Hydrology and Earth System Sciences Discussions

Interactive
Comment

Interactive comment on "Towards a hydrological classification of European soils: preliminary test of its predictive power for the base flow index using riverdischarge data" *by* M. K. Schneider et al.

Anonymous Referee #2

Received and published: 26 June 2007

General Comments

The manuscript deals with a very important issue of using available soil data for hydrological predictions. One important issue for the discussion of the results is to bring in hydrological process understanding of humid and Mediterranean catchment response to rainfall. If the study would have been done with this in mind, some to the outcomes of the study could have likely been predicted. Other issues are:

(1) The methods are difficult to follow and it is nearly impossible to reproduce the

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findings with the information given in the manuscript. (I am a firm believer that reproducibility is still a corner stone of scientific communication) Would a flow diagram clarify the methods? This issue can be easily fixed and some concrete suggestions are listed below of how additional information can be provided.

(2) Discussion of the spatial resolution and scale deserves more attention (and should be mentioned in the abstract). For example in section 4.2 differences between southern and central European catchments are discussed. It seems to me that certain geomorphological settings require higher resolution DEMs and soil maps (which was mentioned for alluvial soils that are found on narrow strips near streams).

(3) The role of vegetation for the base flow index under different climatic condition has not been discussed. Clearly vegetation plays a crucial role in particular in Mediterranean climates where rooting depth is likely to be much deeper then in wet (humid) regions (for native vegetation). Accordingly land use maps that distinguish between perennial and annual vegetation cover might be important in this context. Also, as rightly pointed out by the authors inter-annual climate variability (in particular seasonality) may play an important role for Mediterranean regions such that there are several factors that could explain the failure of the predictive system for Mediterranean climates. In particular, soil maps reflect the near surface zone, which for shallow systems may control hydrological response. However, for deep systems (deep roots) the near surface soil properties may not be a good proxy for the hydrology. I suggest that the author may want to go back to the literature to assess how hydrological processes in semi-arid and humid differ which will likely provide the basis for a better explanation why the southern European catchments seem to behave differently. For example, surface runoff processes in Mediterranean catchments may be dominated by Hortonian overland flow (for which the soil classification may not be designed for) whereas humid regions are controlled by saturation excess (and of course subsurface flow). Also, there are likely some fundamental differences in geomorphology between humid and dry climates. Hence hydrological processes operating at short and longer time scales

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in Mediterranean climate may differ from humid regions and there is quite a bit of literature on this especially by Europeans from Spain (eg Puigdefabregas) and the UK (eg Kirkby). Because the BFI is derived empirically it may pick up different processes in different climates.

Specific Comments

Abstract:

p 832, line 5-15: mention somewhere spatial resolution of the study

Introduction:

P 834, line 5-10: I doubt that laboratory derived van Genuchten parameters will ever be of use to predict catchment response.

P 835, line 1-7: Not sure about the BFI - wouldn't flow duration curves give more information and are derived as simple as BFI (not sure about that one). Is the citation widely available or is there a more appropriate and readily accessible reference describing BFI?

P 835, line 15: Please define small to meso scale in terms of ha or km2 and order of catchment (first or second order)

P 837, line 1: Include weblink in the list of references.

(I have not gone to the supplemental information available on the web - I believe they are very important to understand and reproduce this research.)

P 839, line 8-25: This section is not reproducible. I suggest providing further detail as web based supplemental material for which all catchments that were used are reported, also the ones that were excluded.

P 840, line 9: Is their another reference for the single flow direction algorithm?

P 840, line 20: Provide info on catchments included and excluded in analysis as sup-

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plemental information (as mentioned before).

P 840, line 23-24: Could seasonality of precipitation and ET be incorporated in analysis?

P 842, line 12-13: How may catchments were excluded this time?

P 842, line 24: NA should read NR I assume.

P 843, line 2, 5 and throughout this page: It is more readable when soil classes are explicitly named instead of listing the class number only - for example mineral soil class 6 or peat class 29

P 844-845: When I read this section I ask myself whether BFI is the right way to go about this problem - I believe that on should look at the river discharge data by other means and make comparison between UK and other geographic regions in Europe in order ascertain whether discharge characteristics are fundamentally different from the UK and in particular the southern European catchments (this could be discussed in the Discussion section under suggested future work).

P 850, line 25-27: Could geological maps be used to help classify subsurface hydrological properties and aid in the classification?

P 852,line 13-19: I think the authors should think very carefully about further data needs. As mentioned above geological maps may help to aid in understanding subsurface hydrological processes contributing to river discharge as well as incorporation of vegetation information.

Table 2: Explain the last two columns in a footnote. Table should be self-explanatory.

Fig. 4: Legend is not clear - I believe it refers to colour (most people would only see gray scale) and the symbols are explained in caption. (This is a bit confusing). I suggest one legend where both colour and symbols are appropriately explained.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 4, 831, 2007.

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