

Interactive comment on “Subsurface lateral flow from hillslope and its contribution to nitrate loading in the streams during typical storm events in an agricultural catchment” by J. Tang et al.

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The authors describe a study in which hydrometric measurements are combined with sampling data from surface and subsurface waters to develop a model of the flow paths and solute transport dynamics from two agricultural hillslopes during two storms in southeast China. The authors emphasize the important role of subsurface transport of nitrate to streams via a perched water table that forms in the depth range of about 0.5 to 1.5 m in the soil. This subsurface transport of nitrate is particularly important during the stream recession after overland flow has peaked and waned. Overall, I think

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this is a good study, appears to be generally technically sound, and does add to our knowledge of runoff and solute transport during storms in agricultural landscapes that are important drivers of excess nutrient runoff globally.

I have a few criticisms and concerns about the paper, but in my view there are no major technical problems with the paper. Most of my concerns can be addressed with some additional thought and editing of the manuscript.

General concerns

The abstract is not well written and needs to more clearly lay out the intent of the study, what data were collected and why, and what can be concluded from the results. The reader should be able to fully understand the abstract without needing to read the full manuscript. For example, the abstract describes a “peanut hillslope” that cannot be understood in this context.

Subsurface flow in fact has been addressed in numerous studies in agricultural landscapes. However, this work has been done mainly in the context of tile or subsurface drains that are ubiquitous in many agricultural landscapes around the world. The authors ought to acknowledge this work to provide the proper context and perspective for their study. For example, if one goes into google scholar and searches on the words “tile drain nitrate runoff” dozens of papers appear, indicating the extent to which subsurface runoff of nutrients has been studied in agricultural landscapes, though admittedly, the system studied in China was not artificially drained.

Minor comments referred to page and line number

P3, L21 –What is peanut hillslope? Abstract needs to be self-explanatory

P4, L5 – Is this an annual value, please clarify

P4, L11 – This is where the extensive literature on tile drained agricultural landscapes could be acknowledged

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P5, L9 – Many agricultural regions are in flat plains areas with no distinct hillslopes. Perhaps this statement is true for China, but certainly not globally

P12, L 8-9 – Streamflow nitrate concentration assumed to be the same as subsurface nitrate concentration. On what basis? Please provide some justification for assumption

Page 17, L 17 – Would hesitate to use the word “proved”—“supported” is probably better

Page 18, L 1 - How do results implicate vertical preferential flow, was penetration too fast to be caused by a uniform wetting front?

Page 19, L6 – The word “buy” should be “but”

Page 19, L 11 – The word “coarser” is spelled incorrectly

Page 21, L 17 – The word “contributed” should be “attributed”

Page 22, L 5 – The phrase “interfered by ground water” is not clear

Page 23, L 12 – The word “changing” should be “ranging”

Page 23, L 14-15 – I don’t believe that soils with low soil organic matter content necessarily implies negligible biogeochemical processes within the catchment

Page 23, L 18 – Not clear what “for a long run” means in this context

Page 23, L 23 – I don’t believe it can be stated that EC can be assumed to be a good surrogate for nitrate in many agricultural catchments. EC is driven by the dominant solutes, which in many settings may not be nitrate, and the dominant solutes may not be synchronous with nitrate.

Page 23, L 25 - Should state goodness of fit

Page 23, L 27 – Interference—contribution would be better word here

Page 24, L 7 – Add word “flow” after stream

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Page 24, L 17 – The word “may” should be “major”

Page 24, L 21 – The word “occurred” should be “occur” assuming statement is being used as generality

P29, L 11 – The name “Lowrence” should be “Lowrance”

P29, L 15 – Chicago spelled incorrectly

Fig. 7 – Some of the results look counter-intuitive, such as the high % overland flow at the beginning of event at Stations 5 and 6. Is this mentioned or acknowledged in text?

Fig. 7 – Does not seem to show observed and predicted nitrate as stated in caption. Fig. 7 and 8 captions are incorrect and need to be switched

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