Geophysical Research Abstracts
Vol. 16, EGU2014-2119, 2014
EGU General Assembly 2014

Application of interception models in a watershed with Mediterranean type climate

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The study of rainfall interception by the vegetation canopy is of great importance in the water balance of watersheds, because much of the precipitation returns to the atmosphere as evaporation. Studies regarding interception by Mediterranean type vegetation in arid and semi-arid areas are very necessary and useful given the low rainfall that characterizes them.

The aim of this work has been to study the Rutter and Gash interception models and to apply them to the predominant vegetation in the watershed of "The Cabril", Southern Spain, including: scrub, composed mostly of rockrose (Cistus ladanifer), and arboreal masses of pine trees (Pinus pinea).

The data of throughfall and stemflow were recorded from November 2010 to June 2013. The rainfall that occurred in that time period have been divided into rain events preceded by 8 and 24 hours without rain in order to determine the various parameters describing the vegetation cover, among others, the storage capacity of the canopy and of the stem, the coefficient of free throughfall and the proportion of rainfall that is diverted to the trunk.

The results show a greater storage capacity of the pine canopy and a reduced storage capacity of the its trunk compared with rockrose,. Interception losses measured in field achieved in Pinus pinea and Cistus ladanifer the 26.86% and 16.36% of the total precipitation, respectively. Interception values obtained by applying the models have a good fit to field measured data, since the differences between both are, in most cases, less than 5%. Rutter model modified by Valente, after the original contributions made in this work, presents an even better fit than the Gash interception model, being interception losses estimated by this method of 27.79% for pine and 20.36% for rockrose.

Stemflow losses estimated by the same method reach the 0.15% in pine trees and the 10.73% in rockrose. This large difference is due, on the one hand, to that C. Ladanifer secretes a resin impregnating its leaves and stem and which acts as a water repellent, reducing the storage capacity of the shank while facilitating the flow of water through their stems and, on the other hand, to the architecture of rockrose, mainly the insertion of the branches, which also favors the flow to trunk. Cortical fluxes together with throughfall fluxes are the net precipitation. This amount of water represents 72.20% of gross precipitation in the case of pine and 79.66% for the rockrose.