Geophysical Research Abstracts,
Vol. 11, EGU2009-3930, 2009
EGU General Assembly 2009

Evaluation of soil moisture regime prediction methods under different ecological conditions in the Pre-Pyrenees

J.C. Loaiza Usuga (1), F. De Bello (2), and V.R.N. Pauwels (3)

(1) Laboratory of Hydrology and Soil Conservation, Forestry and Technology Centre of Catalonia, Solsona, Spain (jc.loaiza@ctfc.es, +34-973481752), (2) Laboratoire d'Ecologie Alpine, Universitée Joseph Fourier, Grenoble, France, (3) Ghent University, Laboratory of Hydrology and Water Management (LHWM), Ghent, Belgium

Soil moisture regimes under different land uses were observed and modeled in a representative forest basin in the Catalunyan Pre-Pyrenees, more specifically in the Ribera Salada catchment (222.5 km2), from 1998 through 2005. The vegetation cover in the catchment consists of pasture, tillage and forest. A number of representative plots for each of these land cover types were intensely monitored during the study period. The annual precipitation fluctuates between 516 and 753 mm, while the soil moisture content oscillates between 14 and 26% in the middle and low lying areas of the basin, and between 21 and 48% in shady zones near the river bed, and in the higher parts of the basin. Soil moisture and rainfall are controlled in the first place by altitude, with the existence of two climatic types in the basin (sub-Mediterranean and sub-alpine), and further by the land use. A fully physical process-based hydrologic model (TOPLATS) was found to be able to simulate exactly the soil moisture regimes in the basin in the different combination of local abiotic and biotic factors. The TOPLATS-based results are more precise than the results obtained using another frequently used method, more specifically the Newhall Simulation Model (NSM), which has been developed to simulate soil moisture regimes. NSM was found to overestimate wet soil moisture regimes. The differences between the obtained results can be explained by the model structure. On the one hand, TOPLATS uses a full set of meteorological forcing data to apply a large number of coupled physical equations to simulate the interaction between the land surface and the atmosphere. These equations require a large number of parameters which can be obtained either by calibration or by in-situ measurements. On the other hand, the NSM uses only air temperature and precipitation to apply a number of regression-based threshold equations, requiring no site-specific parameters. While the NSM has certainly proven to be useful in conditions where computational power is limited, and if one is careful in the interpretation of its results, the conclusions from this paper indicate that more attention should be paid to the use of hydrologic models for the estimation of soil moisture regimes.