

Interactive comment on “N₂O, NO and CH₄ exchange, and microbial N turnover over a Mediterranean pine forest soil” by P. Rosenkranz et al.

Anonymous Referee #1

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General comments:

The paper reports NO, N₂O, and NO₂ fluxes from a Mediterranean pine forest during two periods in 2003. The flux measurements are accompanied by measurement of the microbial N turnover in the soil and other soil parameters. In contrast to many other studies of nitrogen oxides emission in forests, this forest acts as a sink for N₂O (and for NO_x). The reason for this is attributed to the low nitrogen availability in the soil.

Although the data cover a limited time period they are very valuable because of lack of data from this region and the subject is definitely within the scope of BIOGEO-SCIENCES. The experimental design and techniques seem up-to-date and well combined. I like the combination of measurements, although I miss continuous measure-

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ments of soil moisture. The measurements of soil gas concentrations of N_2O and CH_4 supports the flux measurements. Generally the presentation is fine. The discussion is well-elaborated and gives good explanations for the findings.

The "simulated rainfall" experiment is interesting. However, it needs some more explanation and also creates problems for the spatial representativeness; especially since the paper claims to have made measurements with a high spatial resolution.

The "Conclusions" could be expanded with statements on NO and CH_4 including some estimates of annual fluxes.

Specific comments:

p. 678, l. 7: Is the sample flow of 130 l/min per chamber? If so, this might create a quite high underpressure in the chamber with the risk of sucking air out of the soil.

p. 678, l. 21-22: Please specify the depth of soil temperature measurements. Are these measurements different from those mentioned at p. 677, l. 14?

p. 678, l. 24: Were the chambers placed on collars? If not, how was the contact with the soil sealed?

p. 678, l. 25: How many times were the chambers moved? Were there differences between the placement "sets"?

p.678, l. 28: What was the composition of the artificial rainfall? Did it include N? Was the data from these chambers included in the overall means given in Table 1? Were the fluxes in the 3 chambers (plots) chosen for the rainfall simulation different from those left in natural conditions before the simulation?

p. 684, l. 18: How was the annual estimate of N_2O flux derived? Have annual estimates been calculated for NO and CH_4 ?

p. 687, l. 11: It would have been nice if soil moisture had been measured continuously and that water filled pore space (WFPS) had been calculated. The discussion should

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mention that often an optimum water content (or optimum WFPS) for NO emission has been recorded.

p. 688, l. 1: Could a reason be given for the correlation between NO₂ deposition and NO emission?

p. 689, Conclusions: I miss some statements about NO and CH₄ in the Conclusions.

Table 1: It seems that "N" refers to the number of days, rather than the number of individual flux measurements. If so, why are there fewer days of NO/NO₂? In the footnote, I think it would be more correct to say that "Different letters indicate significant differences between seasons (p<0.05)".

Table 3: There must be something wrong with the lettering of significant differences. Also the explanation of the letter needs clarification.

Figures 1 and 2: It would be more consistent and also give a more clear picture if N₂O fluxes were also shown as daily means.

Figure 2: What is the reason for the gap in NO₂ values. Converter problems?

Technical comments:

p. 686, l. 1: Change "... lower as found..."; to "... lower than those found ..."

p. 686, l. 11: Change "... higher as the ..." to "... higher than the ..."

p. 688, l. 27: Change "There was also found a strong" to "A strong significant correlation was also found between chamber ..."

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