

Table S1. Characteristics of the sampling sites and their ring-width standard chronologies.

Regions	Sampling sites	Latitude (° N)	Longitude (° E)	Altitude (a.s.l. m)	CL	SN	Rbar	MS	SNR	SSS>0.85
RN: Surrounding of Mt. Nurgong-Yabulai	BD04	40.281	103.506	1466	1844-2006	31	0.54	0.29	7.84	1941-2006
	ZX03	40.199	104.795	1307	1860-2015	39	0.59	0.34	14.17	1924-2015
	ZX04	40.217	104.573	1382	1918-2016	45	0.58	0.44	28.30	1941-2015
	ZX05	40.485	104.263	1471	1876-2015	47	0.63	0.42	34.25	1925-2015
	ZX06	40.410	104.016	1479	1901-2015	44	0.55	0.43	20.18	1937-2015
	ZX07	39.890	104.640	1510	1885-2015	38	0.51	0.4	19.52	1975-2015
	ZX08	40.153	104.037	1400	1894-2017	68	0.72	0.43	59.77	1914-2017
	ZX13	39.772	103.573	1371	1850-2017	46	0.49	0.39	16.38	1911-2017
RW: Surrounding of Ulan Buh Desert	ZXZN	39.113	105.658	1299	1903-2022	54	0.41	0.43	11.69	1967-2022
	ZXJL	40.150	105.555	1280	1886-2021	39	0.44	0.32	11.51	1996-2021
	ZXTM	40.695	105.985	1343	1941-2022	36	0.39	0.47	8.80	1985-2022
	ZXDK	40.585	106.357	1036	1892-2022	36	0.57	0.51	20.88	1969-2022
	ZXBL	40.239	107.024	1076	1958-2023	68	0.57	0.49	22.70	1978-2023
	ZXMX	39.831	107.012	1416	1942-2023	38	0.41	0.43	4.46	1974-2023
	ZX09	39.531	106.530	1312	1885-2017	45	0.45	0.48	11.44	1951-2017

	ZXBJ	39.360	105.916	1215	1949-2022	38	0.47	0.41	11.33	1967-2022
RY: Surrounding of Badan Jaran Desert	ZX14	39.419	102.483	1426	1912-2019	54	0.54	0.46	17.93	1943-2019
	ZXMQ	38.875	102.921	1545	1966-2022	64	0.50	0.53	21.41	1981-2022
	BD01	39.774	101.399	1251	1856-2006	37	0.37	0.26	3.80	1946-2006
	BD02	39.687	102.303	1424	1840-2006	41	0.42	0.22	2.98	1958-2006
	BD03	40.458	102.261	1280	1891-2006	32	0.39	0.20	3.22	1945-2006
RT: Surrounding of Tengger Desert	ZX01	38.209	105.226	1390	1917-2015	56	0.53	0.36	19.61	1934-2015
	ZX02	37.933	105.267	1358	1911-2015	53	0.46	0.38	9.57	1959-2015
	ZX10	37.618	104.563	1526	1919-2017	53	0.65	0.47	34.05	1944-2017
	ZX11	37.730	105.155	1345	1971-2017	43	0.64	0.41	22.11	1973-2017
	ZX12	37.885	104.649	1445	1889-2017	54	0.6	0.4	29.74	1921-2017

2 CL, chronology length; SN, the number of samples; Rbar, mean series intercorrelation; MS, mean sensitivity; SSS>0.85, the period of subsample
3 signal strength (SSS) index >0.85; and SNR, signal-to-noise ratio.