

Interactive comment on “The nitrate export in subtropical mountainous catchment: implication for land use change impact” by J.-C. Huang et al.

Anonymous Referee #1

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This paper investigates the impacts of landuse change on the nitrate transportation pattern at a tropical mountainous watershed. The analysis is mainly data-driven and supplemented by a hydrologic model. The different behavior of the subcatchments with various levels of cultivation implies the highly sensitivity of nitrate loading to agricultural activities. I found that the methodology is generally appropriate, and the results are interesting. However, I hope the authors pay substantial attention to the representation, or writing. Although the general organization is ok, sometimes the interpretation is not presented with smooth logic. English grammar can also be improved, but in a secondary manner. Moreover, the authors could be challenged further to highlight the distinct features of their study area and the corresponding impacts. There are two major features distinguishing this catchment from the others around the world.

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The first is the abundant precipitation and typhoon season, and the second is that the farm land is mainly located at the riparian areas. This provides the authors a unique opportunity to understand how these features lead to the nitrate transportation patterns distinct from those in the other regions. The authors may not have to add extra comparative analysis into this paper, but there could be more in-depth discussion along this direction. For example, at an agricultural catchment in Midwest USA, featured by very flat topography and extensive tile drains, the nitrate loading into the stream is mainly carried by tile drainage. And it was found there is a carry-over of nitrate storage in the soil from dry years to wet years, which leads to relatively constant mean annual nitrate concentration. Similarly a question could be asked for this study area: What are the dominant runoff generation mechanisms in the study area of this paper, and how do they affect the spatio-temporal pattern of nitrate?

Above said, I have some specific comments as following. 1. The title is somehow confusing and does not read well. Please reword.

2. P9294. A bit more details of the methodology should be included. The conclusions could be organized in a more logic way. The number “5.2%” is given here and later in the conclusion section, so one would take it as a very important number. But there is no other description about this number, i.e., how was it estimated. Is it the fraction of the catchment (as a whole) subject to agricultural activities?

3. P9295, Line 27. “It is also recognized that this island ecosystem is relatively vulnerable in such environmental settings”. Reference please.

4. P9296, Line 22. Reference for the global mean annual precipitation?

5. P9296, Line 24-25. This sentence could be rephrased as “The mean daily discharges averaged within the total study period are 7.94 m³/s for Chi-Chia-Wan and 2.41 m³/s for You-Sheng Creek, and those averaged within the wet season are 11.80m³/s and 4.07m³/s respectively.” This is just one example that the authors could make their representation more clear.

6. P9297, Line 1-2. Again, not clear. 15.8oC within what period?
7. P9297, Line 8. Are you implying that in American and Europe the cultivated land occupy other zones? Then what are they? References? Actually this could an important point to convince the novelty and uniqueness of your work.
8. P9297, Line 20-21. How “rationally” is this assumption? Does elevation matter here? Are the observed rainfall data from the three rain gauges showing spatial homogeneity across different temporal scales?
9. P9298, Section 2.2. How about sedimentation here? It might also bring some particulate nitrogen into the stream.
10. P9298, Line 24. The word “elemental flux” is too vague here. “nitrate flux” will just do.
11. P9299, Line 1-2. Please add some description of the model here. The original TOPMODEL does not consider fast subsurface flow (preferential flow, or macro-pore flow), which is typical in mountainous forest areas. Is your model including this?
12. P9302, Line 7-9. I could not follow the logic. I could understand that the selected yield factors minimize RMSE values, but how do they reduce the annual variation and the landscape heterogeneity effect? The annual variation and the landscape heterogeneity effect are something we try to understand and gain physical insight into, not to reduce by parameter calibration.
13. P9302, Line 21-23. My understanding is that Irrigation, complementary to precipitation, usually leads to higher low flow. Why the authors got the opposite conclusion? Doe your model include irrigation?
14. P9303, Line 5. Should “0.35” be “3.5”?
15. P9303, Line 15. To me the seasonality at K1 is just as significant as at Y1, in a relative sense, except for smaller magnitude.

16. P9303, Line 25. Does “fewer” here mean less illegal plantation, or “a few” ?

17. P9307, Line 9-10. “We were not surprised. . .”. Not necessary. Could be removed.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 9293, 2010.

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