



Supplement of

Soil moisture as the dominant driver of CO₂ efflux in Mediterranean urban green spaces: evidence for a Gaussian temperature response and mechanistic modelling of moisture and temperature interactions

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Table S1. Geographic coordinates of the soil CO₂ efflux sampling points at each of the three study sites (Ciudad Universitaria, La Elipa and Pinar de Conde Orgaz), Madrid, Spain. Three replicate sampling points were established for each of the four plant communities at each site (AH-D: annual herbs dominated by *Diplotaxis virgata*; AG-H: annual grasslands dominated by *Hordeum leporinum*; PH-M: perennial herbs dominated by *Malva* spp.; PG-D: perennial grasslands dominated by *Dactylis glomerata*).

Plant community	Study site	Latitude (N)	Longitude (W)	Decimal latitude	Decimal longitude
AH-D	Ciudad Universitaria	N40°26'38.5"	W3°43'21.4"	40.444028	-3.722611
AH-D	Ciudad Universitaria	N40°27'0.6"	W3°44'6.7"	40.450167	-3.735194
AH-D	Ciudad Universitaria	N40°27'13.2"	W3°43'53"	40.453667	-3.731389
AG-H	Ciudad Universitaria	N40°26'44.5"	W3°43'25.7"	40.445694	-3.723806
AG-H	Ciudad Universitaria	N40°27'2"	W3°44'2.6"	40.450556	-3.734056
AG-H	Ciudad Universitaria	N40°27'11.2"	W3°43'47.5"	40.453111	-3.729861
PH-M	Ciudad Universitaria	N40°26'23.7"	W3°43'24.2"	40.439917	-3.723389
PH-M	Ciudad Universitaria	N40°26'53.7"	W3°43'36.9"	40.448250	-3.726917
PH-M	Ciudad Universitaria	N40°26'52.5"	W3°43'57.9"	40.447917	-3.732750
PG-D	Ciudad Universitaria	N40°26'45.2"	W3°43'25.5"	40.445889	-3.723750
PG-D	Ciudad Universitaria	N40°27'3.8"	W3°44'5.5"	40.451056	-3.734861
PG-D	Ciudad Universitaria	N40°27'10.9"	W3°43'48.3"	40.453028	-3.730083
AH-D	La Elipa	N40°25'13.5"	W3°39'25.3"	40.420417	-3.657028
AH-D	La Elipa	N40°25'3.9"	W3°38'58.9"	40.417750	-3.649694
AH-D	La Elipa	N40°25'17.1"	W3°39'27.6"	40.421417	-3.657667
AG-H	La Elipa	N40°25'10.4"	W3°39'21.3"	40.419556	-3.655917
AG-H	La Elipa	N40°25'8.5"	W3°39'19.5"	40.419028	-3.655417
AG-H	La Elipa	N40°25'7.3"	W3°39'9.3"	40.418694	-3.652583
PH-M	La Elipa	N40°25'14.6"	W3°39'21.1"	40.420722	-3.655861
PH-M	La Elipa	N40°25'8.0"	W3°39'7.0"	40.418889	-3.651944
PH-M	La Elipa	N40°25'17.3"	W3°39'27.2"	40.421472	-3.657556
PG-D	La Elipa	N40°25'8.9"	W3°39'19.5"	40.419139	-3.655417
PG-D	La Elipa	N40°25'8.5"	W3°39'17"	40.419028	-3.654722
PG-D	La Elipa	N40°25'7.1"	W3°39'15.2"	40.418639	-3.654222
AH-D	Pinar De Conde Orgaz	N40°26'59.2"	W3°38'34.3"	40.449778	-3.642861
AH-D	Pinar De Conde Orgaz	N40°26'59.6"	W3°38'33"	40.449889	-3.642500
AH-D	Pinar De Conde Orgaz	N40°26'59"	W3°38'33.2"	40.449722	-3.642556
AG-H	Pinar De Conde Orgaz	N40°26'57.8"	W3°38'23.7"	40.449389	-3.639917
AG-H	Pinar De Conde Orgaz	N40°26'58.1"	W3°38'28.7"	40.449472	-3.641306
AG-H	Pinar De Conde Orgaz	N40°26'58.6"	W3°38'31"	40.449611	-3.641944
PH-M	Pinar De Conde Orgaz	N40°26'58.9"	W3°38'37.5"	40.449694	-3.643750
PH-M	Pinar De Conde Orgaz	N40°26'58"	W3°38'23.4"	40.449444	-3.639833
PH-M	Pinar De Conde Orgaz	N40°26'57.2"	W3°38'17.7"	40.449222	-3.638250
PG-D	Pinar De Conde Orgaz	N40°26'58.2"	W3°38'23.1"	40.449500	-3.639750
PG-D	Pinar De Conde Orgaz	N40°26'58"	W3°38'26"	40.449444	-3.640556
PG-D	Pinar De Conde Orgaz	N40°26'59.3"	W3°38'30"	40.449806	-3.641667

Table S2. Parameter estimates from the nonlinear mixed-effects sensitivity analysis (first-order autoregressive correlation structure, corAR1, with plot as random effect) for the mechanistic model described in Section 2.4, by plant community. Compare with the original fit reported in Table 6. AH-D: annual herbs dominated by *Diplotaxis virgata*; AG-H: annual grasslands dominated by *Hordeum leporinum*; PH-M: perennial herbs dominated by *Malva* spp.; PG-D: perennial grasslands dominated by *Dactylis glomerata*. cT: temperature sensitivity coefficient of soil CO₂ efflux. cM: moisture sensitivity coefficient of soil CO₂ efflux. TCmax: soil temperature at which CO₂ efflux is maximal. CMax: maximum predicted soil CO₂ efflux.

Community	cT	cM	C0	TCmax (°C)	CMax (μmol CO ₂ m ⁻² s ⁻¹)
AH-D	0.0751	0.0014	0.6856	17.77	4.95
AG-H	0.1516	0.0028	0.3323	19.50	6.71
PH-M	0.0758	0.0014	1.3376	17.93	7.97
PG-D	0.0746	0.0012	0.9744	16.83	4.94

Figure S1. Fitted relationship between soil CO₂ emissions and soil temperature (SST) for each plant community, from the nonlinear mixed-effects sensitivity analysis (first-order autoregressive correlation structure, corAR1, with plot as random effect) described in Section 2.4. Compare with the original fit shown in Fig. 12 and Table S2.

