

Interactive comment on “Pure stands of temperate forest tree species modify soil respiration and N turnover” by N. Brüggemann et al.

N. Brüggemann et al.

Received and published: 2 July 2005

Response to the general comments of ref #3:

Banning all descriptive studies from scientific journals would result in pretty empty journal volumes. However, the authors agree with the referee that published scientific results should present something new. Although it was known before that tree species could influence soil C and N turnover it was not known to what extent this would occur in locations with remarkably high atmospheric N input ($\sim 20 \text{ kg N ha}^{-1} \text{ a}^{-1}$) and on a sandy substrate. The second finding, that is in our view also a new result, is the obviously tight coupling between C and N turnover, mirrored in the high correlations between C and N turnover rates. The authors agree with the referee that a presentation of the data in units on an area basis will aid the assessment of the contribution of each layer to whole ecosystem C and N turnover. This will certainly boost the turnover rates in the Ah horizon to values not much below those of the organic layer. However,

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

as the densities of the organic layers and the Ah horizons are not significantly different between the stands this will not alter the pattern of tree species differences. Relating the rates to a mass unit Corg or Nt is in our view not very helpful in terms of getting an idea about the specific availability of C and N in the soil, as one does not know from Corg or Nt values which fractions of them are really available for microbial turnover. Letters in Fig. 3 are missing BECAUSE there is no significant difference between Ah horizons of the different tree species.

Response to the specific comments of ref #3:

1. This is not correct. Information about C and N content is given in Tab. 3.
2. There was an extensive discussion in the last years whether one should use intact soil cores or sieved soil samples for the determination of N turnover rates with the 15N pool dilution technique. The former leaves the soil structure and the aeration status of the soil more or less unchanged. However, it is virtually impossible to apply the label uniformly without creating hotspots of high label concentration and locations where no label is present in the soil. This will disturb the measurements significantly. Sieving the soil of course disturbs the structure and the aeration status of the soil, but it allows an even distribution of the label without label hotspots or voids. So both methods have advantages and drawbacks.
3. Of course a higher number of sampling dates is always desirable, but not always feasible. We think that especially the spring with rising soil temperatures, but still a lot of undegraded litter of the previous year available, and the summer with the highest soil temperatures are the most important times of the year with respect to soil C and N turnover.
4. The referee is correct that the major part of the correlation is contributed by the organic layer data. Thus, omitting the Ah horizon data will not change the statement.
5. Of course it would be helpful to have e.g. soil profile measurements of O₂ con-

[Full Screen / Esc](#)[Print Version](#)[Interactive Discussion](#)[Discussion Paper](#)

centration to evaluate the influence of the thickness and structure of the different litter layers, but this is a whole project in itself. The soil temperature at the spruce site was lowest at the time of sampling. However, to compare the effect of the different tree species on C and N turnover alone the temperature during laboratory incubations was kept constant at 12°C for all samples.

6. Why should the maximum water holding capacity be constant? Especially the litter layer is highly dynamic and can change its constitution considerably throughout the year.

Interactive comment on Biogeosciences Discussions, 2, 303, 2005.

BGD

2, S333–S335, 2005

Interactive
Comment

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper