Hydrol. Earth Syst. Sci. Discuss.,
doi:10.5194/hess-2015-545-AC2, 2016

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Uncertainty assessment of a dominant-process catchment model of dissolved phosphorus transfer" *by* R. Dupas et al.

R. Dupas et al.

remi.dupas@ufz.de

Received and published: 24 April 2016

Dear Editor and Referees,

We appreciated the constructive criticisms of the two referees Tobias Krüger and Paul Whitehead. We have addressed each of their concerns as outlined below.

RC2

[. . .] Are there any instream dynamics occurring such as precipitation of P onto the sediment bed and remobilisation during storm events? The paper of Wade et al referred to the in paper addresses some of these issues.

19. Our (unpublished) data suggest that resuspension of stream sediments would adsorb SRP during storm events, especially during the rising limb of the hydrograph.

In a previous study (Dupas et al. 2015 Hydrological Processes) resorption onto stream sediment during the rising limb of the hydrograph was hypothesised as being a possible cause of the hysteresis loop in the C-Q relationships during storm events. We will add a sentence to mention this process "The reason for this simplification was that we lacked knowledge of SRP re-adsorption in downslope cells (or on suspended sediments in the stream network) and on the long-term fate of re-adsorbed SRP". But contrarily to Wade et al. we used our model in a small catchment to avoid having to simulate stream processes in order to focus on land-to-stream transfer.

The model of the soils system is kept simple and makes use of the standard Olsen P soil measurements to keep track of P loading on the soils.

What is really excellent about this paper is the combination of the statistical and sensitivity techniques utilised. The combination of the GLUE methodology but framed within a realistic limits of acceptability approach is a very good strategy, but this is further enhanced by the use of the Hornberger-Spear GSA methodology, to investigate parameter uncertainty. Whilst this proved to be a very useful strategy to evaluate the parameters, the work could have been taken a stage further to utilise the GSA technique to evaluate the distribution of parameters and the Kolmogorov–Smirnov Statistics for distribution separation. This tells you which parameters are controlling the dynamic behaviour and ranks the parameters. This is described in the 2 papers below, and can be used as a means of improving the model fit, by focusing on the calibration of the most sensitive parameters. Whilst I do not think this analysis is needed for this paper, it would make an interesting follow on piece of work.

20. I agree and I would like to point the fact that the GLUE analysis for the hydrological model relies on a previous sensitivity analysis which identified the most sensitive hydrological parameters. The manuscript will be amended as suggested to include this suggestion as a perspective "This identification of sensitive parameters can be used in future application of the TNT2-P model in the study catchment, as suggested by Whitehead and Hornberger (1984) and Wade et al. (2002b)."

With best regards,

On behalf of all co-authors,

Rémi Dupas

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2015-545, 2016.