EGU2020-11971
https://doi.org/10.5194/egusphere-egu2020-11971
EGU General Assembly 2020

Hydrosedimentological monitoring and modeling in paired watersheds in the Pampa biome

Franciele de Bastos[1], José Miguel Reichert[1], Éderson Diniz Ebling[1], and Stephan Hörbinger[2]
[1]Federal University of Santa Maria, Forest Sciences Department, Brazil (francieledebastos@gmail.com)
[2]Universität für Bodenkultur Wien, Institute of Soil Bioengineering and Landscape Construction

In the last years, the intensification of erosive processes from inappropriate land use and management have made sediment production a worldwide problem, compromising soil physical and chemical quality, and water quality and quantity. This source of pollution can be reduced by understanding hydrological processes. Catchment scale monitoring allows the identification of the effects of anthropogenic actions on these processes, enabling assertive decision-making to reduce erosion processes. Modeling tools have been widely used in environmental studies, helping to understand the processes and providing the prediction of future scenarios. However, the development and use of models capable of simulate hydrossedimentological flows in forest areas are still incipient. The goal of this study was to represent the behavior and to understand the dynamics of hydrological and sedimentological processes by monitoring and modeling with the Limburg Soil Erosion Model (LISEM) two small paired rural watersheds. The study was conducted in two paired watersheds, with land use based in eucalyptus plantation (EW, 0.83 km^2) and grassland (GW, 1.10 km^2), both located in the Pampa biome, in the state of Rio Grande do Sul, Brazil. The hydrosedimentometric monitoring was conducted from January to March 2019, in fluviometric monitoring sections composed of flumes and equipped with level, precipitation, and turbidity sensors to quantify flow, rainfall, and concentration of suspended sediments, respectively. Three events of similar magnitude, with total rainfall accumulation of approximately 30 mm, were simulated for the two catchments studied. The modeling was applied to the scale of individual events. The results were evaluated by surface runoff, peak flow time, and total sediment production, observed and simulated. The percentage trend (PBIAS) was used to evaluate the percentage of overestimation or underestimation of the simulated data in relation to the measured ones. To evaluate the simulated hydrograph shapes and total sediment yield, the Nash and Sutcliffe Efficiency Coefficient (NSE) was used. LISEM satisfactorily represented the runoff in rainfall events of different intensities for both basins, supported by the Nash and Sutcliffe coefficients (> 0.50) and PBIAS or ERROR (< 25% for runoff and < 55% for the production of sediments). The model was unable to represent sediment production satisfactorily (< 0.50). This may be associated with spatial variability of the soil and the characteristics of the model used, which simulates the surface flow promoted by individual rainfall events in watersheds. In the study area, the influence of forest cover associated with sandy soil with deep clay accumulation favors the subsurface erosive process. FW had lower total sediment yield and lower peak flows, which is associated with the vegetation type. With the incidence of rain in the forest compartment, part of

it is compartmentalized upon reaching the forest canopy, part seeps through the trunk, reaching the litter at a lower speed, favoring infiltration and decreasing surface runoff. Our studies are in the early stages, continued monitoring is necessary to evaluate events of different magnitudes, and to identify a model capable of adequately representing the predominant subsurface runoff in forest areas.