Response to the editor after its decision on September 10th, 2021.

Robustness of a parsimonious subsurface drainage model at the French national scale

(hess-2021-168)

By A. Jeantet et al.,

Dear Dr. Stamm,

Thank you for your comments improving the manuscript after receiving the revised version. As the previous version, they have been integrated in the revised manuscript and highlighted by a specific comment mentioning the corresponding order of appearance. The mention "Language" designates the comments from the Language part and "FC" for those from the "Further comments" part. The lines mentioned-below refer to the marked version:

"Language":

All the language issues have been corrected as followed:

1. "*#5: (L. 310 in the track-change document): Replace compile by include.*"
   Reply: the word "compile" has been replaced by "include" as requested at the line 298;

2. "*#6: Consistently use mmd□1 instead of mm only. On L. 372, skip from boxplots: the median is not derived from these plots.*"
   Reply: as requested, the "mm" have been replaced by "mm/d" from lines 354 to 361, and the expression "median values from boxplots" has been replaced by "median values" only;

3. "*#14: Rephrase as: … period increases S_{inter} values.*"
   Reply: as requested, the expression "conducts to increase" has been replaced by "increases" at the line 563;

Further comments:

1. "*#10: Please mention this general trend in the text.*"
   Reply: the following sentence has been integrated at the line 473 after "… slightly underestimated.":

   "This behavior is generalizable, being observed on most database sites. However, the phenomenon varies from one site to another without any clear relationship with any soil characteristic, mostly depending on the calibration quality."

2. "*#12: Please specify your statement in the paper according to your response.*"
   Reply: the following paragraph has been integrated at the line 437:

   "In this context, a physically-based model is theoretically better suited. However, this kind of model is generally composed of many parameters representing the complexity of a study site such as current crop, root depth, saturated water content (i.e. unsaturated one), hydraulic parameters or water holding capacity. Performing such a model on a large database requires providing all these characteristics for each site, which is in practice very difficult, because the measurement technics are globally expensive. The calibration might be useful but it is time consuming due to the large number of parameters. Conversely, a simple model like SIDRA-RU offers significant advantages, as it requires few information and faster calibration, thus becoming in practice suitable for generalizing."

   The sentence from "As such,…" to "its simple design" has been erased.

3. "*#16: I cannot follow this argument: for each site, the is a value for each parameter from the reference data base and the respective calibrated value. These values can be compared. Please do so. You may add the results in the Appendix.*"
   Reply: the editor is right, the response for this comment on the previous version was not clear enough. The site-specific comparison cannot be achieved because we do not have the measured hydraulic conductivity K or drainage porosity µ from the calibrated sites. The latter are not included in the list of reference drainage sites. Most of calibrated sites have been settled more recently and were not part of the analysis campaign on the reference drainage sites. The only way to assess the consistency of the calibrated K and µ was to compare the distribution of the calibrated parameters to the distribution of parameters from reference drainage sites, as performed on Fig. 11.

4. "*#19: Please provide the argument also in the paper.*"
   Reply: the following sentence has been integrated at the line 562 after "a dry calibration period":

   "…, defined by a larger occurrence of dry events on a same period due to climate conditions,… ".

We hope this version fulfils your requests.

Best regards,

Alexis Jeantet