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Optimization of the INCA-SED catchment based erosion model for a catchment near Lake Balaton, Hungary - starting experience

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Soil and freshwater quality of a region strongly determine (agro-)ecosystem's functioning and the quality of life in the area. Water regime and mass transport through the vadose zone and in surface water courses have major effects on water quality and soil functioning. Erosion damages fertile soils and can contribute to the sedimentation and pollution of lakes and rivers, thus, threatening agro- and natural ecosystem. Agroecosystems are among the most sensitive ecosystems subject to climate change. Hence, it is of high priority to understand the effect of anthropogenic and natural forces on agricultural soils in order to maintain soil functioning and freshwater quality. Therefore, we propose multiple aims: (i) to develop an integrated multi-scale approach to monitor, model and evaluate occurrences of extreme hydrological situations and their effects with respect to floods, droughts and soil erosion. (ii) to apply data-model fusion, integrating knowledge on plot- and catchment scale description of water and soil particle transport and (iii) to evaluate the combined effects of different land use and climate change scenarios on water regime and soil erosion. The INCA-SED catchment based model is used in this study for modelling runoff and particle transport.

The present work is part of an ongoing monitoring study, which is being carried out on three reference watersheds around Lake Balaton, Hungary, where plot- and catchment scale parameters are being monitored. We present here the preliminary results of monitoring and data collection methods on catchment and plot scales and the starting experiences of fitting the INCA-SED model to a catchment near Lake Balaton based on these data. The selected catchments are small (0.7 to 7 km^2), with various land use types including agriculture, forest and grasslands. In each catchment, typical combinations of soil properties, land use types and orography were created, called Hydrological Response Units; HRUs, characterizing the pilot areas in general. Weather data were obtained from local measurements at the sites for precipitation, or from meteorological stations close to the pilot areas for other meteorological variables.

Keywords: soil moisture, monitoring, climate scenarios, catchment scale modelling