



Estimation of evapotranspiration based on diurnal streamflow fluctuations in a small agricultural catchment

Borbála Széles (1,2), Martine Broer (2), Günter Blöschl (1,2), Juraj Parajka (1,2), Patrick Hogan (2), Markus Oismüller (1,2)

(1) Institute of Hydraulic Engineering, Vienna University of Technology, Vienna, Austria, (2) Centre for Water Resource Systems, Vienna University of Technology, Vienna, Austria

The objective of this study was to understand and investigate on which scale the diurnal streamflow fluctuations detected at several different outlet points of a 66 ha Austrian experimental catchment, i.e. the Hydrological Open Air Laboratory (HOAL), are affected by the riparian and non-riparian zone. We found that apart from the main stream, other runoff generation mechanisms, such as tile drainage flow and excess saturation wetland runoff, also feature diurnal fluctuations. However, the diurnal streamflow signals in rainless periods did not simultaneously occur at the subcatchments; we either found a time lag between the fluctuations observed at the tributaries and the main outlet point or the tile drainage systems and wetlands did not show the short-term fluctuations of the streamflow rates. We provide an estimation of the evapotranspiration rates by setting up a simple model simulating the recession periods and the diurnal streamflow fluctuations that uses downwelling shortwave radiation as the only input, which proved to be a correct inducing factor of the diurnal signals. A multiple objective calibration approach was applied, that incorporated additional information on the timing and amplitudes of the fluctuations, thereby providing a better fit between the measured and simulated streamflows. The three model parameters showed a seasonal evolution, that gradually increased from spring to autumn. The spatial and temporal variability of the fluctuations and the differences between the magnitudes and timings of the fluctuations were analysed.