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Elucidating the impact of nitrate and labile carbon application on spatial heterogeneity of denitrification by 15N modelling

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N2O is considered to be an important GHG with soils representing its major source and accounting for approximately 6% of the current global warming and is also implicated in the depletion of stratospheric ozone. The atmospheric N2O concentration has been increasing since the Industrial Revolution making the understanding of its sources and removal processes very important for development of mitigation strategies.
Bergstermann et al. (2011) found evidence of the existence of more than one pool of nitrate undergoing denitrification in a silty clay loam arable soil amended with glucose/nitrate solution. The Rayleigh type model was used to simulate d15N of N2O using process rates and associated fractionation factors, but assumptions for some of the model parameters had to be made due to lack of available data. In this study we carried out 2 incubation experiments in order to parameterise the model. To restrict the volume of soil reached by the amendment, we used blocks containing 3 soil cores that were incubated in one vessel to measure emissions of NO, N2O, N2 and CO_2 from a clay grassland soil amended with KNO_3 (N) and glucose (C) in three treatments: '1C' only 1 core received N and C (the other 2 received water), '3C' 3 cores received N and C, and 'Control' (received water only). The results showed changes in the d15Nbulk trends after day 6 post amendment application, coinciding with the decrease of N2O fluxes. We also report the results in the 15N site preference (SP) and d18O. We will show the results from the model validation based on this data.