
Article:
Bradshaw, CD, Lunt, DJ, Flecker, R et al. (4 more authors) (2014) Erratum: "The relative roles of CO and palaeogeography in determining late Miocene climate: results from a terrestrial model-data comparison" (published in Climate of the Past, 8, 1257–1285, 2012). Climate of the Past, 10 (1). 199 - 206. ISSN 1814-9324

https://doi.org/10.5194/cp-10-199-2014

Clim. Past, 10, 199–206, 2014
www.clim-past.net/10/199/2014/
doi:10.5194/cp-10-199-2014

Climate of the Past
Open Access

Corrigendum to

"The relative roles of CO_2 and palaeogeography in determining late Miocene climate: results from a terrestrial model–data comparison" published in Clim. Past, 8, 1257–1285, 2012

C. D. Bradshaw[1], D. J. Lunt[1], R. Flecker[1], U. Salzmann[2], M. J. Pound[2,3,4], A. M. Haywood[3], and J. T. Eronen[5,6]

[1]Bristol Research Initiative for the Dynamic Global Environment (BRIDGE), School of Geographical Sciences, University of Bristol, University Road, Bristol, BS8 1SS, UK
[2]School of the Built and Natural Environment, Northumbria University, Newcastle upon Tyne, NE1 8ST, UK
[3]School of Earth and Environment, University of Leeds, Leeds, LS2 9JT, UK
[4]British Geological Survey, Kingsley Dunham Centre, Keyworth, Nottingham, NG12 5GG, UK
[5]Department of Geosciences and Geography, P.O. Box 64, 00014, University of Helsinki, Finland
[6]Biodiversity and Climate Research Centre LOEWE BiK-F, Senckenberganlage 25, 60325 Frankfurt am Main, Germany

Correspondence to: C. D. Bradshaw (c.bradshaw@bristol.ac.uk)

In the manuscript "The relative roles of CO_2 and palaeogeography in determining late Miocene climate: results from a terrestrial model–data comparison" by C. D. Bradshaw et al. (Clim. Past, 8, 1257–1285, 2012), an error in a database query used for our model–data comparison has been found, altering the magnitude and direction of a small number of anomalies. Although some results change slightly, the overall study findings and conclusions are unaltered. The original publication included a corrigendum (doi:10.5194/cp-8-1301-2012) as figure fonts were incorrectly embedded; these are now obselete.

- Section 5.1.1, sentence 3: the "129 overlaps" should be "135 overlaps".
- Section 5.1.2, paragraph 3, sentence 2: the reduction of "12 overlaps, or 3 %", should be "18 overlaps, or 4 %" and the "13 %" improvement should be "11 %".
- Section 5.1.2, sentence 2: the "852 overlaps" should be "858 overlaps".
- Section 5.1.2, paragraph 2, sentence 1: the "192 improvements" should be "185 improvements" and the "23 deteriorations" should be "25 deteriorations".
- Section 5.6, paragraph 2, sentence 9: the "172 more overlaps" should be "166 more overlaps".

Due to the change in direction of some of the anomalies, the following alterations to the text are required:

- Section 5.1.1, sentence 2 "no datapoint is suggesting cooler temperatures in the late Miocene" should read "only 12 datapoints suggest cooler temperatures in the late Miocene and these are concentrated in South East Asia."
- Section 5.1.2, paragraph 1, add after sentence 2: "For 29 datapoints, the warmer late Miocene MATs produced by the model are too warm as compared to the data. These are found particularly in regions of the most orographic change (the Andes, the Himalayas, the East African Plateau and the southern-most tip of the Rockies), and also in the southern Mediterranean."
- Section 5.1.2, paragraph 2, add after sentence 2: "Despite these improvements in the model-data comparison, there are still many mid-latitude Northern Hemisphere datapoints which indicate warmer MATs than the LM400c simulation is able to model. However, there are now 26 additional datapoints for which the model simulated temperatures are too warm, especially in North America."

Published by Copernicus Publications on behalf of the European Geosciences Union.

– Section 5.2.1, sentence 2 “the MAPs are wetter; none of the datapoints suggest drier MAPs in the late Miocene” should read “the MAPs are generally wetter; 41 of the datapoints in Europe and Africa suggest drier MAPs in the late Miocene.”

– Section 5.2.2, sentence 2 “The 88 datapoints which do not overlap with the modelled MAPs are wetter than the model predicts” should read “Of the 88 datapoints which do not overlap with the modelled MAPs, 86 are wetter than the model predicts.”

– Section 5.3.1, sentence 2 “the CMTs are wamer; none of the datapoints suggest cooler CMTs in the late Miocene” should read “the CMTs are generally cooler in the late Miocene across Europe and south-east Asia; further sensitivity studies are required to identify the boundary conditions causing this difference. However, CMTs are warmer in central and northern Asia in the late Miocene and this is perhaps related to the presence of the Paratethys and the lower orography of the Himalayas (e.g. Ramstein et al., 1997).”

Supplementary material related to this article is available online at http://www.clim-past.net/10/199/2014/cp-10-199-2014-supplement.pdf.

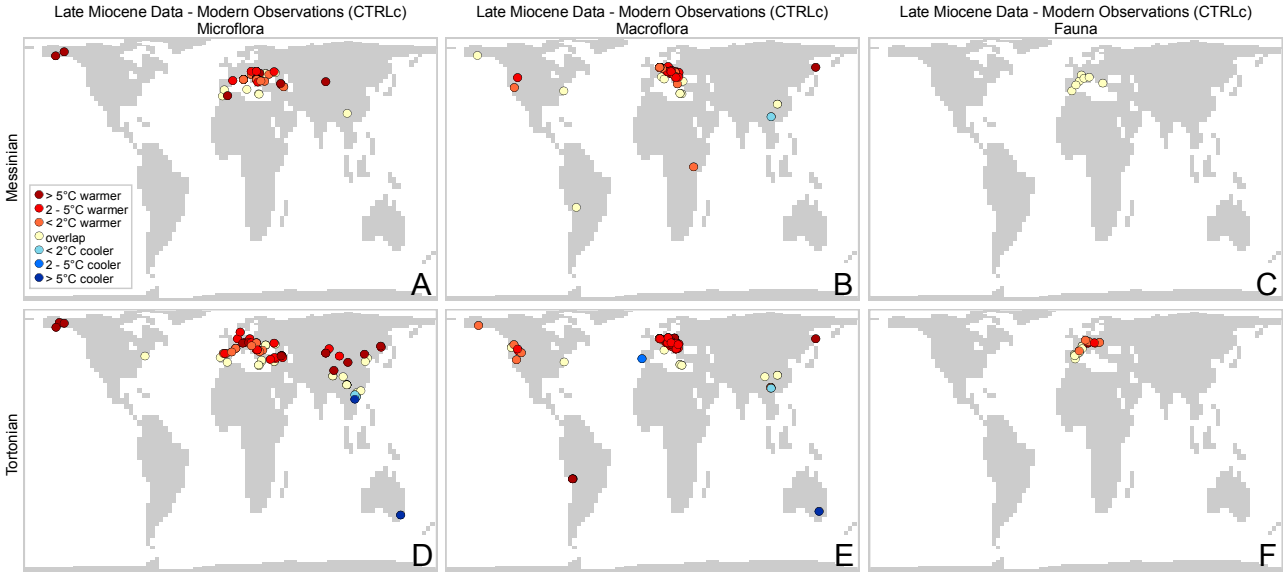

Fig. 7. Results from the model–data comparison for mean annual temperature, late Miocene data – modern potential natural climate estimates.

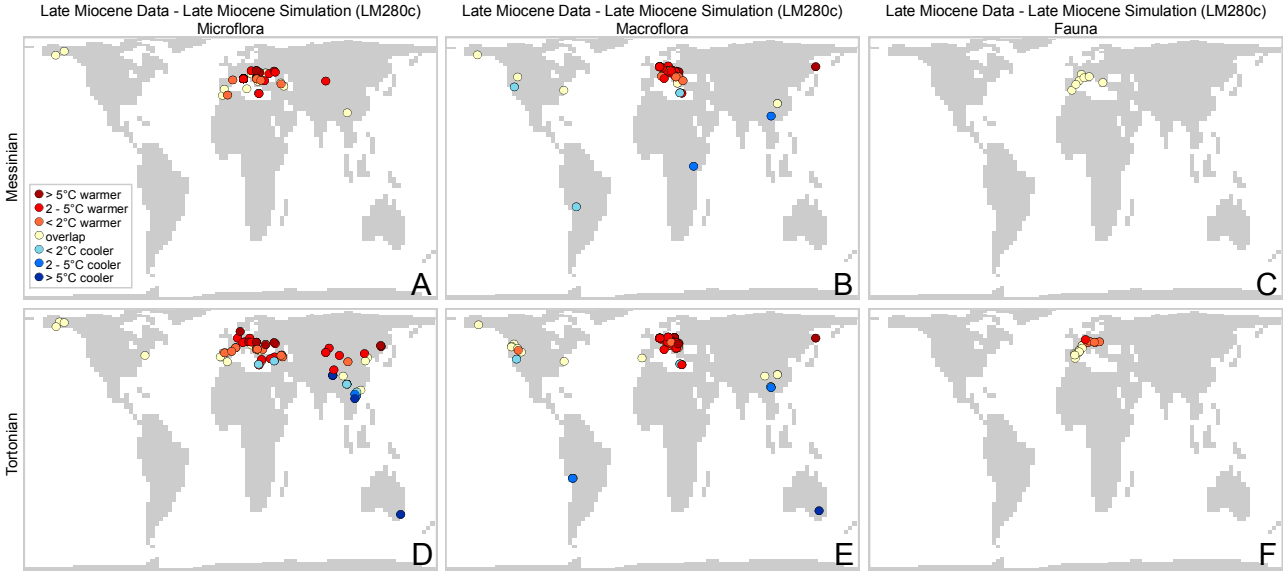

Fig. 8. Results from the model–data comparison for mean annual temperature, late Miocene data (LM280c).

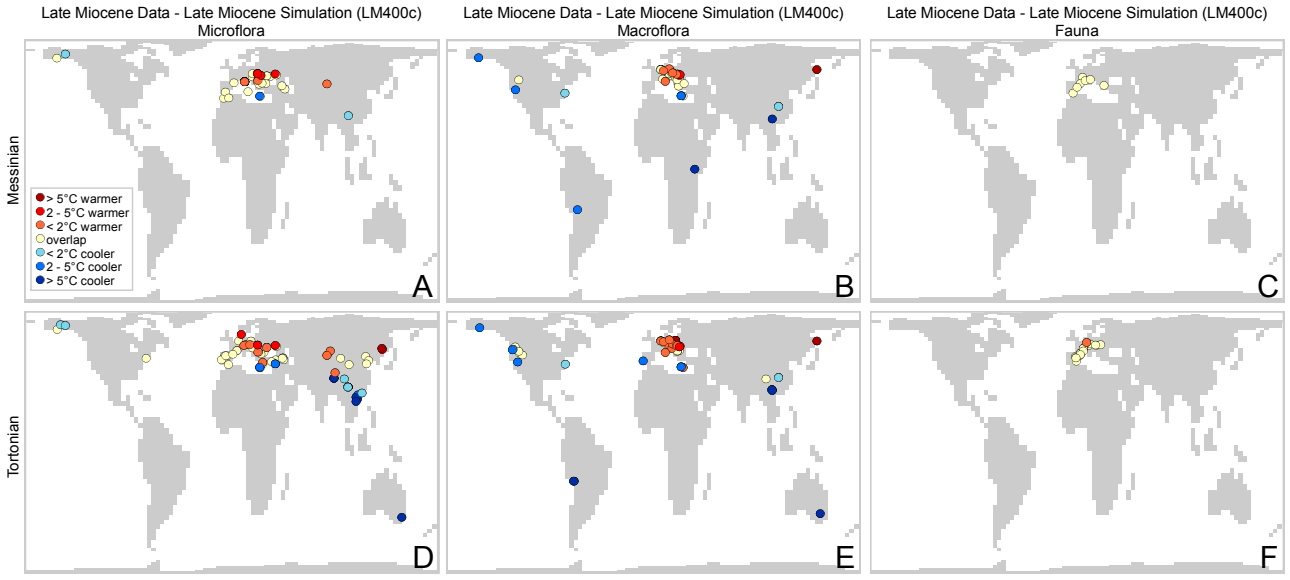

Fig. 9. Results from the model–data comparison for mean annual temperature, late Miocene data (LM400c).

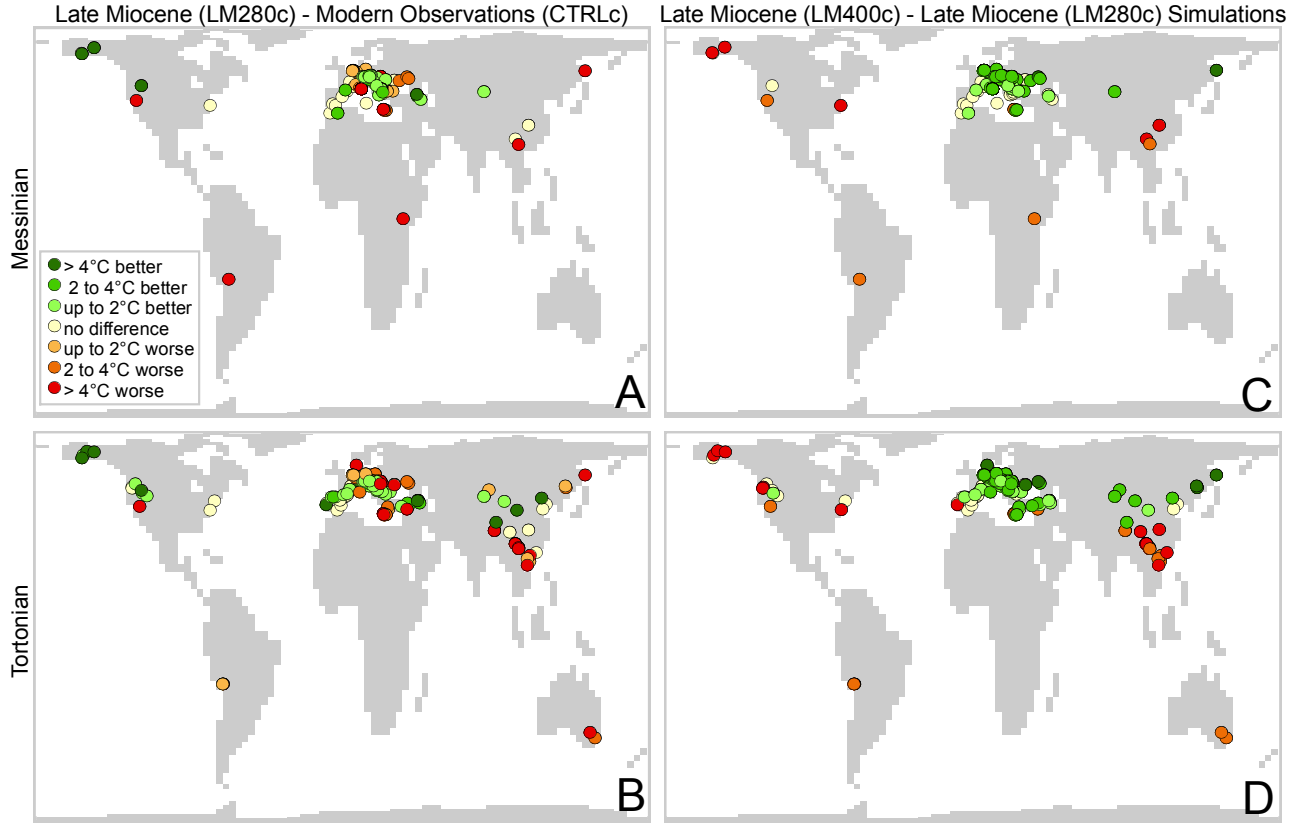

Fig. 10. Improvements in the model–data comparison for mean annual temperature. The lefthand column **(A, B)** shows the improvement that the late Miocene palaeogeography makes to the model–data comparison. The righthand column **(C, D)** shows the improvement that higher CO_2 makes to the model–data comparison. Green circles indicate an improvement; red circles indicate a deterioration. The datapoints showing "no difference" (white circles) are plotted underneath the other datapoints in order to highlight the differences.

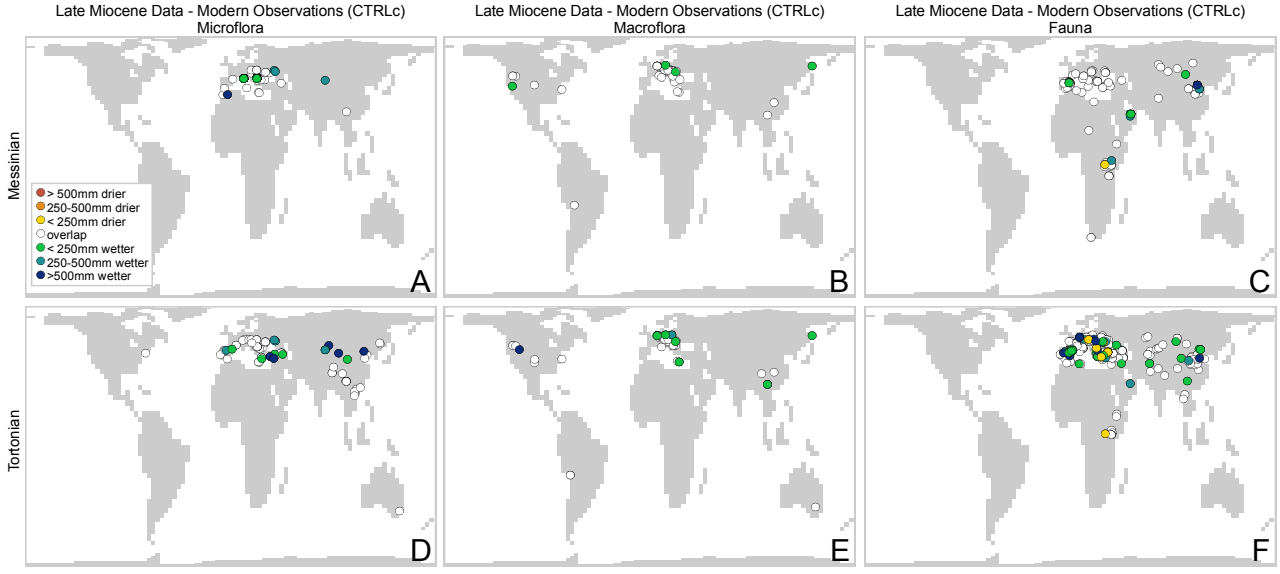

Fig. 11. Results from the model–data comparison for mean annual precipitation, late Miocene data – modern potential natural climate estimates.

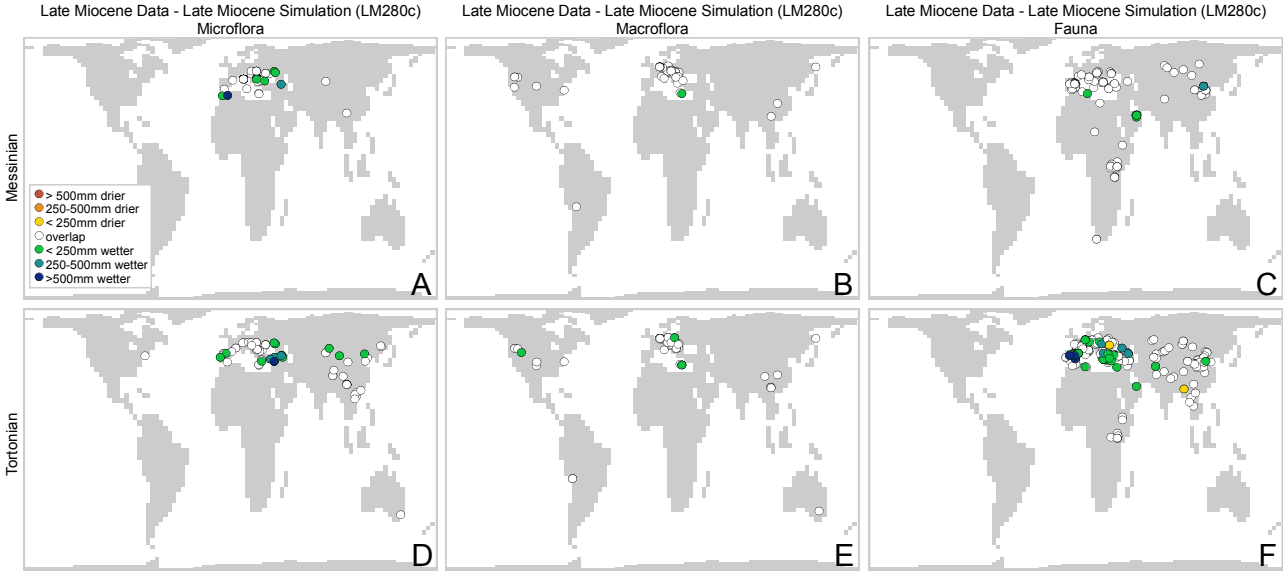

Fig. 12. Results from the model–data comparison for mean annual precipitation, late Miocene data (LM280c).

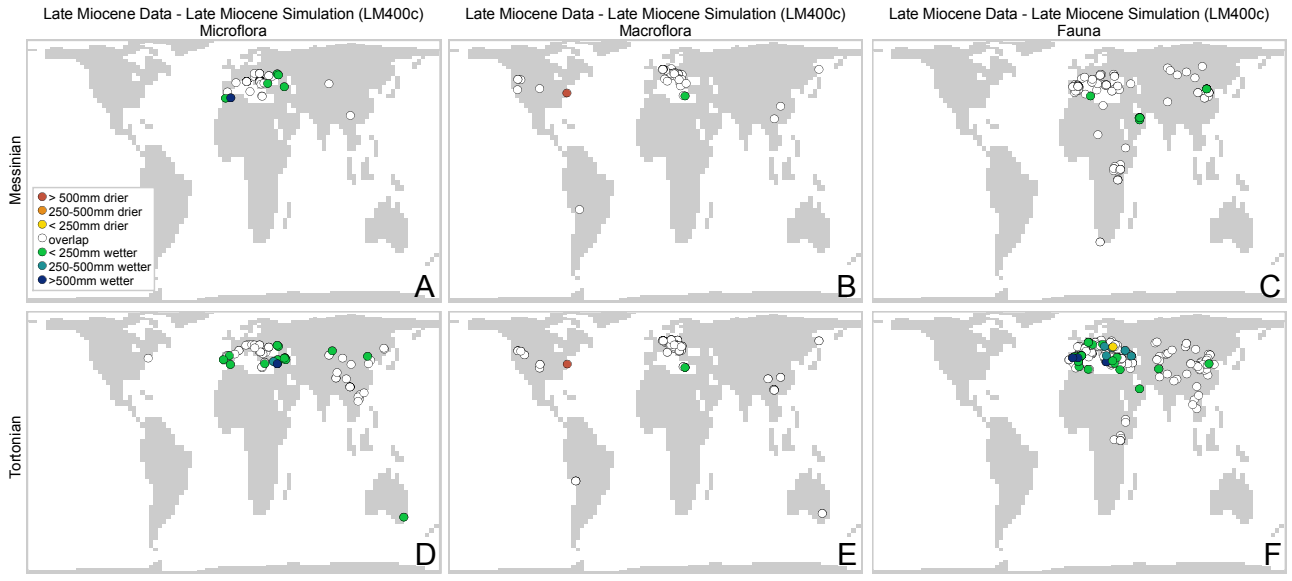

Fig. 13. Results from the model–data comparison for mean annual precipitation, late Miocene data (LM400c).

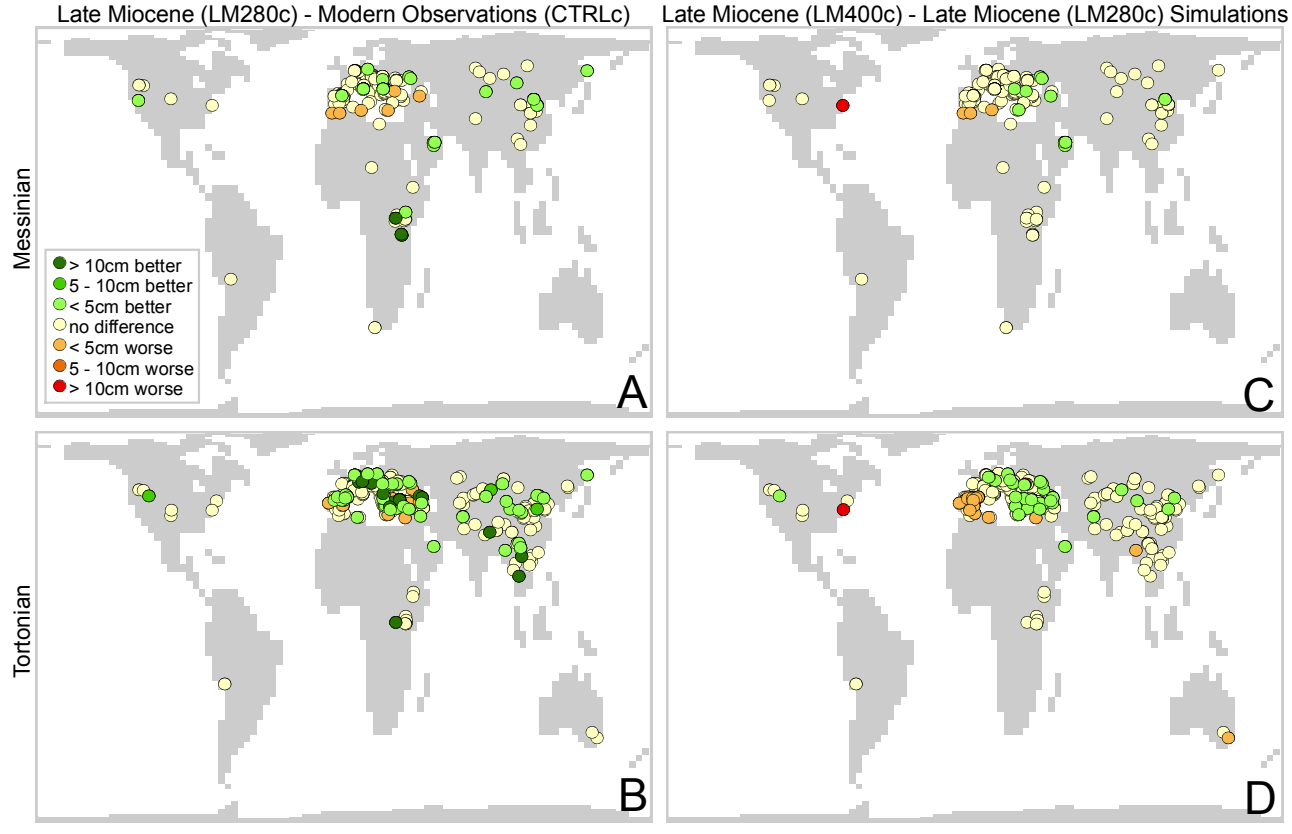

Fig. 14. Improvements in the model–data comparison for mean annual precipitation. The lefthand column **(A, B)** shows the improvement that the late Miocene palaeogeography makes to the model–data comparison. The righthand column **(C, D)** shows the improvement that higher CO_2 makes to the model–data comparison. Green circles indicate an improvement; red circles indicate a deterioration. The datapoints showing "no difference" (white circles) are plotted underneath the other datapoints in order to highlight the differences.

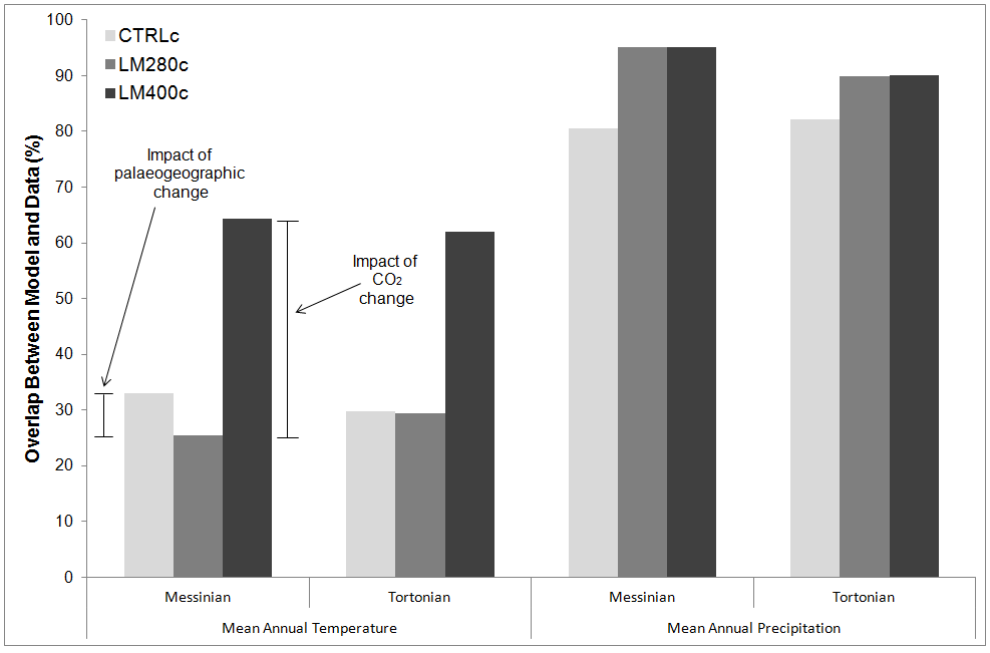

Fig. 17. Model–data comparison summary for MAT and MAP. Shown are the percentages of the total number of datapoints that overlap with the model results.

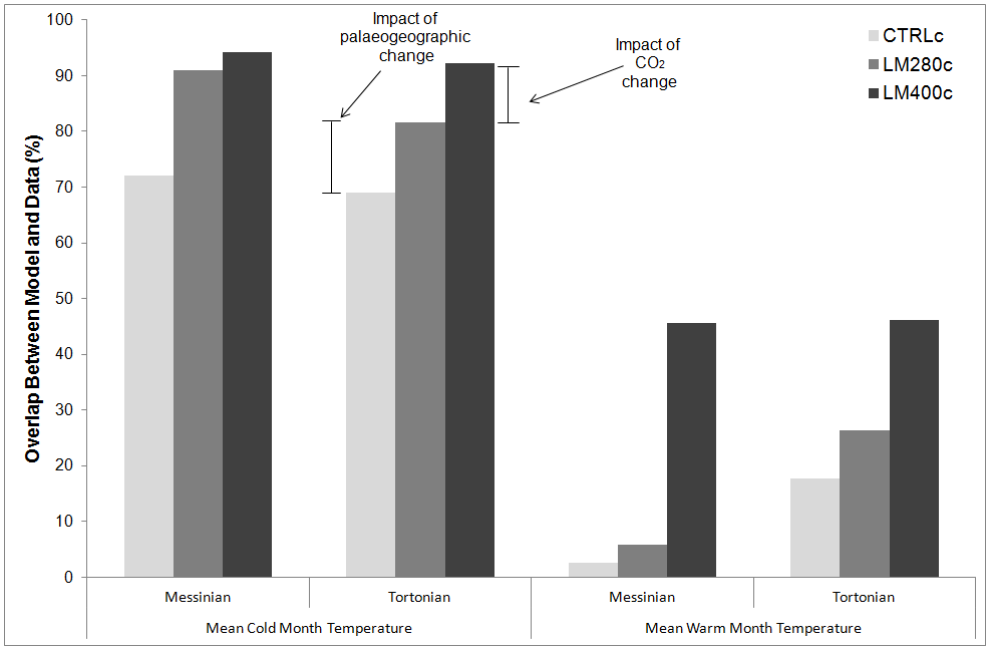

Fig. 18. Model–data comparison summary for CMT and WMT. Shown are the percentages of the total number of datapoints that overlap with the model results.

Table 2. Results from the model–data comparison for modern and late Miocene palaeogeography. Totals are expressed in bold.

Variable	Epoch	CTRLc–LMdata datapoints in agreement	LM280c–LMdata datapoints in agreement	Total number of LMdata datapoints	Number of LM280c improvements over CTRLc All data (overlaps)	Number of LM280c deteriorations over CTRLc All data (overlaps)	Net LM280c improvement over CTRLc All data (overlaps)	Percentage improvement LM280c over CTRLc All data (overlaps)
MAT (Macroflora)	Messinian	13	8	55	19(2)	28(7)	−9(−5)	−16(−9)
MAT (Microflora)		53	41	159	88(33)	62(45)	26(−12)	16(−8)
MAT (Fauna)		6	7	7	0(0)	0(0)	0(0)	0(0)
MAT (Macroflora)	Tortonian	17	18	90	41(8)	38(7)	3(1)	3(1)
MAT (Microflora)		32	29	98	53(12)	29(15)	24(−3)	24(−3)
MAT (Fauna)		13	14	20	6(1)	1(0)	5(1)	25(5)
MAT (All)	**late Miocene**	**135**	**117**	**429**	**207(56)**	**158(74)**	**49(−18)**	**11(−4)**
MAP (Macroflora)	Messinian	47	50	51	4(4)	1(1)	3(3)	6(6)
MAP (Microflora)		104	146	154	48(45)	4(3)	44(42)	29(27)
MAP (Fauna)		129	135	143	14(7)	1(1)	13(6)	9(4)
MAP (Macroflora)	Tortonian	69	75	79	9(7)	2(1)	7(6)	9(8)
MAP (Microflora)		77	76	94	15(4)	6(5)	9(−1)	10(−1)
MAP (Fauna)		432	482	531	95(57)	11(7)	84(50)	16(9)
MAP (All)	**late Miocene**	**858**	**964**	**1052**	**185(124)**	**25(18)**	**160(106)**	**15(10)**
CMT (Macroflora)	Messinian	31	38	48	16(11)	5(4)	11(7)	23(15)
CMT (Microflora)		106	135	142	36(34)	5(5)	31(29)	22(20)
CMT (Macroflora)	Tortonian	53	57	74	19(13)	11(9)	8(4)	11(5)
CMT (Microflora)		45	59	68	22(18)	5(4)	17(14)	25(21)
CMT (All)	**late Miocene**	**235**	**289**	**332**	**93(76)**	**26(22)**	**67(54)**	**20(16)**
WMT (Macroflora)	Messinian	0	2	48	27(2)	21(0)	6(2)	13(4)
WMT (Microflora)		5	9	143	15(5)	124(1)	−109(4)	−76(3)
WMT (Macroflora)	Tortonian	2	6	72	47(4)	23(0)	24(4)	33(6)
WMT (Microflora)		23	31	69	31(8)	15(0)	16(8)	23(12)
WMT (All)	**late Miocene**	**30**	**48**	**332**	**120(19)**	**183(1)**	**−63(18)**	**−19(5)**
Megabiome	Tortonian	124	123	314	N/A(19)	N/A(20)	N/A(−1)	N/A(0)
Megabiome	**late Miocene**	**229**	**222**	**556**	**N/A(34)**	**N/A(41)**	**N/A(−7)**	**N/A(−1)**

Table 3. Results from the model–data comparison for high and low CO_2 concentration assumptions. Totals are expressed in bold.

Variable	Epoch	LM280c–LMdata datapoints in agreement	LM400c–LMdata datapoints in agreement	Total number of LMdata datapoints	Number of LM400c improvements over LM280c All data (overlaps)	Number of LM400c deteriorations over LM280c All data (overlaps)	Net LM400c improvement over LM280c All data (overlaps)	Percentage improvement LM400c over LM280c All data (overlaps)
MAT (Macroflora)	Messinian	8	34	55	39(29)	9(3)	30(26)	55(47)
MAT (Microflora)		41	101	159	116(62)	3(2)	113(60)	71(38)
MAT (Fauna)		7	7	7	0(0)	0(0)	0(0)	0(0)
MAT (Macroflora)	Tortonian	18	51	90	63(43)	18(10)	45(33)	50(37)
MAT (Microflora)		29	59	98	56(41)	25(11)	31(30)	32(31)
MAT (Fauna)		14	19	20	6(5)	0(0)	6(5)	30(25)
MAT (All)	**late Miocene**	**117**	**271**	**429**	**280(180)**	**55(26)**	**225(154)**	**52(36)**
MAP (Macroflora)	Messinian	50	49	51	1(0)	1(1)	0(−1)	0(−2)
MAP (Microflora)		146	147	154	5(1)	2(0)	3(1)	2(1)
MAP (Fauna)		135	135	143	7(0)	1(0)	6(0)	4(0)
MAP (Macroflora)	Tortonian	75	76	79	4(2)	1(1)	3(1)	4(1)
MAP (Microflora)		76	75	94	15(1)	4(2)	11(−1)	12(−1)
MAP (Fauna)		482	483	531	24(5)	29(4)	−5(1)	−1(0)
MAP (All)	**late Miocene**	**964**	**965**	**1052**	**56(9)**	**38(8)**	**18(1)**	**2(0)**
CMT (Macroflora)	Messinian	38	42	48	10(7)	3(3)	7(4)	15(8)
CMT (Microflora)		135	141	142	7(7)	1(1)	6(6)	4(4)
CMT (Macroflora)	Tortonian	57	65	74	17(11)	3(3)	14(8)	19(11)
CMT (Microflora)		59	64	68	7(7)	4(2)	3(5)	4(7)
CMT (All)	**late Miocene**	**289**	**312**	**332**	**41(32)**	**11(9)**	**30(23)**	**9(7)**
WMT (Macroflora)	Messinian	2	13	48	46(11)	0(0)	46(11)	96(23)
WMT (Microflora)		9	14	143	134(5)	0(0)	134(5)	94(3)
WMT (Macroflora)	Tortonian	6	23	72	66(17)	0(0)	66(17)	92(24)
WMT (Microflora)		31	43	69	38(12)	0(0)	38(12)	55(17)
WMT (All)	**late Miocene**	**48**	**93**	**332**	**284(45)**	**0(0)**	**284(45)**	**86(14)**
Megabiome	Messinian	99	119	242	N/A(39)	N/A(19)	N/A(20)	N/A(8)
Megabiome	Tortonian	123	158	314	N/A(58)	N/A(23)	N/A(35)	N/A(11)
Megabiome	**late Miocene**	**222**	**277**	**556**	**N/A(97)**	**N/A(42)**	**N/A(55)**	**N/A(10)**