Ecography

ECOG-02551
Latimer, C. E. and Zuckenberg, B. 2016. Forest fragmentation alters winter microclimates and microrefugia in human-modified landscapes. – Ecography doi: 10.1111/ecog.02551

Supplementary material

Appendix 1

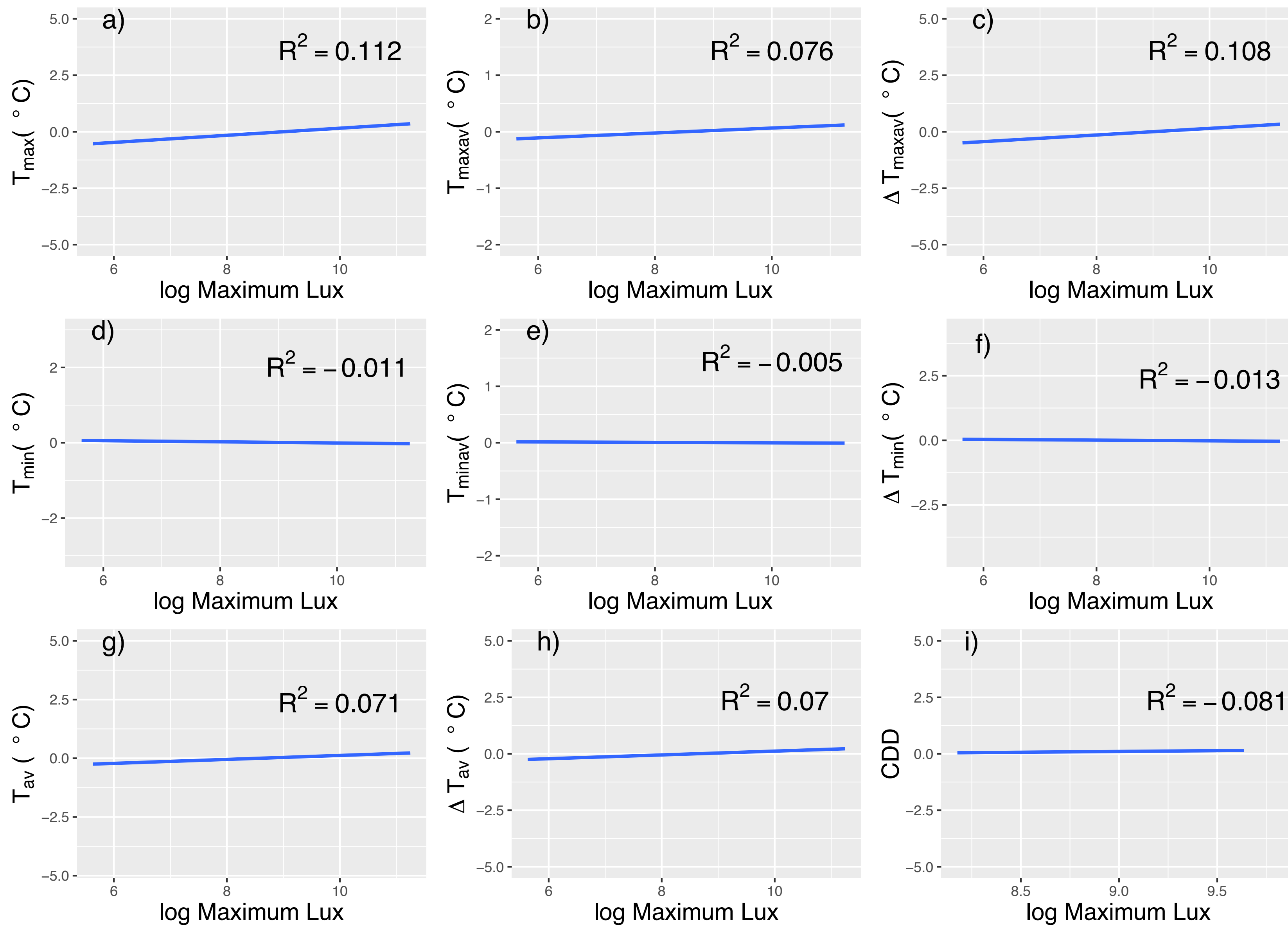
a)
$R^2 = 0.112$
T_{max}($^\circ$C)
log Maximum Lux
b)
$R^2 = 0.076$
T_{maxav}($^\circ$C)
log Maximum Lux
c)
$R^2 = 0.108$
ΔT_{maxav}($^\circ$C)
log Maximum Lux
d)
$R^2 = -0.011$
T_{min}($^\circ$C)
log Maximum Lux
e)
$R^2 = -0.005$
T_{minav}($^\circ$C)
log Maximum Lux
f)
$R^2 = -0.013$
ΔT_{min}($^\circ$C)
log Maximum Lux
g)
$R^2 = 0.071$
T_{av} ($^\circ$C)
log Maximum Lux
h)
$R^2 = 0.07$
ΔT_{av} ($^\circ$C)
log Maximum Lux
i)
$R^2 = -0.081$
CDD
log Maximum Lux

Figure A1. Model residuals plotted against the $\log_{10}$ maximum Lux (lumens/m^2). Panels are for a) maximum daily temperature, b) average maximum daily temperature, c) maximum daily temperature differential, d) minimum daily temperature, e) average minimum daily temperature, f) minimum daily temperature differential, g) average daily, h) average daily temperature differential, and i) cumulative degree days. Lack of a strong linear pattern in the residuals indicates little or no bias associated with not having microclimate temperature sensors under a direct solar radiation shield after accounting for plot- and landscape-level characteristics.

Table A1. Model selection results of a prior candidate models for each microclimate response variable, with the effect of absolute elevation (ELEV) included in the model formulas. Note: elevation was correlated ($r^2 = 0.68$) with forest edge density (ED), and was not included in any models with ED in the formula. Models presented include the best-supported model (lowest AICc value) and competing models within two ΔAICc of the top model. The best-supported models in this dataset were also the best-supported in Table 2 of the main text, suggesting that absolute elevation was not as important as relative elevation in our study.

Model No.	Response	Model	K	AICc	deltaAICc	Wi
1	T_{min}	**URBDIST** + **ED +** BA + **RELEV** + **ED:BA**	8	17760	0.00	0.25
1	T_{minav}	**URBDIST** + **ED** + **DIST** + NDIST + **RELEV**	14	10708	0.00	0.37
2		**URBDIST** + **ED** + **LTDEN** + NDIST + **RELEV**	10	10709	0.45	0.30
3		**URBDIST** + **ED** + **LTDEN** + ED:LTDEN + **RELEV**	10	10710	1.75	0.15
1	T_{max}	**TREEDEN** + ELEV + **RELEV**	8	26084	0.00	0.26
2		URBDIST + **ED** + **NDIST** + **LTDEN** + RELEV	10	26086	1.86	0.12
1	T_{maxav}	**URBDIST** + **ED** + **NDIST** + **LTDEN** + **RELEV**	10	11555	0.00	0.38
2		**URBDIST** + **ED** + **NDIST** + **DIST** + **RELEV**	14	11556	1.61	0.17

1	T_{av}	**URBDIST** + **ED** + **NDIST** + LTDEN + **RELEV**	10	19302	0.00	0.38
2		**URBDIST** + **ED** + **NDIST** + DIST + **RELEV**	14	19393	1.30	0.18
1	CDD	**URBDIST** + **ED** + BA + **RELEV** + **ED:BA**	8	444	0.00	0.78
1	ΔT_{min}	**URBDIST + ED +** BA **+ RELEV + ED:BA**	10	18135	0.00	0.31
2		**URBDIST** + **ED** + **NDIST** + **LTDEN** + **RELEV**	10	18135	0.10	0.30
3		**URBDIST** + **ED** + **LTDEN** + **RELEV** + ED:LTDEN	10	18137	1.88	0.12
1	ΔT_{max}	**TREEDEN** + ELEV + **RELEV**	8	26221	0.00	0.23
2		**BA** + ELEV + RELEV	8	26222	1.16	0.14
1	ΔT_{av}	URBDIST + **ED** + **NDIST** + **LTDEN** + **RELEV**	10	19497	0.00	0.18
2		URBDIST + **ED** + **LTDEN** + **RELEV** + **ED:LTDEN**	10	19498	0.69	0.12
3		**URBDIST** + **ED** + **RELEV**	8	19498	1.05	0.12
4		**TREEDEN** + ELEV + **RELEV**	8	19499	1.72	0.07

Table A2. Tests for spatial autocorrelation in the best supported model for each response variable. Model response variable, model formulation, Moran's I and P-values are presented. Moran's I values and associated P-values were calculated using the 'correlog' function in the ncf package in R. We used a lag rate of 500 m and 1000 resamples to calculate bootstrapped P-values.

Response	Model	Moran I	P
T_{min}	URBDIST + ED + BA + RELEV + ED:BA	-0.114	0.275
T_{minav}	URBDIST + ED + NDIST + DIST + RELEV	-0.014	0.305
ΔT_{min}	URBDIST + ED + BA + RELEV + ED:BA	-0.012	0.248
T_{max}	TREEDEN + RELEV	-0.049	0.061
T_{maxav}	URBDIST + ED + NDIST + LTDEN + RELEV	-0.042	0.065
ΔT_{max}	TREEDEN + RELEV	-0.051	0.067
T_{av}	URBDIST + ED + NDIST + LTRDEN + RELEV	-0.049	0.064
ΔT_{av}	URBDIST + ED + NDIST + LTRDEN + RELEV	-0.060	0.077
CDD	URBDIST + ED + BA + RELEV + ED:BA	-0.021	0.158

Table A3. Model selection results for temperature differentials (ΔT_{max}, ΔT_{min}, ΔT_{av}) calculated using standard weather station data instead of daily PRISM data. Models presented include the best supported model (lowest AIC_c value) and competing models within two ΔAIC_c of the top model. The best supported models using weather station data to calculate temperature differentials are the same best supported models using daily PRISM data to calculate the temperature differentials presented in Table 2.

Model No.	Response	Model	k	AIC_c	ΔAIC_c	w_i
1	ΔT_{max}	**TREEDEN** + RELEV	7	26013	0.00	0.30
2		**BA** + RELEV	7	26015	1.84	0.12
1	ΔT_{min}	**URBDIST** + **ED** + BA + **RELEV** + **ED:BA**	10	17498	0.00	0.63
1	ΔT_{av}	URBDIST + **ED** + **NDIST** + **LTDEN** + **RELEV**	10	19106	0.00	0.27
2		URBDIST + **ED** + **NDIST** + DIST + **RELEV**	14	19108	1.28	0.14