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Hydrologic modeling of semi-arid watersheds using enhanced climate data within the Soil and Water Assessment Tool (SWAT)

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Abstract:

The absence of streamflow gages and climate stations contribute to the difficulty of understanding watershed hydrology. This study investigates the use of synthetic climate data within the Soil Water Assessment Tool (SWAT), which is integrated into an ArcGIS interface. Study watersheds in northern and southern New Mexico include gaged (Santa Cruz and Mimbres) and ungaged (Truchas and Placitas) watersheds. The study employs streamflow from USGS gaged watersheds to calibrate the model for ungaged watersheds. It also evaluates the impact on model outputs of using enhanced climate data including: 1) Tmax and Tmin from a disaggregation of PRISM data; 2) Precipitation from a sample obtained from the NCEP mosaicked precipitation product; and 3) PET, Solar Radiation, Wind speed, and Relative Humidity from processing of the North America Regional Reanalysis (NARR) product. Additional spatial data consist of a DEM (NHD 10 m), soils map (STATSGO) and a land cover map (NLCD 2001). Watershed area ranged from 109 to 1090 km². Simulations were performed over the time period from 2003 to 2007. Annual average runoff coefficients (runoff/rainfall) were higher in northern New Mexico (0.08 and 0.19) than in the southern watersheds (0.05 and 0.09). Ongoing efforts include model calibration, climate data evaluation, and parameter sensitivity analysis. The final project output is expected to be a better understanding of runoff processes in ungaged basins in semiarid regions.

Impact Statement:

The final project output is expected to be a better understanding of runoff processes in ungaged basins in semiarid regions.

Category: Other Water Resource Topics
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