Biogeosciences Discussions, 2, S470–S471, 2005
www.biogeosciences.net/bgd/2/S470/
European Geosciences Union

Biogeosciences Discussions

Interactive comment on "Profiles of C- and N-trace gas production in N-saturated forest soils" *by* K. Butterbach-Bahl et al.

Anonymous Referee #1

Received and published: 26 August 2005

The manuscript describes incubation studies with soil samples from different forest sites. Samples were incubated under aerobic and under anaerobic conditions and fluxes of N2O, NO and CH4 were measured. It concludes that "such data are urgently needed as guidelines for the development and testing of process-oriented models...".

The authors may have aspired to produce such data and there is certainly useful information in the manuscript. For example, N2O and NO flux decrease by about three orders of magnitude from the surface to the greatest sampling depth between 0.3 and 0.4 m. Corresponding changes with depth are shown for microbial biomass. As a modeller, I might thus make the rough and simplified assumption that N2O and NO flux in a soil profile are proportional to microbial biomass. However, I would hesitate to make more detailed deductions from this study. First, the effect of anaerobic conditions in this study is difficult to judge because it is not clear what is meant with "anaerobic".

If O2 had been completely removed from those incubations, N2O would not have accumulated in the incubation vessels but would have been reduced to N2. Therefore, some O2 must have been present in the "anaerobic" treatment. But at what partial pressure? Without this information, data from the anaerobic treatments is of little use. Second, and this is a problem with many trace gas studies, there is no true replication of the differently managed sites. There are obviously many samples per site but these are pseudo-replications. For each forest type, there is only one replicate (n = 1). The abstract calls this dataset "...very useful for the development and testing of process oriented models...". This is a very ambitious description.

Instead of focusing on the description of depth profiles from individual forest sites and possible differences between them, the data might be pooled to produce some convincing general conclusions on depth dependence of N2O, NO and CH4 flux in forest soils, based on n = 4 forest sites.

Interactive comment on Biogeosciences Discussions, 2, 1127, 2005.