

An integrated hydrologic analysis considering ephemeral stream runoff characteristics in Cheonmi-cheon watershed, Jeju Island

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Abstract. In this study, a method of simulating ephemeral stream runoff characteristics in Jeju watershed is newly suggested. In the Jeju Island (Republic of Korea), surface runoff characteristics are very different from those of the inland. Most streams dry up shortly after rainfall events due to the rapid recharge of deep aquifers through highly permeable volcanic basalt rock. For this reason, accurate estimation of hydrologic components is challenging even with up-to-date watershed models like the Soil and Water Assessment Tool (SWAT). Thus, the process based conceptual-physical scheme is established based on SWAT-K(Korea) and applied to Cheonmi-cheon watershed which shows typical pattern of ephemeral stream runoff characteristics. For the proper simulation of this runoff characteristics, the intermediate flow and baseflow portion of SWAT-K are controlled to make downward percolation should be dominant. The surface runoff simulated by using the modified scheme showed good agreement with observed runoff data including short and long term rainfall-runoff relation. In addition, recharge and groundwater flow into the deep aquifer were dominant based on the results of runoff simulations. This conceptual model should be continuously progressed including rainfall interception, spatially estimated evapotranspiration, snow-melting and so forth for the reasonable simulation of the hydrologic characteristics in Jeju island.

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