Table S1. Reconstructed 'extinct' climate for the Late Eocene of southern China (in-text Fig. 3) compared to modern-day station data (using 1 °C extra tolerance for temperature, 100 mm/year and 10 mm/month for precipitation; cf. Utescher et al., 2014; WMP values not considered). In bold, stations with best fit.

Region/station[a]	CMT	MAT	WMT	MAP	HMP	LMP
Late Eocene, southern China	**6.6–7.1**	**17.2–18.3**	**25.4–25.6**	**1187–1206**	**187–191**	**19–24**
Gulf of Mexico (3); *Aw*	22–25	25–27	27–30	Within tolerance	Within tolerance	Within tolerance
Xiamen, Fujian (1); *Cfa*	13	21	28.5	Within tolerance	Within tolerance	Within tolerance
Jiangsu, Shikoku, Honshu (3); *Cfa*	**2–5**	**13–16**	**Within tolerance**	**Within tolerance**	**Within tolerance**	**Within tolerance**
Southeastern U.S. (14)[b]; *Cfa*	**Within tolerance**	**Within tolerance**	**Within tolerance**	**Within tolerance**	**120–170**	**60–80**
Ya'an, Sichuan (1); *Cwa*	**Within tolerance**	**Within tolerance**	**Within tolerance**	**1700**	**430**	**Within tolerance**
Mt. Kenaan, Israel (1); *Csa* (→ *Cfa*)	Within tolerance	Within tolerance	Within tolerance	700	Within tolerance	0
Pacific Northeast[c], coast (3); *Csb* (→ *Cfb*)	2–5	9–12	17–19	Within tolerance	Within tolerance	Within tolerance

[a] Number of stations covered by given range in brackets.

[b] Georgia, North Carolina, South Carolina

[c] Oregon, U.S.; British Columbia, Canada

Table S2. Climate coverage gaps in the data of Quan et al. (2012); shown are narrowest (most 'precise'), non-overlapping intervals that could possibly have been reconstructed (zero intervals not considered). Values linked to CA-relevant NLRs highlighted: red backgrounds, NLR(s) form 'climatic outliers' for the respective climate parameter (File S2, not referring to the original study); yellow background, NLR(s) lead to ambiguous intervals/partly recognised as 'climatic outliers'; green background, NLR(s) partly define CA interval boundaries; blank background, NLR(s) with this value remain neutral in CA reconstructions. Note that only non-overlapping intervals allow inferring climate shifts (Mosbrugger and Utescher, 1997; Klotz, 1999). See File S2 for list of taxa that could potentially resolve the informative intervals below (including information on status of NLRs and notes on erroneous tolerances recorded for Palaeoflora database)

Parameter	**Non-overlapping intervals**	
MAT	12	7–7.2; 12.2–12.5; 15.3–15.6; 15.7–16.1;16.5–16.6; 16.8–17; 17–17.2; 17.2–18.3; 20.4–20.8; 21.7–21.8; 22.2–22.7
CMT	10	0.4–0.7; 4.3–4.4; 5.8[a]–6.2; 6.6–7; 7.7–7.8; 7.8–8.1; 10.6–10.9; 12.6–13.3; 13.6–13.8; 15.2–15.6
WMT	9	17.2–17.3; 23.2–23.3; 24.7–24.9; 24.9–25; 25.4–25.6; 26–26.4[b]; 27.3–27.4; 27.5–27.7; 28.1–28.2
MAP	7	740–774; 810–813; 897–913; 1122–1151; 1194–1206; 1215–1278;1304–1335
HMP	8	140–143; 148–149; 160–172; 183–185; 187–191; 205–212; 225–236 ;322–323
LMP	5	12–13;22–24;25–29; 43–45; 50–51
WMP	11	51–52; 55–60; 67–68; 79–80; 85–89; 93–94; 108–111; 118–120[b]; 139–141; 173–175; 221–224

[a] Defined by the mutual climate range (coexistence interval) of *Epilobium* and *Fuchsia* (see Table 4)

[b] WMP max tolerance of "Diervilla?" – i.e. of a genus assigned to a fossil taxon of uncertain systematic affinity; being flagged as uncertain already by the original authors, this NLR was not considered for our re-analysis, but defines WMP intervals in the original study.

Table S3. NLRs that would take over in determining the lower boundaries of MAT and CMT intervals constrained by the too narrow tolerances recorded for Cytheaceae. *, denote taxa discussed in section 4.1

Assemblage, NLRs		**Reconstructed CA/PF interval**		**New lower boundary of CA/PF interval, Cyatheaceae corrected**	
		MAT [°C]	**CMT [°C]**	**L.b. MAT [°C]**	**L.b. CMT [°C]**
#10	27	15.2–15.6	6.6–7	13.3 (*Planera**)	≤ 5 (corrected value)
#16	37	15.7–16.1	6.6–7.8	[not affected]	5.5 (Cycadaceae*)
#19	43	As above	6.6–7.1	[not affected]	≤ 5 (corrected value)
#22	33	14.8–16.6	6.6–7	[not affected]	5 (*Engelhardia**)[a]
#26	40	16.5–16.6	As above	[not affected]	6.4 (*Angiopteris*)
#43	14	15.2–21.4	6.6–13.9	14.8 (Olacaceae)	≤ 5 (corrected value)
#12	31	–15.6–	6.6–12.5	[not affected]	5 (*Engelhardia**)
#14	32	16.5–16.6	6.6–7	[not affected]	5.5 (Cycadaceae*)
#17	37	15.7–16.1	As above	[not affected]	5.5 (Cycadaceae*)
#20	36	As above	6.6–7.8	[not affected]	5.5 (Cycadaceae*)
#27	55	–16.5–	6.6–7	[not affected]	5.5 (Cycadaceae*)
#42	26	15.7–18.4	6.6–12.5	[not affected]	5 (*Engelhardia**)
#53	20	11.6–18.4	As above	[not affected]	6.4 *(Agathis)*[b]
#15	22	16.5–18.4	As above	[not affected]	5.5 (Cycadaceae*)
#24	27	11.6–16.1	6.6–7.8	[not affected]	≤ 5 (corrected value)
#28	46	16.5–16.6	6.6–7	[not affected]	6.4 (*Angiopteris*)
#39	102	17.2–18.3	6.6–7.1	[not affected]	6.4 (*Angiopteris*)
#62	32	–16.5–	As above	[not affected]	5.5 (Cycadaceae*)

[a] CMT_{min} for *Engelhardia* changed to 3.1 °C (Utescher et al., 2014)

[b] Problematic NLR regarding assumptions 1–3 (see Table 4; Files S1, S2)

Table S4. Fossils with (potential) affinity to former Taxodiaceae (see also Table 3 in main-text), selected nearest-living relatives, and (palaeo)climate defined by these in the study of Quan et al. (2012); best-possible nearest-living relatives for each fossil taxon are given in the last column (none of which is useful in MCR-NLR methods). [x], excluded from analysis by Quan et al. as "*relict taxon*"

Fossil	**NLR according Quan et al.**	**Acts as delimiter [D], or delimiter or 'climatic outlier' [D/O], or neutral [n]**	**Correct NLR**
Brachyphyllum (L)	"taxodioid Cupressaceae"	**[D/O] MAP (#24)**	Cupressaceae (cosmopolitan)
Cryptomeria (P)	*Cryptomeria*	**[D] WMP**	Taxodioideae (?); Cupressaceae
Cryptomeriapollenites (P)	*Cryptomeria*	**[D/O] MAP and HMP (#24)**	Taxodioideae (?); Cupressaceae
Inaperturopollenites (P)	"taxodioid Cupressaceae"	**[D] MAP (#36)** **[D] MAP and LMP (#36)** **[D/O] MAP (#24)** [n] (#19, #22, #46, #47, #53, #60)	Cupressaceae (cosmopolitan)
Glyptostrobus (L)	*Glytostrobus*[a]	[n] (#11)	Possibly correct
Glyptostrobus (P)	*Glytostrobus*[a]	[n] (#40]	Taxodioideae (?); Cupressaceae
Metasequoia (L)	*Metasequoia*	[x] (#11)	Possibly correct
Metasequoia (P)	*Metasequoia*	[x] (#34, #40)	Sequoioideae (?); Cupressaceae
Sequoia (L)	*Sequoia*	[x] (#11)	Easily confused with *Taxodium*
Sequoiapollenites (P)	*Sequoia*	[x] (#15, #27, #28)	Sequoioideae (?); Cupressaceae
Taxodiaceae (P)	"taxodioid Cupressaceae"	**[D/O] (#34)** [n] (#39)	Cupressaceae (cosmopolitan)
Taxodiaceaepollenites (P)	"taxodioid Cupressaceae"	**[D] MAP (#37)** **[D] HMP (#38)** **[D/O] HMP (#42)** **[D/O] LMP (#32)** [n] (31 assemblages)	Cupressaceae (cosmopolitan)
Taxodium (L)	*Taxodium*	[n] (#11)	Easily confused with *Sequoia*
Taxodium (P)	*Taxodium*	**[D/O] MAP (#34)**	Taxodioideae (?); Cupressaceae

[a] Tolerances defined PF-tolerance for NLR "taxodioid Cupressaceae"