Geophysical Research Abstracts,
Vol. 11, EGU2009-9448, 2009
EGU General Assembly 2009

Spatio-temporal patterns in land use and management affecting surface runoff response of agricultural catchments – a review

P. Fiener (1), K. Auerswald (2), and K. Van Oost (3)

(1) Universität zu Köln, Hydrogeography and Climatology Research Group, Department of Geography, Cologne, Germany (peter.fiener@uni-koeln.de), (2) Lehrstuhl für Grünlandlehre, Technische Universität München, Munich, Germany (auerswald@wzw.tum.de / Fax: +498161713243), (3) Département de Géographie, Université catholique de Louvain, Belgium (vanoost@gmail.com)

In many landscapes, land use creates a complex pattern in addition to the patterns resulting from soil, topography and rain. Despite the static layout of fields, a spatio-temporally highly variable situation regarding the surface runoff and erosion processes results from the asynchronous seasonal variation associated with different land uses. While the behaviour of individual land-uses and their seasonal variation is analyzed in many studies, the spatio-temporal interaction related to this pattern is rarely studied despite its crucial influence on hydrological and geomorphic response of catchments. The difficulty in studying such interactions mainly results from the fact that it is impossible to set up a replicated experiment on the landscape scale. The purpose of this review is to present the advances made thus far in quantifying the effects of patchiness of land use and management on surface runoff response in agricultural catchments. We will focus on the effects of spatio-temporal patterns in land use patches on hydraulic connectivity between patches and within catchments. This will include the temporal patterns in land management affecting infiltration, surface roughness and hence runoff concentration within single fields or land use patches insofar as these effects must be known to evaluate the combined effect of patch behaviour in space and time on catchment connectivity and surface runoff. Surface runoff effects of patchiness and connectivity between patches or within a catchment, can either be addressed by modelling studies or by comprehensive catchment field measurements, e.g. paired-watershed experiments or landscape scale studies on different scales. This limits our review to studies at the scale of small catchments < 10 km^2, where the time constant of the network (i.e. travel time through it) is smaller than the infiltration phase. Despite this limitation, these small catchments are important as they constitute 2/3 of the total surface of large water drainage networks.