



Experimental approach to investigate the influence of land use and soil cultivation on subsurface flow

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Flood events are largely influenced by discharge generated by overland and subsurface flow. Modern flood management strategies therefore include measures of land use and soil cultivation changes, which positively affect the soil hydraulic properties and water retention capacities in considered catchment areas. The aim of the presented experimental approach is to investigate the processes of surface and subsurface flow generation and concentration to gain a deeper understanding of how the different flow processes contribute to flood events. The obtained data further helps to improve the model parametrization and calibration. The measurement site is located on a north-western faced hillslope in the southern Glonn catchment (Bavaria, Germany) and includes a cropland, a grassland and a forested field. The experimental set-up measures meteorological parameters, soil hydraulic properties at different points in the fields, discharge measurements at the bottom of the fields (surface runoff and subsurface flow) and discharge measurements in the adjacent creek. In this way, the heterogeneity of vertical and lateral subsurface flow can be investigated, including the influence of land use and soil hydraulic properties. The measurements showed a correlation of surface and subsurface flow paths and the influence of antecedent moisture conditions and vegetation period on the distribution of the flow components. The measured data can be used to plausibly calibrate and validate process-based modeling approaches to investigate the impacts of different land use activities on flood generation.