

Interactive comment on “The import and export of organic nitrogen species at a Scottish ombrotrophic peatland” by R. M. McKenzie et al.

Anonymous Referee #1

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This paper considers the extent and nature of the transmission of organic nitrogen from atmospheric deposition through soils to streamflow in an ombrotrophic bog in Scotland. Organic nitrogen is now recognised as an important component of both atmospheric deposition and fluvial nitrogen and this paper represents one of the first and most comprehensive tests of the links between these. The system in which this is done is well characterised from other studies and the groups involved are very well experienced in both atmospheric and fluvial measurements. I think the paper should be published with some minor modifications. In particular I think it can be shortened and focussed on the main conclusions, rather than minor short term variability and discussion of minor compounds in the largely uncharacterised DON. It is also important to note that the fluvial nitrogen transport in streams draining an ombrotrophic bog are probably particularly rich in organic compared to inorganic N, and the conclusions here may not be

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readily extrapolated to other types of river systems. Specific points Introduction There probably should be a reference to the recent efforts at characterising atmospheric DON using other mass spectrometry systems by Altieri and colleagues (Altieri et al., 2009 ES&T 43, 6950-5). There seems to be little evidence that anthropogenic compounds dominate high molecular weight atmospheric aerosol DON, although of course the potential hazards associated with such compounds cannot be ignored. Line 136 says the samples were collected daily but line 142 says they were collected weekly, which is it? In the past this group have used thymol as a preservative, presumably this was not done here, so are the components stable over storage in the field and the laboratory? IN line 565 a freezer is mentioned. Line 209-218. Was the efficiency of the solid phase extraction for DON specifically tested? Line 262-270 The seasonality is not really particularly obvious but it would be useful to know if it is associated with changing rainfall amounts, changing back trajectories or changing emission. Sections 3.3 and 3.4 might be simplified since there is one key and very important conclusion which is that DON completely dominates. Section 3.5 Given the very important conclusion at the end of this section that 90% of the DON could not be identified, I wonder if some of the detail in this section is necessary. The suggestion at the end of the section is that the DON is lost in the extraction rather than chromatographic steps and this should be discussed as noted above. The statement in line 561-2 is probably correct in an analytical chemistry sense, but not really in terms of characterising the DON. In some ways section 4.6 might be more logical within the methods section Section 4.1 You might note how concentrations compare to the earlier date of Cape and to the other sites they sampled. The suggestion in line 411 is that the results are really quite different to the earlier work and I'm not sure that the argument on line 420 that this reflects large scale dry deposition is credible. The speculation in this section about sources seems entirely focussed on local sources for DON and it is not clear to me why local rather than long range sources are so important. Section 4.2 does not seem very concise or well focussed. Section 4.3 Other types of river systems are often dominated by nitrate, so stream systems with these high DON% are typical of only upland sites such as studied here

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and this should be made clearer. As with the previous section, this discussion seems rather general and lacks focus. The simple conclusion is that DON dominates. Section 4.4 There seems to be limited real evidence of seasonality and no clear explanation of why there should be so I would suggest this section can be shortened. Section 4.5 I think the concentration data alone demonstrates that the DON in soil and stream water cannot all be coming from the atmosphere, an observation that clearly supports the GC analysis results.

Minor points grammatical errors line 23 line 121 hummocks and hollows are surely not vegetation Line 257 and 259 what are the percentages in brackets? I assume it is the % of the total N based on Table 1

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