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Using statistical models to depict the response of multi-timescale drought to forest cover change across climate zones

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1 Data

Table S1. Datasets needed in the study

Varibles	Spatial resolution	Download link	Citation	DOI data/article	Last accessed
Climate classification	0.1 °x0.1°	https://hess.copernicus.org/articles/11/1633/2007/hess-11-1633-2007-supplement.zip	Peel et al. (2007)	https://doi.org/10.5194/hess-11-1633-2007	Feb 2018
SPEI	0.5°x0.5°	http://sac.csic.es/spei	Vicente-Serrano et al. (2010a, b)	https://doi.org/10.20350/digitalCSIC/15555	March 2020
scPDSI	0.5°x0.5°	https://crudata.uea.ac.uk/cru/data/drought/	Barichivich et al. (2021)	https://doi.org/10.1175/BAMS-D-21-0098.1	March 2021
CCI land cover dataset	300 m	http://maps.elie.ucl.ac.be/CCI/viewer/download.php	ESA (2017)		June 2021
Precipitation	0.5°x0.5°	https://crudata.uea.ac.uk/cru/data/hrg/	(Harris et al., 2020)	https://doi.org/10.1038/s41597-020-0453-3	March 2021
Temperature	0.5°x0.5°	https://crudata.uea.ac.uk/cru/data/hrg/	(Harris et al., 2020)	https://doi.org/10.1038/s41597-020-0453-3	March 2021

Table S2. The classification of SPEI values

SPEI values	Drought classifiaction
2.00 and above	Extremely wet
1.50 to 1.99	Very wet
1.00 to 1.49	Moderately wet
-0.99 to 0.99	Near normal
-1.49 to -1.00	Moderately dry
-1.99 to -1.50	Very dry
-2.00 and less	Extremely dry

Table S3. The classification of scPDSI values

scPDSI values	Drought classifiaction
4.00 and above	Extremely wet
3.00 to 3.99	severely wet
2.00 to 2.99	Moderately wet
1.00 to 1.99	Mildly wet
0.50 to 0.99	Incipiently wet
-0.49 to 0.49	Near normal
-0.99 to -0.50	Incipiently dry
-1.99 to -1.00	Mildly dry
-2.99 to -2.00	Moderately dry
-3.99 to -3.00	severely dry
-4.00 and less	Extremely dry

2 Methods

Table S4. Significance from two-sided t-tests for coefficients being compatible with 0 in the linear models across different climate zones (equatorial, arid, temperate, snow) and for the scPDSI and SPEIτ with different integration times. (level of significance '***' 0.001, '**' 0.01, '*' 0.05, '.' 0.1)

		X_{forest}	X_{precip}	X_{temp}	$X_{\text{forest}} : X_{\text{precip}}$	$X_{\text{forest}} : X_{\text{temp}}$	$X_{\text{precip}} : X_{\text{temp}}$
Equatorial	scPDSI		***	***			
	SPEI03		***	***			
	SPEI06		***	***			
	SPEI12		***	*			
	SPEI24		***	*			
Arid	scPDSI	**	***				
	SPEI03		**	**		*	
	SPEI06		**	**		*	
	SPEI12		***	***	*	**	
	SPEI24		**	**	*	**	
Temperate	scPDSI	*	***	*	.	*	*
	SPEI03		***	**			
	SPEI06		***	***			
	SPEI12		***	***			
	SPEI24	.	***	***		.	
Snow	scPDSI		*				
	SPEI03		**				
	SPEI06		***				
	SPEI12			**	.		
	SPEI24		*	*			

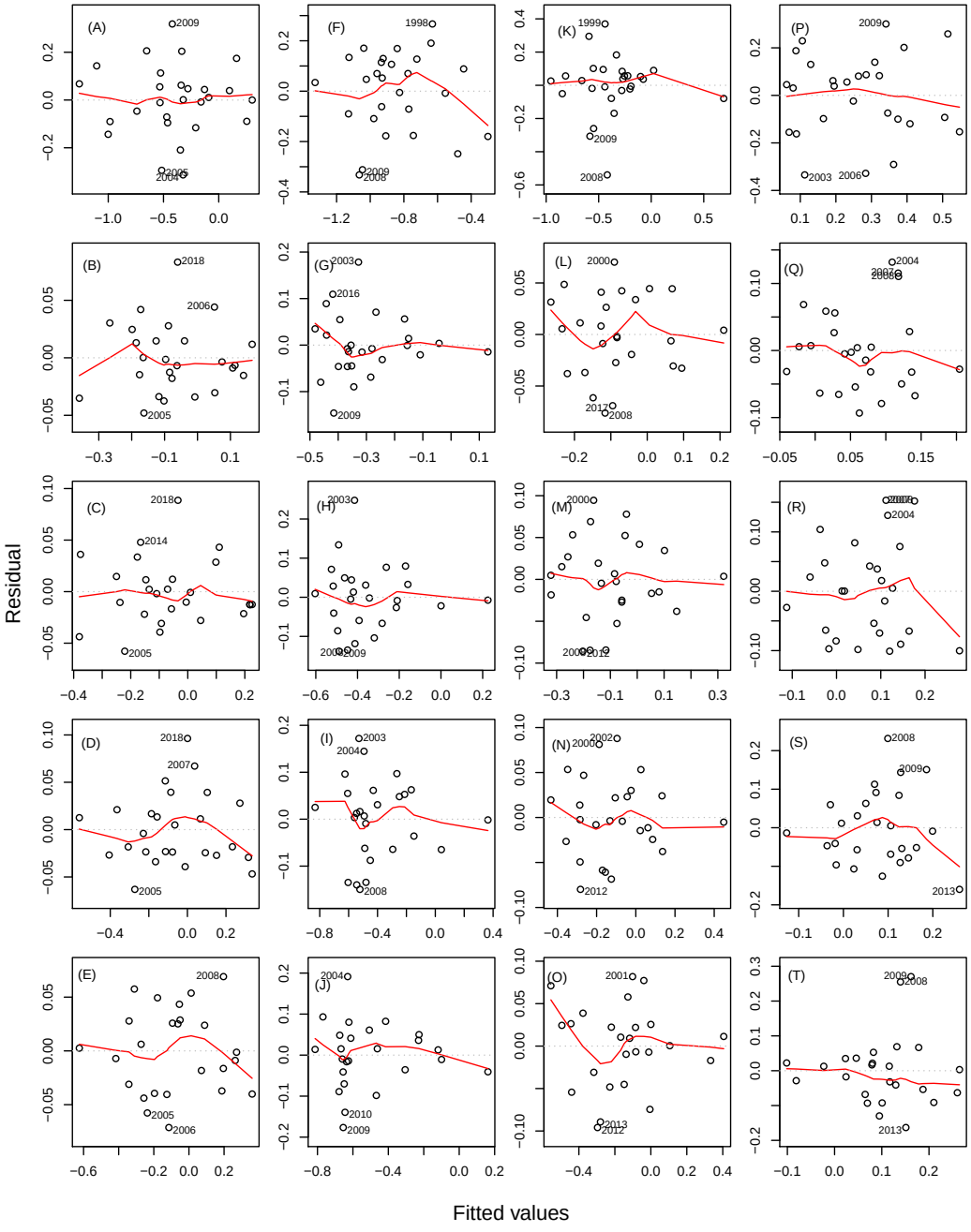

Figure S1. Residuals vs fitted for the linear models across different climate zones (columns from left to right: equatorial, arid, temperate, snow) and for the scPDSI and SPEIτ with different integration times (rows from top to bottom: scPDSI and SPEIτ with $\tau \in \{03, 06, 12, 24\}$).

3 Results

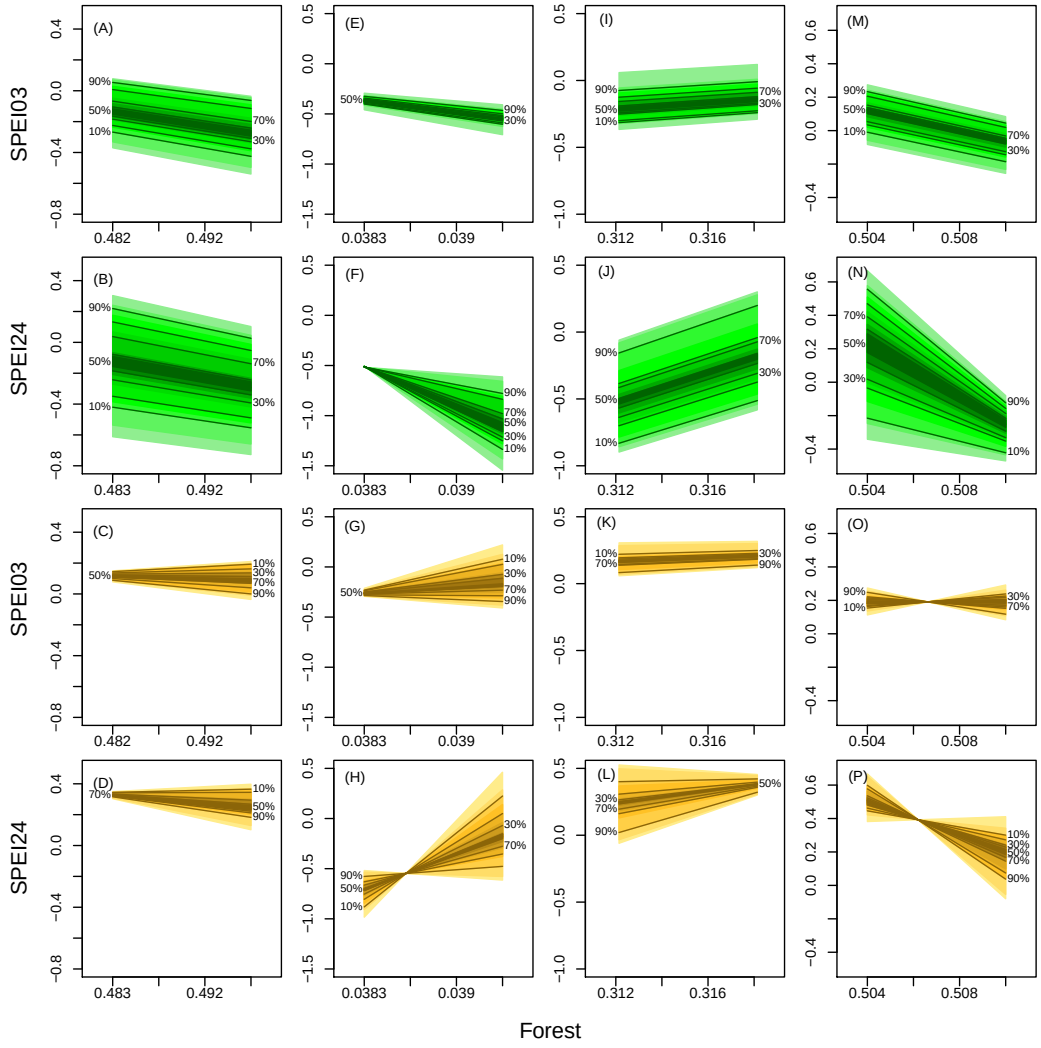

Figure S2. Same as Fig. 6 but for the first two rows, the temperature is held constant at its 0.99 quantiles (maximum) and for the bottom two rows, precipitation is held constant at its 0.99 quantiles(maximum).

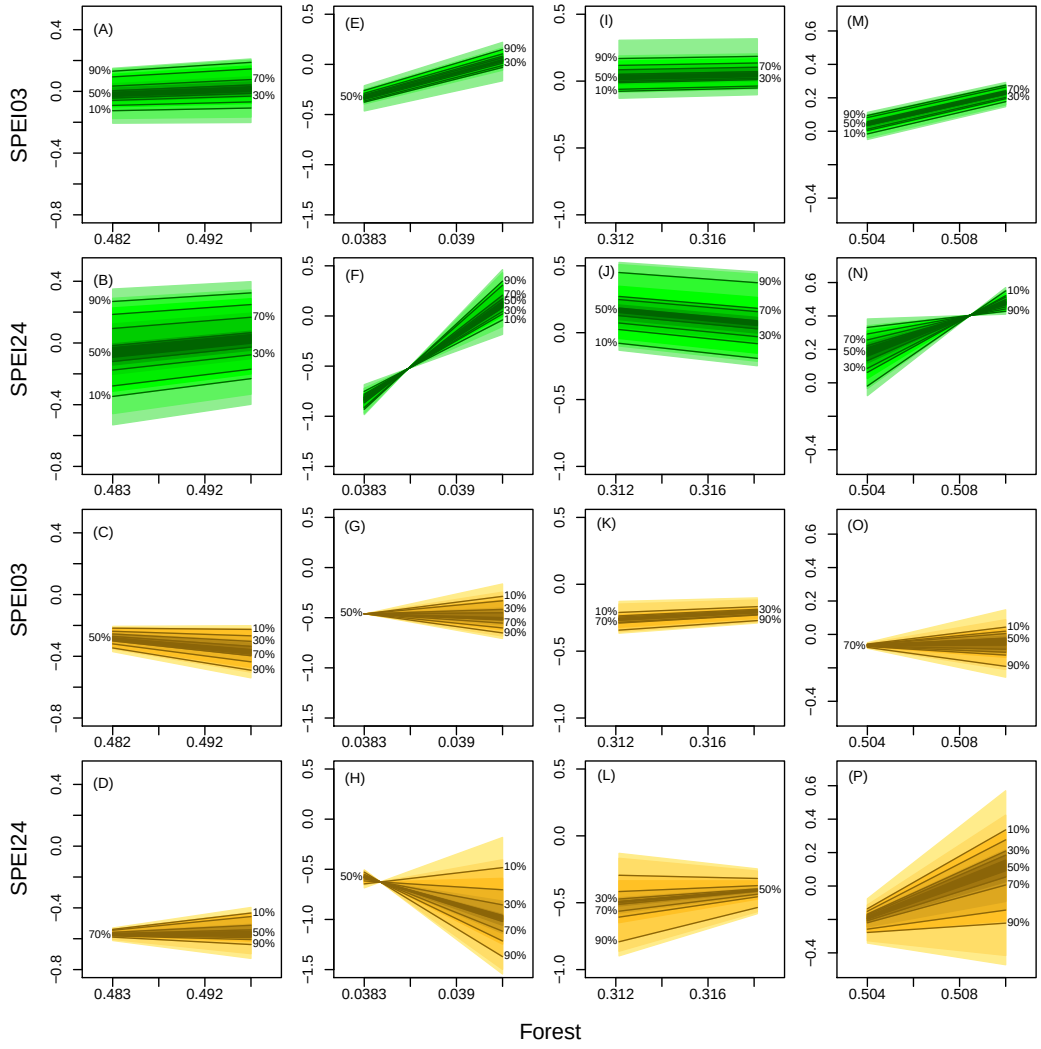

Figure S3. Same as Fig. 6 but for the first two rows, the temperature is held constant at its 0.01 quantiles (minimum) and for the bottom two rows, precipitation is held constant at its 0.01 quantiles (minimum).

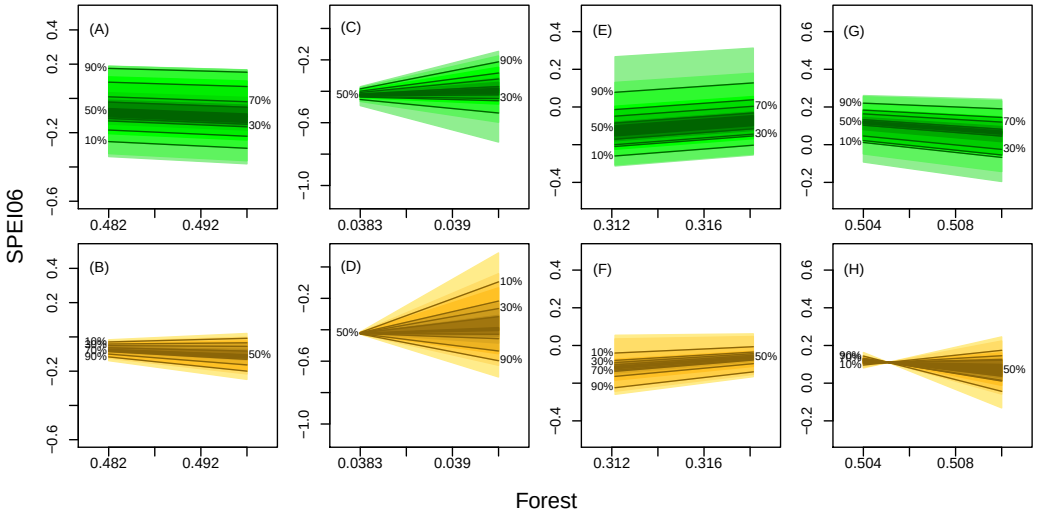

Figure S4. Same as Fig. 6 but for SPEI06

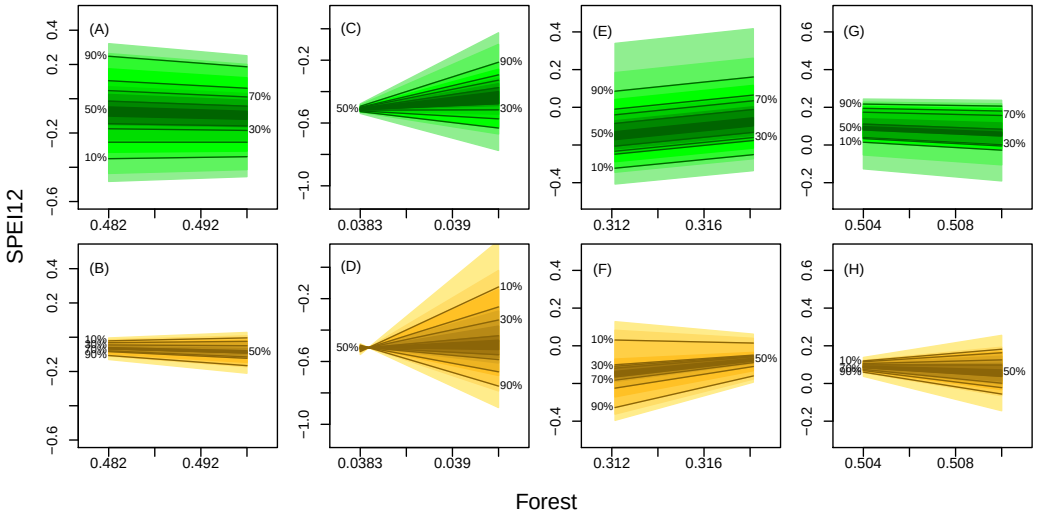

Figure S5. Same as Fig.6 but for SPEI12.

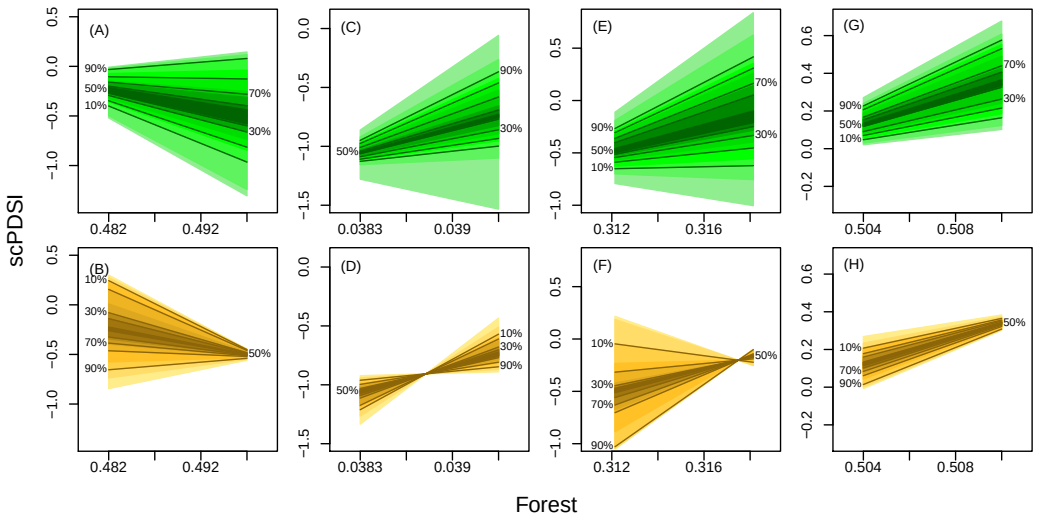

Figure S6. Same as Fig. 6 but for scPDSI.

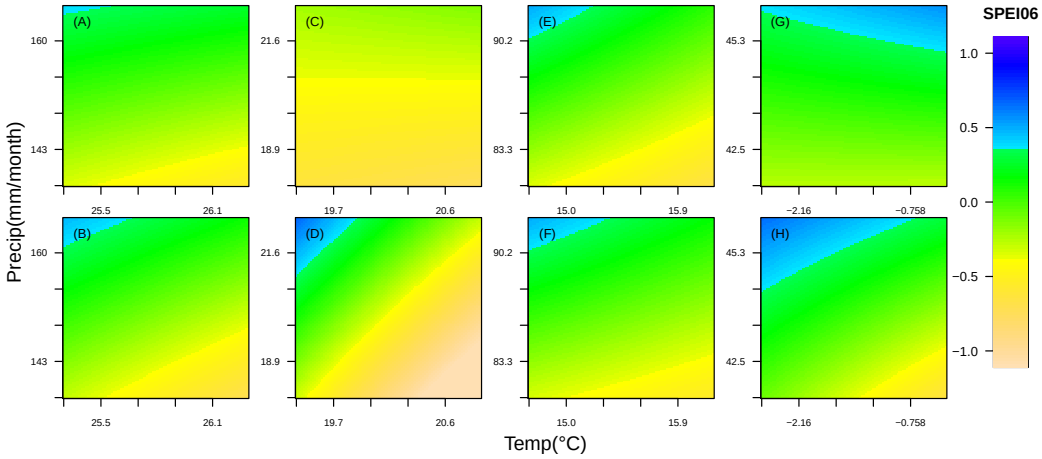

Figure S7. Same as Fig. 7 but for SPEI06.

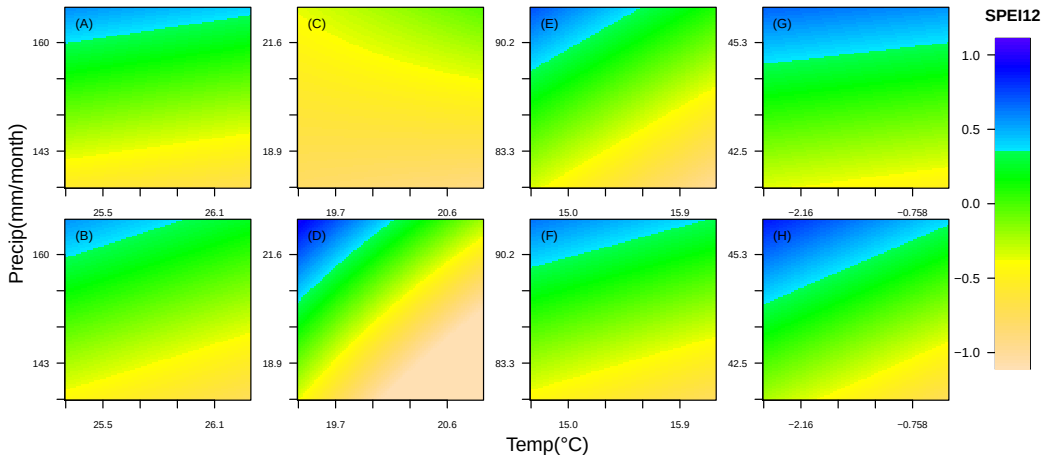

Figure S8. Same as Fig. 7 but for SPEI12.

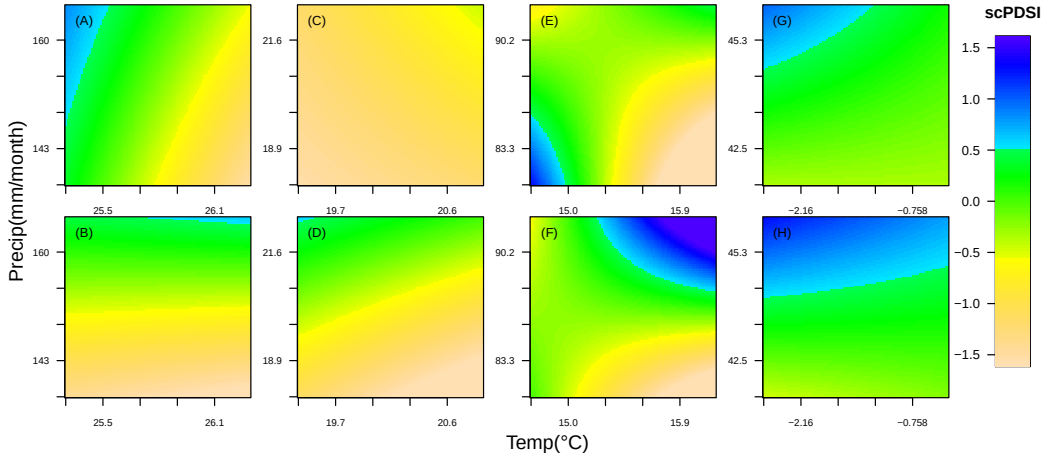

Figure S9. Same as Fig. 7 but for scPDSI.

References

Barichivich, J., Osborn, T., Harris, I., van der Schrier, G., and Jones, P.: Monitoring global drought using the self-calibrating Palmer Drought Severity Index [in" State of the Climate in 2020" eds. Dunn RJH, Aldred F, Gobron N, Miller JB & Willett KM], Bulletin of the American Meteorological Society, 102, S68–S70, 2021.

ESA: Land Cover CCI: Product User Guide Version 2.0, https://maps.elie.ucl.ac.be/CCI/viewer/download/ESACCI-LC-Ph2-PUGv2_2.0.pdf, 2017.

Harris, I., Osborn, T. J., Jones, P., and Lister, D.: Version 4 of the CRU TS monthly high-resolution gridded multivariate climate dataset, Scientific data, 7, 109, 2020.

Peel, M. C., Finlayson, B. L., and McMahon, T. A.: Updated world map of the Köppen-Geiger climate classification, Hydrology and earth system sciences, 11, 1633–1644, 2007.

Vicente-Serrano, S. M., Beguería, S., and López-Moreno, J. I.: A multiscalar drought index sensitive to global warming: the standardized precipitation evapotranspiration index, Journal of climate, 23, 1696–1718, 2010a.

Vicente-Serrano, S. M., Beguería, S., López-Moreno, J. I., Angulo, M., and El Kenawy, A.: A new global 0.5 gridded dataset (1901–2006) of a multiscalar drought index: comparison with current drought index datasets based on the Palmer Drought Severity Index, Journal of Hydrometeorology, 11, 1033–1043, 2010b.