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Interactive comment on "Sources of nitrous oxide emitted from European forest soils" *by* P. Ambus et al.

P. Ambus et al.

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Response to referee comments

Anonymous referee #2. The referee points out the need to include some indicators for uncertainty concerning the data on contributions of NH4+ and NO3- to N2O formation (Table 4). This is agreed. Standard errors on the mean have consequently been included in Table 4.

O. Van Cleemput. Comment 1: An important issue concerning importance of tree litter for trace gas formation and exchange is pointed out by Prof. Van Cleemput. It is possible that exclusion of litter may lead to a biased result given the fact that presence of litter not only provides a source/sink of trace gases, but may also act as a diffusion barrier between atmosphere and top mineral soil. Nevertheless, the evidence from the literature is indefinite. A paragraph discussing this issue in more details has been incorporated into the revised paper (end of section 4.1). Comment 2: With re-

spect to incubation temperature it is agreed that incubating at sampling temperature more closely would reflect the 'ambient' microbial activity. On the other hand, sampling took place when soil temperature had reached certain threshold levels, as an average between night- and daytime temperature. And as the diurnal temperature amplitude differed among the sites it would be experimentally very complex to simulate ambient soil temperature conditions for all sites. Consequently, we decided to incubate at constant temperature. The modest temperature of 15 žC was chosen in order to ensure a response within reasonable time (<2 days), but at the same time impede conditions for rapid growth. Comments 3&4: Corrected.

A. Gattinger. Comment 1: This issue was also raised by Van Cleemput, and has been taken into consideration. Comment 2: It is very relevant to compare the current results with those obtained in parallel field observations at the same time in order to reveal to which degree the lab. incubations may represent field conditions. As a matter of fact, the two methodological approaches reach the same conclusion concerning impact of forest type. This has been mentioned in the revised paper (first paragraph in section 4.1). On the other hand, the ranking of sites within each type category varies between the two studies. However, the lab. study is based only on two time points under standardized environmental conditions, whereas the field study is based on frequent or time-continuous observations at the seasonal/annual scale under variable environmental conditions. A direct comparison between the two datasets is therefore not straightforward and would require several assumptions, which is beyond the scope of this paper. Comment 3: Concerning Fig. 2, the X-axis proportions has been changed slightly, gridlines has been added to better visualize position of the zero-line and symbol size has been reduced. A even better visualization of the position of small values would require e.g. a log-scale presentation, however, in order to demonstrate the range in activities the linear scale has been maintained. It also needs to be emphasized that not all soil samples produced N2O; as a matter of fact a few samples apparently reduced N2O, although at very low rates. This has been clarified in the revised manuscript, section 3.2. Comment 4: Truly, water-logging soils can induce N2O

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production. However, in the current experiment the soils were not water-logged. We maintained moisture conditions at pF 2.36, which resulted in water filled pore spaces not exceeding 73 % in any of the soils (Table 2). These conditions were chosen to simulate the field conditions following e.g. rainfall events when it is anticipated that significant N2O emission will occur. As the focus of the work was on the identification of dominant sources of N2O production, we chose to work under conditions when N2O production actually may occur.

Interactive comment on Biogeosciences Discussions, 2, 1353, 2005.