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Simulating Runoff from Agricultural Watersheds in North India

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Rainfall-runoff modeling is not new concept. Therefore, the question is "why do we need another model for simulating runoff when there are numerous models reported in literature (HEC, HSPF, SHE, SWAT and others)?" In a developing country, like India, application of rainfall-runoff models is severed by the instruments used for measuring various variables/parameters required for model simulations. One such example is that in advanced countries digital instruments are used for measuring precipitation, however, precipitation is still measured with old bucket type instruments in India. Our motivation in this study is to develop a simple yet sufficiently complex model with a future scope of enhancement and which uses locally available hydrological data for model simulation, minimizing the use of generalized parameter from literature. We have developed a process based numerical rainfall-runoff model by solving St. Venant equations using Galerkin finite element method under kinematic wave approximations. The model has capability to handle continuous storm events. We calibrated and validated our model with the field data collected from two experimental agricultural watershed; (1) Zonal research Station for Kandi Area, Ballowal Saunkhri, India and (2) Central Soil and Water Research Training Institute, Dehradun, India. Output file structure from the model has been arranged in such a way that the simulated results can be visualized in a GIS environment. Preliminary results suggest that the model can sufficiently capture the dynamics of precipitation induced runoff in agricultural watershed.