



Runoff simulation using satellite derived actual evapotranspiration for ungauged forested watersheds

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The use of actual evapotranspiration derived by satellite data at watershed scale is studied in water balance modeling of forested watersheds in the mountainous region of central Greece. The basin-wide actual evapotranspiration (AET) was estimated through a physically based six-parameter monthly water balance model. The model uses as input data of areal temperature, precipitation and potential evapotranspiration, and calculates surface runoff, soil moisture, groundwater recharge and AET. Monthly composites of the Normalized Difference Vegetation Index (NDVI), derived from the National Oceanic and Atmospheric Administration's (NOAA) / Advanced Very High Resolution Radiometer (AVHRR) were related with the computed monthly AET estimates. The procedure was, firstly, applied to four forested mountainous watersheds of the region and the developed relationships between NDVI and AET were, then, validated temporally. The NDVI derived AET estimates used in the six-parameter water balance model resulted in equally accurate simulations of monthly runoff, when compared with the simulations acquired from the classical application of the calibrated water balance model. These results led to the development of a regional relationship between AET and NDVI. Using the AET estimates of the developed regional relationship as input to a simpler three parameter water balance model at the four study watersheds gave acceptable results in runoff simulation. Furthermore, the number of model parameters were reduced to two, which were essentially insensitive. Finally, application of the regional AET-NDVI relationship along with the three parameter uncalibrated water balance model to two other forested watersheds of the region showed the validity of the procedure for runoff simulation in ungauged watersheds.