Impacts of climate change on N-cycling microorganisms in soil

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The effects of climate change on nitrogen turnover processes in soils are still not completely understood. Nitrification and denitrification are important drivers of N2O emissions from soils, and emissions are increasing. The influence of elevated atmospheric CO2 concentration, elevated temperature, changed precipitation patterns and drought on N2O emissions and the abundance and activity of ammonia oxidizing and denitrifying microorganisms were investigated in five different field experiments in agricultural ecosystems (grasslands and arable fields). Elevated atmospheric CO2 increased the growth and nutrient uptake of crop plants leading to decreased N2O production rates in an arable soil, whereas ammonia oxidizer and denitrifier abundances were more affected by seasonal variations in soil moisture than by elevated CO2. In a grassland ecosystem elevated CO2 was found to increase N2O emissions, but the CO2 effect was restricted to sites with increased soil moisture. Elevated soil temperature doubled N2O emissions in an arable field even though soil water content in the top soil layer was reduced as compared to soil under ambient temperature. Drought periods decreased the abundance of denitrifying bacteria in soil, but had only minor effects on potential denitrification rates. Data from the five experiments will be presented to offer insight into possible changes and feedbacks in the N-cycle in soils under future climate change scenarios