Supplement

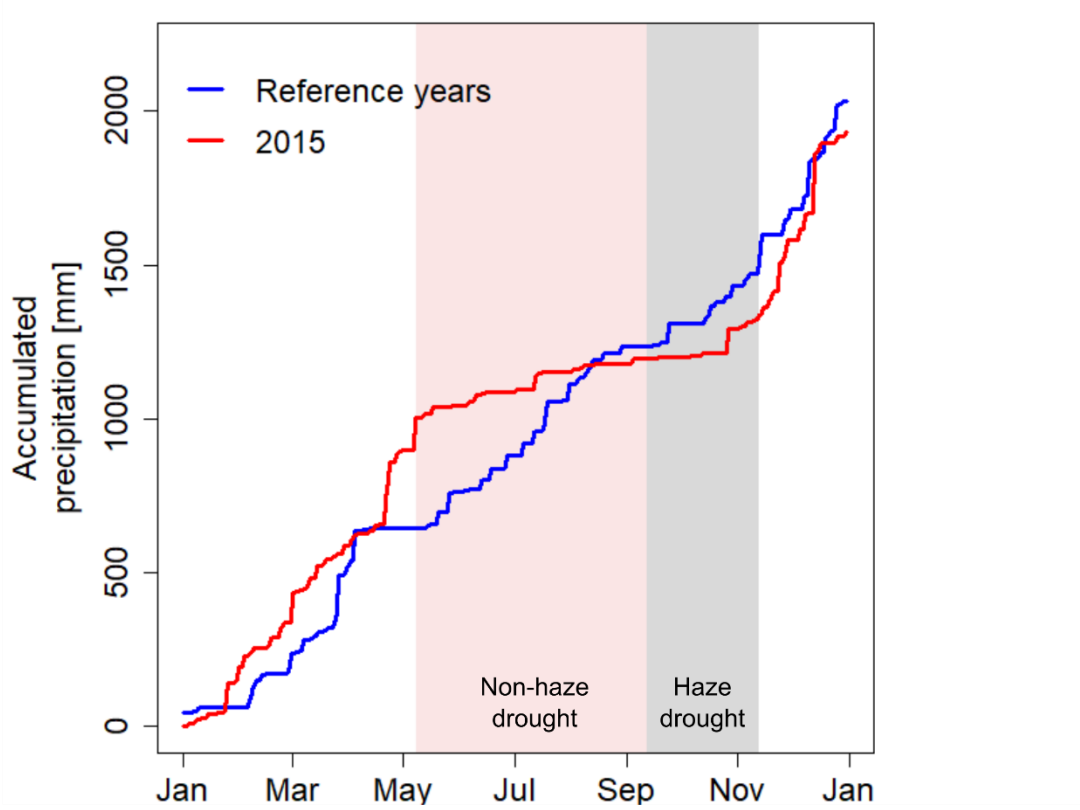

Figure S1: Accumulated precipitation in 2015 and during the reference time period. Shaded areas in red and grey mark the non-haze drought and the haze drought period in 2015, respectively.

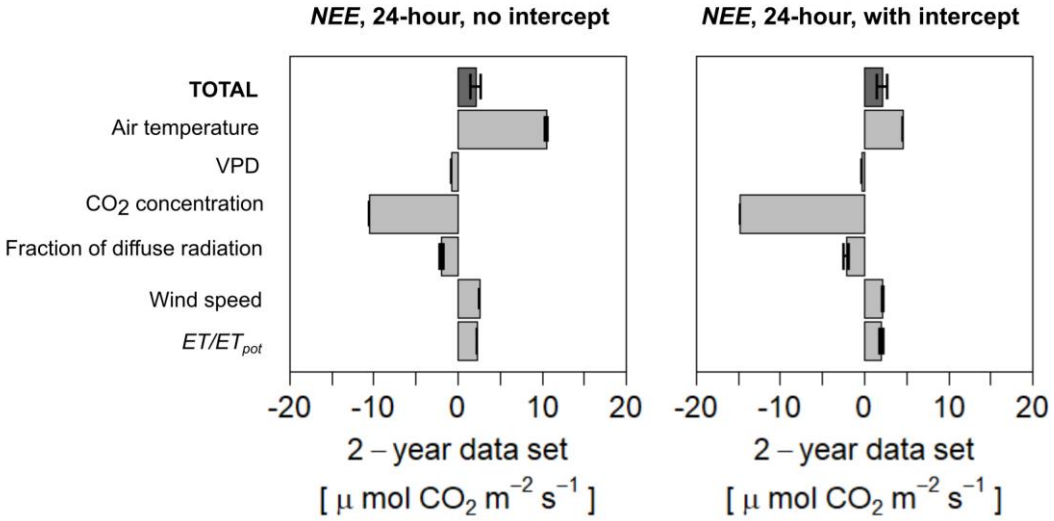

Figure S2: Comparison of Multiple Linear Regression Model (*MLRM*) results without (left) and with (right) intercept on 24-hour net ecosystem CO_2 exchange (*NEE*) during the entire study period (2014-2016). Error bars show the standard error.

Table S1: Contribution (± standard error) of meteorological parameters (predictors) on net ecosystem CO_2 exchange (*NEE*) derived from multiple linear regression model (*MLRM*) during different time periods (full 2-year study period, non-haze drought, haze drought, and non-haze & non-drought conditions). Negative values indicate CO_2 uptake for 24-hour *NEE* and midday *NEE*, and CO_2 release for night time *NEE*. If not otherwise stated, measurement height is 22 m above the surface.

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Predictor [µmol m^{-2} s^{-1}], full 2-year study period									
	Air temperature	**Air temperature (12 m)**	**Wind speed**	**Fraction of diffuse radiation**	**CO_2 concentration**	**Vapor pressure deficit**	***ET/ET*$_{pot}$**	**Incoming *PAR***	**Total**
NEE, 24-hour	-10.50 (± 0.06)	-	-2.61 (± 0.12)	1.94 (± 0.54)	10.54 (±0.01)	0.73 (± 0.03)	-2.23 (±0.44)	-	-2.13 (± 1.18)
NEE, midday (10-14 h)	-34.48 (± 0.12)	-	-	6.86 (± 1.06)	30.30 (± 0.01)	6.87 (± 0.06)	-2.47 (± 1.67	-14.68 (± 0.001)	-21.32 (± 2.93
NEE, night time (19-5:30 h)	37.70 (± 0.29)	-28.37 (± 0.30)	-1.17 (± 0.58)	-	-	-0.98 (± 0.10)	0.51 (± 0.76)	-	7.69 (± 2.03)

Predictor [µmol m^{-2} s^{-1}], non-haze drought									
	Air temperature	**Air temperature (12 m)**	**Wind speed**	**Fraction of diffuse radiation**	**CO_2 concentration**	**Vapor pressure deficit**	***ET/ET*$_{pot}$**	**Incoming *PAR***	**Total**

NEE, 24-hour	-10.65 (± 0.05)	-	-2.96 (± 0.11)	1.82 (± 0.40)	10.39 (± 0.01)	0.85 (± 0.02)	-1.97 (± 0.39)	-	-2.51 (± 0.96)
NEE, midday (10-14 h)	-34.40 (± 0.10)	-	-	-5.50 (± 0.65)	29.94 (± 0.01)	7.00 (± 0.04)	-2.26 (± 1.46)	-15.96 (± 0.001)	-21.18 (± 2.26)
NEE, night time (19-5:30 h)	38.48 (± 0.32)	-28.69 (± 0.32)	-1.30 (± 0.28)	-	-	-1.39 (± 0.06)	0.51 (± 0.47)	-	7.61 (± 1.45)

Predictor [µmol m^{-2} s^{-1}], haze drought

	Air temperature	**Air temperature (12 m)**	**Wind speed**	**Fraction of diffuse radiation**	**CO_2 concentration**	**Vapor pressure deficit**	***ET/ET_{pot}***	**Incoming *PAR***	**Total**
NEE, 24-hour	-10.94 (± 0.01)	-	-2.39 (0.03)	2.13 (0.19)	10.86 (± 0.001)	1.09 (± 0.004)	-1.96 (± 0.12)	-	-1.20 (± 0.35
NEE, midday (10-14 h)	-36.09 (± 0.10)	-	-	-9.39 (± 1.13)	30.95 (± 0.01)	9.20 (± 0.03)	-2.10 (± 0.97)	-11.49 (± 0.0004)	-18.92 (± 2.24)
NEE, night time (19-5:30 h)	39.31 (± 0.23)	-28.44 (± 0.0.25)	-1.07 (± 0.35)	-	-	-1.87 (± 0.03)	0.51 (± 0.24)	-	8.44 (± 1.11)

Predictor [µmol m^{-2} s^{-1}], non-drought and non-haze conditions

	Air temperature	Air temperature (12 m)	Wind speed	Fraction of diffuse radiation	CO_2 concentration	Vapor pressure deficit	ET/ET_{pot}	Incoming *PAR*	Total
NEE, 24-hour	-10.38 (± 0.05)	-	-2.55 (± 0.10)	1.96 (± 0.65)	10.57 (± 0.003)	0.63 (± 0.04)	-2.42 (± 0.34)	-	-2.19 (± 1.19)
NEE, midday (10-14 h)	-34.26 (± 0.12)	-	-	-6.91 (± 1.33)	30.33 (± 0.01)	6.46 (± 0.08)	-2.65 (± 1.67)	-14.76 (± 0.001)	-21.78 (± 3.21)
NEE, night time (19-5:30 h)	37.19 (± 0.31)	-28.25 (± 0.31)	-1.14 (± 0.69)	-	-	-0.71 (± 0.20)	0.51 (± 0.86)	-	7.60 (± 2.36)

Table S2: Multiple Linear Regression Model (*MLRM*): Statistics of midday (10-14 h local time), night time (19-5:30 h) and 24-hour averaged environmental parameters. If not otherwise stated, measurement height is 22 meter above the surface.

Parameter (midday)	**Estimate**	**SE**	**t-value**	**P-value**
Incoming PAR	-0.01	0.00	-12.44	<0.001
Air temperature	-1.15	0.14	-8.50	<0.001
Vapor pressure deficit	0.56	0.07	7.98	<0.001
CO_2 concentration	0.08	0.01	9.09	<0.001
Fraction of diffuse radiation	-9.98	1.20	-8.29	<0.001
ET/ET_{pot}	-5.58	1.90	-2.94	<0.001
Parameter (night time)	**Estimate**	**SE**	**t-value**	**P-value**
Air temperature	1.50	0.17	8.68	<0.001
Vapor pressure deficit	-0.35	0.06	-6.07	<0.001
ET/ET_{pot}	1.65	0.45	3.67	<0.001
Air temperature (12 m)	-1.14	0.17	-6.52	<0.001
Wind speed	-0.88	0.34	-2.59	<0.01
Parameter (24-hour)	**Estimate**	**SE**	**t-value**	**P-value**
Vapor pressure deficit	0.12	0.06	2.11	0.04
CO_2 concentration	0.03	0.01	2.80	0.01
Fraction of diffuse radiation	2.18	1.22	1.79	0.08
Wind speed	-1.70	0.27	-6.31	<0.001
Air temperature	-0.39	0.12	-3.15	<0.001
ET/ET_{pot}	-4.33	0.99	-4.39	<0.001

Table S3: Multiple Linear Regression Model (*MLRM*): Correlations of midday (10-14 h local time), night time (19-5:30 h) and 24-hour averaged environmental parameters. If not otherwise stated, measurement height is 22 meter above the surface.

Midday	Incoming PAR	Air temperature	Vapor pressure deficit	CO_2 concentration	Fraction of diffuse radiation	ET/ET_{pot}
Incoming PAR	1.00	0.55	0.56	-0.42	-0.82	-0.28
Air temperature	0.55	1.00	0.89	-0.22	-0.33	-0.52
Vapor pressure deficit	0.56	0.89	1.00	-0.18	-0.30	-0.53
CO_2 concentration	-0.42	-0.22	-0.18	1.00	0.33	0.14
Fraction of diffuse radiation	-0.82	-0.33	-0.30	0.33	1.00	0.16
ET/ET_{pot}	-0.28	-0.52	-0.53	0.14	0.16	1.00

Night time	Air temperature	Vapor pressure deficit	Air temperature (12 m)	Wind speed	ET/ET_{pot}
Air temperature	1.00	0.71	0.76	0	-0.01
Vapor pressure deficit	0.71	1.00	0.44	0.24	-0.02
Air temperature (12 m)	0.76	0.44	1.00	0.04	-0.03
Wind speed	0	0.24	0.04	1.00	-0.06
ET/ET_{pot}	-0.01	-0.02	-0.03	-0.06	1.00

24-hour	Vapor pressure deficit	CO_2 concentration	Fraction of diffuse radiation	Wind speed	Air temperature	ET/ET_{pot}
Vapor pressure deficit	1.00	0.05	-0.14	0.25	0.76	-0.62
CO_2 concentration	0.05	1.00	0.29	-0.30	0.09	0.13
Fraction of diffuse radiation	-0.14	0.29	1.00	-0.22	-0.19	0.25
Wind speed	0.25	-0.30	-0.22	1.00	-0.09	-0.14
Air temperature	0.76	0.09	-0.19	-0.09	1.00	-0.69
ET/ET_{pot}	-0.62	0.13	0.25	-0.14	-0.69	1.00

Table S4: Effect of meteorological parameters (predictors, ± standard error) on net ecosystem CO_2 exchange (*NEE*) during non-haze drought conditions derived from multiple linear regression model (*MLRM*). Negative values indicate decrease in CO_2 uptake for 24-hour *NEE* and midday *NEE*, and increase in CO_2 release for nighttime *NEE*. If not otherwise stated, measurement height is 22 m above the surface.

	Predictor [µmol m^{-2} s^{-1}]								
	Air temperature	**Air temperature (12 m)**	**Wind speed**	**Fraction of diffuse radiation**	**CO_2 concentration**	**Vapor pressure deficit**	***ET/ET$_{pot}$***	**Incoming *PAR***	**Total**
NEE, 24-hour	0.26 (± 0.01)	-	0.41 (± 0.01)	0.14 (± 0.25)	0.18 (± 0.0002)	-0.22 (± 0.02)	-0.45 (± 0.04)	-	0.32 (± 0.23)
NEE, midday	0.14 (± 0.02)	-	-	-1.40 (± 0.68)	0.39 (± 0.001	-0.54 (± 0.0003)	-0.39 (± 0.21)	1.20 (± 0.0003)	-0.60 (± 0.95)
NEE, nighttime (19-5:30 h)	-1.29 (± 0.02)	0.44 (± 0.01)	0.1 (± 0.41)	-	-	0.68 (± 0.14)	0 (± 0.39)	-	-0.02 (± 0.91)

Table S5: Effect of meteorological parameters (predictors, ± standard error) on net ecosystem CO_2 exchange (*NEE*) during haze drought conditions derived from multiple linear regression model (*MLRM*). Negative values indicate decrease in CO_2 uptake for 24-hour *NEE* and midday *NEE*, and increase in CO_2 release for nighttime *NEE*. If not otherwise stated, measurement height is 22 m above the surface.

	Predictor [µmol m^{-2} s^{-1}]								
	Air temperature	**Air temperature (12 m)**	**Wind speed**	**Fraction of diffuse radiation**	**CO_2 concentration**	**Vapor pressure deficit**	***ET/ET*$_{pot}$**	**Incoming *PAR***	**Total**
NEE, 24-hour	0.55 (± 0.05)	-	-0.16 (± 0.07)	-0.17 (± 0.46)	-0.29 (± 0.003)	-0.46 (± 0.04)	-0.46 (± 0.22)	-	-0.99 (± 0.84)
NEE, midday	1.83 (± 0.02)	-	-	2.48 (± 0.20)	-0.62 (± 0.001)	-2.74 (± 0.05)	-0.55 (± 0.70)	-3.27 (± 0.001)	-2.86 (± 0.97)
NEE, nighttime (19-5:30 h)	-2.12 (± 0.08)	0.19 (± 0.06)	-0.07 (v 0.33)	-	-	1.16 (± 0.17)	0	-	-0.84 (± 1.25)

Table S6: Effect of meteorological parameters (predictors, ± standard error) on net ecosystem CO2 exchange (NEE) during increased non-haze drought (NHD+) scenario derived from multiple linear regression model (MLRM). Negative values indicate decrease in CO2 uptake for 24-hour NEE and midday NEE, and increase in CO2 release for nighttime NEE. If not otherwise stated, measurement height is 22 m above the surface.

	Predictor [µmol m^{-2} s^{-1}]								
	Air temperature	**Air temperature (12 m)**	**Wind speed**	**Fraction of diffuse radiation**	**CO_2 concentration**	**Vapor pressure deficit**	***ET/ET*$_{pot}$**	**Incoming *PAR***	**Total**
NEE, 24-hour	2.39 (± 0.02)	-	0.41 (± 0.003)	0.50 (± 0.13)	0.18 (± 0.00003)	-0.39 (± 0.01)	-0.84 (± 0.04)	-	2.25 (± 0.17)
NEE, midday	7.02 (± 0.16)	-	-	-2.50 (1.71)	0.39 (± 0.001)	-1.94 (± 0.08)	-0.84 (± 0.17)	4.40 (± 0.001)	6.52 (± 1.80)
NEE, nighttime (19-5:30 h)	-8.99 (± 0.13)	6.18 (± 0.08)	0.15 (± 0.06)	-	-	0.96 (± 0.13)	0.10 (± 0.04)	-	-1.59 (± 0.29)

Table S7: Effect of meteorological parameters (predictors, ± standard error) on net ecosystem CO_2 exchange (*NEE*) during increased haze drought (*HD+*) scenario derived from multiple linear regression model (*MLRM*). Negative values indicate decrease in CO_2 uptake for 24-hour *NEE* and midday *NEE*, and increase in CO_2 release for nighttime *NEE*. If not otherwise stated, measurement height is 22 m above the surface.

	Predictor [µmol m^{-2} s^{-1}]								
	Air temperature	**Air temperature (12 m)**	**Wind speed**	**Fraction of diffuse radiation**	**CO_2 concentration**	**Vapor pressure deficit**	***ET/ET_{pot}***	**Incoming *PAR***	**Total**
NEE, 24-hour	2.74 (± 0.13)	-	-0.16 (± 0.01)	-0.60 (±0.28)	-2.46 (± 0.01)	-0.68 (± 0.03)	-0.85 (± 0.19)	-	-2.01 (± 0.38)
NEE, midday	9.05 (± 0.21)	-	-	4.36 (± 0.87)	-6.80 (± 0.01)	-4.58 (± 0.23)	-0.97 (± 0.68)	-5.57 (± 0.003)	-4.51 (± 0.16)
NEE, nighttime (19-5:30 h)	-9.98 (± 0.76)	5.88 (± 0.36)	-0.07 (± 0.02)	-	-	1.54 (± 0.26)	0.10 (± 0.06)	-	-2.53 (± 0.10)