# Upscaling the representative elementary watersheds to the meso-scale watershed: modelling runoff generation in the Hesperange catchment, Luxemburg

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Recently, the framework of the Representative Elementary Watershed (REW) approach has been extended to include a new domain for describing subsurface storm flow. The mass balance equations and the closure relations associated with subsurface storm flow were developed by Zhang et al. (2006). In accordance with the new development of the framework, the model code, REWASH, has been further enhanced and a rainfall-runoff model has been built for the Hesperange catchment, a sub-catchment of the Alzette river basin, in Luxembourg. This meso-scale catchment is characterised by quick response to precipitation and subsurface storm flow is one of the dominant runoff generation processes. The model has been evaluated by a multi-criteria approach using multi-variable measurements (e.g. discharge and groundwater table) at various sites. The model is first calibrated with data gauged at the sub-catchments (the upstream representative elementary watersheds, i.e. REWs, of the parent catchment), and then examined with data measured further downstream, and with the total runoff of the catchment outlet. The results are compared with those obtained using a conventional approach that does this in the reverse direction, presented earlier by Zhang et al. (2006). Analyses of the differences between the results of the two studies are presented and parameters' scaling is discussed. It is shown that subsurface storm flow contributes considerably to stream flow of the upstream REWs. The model is well able to simulate discharge at different points of the catchment and capture the groundwater table dynamics. This study demonstrates that the model is a useful tool for hydrological analysis of catchments at meso-scale, and it has potential for applica-

tion to ungauged basins. It is also revealed that predictive uncertainties associated with parameter scaling should be investigated in the future research on the REW approach.

Reference

Zhang, G. P., Savenije, H. H. G., Fenicia, F. and Pfister, L., 2006. Modelling subsurface storm flow with the Representative Elementary Watershed (REW) approach: application to the Alzette river basin, Hydrol. Earth Syst. Sci. Discuss, accepted.