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The effects of different land use patterns on sedimentological (dis)connectivity in small agricultural catchments

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Nearly all river catchments are directly or indirectly affected by human actions (e.g. due to river engineering structures or different land use practices), which inevitably leads to hydrological and sedimentological changes. The vegetation cover is one of the primary internal factors on sediment yield and even the most susceptible factor for human alterations. While land clearance and intensive agricultural land use enforce sediment entrainment and delivery, in turn, different types of vegetation have significant effects on buffering and filtering sediments. Therefore, vegetation cover and land use patterns play an important role in (dis)connecting landscape compartments and related investigations are a promising tool to examine the movement of sediments throughout geomorphological systems.
This study aims at examining the effects of different land use patterns on the sediment delivery along flow routes in a small agricultural catchment of the Eastern Bohemian Massif.
Detailed land use mapping from aerial photographs was done to delineate current land use conditions. The agricultural areas were assumed to be the source areas of fine sediments originating from eroding top soil. A sediment routing model based on a multiple flow approach on different spatial scales (i.e. within a 50m and 250m streamside buffer as well as on a whole catchment level) was used to model source area to river channel connectivity. On sites where confluences were modelled, detailed vegetation mapping and geomorphological mapping of the riparian zone were applied in the field. The fluvio-geomorphic response of in-channel siltation was used as an indicator of connectivity relationships between the source area(s) and the channel network. In order to delineate the (dis)connecting effects of land use patterns on the sediment delivery, different sedimentological land use characteristics along the modelled flow routes were analysed and statistically interrelated.
The results show that the effects of different land use patterns on landscape connectivity are highly dependant on topographical factors and features which can even result from their vegetation cover, as well as on the widths and their order of appearance along the flow routes.