Effects of elevated atmospheric CO2, prolonged summer drought and temperature increase on N2O and CH4 fluxes in a temperate heathland

In temperate regions, climate change is predicted to increase annual mean temperature and intensify the duration and frequency of summer droughts, which together with elevated atmospheric carbon dioxide (CO2) concentrations, may affect the exchange of nitrous oxide (N2O) and methane (CH4) between terrestrial ecosystems and the atmosphere. We report results from the CLIMAITE experiment, where the effects of these three climate change parameters were investigated solely and in all combinations in a temperate heathland. Field measurements of N2O and CH4 fluxes took place 1–2 years after the climate change manipulations were initiated. The soil was generally a net sink for atmospheric CH4. Elevated temperature (T) increased the CH4 uptake by on average 10 μg C m−2 h−1, corresponding to a rise in the uptake rate of about 20%. However, during winter elevated CO2 (CO2) reduced the CH4 uptake, which outweighed the positive effect of warming when analyzed across the study period. Emissions of N2O were generally low.

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