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# Improving surface-subsurface water budgeting using high resolution satellite imagery applied on a brownfield

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The estimation of surface-subsurface water interactions is complex and highly variable in space and time. It is even more complex when it has to be estimated in urban areas, because of the complex patterns of the land cover in these areas. In this research, a modeling approach with integrated remote sensing analysis has been developed for estimating water fluxes in urban environments. The methodology was developed with the aim to simulate fluxes of contaminants from polluted sites. Groundwater pollution in urban environments is linked to patterns of land use and hence it is essential to characterize the land cover in detail. An object-oriented classification approach applied on high-resolution satellite data has been adopted. To assign the image objects to one of the land-cover classes a multiple layer perceptron approach was adopted (Kappa of 0.86). Groundwater recharge has been simulated using the spatially distributed WetSpass model and the subsurface water flow using MODFLOW in order to identify and budget water fluxes. The developed methodology is applied to a brownfield case site in Vilvoorde, Brussels (Belgium). The obtained land use map has a strong impact on the groundwater recharge, resulting in a high spatial variability. Simulated groundwater fluxes from brownfield to the receiving River Zenne were independently verified by measurements and simulation of groundwater-surface water interaction based on thermal gradients in the river bed. It is concluded that in order to better quantify total fluxes of contaminants from brownfields in the groundwater, remotes sensing imagery can be operationally integrated in a modeling procedure.