

Estimation of root-zone soil water content by a simple bucket model: applications on Hungarian datasets

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The goal of this study is to estimate the soil water content in Hungary. For estimation the root-zone soil water content a simple bucket model has been used. The calculations were made on a daily time step. Required input data are daily average of temperature and relative humidity, daily amount of precipitation and characteristics of soil type (wilting point and field capacity soil moisture contents, depth of root-zone). The model was tested by two one-year long Hungarian datasets for a sandy and a sandy loam soil types. For both measuring sites model calculations were compared with measured soil water contents. A fairly good agreement was established. Sensitivity analyses were also performed; the effects of input parameters upon outputs have been studied. After point calculations, the model was applied for a grid using the results of tests. Soil water content for Hungary was estimated on a rectangular grid with resolution 0.10 x 0.15 degree. The soil texture data was obtained using a Hungarian soil-map. The grid cell soil texture was represented by the dominant soil texture. The meteorological data utilised in the model were generated by the ALADIN meso-scale limited area numerical weather prediction model used by the Hungarian Meteorological Service. A model application is also shown in this study. The effect of predicted root-zone soil water content on the ozone flux near the ground is also investigated. It was found that soil water deficiency can strongly reduce the stomatal conductance and so the ozone flux through it. The stomatal ozone flux calculations for both taking and without taking into account the effect of the soil moisture stress on the ozone deposition were performed. For the tested hot, summer day a pregnant difference has been arose between the two cases. The obstructive effect of the soil wetness stress on the stomatal ozone deposition varies between 0 and 70 per cents. This phenomenon cannot be neglected in the continental climate region, especially in the hot summer period with the prevailing drought conditions.