Biogeosciences Discuss.,
doi:10.5194/bg-2016-363-RC1, 2016

Biogeosciences
Discussions
Open Access

Interactive comment on "Soil concentrations and soil-atmosphere exchange of alkylamines in a boreal Scots pine forest" *by* A.-J. Kieloaho et al.

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Received and published: 20 September 2016

The authors discuss the role of boreal forest soil layers as amine source. There is a striking in balance between the apparent importance that amines play in the context of aerosol formation and the knowledge on the emissions. The study focus on fungi as a potential source and presents an estimation of potential exchange fluxes of two amines (DMA and DEA) that have been experimentally accessible. The authors follow a reasonable simple strategy and estimate the fluxes based on a resistance analogy between the concentration in the atmosphere above the soil and the concentration in the open pore space of the soil. The paper is within the scope of BG. An important result is the evidence that fungi in soil are a potential amine source and as fungi are generally part of the organic part of a soil system, soil surfaces can potentially emit amines. Atmospheric concentrations 2m above ground are available with weekly samples. The soil concentration used in the resistance analogy is calculated assuming equilibrium conditions over a water-air interface with given pH and temperature. The aqueous concentration is determined based on bulk extraction techniques of soil samples and in the laboratory grown fungal samples. I haven't seen from which depth interval the soil samples have been taken. I also cannot judge whether the given values are representative and in the same order of magnitude as what effectively occurs in nature. But the assumption of a single pore space concentration values logically reduces the calculated dynamic of the concentrations in the open pore space over the reported time frame to variability in soil pH, soil water content and soil temperature.

The analysis drastically shows that the depth of the humus layer has the strongest influence on the estimated exchange flux (see figure 6E). This is a consequence of the chosen approach as with the resistance analogy the soil source is assumed to take place at the bottom, i.e. the amine molecules must diffuse through a soil layer with a thickness Δz and rg sharply increases with increasing Δz. I rather think that potential amine sources are distributed in the humus layer proportionally to the decaying rate of fungi. I can also imagine that there are existing consumption processes of amines, so that most of the amines that enter the open pore space will be consumed before they have the chance to reach the atmosphere. The assumed mean layer of 5cm could be a reasonable compromise to yield numerically good looking fluxes.

All in all, I am not fully convinced that the soil in Hyytiälä act as the amine source that drives the measured concentration at 2m in the trunk space. It would be important to directly determine e.g. DMA concentration at the soil surface to give evidence for an emission gradient. The new generation of "ptr-qitof" systems promises to have sensitivities below 1 ppt that should be sufficient to detect a gradient. But of course this is a recommendation for future work and I am also aware tat this systems are very expensive.

A last point: I converted the mean DMA flux of 170nm m-2 and d-1 to roughly 9 gr ha-1yr-1 as I am more used to judge N fluxes per hectare. It would be helpful if this number is discussed in the context of the yearly N turnover in Hyytiälä. I assume that the vegetation at this station is generally N limited and that the biological systems are using N economically. If I assume the typical ratio of /NH3 of 1% that is found in agricultural systems, total reduced N emissions of the soil compartment would be around 1 kg ha-1yr-1. Is this plausible?

Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2016-363, 2016.