

## ***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 #2**

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### GENERAL COMMENTS

In this paper, two approaches are presented to identify Dominant Runoff Processes (DRPs) in the Zimmer basin located in Germany. The results of these two approaches, one GIS-based and one statistical, are compared to an existing DRP map generated by Schobel (2005) based on an intensive field campaign. In chapter two the characteristics of the study site are described, especially the geological structure. Nevertheless, I would suggest to omit the short versions of the geological units in the brackets because these abbreviations will neither be used in the future nor will they appear in any map. It might be useful to show the spatial distribution of the geology of the basin in a map as

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the geology will be important for describing and analyzing the results. In the methodology chapter, the procedures of both approaches are explained clearly, additionally a short description of the Canonical Discriminant Analysis (CDA) would be helpful. I also suggest to change the heading of the chapters 3.1 and 3.2. It would be coherent for the reader of the paper, if you entitled the two approaches by using specific names like GIS-based approach or statistical-based approach. The application of both approaches provides satisfying results which are described and discussed in chapter 4. Unfortunately, a critical discussion by setting relations to other similar research studies is missing. Only a comparison to Scherrer and Naef (2003) is given. Especially at page 1685, line 12 to 17, I would expect some similar references. I think the result is right but it should be explained more precisely. At page 1687, line 5-16 there is only a repetition of correctly or incorrectly classified areas without analysing the reasons for these discrepancies. Also I would expect three maps with generated DRP, two based on the new approaches and one based on the studies of Schobler (2005). The next step could be to model the runoff based on the three maps and then to make a decision what's the best approach for generating DRP. In chapter 4.1 (page 1685, line 4), there is one point which is very important for the whole paper. The conclusion is drawn, that the resolution of the DEM is not perfect but the whole statistical approach is based on this DEM because the geomorphometrical features are derived from this DEM. This could be another reason for wide differences between the GIS-based generated DSOF1 areas and DSOF1 areas in the map of Schobler (2005). All the convergent slopes in the middle of the sub-basin Grundgraben are not included. I would suggest at first to improve the DEM afterwards further analysis could be made. In the end the authors have drawn some conclusions but there is no final comment which approach is to prefer or can be recommended for the regionalization in the meso-scale. At page 1688, line 21 the authors propound that soils and soil toposequences reveal a strong correlation to the spatial distribution of the DRPs but no analyses about these dependencies have been described in the previous chapters.

SPECIFIC COMMENTS

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Title: Don't use the word modelling because with the two approaches you simply identify hydrological response units.

Page 1678, line 18: Change Scherrer et al. 2006 into Scherrer 2006

Page 1678-1679: The introduction gives a good short overview about process studies in the micro and the hillslope scale. But I miss a proper overview to other studies which present methods for identifying hydrological response units. There is a concentration on the results of Scherrer, Naef and Schmocker-Fackel who worked at the same institute at the ETH of Zuerich.

Page 1680, line 24: The geological abbreviations i.e. so1 or so2 can be left out.

Page 1681, Line 1: What means surface gley?

Page 1681, Line 5: Some information about the runoff would be good.

Page 1681, line 13: Please omit the word see in the Figure and Table announcements.

Page 1681, Line 14: Do you mean 16 rainfall simulations or 16 rainfall-runoff simulations? Because with rainfall simulations it is not possible to determine hydrological response units.

Page 1681, Line 16: Mueller 2008 is not listed in the references.

Page 1681, Line 16: Change Mueller 2007 into Mueller et al. 2007.

Page 1682: In general what is the difference between impermeable and permeable? Does this classification base on the geological or on the pedological information? If it is based on the soils then I would not agree that there are only two classifications. If it is based on the geology then I note to take the soil characteristics more into account.

Page 1682, Line 1: What means PBS 2006? This reference is not included in the reference list

Page 1682, Line 16: The result of the first approach isn't a model, only a map with the

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DRP is generated by cutting different information layers.

Page 1686, line 12: What are the reasons to choose this parameters?

Page 1686, line 19-29: In general what is the difference between SOF1, 2 and 3 especially what is the meaning of the number? Please explain.

Page 1702: There is only one map shown but there are two approaches. I would expect two maps additionally to the map of Schobel (2005).

Page 1694, Table 3: Several classes of risk are listed in the table, but in the text there is no explanation how these classes are defined. Although there is a short description in the legend but it is not clear how the boundaries between the different classes are derived.

## TECHNICAL COMMENTS

Figure 1: Please display also the stream network in the map. In the legend the sign for the boundaries of the catchment and the sub-catchments are missed.

Figure 5a. Please revise the axes labels and use a bigger font size.

Table 5: The legend is very confusing. Perhaps the names of the variables could be changed. Please explain the values of the canonical function coefficients in a short sentence.

Table 6: I think the sign for percentage is at the wrong place.

Table 6: It is confusing that the upper matrix is in ha and the lower matrix is in percent.

## FINAL OPINION

In my opinion the objective of this paper is of international interest but it has to be revised basically before re-submitting. I would suggest to improve the discussion basically especially take more similar references into account. What is the difference to other concepts which also identify hydrological response units and especially what are

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the new advantages of your approaches. There are several quite good research studies concerning to this subject like Fluegel 1995, Tilch et al. 2006, Tilch et al. 2002. Please make a final decision and recommendation which approach is to prefer or can be recommended for the regionalization in the meso-scale. Also the validation of the three approaches by runoff modelling should be done. At least please ask for a native English person to edit the paper there are some mistakes.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 1677, 2008.

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