

## ***Interactive comment on “Recession analysis 42 years later – work yet to be done” by Elizabeth R. Jachens et al.***

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Received and published: 28 June 2019

I like the paper (i.e. the research question, methods, analyses) and it is in the scope of HESS. The authors investigated a common technique in recession analysis (dQ/dt-Q- point clouds) and argued that parameter fitting based on this cloud is misleading to better understand catchment functioning. Instead, in line with other recent publications, the authors suggest that individual recessions (i.e single events) should be analyzed. The paper is rather short what is good and written in a good style. I suggest minor revision before publication.

### Major comments ###

1. I have some concerns about the title of the paper. It is not really specific and the “42

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years” will be only valid for this year 2019, that is not a good choice, I think. It would be better to include the difference between analyzing  $dQ/dt$ - $Q$ -point clouds and individual recession. By the way, the paper is not about “recession analysis” (as there are many other recession analysis techniques out there, e.g. master recession curve), so the focus on the  $dQ/dt$ - $Q$ -cloud could be emphasized in the title.

2. Is the difference between slope  $b$  from the point cloud and slope  $b$  from median individual  $b$  a function of the recession extraction criteria (e.g. longer than 5 days, cut the first day, etc., P02L26). By the way, have the recession a minimum of 5 days with or without the removed first day? Brutsaert and Nieber 1977 also used rainfall data to extract recession segments. . . The recession extraction should be clearly stated in the methods (not only in the Introduction).

3. median parameters from individual recession analysis (P03L04): I missed a discussion about seasonal catchment or streamflow behavior in the paper. There are many studies with recession analysis considering seasonal components in  $a$ ,  $b$ , and  $dQ/dt$ - $Q$ -plots. The authors should at least refer to those studies or give a comment on the issue.

4. Why synthetic hydrographs (P03L08)? Advantages of this approach should be (shortly) mentioned (earlier than in Sect. 2.2).

5. Section 3 is Results, not Methods

6. "The pre-defined theoretical  $b$  values for the LE appear to provide poor fits for the point cloud" (P05L17) very important results for all further studies that using LE and pre-defined  $b$ 's. You should emphasize this (even more)!

7. more explanation on the hydrological functioning of  $a$  and  $b$  (or give references), like e.g. P07L11, this would make it easier for a broader readership.

8. explain in more detail how the synthetic hydrographs are derived (or give references). Why is this way better than using multiple (real world) catchments?

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9. How representative is the median  $b$  from individual recessions across all Cases 1-3 for the individual recession hydrographs? It might be beneficial to show the distributions of  $b$  around the median (e.g. violin plot?)

10. I asked myself what is the most sensitive part of the recession analysis presented here? The recession extraction method? The fitting procedure? Are there specific references discussing the different sensitivities? That means the value of the paper could further be improved if the authors give some guidance on how specifically the individual recession segments should be extracted then.

### Minor comments ###

P01L21 Here the Brutsaert and Nieber and the Kirchner paper are missing.

P01L24 Add Brutsaert and Nieber, 1977 as a first fundamental paper using  $dQ/dt-Q$ .

P02L03-07 Better change the two sentences: first collective recession analysis remains common, then the recent criticism.

P02L10 Lower envelope has not been introduced yet.

P02L20/21 Explain shortly what a greater  $b$  means in terms of recession behavior.

P03L11 Last sentence of section 1 is rather a result or a conclusion, but can be rewritten to a hypothesis or research question.

P03L14 I would change the order; first the definition of hydrographs then the parameter estimation methods (which needs the hydrographs to be applied).

P03L24 Would be helpful to give key references here for the four fitting methods and to state if the original procedures from the references are used or modified.

P03L27 Why 5% (and not 10%), is 5% common?

P06L18 Last paragraph of section 3.2 belongs rather to the methods than to the results section. At least, a reference in the methods section referring to this result should be

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given.

P08L21:"sum of the squares", I don't get this.

### Technical comments ###

P01L13 "based on dQ/dt-Q-recession analysis"

P02L01 why "primary"?

P02L14: two times Kirchner reference, remove one.

P02L24 "significantly"? sound like it was statistically proven?

P03L05 "Being able to... vulnerability studies" - the sentence is not well connected here, move up?

P03L22 "theatrical"?

P08L22 to understand the underlying hydrology

P08L23 Sentence is a repetition of the last sentence of the paragraph before

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2019-205>, 2019.

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