Hydrology and Earth System Sciences Discussions

Interactive comment on "Prediction of dissolved reactive phosphorus losses from small agricultural catchments: calibration and validation of a parsimonious model" *by* C. Hahn et al.

R. Adams

russelladams68@gmail.com

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I enjoyed reading your paper and think that you are addressing a key topic in P export that has been overlooked by other studies. However, I have a few points that I would like clarified and there were a couple of minor typo errors

1. If I understand p1474 correctly then the DRP concentration in the baseflow is fixed at 0.05 mg/L? How was this value arrived at?

2. Since you plotted timeseries of instantaneous DRP loads (L) rather than concentrations (C) in Figs 2-5, it is difficult to see how well the model performed at reproducing C, since L is easier to predict (if the Q is predicted reasonably accurately) as it is QxC! The

predictions of DRP loads looks reasonably accurate apart from some missed events perhaps due to problems with the quality of the rainfall data, that are referred to in the text on p1482.

3. Could you add a brief paragraph explaining where the model calibration data especially for the DRP model came from? I think you jump straight to "Validation" in 2.3. and refer the reader to your earlier papers, but i would like to know if the measurements in the 4 subcatchments in Fig 1 are for example grab or automatic samples from an ISCO6712 ?

4. I think your model results in section 3.1 indicate that it performs well since in both sets of subcatchments here DRP concentrations are strongly correlated with flow. In other catchments, perhaps ones where C during low flows is quite variable due to point sources etc then I am not so confident of the model's performance.

5. Section 3.3.3, having used similar OFCs in humid catchments I feel that it's difficult to get an agreement between field measurements and model predictions since as you point out true "overland flow" that is collected by these devices in fairly rare unless there is significant infiltration excess (or impermeable area) runoff from the hillslope. Most models tend to represent near-surface saturation excess runoff better but this is hard to validate in the field. I think section 3.3 in general could be shortened slightly as some of the findings are not unsurprising, if you compare this study with similar ones in other catchments?

6 Table 2 indicates that the 4 calibration subcatchments have 2-3 times as much forest than urban areas but you state that forested areas are negligible on P 1471, l11. This appears not to be the case here so more detail on the forest hydrology model would be useful?

Specific Comments:

P1471 Eq. 6 I would like to see exactly how the threshold value of the ATB index

(lamda) is calculated? P1480, l10, Spelling mistake, title "Rainfal" Fig 2 panel "C" is also a plot with a selected y (non-log) range?, similar to "D"? Figs 2-6 These are presumably showing the range of predicted values between upper and lower percentiles since there are two red lines? Please state clearly perhaps in the captions what these represent?

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