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Studying water budget of paved urban sites using weighable lysimeters

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Our lysimeter study addresses high-resolution analysis of the water balance of permeable pavements used for sidewalks and streets. Berlin's typical pavers, "Bernburg cobble stone" and "concrete paver" are analysed for actual evaporation, runoff and groundwater recharge.
To achieve the reasonable boundary condition realistic seam material were bed in surface construction.

The lysimeter bodies, filled with construction sand, stand in 1.5 m deep stainless cave on a scale with a 100g/sec resolution. The seepage water is captured by four suction plates with a suction of 63 hPa. To measure the run-off separately, special gutters are set up directly along the surface edge. This gutter leads the run-off water immediately to a separate discharge pipe and the run-off will be measured with a resolution of 0.0005 mm/sec; no water gets lost within this procedure.
A dynamic runoff coefficient could be gained for a span of typical rainfall intensities.

We will present runoff coefficients (RC) from both pavements as functions of the rainfall intensity, based on about 40 individual precipitation events. We could show that the rainfall intensity is the best predictor for the runoff behaviour.
Concrete pavers can cause runoff with higher RC at lower intensity. However, for intensities > 0.1 mm/min their RCs tend to increase slower than those of mosaic cobble stone pavements.
RCs might not be dependent on pavements during strong precipitation events. The measured RC are typical for the rainfall characteristic of Berlin, Germany and should not be used for other climate regions. First, the controlling variable must be identified and incorporated into process based models.
Such models are essential for the prediction of urban evaporation so as to develop new urban water and climate management strategies.