Underestimation of denitrification rates from field application of the ^{15}N gas flux method and its correction by gas diffusion modelling

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Supplement

Table S1: Soil data (WFPS = water-filled pores space; means± standard deviation of four replicate micro-plots)

Depth of sample	**WFPS**	**NO_3^-**	**NH_4^+**	**^{15}N atom fraction of NO_3^-**	**Bulk density**
	%	mg N kg^{-1}	mg N kg^{-1}		g cm-3
0-10 cm	71.8±2.6	16.6±1.9	1.76±1.05	0.092±0.014	1.48
10-20 cm	61.5±2.4	14.4±2.5	0.81±0.32	0.150±0.045	1.54
20-30 cm	60.0±1.5	16.6±4.1	0.70±0.18	0.201±0.045	1.48
0-30 cm (average)	64.4±1.7	15.9±2.5	1.1±0.4	0.148±0.030	1.50

Table S2: Field fluxes of pool-derived N_2, N_2O and N_2+N_2O, residual fraction of N_2O remaining after N_2O reduction to N_2 (r_{N2O}) and ^{15}N enrichment of the ^{15}N-labelled N pool producing N_2O (a_{p_N2O}) with bottom open and bottom closed (individual replicates and mean values ± standard deviation). Unequal uppercase letter indicate significant (P<0.05) differences between mean values with bottom open and bottom closed.

ID	N_2 flux	N_2O flux	N_2+N_2O flux	r_{N2O}	a_{P_N2O}
	g N ha^{-1} d^{-1}	g N ha^{-1} d^{-1}	g N ha^{-1} d^{-1}		
Cylinder 1 / bottom open	286.3	62.1	348.4	0.178	0.126
Cylinder 2 / bottom open	436.0	73.9	509.9	0.145	0.194
Cylinder 3/ bottom open	763.9	237.6	1001.4	0.237	0.113
Cylinder 4 / bottom open	488.2	9.6	497.8	0.019	0.174
average, bottom open	493.6[a]±199.5	95.8[a]±98.5	589.4[a]±284.3	0.145[a]±0.092	0.152[a]±0.038
Cylinder 1 / bottom closed	349.9	139.4	489.3	0.285	0.120
Cylinder 2 / bottom closed	776.2	30.3	806.5	0.038	0.202
Cylinder 3/ bottom closed	1150.7	170.7	1321.3	0.129	0.121
Cylinder 4 / bottom closed	540.0	62.5	602.5	0.104	0.177
average, bottom closed	704.2[a]±345.0	100.7[a]±65.4	804.9[b]±368.5	0.139[a]±0.105	0.155[a]±0.041

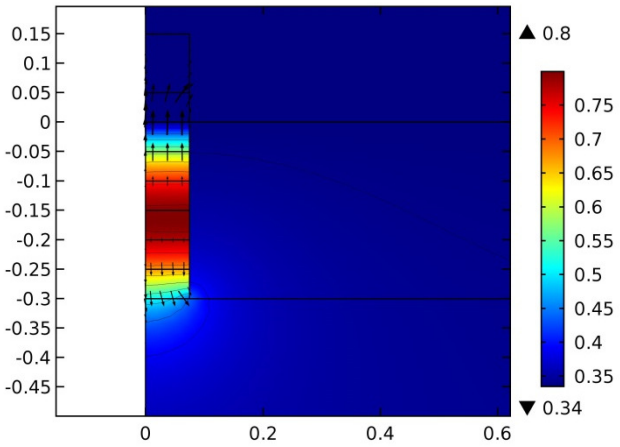

Figure S1: Simulation of concentrations (colours, ppm) and fluxes (arrows) with open chamber at steady state.

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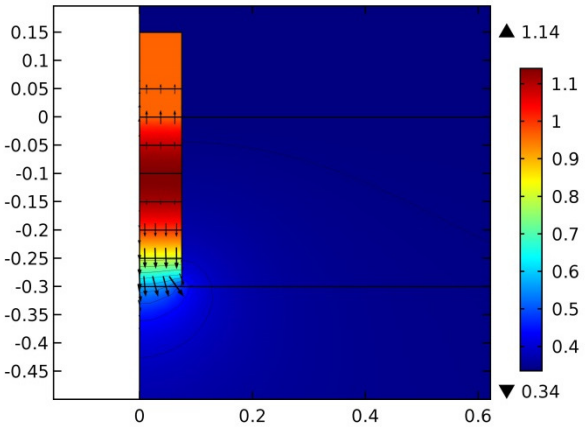

Figure S2: Simulation of concentrations (colours, ppm) and fluxes (arrows) 5 hours after chamber closure.

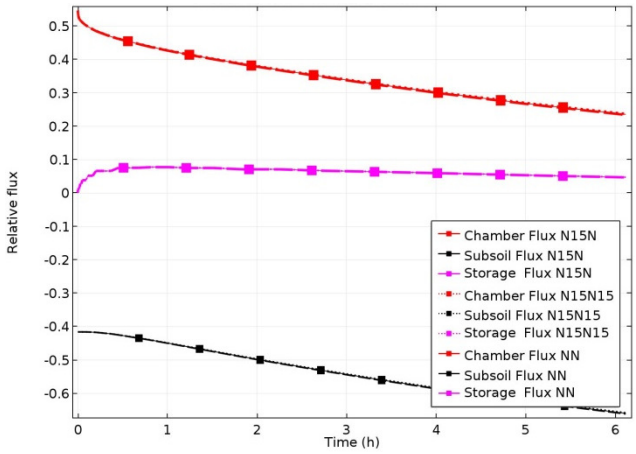

Figure S3 Relative fluxes of N_2 isotopologues ($^{14}N^{14}N$, $^{15}N^{14}N$, $^{15}N^{15}N$) following chamber closing.