REVIEWER BLIND COMMENTS TO AUTHORS

Manuscript Number: HESS-2017-628

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Manuscript Title: Modelling biocide and herbicide concentrations in catchments of the Rhine basin

General Comments:

The authors have used the parsimonious model *iWaQa* for predicting temporally resolved concentrations of pesticides (from agricultural runoff) and biocides (from diffuse loss from urban areas) in large parts of the Rhine river watershed. The overall goal of the paper was to calibrate the described model and evaluate its prediction capability in a case study in the Rhine basin. I especially appreciate that the authors clearly mention the limitations of the model approach and the time-consuming data collection process often hampered by insufficient data availability.

The manuscript is well-structured and written in good English. Description of the model framework as well as its parameterization and calibration is straightforward and despite its complexity well understandable to me. The line of reasoning in the discussion is mostly convincing to me, but presentation of results is supported by a number of figures and tables that are not always easily understandable and not all are meaningful to me in its current form (see specific comments).

Nevertheless, I can recommend the manuscript to be accepted for publication after minor revision according to the comments below.

Specific comments

- Literature with respect to other related model work in this field is not sufficiently reviewed. References are sometimes unfortunate, e.g. MONERIS is cited not with original papers but with a side application and reference to GREAT-ER is outdated (see Kehrein et al., 2015). The EU approach (FOCUS model suite) is neglected as is the DRIPS model (Röpke et al., 2004).
- The assumption of general presence of persistent pesticides in baseflow and groundwater (page 6) is somehow terrifying to me, since prevention of elevated concentration levels in groundwater is the main driver for research in this field. Background concentrations determined in the calibration step need to be explicitly compared to the large number of data available. Fortunately, many of these data points are small and below critical limits. These data allow for defining an upper bound for the calibrated background concentrations.
- Many German cities situated in the Rhine catchment use combined sewer systems, whereby a significant fraction of urban surface runoff is directed not instantaneously into rivers (page 6), but to the nearest sewage treatment plant. While the substance-specific load reduction during wastewater treatment is included in the loss rate β, it should be discussed whether retardation of transport into the receiving waters for the hydraulic retention time in the sewer system and the wastewater treatment plant could have an effect on the timing of the biocide concentration peaks in the simulations.
- I think that some figures in the main text are not important enough to justify their presence. Moreover, the meaning of some figures is hardly recognizable from the discussion. I strongly encourage the authors to shift some of the figures to the supporting information. In the main text, I would focus the discussion on the most important points supported by meaningful and easily understandable figures with clearly labelled axes.
    - Figure 4: I could not find a description of the transformation step used to generate the data displayed here. Both axes are displayed in dimensionless scale, but I have no idea what that means. It remains also unclear, what the dashed line represents and why the Figure points to systematic deviations between observed and modelled concentrations (page 13, line 31)

    - Figure 5: It is not possible to extract the numbers for the GRI values given in the text (page 13/14) from the graph. For me, the range shown in the graph is larger with values up to 5 for the herbicides. Meaning of vertical lines is unclear and the error bars (grey) unreadable. Colour of second section (C-T, C-S) is not identifiable and it is confusing that all categories appear twice on the category axis.
    - Figure 10: Scaling of the axes is unclear (log-scale of what?)
- Model performance for biocides is poorer than for pesticides (page 14, line 2), which should be discussed in the light of the different number of calibrated parameters for herbicides (seven/nine with error function) and biocides (just one). Either the biocide model needs more detailed process descriptions or the herbicide model is over-parameterized mutually levelling off uncertainties introduced by the parameters.

Minor comments

- pathways, wastewater (page 2)
- … where M(t) [g d^{-1}] **is** the mass ratio … (page 5)
- … temperature sum models is used (page 5)
- … of the pronounced concentration~~s~~ peaks (page 15)
- Number of Figure missing (page 16, line 2)
- … for the model compound**s** considered in this paper (page 16)
- …micropollutants from point~~s~~ sources (page 16)
- …purely hydrological models can accomplish (page 16)
- Number of Figure missing (page 17, last but one line)