

SWAT: How Much Does Resolution of Soils Matter When Comparing Real vs. Simulated Meteorological Data?

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Although spatially explicit data layers commonly used in hydrologic models are readily available, accessibility of meteorological data with adequate spatial and temporal coverage remains a challenge. The ability to accurately predict streamflow with a model, for example, can be strongly impacted by the input data. The goal of this study was to determine sensitivity of the SWAT (Soil and Water Assessment Tool) model to the use of measured, local versus simulated meteorological data for a given resolution of soils, landuse and Digital Elevation Models (DEMs) required by the model. Data was collected for the Alafia River watershed in the Tampa Bay Estuary in West Central Florida. The soil input layers were analyzed at two different resolutions; viz. 30m (obtained from Soil Survey Geographic Database - SSURGO) and 250m (obtained from the State Soil Survey Database - STATSGO). Landuse data photo-interpreted from 1:12,000 (3m) color-infrared digital ortho-quarter quadrangles (DOQQs) were obtained from the Southwest Florida Water Management District (SWFWMD). DEMs were obtained from the United States Geological Survey (USGS) at 30m resolution. This study was performed at 30m and 240/250m resolution (LU and DEMs were resampled to 240m for the model runs with STATSGO data, as close as mathematical accuracy allows). Five stations with local meteorological data were used in the “real” model runs (for wet - 1994-1996 and dry - 1998-2000 periods) and the simulated weather data were used for the same periods. The output variable of comparison was model flow out. From preliminary analysis, model outputs were sensitive to the variation in both soil resolution and meteorology as the real meteorology over-predicted the simulated meteorology, and the coarser soils data (STATSGO) tended to under-predict the higher resolution (SSURGO) soils data.

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