

Supplementary Information to accompany paper by Dadson *et al.* “Links between erosion, runoff variability, and seismicity in the Taiwan orogen”

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Figure S1 Summary of fluvial suspended sediment flux data. **a**, Example of water discharge (solid line) and sediment discharge (open circles) for Peinan River in southwest Taiwan. **b**, Correspondence of river gauging records with reservoir sedimentation rates. Circle, Feitsui; square, Jenitan; diamond, Kukuan; triangle, Lyiutan; triangle-left, Paiho; triangle-down, Shihmen; triangle-right, Tapu; plus, Tech; diagonal cross, Tsengwen; star, Wushoh. Solid line is linear least-squares fit with intercept 0.8 and slope 0.7, $r^2=0.45$, RMSE=2.0, $n=31$; dashed lines bound 95 percent confidence zone.

Figure S2 Precipitation, runoff, and relief. **a**, Annual average precipitation in Taiwan measured between 1949–1990. **b**, annual average runoff in Taiwan, estimated from hydrometric record. **c**, slope map computed from 40 m digital elevation model as tangent in direction of steepest descent.

Table S1 Erosion rates from river loads

Table S2 Holocene terrace incision rates

Table S3 Rock strength measurements

Table S1. River suspended sediment discharges

Gauging Station	River Basin	Station Name	Longitude (Decimal Degrees)	Latitude (Decimal Degrees)	Drainage Area (km ²)	Years in record	Number of Sediment Observations	Runoff (m.yr ⁻¹)	Sediment Discharge (Mt.yr ⁻¹)	Variability ¹ (%)	Uncertainty ² (%)	Erosion rate (mm.yr ⁻¹)
1140H067	Tan-Shui	San-Ying Bridge	121.345	24.947	842	31	924	1.1	1.7	92	18	0.8
1140H066	Tan-Shui	Hsiu-Lung	121.521	24.991	751	30	914	2.6	1.8	115	14	0.9
1140H058	Tan-Shui	Wu-Tu	121.688	25.081	204	30	889	4.0	1.0	108	17	1.8
1140H043	Tan-Shui	Kao-Yi	121.356	24.716	542	30	827	1.7	11.3	85	31	7.9
1140H001	Tan-Shui	Yun-Feng	121.290	24.658	335	30	849	1.7	5.5	82	33	6.2
1140H010	Tan-Shui	Fu-Shan	121.485	24.793	160	15	804	3.7	1.6	49	26	3.8
1140H048	Tan-Shui	San-Hsia	121.366	24.936	125	26	776	2.4	0.6	169	16	1.9
1140H041	Tan-Shui	Hsiu-Luan	121.277	24.618	116	30	776	1.6	0.2	109	57	0.7
1140H062	Tan-Shui	Ching-Mei	121.536	24.989	115	16	507	2.7	0.1	113	16	0.3
1140H082	Tan-Shui	Po-Bridge	121.545	24.979	109	12	351	2.7	0.9	168	24	3.0
1140H002	Tan-Shui	Leng-Chiad	121.376	24.679	108	30	817	2.1	0.4	76	72	1.4
1140H078	Tan-Shui	Jen-Shou Bridge	121.802	25.109	95	20	596	4.2	0.4	126	16	1.6
1140H049	Tan-Shui	Heng-Chi	121.391	24.935	53	26	769	2.5	0.2	172	16	1.3
1180H002	Nan-Kan	Nan-Kan-Chi Bridge	121.273	25.057	122	19	546	2.0	0.1	111	12	0.4
1290H002	Feng-Shan	Hsin-Pu	121.057	24.827	208	31	948	1.5	0.8	127	23	1.4
1300H017	Tou-Chien	Jein-Kuo Bridge	121.011	24.809	499	11	330	1.4	1.5	131	25	1.1
1300H010	Tou-Chien	Erh-Chung-Pu-1	121.034	24.793	485	10	309	1.5	0.8	124	91	0.6
1300H016	Tou-Chien	Chu-Lin Bridge	121.085	24.749	441	21	638	1.6	2.6	165	21	2.2
1300H014	Tou-Chien	Shang-Ping	121.106	24.671	222	30	925	2.0	0.8	127	31	1.4
1300H013	Tou-Chien	Nei-Wan	121.173	24.704	139	30	913	2.1	0.2	125	24	0.5
1340H006	Chung-Kang	San-Wan	120.949	24.644	165	14	427	1.6	1.6	147	70	3.7
1340H009	Chung-Kang	Yun-Hsin-Chou	120.998	24.630	144	15	456	1.8	0.1	106	24	0.3
1340H007	Chung-Kang	Nan-Chuang-2	121.000	24.598	78	12	360	2.2	0.2	93	ND	0.8
1350H012	Hou-Lung	Pei-Shih Bridge	120.817	24.596	472	16	488	1.0	2.9	122	28	2.3
1350H001	Hou-Lung	Ta-Lu-Keng	120.854	24.464	247	31	940	1.8	3.5	141	27	5.3
1350H013	Hou-Lung	Pi-An-Chou	120.865	24.448	110	16	483	1.8	0.6	136	24	2.1
1350H011	Hou-Lung	Wen-Shui	120.882	24.445	108	12	363	1.8	0.3	143	95	1.1
1350H009	Hou-Lung	Chu-Pai-Tan	120.911	24.590	46	29	868	1.7	0.0	132	25	0.0
1400H009	Ta-An	I-Li	120.730	24.344	633	31	948	1.6	7.1	118	19	4.2
1400H011	Ta-An	Cho-Lan	120.807	24.308	599	28	838	1.9	6.9	113	24	4.4
1400H008	Ta-An	Shuan-Ychi	120.903	24.294	549	10	309	2.2	4.7	151	58	3.3
1400H015	Ta-An	Hsiang-Pi	120.959	24.379	438	9	268	2.2	0.8	109	50	0.7
1400H010	Ta-An	Li-Yu-Tan	120.772	24.341	53	18	550	1.5	0.1	169	41	0.7
1400H012	Ta-An	Hsueh-Shan-Keng	120.928	24.337	45	24	730	2.4	0.0	65	23	0.1
1420H035	Ta-Chia	Sung-Mao	121.252	24.291	417	15	810	2.0	1.0	80	19	0.9
1420H015	Ta-Chia	Huan-Shan Junction	121.274	24.299	258	15	786	1.9	0.5	93	17	0.7

1420H016	Ta-Chia	Szu-Chi-Lang	121,266	24,308	156	14	745	1.8	0.3	90	22	0.8
1420H043	Ta-Chia	Ho-Huan	121,280	24,305	129	12	623	1.9	0.2	121	37	0.6
1420H014	Ta-Chia	Nan-Hu	121,290	24,311	126	14	720	1.4	0.2	99	34	0.6
1420H034	Ta-Chia	Chi-Chia-Wan	121,298	24,346	111	14	663	1.6	0.1	97	69	0.3
1420H046	Ta-Chia	Tung-Mao Chi	120,926	24,185	21	11	427	2.3	0.0	197	ND	0.0
1430H025	Wu	Ta-Tu Bridge	120,574	24,107	1981	30	920	1.9	9.8	88	16	1.9
1430H030	Wu	Wu-Chi Bridge	120,687	24,010	1051	19	579	1.7	3.4	102	19	1.2
1430H006	Wu	Kan-Tzu-Lin	120,837	24,029	954	31	965	1.7	2.6	92	18	1.0
1430H032	Wu	Nan-Pei Bridge	120,896	24,059	408	25	766	2.0	0.9	126	20	0.9
1430H037	Wu	Kuan-In Bridge	120,905	23,985	338	20	613	1.9	0.5	125	17	0.6
1430H028	Wu	Chi-Nan Bridge	120,635	24,094	269	20	451	2.0	3.5	141	24	4.9
1430H031	Wu	Ying-Pan-Kou	120,646	23,956	262	13	375	1.3	0.7	124	60	1.0
1430H038	Wu	Nan-Kang Bridge	120,666	23,944	254	16	501	1.5	2.9	159	32	4.3
1510H058	Cho-Shui	Ziu-Chian Bridge	120,391	23,838	2989	15	436	1.2	54.1	111	24	6.8
1510H029	Cho-Shui	Hsi-Lo	120,466	23,823	2976	16	485	1.4	63.6	119	23	8.1
1510H057	Cho-Shui	Chunyun Bridge	120,628	23,789	2906	14	424	1.5	41.8	112	32	5.4
1510H021	Cho-Shui	Chi-Chi	120,773	23,829	2304	25	783	1.9	65.8	75	22	10.8
1510H059	Cho-Shui	Yanhsing Bridge	120,862	23,788	2091	13	403	1.4	35.1	97	38	6.3
1510H048	Cho-Shui	Chung-Ta	121,035	23,756	411	12	437	1.3	0.7	100	75	0.6
1510H049	Cho-Shui	Nei-Mao-Pu	120,838	23,715	367	29	898	1.9	3.2	83	46	3.3
1510H024	Cho-Shui	Tung-Tou	120,651	23,646	259	31	955	2.3	4.2	116	46	6.1
1510H046	Cho-Shui	Ho-Sheh	120,887	23,607	205	12	415	2.0	0.6	130	62	1.1
1510H055	Cho-Shui	Shen-Mu	120,865	23,571	88	12	434	1.7	0.0	132	ND	0.2
1510H044	Cho-Shui	Shui-Li	120,872	23,892	55	12	450	5.2	0.0	129	92	0.0
1540H009	Pei-Kang	Pei-Kang-2	120,293	23,564	597	31	961	1.3	2.2	91	27	1.4
1540H029	Pei-Kang	Tun-Kun Bridge	120,411	23,683	253	17	511	1.5	1.6	136	43	2.3
1540H014	Pei-Kang	Chi-Kuo	120,391	23,610	129	29	879	1.1	0.6	116	29	1.8
1550H003	Po-Tzu	Po-Tzu-2	120,220	23,470	289	8	252	1.4	2.1	118	38	2.7
1550H011	Po-Tzu	Suan-Tou	120,283	23,482	283	23	690	1.4	1.0	106	39	1.4
1550H009	Po-Tzu	Niu-Chou-Chi Bridge	120,435	23,515	150	28	849	1.6	0.5	97	37	1.4
1550H006	Po-Tzu	Lu-Man	120,526	23,498	22	10	309	2.2	0.3	148	55	5.0
1580H005	Pa-Chang	Ho-Sung Bridge	120,245	23,330	441	31	973	1.5	6.3	75	25	5.4
1580H007	Pa-Chang	Chun-Huei Bridge	120,450	23,430	122	31	948	1.5	7.9	91	37	24.3
1580H008	Pa-Chang	Chang-Pan Bridge	120,442	23,430	101	31	949	1.8	1.1	101	42	4.2
1580H001	Pa-Chang	Chu-Kuo	120,598	23,440	83	31	947	2.2	2.2	119	52	9.9
1590H012	Chi-Shui	Shin-Ying	120,305	23,297	227	31	958	1.3	1.8	66	24	3.0
1590H011	Chi-Shui	Chi-Pai-Yao	120,358	23,299	87	10	310	1.5	1.9	102	44	8.4
1590H013	Chi-Shui	Ching-Yeh-Bridge	120,386	23,338	84	10	314	1.5	1.6	126	44	7.3
1630H010	Tseng-Wen	Tseng-Wen	120,198	23,109	1157	12	369	1.1	25.1	92	48	8.2
1630H005	Tseng-Wen	Yu-Tien	120,450	23,119	161	31	927	1.9	4.7	89	40	11.1
1630H013	Tseng-Wen	Tso-Chen	120,373	23,068	121	30	899	1.6	9.5	80	47	29.5

1650H006	Yen-Shui	Hsin-Shih	120.269	23.060	146	28	839	1.2	1.1	123	39	2.8
1650H004	Yen-Shui	Kuan-Miao	120.303	22.969	38	10	304	1.3	1.0	92	73	9.5
1660H009	Erh-Jen	A-Lien-2	120.331	22.891	175	22	659	1.8	30.2	97	42	65.0
1660H001	Erh-Jen	Kan-Shan-Tou	120.354	22.879	139	31	931	1.8	29.8	130	42	80.7
1730H026	Kao-Ping	Kao-Ping Bridge	120.431	22.652	3076	21	657	2.5	49.0	86	16	6.0
1730H043	Kao-Ping	Li-Lin Bridge	120.445	22.772	2895	10	313	2.3	63.4	117	25	8.3
1730H039	Kao-Ping	Liu-Kwei	120.630	22.997	853	19	584	1.9	9.2	102	25	4.1
1730H031	Kao-Ping	Lao-Nung	120.661	23.050	812	31	943	2.5	13.8	89	23	6.4
1730H022	Kao-Ping	Yueh-Mei	120.516	22.964	540	17	513	2.3	11.2	122	30	7.9
1730H042	Kao-Ping	San-Lin Bridge	120.560	23.003	519	14	454	2.2	9.3	93	30	6.8
1730H036	Kao-Ping	San-Ti-Men	120.640	22.714	409	31	952	2.6	4.7	93	22	4.3
1730H038	Kao-Ping	Mei-Shan	120.816	23.273	392	17	476	2.3	0.2	98	39	0.2
1730H041	Kao-Ping	Ta-Chin-Chiou	120.640	22.882	375	11	341	2.4	2.4	99	35	2.4
1730H035	Kao-Ping	Ta-Chin	120.667	22.900	360	13	388	3.4	4.1	124	33	4.3
1730H037	Kao-Ping	Min-Cho	120.677	23.210	304	15	412	2.5	0.3	148	42	0.4
1740H002	Tung-Kang	Chao-Chou	120.532	22.566	175	31	952	2.9	0.4	82	12	0.8
1760H004	Lin-Pien	Hsin-Pei	120.542	22.464	310	31	950	2.5	3.3	73	20	4.0
2150H003	Tai-Mar-Li	Jing-Lan	120.934	22.595	190	14	471	2.3	0.4	97	65	0.7
2170H001	Chih-Pen	Chih-Pen	121.014	22.696	166	27	878	2.4	3.6	98	24	8.2
2180H002	Li-Chia	Li-Chia	121.041	22.763	149	29	453	2.0	4.6	89	27	11.7
2200H011	Pei-Nan	Tai-Tung Bridge	121.134	22.793	1584	31	1083	1.8	87.7	67	14	20.9
2200H020	Pei-Nan	Hsin-Wu-Lu	121.157	23.124	639	22	698	2.2	11.1	132	25	6.6
2200H007	Pei-Nan	Yen-Ping	121.077	22.900	476	31	1028	2.1	9.1	71	23	7.2
2200H019	Pei-Nan	Shang-Li-2	121.051	22.879	440	9	275	2.2	1.0	76	75	0.9
2370H017	Hsiu-Ku-Luan	Jui-Sui Bridge	121.397	23.487	1539	31	968	2.1	22.3	92	33	5.5
2370H018	Hsiu-Ku-Luan	Yu-Li Bridge	121.320	23.324	1008	21	632	1.5	25.7	130	39	9.6
2370H004	Hsiu-Ku-Luan	Cho-Lu	121.256	23.301	456	15	454	1.7	8.3	111	41	6.9
2370H016	Hsiu-Ku-Luan	Li-Shan	121.303	23.429	249	31	957	2.5	3.2	129	38	4.9
2370H020	Hsiu-Ku-Luan	Ching-Shui	121.237	23.278	169	12	308	1.9	0.0	175	ND	0.1
2370H019	Hsiu-Ku-Luan	Ma-Yeuan Bridge	121.359	23.573	86	21	632	2.2	0.5	142	69	2.3
2370H011	Hsiu-Ku-Luan	Fu-Yuan	121.347	23.586	83	10	323	3.9	0.1	172	73	0.3
2420H024	Hua-Lien	Hua-Lien Bridge	121.591	23.924	1506	31	976	2.1	31.4	107	39	7.9
2420H019	Hua-Lien	Jen-Shou Bridge	121.497	23.958	426	31	969	1.4	5.6	93	43	4.9
2420H037	Hua-Lien	Wan-Li-Chi Bridge	121.419	23.722	242	21	630	1.7	3.2	125	45	5.0
2420H004	Hua-Lien	Wan-Li Bridge	121.377	23.722	233	10	324	3.0	3.5	117	60	5.7
2420H018	Hua-Lien	Ping-Lin	121.444	23.814	214	31	814	1.3	13.0	112	28	22.9
2420H036	Hua-Lien	Ma-An-Chi Bridge	121.401	23.689	136	31	962	2.9	2.7	93	39	7.5
2420H040	Hua-Lien	Ta-Ma	121.351	23.694	115	12	284	3.8	0.1	192	ND	0.3
2460H005	Li-Wu	Lu-Shui	121.492	24.179	435	31	1839	2.4	14.4	77	25	12.5
2500H003	Ho-Ping	Chi-Neng-Pu	121.735	24.326	553	26	795	2.2	15.3	116	59	10.4
2500H005	Ho-Ping	Ho-Ping-Pei-Chi	121.648	24.364	272	14	427	2.4	1.4	71	38	1.9

2500H004	Ho-Ping	Ho-Ping-Nan-Chi	121.649	24.354	190	14	428	2.3	0.0	197	ND	0.0
2510H005	Nan-Ao	Nan-Ao-Chiao	121.780	24.462	170	26	785	3.2	2.4	103	33	5.2
2510H004	Nan-Ao	Ao-Wei-Chiao	121.772	24.451	139	26	730	2.4	0.4	92	29	1.2
2510H001	Nan-Ao	Shan-Chiao	121.656	24.558	37	15	776	4.5	0.1	73	ND	1.2
2560H006	Lan-Yang	Lan-Yang Bridge	121.764	24.718	821	31	980	2.2	17.3	63	27	8.0
2560H001	Lan-Yang	Niu-Tou	121.557	24.642	447	22	658	1.0	4.9	156	36	4.2
2560H017	Lan-Yang	Chia-Yuang Bridge	121.484	24.580	274	27	802	1.8	1.6	94	38	2.2
2560H019	Lan-Yang	Chung-San-Chou	121.736	24.759	101	16	484	3.7	0.2	87	24	0.8
2560H018	Lan-Yang	Ku-Lu	121.674	24.611	11	14	795	4.5	0.1	79	90	1.9
2620H002	Shuang	Shuang-Chi-2	121.912	25.014	122	13	533	4.5	0.0	126	49	0.1
2630H006	Jian-Shan-Jean	Shih-Ting-Chi-2	121.892	25.055	8	14	535	5.2	0.0	144	72	0.9

(1) Variability is the standard error of the mean of sediment discharge observations; (2) Uncertainty is the standard error of the mean of the discharge observations having removed seasonal variability. ND, Seasonal variability could not be characterized. Coastal stations are shown in bold; those shown on Fig. 2a (>400 km²) are italicized

Table S2, Radiocarbon dates in mountain rivers of Taiwan

Locality ¹	River	Lab No ²	Longitude	Latitude	¹⁴ C age (yr BP 1s)	Calendar age ³ yr BP (1s)	Sample height (m)	Bedrock height (m)	Bedrock incision rate (mm yr ⁻¹)	Uncertainty (mm yr ⁻¹)
1	Erjen	NTU-2614	120°23'49"	22°50'08"	5490±50	6215-6306	33	31	5.0	1.0
2	Erjen	NTU-2341	120°21'28"	22°52'03"	2270±50	2156-2340	15	15	6.7	1.6
2	Erjen	NTU-1968 ^b	120°21'24"	22°51'59"	2160±50	2062-2297	17	17	7.9	2.0
2	Erjen	NTU-2427	120°21'24"	22°52'00"	1680±40	1530-1611	23	17	< 11	2.4
2	Erjen	NTU-2631	120°21'12"	22°52'54"	2220±50	2141-2321	12	10	4.5	1.1
3	Tsengwen	NTU-2334	120°24'06"	23°03'18"	5490±50	6215-6306	16	15	< 2.4	0.5
3	Tsengwen	NTU-2430	120°24'39"	23°03'28"	2320±40	2325-2348	18	18	< 7.8	1.6
3	Tsengwen	NTU-2325	120°23'50"	23°03'18"	3150±50	3277-3392	30	28	8.4	1.8
3	Tsengwen	NTU-2591	120°23'45"	23°03'19"	3210±40	3372-3465	27	26	7.6	1.6
3	Tsengwen	Wk-6131	120°23'40"	23°03'24"	587±58	534-645	8	7	< 13	3.5
3	Tsengwen	NTU-2599	120°23'50"	23°04'06"	7560±50	8315-8371	59	58	7.0	1.4
4	Tsengwen	NTU-2232	120°23'29"	23°08'33"	< 250	NA	5	4	> 16	NA
5	Pachang	NTU-2193	120°32'20"	23°23'09"	2570±70	2509-2755	18	18	6.9	1.7
6	Tsengwen	NTU-2231	120°23'25"	23°08'32"	280±45	289-423	5	4	12.1	4.5
7	Potzu	NTU-3772	120°28'47"	23°34'03"	880±30	736-880	6.5	6	7.6	2.2
8	Tahan	NA ^c	121°18'	24°55'	11600±90	13403-13668	22	15-20	1.3	0.3
9	Liwu	NA	121°28'09"	24°13'40"	2480±40	2376-2715	NA	30 ^d	12.0	3.2
9	Liwu	NA	121°28'41"	24°11'08"	2400±40	2348-2461	NA	15 ^d	6.3	1.4
10	Hsiukulan	NTU-3756	121°29'09"	23°28'16"	3830±30	4152-4274	28	27	< 6.5	1.4
11	Tsengwen	Wk-6129	120°29'50"	23°05'00"	9630±60	10568-10950	56	53	< 5.0	1.1
12	Erjen	Wk-4111	120°22'49"	22°53'07"	5060±140	5648-5935	61	60	10.4	2.3
12	Erjen	NTU-2375	120°23'20"	22°53'31"	2020±40	1897-1994	35	34	17.6	3.9
12	Erjen	NTU-1337	120°22'58"	22°53'08"	1710±40	1543-1691	36	35	21.9	5.3

12 Erjen	NTU-1320 ^a	120°22'38"	22°52'33"	2240±40	2150-2326	27	26	11.7	2.8
12 Erjen	NTU-1945 ^b	120°22'38"	22°52'33"	2410±40	2350-2468	27	26	10.9	2.4
12 Erjen	NTU-2335	120°23'13"	22°53'14"	1340±50	1194-1294	19	19	15.4	3.7
12 Erjen	NTU-2391	120°22'58"	22°52'54"	1000±45	910-943	12	12	13.0	2.8

1, NTU = National Taiwan University; Wk = University of Waikato.

2, Calibrated using program and calibration curve(s) of Stuiver and Raimer (1993).

a, Chen, Y.G. (1993) Sea-level change and neotectonics in southern part of Taiwan region since late Pleistocene [Ph.D. thesis]: Institute of Geology, National Taiwan University, 158 p. (in Chinese).

b, Lee, Y.W., Chen, Y.G., and Liu, T.K. (1994) Preliminary study of river terraces correlation and their neotectonic significance along the Erhjen-chi, southern Taiwan: Abstracts with Programs of 1996 Annual Meeting of Geological Society of China, p. 612-616 (in Chinese).

c, Chen, Y.G. and Liu, T.K. (1991) Radiocarbon dates of river terraces along the lower Tahanchi, northern Taiwan: their tectonic and geomorphic implications: Proceedings of the Geological Society of China, 34, 337-347.

d, This age was obtained from a palaeo-valley fill. There is no indication that the fill has been truncated by any erosion surface, suggesting that it was deposited by a single event. The height associated with this observation is the height difference between the bedrock floor of the palaeo-valley and that of the modern river.

Table S3, Rock strength data

Region	Number of Samples	Uniaxial compressive strength (MPa)				
		Min	Max	Mean	Standard Deviation	1 σ range
Western Foothills	682	0.1	109.2	20.0	13.8	6.2 – 33.8
Hsueshan Range	88	5.1	219.9	79.7	34.2	45.5 – 113.9
Slate Belt	57	1.5	253.4	39.2	34.4	4.8 – 73.6
Tananao Schist	287	1.2	189.9	45.3	23.1	22.2 – 68.4

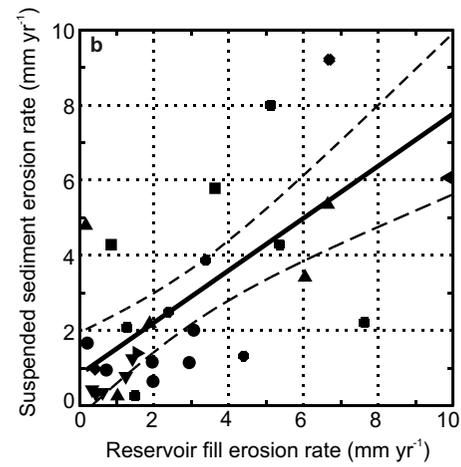
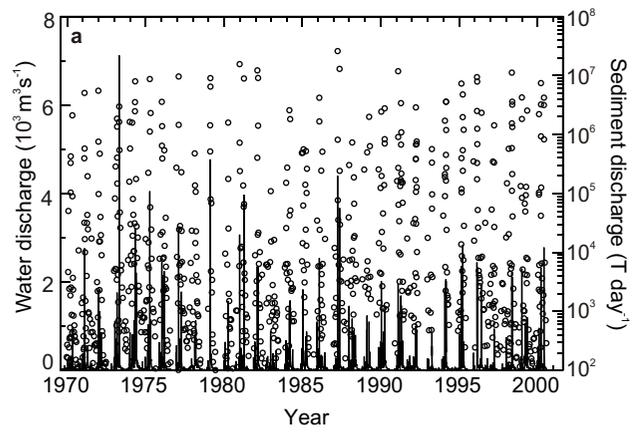
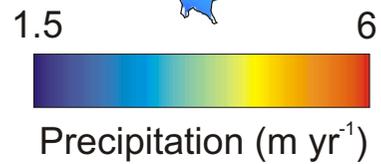
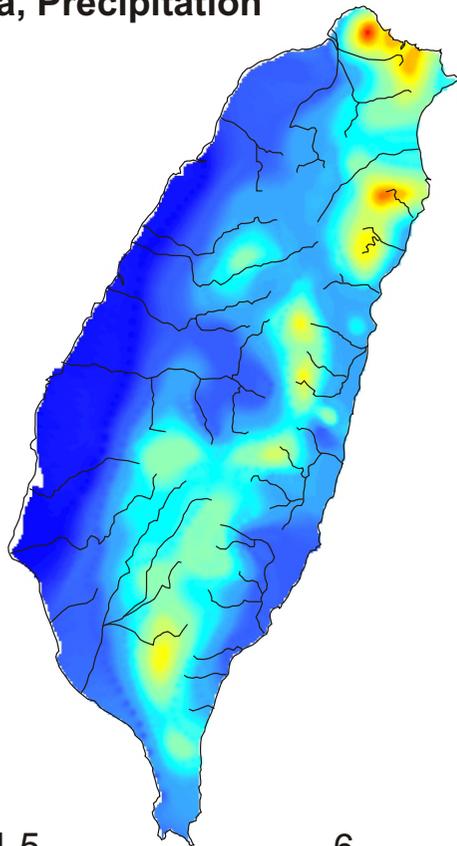
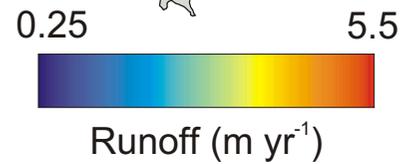
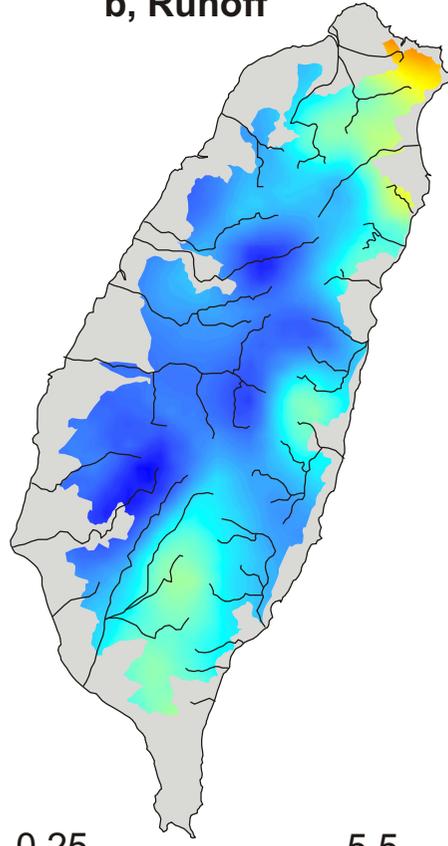


Figure S1

a, Precipitation



b, Runoff



c, Slope

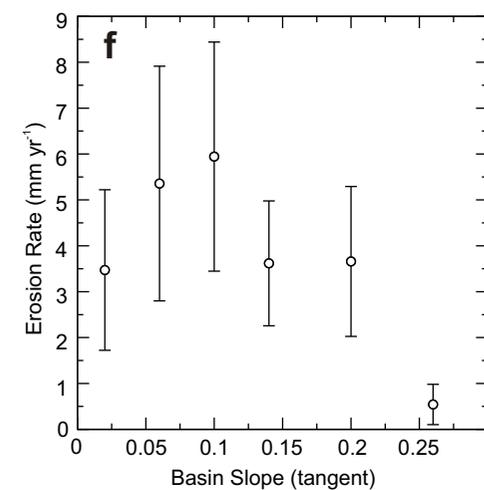
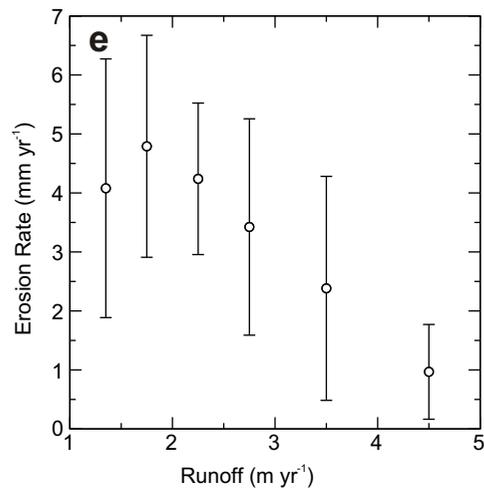
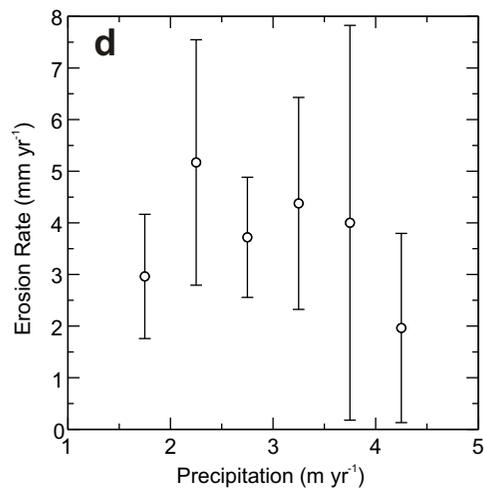
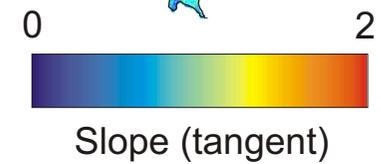
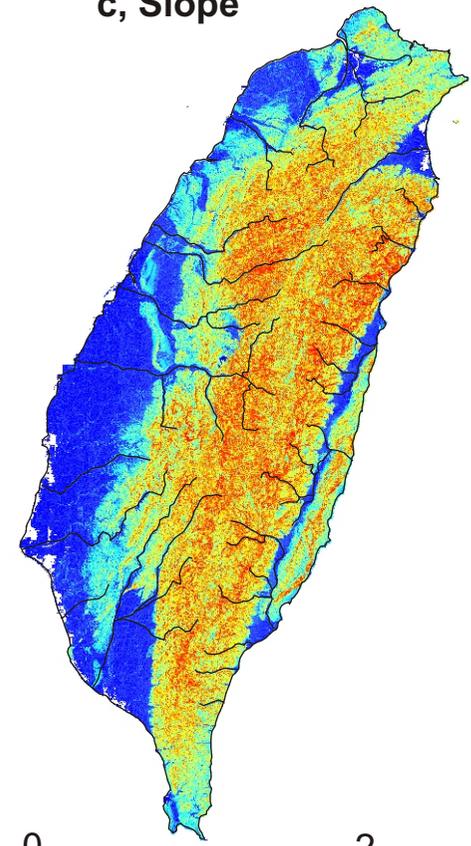


Figure S2