



## **A comprehensive guide for designing more efficient irrigation systems with respect to application control**

Issam Khaddam and Niels Schuetze

Institute of Hydrology and Meteorology ,Technische Universitaet Dresden, Dresden, Germany

The worldwide water scarcity problems are expected to aggravate due to the increasing population and the need to produce more food. Irrigated agriculture is considered the highest consumer of fresh water resources with a rate exceeds 70% of global consumption. Consequently, an improvement in the efficiency of all irrigation methods, such as furrow or drip irrigation, becomes more necessary and urgent. Therefore, a more precise knowledge about soil water distribution in the root zone and the water balance components is required. For this purpose and as a part of the SAPHIR project (Saxonian Platform for high Performance Irrigation), a 2D simulation- based study was performed with virtual field conditions. The study investigates the most important design parameters of many irrigation systems, such as irrigation intensity and duration, and shows there influence on the water distribution efficiency. Furthermore, three main soil textures are used to test the impact of the soil hydraulic properties on irrigation effectiveness. A numerous number of irrigation scenarios of each irrigation system was simulated using HYDRUS 2D. Thereafter, the results were digitally calculated, compiled and made available online in the so called "Irrigation Atlases". The irrigation atlases provide graphical results of the soil moisture and pressure head distributions in the root zone. Moreover, they contain detailed information of the water balance for all simulated scenarios.

The most studies evaluate the irrigation water demands on local, regional or global scales and for that an efficient water distribution is required. In this context, the irrigation atlases can serve as a valuable tool for the implementation of planned irrigation measures.