Geophysical Research Abstracts
Vol. 18, EGU2016-19, 2016
EGU General Assembly 2016

Influence of Rainfall Data Resolution and Catchment Subdivision on Runoff Modelling

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Precipitation and catchment characteristics are significant factors for runoff modelling. This study demonstrates the relative benefits offered by the application of alternate rainfall products to several scales of catchment subdivision for simulation of the runoff hydrograph in the upper Ping river basin, northern Thailand. Two point locations at the runoff stations in the upper Ping river basin were selected for model calibration over the period of 2004-2005. Rain gauge and radar rainfall products were specified as inputs to the semi-distributed hydrological URBS model at each runoff station with five catchment subdivision schemes for runoff simulation. Point rainfall from the sparse rain gauge network and estimated radar rainfall at each radar pixel were spatially averaged over each sub-catchment using Thiessen polygons and arithmetic averaging approaches, respectively. Results for using high resolution of radar rainfall input appear that the accuracy of runoff estimates is affected appreciably by a number of sub-catchments, and the accuracy of runoff estimates tends to obviously increase with an increase of the number of sub-catchments. On the other hand, there is no significant improvement with an increasing number of sub-catchments while the coarse resolution of rain gauge rainfall input is used. The comparison on runoff accuracy among different scenarios indicates that the use of radar rainfall together with the largest number of sub-catchments gives the highest accuracy of runoff estimates.