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Hydrology and Earth System Sciences Discussions

Interactive comment on "Nested-scale discharge and groundwater level monitoring to improve predictions of flow route discharges and nitrate loads" *by* Y. van der Velde et al.

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Reply to the short comment of the editor:

We agree with both referees and the editor that our simplistic approach to nitrate transport does not reflect the complexity of processes that affect nitrate transport, and therefore should not be presented as a nitrate transport model. We have even demonstrated this point ourselves in previous work [WRR, van der Velde et al., 2010] as was pointed out by referee #2. The point we wanted to make was that correct contributions of flow routes, with each flowroute connected to specific biochemical processes and travel

times and consequently specific solute concentrations, are paramount for correct solute (nitrate) load estimates. Correct flow route fluxes are far more important for load simulations than for correct discharge simulations. Unrealistic contributions of flow routes might very well lead to realistic predictions of total discharge, but when each flow route is related to unique nitrate concentrations as measured in the field (albeit probably not constant with time) this will give unrealistic nitrate load estimates. This is demonstrated by showing that the spread in possible outcomes for the total nitrate load is much larger for a model calibrated on catchment discharge only, compared to a model that is calibrated on a nested-scale experimental setup with explicit measurements of flowroutes at a field scale, although both models describe discharge equally well. For this reason we agree with the referees to remove nitrate transport from the title and as explicit objective of this paper and clearly refrain from presenting a solute transport model. However we would like to keep the nitrate comparison in the paper as a demonstration of the crucial role of flowroutes in solute transport modelling. To this end we have rewritten the part about nitrate transport and the corresponding results. We think it helps to connect this paper to our previous and future work and puts the paper inline with the overall goal of our work: To improve our understanding of hydrological pathways in lowland catchments and through that improve nutrient transport modelling in lowland catchments. If however, the reviewers and editor object to this line of reasoning, we will remove the nitrate load demonstration completely as suggested.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 8427, 2010.