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# Calibration of a simple evapotranspiration model in a semi-arid rangeland using soil moisture measurements and a soil moisture - temperature regression

**M. Maneta**, S. Schnabel, D. Lagar, A. Gómez

Grupo de Investigación Geoambiental, Dpt Geografía, Universidad de Extremadura, Campus Universitario s/n, 10071, Cáceres, Spain. (maneta@unex.es)

Many conceptual watershed models use the bucket model or similar concepts to simulate the vadose zone. In those cases, soil moisture can be represented by an aggregated value that summarizes the water storage in a control volume in which the water balance is kept. Below field capacity, water can only be removed from the soil by evapotranspiration. The latter is the main process through which water leaves the catchment in arid and semiarid lands. A good estimation of actual evapotranspiration is therefore needed for a correct simulation of the soil water dynamics.

A simplification of the Kristensen and Jensen model [1] to calculate actual evapotranspiration from potential evapotranspiration was used to simulate the dynamics of the averaged soil water in a soil column in a rangeland in SW Spain. The water content was simulated using a 1 day time step. A first calibration of the model was done using the SCE algorithm [2] against the available soil moisture measurements. The results were compared with a second calibration using a two objectives approach. This second calibration used both the soil moisture observations and a linear trend existing between daily maximum temperatures and soil moisture. With this second calibration method it was attempted to avoid a calibration that could be too specific for the conditions of the hydrologic year used in the calibration if only using soil moisture data. A second reason was to lay a better posed calibration problem. The effect of including this trend on the identifiability of the parameters was studied. The calibrated parameters obtained with both methods were tested by simulating the measured soil moisture dynamics in an independent hydrologic year and compared with the values suggested in the literature.

References:

[1] Kristensen, K.J. and Jensen, S.E., 1975. A model for estimating actual evapotranspiration from potential evapotranspiration. Nordic Hydrology, 6: 170-188.

[2] Duan, Q., Sorooshian, S. and Gupta, V.K., 1992. Effective and efficient global optimization for conceptual rainfall runoff models. Water Resour. Res., 28(4): 1015-1031.