Modelling Water Availability for Urban Trees Growing in Paved Soils

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Abstract: Despite the classification of built urban environments as impervious surfaces, infiltration of precipitation occurs on paved soils and can supply water to urban trees. However, under changing climate and particularly in arid conditions, additional irrigation is necessary to sustain healthy mature urban trees that provide evaporative cooling, shade, and enhance urban wellbeing. Based on an extensive open dataset on soil moisture under 18 pavement types (Schaffitel et al. 2020), we are developing a process-based numerical model using Hydrus-1D to simulate water flows in sealed soil domains. This study examines the soil water balance under different pavement materials and atmospheric forcing conditions. We analyze irrigation scenarios under different climates to determine pavement configurations above tree root zones that require modifications to maintain ecosystem services provided by trees, while conserving water.
This research aims to advance the fundamental understanding of how soil sealing impacts water availability for urban trees, which is crucial for predicting changing water demands and optimizing the use of increasingly limited water resources in urban forestry.

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