



Analysis of concurrent spatio-temporal patterns of soil moisture and apparent electrical conductivity in the olive-tree influence area

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Efficient water resources management requires the characterization and quantification of soil moisture patterns at different scales. This is of special interest in crops such as the olive tree still in expansion and mostly monoculture in regions of southern Spain. Volumetric soil moisture (θ) measured with a sensors network down to 0.8 m depth and integrated measurements of apparent electrical conductivity (ECa) obtained with an electromagnetic induction meter sensing an approximate depth of 1.0 m have been compared. A total of 47 field campaigns between 2014 and 2015 were realized to concurrently monitor both variables.

The spatial means of θ and ECa showed a strong correlation (0.8) along the period under study. Both variables manifested a positive relation between the spatial means and standard deviations that corresponded with the dry branch of the typical convex shape found in other soil moisture variability studies. Although both variables had similar behavior with respect to their spatial values, a location specific analysis conducted through a temporal stability analysis showed a differential response. While ECa presented a clear dependence of the mean relative differences (MRD) on distance from the tree trunk this was not observed in the MRD of θ . However, both types of measurements led to the selection of the same representative location that was found at a distance of 2.2 m from the tree trunk, very close to the projection of the external boundary of the tree canopy. Although with some limitations, these results reveal the potential of ECa for monitoring θ spatio-temporal patterns in olive tree orchards