Interactive comment on "Modelling biocide and herbicide concentrations in catchments of the Rhine basin" by Andreas Moser et al.

Anonymous Referee #3

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The authors present an extensive modeling study on pesticide transport in the Rhine basin. The paper including the supplement is very long (as is the river Rhine). It builds on quite an impressive amount of work and is well written, although not everything is explained in full detail. The latter is probably unavoidable with such kind of studies. I appreciate that the authors provide there input data and model code.

The basic idea is to set up a simple, parsimonious model, to calibrate it with detailed data (from Switzerland, where a number of very good, detailed studies were carried out in the past) and predict transport on large scale. The approach is actually quite successful. Modeled concentrations partly deviate from measured concentrations by up to a factor of 5 or so, but we should also not forget that the concentrations are low. It is clear that the model can be improved when better input data become available (if

ever).

I have only one major point to make. I refer to the last paragraph of section 5.1. The authors used a (lumped) modeling approach in which sorbed phase and solution phase concentration are expressed in total masses in the system (watershed). The model was parameterized with laboratory data from a study by Freitas et al. 2008 (reference missing), but it is not explained how. Was the different soil to solution ratio in the lab considered? If the model is directly applied to the lab data (Ms=sorbed, Mw=dissolved), it would yield too low partitioning coefficients, what is indeed what the authors observed (section 5.1, last paragraph). This is so because, as a physicochemical fact, the sorption isotherm is independent of the soil to solution ratio as has been shown many times in the literature. In the lab, the mass in solution is much higher (by a factor of 5 or so, depending on the soil to solution ratio used). Taking it differently, sorption isotherms measured in the lab cannot be applied to a system (watershed) without making an assumption about the soil to solution ratio in it.

Unfortunately, my print-out version did not contain page numbers.

page 1, line 17

to what degree

At some locations in the text, references to figures lack the number (figure [empty]).

eq 1

M(t) is undefined (cf. eq 8)

eq 8

in eq 2 and 3, Ma was defined as the mass applied to the catchment the mass present in the catchment should be M as in the LHS of eq 1

Figure 4

how were the residuals transformed?

Figure 5

Overview of

Figure 6

I did not get the rational behind the fold difference. This should be explained in the text and in the figure caption.

Figure 7

What is the violin about? Is the envelope a standard error? Explain in the text and in the figure caption.

Figure 9

Explain the envelope?

Figure 10

I have no clue what this figure is about. Explain the axes, assign units. Explain properly or delete the whole thing.

Table 1

Did you properly explain the scaling factor μ? I think no.

Table 2

Explain the abbreviations (like NADUF).

Table 3

Explain the symbols in the caption.

Table 4

Explain abbreviations.

Table 5

C and V should be defined. Atrazine

***Summing up, the tables and figures should be self-explaining.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2017-628, 2017.