1 Table S1. Rupture Parameters of the fault segments in the northwestern Yunnan region

Fault Name	Segment No.	Historical events		Characteristic EQ.		Paleo-earthquakes	Holocene slip rate (mm/yr)		Dip		References
		Time	Mag.	Length (km)	Mag.* (M_W)		Horizontal	vertical	Direction	Angle (°)	
Lijiang-Xiaojinhe fault	F1			56	6.9		2.0±0.7	0.2±0.1	N	80	Rui Ding, 2024, Private Communication
	F2	1976	*M*6.3	37	6.6		1.0±0.7	0.2±0.1	N	80	
	F3			44	6.7		1.0±0.7	0.2±0.1	N	80	
	F4			17	6.1		2.1±1.5	0.4±0.2	N	80	Gao et al., 2019 Ding et al., 2018
	F5			15	6.0		3.3±0.5	0.4±0.2	N	75	
	F6			23	6.3	7940~6540 a. BP 4740~4050 a. BP 1830~420 a. BP	3.3±1.2	0.4±0.2	N	75	
	F7			21	6.2	5120~3200 a. BP 2100~1200 a. BP	3.3±1.2	0.4±0.2	N	75	
	F8			25	6.4	44980~17660 a. BP 7210~3810 a. BP 2540~1540 a. BP	2.4±0.5		N	75	Gao et al., 2019 Ding et al., 2018
	F9			16	6.0		2.4±0.5		N	75	
	F10	1951	*M*6.4	42	6.7	5980±560 a. BP 1770±1000 a. BP	2.4±0.5		N	75	Li et al., 2016 Gao et al., 2019 Ding et al., 2018

Longpan-Qiaohou fault	F11	1751	*M*6.7	49	6.8	10737±468 a. BP 6230±130 a. BP	2.2±1.2	0.2±0.2	W	75	Institute of Geology-State Seismological Bureau, and Yunnan Seismological Bureau, 1990; Tang et al., 2014
	F12	1925	*M*6.1	58	6.9				W	75	
	F13			25	6.3				W	75	
	F14			19	6.1				W	75	
Yulong East fault	F15	1990	M_W6.6	23	6.3		-0.84	~0.70	E	75	Zhou et al., 2004; Han et al., 2004
	F16			30	6.5				E	75	
Zhongdian fault	F17			15	6.0		-1.8±0.2	0.6±0.2	W	80	Chang et al.,2014; Chang et al., 2023; Cheng et al., 2020
	F18	1966	*M*6.4	20	6.2				W	80	
	F19	1933	*M*6.3	23	6.3	4910~45aBP 7000 a BP 32.93~19.96 ka. BP			W	80	
	F20			48	6.8				E	80	
	F21			74	7.1				E	80	

	F22	1961	*M*6.1	39	6.6	1075±95 a BP 490±110 a BP			E	80	
Heqing-Eryuan fault	F23			49	6.8		2.0±1.0	0.7~1.0	W	80	Institute of Geology-State Seismological Bureau, and Yunnan Seismological Bureau, 1990; Han et al., 2005; Sun et al.,2017
	F24	1839-2-7 1839-2-23	*M*6.3 *M*6.3	60	7.0				W	80	
Ninglang fault	F25			16	6.0		0.5±0.4	0.0±0.3	W	80	Wu et al., 2023; Panxing Yang, 2024, Private Communication
	F26			49	6.8				W	80	
Chenghai fault	F27	1515	*M*7.8	62	7.0	9851 a BP 7400 a BP 5501 a BP 2299 a BP 1515 AD	3.0±1.5	1.7±0.3	W	80	Institute of Geology-State Seismological Bureau, and Yunnan Seismological Bureau, 1990; Yu et al., 2005
	F28	1515	*M*7.8	31	6.5	1606 *M*6			W	80	Institute of Geology-State Seismological Bureau, and Yunnan Seismological

											Bureau, 1990; Tang et al., 2017; Huang et al.,2018
	F29	1803	*M*6.3	82	7.2		2.5±1.5	1.7±0.3	W	80	Institute of Geology-State Seismological Bureau and Yunnan Seismological Bureau, 1990; Tang et al., 2017; Huang et al., 2018
Weixi-Qiaohou fault	F30			43	6.7		-1.25	~0.91	W	80	Ren et al., 2007;
	F31			37	6.6				W	80	
	F32			49	6.8				W	80	
Tongdian-Weishan fault	F33			49	6.8		-2.1±0.3	0.4±0.1	W	80	Chang et al., 2016;2022
	F34			58	6.9	28000 a. BP			W	80	
	F35			54	6.9				W	80	
Diancangshan East fault	F36	1925 1515	*M*6.9 *M*6.1	50	6.8	62 a BP 474 a BP ⩾2070 a. BP 2700 a BP 5500 a. BP 6500 a.BP	/	1.5±0.5	E	80	Guo et al., 1984; Zhou et al., 2004

≤10800 a BP										
Red River fault	F37	1623	*M*6.3	23	6.3	-1.1 ± 0.4	/	W	80	Shi et al., 2018
	F38	1625	M6.8	32	6.5	-1.1 ± 0.4	/	W	80	Shi et al., 2018; Li et al., 2016

References

Chang, Z., Zhang, Y., Li, J., & Zang, Y. 2014. The Geological and Geomorphic Characteristic of Late Quaternary Activity of the Deqin-Zhongdian-Daju Fault. Journal of Seismological Research (in Chinese), **37**, 46-52.

Chang, Z., Chang, H., Zang, Y., & Dai, B. 2016. Recent active features of Weixi-Qiaohou fault and its relationship with the Honghe fault. Journal of Geomechanics (in Chinese), **22**, 517-530.

Chang, Z., Li, J., Chang, H., Luo, L., Liu, C., & He, S. 2022. Late-Quaternary Activity of Tongdian-Madeng Basin Segment of Weixi-Qiaohou fault. Acta Scientiarum Naturalium Universities Pekinensis (in Chinese), **58**, 875-887.

Cheng, L., Li, G., Wu, H., Yu, J., & Su, G. 2020. A Preliminary Study of Paleo-earthquake in the Majiacun-Daju Section of Zhongdian-Daju Fault, Yunnan Province. Earthquake Research in China (in Chinese), **36**, 211-220.

Ding, R., Ren, J., Zhang, S., Lu, Y., & Liu, H. 2018. Late Quaternary Paleoearthquakes on the Middle segment of the Lijiang-Xiaojinhe fault, Southeastern Tibet. Seismology and Geology (in Chinese), **40**, 622-640.

Gao, Y., Ding, R., Zhang, S., & Ren, J. 2019. Slip rate of Lijiang-Xiaojinhe fault in the Holocene. Technology for Earthquake Disaster Prevention (in Chinese), **14**, 617-627.

Guo, S., Zhang, J., Li, X., Xiang, H., Chen, T., & Zhang, G. 1984. Fault displacement and recurrence intervals of earthquakes at the northern segment of the Honghe fault zone, Yunnan Province. Seismology and Geology (in Chinese), **6**, 1-12.

Han, Z., Guo, S., Xiang, H., Zhang, J., & Ran, Y. 2004. Seismotectonic Environment of occurring the February 3, 1996 Lijiang M=7.0 earthquake, Yunnan Province. Acta Seismologica Sinica (in Chinese), **26**, 410-418.

Han, Z., Xiang, H., & Guo, S. 2005. Sinistral shear and extension of the northern section of Lijiang Basin in northwest Yunnan in Quaternary. Chinese Science Bulletin, **50**, 452-459.

Huang, X., Wu, Z., Huang, X., & Luo, R. 2018. Tectonic Geomorphology constrains on Quaternary Activity and Segmentation along Chenghai-Binchuan Fault zone in Northwest Yunnan, China. Earth Science (in Chinese), **43**, 4651-4670.

Institute of Geology-State Seismological Bureau, & Yunnan Seismological Bureau. 1990. Active faults in Northwestern Yunnan Region (in Chinese). Seismological Press, Beijing, China.

Li, A., Zhang, S., Ding, R., & Wang, X. 2016. A Paleoseismic research of the south segment of the Lijiang-Xiaojinhe fault in the Holocene. Crustal Structure and Crustal Stress, 1-9.

Li, X., Ran, Y., Chen, L., Wang, H., Yu, J., Zhang, Y., & Xie, Y. 2016. The Holocene seismic evidence on southern segment of the Red River fault zone. Seismology and Geology (in Chinese), **38**, 598-604.

Ren, J., Zhang, S., Hou, Z., & Liu, X. 2007. Study of Late Quaternary slip rate in the Mid-Segment of the Tongdian-Weishan fault. Seismology and Geology (in Chinese), **29**, 756-764.

Shi, X., Sieh, K., Weldon, R., Zhu, C., Han, Y., Yang, J., & Robinson, S. 2018. Slip rate and rare large prehistoric earthquakes of the Red River fault, southwestern China. Geochemistry, Geophysics, Geosystems, **19**, doi:10.1029/2017GC007420.

Sun, C., Li, D., Shen, X., Kang, Y., Liu, R., & Zhang, Y. 2017. Holocene activity evidence on the southeast boundary fault of Heqing basin, middle segment of Heqing-Eryuan fault zone, West Yunnan Province. China. Journal of Mountain Science, **14**, 1445-1453.

55 Tang, Y., Hu, C., Tian, Q., Wang, L., Yang, P., & Xiong, R. 2014. A Preliminary Study
56 of Paleo-earthquakes in the Jianchuan Section of Longpan-Qiaohou Fault Zone,
57 Yunnan Province. Earthquake (in Chinese), **34**, 117-124.
58 Tang, F., Ma, H., & Song, J. 2017. Study on the Late Quaternary activity of Chenghai
59 fault zone. Proceeding of the 16th World conference on earthquake engineering,
60 Santiago, Chile.
61 Wu, X., Xu, X., Yu, G., Ren, J., Yang, X., Chen, G., Xu, C., Du, K., Huang, X., Yang,
62 H., Li, K., & Hao, H. 2023. China Active Faults Database and its web system.
63 Earth System Science Data, doi:10.5194/essd-2023-119.
64 Yu, W., Zhang, J., Zhou, G., Wang, J., & Zeng, X. 2005. Surface Rupture of the 2001
65 Yongsheng *M*6 Earthquake and Chenghai Fault. Journal of Seismological
66 Research (in Chinese), **28**, 125-128.
67 Zhou, Q., Guo, S., & Xiang, H. 2004. Principle and method of delineation of potential
68 seismic sources in northeastern Yunnan Province. Seismology and Geology (in
69 Chinese), **26**, 761-771.