

## ***Interactive comment on “Modelling dominant runoff production processes at the micro-scale – a GIS-based and a statistical approach” by C. Müller et al.***

### **Anonymous Referee #3**

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#### Overall Comments

The paper addresses an interesting topic of hydrology: delineating dominant runoff process (DRP) from spatial data sources (DEM, geology, soil, land use). Two approaches are presented, one rather simple and the other statistical. The results are compared with a reference map of DRP (Schobel, 2005) delineated based on the method of Scherrer and Naef (2003).

I suppose, in many catchments of low mountain ranges there is a lack of detailed spatial data, e.g. DEM, soils etc. Therefore, the typical way of delineating DRPs in this kind of catchments is to do extensive field work and implement the received results into a

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hydrological model for further analysis. For me, it is one of the challenges today to find new ways of delineating DRP with limited spatial data sets as is not feasible to go the described way for every single (ungauged) catchment. This, however, requires not only new approaches but also a regionalization of them to account for the different types of landscapes. For investigating new approaches, a comparison of simple and complex types is a good way to understand which parameters a crucial for the different DRP even if the DRP might not be causally determined.

In my opinion, a paper about this topic does not necessarily need to present the whole story from process research over delineating DRP to hydrologic modelling. However, the paper in this form is more or less about an attempt to reproduce a DRP reference map with two different approaches ("modelling" is definitely the wrong word for it) with a lot of hydrological background information and discussion missing. The reader does neither learn much about the delineation of the DRP with spatial data nor about the differences between both approaches with respect to (regional) limitations or validation. Furthermore, he does not learn much about GIS-techniques as both approaches are not technically new, what per se is not critical when the results are appropriately discussed and leading further.

The delineation of DRP from catchment characteristics is not trivial. However, in low mountain ranges topography has a dominant influence on runoff generation. Therefore, it is not surprising that for an "acceptable" percentage of the catchment area, DRP can be delineated with topography and one or two more parameters. But if you take a closer look at some areas, as the authors state, (p1687 II 25, 26) "topographical parameters cannot differentiate these different dominant runoff processes". Unfortunately, the paper touches this topic ("the challenging rest") only briefly. There is also only limited information on different GIS-based approaches in the literature. The information for the delineation of DRP of the parameters like topography, geology and soils is very different. Soil data and geology actually represent different level in a 3D environment. The use of one instead of the other raises many questions. This is not

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discussed. The genesis of table 2 (dependency of DRP on slope/land use) for the first approach is not explained, is it "calibrated" or how are the DRPs related to the slope classes (what does "assumed" mean)? In this kind of approach (decision tree like) all the knowledge about the DRP of the catchment should be used when the assigning DRP to the different catchment parameters. This should be addressed in more detail. There is also no validation in a catchment which is not used for the development of the approaches. As a consequence, no statement can be made if the approaches actually have the potential to delineate DRP without previous extensive field work.

Finally the paper lacks a clear message. Which approach should be used and why? Which approach may give better results if additional data is available? Which approach may be better for regionalization? Which DRP map is more consistent with the existing knowledge about the DRP although the objective classification results from GIS might be less good?

In conclusion, I would suggest to

- give more information on existing GIS/DRP-approaches in the introduction
- give more information on the hydrological behaviour and the DRP of the catchments (e.g. summary of cited references, runoff diagrams etc.)
- shorten the description of the technical procedures and focus the comparison between results and reference map
- discuss the results with respect to the different approaches (the two used + approaches in literature) in more detail
- give a clear message for the reader

Minor comments

P 1679 | 18: for me, the use of a coarse geological map (and only perm./imperm. information) is no compensation for a detailed soil map. Please explain why the detailed

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soil information can be substituted so easily.

P1681 I 8: "two model approaches based on dominant runoff processes"; should be "two model approaches for the delineation of dominant runoff processes";

P1681 I 16: please give a short summary of the references

P 1682 I 18: is the land-use information only necessary for the delineation of Dsof1 on urban areas?

Table 2: is there DP on permeable hillslopes above 40 % slope under prolonged rain-fall?

Table 5: please give some more background information for readers who are not too familiar with CDA

Figure 2 a/b: not necessary, better: runoff diagram

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