Journal of Geophysical Research: Solid Earth

Supporting Information for

Reconciling the long-term growth of the Northeastern Tibetan Plateau and the upstream Yellow River profile

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Introduction

This Supplementary Information contains two figures and three tables, supporting the analysis in the main text.

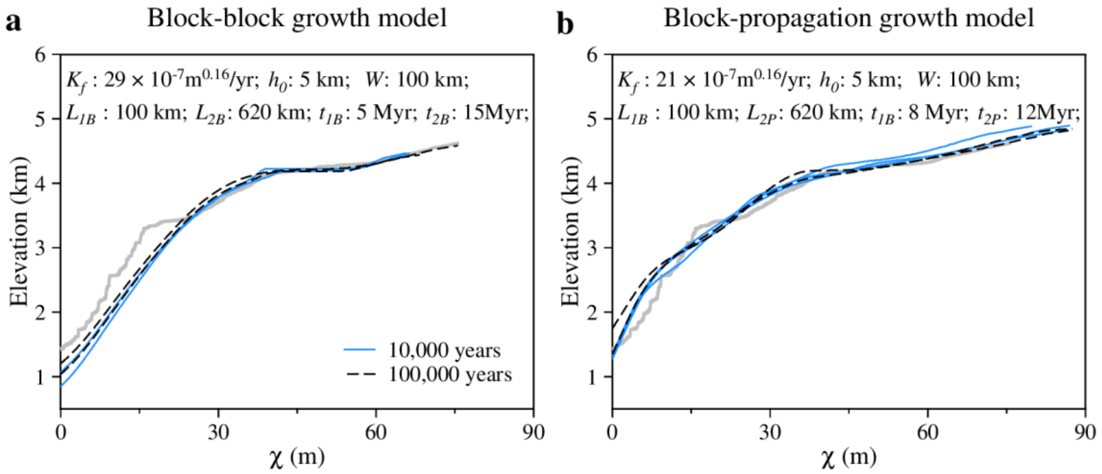

Figure S1. Comparison of χ from different time steps. (a) Block-block growth model. (b) Block-propagation growth model. The grey line is an observed river profile. The dashed lines are 100,000 years of a time step. The blue solid lines are 10,000 years of a time step. L_{1B} and t_{1B} are the distance and duration of the first block growth, respectively. L_{2B} and t_{2B} are the distance and duration of the second block growth, respectively. L_{2P} and t_{2P} are the distance and duration of the second propagation growth, respectively. River profiles resulting from different time steps are similar.

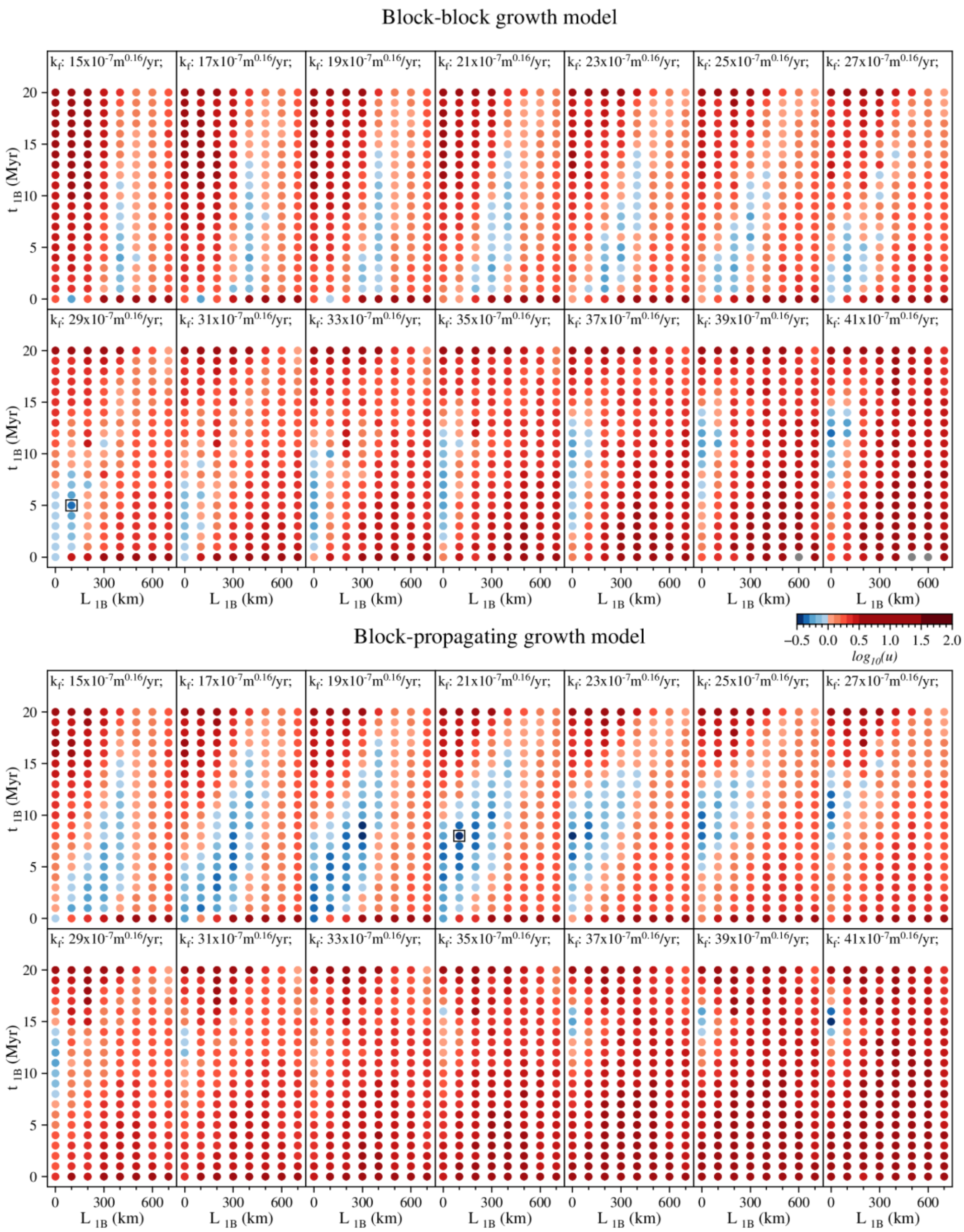

Figure S2. The detailed distribution of misfit $log_{10}(\mu)$ for three free parameters. In the block-block growth model. A black box marks one of the best-fit parameter sets (K_f = 29 × 10^{-7} $m^{0.16}$/yr, L_{1B} = 100 km, t_{1B} = 5 Myr), and the smallest $log_{10}(\mu)$ value is −0.335. In the block-propagation growth model. A black box marks one of the best-fit parameter sets (K_f = 21 × 10^{-7} $m^{0.16}$/yr, L_{1B} = 100 km, t_{1B} = 8 Myr), and the smallest $log_{10}(\mu)$ value is −0.439.

Table S1. A compilation of initial faulting ages.

Lat (°N)	Lon (°E)	Age (Ma)	Error	Data type	Reference
34.717	99.679	15.00	0.00	Thermochronometric ages	Duvall et al. (2013)
34.609	99.814	20.00	0.00		
34.094	101.508	6.50	1.50		
34.095	101.505	6.50	1.50		
34.096	101.502	6.50	1.50		
34.098	101.499	6.50	1.50		
34.103	101.497	6.50	1.50		
36.073	98.405	14.50	2.50		
36.071	98.407	14.50	2.50		
36.069	98.406	14.50	2.50		
36.066	98.406	14.50	2.50		
36.064	98.409	14.50	2.50		
36.256	98.472	14.50	2.50		
36.258	98.467	14.50	2.50		
36.254	98.460	14.50	2.50		
36.250	98.454	14.50	2.50		
36.248	98.450	14.50	2.50		
36.280	98.719	14.50	2.50		
36.277	98.712	14.50	2.50		
36.270	98.708	14.50	2.50		
36.267	98.711	14.50	2.50		
36.263	98.705	14.50	2.50		
35.856	98.769	14.50	2.50		
36.015	98.751	14.50	2.50		
35.992	98.566	14.50	2.50		
36.067	98.513	14.50	2.50		
37.401	101.902	12.41	1.50	Thermochronometric ages	Li et al. (2019)
37.580	101.839	11.68	1.94		
37.580	101.828	11.64	2.12		
37.611	101.832	10.96	2.07		
37.889	102.173	11.89	1.98		
35.666	106.229	8.06	1.02	Thermochronometric ages	Zheng et al. (2006)
35.670	106.230	8.16	0.90		
35.668	106.233	7.90	0.90		
35.670	106.235	7.30	1.10		
35.669	106.239	7.40	0.90		
36.300	105.200	~3.96	/	Stratigraphic relations	Zhang et al. (1991)
36.800	106.100	~3.96	/		
36.184	102.620	~22.00	/	Thermochronometric ages	Lease et al. (2011)
35.751	102.736	~13.00	/		
36.649	98.898	9.00	0.00	Fault signatures	Yuan et al. (2011)
36.641	98.903	9.00	0.00		
36.629	98.962	9.00	0.00		
37.103	100.686	10.00	3.00		
36.941	100.817	10.00	3.00		
37.100	98.267	12.50	2.50	Thermochronometric ages and fault signatures	Li et al. (2022)

Table S2. A compilation of thermochronometric ages (since 50 Ma).

Lat (°N)	Lon (°N)	Distance (km)	Height (km)	AHe (Age)	error	AFT (Age)	error	Acceleration time	Reference
102.611	36.178	561.76	3.45	21.80	1.90			23-17 Ma	Laji Shan (Lease et al., 2011)
102.620	36.184	562.80	3.27	22.70	2.40				
102.627	36.184	563.32	3.03	21.90	1.90				
102.631	36.184	563.62	2.92	22.60	1.90				
102.630	36.171	562.74	2.74	18.90	1.60				
102.633	36.171	562.96	2.58	17.60	1.30	37.80	3.80		
102.730	35.768	545.16	2.93	8.10	1.10	23.40	2.00	13-5 Ma	Jishi Shan (Lease et al., 2011)
102.736	35.769	545.67	2.74	9.10	1.20				
102.733	35.746	544.02	2.65	8.00	1.00				
102.738	35.767	545.70	2.60	7.90	1.00	14.00	2.60		
102.736	35.751	544.56	2.59	10.30	1.30				
102.739	35.766	545.71	2.55	8.30	1.10				
102.741	35.753	545.06	2.49	8.60	1.10				
102.744	35.757	545.53	2.40	7.20	0.90	18.10	1.20		
102.741	35.765	545.80	2.43	5.40	0.70	18.10	3.40		
102.743	35.763	545.83	2.39	5.40	0.80	18.30	3.40		
102.688	36.028	558.18	3.22	21.50	4.00				
102.709	36.028	559.75	3.03	18.90	2.70				
102.711	36.030	560.02	2.94	10.60	2.00				
101.508	34.094	348.01	4.43			15.80	3.40	8-5 Ma	East Kunlun (Duvall et al., 2013)
101.505	34.095	347.85	4.26			20.40	4.00		
101.502	34.096	347.68	4.09			9.60	2.30		
101.499	34.098	347.58	3.84			6.40	0.70		
101.497	34.103	347.75	3.66			8.70	2.60		
98.405	36.073	246.51	4.30	45.49	19.10			17-12 Ma	Dulan Chaka Highland (Duvall et al., 2013)
98.407	36.071	246.50	4.20	37.15	11.72				
98.406	36.069	246.29	4.09	15.20	2.96				
98.406	36.066	246.07	3.99	16.18	0.78				
98.409	36.064	246.13	3.87	12.70	1.09				
98.472	36.256	264.69	4.60	35.26	2.41				
98.467	36.258	264.52	4.47	26.81	5.95				
98.460	36.254	263.75	4.28	21.02	2.19				
98.454	36.250	263.06	4.10	13.88	2.17				
98.450	36.248	262.64	3.92	12.55	1.99				
98.719	36.280	282.91	4.81	45.22	8.95				
98.712	36.277	282.22	4.55	18.70	5.85				
98.711	36.267	281.42	4.33	14.16	4.11				
98.705	36.263	280.72	4.16	28.09	7.86				
101.908	37.714	605.84	3.01	40.90	7.60			15-12 Ma	East Qilian Shan (Wang et al., 2020)
101.909	37.711	605.73	2.86	12.90	1.00				
101.908	37.714	605.84	3.01	14.60	3.60				
101.919	37.712	606.52	2.62	38.60	13.40				
106.211	36.664	861.93	-4.80[a]			33.20	4.50	8-7Ma	Liupan Shan, (Zheng et al., 2006)
106.217	35.664	803.31	-5.60[a]			27.10	9.40		
106.229	35.666	804.35	-6.10[a]			8.06	1.02		
106.230	35.670	804.66	-6.11[a]			8.16	0.90		
106.233	35.668	804.77	-6.30[a]			7.90	0.90		
106.235	35.670	805.04	-6.40[a]			7.30	1.10		
106.239	35.669	805.29	-6.60[a]			7.40	0.90		

Note: AHe: Apatite (U-Th)/He; AFT: Apatite Fission Track. [a]Relative depth.

Table S3. A compilation of erosion rates.

Lat (°N)	Lon (°E)	Rate (mm/yr)	Error	Reference
36.700	99.700	0.01	0.00	Lal et al. (2004)
34.884	98.171	0.01	0.00	Li et al. (2014)
33.820	97.149	0.02	0.00	
35.891	99.694	0.11	0.01	
34.100	100.761	0.06	0.00	Harkins et al. (2007)
34.898	100.885	0.06	0.01	
34.799	100.811	0.08	0.01	
34.797	100.811	0.08	0.01	
34.777	100.813	0.08	0.01	
34.526	100.394	0.09	0.02	
34.752	99.693	0.11	0.01	
33.693	101.388	0.07	0.01	
34.598	101.341	0.06	0.01	Kirby and Harkins (2013)
33.765	101.226	0.08	0.01	
33.724	101.271	0.07	0.01	
34.557	99.481	0.06	0.01	
34.479	99.778	0.11	0.01	
34.689	100.623	0.23	0.02	
35.070	102.990	0.11	0.02	Zhang et al. (2017)
35.120	102.130	0.08	0.01	
35.000	103.150	0.03	0.01	
35.220	102.240	0.15	0.01	
35.310	102.790	0.32[a]	0.03	
35.400	102.870	0.33[a]	0.03	

Note: [a]Two high erosion rates are influenced by transient sediments.

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