Hydrology and Earth System Sciences Discussions

Interactive comment on "Water and nutrient balances in a large tile-drained agricultural catchment: a distributed modeling study" *by* H. Li et al.

Anonymous Referee #1

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The paper gives a description of a distributed model of coupled water and nutrient flows for large river basins with special aspect to tile-drained agricultural land use. This plays an important role in many watersheds and is therefore of common interest for the readers of HESS. Model fundamentals are briefly described and an example analysis of a large watershed in Illinois/USA is presented. The results are well presented and logically discussed. The approach is adequate for a large size catchment where data availability is usually limited. The structure of the model is well described. However, a few more details of basic model approaches for single components would be desirable

and some questions arise which should be clarified. How are the U1 and U2 zone defined? You should provide some information which inputs (e.g. soil information, DEM, etc.) are required to characterize the basin. For nutrients, brief descriptions of the processes involved are given. Equations require some more explanations, especially the variables Hp, Up, Mp and Sp are not explicitly explained and units are missing. In some cases it would be good to know the final product of the equation. For example, it is not clear what is the result of residue decay and how it differs from mineralization. What is the output of residue decay, Po? For mineralization it is well known that the process depends on temperature and moisture. From the description of mineralization only a threshold temperature is considered but no temperature function. How are soil temperatures obtained and at which resolution? Also it would be interesting to know, how the dependence of the retention index with the soil type works? Regarding N fixation by crops, it should be explained why fixation is adressed to the ammonium pool instead of putting it to the crop compartment. Can nitrogen losses in the saturated zone be excluded? For a better interpretation of the results some details about soils and relief should be given for the watershed. Heading of 4.1 "model application and validation" is misleading. Because all data were used for calibration there is no real validation in this study. On page 19 the authors mentioned the impact of point source pollution which has an impact on P performance of the model. Why is there no effect on nitrogen? Technical corrections: Please give a reference for the Nash-Sutcliffe index. The description of the temporal pattern of N storage changes are hard to follow with figure 10. Please add some larger tics at least at January 1st and July 1st for a better orientation. On page 25, line 15: the sentence contain two time "is". Delete one. Citation of Torizzo and Pitlick (2004) in the reference lsist is missing in the text.