

Interactive comment on “The Wageningen Lowland Runoff Simulator (WALRUS): a lumped rainfall–runoff model for catchments with shallow groundwater” by C. C. Brauer et al.

Anonymous Referee #2

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This paper presents a rainfall-runoff model for use in lowland areas, the Wageningen Lowland Runoff Simulator (WALRUS). The study focuses on the development of the model, the model structure and how the model is implemented.

The development of novel rainfall-runoff models is an interesting topic of research, particularly for lowland areas. It was clear from the paper that the authors had put a lot of thought into what they wanted to include in their model and how this would be formulated within the model structure. Overall the paper is well written and the figures are well presented. However, there are a couple of issues that need to be addressed, which would help strengthen the message of the paper and highlight the novelty of the model you have developed.

C304

General comments:

1. I feel the paper is very long for a description of a new rainfall-runoff model and as a result, the interesting parts of your paper tended to get a little lost. Here are my suggestions to improve the readability of the paper :

a. p. 1360 (lines 13 -28) – 1361 (lines 1 – 17) I feel you could significantly shorten this section into a single line. These issues are well known and do not require a detailed explanation.

b. I would shorten section 3. I found some of the literature review on the lowland-specific hydrological processes overly long and I also felt there was a lot of repetition between section 3 and section 4 when describing what you had implemented in WALRUS. Although these aspects are important, it would improve readability if they were described more briefly.

2. I felt the novel aspects of your model were not highlighted strongly enough. In your conclusion, it would be useful to end with a very clear statement detailing what is novel about your model, how it is different to the previous model formulation and how this advances hydrological modelling within lowland regions.

3. I also took a quick look at the companion paper in HESSD and have a couple of comments:

a. I felt there was a lot of repetition between the two papers in the first paragraph of the introduction. You may want to consider changing this so there is a clear distinction between the two papers.

b. I agree with Reviewer #1 that a comparison between the Wageningen model and the new WALRUS model would make a useful contribution to the HESSD paper. It is difficult to tell how improved your new model formulation is if there is no comparison with the old one.

Specific comments:

C305

1. p. 1358 (line 20) 'Lack of topography' doesn't make sense, maybe change it for 'low-lying topography'
2. p. 1362 (lines 6 – 12) and elsewhere in the text. Change all instances of 'sect' to 'section' so that this is consistent.
3. p. 1362 (lines 24 – 26) Over what time period was the groundwater and soil moisture data collected?
4. p. 1363 (line 6) 'we used data of 1993' should be 'we used data from 1993'
5. p. 1366 (lines 12 - 14) Sentence is unclear and needs re-writing.
6. p. 1371 (line 5) 'depending' should be changed to 'dependent'
7. p. 1372 (lines 6 – 13) I wasn't entirely convinced by this – what is the physical reasoning for 25mm bins? Would this relationship change if you increased/decreased the size of the bins? The authors might want to expand on the implications of condensing this information into a single equation given the wide scatter in the data.
8. p. 1378 Section 4.10. From the HESSD paper, it appears that you have a time series of surface water supply for the Cabauw catchment. Why did you decide to use an artificial event here to illustrate the model formulation rather than showing how it performed for real data? I found the accompanying plot to this experiment (Figure 9) quite confusing and I had to go back to the text a lot to understand what it was showing. It would be worthwhile making the caption and figure legend clearer.
9. I believe you could remove Figure 1 – it does not add to the paper.
10. I thought Figure 4 was really well presented. However, I would find it useful to have an overview of the Wageningen model structure alongside the new model formulation to gain a really clear picture of what has changed between the two models. This would help to support what is already written in the text.
11. Figure 7 and Table 2. Why do the theoretical curves and parameters deviate so

C306

much from the actual measurements and fitted parameters (especially b)? What would be the implications if you did not have access to this data and instead used theoretical values?

Interactive comment on Geosci. Model Dev. Discuss., 7, 1357, 2014.