

***Interactive comment on “Catchment features
controlling nitrogen dynamics in running waters
above the tree line (Central Italian Alps)” by
R. Balestrini et al.***

Anonymous Referee #2

Received and published: 30 October 2012

This article investigates how catchment characteristics control the dynamics of nitrogen in alpine streams located in the Central Italian Alps. The interesting results indicate that the percentage vegetated and soil cover explain most of the variation observed for nitrate concentrations and nitrate retention in the investigated catchments. Overall, this study constitutes a novel contribution to the biogeochemistry of European alpine catchments, which have been little studied compared to forested catchments.

My main concern relies on the methodology used for estimating nitrate retention. To my knowledge, catchment retention is commonly estimated using a mass balance ap-

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proach. In this study, nitrate retention is estimated based on the ratio between nitrate and calcium concentration in June and an extrapolation to the rest of the sampled months. This is an approach that I had never seen before and that, in my opinion, needs substantial clarification. In this regard, I have several questions: Why was this approach used instead of other more common approaches? Was this approach used before? If yes, please add references. Why is calcium used, although it is not a conservative tracer? Why the ratio in June? The presented equation seems incorrect to me. Shouldn't it be $NO_3\text{ Jul} = (NO_3\text{ Jun} \times Ca\text{ Jul}) / Ca\text{ Jun}$?

Minor comments:

P10448, L15 and L17: Use either “NO₃-N” or “nitrate” consistently throughout the text. Do the same for other acronyms.

P10452, L28: It is unclear why these 16 sites were chosen from the set of potential sites. Please clarify.

P10453, L11-13: It seems that in most study sites the proportion of organic nitrogen was low compared to inorganic nitrogen. Did you get any negative DON values when subtracting DIN from TDN? From the results shown in Table 4, it seems that you were very close to the detection limit and that you likely had some negative DON values. Most studies do not report these negative DON values but I think that they should be reported when present. In addition, this fact could have influenced some of the results involving DON that are shown and discussed in this manuscript.

P10453, L21-22: Concentrations are reported here in units of $\mu\text{g/L}$ or mg/L and in other parts of the text, tables and figures in $\mu\text{mol/L}$ or $\mu\text{eq/L}$. For clarity, use the same units consistently throughout the manuscript.

P10454, L2-16: The methodology used for calculating nitrate retention is quite unclear. It needs to be clarified (see general comment above).

P10457, L3: Change “shown” by “showed”.

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P10457, L8: Change “sites” by “site”.

P10459, L26: Remove “as”.

P10464, L7: The reference “Earl et al. 2006” is for stream ecosystems and not for forest ecosystems. Related to this reference I miss some discussion on the potential role of in-stream nitrogen processing in the study catchments.

P10464, L12: How can you be sure that N deposition is the same for the whole area?

Table 1: This table could be merged with Fig. 1.

Table 3: In my opinion, a Bonferroni correction is needed for these correlations.

Fig. 1: It is not easy to see the sampling sites in this map. Please change the map to make this clearer.

Fig. 3: The SD bars suggest that not all streams showed the same pattern. Please clarify.

Fig. 4: In the legend, please clarify that “estimated” means expected without retention. Is that correct?

Fig. 9: Indicate which symbol corresponds to which catchment, as in Fig. 8.

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