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Appendix

Table S1 Radiocarbon dates for PML13 sediment sequences, Mt. Taibai, central China

Lab no	Material dated	Depth (cm)	^{14}C age (yr BP)	Calibrated age (cal. yr BP)	Range (cal. yr BP) (2σ)
Beta485246	Bulk Sediment	21.5	1100±30	1001	937–1064
BA131710	Bulk Sediment	29.5	1485±20	1366	1325–1406
BA150625	Bulk Sediment	57.5	2345±20	2354	2329–2378
BA131711	Bulk Sediment	79.5	2760±25	2838	2782–2894
BA150626	Bulk Sediment	100.5	3255±25	3502	3443–3561
Beta485248	Bulk Sediment	118.5	3840±30	4255	4151–4358
Beta485249	Bulk Sediment	137.5	5040±30	5807	5713–5900
BA131712	Bulk Sediment	144.5	5025±25	5849	5805–5892

Table S2 Correlation analysis between climatic factors and the environmental proxies[a)]

Magnetic parameters	Indicative significance	*r*		
		EASM	Summer precipitation	Mean annual temperature*r*
χ_{lf} (10^{-8} m^3 kg^{-1})	A rough measure of ferrimagnetic minerals	−0.72	−0.51	0.67
ARM (10^{-6} Am^2 kg^{-1})	Indicates the content of SSD grains	−0.76	−0.59	0.78
$IRM_{300\ mT}$ (10^{-6} Am^2 kg^{-1})	Hard Isothernmal Remnant Magnetization, the content of ferrimagnetic minerals	−0.80	−0.67	0.79
SIRM (10^{-6} Am^2 kg^{-1})	Saturation Isothermal Remnant Magnetization, the content of all magnetic minerals (ferritic minerals, antiferromagnetic minerals, etc.)	−0.76	−0.62	0.77
$IRM_{-100\ mT}$ (10^{-6} Am^2 kg^{-1})	Indicates the content of antiferromagnetic minerals	0.82	0.69	−0.83
$IRM_{-300\ mT}$ (10^{-6} Am^2 kg^{-1})	Indicates the content of antiferromagnetic minerals	0.81	0.68	−0.81
$IRM_{300\ mT}$/SIRM	The relative content of ferrimagnetic minerals in the total ferromagnetic minerals	−0.70	−0.60	0.66
$IRM_{-100\ mT}$/SIRM	The proportion of antiferromagnetic minerals in total ferromagnetic minerals	0.73	0.59	−0.75
$IRM_{-300\ mT}$/SIRM	The proportion of antiferromagnetic minerals in total ferromagnetic minerals	0.76	0.62	−0.77
ARM/SIRM	The proportion of SSD grains in total ferromagnetic minerals	−0.32	−0.22	0.38

a) Correlations listed in this table are all significant ($p < 0.01$) according to *t*-test.

Table S3 Correlation matrix of the grain size and mineral magnetic parameters[a)]

r	Mean grain size	χ_{lf}	ARM	IRM_{300mT}	SIRM	$IRM_{-100\ mT}$	$IRM_{-300\ mT}$	$IRM_{300\ mT}$/SIRM	$IRM_{-100\ mT}$/SIRM	$IRM_{-300\ mT}$/SIRM	ARM/SIRM
Mean grain size	1.00										
χ_{lf}	−0.33	1.00									
ARM	−0.44	0.88	1.00								
$IRM_{300\ mT}$	−0.35	0.93	0.94	1.00							
SIRM	−0.36	0.94	0.94	0.98	1.00						
$IRM_{-100\ mT}$	0.35	−0.90	−0.94	−0.97	−0.95	1.00					
$IRM_{-300\ mT}$	0.33	−0.92	−0.92	−0.99	−0.97	0.98	1.00				
$IRM_{300\ mT}$/SIRM	−0.34	0.75	0.80	0.85	0.73	−0.82	−0.82	1.00			
$IRM_{-100\ mT}$/SIRM	0.44	−0.89	−0.96	−0.91	−0.91	0.96	0.92	−0.81	1.00		
$IRM_{-300\ mT}$/SIRM	0.38	−0.89	−0.92	−0.93	−0.90	0.96	0.95	−0.88	0.96	1.00	
ARM/SIRM	−0.46	0.41	0.68	0.42	0.39	−0.49	−0.40	0.55	−0.67	−0.57	1.00

a) Correlations listed in this table are all significant ($p < 0.01$) according to *t*-test.

Table S4 Total variance interpretation of principal component analysis

PC	Initial eigenvalue			Extraction sums of squared loadings		
	Total	Percentage of variance (%)	Accumulation (%)	Total	Percentage of variance (%)	Accumulation (%)
1	8.758	79.620	79.620	8.758	79.620	79.620
2	1.092	9.923	89.543	1.092	9.923	89.543
3	0.598	5.434	94.977			
4	0.306	2.777	97.754			
5	0.113	1.024	98.779			
6	0.094	0.852	99.631			
7	0.022	0.197	99.828			
8	0.014	0.132	99.959			
9	0.004	0.035	99.994			
10	0.000	0.004	99.999			
11	0.000	0.001	100.000			

Table S5 Component matrix of principal component analysis.

	Component	
	1	2
Mean grain size	–0.446	0.702
χ_{lf}	0.929	0.178
ARM	0.974	–0.078
$IRM_{300\ mT}$	0.972	0.181
SIRM	0.953	0.193
$IRM_{-100\ mT}$	–0.977	–0.121
$IRM_{-300\ mT}$	–0.969	–0.209
$IRM_{300\ mT}$/SIRM	0.864	–0.025
$IRM_{-100\ mT}$/SIRM	–0.975	0.080
$IRM_{-300\ mT}$/SIRM	–0.975	–0.031
ARM/SIRM	0.592	–0.652

Table S6 RDA ordination summary

Axes	Axis 1	Axis 2	Axis 3	Total variance
Eigenvalues	8.495	0.171	0.052	1.000
Cumulative percentage variance				
of species data	53.1	54.2	54.5	
of species-environment relation	97.4	99.4	100	
Sum of all eigenvalues				1.000
Sum of all canonical eigenvalues				8.718

Table S7 Correlations between climatic factors with the axis[a)]

Parameters	Axis 1	Axis 2
EASM index	0.92	0.31
Summer precipitation	0.79	–0.48
Mean annual temperature	–0.92	–0.07

a) Significant correlations are marked with dark backgrounds ($p < 0.01$) according to *t*-test.