Hydrol. Earth Syst. Sci. Discuss.,
doi:10.5194/hess-2015-545-RC2, 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.

P. G. Whitehead (Referee)

paul.whitehead@ouce.ox.ac.uk

Received and published: 9 March 2016

This is an excellent paper, addressing the major issue in water quality modelling of how to minimise the complexity of any model but at the same time capture the key dynamics and processes operating. The authors use a upstream agricultural catchment which is fairly small and thereby they minimise the problems of trying to model the instream processes, as well as the terrestrial and soil systems. So this simplifies the modelling but one question is 1. 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.

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.

WHITEHEAD, P.G., HORNBERGER, G.E. (1984), Modelling algal behaviour in the River Thames, Water Research, Vol.18, pp. 945-953.

WADE, A.J. WHITEHEAD, P.G., HORNBERGER, G.M., SNOOK, D. (2002) On Modelling the flow controls on macrophytes and epiphyte dynamics in a lowland permeable catchment: the River Kennet, southern England. Sci Tot Environ. Vol 282-283 pp. 395-417.

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