Elevated atmospheric CO_2 influences ammonia oxidiser community structure and net nitrification

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The control of soil nitrogen (N) availability under elevated atmospheric CO_2 is central to predicting changes in ecosystem carbon storage and primary productivity. The effects of elevated CO_2 on belowground processes have so far attracted limited research and they are assumed to be controlled by indirect effects through changes in plant physiology and chemistry. In this study, we investigated the effects of a 4-year exposure to elevated CO_2 (ambient + 400 μmol mol^{-1}) in open top chambers under Scots pine (*Pinus sylvestris* L.) on net nitrification and the community of ammonia-oxidising bacteria.

Net nitrate production was significantly increased for soil from the elevated CO_2 treatment in the field when incubated in the laboratory under elevated CO_2, but there was no effect when incubated under ambient CO_2. Net nitrate production of the soil originating from the ambient CO_2 treatment in the field was not influenced by laboratory incubation conditions. These results indicate that a direct effect of elevated atmospheric CO_2 on soil microbial processes might take place. Molecular analysis of the ammonia-oxidising bacteria from the same soils before laboratory incubation was investigated using a PCR-based approach targeting the 16S rRNA gene of beta-subgroup ammonia oxidisers. After specific PCR, DGGE (Denaturing Gradient Gel Electrophoresis) and sequence analysis were used to determine ammonia-oxidiser community structure. First results indicate the disappearance of *Nitrosospira* clusters I, II and III under elevated CO_2 but also call for systematic analysis of replicates to take into account methodological and sample variability.