

Supplementary

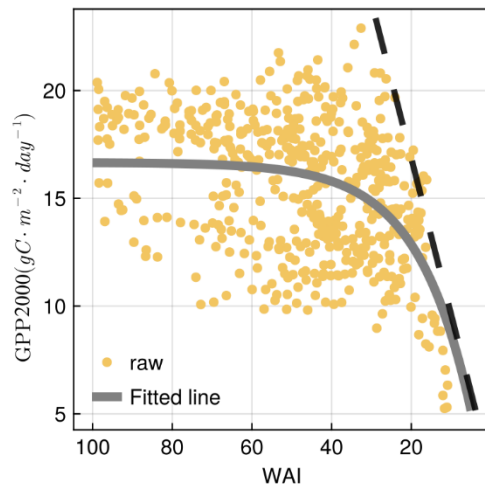


Figure s1 Schematic figure to show the end slope of the water response curve. The slope of the black dashed line means the sensitivity of GPP2000 to the variations of soil water availability (WAI) of the whole ecosystem.

Table s1 Results of parameters for the equation of $G_c = -m \cdot \ln(VPD) + b$ at the Fertilized and Reference sites. m is a parameter for quantifying the sensitivity of G_c to vapor pressure deficit. b is G_{cref} , means reference canopy conductance at 1 kPa vapor pressure deficit. R^2 is the coefficient of determination.

Predictors	Fertilized Site		Reference Site	
	Estimates	p	Estimates	p
m	0.17 ± 0.02	<0.001	0.16 ± 0.02	<0.001
b	0.42 ± 0.02	<0.001	0.38 ± 0.01	<0.001
R^2	0.957		0.975	

Table s2 The linear relation between GPP capacity, atmosphere vapor pressure deficit (VPD), soil water availability (WAI), and their interactions (VPD*WAI) at the Fertilized and Reference sites. R² is the coefficient of determination.

Predictors	Fertilized Site		Reference Site	
	Estimates	<i>p</i>	Estimates	<i>p</i>
(Intercept)	0.21 ± 0.07	<0.001	-0.20 ± 0.07	<0.001
VPD	-0.35 ± 0.06	<0.001	-0.26 ± 0.03	<0.001
WAI	0.36 ± 0.06	<0.001	0.28 ± 0.07	<0.001
VPD*WAI	0.02 ± 0.06	>0.05	0.06 ± 0.07	>0.05
R ²	0.30		0.21	

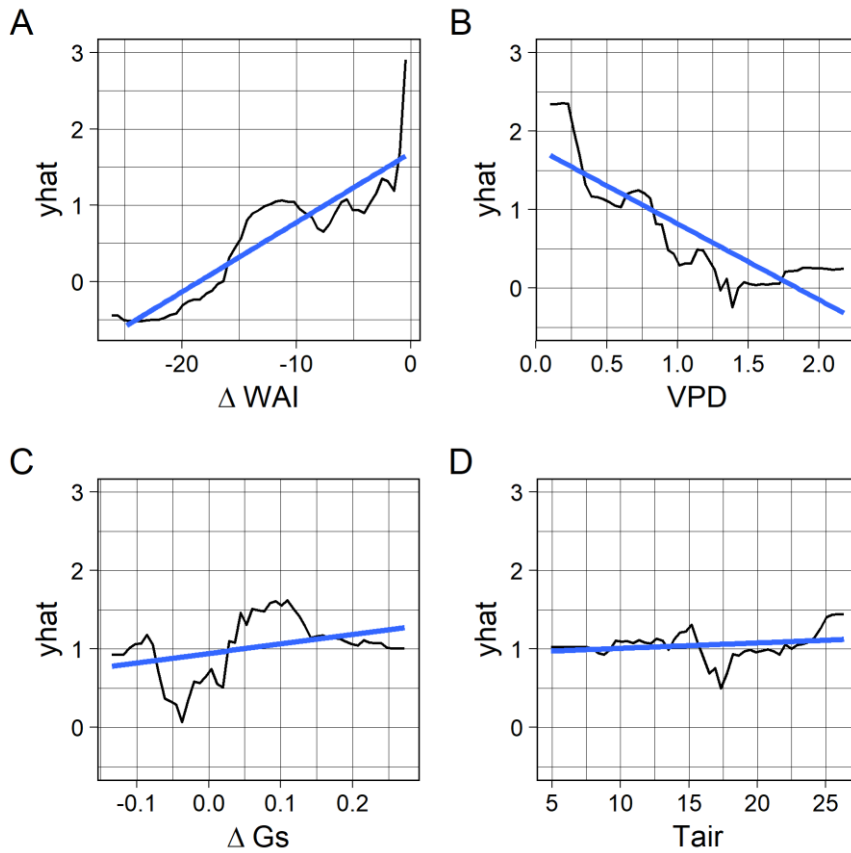


Figure s2 Partial dependence plot of random forest model. ΔWAI means the soil water availability index difference between fertilization and reference site; VPD (kPa) is the mean value of VPD from the two sites; ΔGs ($mol \cdot m^{-2} \cdot s^{-1}$) is the canopy conductance difference between the two sites; Tair ($^{\circ}C$) is the mean air temperature of the two sites. y-hat ($gC \cdot m^{-2} \cdot day^{-1}$) means predicted GPP2000 difference between the Fertilized and Reference sites. We used mean values of VPD and Tair from the Fertilized and Reference sites rather than the difference values since there is no significant difference of VPD and Tair between sites.

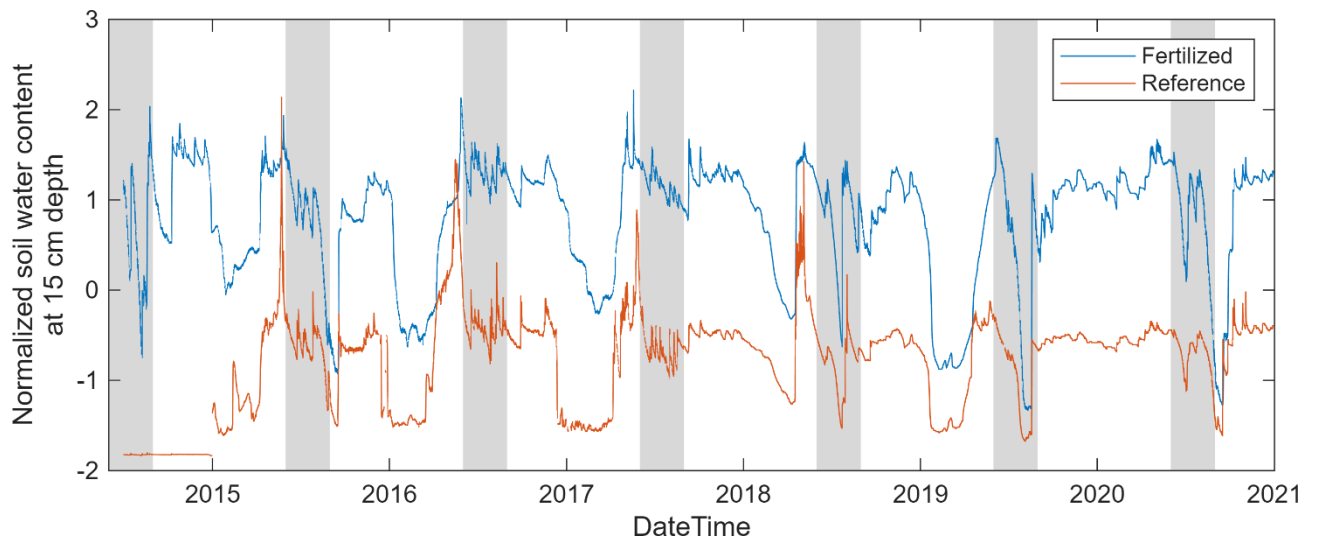


Figure s3 Normalized soil water content at 15 cm depth at the Fertilized and Reference site. The shadows represent the summer period (June, July, and August) over the years.

Comparisons of Gs and GPP2000 in the beginning of experiment (2006)

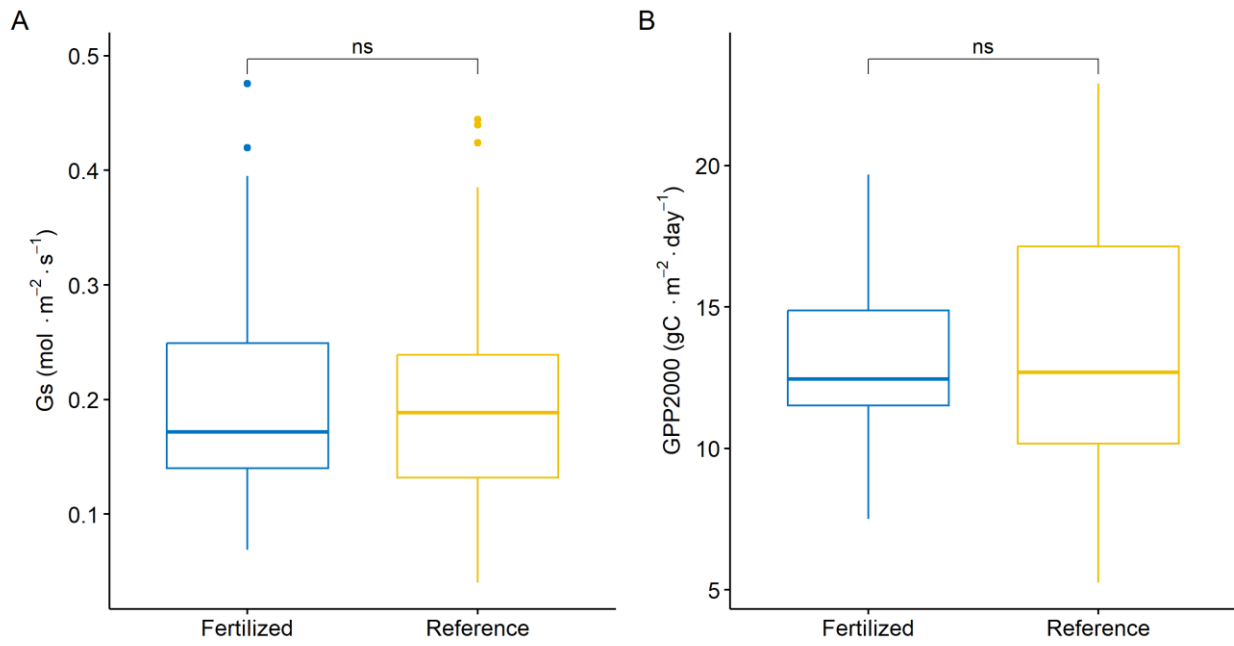


Figure s4 Comparisons of canopy conductance (Gs) (A) and GPP capacity at 2000 PPFD (GPP2000) (B) at the beginning of the nitrogen fertilization experiment in 2006. ns means $p > 0.05$.