Supplementary Materials, Holocene climates of the Iberian Peninsula: pollen-based reconstructions of changes in the west-east gradient of temperature and moisture

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Ms for: *Climate of the Past*

Figure S1. Map showing the location of the SMPDS sites. The colour indicates the modern α values.

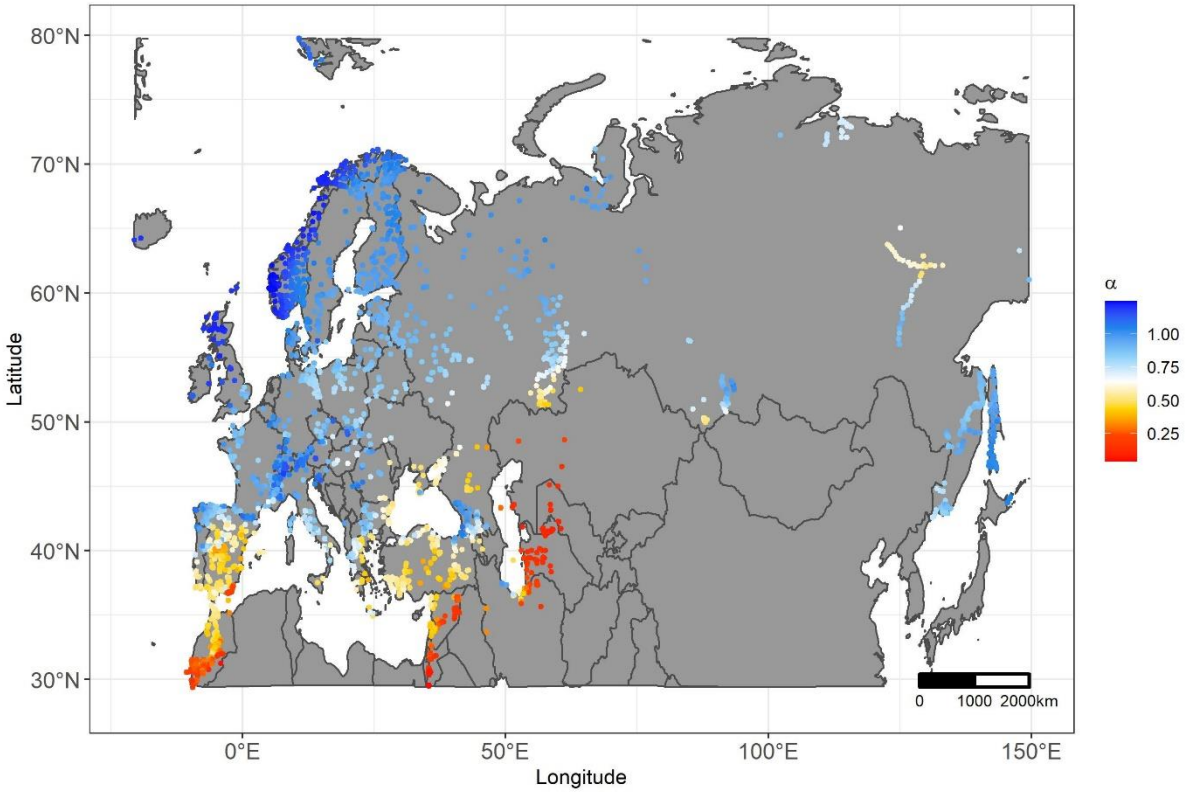


Figure S2. Changes in the west-east gradient of mean temperature of the coldest month (MTCO) through time, represented by anomalies in MTCO relative to 0.5 ka at individual sites. The red lines show the regression lines. The shades indicate the 95 % confidence intervals of the regression lines.

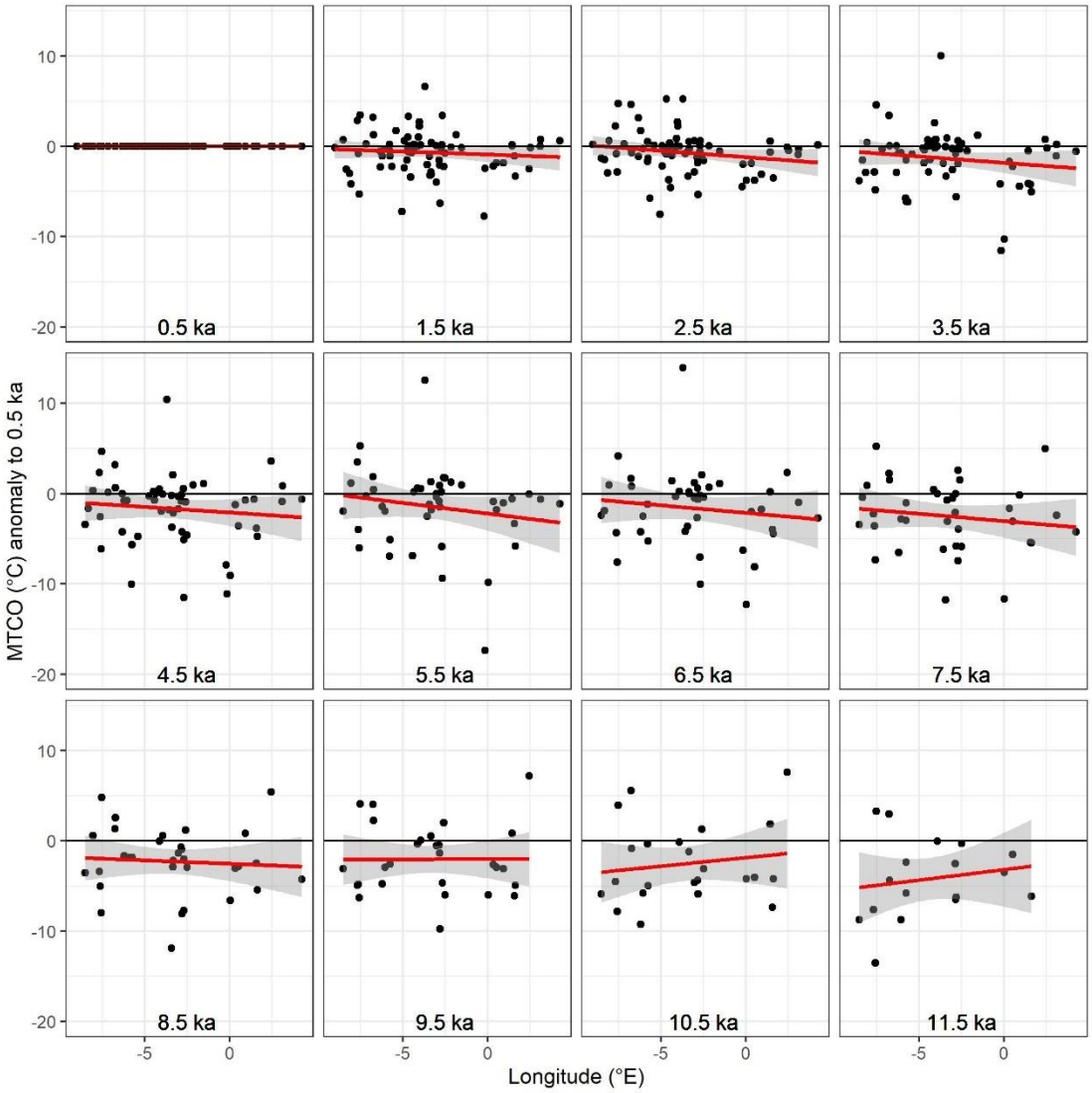


Figure S3. Changes in the west-east gradient of plant-available moisture as represented by anomalies in α relative to 0.5 ka at individual high (>1000 m) and low (<1000 m) elevation sites through the Holocene. The red lines show the regression lines. The shades indicate the 95 % confidence intervals of the regression lines.

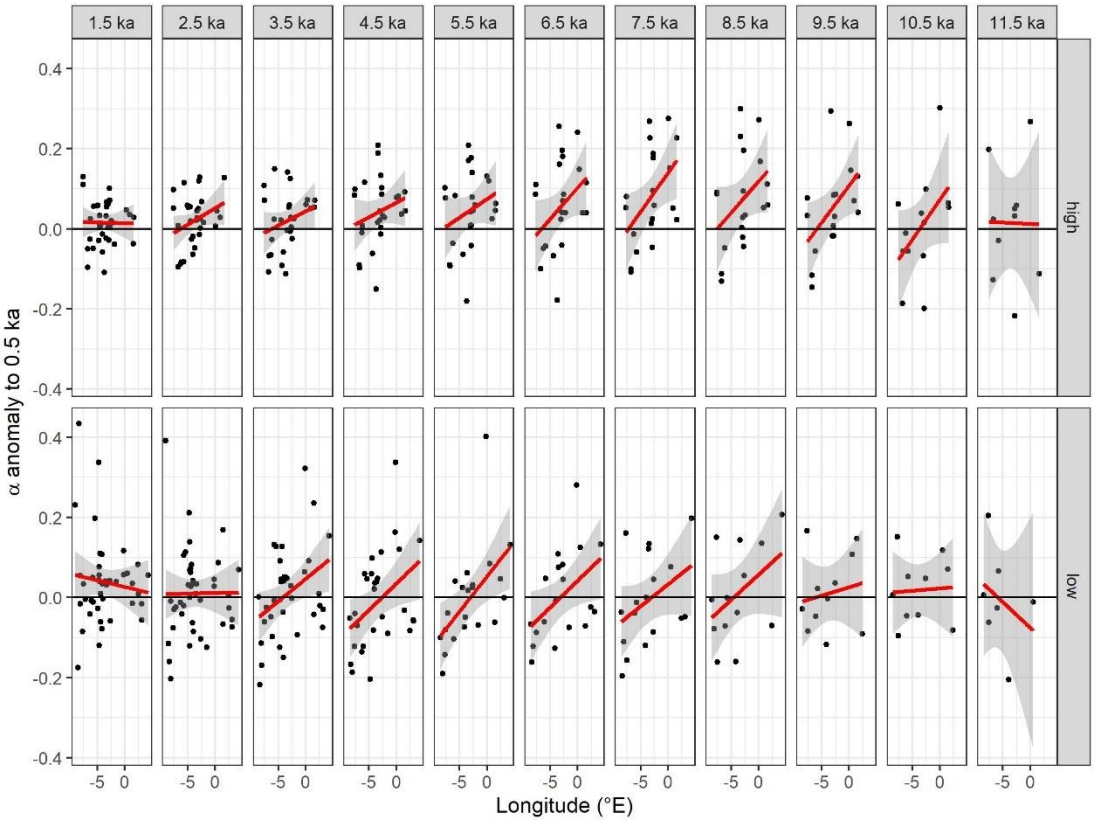


Figure S4. Changes in the elevational gradient of plant-available moisture through time, as represented by anomalies in α relative to 0.5 ka at individual sites. The red lines show the regression lines. The shades indicate the 95 % confidence intervals of the regression lines.

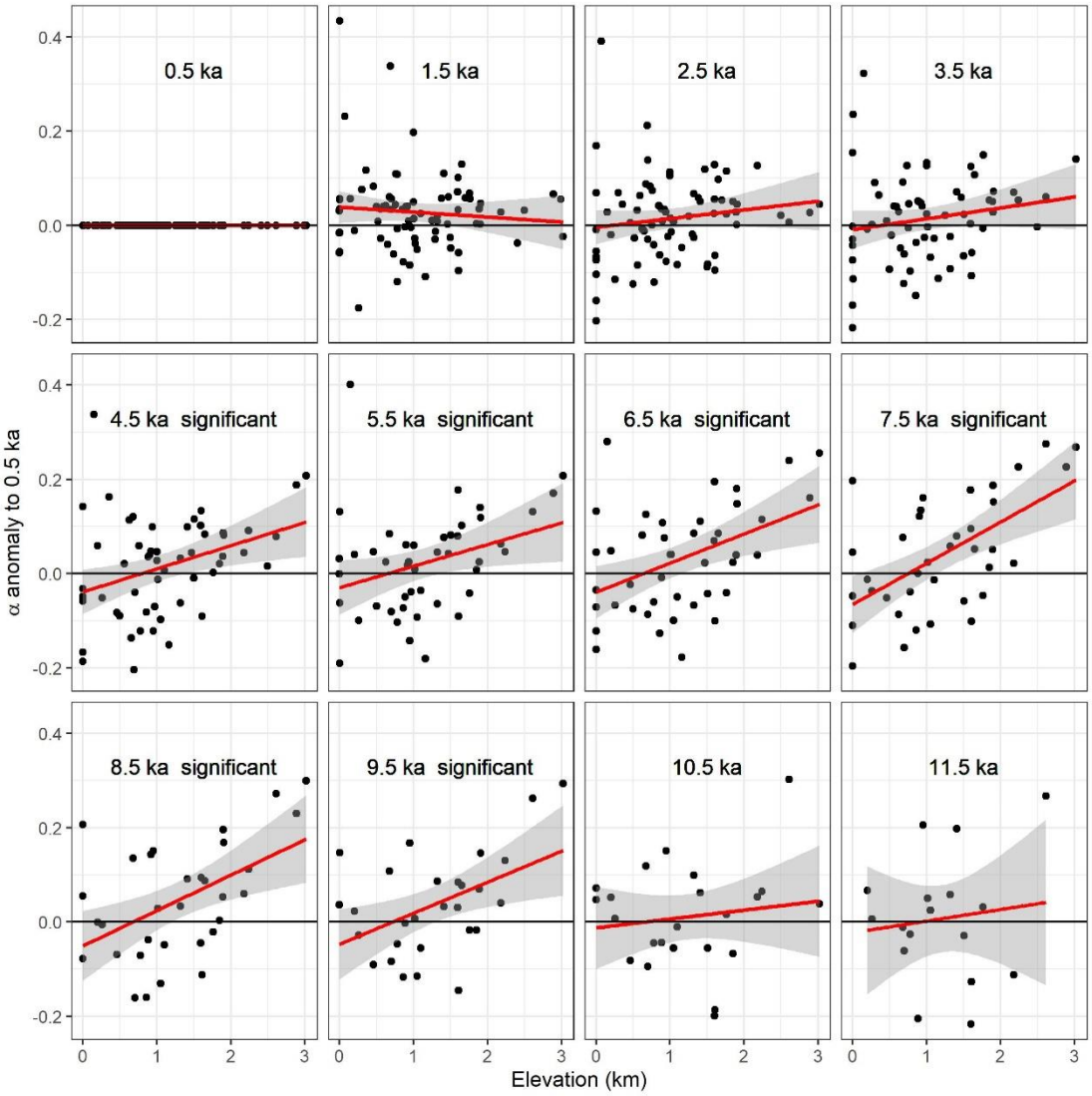


Figure S5. Changes in the west-east gradient of mean temperature of the warmest month (MTWA) through time, as represented by anomalies in MTWA relative to 0.5 ka at individual sites. The red lines show the regression lines. The shades indicate the 95 % confidence intervals of the regression lines.

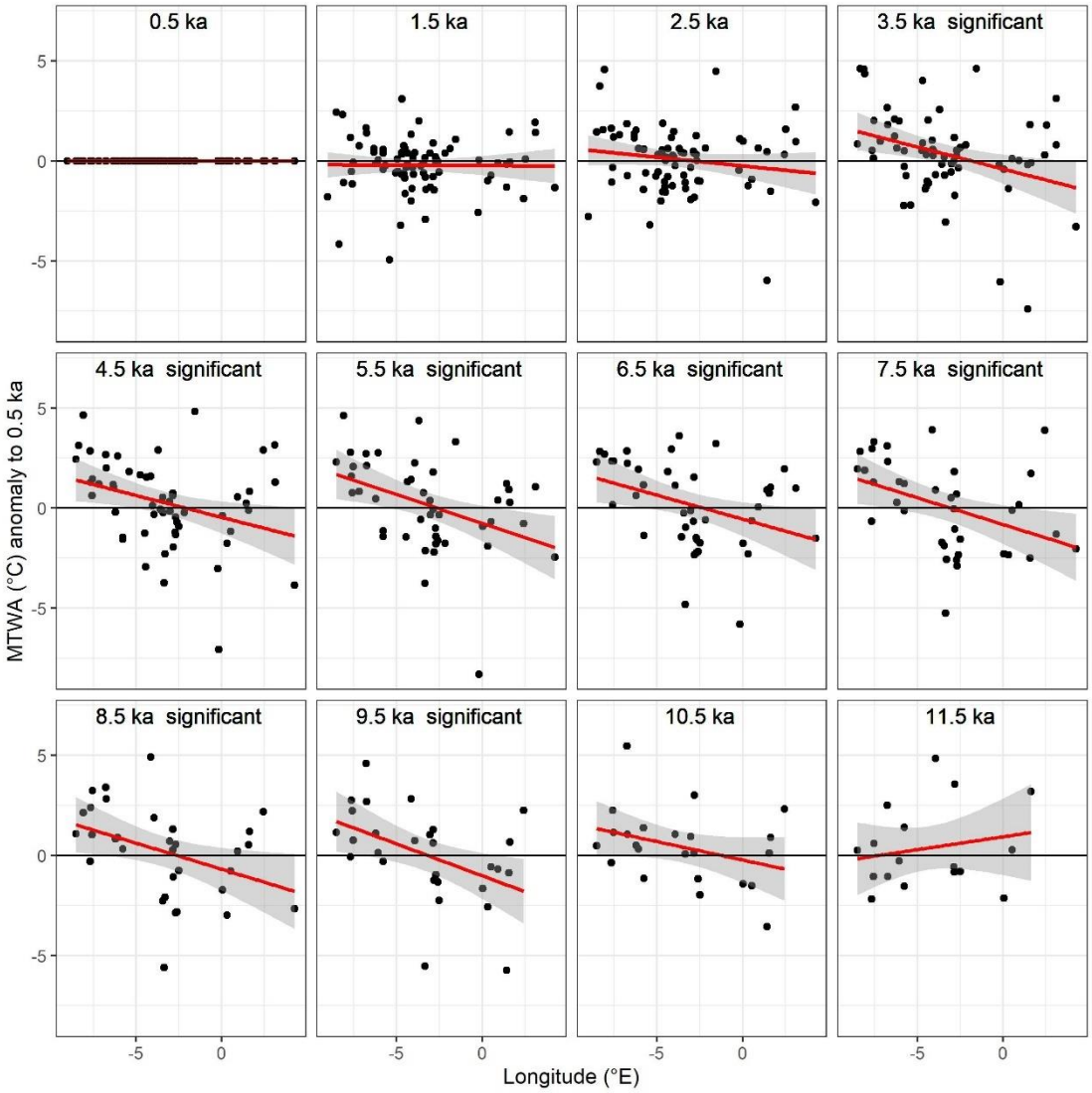


Figure S6. Changes in the west-east gradient of mean temperature of the warmest month (MTWA) as represented by anomalies in MTWA relative to 0.5 ka at individual high (>1000 m) and low (<1000 m) elevation sites through the Holocene. The red lines show the regression lines. The shades indicate the 95 % confidence intervals of the regression lines.

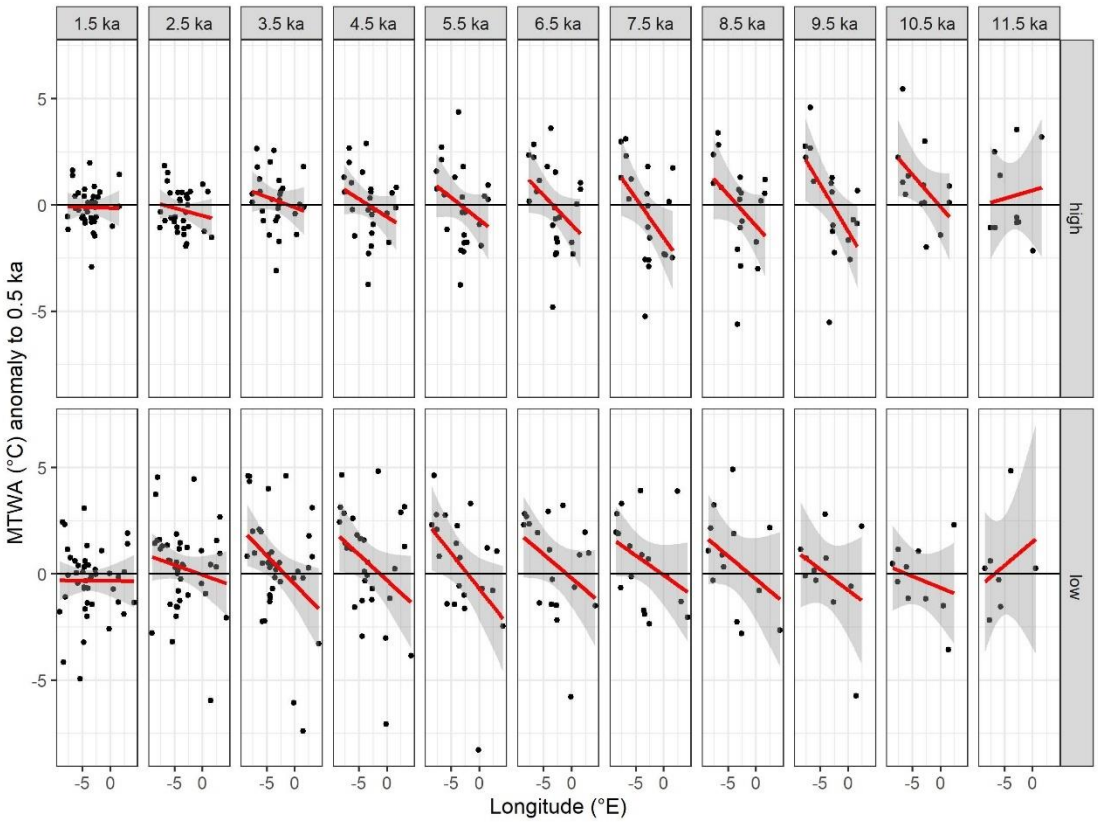


Figure S7. Changes in the elevational gradient of mean temperature of the warmest month (MTWA) through time, as represented by anomalies in MTWA relative to 0.5 ka at individual sites. The red lines show the regression lines. The shades indicate the 95 % confidence intervals of the regression lines.

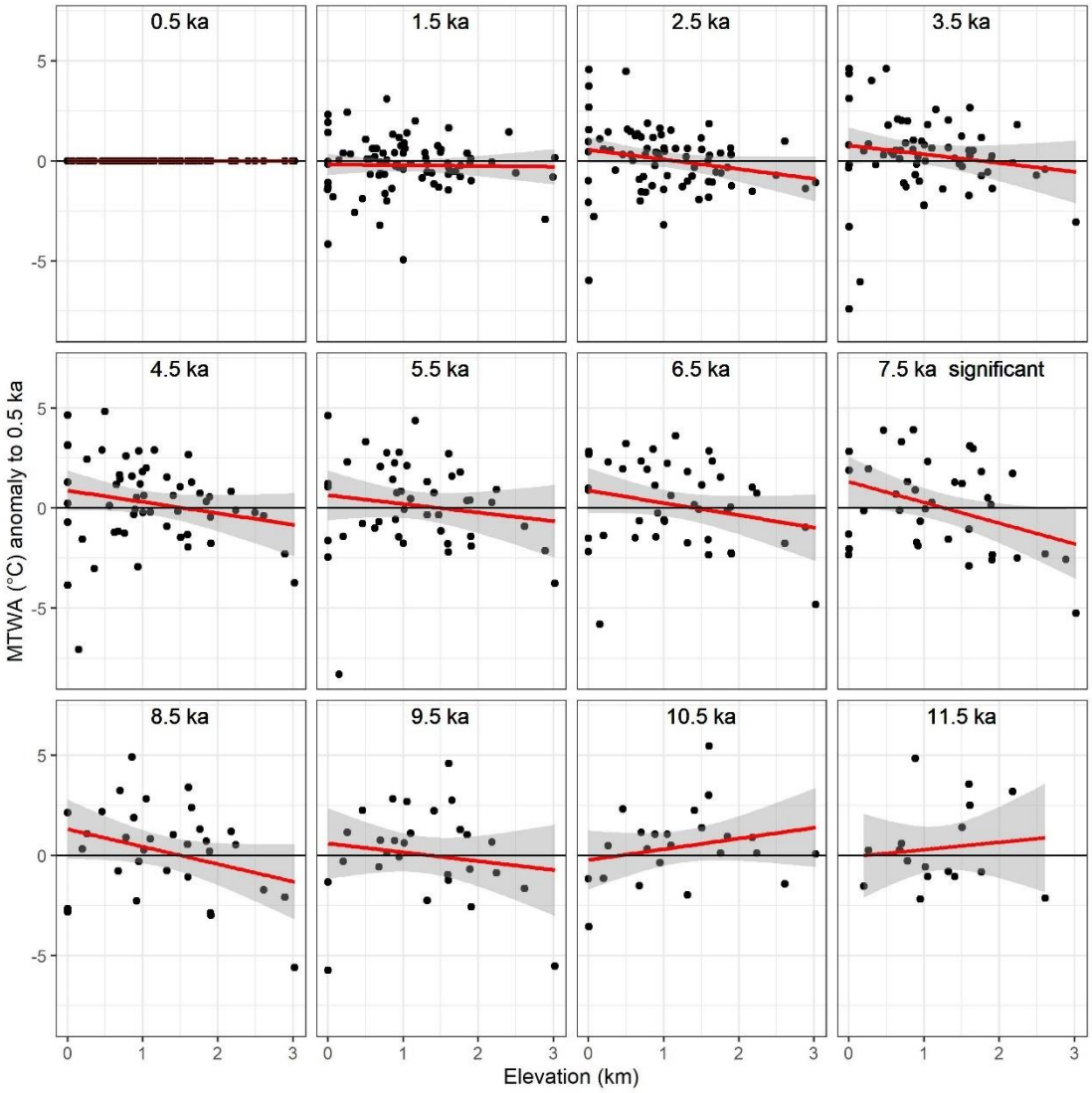


Figure S8. Comparison between reconstructed composite changes in climate anomalies. The left panel represents this paper, the middle panel represents Mauri et al. (2015), the right panel represents Kaufman et al. (2020). Composite curves of this paper and Kaufman et al. (2020) are calculated from individual reconstructions, using anomalies to 0.5 ka and a bin of ±500 years (time slices are 0.5, 1.5, …, 11.5 ka). Composite curves of Mauri et al. (2015) are converted directly from the gridded time slices which are provided with anomalies to 0.1 ka and a bin of ±500 years (time slices are 1, 2, …, 12 ka). The black lines show mean values across sites, with vertical line segments showing the standard deviations of mean values using 1000 bootstrap cycles of site/grid resampling.

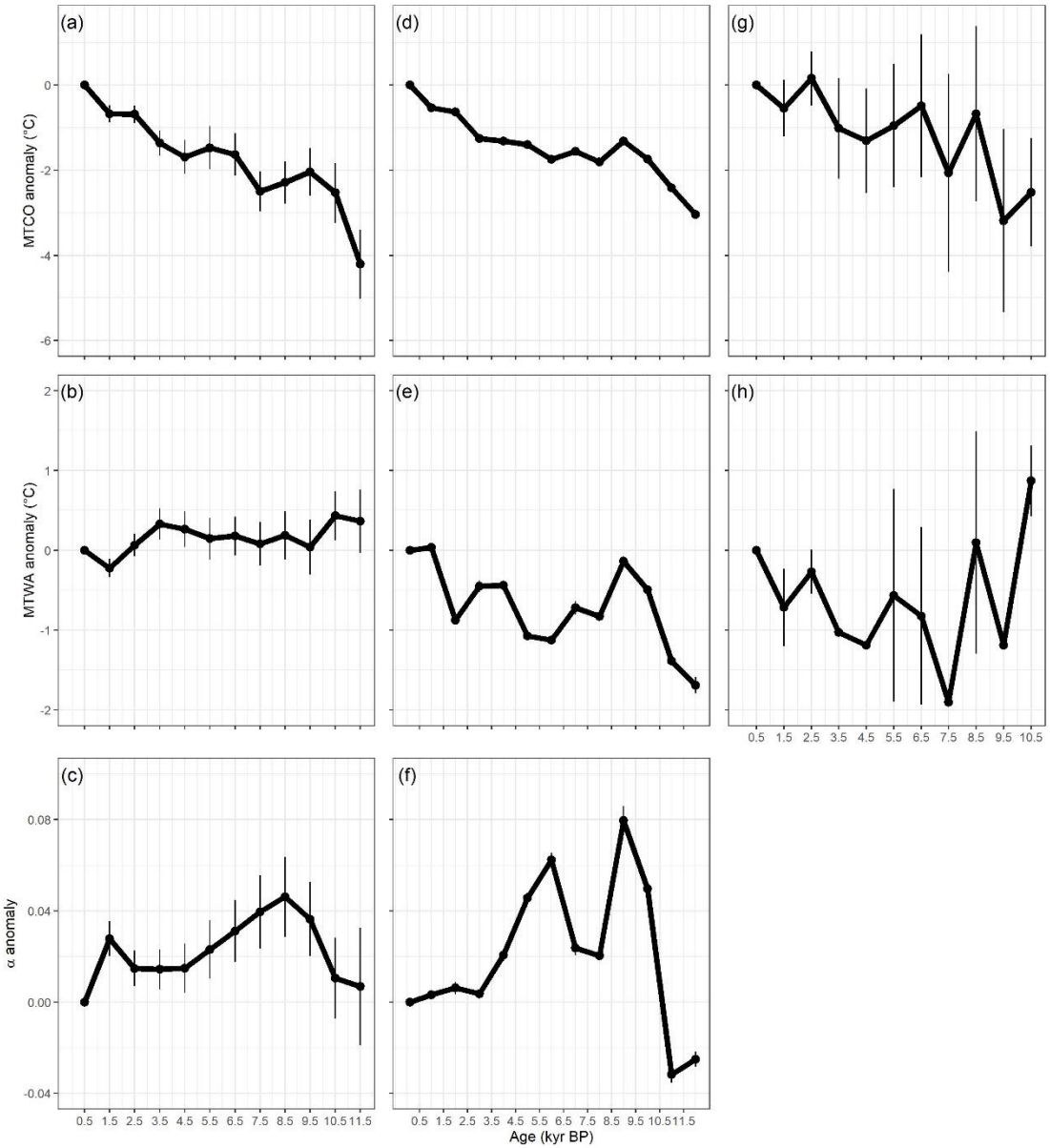
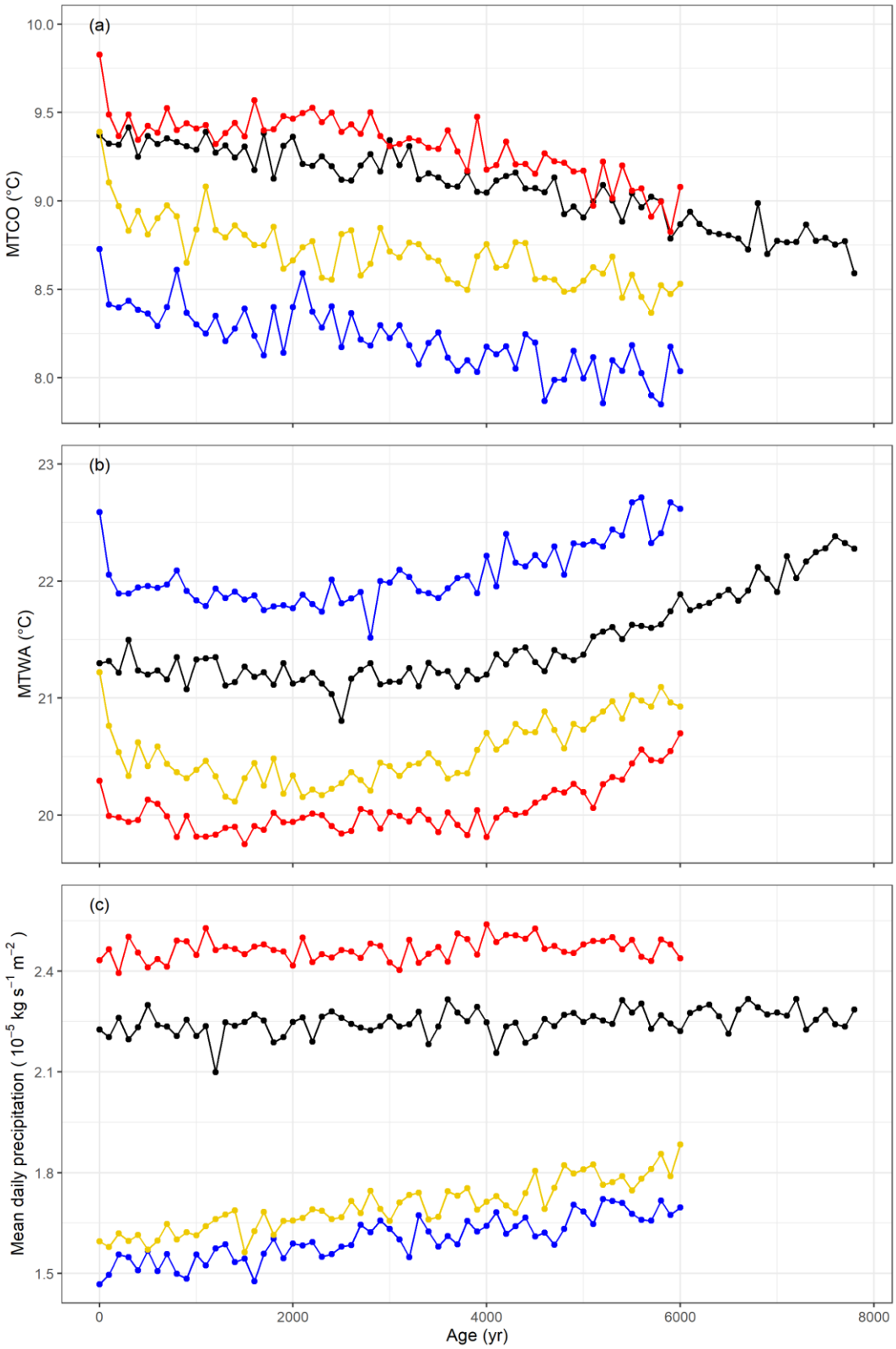


Fig S9. PACMEDY simulated mean values of MTCO, MTWA and precipitation in Iberian Peninsula between 8 ka and 0 ka, smoothed using 100 year bins. The black lines represent MPI simulations, the red lines represent AWI simulations, the blue lines represent TR5AS simulations, the orange lines represent TR6AV simulations.



SI Fig 10. Reconstructed mean temperature of the warmest month (MTWA) at Basa de la Mora using fxTWA-PLS2. The grey shades represent the 95% confidence intervals.

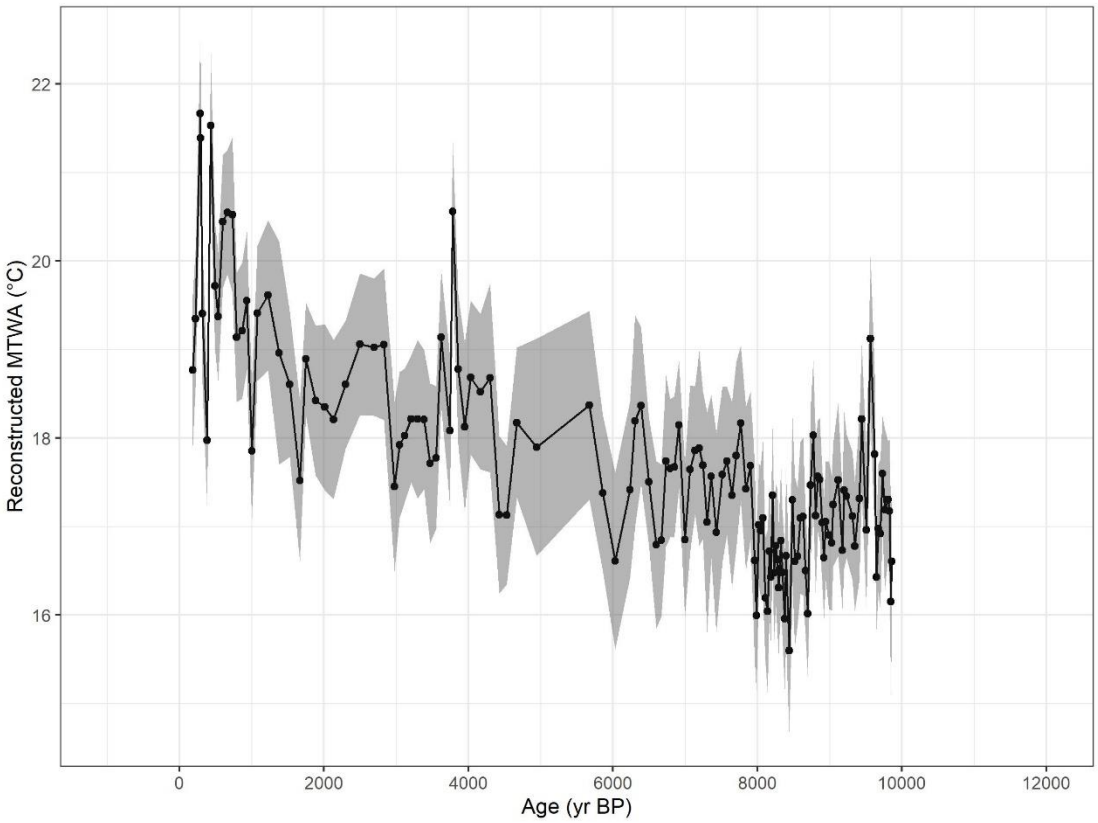


Fig S11. Reconstructed composite changes (anomalies to 0.5 ka) in (a) mean temperature of the coldest month (MTCO), (b) mean temperature of the warmest month (MTWA) and (c) plant-available moisture as represented by α, through the Holocene made with the original version of fxTWA-PLS (fx-TWA-PLS1).

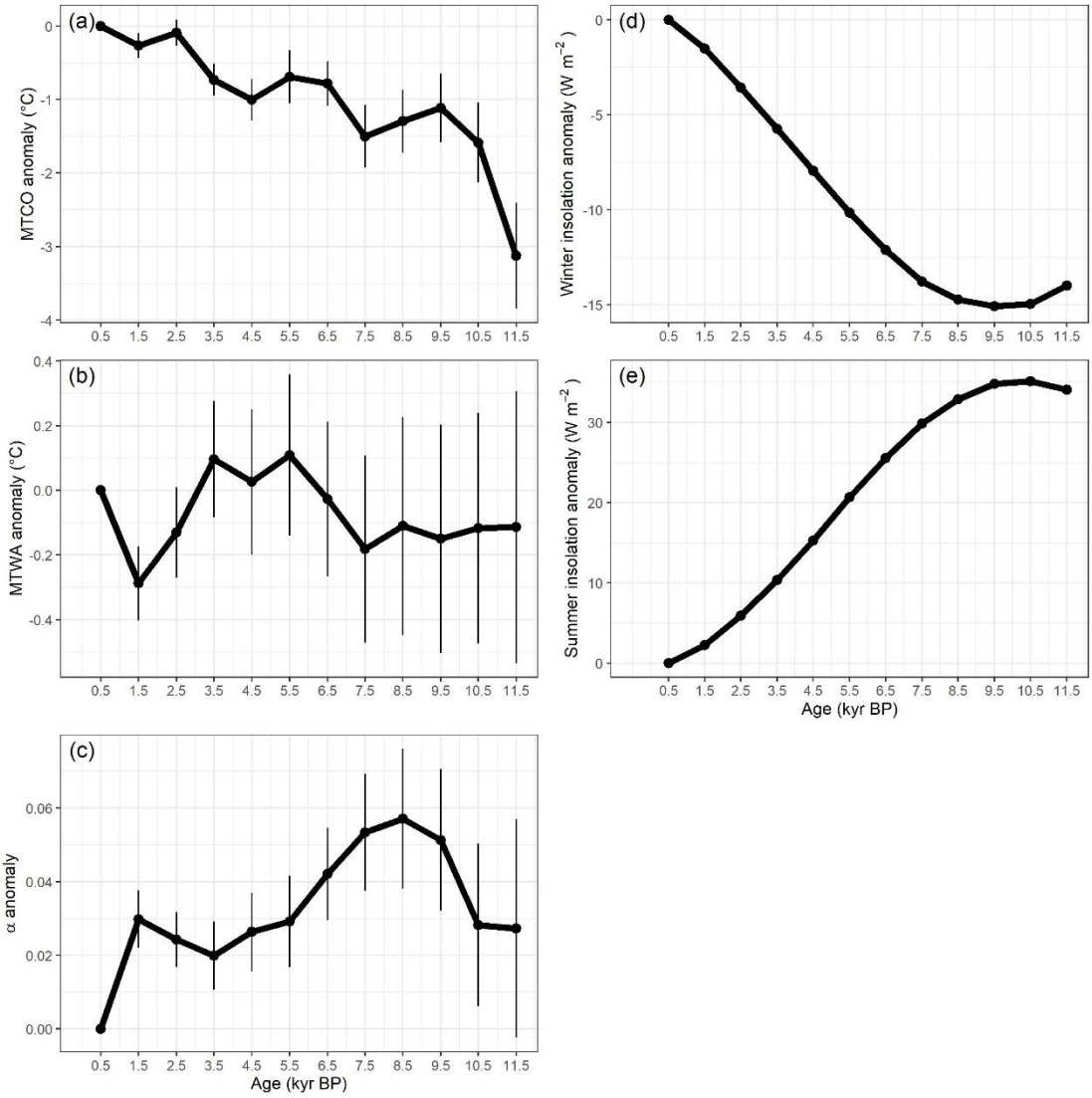


Table S1. Details of the fossil pollen sites used, including longitude, latitude, elevation, time period covered and temporal control (N, which is the number of samples available for the record). The fossil pollen data from the Iberian Peninsula were compiled by Shen et al. (2021) and obtained from http://dx.doi.org/10.17864/1947.294.

Site name	Longitude	Latitude	Elevation	Length (year)	N
Lake Saloio	−9.016	39.613	70	2491	24
Lagoa Travessa	−8.773	38.304	3	4557	65
Alvor Estuary Ribeira do Farelo Ribeira da Torre	−8.594	37.152	0.6	6141	76
Campo Lameiro	−8.517	42.533	260	11959	42
Armacao de Pera Ribeira de Alcantarilha	−8.345	37.110	2.4	7918	17
Vilamora Ribeira de Quarteira	−8.137	37.085	3.5	2933	30
Valle do Lobo Ribeira de Carcavai	−8.075	37.058	2.3	8314	144
Cha das Lameiras	−7.676	40.943	950	11442	32
Lagoa Comprida 2	−7.636	40.363	1650	9769	68
Charco da Candieira	−7.578	40.344	1409	11938	230
Montes do Buio Cuadramón	−7.535	43.474	700	11106	19
Pena de Cadela	−7.170	42.830	970	5247	91
Pedrido	−7.070	43.444	770	5150	71
El Payo	−6.771	40.253	984	627	50
Laguna de la Roya	−6.767	42.217	1608	11968	54
Sanabria Marsh	−6.733	42.100	1050	11832	79
Hinojos Marsh	−6.386	36.960	1.5	2222	46
La Molina mire	−6.327	43.381	650	4497	152
Xan de Llamas	−6.321	42.304	1500	4585	33
El Maíllo mire	−6.210	40.547	1100	10740	108
Lago de Ajo	−6.150	43.050	1570	9580	44
Ayoó de Vidriales	−6.070	42.126	780	11872	63
Peña Negra	−5.792	40.335	1000	3496	63
Navamuno	−5.779	40.321	1505	11998	207
Monte Areo mire	−5.769	43.529	200	11582	55
Turbera de La Panera Cabras	−5.758	40.166	1648	220	23
El Redondo	−5.657	40.221	1765	3191	60
Serrania de las Villuercas	−5.400	39.483	1000	4028	31
Arroyo de Aguas Frias	−5.117	40.267	1120	237	50
Fuente de la Leche	−5.057	40.347	1382	2800	58
Las Animas Mire	−5.030	36.686	1403	854	48
Enol	−4.991	43.272	1075	8424	30
Fuente del Pino Blanco	−4.978	40.236	1343	692	96
Lanzahíta	−4.936	40.222	558	2708	51
Puerto de Serranillos	−4.934	40.307	1700	2304	34
Las Lanchas	−4.894	39.586	800	382	20
El Perro mire	−4.760	39.051	690	4762	41
Botija Bog	−4.696	39.602	755	3691	25
Manaderos	−4.694	40.342	1292	1256	59
Zoñar	−4.690	37.483	300	3279	52

Patateros bog	−4.674	39.597	700	2689	28
Almenara de Adaja	−4.668	41.192	784	2353	25
Labradillos Mire	−4.573	40.345	1460	1263	25
Pozo de la Nieve	−4.552	40.353	1600	2294	41
El Tiemblo	−4.526	40.358	1250	3181	60
Culazón	−4.489	43.233	592	3940	69
Las Vinuelas	−4.488	39.374	761	4266	58
Pico del Sertal	−4.436	43.216	940	5093	9
Cueto de la Avellanosa	−4.364	43.117	1320	6677	34
El Brezosa	−4.361	39.349	733	3974	68
Bermu Mire	−4.146	39.434	783	1217	38
El Carrizal	−4.145	41.319	860	9851	50
Valdeyernos bog	−4.096	39.441	850	3221	25
Praillos de Bossier Mire	−4.072	36.905	1610	3424	25
Arroyo de Valdeconejos	−4.060	40.862	1380	667	44
Arroyo de las Cárcavas	−4.031	40.842	1300	2403	40
Arroyo de Navalacarreta	−4.031	40.852	1250	766	38
Alsa	−4.017	43.118	560	4758	24
Espinosa de Cerrato	−3.935	41.957	885	10756	156
Puerto de las Estaces de Trueba	−3.701	43.121	1160	5873	9
Tubilla del Lago	−3.573	41.808	900	7404	88
Puerto de Los Tornos	−3.433	43.150	920	8752	47
Laguna de la Mula	−3.417	37.060	2497	4641	32
Laguna de Rio Seco	−3.346	37.052	3020	10509	69
Borreguil de la Caldera	−3.323	37.051	2992	1496	80
Laguna de la Mosca	−3.315	37.060	2889	8407	68
Posidonia Lligat	−3.291	42.292	−3	1206	32
Las Pardillas	−3.033	42.033	1850	10550	74
Quintanar de la Sierra	−3.017	42.033	1470	6134	14
Sierra de Gádor	−2.917	36.900	1530	5027	86
Verdeospesoa mire	−2.861	43.055	1015	11137	91
Laguna Negra	−2.848	42.000	1760	11301	68
Laguna Mesagosa	−2.812	41.965	1600	12029	90
Saldropo	−2.717	43.050	625	7173	76
Canada del Gitano_Sierra de Baza	−2.700	37.233	1900	8356	111
Cañada de la Cruz	−2.688	38.068	1595	9419	39
San Rafael	−2.601	36.774	0	10718	133
Roquetas de Mar	−2.589	36.794	0	5854	32
Siles Lake	−2.500	38.400	1320	11339	67
Canaleja	−2.450	40.900	1029	6030	6
Villaverde	−2.367	38.800	870	8066	104
Arbarrain Mire	−2.173	43.211	1004	6793	91
El Sabinar	−2.117	38.200	1117	5439	129
Puerto de Belate	−2.050	43.033	847	6711	60
Ojos del Tremendal	−2.045	40.542	1650	10622	52
La Cruz	−1.873	39.988	1024	1510	23

Antas	−1.824	37.208	0	6792	94
Atxuri	−1.550	43.250	500	6382	33
Salines playa−lake	−0.889	38.505	475	10511	74
Eix	−0.753	38.174	1	6511	79
Navarrés	−0.683	39.100	225	7973	72
El Portalet	−0.399	42.799	1802	9710	207
Laguna Guallar	−0.228	41.408	336	2598	30
Salada Pequeña	−0.217	41.033	357	3680	43
Laguna Salada Chiprana	−0.167	41.233	150	6912	39
Hoya del Castillo	−0.158	41.482	258	5111	34
Marbore	0.040	42.696	2612	11701	61
Basa de la Mora	0.326	42.545	1906	9672	135
Armena	0.336	42.514	2238	3451	53
Estanya	0.529	42.028	677	11919	48
Bassa Nera	0.924	42.638	1891	9654	62
Estanilles	1.296	42.626	2247	4262	57
Creixell	1.434	41.156	1	5715	32
Prat de Vila	1.435	38.916	4	10237	29
Planell de Perafita	1.567	42.479	2240	10245	56
Serra Mitjana Fen	1.583	42.468	2406	1078	15
Bosc dels Estanyons	1.629	42.480	2180	11735	91
Les Palanques	2.438	42.162	460	9487	77
Pla de l'Estany	2.536	42.188	520	3614	43
Lake Banyoles	2.752	42.129	174	8636	141
Castello Lagoon	3.100	42.282	2.4	4834	85
Albufera Alcudia	3.119	39.793	0	7904	54
Algendar	3.959	39.941	21	5092	118
Cala Galdana	3.965	39.937	47	338	29
Hort Timoner	4.126	39.875	40	3597	46
Cala'n Porter	4.131	39.871	24	4007	86
Es Grau	4.259	39.948	2	7551	99

Table S2. Relative contributions of individual taxa to the reconstructions of mean temperature of the coldest month (MTCO), mean temperature of the warmest month (MTWA) and plant-available moisture (α), showing the top 10 taxa for each end of the climate gradient.

	MTCO	**MTWA**		**α**
 Increasing cold	*Vaccinium*	*Ilex*	 Increasing wet	*Nartheciaceae*
	Ledum	*Nartheciaceae*		*Ledum*
	Oxalidaceae	*Dryas*		*Myrica*
	Linnaea	*Empetrum*		*Huperzia*
	Trollius	*Taxus*		*Taxus*
	Aconitum	*Saxifragaceae*		*Oxalidaceae*
	Melanthiaceae	*Rhododendron*		*Ilex*
	Larix	*Linnaea*		*Empertrum*
	Huperzia	*Myrica*		*Picea*
	Dryas	*Ledum*		*Calluna*
Increasing warm 	*Ulmus/Zelkova*	*Parrotia*	Increasing dry 	*Santalaceae*
	Halimium	*Ceratonia*		*Tamarix*
	Myrtaceae	*Zizyphus*		*Cedrus*
	Zizyphus	*Lavandula*		*Nerium*
	Ilex	*Verbanaceae*		*Thymelaeaceae*
	Thymeleaeceae	*Nerium*		*Verbanaceae*
	Nerium	*Vitex*		*Ziziphus*
	Lavandula	*Cytinaceae*		*Lavandula*
	Cytinaceae	*Halimium*		*Cytinaceae*
	Parrotia	*Ulmus/Zelkova*		*Halimium*