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Evaluation of FAO 56 model for bare soil evaporation in a semi - arid region using experimental data

E. A. Torres, E. Rubio, A. Calera, A. Cuesta

Teledetección y SIG, IDR, Universidad de Castilla La Mancha, Spain.

(enrique.torres@uclm.es / phone: +34-967599200-2640)

In some hydrological models bare soil evaporation (BSE) constitutes a weak point. The reason is that these models were originally designed for humid environments in which bare soil fraction is not relevant. However, in arid and semiarid regions, bares soil covers large areas in which soil dynamics present a high space and time variability, becoming an important factor in hydrological modelling for these regions. FAO 56 presents a BSE model which takes into account soil water retention forces using a reduction coefficient. In this study, the FAO 56 model was validated with lysimeters systems in Albacete, Spain. We used a weighting lysimeter on low evaporative demand (winter), and a set of eight mycrolysimeters on bare soil watered at four different levels during high evaporative demand (summer). This data set of lysimeters allowed us to test the FAO 56 model on different conditions of evaporative demand and soil humidity. The data analysis shows that under low evaporative demand conditions, FAO 56 model and the weighting lysimeter differ just on 7% for cumulative evaporation, while on high evaporative demand the results are more sensitive to initial soil humidity. The model used to assess BSE is more accurate when the initial water content is medium, while at low soil water content the model underestimates evaporation and at high soil water content evaporation is overestimated. These results allow us to conclude that the FAO 56 methodology may be implemented with confidence at regional scale in semi-arid conditions to estimate BSE.