

레이다 강우를 이용한 SWAT2000모형의 장기유출량에 대한 평가

Stream Flow Estimation Using NEXRAD Rainfall in SWAT2000 model

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Abstract-Stream Flow Estimation Using NEXRAD Rainfall in SWAT2000 model

The main objective of this study was to evaluate the use of spatially distributed rainfall on stream flow estimation using radar rainfall inputs to a hydrologic model. The Soil and Water Assessment Tool (SWAT), a distributed parameter continuous time hydrologic/water quality model, was used to estimate stream flow for a watershed in the Trinity River Basin of northeast Texas. Results obtained from simulations using NEXRAD rainfall inputs were compared to those obtained through the use of traditional raingauge data as input to the same model.

Estimation efficiency analysis was used to compare the storage volume for Cedar Creek Reservoir with daily, ten-day, and monthly accumulated flow from SWAT simulations using raingauge and NEXRAD rainfall inputs. COE values for the SWAT raingauge simulation ranged from 0.48 to 0.78, whereas COE values for the SWAT NEXRAD simulation ranged from 0.57 to 0.82. In both simulations, COE increased with weekly and monthly aggregation of daily data. The efficiency for both models was similar; however, NEXRAD rainfall inputs seem to provide a better flow estimate.

Summary

In this study observed flow to Cedar Creek Reservoir was compared with hydrologic model (SWAT) simulated flow using raingauge and NEXRAD data as rainfall inputs to the model.

Regression analysis of rainfall measured by raingauges and NEXRAD at each raingauge location suggests that, in general, NEXRAD is a good estimate of rainfall at these locations. At five out of the six stations used in this comparison, the R^2 value was greater than 0.65, and the coefficient of efficiency (COE) was greater than 0.50.

Estimation efficiency analysis was used to compare observed flow with estimated flow from the two SWAT simulations. COE values for the SWAT - raingauge simulation ranged from 0.48 to 0.78, whereas COE values for the SWAT- NEXRAD simulation ranged from 0.57 to 0.82. In both simulations, efficiency increased with longer time interval aggregations. The efficiency for both models was similar; however, NEXRAD rainfall inputs seem to provide a better stream flow estimate.

In general, SWAT - NEXRAD simulations seem to over predict high flow events and under predict low flow events. However, the accuracy of model results suggest that NEXRAD is a good alternative to raingauge data. This can be extremely valuable in watersheds without readily available raingauge data or with sparse raingauge networks.