



Interactive comment on "Nitrous oxide emissions from a beech forest floor measured by eddy covariance and soil enclosure techniques" by M. Pihlatie et al.

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General Comments

This paper describes a novel experiment involving eddy covariance measurement of N_2O fluxes in the trunk space of a forest. The technique has the potential to greatly increase knowledge of trace gas exchange from forest soils. The paper is clearly written, well structured and falls within the scope of Biogeosciences. However the comparison of EC and chamber measurements is complicated by several factors, e.g. (1) the low N_2O fluxes of the ecosystem, (2) the difficulty of making EC measurements in the trunk space, (3) the difficulty in deconvolving spatial variability from temporal variability with EC, and (4) the short duration of the study.

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The data and methods described in the study form a valuable contribution to our knowledge of N_2O fluxes from forest soils and the application of EC in novel environments. However there is a large uncertainty associated with the EC measurement and I am not sure that the data gathered is sufficient to enable an accurate comparison between the chamber and EC measurements to be made. For example, in the text (p. 595 lines 8-9) it is stated that 85% of the EC flux originates within 60 m of the mast and 50% within 15 m. Therefore the region in which the chambers are situated, which lies between these limits, only contributes 35%. This combined with the fact that all the chambers lie within a single octant limits the validity of the comparison. The conclusions may need to be modified to reflect these issues.

Specific Comments

The descriptions of the wind directions in the text (p. 592 line 9) and Figure 7 appear to be inconsistent. The text states that 2-4 μ g N m⁻²h⁻¹ was observed from the SE direction. However figure 7 shows 2-4 μ g N m⁻²h⁻¹ from the wind sector centred at 225°. In Figure 1 the sector labelled 225° is located to the SW of the EC mast.

p.583 lines 1-5. There is increasing evidence of some forest soils acting as N_2O sinks e.g. Goossens et al, *Nutr. Cycl. Agroecosys.*, 2001. Perhaps this should be mentioned?

p.584 line 6. I agree with anonymous referee 3 - are there any more recent examples of the use of EC in the trunk space? Is the requirement of a horizontally homogeneous upwind fetch satisfied in this case?

p.586 line 23. Do the particular characteristics of the below-canopy cospectra affect the choice of averaging period?

p. 587 line 2. Can the 0.07 ms^{-1} threshold be justified? It may not be necessary to show the data but an explanation would be desireable.

p.587 line 10. Is the Lagrangian stochastic technique suitable for application in the trunk space, given the different nature of the flow from an "open" area? p.590 line 1. change to "The mean wind speed..."

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p.590 line 5. The higher contribution of small-scale eddies in the trunk space sounds reasonable, but are there any other sources which support this?

p.590 line 20. Quantify these temporal variations here? How do they compare to temporal fluctuations in the EC measurements?

p.590 line 27. The large contribution of the hot spot is worthy of note, but I think that excluding it is probably not justified due to the small number of measurement plots.

p.591 line 25. Quantify the weak dependency with (e.g.) a correlation coefficient. p.592 line 5. Also provide a quantification of this dependency.

p.595 line 24. What is the spatial coefficient of variation of the manual chamber measurements? This would support the conclusion.

Figure 1. What is the height of the buildings? Are they likely to significantly perturb the flow?

Figure 3. Shorten caption to "Nitrous oxide emissions measured by eddy covariance (EC) and chamber techniques...". What is n_{EC} , the number of EC averaging periods?

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Interactive comment on Biogeosciences Discussions, 2, 581, 2005.