

Abstract

In recent years, the knowledge of transfers of water and heat between the soil, vegetation, and atmosphere is improving. Soil-Vegetation-Atmosphere Transfers (SVAT) modelling simulate well some variables dealing specially with the water balance, such as evaporation and soil moisture. In order to assess the impact of the number of soil layers defined in the models, we have used several formulations for surface runoff, subsurface runoff, diffusion, drainage and base-flow, adapted from recent SVAT models (ISBA, SEWAB, LAPS). A two-layer soil hydrological configuration developed by Albertson and Kiely (Journal of Hydrology (2001)) was used as a basis for the different schemes. The ISBA model (Noilhan et al. 1999) has been used as a first attempt for the water budget. We have improved the results by adding a third soil layer as advocated by A. Boone et al. (1999). In parallel with that, we tested the SEWAB model (Mengelkamp et al. 1999) and the LAPS model (Mihailovic 1996) in their three-layer and multi-layer soil configurations. The outputs have been compared with data collected at a small grassland site near Cork, Ireland. The use of a third soil layer improves the simulation of the hydrological processes compared to a two-layer soil model. However computing with more than three layers does not improve the accuracy of the simulation and a further disadvantage is increased complexity.