Variable/parameter	Description	Value, unit
anvf	Anaerobic volume fraction of the soil (Eq. B1)	–
θ	Fractional soil moisture content (Eq. B1)	–
$NH_{4,aerob}$	NH_4^+ in the aerobic fraction of the soil N pool (Eq. B2)	g N m^{-2}
N_{nit}	Gross N nitrification rate (Eq. B2)	g N m^{-2} dt
α	Factor to scale nitrification activity (Eq. B2)	1.2
$f_{nit}(T)$	Temperature response function of nitrification (Eq. B2)	–
g_{nit}(pH)	pH response function of nitrification (Eq. B2)	–
T_{soil}	Soil temperature	°C
N_2O_{nit}	N_2O emission from nitrification (Eq. B5)	g N m^{-2} dt
f_T	Temperature function for N_2O emission (Eq. B6)	–
NO_{nit}	NO emission from nitrification (Eq. B7)	g N m^{-2} dt
f_{Tk}	Temperature function for chemonitrification (Eq. B8)	–
f_{pHk}	pH function for chemonitrification (Eq. B9)	–
N_{denit}	Gross denitrification rate (Eq. B10)	g N m^{-2} dt
β	Microbe function of gross denitrification (Eq. B11)	–
$f_{denit}(T)$	Temperature function for denitrification (Eq. B12)	–
g_{denit}(pH)	pH function for denitrification (Eq. B13)	–
$NO_{3,anaerob}$	NO_3^- in anaerobic fraction of the soil N pool (Eq. B10)	g N m^{-2}
R_{mb}	Microbial respiration rate (Eq. B11)	dt
K_R	Half-saturation constant (Eq. B11)	dt
K_{NO_3}	Half-saturation constant (Eq. B11)	g N m^{-2}
NO_{denit}	NO loss from denitrification (Eq. B14)	g N m^{-2} dt
N_2O_{denit}	N_2O loss from denitrification (Eq. B15)	g N m^{-2} dt
$N_{2,denit}$	N_2 loss from denitrification (Eq. B16)	g N m^{-2} dt
β_{NO}	Constant (Eq. B14)	0.78
β_{N_2O}	Constant (Eq. B15)	0.54
$g_{denit,NO}$	pH sensitivity function for NO denitrification (Eq. B17)	–
g_{denit,N_2O}	pH sensitivity function for N_2O denitrification (Eq. B18)	–
h_{NO}	pH sensitivity function for NO denitrification (Eq. B19)	–
h_{N_2O}	pH sensitivity function for N_2O denitrification (Eq. B20)	–
$NH_{3,vol}$	Volatilization of NH_3 from the soil N pool (Eq. B21)	g N m^{-2} dt
$NH_{4,soil}$	NH_4^+ concentration in the soil N pool (Eq. B21)	g N m^{-2}
d_{ox}	Soil moisture dependent diffusion coefficient (Eq. B22)	0.001–0.005 dt
NO_{vol}	Volatilization of NO from the soil N pool (Eq. B22)	g N m^{-2} dt
N_2O_{vol}	Volatilization of N_2O from the soil N pool (Eq. B23)	g N m^{-2} dt
$N_{2,vol}$	Volatilization of N_2 from the soil N pool (Eq. B24)	g N m^{-2} dt
NO_{soil}	NO concentration in the soil N pool (Eq. B22)	g N m^{-2}
N_2O_{soil}	N_2O concentration in the soil N pool (Eq. B23)	g N m^{-2}
$N_{2,soil}$	N_2 concentration in the soil N pool (Eq. B24)	g N m^{-2}