extreme flood event prediction by distributed Kinematic Wave Model and TOPMODEL