Application of Tank Model to Rainfall-Runoff Processes in a Hilly Area

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The comparison with the factors of rainfall-runoff processes each other is important to construct the idea of rainfall-runoff processes in a hill slope(Asano et al, 2005). In this study, the surface runoff and subsurface one in different soil horizons were separately collected to detect the movement of subsurface water. The rainfall records were input in tank models to simulate runoff. The simulated runoff was compared with the observed one. The models are consisted of 9 models. They are model c1.1, c1.2, c1.2p, c2.3, c2.3p, c1.1e, c1.2e, c1.2ep, and c2.3e. 'c' means single-row tank model. 'm.n' means m steps and n exits tank model. 'e' means evapotranspiration considered model, and 'p' means pipe attached in the model.

Model c1.1 stands for the runoff rate of to precipitation, and the period from rainfall start to an increase in runoff. Model c2.2 improved the reproducibility of peak flow and regression period, as compared with Model c1.1 Model c1.2p calculated that pipe flow is 16.4% of rainfall in the 4 month observation period.

Model c2.3 considered the difference between AB horizon and BC horizon. Model c2.2 improved the reproducibility of regression period, as compared with Model c2.2. Model c2.3p is better than model c2.3, in a point of runoff Q_{21} starting time.

Model c1.1j is not more accurate than Model c1.1. Runoff Q_{11} in Model c1.2e is close to the observed runoff. Though Model c1.1 miscalculated non-existed runoff in the latter half of August, Model c1.1e calculated 0 runoff in that period. Model c2.3e may calculate 0 runoff in that period, in a condition of low L_{11}.