

Interactive
Comment

Interactive comment on “Nitrate retention and removal in Mediterranean streams with contrasting land uses: a ^{15}N tracer study” by D. von Schiller et al.

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General comments

This paper is well written for the most part, and describes results from 3 ^{15}N tracer tests in northern Spain. Sites were chosen from each of 3 land-use categories from the same watershed. As such the study design is parallel with the interbiome LINX project. I generally find site-based LINX papers difficult to review. While the data are extremely important with regards to better understanding nitrogen cycling and export, such papers become very site-specific and knowledge gained incremental rather than transformative. That said, this paper has some good and important information. New

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contributions from this work include an interesting analysis of the fate of added nitrate as assimilation, denitrification, and export. The work presented here also is the first study using isotopic tracers in Mediterranean biomes, and builds on past work by this team of researchers.

Overall the work certainly encompasses the scope of Biogeosciences. The paper is well presented in general, though some of the discussion is a bit speculative given the limited number of experiments ($n=1$ per land use category).

Most of the data was presented quite clearly with easily interpretable figures. Some areas I had trouble with are described below:

Land-use gradient; Overall I had a hard time buying the land-use gradient presented here. No hypotheses were presented to evaluate what human impacts might have on nitrogen uptake and export. Land-use categories (i.e. % forest cover, etc.) should be presented in Table 1 so that readers can have a better sense of whether or not land-use drives observed patterns, or whether it is more related to discharge or depth. I recommend the authors present the hypotheses they were trying to test when designing the study, with measurements made logically following from them.

Export; I had a difficult time understanding the export part of the story; I did not understand why export was log transformed and related to time post injection (the units of slope are $\mu\text{gN/s}\cdot\text{h}$); some detail is warranted to better explain this. From my calculation ($\text{EXP}((1/S_w)^{\text{reach length}})$) 90% of added tracer is exported (i.e. not removed from the water column) in the forested stream, 75% in the reference stream, and 61% in the agricultural stream. This is kind of an interesting pattern; I wonder what it means in a N export context.

Respiration; I recommend adding reaeration coefficients to Table 1. ER for the agricultural stream seems very high, especially for such a shallow stream. This doesn't jibe with the biomass standing stocks and DOC concentrations. Why is ER so high? Do you have measures of BOD?

Biomass sampling – p. 3314 states that biomass samples were collected at 48 h post injection, but Figure 3 says the samples were collected 24 h post injection. Please correct. Also how much error is associated with sampling at x time post-injection give high regeneration rates? This is mentioned briefly in the discussion, but I wonder if some sort of correction can be made. How does the differential timing of biomass measurement in the agricultural stream (assuming biomass was measured during the first post-injection sampling) affect your results and interpretation? Alder – I find it interesting that N tracer would be detected in the alder roots given its ability to fix N. Does the alder in these sites fix N?

Editorial comments

p. 3308 l. 15 – which gradient?

p. 3308 l. 24 – change “evidences” to “demonstrates” ; “fast” compared to what?

p. 3309 l. 1 – I disagree – streams have been viewed as reactive since 1979 (Webster and Patten)

p. 3309 l. 19 – start new paragraph with “Removal of NO₃-…”

p. 3310 l. 2-3 – this sentence is redundant with last sentence of 1st paragraph (p. 3309)

p. 3312 l. 23 – give model number (e.g. CR800) for data logger to be parallel with description of other equipment

p. 3313 l. 11 – give filter pore size

p. 3313 l. 15-19 – recommend move to “sample processing” (now called laboratory methods) – I recommend this because I was confused as to how NO₃ samples were processed.

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p. 3313 l. 22-23 – delete “two replicates per station” as it is redundant with line 20-21

p. 3313 l. 29 – which stable isotope laboratory?

p. 3315 l. 2 - give model number (e.g. CR800) for data logger to be parallel with description of other equipment

p. 3315 l. 4 – what substrate types were considered? More detail needed here

p. 3316 l. 1 - which stable isotope laboratory?

p. 3316 l. 28 – spell out MSU

p. 3317 l. 3 – visual inspection? What does this mean? The 1998 version of OTIS has parameter estimation capability – how does this analysis tie to hypotheses?

p. 3320 l. 4-6 – Not clear – why log transform? Units of slope don’t seem to be a velocity.

p. 3320 l. 9-10 – Delete (empty sentence) – just describe the characteristics and refer to the table in parentheses

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