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# Diversity in Austrian natural forest soils in relation to nutrient turnover and net greenhouse gas exchange

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We measured the microbial turnover of carbon (C) and nitrogen (N) in 12 natural forest reserves in Austria, along with estimating potential emission rates of nitrous oxide ($N_2O$) and carbon dioxide ($CO_2$), and uptake rates of methane ($CH_4$). The community composition of soil microorganisms was investigated using PLFA (Phospholipid fatty acid) analysis and molecular tools. The biodiversity of selected taxa of micro-, meso- and macrofauna were studied. The aim was to compare nutrient turnover rates with community composition of the soil biota. Ecophysiological quotients were tested for their ability to make predictions about the carbon dynamics of forest soils. The 12 forests represented the six typical forest types in Central Europe: oak, beech, spruce-fir-beech, floodplain, and pine forests.

Forest types had distinct effects on microbial community composition. The nutrient rich floodplain forests sustained a large variety of bacteria, arbuscular mycorrhiza, protozoa and earthworms. Here C and N turnover rates were fastest and leaf litter was quickly decomposed. This was made evident by microbial quotients, xylanase activity, the relative thickness of litter layer and $^{15}N$ abundance in the organic soil. The less fertile beech forests on acidic bedrock showed a dominance of fungi and high biodiversity and abundance of microarthropods such as gamasid mites and collembola. Carbon turnover was slowest in the beech forests on acidic bedrock, and slow turnover may lead to the largest net C accumulation.