

Supplementary Figure S1

A-D. *Quercus preguyavaefolia*, A. YP022, B. YP041, C. YP126, D. YP059;

E. *Populus* sp., YP029;

F. *Rhododendron* sp.1, YP164;

G. *Rhododendron* sp.2, YP048.



Supplementary Figure S2

A. *Lithocarpus* sp., YP038;

B. *Salix* sp., YP258;

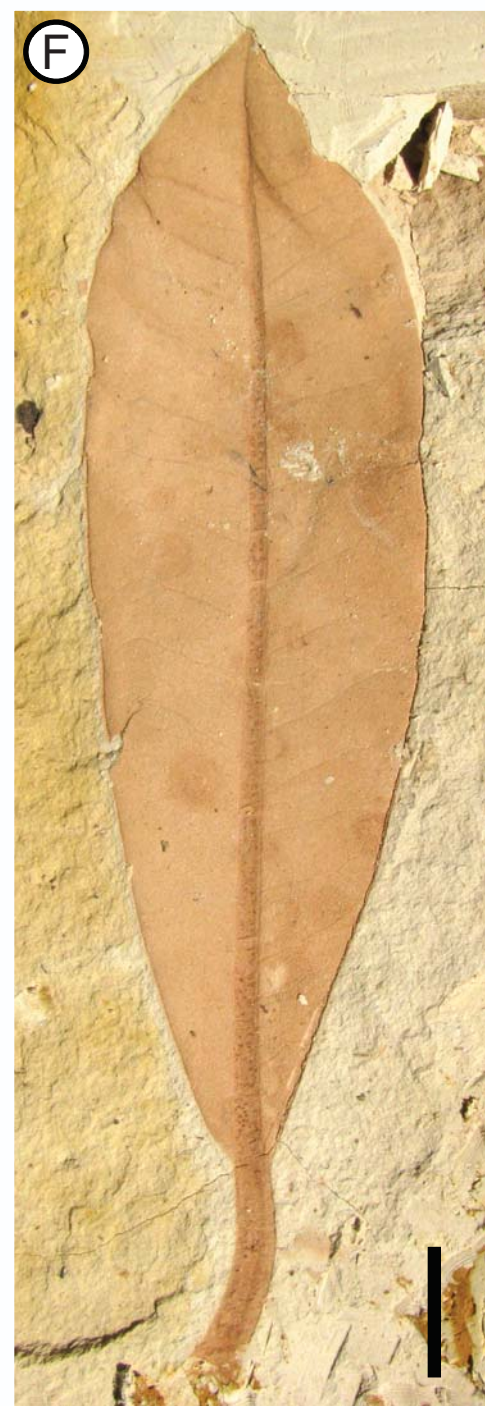
C. Morphotype 1, YP239;

D. Morphotype 2, YP294;

E. Morphotype 3, YP246;

F. Morphotype 4, YP1267;

G. Morphotype 5, YP205.



Supplementary Figure S3

- A. Morphotype 6, YP261;
- B. Morphotype 7, YP217;
- C. Morphotype 8, YP214;
- D. Morphotype 9, YP204;
- E. Morphotype 10, YP211;
- F. Morphotype 11, YP240;
- G. Morphotype 12, YP213;
- H. Morphotype 13, YP1850;
- I. Morphotype 14, YP1781;
- J. Morphotype 15, YP1785;
- K. Morphotype 16, YP616.



Supplementary Table 1 Data of paleoclimate reconstructions of Neogene floras in Yunnan. Methods: LMA = Leaf Margin Analysis; CLAMP = Climate Leaf Analysis Multivariate Program; CA = Coexistence Approach.

No.	Locality	Age	Location	Methods	References
1	Longmen, Yongping, western Yunnan	Late Pliocene	25 °31' N, 99 °31' E	LMA and CLAMP	This study
2	Longling Coal Mine, Longling, western Yunnan	Late Pliocene	24 °41' N, 98 °50' E	CA	Xu et al., 2004; Kou et al., 2006
3	Liantie, Eryuan, western Yunnan	Late Pliocene	26 °00' N, 99 °49' E	CA	Kou et al., 2006
4	Yangyi, Baoshan, western Yunnan	Late Pliocene	24 °57' N, 99 °15' E	CA	Kou et al., 2006
5	Tuantian, Tengchong, western Yunnan	Late Pliocene	24 °41' N, 98 °38' E	LMA and CLAMP	Xie et al., 2012
6	Wanbao, Yuanmou, central Yunnan	Late Pliocene	25 °51' N, 101 °49' E	CA	Yao et al., 2012
7	Mangdan, Longchuan, western Yunnan	Early to Middle Miocene	24 °24' N, 97 °49' E	CA	Zhao et al., 2004
8	Lühe, Chuxiong, central Yunan	Late Miocene	25 °10' N, 101 °22' E	CA	Xu et al., 2008
9	Xiaolongtan, Kaiyuan, southeastern Yunnan	Late Miocene	23 °49' N, 103 °12' E	CA, LMA and CLAMP	Xia et al., 2009
10	Xianfeng, Xundian, northeastern Yunnan	Late Miocene	25 °25' N, 102 °51' E	CA, LMA and CLAMP	Xing et al., 2012
11	Zhongzhai, Lincang, southwestern Yunnan	Late Miocene	23 °54' N, 100 °01' E	CA, LMA and CLAMP	Jacques et al., 2011a, b
12	Dajie, Jingdong, southwestern Yunnan	Late Miocene	24 °20' N, 101 °04' E	CA	Zhang et al., 2012
13	Hexi, Zhenyuan, southwestern Yunnan	Late Miocene	23 °35' N, 101 °10' E	CA	Zhang et al., 2012
14	Pojiao, Jinghong, southern Yunnan	Late Miocene	22 °28' N, 101 °04' E	CA	Zhang et al., 2012
15	Shanggang, Mengla, southern Yunnan	Late Miocene	21 °17' N, 101 °41' E	CA	Zhang et al., 2012

Abbreviations of climate parameters

Climatic parameter	Meaning
MAT (°C)	Mean annual temperature
WMMT (°C)	Warm month mean temperature
CMMT (°C)	Cold month mean temperature
GROWSEAS (months)	Length of the growing season
GSP (mm)	Growing season precipitation
MMGSP (mm)	Mean monthly growing season precipitation
3WET (mm)	Precipitation during the 3 consecutive wettest months
3DRY (mm)	Precipitation during the 3 consecutive driest months
RH (%)	Relative humidity
SH (g/kg)	Specific humidity
ENTHAL (kJ/kg)	Enthalpy
MSI	Monsoon index
DT (°C)	The difference in temperature between the coldest and warmest months
MAP (mm)	Mean annual precipitation
MMaP (mm)	Mean maximum monthly precipitation
MMiP (mm)	Mean minimum monthly precipitation

* Climatic data of the present day are from Yunnan Meteorological Bureau (1984).

1. Longmen, Yongping, western Yunnan (this study)**Age: Late Pliocene**

	LMA	CLAMP	Present
MAT (°C)	17.4 ± 3.3	17.4 ± 1.3	15.9
WMMT (°C)		25.8 ± 1.5	21.4
CMMT (°C)		8.9 ± 2.6	8.2
GROWSEAS (months)		9.3 ± 0.7	10.0
GSP (mm)		1735.5 ± 217.7	986.9
MMGSP (mm)		187.6 ± 25.3	98.7
3WET (mm)		800.3 ± 139.0	588.6
3DRY (mm)		184.5 ± 41.2	69.5
RH (%)		81.1 ± 6.0	75.0
SH (g/kg)		11.1 ± 1.2	
ENTHAL (kJ/kg)		334.4 ± 5.4	
MSI		35.5	52.6

2. Longling Coal Mine, Longling, western Yunnan (Xu et al., 2004; Kou et al., 2006)**Age: Late Pliocene**

	CA	Present
MAT (°C)	18.6 - 22.1	15.0
MAP (mm)	815.8 - 1254.7	2086.1

3. Liantie, Eryuan, western Yunnan (Kou et al., 2006)**Age: Late Pliocene**

	CA	Present
MAT (°C)	13.3 - 18.6	13.9
WMMT (°C)	24.6 - 27.5	20.0
CMMT (°C)	1.9 - 12.1	6.8
MAP (mm)	619.9 - 1484.3	791.7

4. Yangyi, Baoshan, western Yunnan (Kou et al., 2006)**Age: Late Pliocene**

	CA	Present
MAT (°C)	13.3 - 20.9	15.6
MAP (mm)	797.5 - 1254.7	974.2

5. Tuantian, Tengchong, western Yunnan (Xie et al., 2012)**Age: Late Pliocene**

	LMA	CLAMP	Present
MAT (°C)	17.6 ±2.7	15.3 ±1.3	14.9
WMMT (°C)		24.3 ±1.5	19.8
CMMT (°C)		7.7 ±2.6	7.6
GROWSEAS (months)		8.1 ±0.7	9.0
GSP (mm)		1625.7 ±217.7	1381.1
MMGSP (mm)		186.8 ±25.3	153.5
3WET (mm)		787.4 ±139	790.0
3DRY (mm)		209.9 ±41.2	111.6
RH (%)		81.6 ±6.0	79.0
SH (g/kg)		10.3 ±1.2	
ENTHAL (kJ/kg)		329.2 ±5.4	
MSI		35.5	49.1

6. Wanbao, Yuanmou, Central Yunnan (Yao et al., 2012)**Age: Late Pliocene**

	CA	Present
MAT (°C)	15.0 - 19.8	21.8
WMMT (°C)	23.4 - 28.6	27.0
CMMT (°C)	4.9 - 11.9	14.5
DT (°C)	13.7 - 21.0	12.5
MAP (mm)	1114.9 - 1869.9	634.0
MMaP (mm)	198.3 - 268.1	140.9
MMiP (mm)	6.9 - 14.1	2.9

7. Mangdan, Longchuan, western Yunnan (Zhao et al., 2004)**Age: Early to Middle Miocene**

	CA	Present
MAT (°C)	18.8 - 20.5	18.9
WMMT (°C)	27.6 - 28.0	23.4
CMMT (°C)	7.9 - 11.3	11.4
RH (%)	70 - 74	79
MAP (mm)	1170 - 1300	1664.7

8. Lühe, Chuxiong, central Yunan (Xu et al., 2008)**Age: Late Miocene**

	CA	Present
MAT (°C)	13.3 - 20.9	15.5
WMMT (°C)	22.5 - 27.5	20.8
CMMT (°C)	2.5 - 12.6	8.1
DT (°C)	12.1 - 24.8	12.7
MAP (mm)	803.6 - 1254.7	826.8
MMaP (mm)	179.4 - 249.6	191.9
MMiP (mm)	10.2 - 18.5	6.8

9. Xiaolongtan, Kaiyuan, southeastern Yunnan (Xia et al., 2009; Jacques et al., 2011a)**Age: Late Miocene**

	LMA	CLAMP	CA	present
MAT (°C)	20.1 ± 2.3	19.9 ± 1.3	16.7 - 19.2	19.7
WMMT (°C)		26.7 ± 1.5	25.4 - 26.0	24.3
CMMT (°C)		12.5 ± 2.6	7.7 - 8.7	12.8
GROWSEAS (months)		10.1 ± 0.7		12
GSP (mm)		1970.3 ± 217.7		820.5
MMGSP (mm)		201.4 ± 25.3		68.4
3WET (mm)		827.8 ± 139.0		439.4
3DRY (mm)		210.3 ± 41.2		75.6
RH (%)		80.7 ± 6.0		72
SH (g/kg)		12.6 ± 1.2		
ENTHAL (kJ/kg)		342.3 ± 5.4		
MAP (mm)			1215 - 1639	820.5
MSI		31.3		44.3

10. Xianfeng, Xundian, northeastern Yunnan (Xing et al., 2012)**Age: Late Miocene**

	LMA	CLAMP	CA	present
MAT (°C)	17.32 ± 2.46	15.4 ± 1.3	17.2 - 21.7	14.5
WMMT (°C)		26.8 ± 1.5	23.4 - 26.1	20.1
CMMT (°C)		6.2 ± 2.6	10.7 - 13.0	6.8
GROWSEAS (months)		7.6 ± 0.7		9
GSP (mm)		1908.7 ± 217.7		1003.2
MMGSP (mm)		237.4 ± 25.3		111.5
3WET (mm)		794.7 ± 139.0		603
3DRY (mm)		248.0 ± 41.2		50.2
RH (%)		76.8 ± 6.0		72
SH (g/kg)		9.7 ± 1.2		
ENTHAL (kJ/kg)		327.0 ± 5.4		
MAP (mm)			1206.0 - 1613.0	1038.1
MSI		28.6		55.1

11. Zhongzhai, Lincang, southwestern Yunnan (Jacques et al., 2011a, b)**Age: Late Miocene**

	LMA	CLAMP	CA	Present
MAT (°C)	22.0 ± 1.9	19.8 ± 1.3	18.5 - 19.0	17.3
WMMT (°C)		27.3 ± 1.5	27.3 - 27.8	21.3
CMMT (°C)		11.2 ± 2.6	9.6 - 12.5	10.8
GROWSEAS (months)		10.2 ± 0.7		12
GSP (mm)		2269.7 ± 217.7		1178.7
MMGSP (mm)		231.4 ± 25.3		98.2
3WET (mm)		924.4 ± 139.0		680.2
3DRY (mm)		220.6 ± 41.2		68.5
RH (%)		84.98 ± 6.0		74
SH (g/kg)		13.15 ± 1.2		
ENTHAL (kJ/kg)		344.1 ± 5.4		
MAP (mm)			1213 - 1394	1178.8
MSI		31		51.9

12. Dajie, Jingdong, southwestern Yunnan (Zhang et al., 2012)**Age: Late Miocene**

	CA	Present
MAT (°C)	11.5 - 17.3	18.4
WMMT (°C)	19.8 - 28.0	23.3
CMMT (°C)	-0.2 - 5.9	11
DT (°C)	12.3 -24.6	12.3
MAP (mm)	793.9 - 1389.4	1097.2
MMaP (mm)	172.4 - 245.2	215.3
MMiP (mm)	6.9 - 22.1	10.6

13. Hexi, Zhenyuan, southwestern Yunnan (Zhang et al., 2012)**Age: Late Miocene**

	CA	Present
MAT (°C)	11.5 - 20.8	18.6
WMMT (°C)	18.7 - 28.0	22.9
CMMT (°C)	-0.2 - 5.9	11.7
DT (°C)	12.1 - 26.0	11.2
MAP (mm)	793.9 - 1389.4	1281.6
MMaP (mm)	172.4 - 245.2	269.8
MMiP (mm)	5.7 - 22.1	9.6

14. Pojiao, Jinghong, southern Yunnan (Zhang et al., 2012)

Age: Late Miocene

	CA	Present
MAT (°C)	11.5 - 21.9	21.9
WMMT (°C)	18.7 - 28.0	25.6
CMMT (°C)	-0.2 - 5.9	15.7
DT (°C)	12.1 - 24.6	9.9
MAP (mm)	793.9 - 1389.4	1196.0
MMaP (mm)	139 - 245.2	245.8
MMiP (mm)	4.9 - 23.6	11.2

15. Shanggang, Mengla, southern Yunnan (Zhang et al., 2012)**Age: Late Miocene**

	CA	Present
MAT (°C)	11.5 - 21.9	21.1
WMMT (°C)	18.7 - 28.5	24.7
CMMT (°C)	-0.2 - 5.9	15.3
DT (°C)	12.1 - 26.0	9.4
MAP (mm)	793.9 - 1389.4	1527.1
MMaP (mm)	137.3 - 245.2	312.8
MMiP (mm)	4.5 - 22.1	24.1
