Journal of Environmental Hydrology
ISSN 1058-3912
Electronic Journal of the International Association for Environmental Hydrology

JEH Volume 13 (2005), Paper 30 Posted December 19, 2005

MODELING THE EFFECT OF SOIL, VEGETATION TYPE AND DENSITY ON SOIL MOISTURE AND SURFACE ENERGY FLUX

Teferi D. Tsegaye[1]
Reizelie Barreto[2]
William Crosson[3]

[1]*Alabama A&M University, Center for Hydrology, Soil Climatology, and Remote Sensing, Normal, Alabama*
[2]*Pennsylvania State University, State College, Pennsylvania*
[3]*Global Hydrology and Climate Center, Huntsville, Alabama*

ABSTRACT
Soil moisture plays a crucial role in hydrological modeling and land-atmosphere energy balance by controlling the amount of evaporation and thermal heat exchange between the land surface and overlying atmosphere. This energy exchange in turn plays a vital role in modifying atmospheric dynamics, including small-scale phenomena such as thunderstorms as well as larger-scale events such as droughts and floods. Understanding the relationships between the soil moisture distribution in the profile with properties such as surface temperature, radiation balance, evaporation, and infiltration is important in order to forecast hydrological and meteorological processes. The SHEELS (Simulator for Hydrology and Energy Exchange at the Land Surface) numerical model is designed to estimate the movement of water within the soil as well as surface temperature and energy exchange for various agricultural management practices. In 1998, a study was conducted on six plots composed of two 50 x 60 m and four 30 x 50 m plots, one bare, one grass and four corn plots having four different vegetation densities Corn 4, Corn 3, Corn 2, and Corn 1. The SHEELS model was applied using data collected from Huntsville ?8, a field experiment performed to measure soil properties with sensors buried in the soil. A model simulation was performed for four plots, bare soil, Corn 4, Corn 2, and grass over 12 days. Bare soil exhibited higher surface temperature throughout the study period. Due to the increased interception by the corn full canopy, Corn4 plot had lower near surface soil moisture. Model simulations are quite consistent with measurements, however model soil moisture responds too strongly to rainfall. Soil water dynamics are strongly controlled by soil hydraulic properties that have extremely high spatial variability.

Reference: *Teferi D. Tsegaye, T.D., R. Barreto, and W. Crosson. 2005. Modeling the Effect of Soil, Vegetation Type and Density on Soil Moisture and Surface Energy Flux, Journal of Environmental Hydrology, Vol. 13, Paper 30.*

CONTACT:
Teferi D. Tsegaye
Alabama A&M University
Center for Hydrology, Soil Climatology, and Remote Sensing
Normal, AL 35762
USA

E-mail: *teferi.tsegaye@email.aamu.edu*

Return to JEH 2005 Papers

Return to HydroWeb Homepage