

Interactive comment on “Patterns of dissolved organic carbon (DOC) and nitrogen (DON) fluxes in deciduous and coniferous forests under historic high nitrogen deposition” by S. Sleutel et al.

Anonymous Referee #1

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General comments:

The topic of this paper is suitable for Biogeosciences Discussions. The study is well designed and the manuscript is well organized and well written but what is new in this study ? DOC and DON concentrations and fluxes in throughfall, soil solutions and stream water has been studied relatively much in forest ecosystems which situate in areas where atmospheric N deposition is high (e.g. Langusch & Matzner 2002, Brookshire et al. 2007). The main finding of this study was that mineral soil effectively retains nitrogen and especially DOC. It has been shown in many previous studies that podzolic forest soils retain DOC and N effectively (also in areas where atmospheric N

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deposition is high). The comparisons between deciduous and coniferous forests are however new findings and they should be emphasized and discuss more about the reasons behind the observed results.

Specific comments:

Title: the abbreviations (DOC) and (DON) can be removed from the title. Abstract: study site was in Flanders, but in which country ? Mention also that in the abstract. line 11 matter, change element.

Site description: how many soil samples were taken to the analyses (from mineral soil horizons, table 2)? What was the thickness of organic layer (Oi + Oa + Oe) ? How much C and N is stored in organic layer and mineral soil in these study sites ? The amount of annual litterfall is presented in table 3. Is this above-ground litterfall and how you have measured it ? Nothing about litterfall has been mentioned in the method section.

Statistical analyses: Why paired samples t- test was used to study differences between three forest stands ? In my opinion, variance analysis or general linear model would have been the right way to test differences between stands.

Results:

Page 7143, lines 17-19 (last sentence) this belongs to the discussion section, not to results.

Page 7143, 21-24, this do not belong to results. You should make this thing clear already in the introduction.

Page 7144, lines 17-18, what are the r values ?

Page 7145 lines 5-8, this is discussion, not results, so move it to the discussion section.

Page 7145: the last sentence and page 7146 the first sentence. Do not repeat results, these results have been already told in section 3.1.

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Discussion: It seems that there are differences in soil oxalate extractable Fe and Al concentrations and clay content between forest stands (Table 2). These are important variables determining soil DOC adsorption capacity. There could be discussion about how these differences in soil properties may have affected DOC retention in these forest stands. There could be also discussion how potential differences in litter quality and litter decomposition rate may have affected DOC and DON leaching between birch and pine stands. Microbes may also degrade DOC and DON. The microbial population may also differ between deciduous and coniferous forest stands.

The mineral soil effectively retained DOC. Biological immobilization to microbial metabolism or root uptake of DOC may also occur. Furthermore, what is the significance of denitrification in the studied ecosystems? For example Tietema & Verstraten (1991) found that denitrification in ground water accounted for more than 60 % of inputs in high N deposition areas in Netherlands.

Page 7152, lines 25-26 the fact that the relative magnitude of dissolved inorganic N (DIN) loss increases with atmospheric loading is a common observation. You should refer to previous studies.

Figure captions:

Figure captions should indicate what abbreviations SB, CP and CPN mean, because figures should be understandable without reading the text.

Figure captions 2 and 3: are the presented concentrations mean concentrations? If so, it should be mentioned.

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