



## **Calibration of soil moisture flow simulation models aided by the active heated fiber optic distributed temperature sensing AHFO**

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Most of the studies dealing with the development of water flow simulation models in soils, are calibrated using experimental data measured by soil probe sensors or tensiometers which locate at specific points in the study area. However since the beginning of the XXI century, the use of Distributed Fiber Optic Temperature Measurement for estimating temperature variation along a cable of fiber optic has been assessed in multiple environmental applications. Recently, its application combined with an active heating pulses technique (AHFO) has been reported as a sensor to estimate soil moisture. This method applies a known amount of heat to the soil and monitors the temperature evolution, which mainly depends on the soil moisture content. Thus, it allows estimations of soil water content every 12.5 cm along the fiber optic cable, as long as 1500 m , with [U+F0B1] 2 % accuracy , every second.

This study presents the calibration of a soil water flow model (developed in Hydrus 2D) with the AHFO technique. The model predicts the distribution of soil water content of a green area irrigated by sprinkler irrigation. Several irrigation events have been evaluated in a green area located at the ETSI Agronómica, Agroalimentaria y Biosistemas in Madrid where an installation of 147 m of fiber optic cable at 15 cm depth is deployed. The Distribute Temperature Sensing unit was a SILIXA ULTIMA SR (Silixa Ltd, UK) and has spatial and temporal resolution of 0.29 m. Data logged in the DTS unit before, during and after the irrigation event were used to calibrate the estimations in the Hydrus 2D model during the infiltration and redistribution of soil water content within the irrigation interval.

### References:

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