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A process based run-off model for paved urban soils

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Paving is the most severe impact on soil hydrology in urban areas.
Grey box run-off generation models are used in civil engineering e.g. dimensioning of drainage infrastructures. Mostly, maximum run-off is calculated using storm water data and static run-off coefficients.
In future, cities need to adapt to heat waves and changing rainfall regimes. This implies a change in the management of urban waters from drainage to use. Static run-off models are not suitable to predict the future runoff availability, because they do not describe the underlying processes of run-off generation. For predictions in a Climate Change context, process based models are needed.

In this study we introduce such a process based model. It has been calibrated for two pavement types based on lysimeter measurements. The model describes the run-off coefficient as a function of: rain event intensity, surface storage capacity and the infiltration capacity of the pavement. Thus, the model is able to describes the behavior of impermeable and permeable pavements but also of roof tiles and bare soils.
Once calibrated for a pavement, the model can be used to predict dynamic run-off generation for a wide range of rain intensities from the smallest drizzle to the heavy rainfall events and can therefore be employed in tests of future management strategies for urban water.