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The effects of rainfall partitioning and evapotranspiration on the temporal and spatial variation of soil water content in a Mediterranean agroforestry system

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Tree plantation for wood production has been proposed to mitigate CO_2-related climate change. Although these agroforestry systems can contribute to maintain the agriculture in some areas placed between rainfed crops and secondary forests, water scarcity in Mediterranean climate could restrict its growth, and their presence will affect the water balance. Tree plantations management (species, plant density, irrigation, etc), hence, can be used to affect the water balance, resulting in water availability improvement and buffering of the water cycle.
Soil water content and meteorological data are widely used in agroforestry systems as indicators of vegetation water use, and consequently to define water management. However, the available information of ecohydrological processes in this kind of ecosystem is scarce.
The present work studies how the temporal and spatial variation of soil water content is affected by transpiration and interception loss fluxes in a Mediterranean rainfed plantation of cherry tree (Prunus avium) located in Caldes de Montbui (Northeast of Spain).
From May till December 2011, rainfall partitioning, canopy transpiration, soil water content and meteorological parameters were continuously recorded. Rainfall partitioning was measured in 6 trees, with 6 automatic rain recorders for throughfall and 1 automatic rain recorder for stemflow per tree. Transpiration was monitored in 12 nearby trees by means of heat pulse sap flow sensors. Soil water content was also measured at three different depths under selected trees and at two depths between rows without tree cover influence.
This work presents the relationships between rainfall partitioning, transpiration and soil water content evolution under the tree canopy. The effect of tree cover on the soil water content dynamics is also analyzed.