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Biogeosciences Discussions

Interactive comment on "Nitrogen stable isotopes of ammonium and nitrate in high mountain lakes of the Pyrenees" *by* M. Bartrons et al.

Anonymous Referee #2

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The study by Bartrons et al. investigates the N isotopic composition of dissolved inorganic nitrogen in different N-pools in high-mountain lakes in the Pyrenees. It did not become clear to me what we can learn from this study and how we could apply findings to other environments. The paper compares the N isotopic composition of different lakes and lake reservoirs, and tries to relate it to environmental constraint, yet it does not explain the mechanisms behind these possible links (e.g., altitude vs. d15N). It also completely ignores the fact that there are strong spatial and temporal variations in the lakes d15N_DIN due to internal N cycle processes. All in all, the lines of argumentation are weak, the discussion is speculative, and the conclusions are trivial, as are the initial objectives. The conclusion is written I an awkward style.

In detail:

The informational value of the abstract is low.

P11481, l. 22: How certain biogeochemical processes fractionate the N isotopes should be presented in more detail, and reduced to the processes that will be pertinent to the discussion of the paper.

There is no information as to what kind of DIN_d15N values to expect in the various lakes, and what the potential environmental controls could be.

It is not discussed at all why the porewater DIN has a much different d15N than the external N. It the lakes represent closed systems, the OM produced will reflect the d15N of the source. The original N signature will be incorporated into the sediments, and will also modulate the d15N N of ammonium that fluxes out of the sediments. Any discrepancy between these two main sources of DIN to the water column have to be explained by N-isotope partitioning during transformations in the lake, i.e., N burial or denitrification.

Use of DRSi as proxy for water column productivity: Do you assume that productivity high when Si is high? Or that it is high when Si is low, i.e., all Si is being used during high productivity.

What is the yield for your ammonium diffusions? How can you analyze d15N of NH4 at very low concentrations (1uM), while you cannot measure these levels in nitrate samples? What explains the high variability in ammonium concentration?

In section 3.2, relationships between d15N_DIN and lake features are presented. No information is provided as to why or why not the d15N of ammonium in the lake, for example, should be related to the altitude of the lakes.

p. 11488: Diffusive processes barely fractionate the N isotopes. This has to do with the fact that most solutes are hydrated, and the effective mass difference between the molecules is minor.

p.11489, l. 23: use of NH4 in front of NO3?? Covering beyond the range??

p. 11490, l.20-21: I cann ot follow the logic of this sentence.

Interactive comment on Biogeosciences Discuss., 6, 11479, 2009.