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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.

Anonymous Referee #1

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The paper ÂńPrediction of dissolved reactive phosphorus losses from small agricultural catchments: calibration and validation of a parsimonious modelÂż is describing a new and very important development in modeling – modeling P loss has been difficult. It is important to be able to model P losses, since we will be able to identify source areas and in turn the effect of changes in agriculture within the catchment on P losses. The paper is well-written and it describes very well the modeling efforts, step by step, and the hydrologic approach is very easy to follow and convincing. The soil moisture and the runoff generation are very well described and as such the model defines the source areas of runoff. Snow cover and snowmelt seem to be of minor importance for the results on runoff and the model has a good agreement without including the

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rainfall-runoff-ratio. It seems, however, as the model is mainly a hydrological model and the phosphorus part is not really described in detail. I would have preferred to have information on soil P status and P application included in this paper as well since this may give important information on the P concentrations. I have to admit, I did not have access to the Lazzarotto, 2005 and 2006. The soil P status may be described more in detail in these documents. It is e.g. stated that "DRP concentrations in runoff were strongly correlated with runoff volume". Does it mean that DRP concentrations increase with increased runoff? I have the opposite experience on this – there seem to be a dissolution of DRP with increased runoff, depending on the source of DRP. If the model results on phosphorus loading are mainly dependent on hydrology, does it mean that P concentrations do not vary between sites? Are these sites similar with regards to soil P status and P application? The P part of the paper would be easier to read if more information on P in soil was included. Furthermore, the soil management may influence loss of P (both dissolved and particulate). If the grassland was not tilled maybe the freezing of plant material could contribute to the concentrations of dissolved P. Was this P source evaluated? The hydrology is described as total runoff from the catchments and the subcatchments. Were these areas artificially tile drained or was it natural runoff? If artificially tile drained the total runoff would consist of surface and subsurface runoff. For artificially tile drained soils, the source areas generally cover a large area of catchment, since there is a fast transport through the tiles to the stream. Hence, not only the area close to the stream should be defined as critical source areas. Thank you for a very interesting paper.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 1465, 2013.