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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Statistical analysis and modelling of surface runoff from arable fields" *by* P. Fiener et al.

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The paper by Fiener et al. provides an attempt to interpret rainfall/runoff dynamics using a dataset containing about 300 events. With this aim, the authors derived three regression functions based on some physical characteristics of the sites investigated. These functions describe the initial abstraction and the runoff volume. Surprisingly, the study introduced two parameters that have never been taken into consideration in the description of runoff production: the stone cover exceeding 10% and the time since tillage. Authors claim that this last parameter have a significant role in runoff production. This finding, if confirmed, has important consequences, because one of the most relevant parameter controlling runoff in agricultural areas is related to human

activity.

From my point of view, the result of the study is captivating. Nevertheless, I believe that some additional analyses are needed to corroborate the main output of the study.

1. First of all, the attempt to define an empirical relationship between rainfall and runoff is not new. The Soil Conservation Service has carried out several experiments in order to derive the well-known CN-method that is used in several hydrological models and in numerous technical studies. This method is also quoted several times by the same authors as a reference methodology. Therefore, it would be extremely instructive to see the results of the CN-method for the description of the rainfall/runoff simulations considered in the present study. Furthermore, the comparison of the PDFs of runoff errors of the two methods would be extremely useful to comprehend the improvements gained introducing the new formulation.

2. I'm sceptical about some of the interpretations given by the authors. When dealing with multiple regressions, it always very complex to give a physically consistent interpretation of the variable used, especially if we neglect the controlling ones. The physical characteristics that influencing runoff generation are typically the soil permeability, the antecedent soil moisture, soil texture, macropores, vegetation (rooting depth, root density), position of the phreatic surface and also the local topography (e.g., the topographic convergence may significant lateral flow). According to the list of parameters reported in table 1 several of these characteristics have not been taken into consideration and this represent a limitation for the interpretation of the results. I suggest to include in the analyses also the soil permeability at saturation (K_s), vegetation stage by using the Leaf Area Index (LAI), rooting depth of the vegetation, the topographic index, etc.

3. It is difficult to comprehend the role of stones on the initial abstraction. This value is usually associated with the water retained in the surface depressions. If stones modify the macroporosity (see section 4.1) of the soil why this parameter does not enter in the

runoff equation?

Minor aspects

Page 3673 lines 17-20: The authors state that “runoff after 30mm of rain was on average 20mm if the rainfall occurred within less than an hour after tillage, while it was less than 5mm if the rainfall occurred more than 100 days after tillage”. This seems to contradict the statement of page 3679 lines 1-4.

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