Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1
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Comment on hess-2021-626

Anonymous Referee #1

Referee comment on "Comparing the runoff decompositions of small testbed catchments: end-member mixing analysis against hydrological modelling" by Andrey Bugaets et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-626-RC1, 2022

I know I should start the review by summarizing the main characteristics of the paper, but I was unable to discern any.

I broke off the review at page 5 because this paper is too carelessly prepared. The English is very difficult to understand, the HESS guidelines have been poorly adhered to.

Furthermore, the paper has fundamental weaknesses. The issues raised in the Introduction cannot be addressed by a study that relies on two small catchments located very close to each other. The paper criticizes the use of empirical relations in hydrological modelling, then relies on empirical relationships itself. Parts of the methodology are poorly and/or incompletely explained.

Given these problems, I do not think it is worthwhile to spend more time on this paper. I am sorry for this, but I am simply losing too much time struggling through the text.

Below are the comments that I was able to make.

English editing is needed. I found 4 grammatical errors in the first paragraph alone and stopped checking them after that because I do not have the time:

l.23: takes -> take

l.24: extrapolating -> extrapolated

l.26-27: challenge task -> a challenging task

l.29: ...for validation flow pathways and residence times...: I do not understand what you are trying to say.

l.37-38: ...evolving model... top-down strategy: I do not understand.

l.40: You claim that catchment hydrology is still very much empirical by quoting a single reference that is over 36 years old! This statement has no credibility at all.

l.42-43: ..the scale-dependency of HRU-based model ... small-scale physical laws... The English is so warped I cannot understand this.

l.50: ground flow -> groundwater flow

l.54-55: There are a number of examples...lack of suitable data sets. It is unclear to me what this means, but the second part seems to contradict the first part.

l.58-59: How can you rank models based on processes?

l.60: ...based on solutions of direct or inverse task of modeling... Forward modeling and inverse modeling are completely differen activities with very different goals. Why are you using them as if they are similar?

l.61-65: We can read the section headings, so there is no need to provide a table of contents. Instead, formulate the objective of the paper.

l.67-69: In the Introduction you criticized essentially all hydrological modles developed so far, yet you only test them on two very small catchments that are very close to each other, and are probably too small for a model relying on hydrological response units. So you cannot consider the performance for different climates, land use, geography, or size. What is the point of this study then, as related to the issues you raised in the

Introduction?

l.77: You are at the same elevation as Hokkaido and you have very cold winters. Is it really tropical there?

l.84: Without explaining the symbols, equations are meaningless.

l.86: I checked the reference to find out about the fair profiles number but could not find an explanation. But I found an extensive modeling exercise with ECOMAG. To what extent does this paper repeat this reference?

l.91: The suction you apply in such instruments determines which part of the pore space you sample, but you do not report this.

Suction cups cannot sample macropores unless these remain filled for a long period of time, which is typically not the case in unsaturated soils. Did your soils have macropores?

Did you remove these during the winter? (I am not sure they survive when they freeze.)

l.96: ...Data quality control suggested next simulation periods... How exactly?

l.97, 98, 161, 181: unexplained abbreviations.

l.108-109: The end-member mixing analysis...hydrology methods... Unclear.

l.110: ... hereafter called fractions... A fraction is very different from a source. You need to explain better what exactly you are doing.

l.112: ...some empirical relations... Vague. And in the Introduction you stated that reliance on empirics was a weakness of current models.

l.123-124: ...water quality... I believe you mean the various substances dissolved in the

water.

l.126-130: This explanation of the use of bivariate scatter plots needs to be explained much clearer. What property exactly are you plotting? Concentrations, fluxes, loads during a given period? And when you state all possible combinations need to be plotted a assume you mean all possible combinations of two, i.e., only solute pairs will be plotted.

What will be the effect on colinearity if one solute is non-sorbing and the other is adsorbed? Both can still be conservative.

l.179: Please consult the guidelines for authors on the use of abbreviations in equations and the font of variables.