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Hydrology and Earth System Sciences
Discussions

Interactive comment on "The influence of riparian evapotranspiration on stream hydrology and nitrogen retention in a subhumid Mediterranean catchment" *by* Anna Lupon et al.

Anonymous Referee #2

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Overall comments: This paper seeks to determine the role of riparian vegetation on controlling duration and extent of stream recharge to near-stream aquifers, termed stream hydrological retention by the authors, and concomitant changes to forms of inorganic nitrogen. This is no easy task, as the processes involved are hard to link as they operate at different spatial and temporal scales. None the less, the authors have done a commendable job, providing enough correlative data to strongly suggest water table drawdowns are indeed induced by ET, which leads to increased stream hydrologic retention. That this would also be associated with increased rates of nitrification is novel. I recommend publication with hopefully minor revisions. My most important concerns with the manuscript involve separation of the chemistry data to look at time

periods that strictly align with periods of net discharge losses (unless I've misread how the data were grouped), and the presentation of the methods with respect to the ET determinations. My specific comments are provided below.

Study Area: I'm confused as to how the valley reach drained less of the catchment area than the headwater reach. Figure 1 indicates the sites are both located on the main stem of the river, which should mean the total catchment area being drained at any point along the stream increases as you move downstream.

Results Section 4.3: I'm not sure the approach presented here is the most fruitful. Lumping the whole dataset together for each sampling point to compare means in phases of the year probably confounds the interpretation. The authors have already removed storm flow data from their Q analysis, would it not make sense to also do that for the solute analysis? Surely the few rain events during the vegetative periods will lead to unique N & Cl responses than what the authors are striving towards; that is, N flushing as Qgw becomes more positive. Why not try to look only at solute differences during base flow?

Discussion Section 5.2: The authors point out the previous literature on losing reaches has found net nitrate removal from the stream water. It might be worth mentioning here that net nitrification leading to ammonium losses and nitrate increases in other stream type are not uncommon (Triska et al., 1990, 1993 for early data). This highlights the importance of in-stream (in-hyporheic zone) N transformations that would be (mostly) disconnected from whether the stream is gaining or losing water to the riparian zone.

L35: change "relays" to "relies"

L58-60: The tone set here is too negative to their purposes. "There is little empirical evidence" sounds like people have studied riparian ET – nitrogen cycling before and not found any linkage. I think the authors are trying to say that there has been very little investigation into this linkage.

L106: were the forest inventories done as straight-line transects of 30-m length, or were they plots 30-m long, perhaps also by 30-m wide?

L108: the upper case version of pi is used in the basal area calculation, rather than the lower case.

L115: insert “transducer” or “sensor” after “water pressure.”

L121: more information is necessary on the piezometer. Was it a piezometer or a well? Wells are slotted throughout their length and measure groundwater level. Piezometers are only perforated for some specific interval (less than its entire length) and measure hydraulic head at that specific depth (which may differ quite a bit from the water table).

L152-153: I feel more information on the tree transpiration / sap flow measurements is needed. I realize they were taken from the Nadal-Sala et al. (2013) study; however, it seems pretty central to the present paper and the reader should not have to go to another source for so crucial a measurement technique.

L250-251: Figure 2c refutes this statement. There appear to be at least a few days around January / February, 2012 with Qgw < 0 in the valley reach.

L334: Change “suite” to “suit.”

L366: Change “stronly” to “strongly.”

References:

Triska, FJ, JH Duff, RJ Avanzino, 1990. Influence of exchange flow between the channel and hyporheic zone on nitrate production in a small mountain stream. Canadian Journal of Fisheries and Aquatic Sciences. 47(11): 2099-2111.

Triska, FJ, JH Duff, RJ Avanzino, 1993. Patterns of hydrological exchange and nutrient transformation in the hyporheic zone of a gravel-bottom stream – examining terrestrial aquatic linkages. 29(2): 259-274.

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