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Overland flow and soil erosion modelling on cultivated catchment (100-1000km^2) at the cultural year scale

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Agriculture intensification on semi-rural basins often leads to soil erosion, downhill flooding and water pollution (drinking water and water bodies) by eroded sediments and attached chemicals. In the North-western French loam belt, watershed syndicates were implemented to address these issues. To design appropriate soil conservation regulations or for policy implementation, watershed syndicates have a need for soil erosion models which can integrate agricultural constrains (e.g. the type of crop or tillage operation) and which run at the time scale of the cultural year and at the spatial scale of several hundreds of square kilometres. Most of the available soil erosion prediction models are either for large areas but in which case they are most often lumped (and therefore cannot take into account the spatial heterogeneities induced by agricultural practices within the catchment); or spatially distributed and physically-based which means very data-demanding and thus, not compatible with applications for several hundreds of square kilometres. The objective of this paper is to present an application of a soil erosion model for the Austreberthe catchment (200 km^2) and for the 1996-1997 cultural year with special emphasis on the difficulties encountered in terms of data availability and model parametrisation.

The STREAM erosion model was chosen as it is a compromise between erosion process implementation and data availability and processing. The gridded DEM set the spatial resolution for sediment generation and routing to the hydrographic network, while rainfall data accuracy implied daily simulations. Classified remote sensing data and Corine Land Cover information provided land use information. On cultural areas,

crop development was based on time since plantation, whereas soil erodibility (i.e. crusting) evolution was estimated with cumulated rainfall amounts since plantation. Combining data from remote sensing images, available maps, and experimental references (e.g. for crop development and crusting dynamic) corresponding to this soil type and climate, we could simulate the main rainfall events that happened during this cultural season. Nevertheless, for certain events, high uncertainties remain mainly due to the available data quality, particularly concerning the rainfall measurements resolution.