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Modelling biocide and pesticide losses in a catchment with mixed land use.

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During rain events biocides and pesticides are transported from agricultural fields but also from urban sources to surface waters. Originally designed to be biologically active these compounds may harm organisms of the aquatic ecosystem. Although several models exist to predict either urban or agricultural storm event only few combined this two sources, and none of them included the losses of biocides from building envelopes. It was therefore the aim of this study to develop a relatively simple model for the prediction of water and substance flows from urban and agricultural sources to surface waters. We developed a transport flow model accounting for both micro and macropore flows in agricultural soils. We modelled both drainage flow and surface runoff from agricultural areas. In urban areas the model represents: various sources (e.g. facades, streets, households), sewer systems including combined sewer overflows and wastewater treatment plants.
The model was applied to a catchment where a previous extensive field study has been conducted. The modelled and measured discharge results corresponded well in terms of quantity and dynamic. The modelled results highlighted the change of urban and agricultural flow components during a rain event. Urban components were dominant during the most intensive rain period followed by agricultural components. The model was able to predict the dynamic of atrazine (agricultural-used compound) loads well. Also the dynamic of diuron losses, a compound used for material protection in facades was modelled well. For a third compound, glyphosate, which is used in both urban and agricultural areas, we could demonstrate, based on modelled flow components and measured load dynamics, that the main contributions originate from urban areas. Thus the model helped to identify better the key source of a compound with a dual use. The model is currently further applied and validated to other data sets.