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Supplement of

Short communication: Field data reveal that the transport probability of clasts in Peruvian and Swiss streams mainly depends on the sorting of the grains

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Supplement S1: Comparison between transport mobility for the case where ϕ is equally distributed between 0.03 and 0.06, and for model runs where ϕ depends on the reach gradient according to equation 8 in the main text.

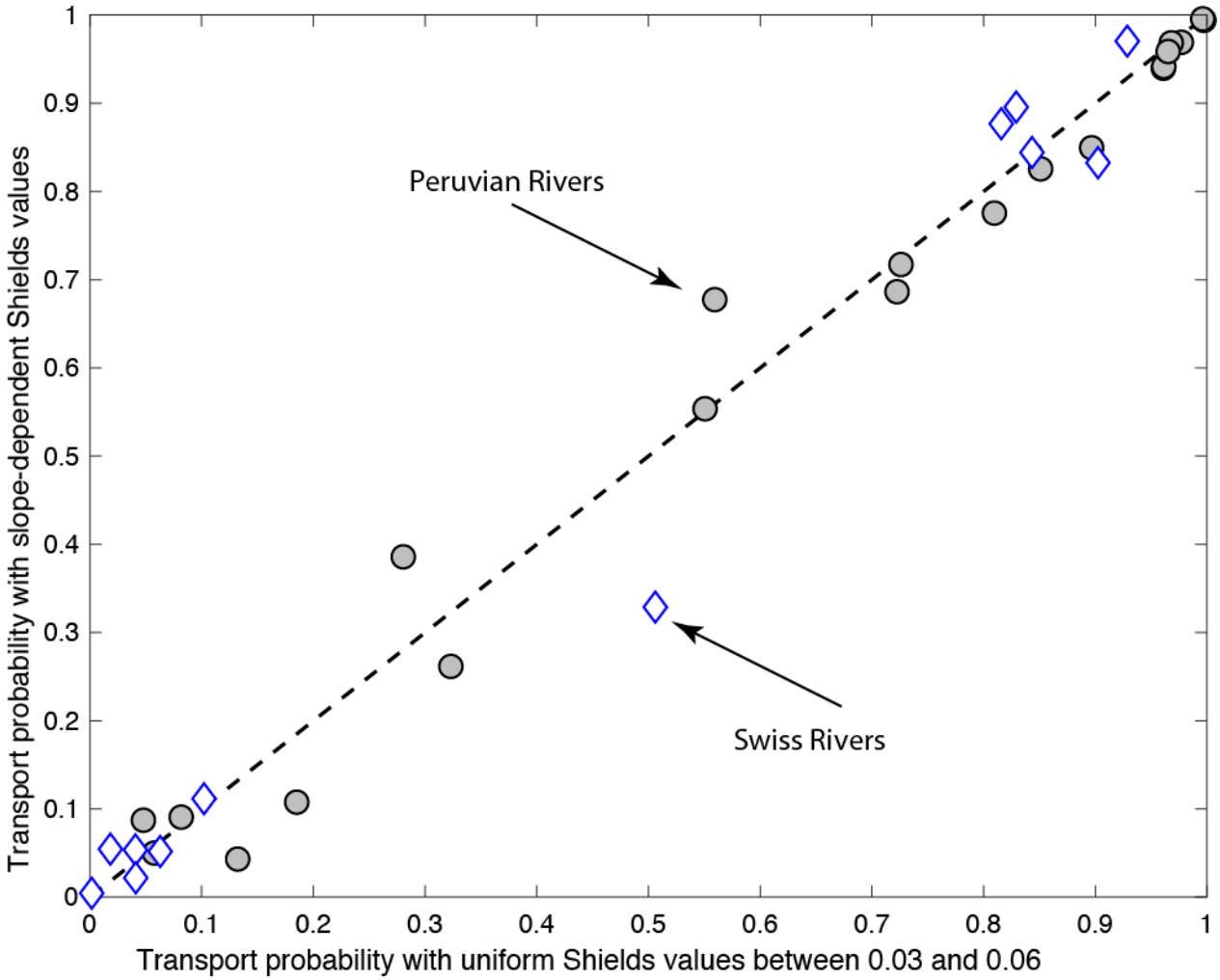

Figure S1, showing the results of Monte Carlo simulations where the Shields variables ϕ were equally distributed between 0.03 and 0.06 (x-axis) and where a slope dependency of ϕ with $\phi=0.15S^{0.25}$ (y-axis) was used. The consequences for the transport probability did not change as the results of both scenarios plot on a 1:1 line.

Table S2: Grain size data from various streams and intrabar variability of D84

Kander

Photo	IMG_1638_R Sorted Length (cm)	IMG_1639_R Sorted Length (cm)	IMG_1640_R Sorted Length (cm)	IMG_1641_n_R Sorted Length (cm)	IMG_1643_R Sorted Length (cm)	IMG_1644_R Sorted Length (cm)
	0.89	1.22	2.65	1.71	1.58	1.43
	0.91	1.54	3.26	2.28	2.54	1.72
	1.26	1.69	3.29	2.42	2.58	2.08
	1.35	1.81	3.47	2.74	2.78	2.14
	1.70	1.85	3.72	2.79	2.86	3.28
	1.72	2.05	3.72	2.85	3.25	3.43
	1.81	2.15	4.72	3.46	3.44	3.44
	2.12	2.30	4.78	3.86	3.51	3.44
	2.42	2.32	4.83	3.98	3.90	3.72
	2.58	2.33	4.92	4.20	3.96	3.91
	2.59	2.55	4.92	4.38	4.01	4.01
	2.59	2.91	5.25	4.40	4.08	4.27
	2.84	3.58	5.52	4.66	4.10	4.32
	2.84	3.70	5.72	5.93	4.14	4.49
	2.96	3.90	5.85	5.93	4.30	4.56
	3.19	4.17	6.00	8.03	4.46	4.97
	3.19	4.32	6.20	8.03	4.53	5.42
	3.23	4.58	6.29	8.18	4.56	5.42
	3.27	4.75	6.46	8.69	4.82	5.58
	3.28	4.92	6.86	9.08	4.94	7.07
	3.68	5.01	7.15	10.30	5.08	7.29
	3.76	5.03	8.07	10.45	5.20	7.88
	4.00	5.04	8.13	11.05	5.25	8.31
	4.24	5.09	8.39	12.13	5.35	8.98
	4.26	5.17	9.36	12.59	5.42	9.19
	5.23	5.19	10.12	14.00	5.47	9.88
	5.28	5.21	10.18	15.87	5.69	10.70
	5.43	5.22	11.79	16.39	6.02	11.58
	5.50	5.28	11.88	16.60	6.14	11.74
	5.88	5.38	12.08	17.19	6.29	12.04
	5.93	5.65	12.11	18.11	6.39	13.06
	5.94	5.96	12.34	25.51	6.58	13.77
	6.33	6.11	19.42	29.58	6.59	14.44
	6.77	8.40	20.81		6.94	16.20
	6.88	9.66	31.19		7.24	18.04
	7.26	9.93			7.56	19.26
	7.60	10.20			7.56	20.10
	7.91	10.46			7.64	21.05
	7.97	10.72			8.24	21.87
	8.44	11.12			9.67	
	9.67	11.21			10.02	
	10.03	11.70			10.30	
	10.16	13.71			12.62	
	10.89	14.56			15.37	
	10.97	19.11				
	12.43	20.84				
	17.48	26.90				

Simme Photo	IMG_1631_R Sorted Length (cm)	IMG_1632_R Sorted Length (cm)	IMG_1633_R Sorted Length (cm)	IMG_1634_R Sorted Length (cm)	IMG_1635_R Sorted Length (cm)
	0.65	1.08	1.51	2.59	1.56
	1.22	1.56	2.13	2.65	1.78
	1.36	1.66	2.25	3.03	2.01
	1.42	1.98	2.81	3.06	2.15
	1.69	2.04	2.86	3.32	2.24
	1.85	2.12	3.29	3.78	2.24
	2.01	2.25	3.42	3.86	2.29
	2.02	2.89	3.49	4.70	2.41
	2.37	2.97	3.62	4.83	2.53
	2.50	2.99	3.70	4.87	2.54
	2.83	3.30	3.80	5.49	2.81
	2.87	3.31	4.46	6.43	2.87
	3.06	3.57	4.76	6.72	2.99
	3.28	3.62	4.80	6.82	3.08
	3.37	3.67	5.03	6.89	3.32
	3.48	3.67	5.12	7.55	3.37
	4.03	3.80	5.17	7.71	3.41
	4.24	3.82	5.19	7.98	3.51
	4.40	3.86	5.33	8.08	3.57
	4.49	3.98	5.36	8.30	3.62
	4.51	3.98	5.79	8.69	3.67
	4.61	4.44	6.26	9.15	3.69
	4.83	4.56	6.60	9.20	4.01
	4.83	4.88	6.78	9.35	4.22
	4.93	4.89	7.10	9.56	4.33
	5.70	5.10	7.14	9.85	4.57
	6.96	5.41	7.78	9.89	4.58
	7.29	5.47	8.02	10.69	4.65
	7.58	5.47	8.09	10.78	5.03
	7.61	5.49	8.65	11.08	5.47
	7.87	6.23	8.70	12.07	5.48
	8.06	6.77	9.30	13.70	6.10
	8.43	7.03	9.74	14.15	6.36
	8.81	7.03	9.98	39.99	6.48
	9.03	7.10	13.35		6.66
	9.35	7.28	15.66		6.87
	9.78	7.49	16.47		8.04
	10.09	7.54	19.74		8.19
	10.34	8.11	19.80		8.29
	10.43	8.15	19.95		8.54
	11.07	8.29	23.24		8.56
	11.68	8.34	27.16		8.93
	12.51	8.67	36.14		9.23
	13.98	8.69	37.19		9.48
	15.05	8.96			9.79
	15.47	9.09			11.16
	23.05	10.17			11.44
	23.90	10.21			12.72

25.30	10.25	14.46
26.07	10.81	14.79
38.82	12.18	16.77
51.66	20.15	18.35
	22.24	19.71
	23.98	21.42
	26.72	39.25
	35.08	
	36.83	

Lütschine

Phtoto	IMG_1657_R Sorted Length (cm)	IMG_1658_R_36 Sorted Length (cm)	IMG_1659_R Sorted Length (cm)	IMG_1660_R Sorted Length (cm)	IMG_1663_R Sorted Length (cm)	IMG_1664_R Sorted Length (cm)
	1.38	1.28	1.43	1.75	1.14	2.74
	1.38	1.59	1.49	1.94	1.37	3.11
	1.82	2.15	1.85	2.50	1.84	3.16
	1.96	2.46	2.36	3.02	2.22	3.48
	2.07	2.84	2.64	3.05	2.50	3.73
	2.36	2.98	2.66	3.37	2.85	3.76
	2.38	3.09	2.86	3.65	3.06	3.76
	2.45	3.26	2.86	3.84	3.59	3.84
	2.95	3.36	2.96	3.86	3.74	4.29
	3.10	3.53	2.98	4.25	4.10	4.47
	3.25	3.69	3.01	4.30	4.38	4.50
	3.28	3.82	3.07	4.56	4.58	5.39
	3.44	3.83	3.29	5.03	4.77	5.69
	3.69	4.12	3.33	5.12	4.88	5.80
	3.79	4.17	3.39	5.14	4.93	6.30
	3.83	4.18	3.43	5.19	4.95	6.53
	4.67	4.27	3.43	5.29	4.97	6.80
	4.67	4.73	3.50	5.33	4.99	7.00
	4.82	4.87	3.61	5.46	5.04	7.32
	5.15	4.89	3.68	5.56	5.25	7.33
	6.64	5.01	3.78	5.86	5.26	7.82
	6.74	5.30	4.21	6.01	5.29	8.04
	7.36	5.82	4.27	6.02	5.42	8.18
	7.55	5.83	4.33	6.20	5.55	8.32
	7.56	6.28	4.62	6.48	5.67	8.58
	7.57	6.40	4.78	6.53	6.23	9.62
	7.89	6.74	4.92	7.84	6.26	9.63
	8.66	6.91	4.97	8.06	6.29	9.87
	9.00	7.01	5.21	8.58	6.82	10.28
	9.25	7.02	5.44	9.07	6.83	10.76
	9.34	7.40	5.73	9.07	7.02	11.31
	9.75	7.88	6.22	9.20	7.04	11.52
	10.23	7.92	6.65	10.43	7.27	12.50
	10.50	8.00	6.66	10.76	7.31	13.28
	10.64	8.33	6.75	10.82	7.41	13.30
	10.95	8.55	7.95	11.06	7.87	14.02
	12.22	8.66	8.43	11.37	8.83	14.04
	12.25	8.96	8.62	12.23	8.94	14.30
	12.38	9.01	8.96	12.48	9.16	17.52

12.59	9.48	9.55	12.64	9.21	18.03
12.69	10.18	9.57	12.73	9.65	
13.08	11.52	9.70	13.47	10.40	
15.27	13.04	9.87	14.31	10.64	
15.65	13.05	10.91	14.41	11.15	
22.11	17.30	11.48	14.69	11.18	
	19.74		17.22	11.24	
	20.15		18.05	13.17	
			23.08	13.27	
			23.32		

Rhine

Photo	**IMG_1673_R Sorted Length (cm)**	**IMG_1674_R Sorted Length (cm)**	**IMG_1675_R Sorted Length (cm)**	**IMG_1676_R Sorted Length (cm)**	**IMG_1678_R Sorted Length (cm)**	**IMG_1681_R_37 Sorted Length (cm)**
	1.10	1.59	0.91	1.16	2.42	1.54
	1.31	3.54	1.47	1.93	3.18	1.66
	1.53	3.63	1.83	2.45	3.21	1.78
	1.64	3.70	2.18	2.81	3.33	1.91
	1.95	3.76	2.25	3.26	3.85	2.26
	1.98	3.79	2.38	3.27	4.59	3.74
	1.99	3.79	2.82	3.30	4.93	4.44
	2.02	3.95	2.86	3.36	5.00	4.47
	2.03	4.21	2.96	3.56	5.41	5.32
	2.03	4.26	3.44	3.71	5.54	5.63
	2.12	4.30	3.77	3.93	5.63	5.69
	2.28	4.71	3.90	4.00	5.83	5.76
	2.76	5.01	3.95	4.31	6.12	5.81
	2.93	5.71	4.01	4.32	6.16	5.82
	2.99	5.82	4.44	4.48	6.85	5.97
	3.11	6.58	4.75	4.51	6.93	6.24
	3.14	6.83	4.79	4.61	7.18	6.41
	3.31	6.98	4.80	5.03	7.25	6.73
	3.32	8.65	4.99	5.11	7.27	6.86
	3.34	8.65	5.12	5.26	7.42	7.88
	3.53	9.81	5.16	5.49	7.49	8.19
	3.74	9.94	5.40	5.95	7.50	8.26
	3.81	10.29	6.41	5.98	7.58	8.93
	3.86	10.67	6.85	6.20	8.14	9.07
	3.96	11.34	7.02	6.33	8.42	9.38
	4.48	11.89	7.69	6.57	8.47	9.85
	4.60	13.71	7.71	6.81	8.73	10.19
	4.75	13.88	8.11	7.00	8.92	10.59
	4.78	13.98	8.19	7.10	9.19	10.72
	4.90	14.69	9.99	7.32	9.41	11.05
	4.96	18.77	11.34	7.39	9.42	11.33
	5.11	18.96	11.45	7.52	9.84	13.12
	5.14	19.29	11.58	7.81	9.91	14.25
	5.20	24.68	11.79	8.50	9.93	14.61
	5.37		12.09	8.68	10.01	19.01
	5.42		12.51	9.03	10.27	
	5.54		12.58	9.44	11.11	
	6.49		12.64	9.60	11.63	

6.50	12.87	9.62	13.01
6.50	13.08	10.40	13.12
6.55	14.17	10.58	13.54
6.83	14.87	10.61	13.81
6.94	14.92	10.87	13.96
6.95	15.09	11.18	14.25
7.52	16.61	11.49	14.92
7.78	17.82	11.66	16.64
7.87		11.69	17.72
7.88		12.11	18.30
8.58		12.18	20.85
8.59		12.50	
8.75		12.53	
9.40		13.54	
9.46		13.54	
9.53		14.00	
9.87		14.22	
10.06		14.59	
10.56		16.16	
10.58		16.76	
10.81		16.80	
10.87		22.36	
11.08			
11.23			
11.53			
11.75			
12.10			
12.30			
13.59			
13.60			
14.54			
14.96			
15.36			
16.73			
20.95			
29.86			

Sarine

Photo	IMG_1735_R Sorted Length (cm)	IMG_1736_R Sorted Length (cm)	IMG_1737_R Sorted Length (cm)	IMG_1738_R Sorted Length (cm)	IMG_1739_R Sorted Length (cm)
	1.40	1.79	1.99	1.44	1.11
	1.45	2.26	2.27	2.38	1.34
	1.96	2.27	2.60	2.53	2.05
	2.05	2.46	2.97	2.66	2.19
	2.12	3.01	3.11	2.81	2.27
	2.45	3.04	3.12	3.09	2.57
	2.62	3.08	3.19	3.40	2.57
	2.80	3.48	3.29	3.53	2.60
	3.00	3.55	3.62	3.57	2.66
	3.03	3.63	3.70	3.68	2.76
	3.14	3.65	3.77	3.77	2.88
	3.18	3.73	3.81	3.90	2.99

3.20	3.82	3.84	4.30	3.00
3.22	3.92	4.08	4.76	3.05
3.32	3.99	4.12	5.06	3.07
3.57	4.07	4.35	5.31	3.09
3.70	4.27	4.64	5.31	3.10
3.70	4.41	4.75	5.40	3.24
3.87	4.43	4.80	5.50	3.25
3.87	4.47	4.81	5.79	3.26
4.20	4.54	4.81	6.06	3.34
4.27	4.63	4.94	7.08	3.38
4.30	4.65	4.97	7.21	3.41
4.35	4.69	5.07	7.22	3.52
4.48	4.75	5.07	7.57	3.58
4.52	4.83	5.21	7.64	3.63
4.62	4.83	5.57	7.72	3.63
4.68	4.97	5.73	7.90	3.67
4.78	5.02	5.88	7.95	3.86
4.87	5.09	5.89	8.05	4.00
4.89	5.37	6.11	8.25	4.01
5.03	5.46	6.31	8.33	4.06
5.18	5.46	6.63	9.32	4.11
5.26	5.61	6.71	9.39	4.12
5.38	5.79	6.73	9.43	4.34
5.41	5.87	6.78	9.45	4.43
5.68	6.14	7.31	9.68	4.44
5.83	6.18	7.33	10.00	4.44
5.84	6.27	7.55	10.09	4.48
5.85	6.29	7.87	11.58	4.50
5.92	6.40	8.24		4.56
5.95	6.56	8.66		4.59
5.96	6.57	9.10		4.63
6.05	6.62	9.48		4.65
6.12	6.80	9.48		4.76
6.31	6.83	9.78		4.77
6.44	7.02	10.06		5.29
6.45	7.22	10.22		5.32
6.59	7.39	11.03		5.52
7.22	7.69	11.23		5.54
7.39	7.72	11.28		5.98
7.49	7.74	13.25		5.98
8.01	7.82			6.14
8.15	7.93			6.68
9.04	8.59			7.39
9.57	8.79			8.06
10.83	8.79			8.10
11.54	8.96			8.27
14.36	9.18			10.70
	9.62			
	9.82			
	10.83			
	12.26			
	12.45			
	14.56			

14.68

Sitter

Photo	IMG_1766_R Sorted Length (cm)	IMG_1767_R Sorted Length (cm)	IMG_1768_R Sorted Length (cm)	IMG_1769_R Sorted Length (cm)	IMG_1770_R Sorted Length (cm)
	1.18	1.12	1.37	1.30	0.95
	1.35	1.22	1.38	1.37	1.02
	1.36	1.27	1.57	1.39	1.15
	1.44	1.38	1.63	1.39	1.34
	1.52	1.50	1.68	1.56	1.34
	1.57	1.51	1.73	1.61	1.48
	1.62	1.76	1.76	1.72	1.48
	1.66	1.78	1.81	1.72	1.48
	1.67	1.96	1.91	1.72	1.49
	1.68	2.01	2.11	1.75	1.52
	1.69	2.03	2.13	1.76	1.58
	1.79	2.10	2.34	1.87	1.62
	1.84	2.28	2.40	2.06	1.64
	1.91	2.39	2.41	2.07	1.68
	2.03	2.41	2.54	2.08	1.73
	2.10	2.47	2.59	2.08	1.74
	2.17	2.54	2.60	2.10	1.79
	2.24	2.73	2.67	2.11	1.82
	2.25	2.84	2.70	2.15	1.84
	2.29	3.07	2.71	2.40	1.89
	2.34	3.13	2.85	2.49	1.90
	2.35	3.18	3.10	2.49	1.95
	2.51	3.34	3.12	2.52	1.97
	2.51	3.56	3.13	2.55	1.97
	2.56	3.56	3.24	2.63	1.98
	2.61	3.61	3.59	2.67	1.99
	2.65	3.62	3.63	2.95	1.99
	2.70	4.10	3.69	3.14	2.03
	2.92	4.26	3.90	3.44	2.17
	2.98	4.28	4.15	3.50	2.22
	2.98	4.74	4.15	3.54	2.29
	3.05	5.01	4.22	3.57	2.30
	3.52	5.03	4.24	3.65	2.30
	3.55	5.29	4.59	3.66	2.33
	4.02	5.36	4.85	3.76	2.35
	4.24	5.44	4.94	3.86	2.44
	4.42	5.62	5.17	4.01	2.45
	4.46	6.33	5.45	4.18	2.49
	5.07	6.40	5.46	4.31	2.50
	5.19	6.46	5.53	4.43	2.51
	5.35	6.63	5.83	4.50	2.52
	5.55	6.92	6.38	4.73	2.65
	6.01	7.07	6.54	5.02	2.67
	6.25	7.15	6.66	5.16	2.77
	6.33	7.20	7.21	5.29	2.77
	6.60	7.47	7.75	5.57	2.79
	6.70	7.55	7.95	6.54	2.87

6.80	7.63	8.08	6.58	2.92
7.34	7.84	9.05	6.88	2.94
7.45	8.65	9.87	7.08	3.11
7.49	9.38	10.11	9.20	3.11
7.67	9.61	10.12		3.18
8.13	9.98	11.60		3.25
9.66				3.31
9.99				3.42
11.53				3.47
11.69				3.95
13.60				3.98
				4.03
				4.55
				4.78
				5.19

Thur

Photo	**IMG_1779_R Sorted Length (cm)**	**IMG_1781_R Sorted Length (cm)**	**IMG_1782_R Sorted Length (cm)**	**IMG_1783_R Sorted Length (cm)**	**IMG_1784_R Sorted Length (cm)**
	0.93	1.27	1.24	0.97	1.44
	1.02	1.27	1.42	1.17	1.46
	1.03	1.30	1.47	1.19	1.47
	1.10	1.30	1.51	1.23	1.48
	1.15	1.32	1.52	1.28	1.48
	1.27	1.40	1.61	1.29	1.50
	1.29	1.47	1.78	1.39	1.53
	1.29	1.49	1.80	1.41	1.53
	1.32	1.54	1.84	1.53	1.54
	1.40	1.58	1.95	1.54	1.56
	1.45	1.58	2.04	1.57	1.58
	1.46	1.65	2.09	1.60	1.58
	1.46	1.65	2.18	1.62	1.59
	1.57	1.67	2.30	1.69	1.63
	1.58	1.69	2.30	1.73	1.68
	1.69	1.73	2.30	1.74	1.73
	1.71	1.76	2.38	1.75	1.76
	1.75	1.77	2.39	1.80	1.77
	1.76	1.79	2.44	1.81	1.77
	1.77	1.81	2.45	1.85	1.78
	1.82	1.81	2.52	1.91	1.86
	1.83	1.83	2.79	1.94	1.89
	1.89	1.93	2.93	2.11	1.90
	1.90	1.94	2.98	2.16	1.94
	1.98	2.00	3.15	2.32	1.96
	2.03	2.01	3.20	2.38	2.00
	2.05	2.03	3.23	2.40	2.03
	2.09	2.14	3.28	2.47	2.03
	2.10	2.26	3.32	2.65	2.09
	2.14	2.31	3.32	2.66	2.10
	2.15	2.42	3.40	2.66	2.14
	2.15	2.46	3.48	2.69	2.14
	2.17	2.49	3.51	2.69	2.19

2.21	2.49	3.66	2.69	2.23
2.32	2.51	3.76	2.84	2.24
2.33	2.62	3.77	2.84	2.27
2.35	2.65	4.03	3.00	2.36
2.36	2.73	4.04	3.12	2.38
2.42	2.79	4.16	3.13	2.43
2.68	2.98	4.26	3.23	2.58
3.05	2.98	4.32	3.28	2.71
3.14	2.99	4.42	3.40	2.76
3.31	3.08	4.44	3.47	2.77
3.33	3.14	4.51	3.51	2.79
3.50	3.34	4.99	3.97	2.92
3.91	3.37	5.11	4.18	3.02
4.39	3.37	5.13	4.31	3.12
4.48	3.44	5.15	4.32	3.21
4.49	3.48	5.16	4.43	3.27
4.82	3.66	5.19	5.61	3.42
4.83	3.67	5.37	5.67	3.45
5.57	3.73	5.57	5.77	3.55
6.05	3.91	5.68	5.96	3.71
6.20	3.92	5.89	6.58	3.72
6.21	3.97	6.27	6.98	3.89
6.29	4.06	6.51	7.26	3.97
6.80	4.07	6.87	7.93	3.98
7.50	4.12	7.84		4.03
9.24	4.30	8.48		4.24
10.45	4.87	8.61		4.30
	5.07	8.73		4.74
	5.20	21.84		5.03
	5.82			5.08
	7.68			5.16
	9.76			6.47

River	mean D84 (cm)	relative std	number of pictures
Kander	11.6	29%	6
Simme	12.6	22%	5
Lütschine	10.9	19%	6
Rhine	12.7	9%	6
Saane	8	21%	5
Sitter	5.9	30%	5
Thur	4.5	16%	5

Table S3: Hydrological data

Rivers in Switzerland

id	River	Mean annual water flow Qmean (m^3/s)	standard deviation of Qmean (m^3/s)	Rel. std (observed)	Std deviation set to 20% (m^3/s)	Time period
1	Emme	11.9	2.5	21%	2.4	1990-2011
2	Landquart	24.1	5.1	21%	4.8	1990-2011
3	Waldemme Littau	15.5	2.8	18%	3.1	1990-2011
4	Reuss	42.9	4.7	11%	8.6	1990-2011
5	Maggia Losone II	22.7	10.8	48%	4.5	1990-2011
6	Maggia Losone I	22.7	10.8	48%	4.5	1990-2011
7	Rhein	167.5	24.5	15%	33.5	1977-1991
8	Sarine	21.0	3.9	19%	4.2	1990-2011
9	Lütschine	19.0	1.7	9%	3.8	1990-2011
10	Thur	37.9	6.8	18%	7.6	1990-2011
11	Simme	12.0	1.8	15%	2.4	1990-2011
12	Sitter	10.2	1.6	16%	2.0	1990-2011
13	Kander	20.0	2.3	11%	4.0	1990-2011
14	Sense	8.7	1.7	19%	1.7	1990-2011

All data is taken from the Federal Office for the Environment (FOEN)

Rivers in Peru

id	River	Mean annual water discharge Qmean (m^3/s)	Observed standard deviation from Qmean (m^3/s)	Obs. rel. std	Std. deviation set to 50% for Peru (m^3/s)	Length of daily record in year equivalent with >75% record time per year (yr, period)	Qmean at station close to grain size sampling site (m^3/s)	Inter-annual std. of Qmean (m^3/s)	Rel. inter-annual std. of Qmean
15	PRC-ME1	3.4	0.8	24%	1.7	-	-	-	-
16	PRC-ME3	4.0	5.0	125%	2.0	28 (1964-2019)	2.4	1.9	81%
17	PRC-ME5	3.4	1.0	29%	1.7	-	-	-	-
18	PRC-ME6	38.1	37.8	99%	19.1	65 (1952-2016)	33.3	18.0	54%
19	PRC-ME802	30.1	21.7	72%	15.1	-	-	-	-
20	PRC-ME7	68.4	52.7	77%	34.2	21(1961-2009)	71.2	35.5	50%
21	PRC-ME9	91.1	82.2	90%	45.6	5 (1971-2017)	107.4	50.7	47%
22	PRC-ME1402	20.4	29.9	147%	10.2	-	-	-	-
23	PRC-ME15	12.1	16.7	138%	6.1	-	-	-	-
24	PRC-ME16	13.6	17.8	131%	6.8	-	-	-	-
25	PRC-ME17	10.1	14.8	147%	5.1	26 (1950-2019)	21.4	12.3	57%

26	PRC-ME19	26.4	25.9	98%	13.2	-	-	-	-
27	PRC-ME20	8.2	9.8	120%	4.1	-	-	-	-
28	PRC-ME22	3.7	4.3	116%	1.9	23 (1939-1983)	4.6	2.2	47%
29	PRC-ME39	4.9	5.1	104%	2.5	-	-	-	-
30	PRC-ME23	8.9	7.8	88%	4.5	-	-	-	-
31	PRC-ME25	3.8	4.6	121%	1.9	1 (1972)	3.6	6.7	188%
32	PAT-ME	30.9	24.3	79%	15.5	-	-	-	-
33	PRC-ME38	9.8	12.7	130%	4.9	-	-	-	-
34	PRC-ME27	96.1	67.7	70%	48.1	-	-	-	-
35	PRC-ME30	25.4	27.7	109%	12.7	19 (1976-2019)	30.9	12.0	39%

All data is from Reber et al. (2017)

Blue coloured stations where sampling sites and gauging records are closer than 5 km. These sites were used to calibrate the TRMM data. The calibrated TRMM dataset was then employed to upscale the gauging records of the other streams to the sites where the grain size data has been collected. Please see Reber et al. (2017) and Litty et al. (2017) for further explanations.

Red coloured data have large std. because only 1 year with >75% of daily records is available

Table S4: Runoff quantiles, shear stress and material transport

Rivers in Switzerland

Emme

Classified discharge (m^3/s; 1918-2017, 100 years)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
0.64	*0.0*	6	0.2	0.0
1.15	*0.8*	9	1.7	0.0
1.64	*1.6*	10	4.4	0.1
2.01	*2.5*	12	7.2	0.2
2.53	*4.9*	13	12.6	0.6
3.04	*5.2*	15	18.4	1.0
3.57	*4.9*	16	24.7	1.2
4.16	*4.9*	17	31.9	1.6
4.95	*6.3*	19	40.5	2.6
5.82	*6.3*	21	49.0	3.1
6.85	*6.3*	23	57.2	3.6
8.01	*6.3*	25	66.5	4.2
9.30	*6.0*	27	73.1	4.4
10.80	*6.3*	29	79.7	5.0
12.70	*6.3*	32	85.5	5.4
15.00	*6.3*	35	90.3	5.7
17.40	*4.9*	38	93.2	4.6
20.60	*4.9*	42	95.8	4.7
25.60	*5.2*	47	98.0	5.1
35.40	*4.9*	56	99.4	4.9
46.80	*2.5*	65	99.8	2.5
54.20	*0.8*	71	99.9	0.8
69.30	*0.8*	81	100.0	0.8
92.20	*0.6*	95	100.0	0.6
			Probability of annual transport	*62.7%*

Landquart

Classified discharge (m^3/s; 1926-2017, 92 years)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
3.77	*0.0*	37	12.1	0.0
4.90	*0.8*	43	21.1	0.2
5.55	*1.6*	46	26.9	0.4
6.10	*2.5*	49	29.8	0.7
6.90	*4.9*	52	35.7	1.8
7.67	*5.2*	55	41.6	2.2
8.39	*4.9*	58	46.5	2.3
9.23	*4.9*	61	51.6	2.6
10.50	*6.3*	65	58.2	3.7
12.10	*6.3*	71	65.8	4.2
14.20	*6.3*	78	74.3	4.7
16.90	*6.3*	85	81.2	5.1
19.60	*6.0*	92	86.4	5.2
23.10	*6.3*	102	90.7	5.7
27.30	*6.3*	111	94.2	6.0
32.70	*6.3*	123	96.4	6.1
37.70	*4.9*	132	97.8	4.8
44.30	*4.9*	145	98.9	4.9
53.30	*5.2*	161	99.4	5.2
66.50	*4.9*	181	99.6	4.9
79.20	*2.5*	199	99.9	2.5
87.20	*0.8*	209	99.9	0.8
101.00	*0.8*	228	100.0	0.8
122.00	*0.6*	254	100.0	0.5
			Probability of annual transport	*75.3%*

Waldemme Litau

Classified discharge (m^3/s; 1978-2017, 40 years)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
1.61	*0.0*	16	2.5	0.0
2.25	*0.8*	19	6.3	0.1
2.66	*1.6*	21	9.3	0.2
3.07	*2.5*	23	12.8	0.3
3.74	*4.9*	25	19.4	1.0
4.44	*5.2*	28	26.2	1.4
5.09	*4.9*	30	32.0	1.6
5.74	*4.9*	32	38.5	1.9
6.70	*6.3*	35	45.7	2.9
7.77	*6.3*	38	53.9	3.4
8.97	*6.3*	41	62.3	3.9
10.40	*6.3*	44	69.1	4.4
11.90	*6.0*	48	75.2	4.5
13.70	*6.3*	52	81.9	5.2
15.90	*6.3*	56	86.0	5.4
18.60	*6.3*	61	90.8	5.7
21.70	*4.9*	67	94.1	4.7
25.50	*4.9*	73	96.3	4.8
32.30	*5.2*	83	98.3	5.1
44.60	*4.9*	99	99.6	4.9
61.10	*2.5*	117	99.9	2.5
71.50	*0.8*	128	99.9	0.8
92.40	*0.8*	148	100.0	0.8
134.00	*0.6*	182	100.0	0.6
			Probability of annual transport	*66.0%*

Reuss

Classified discharge (m^3/s; 1922-2017, 96 years)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
4.25	*0.0*	14	4.9	0.0
5.28	*0.8*	15	8.4	0.1
6.20	*1.6*	17	12.4	0.2
7.20	*2.5*	18	16.7	0.4
8.99	*4.9*	20	25.0	1.2
10.80	*5.2*	23	33.4	1.7
12.50	*4.9*	24	40.9	2.0
14.20	*4.9*	26	47.0	2.3
16.50	*6.3*	29	56.8	3.6
19.30	*6.3*	31	64.7	4.1
23.10	*6.3*	34	73.8	4.7
28.50	*6.3*	39	82.2	5.2
35.80	*6.0*	44	89.3	5.4
45.90	*6.3*	50	94.3	6.0
56.20	*6.3*	56	97.3	6.1
66.50	*6.3*	61	98.4	6.2
75.00	*4.9*	65	98.9	4.9
84.90	*4.9*	70	99.1	4.9
99.40	*5.2*	76	99.5	5.2
121.00	*4.9*	85	99.8	4.9
143.00	*2.5*	94	99.9	2.5
154.00	*0.8*	98	100.0	0.8
172.00	*0.8*	104	100.0	0.8
204.00	*0.6*	114	100.0	0.6
			Probability of annual transport	*73.9%*

Maggia Losone II

Classified discharge (m^3/s; 1985-2017, 33 years)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
0.76	*0.0*	3	0.0	0.0
1.65	*0.8*	5	0.0	0.0
2.66	*1.6*	6	0.0	0.0
3.08	*2.5*	6	0.0	0.0
3.51	*4.9*	7	0.0	0.0
3.93	*5.2*	7	0.0	0.0
4.30	*4.9*	8	0.0	0.0
4.64	*4.9*	8	0.1	0.0
5.07	*6.3*	8	0.1	0.0
5.56	*6.3*	9	0.1	0.0
6.16	*6.3*	9	0.2	0.0
6.94	*6.3*	10	0.2	0.0
7.98	*6.0*	11	0.5	0.0
9.37	*6.3*	12	0.7	0.0
11.40	*6.3*	13	1.2	0.1
14.50	*6.3*	15	2.7	0.2
18.40	*4.9*	17	5.0	0.2
25.00	*4.9*	20	11.0	0.5
39.40	*5.2*	26	25.7	1.3
80.20	*4.9*	38	64.2	3.2
168.00	*2.5*	57	91.3	2.3
229.00	*0.8*	68	96.7	0.8
371.00	*0.8*	88	99.4	0.8
654.00	*0.6*	121	99.9	0.5
			Probability of annual transport	*10.1%*

Maggia Losone I

Classified discharge (m^3/s; 1985-2017, 33 years)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
0.76	*0.0*	6	0.1	0.0
1.65	*0.8*	9	1.5	0.0
2.66	*1.6*	12	5.6	0.1
3.08	*2.5*	13	7.6	0.2
3.51	*4.9*	14	10.2	0.5
3.93	*5.2*	15	14.1	0.7
4.30	*4.9*	16	17.4	0.9
4.64	*4.9*	17	18.5	0.9
5.07	*6.3*	18	21.9	1.4
5.56	*6.3*	18	25.9	1.6
6.16	*6.3*	19	30.0	1.9
6.94	*6.3*	21	36.7	2.3
7.98	*6.0*	22	43.4	2.6
9.37	*6.3*	25	52.2	3.3
11.40	*6.3*	27	62.5	3.9
14.50	*6.3*	31	74.0	4.7
18.40	*4.9*	35	84.0	4.2
25.00	*4.9*	42	92.6	4.6
39.40	*5.2*	54	98.1	5.1
80.20	*4.9*	80	99.9	4.9
168.00	*2.5*	120	100.0	2.5
229.00	*0.8*	142	100.0	0.8
371.00	*0.8*	185	100.0	0.8
654.00	*0.6*	252	100.0	0.6
			Probability of annual transport	*48.5%*

Sarine

Classified discharge (m^3/s; 1923-2017, 95 years)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
2.74	*0.0*	9	0.0	0.0
3.63	*0.8*	11	0.0	0.0
4.38	*1.6*	12	0.0	0.0
5.10	*2.5*	13	0.0	0.0
6.13	*4.9*	14	0.0	0.0
7.18	*5.2*	15	0.1	0.0
8.16	*4.9*	16	0.2	0.0
9.17	*4.9*	18	0.4	0.0
10.60	*6.3*	19	0.6	0.0
12.30	*6.3*	21	0.9	0.1
14.20	*6.3*	22	1.2	0.1
16.40	*6.3*	24	1.9	0.1
18.80	*6.0*	26	2.9	0.2
21.90	*6.3*	28	3.9	0.2
25.60	*6.3*	31	6.3	0.4
30.00	*6.3*	34	9.5	0.6
34.20	*4.9*	36	12.5	0.6
39.80	*4.9*	39	16.9	0.8
48.40	*5.2*	44	24.6	1.3
61.20	*4.9*	50	35.2	1.7
75.10	*2.5*	56	46.3	1.1
84.40	*0.8*	60	52.1	0.4
99.70	*0.8*	65	61.5	0.5
132.00	*0.6*	76	74.3	0.4
			Probability of annual transport	*8.7%*

Lütschine

Classified discharge (m^3/s; 1924-2017, 94 years)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
1.59	*0.0*	10	0.0	0.0
1.95	*0.8*	11	0.0	0.0
2.22	*1.6*	12	0.0	0.0
2.46	*2.5*	13	0.0	0.0
2.90	*4.9*	14	0.0	0.0
3.34	*5.2*	15	0.0	0.0
3.82	*4.9*	16	0.0	0.0
4.40	*4.9*	18	0.0	0.0
5.48	*6.3*	20	0.1	0.0
6.89	*6.3*	23	0.2	0.0
8.85	*6.3*	26	0.4	0.0
11.16	*6.3*	29	0.8	0.1
15.20	*6.0*	35	2.5	0.1
20.10	*6.3*	41	5.0	0.3
25.10	*6.3*	46	8.7	0.5
30.40	*6.3*	51	13.2	0.8
34.70	*4.9*	55	17.3	0.9
39.40	*4.9*	59	22.2	1.1
45.20	*5.2*	63	28.5	1.5
53.20	*4.9*	70	36.3	1.8
60.30	*2.5*	74	42.1	1.0
63.70	*0.8*	76	45.1	0.4
70.20	*0.8*	81	49.9	0.4
80.80	*0.6*	87	57.5	0.3
			Probability of annual transport	*9.3%*

Thur

Classified discharge (m^3/s; 1965-2017, 53 years)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
3.55	*0.0*	4	0.0	0.0
4.70	*0.8*	4	0.0	0.0
5.91	*1.6*	5	0.0	0.0
7.07	*2.5*	5	0.0	0.0
8.86	*4.9*	6	0.0	0.0
10.70	*5.2*	7	0.0	0.0
12.30	*4.9*	7	0.1	0.0
14.00	*4.9*	8	0.1	0.0
16.30	*6.3*	8	0.1	0.0
18.90	*6.3*	9	0.2	0.0
21.80	*6.3*	10	0.2	0.0
25.10	*6.3*	11	0.5	0.0
28.90	*6.0*	11	0.7	0.0
33.30	*6.3*	12	0.9	0.1
39.00	*6.3*	13	1.4	0.1
46.30	*6.3*	15	3.0	0.2
53.40	*4.9*	16	4.4	0.2
63.40	*4.9*	18	6.7	0.3
79.80	*5.2*	20	11.2	0.6
112.00	*4.9*	24	22.5	1.1
152.00	*2.5*	28	37.1	0.9
180.00	*0.8*	31	44.5	0.4
235.00	*0.8*	36	60.5	0.5
338.00	*0.6*	44	78.5	0.4
			Probability of annual transport	*4.9%*

Simme

Classified discharge (m^3/s; 1921-2017, 97 years)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
1.91	*0.0*	32	1.0	0.0
2.33	*0.8*	35	1.8	0.0
2.66	*1.6*	38	2.5	0.0
2.96	*2.5*	41	3.2	0.1
3.51	*4.9*	44	5.3	0.3
4.06	*5.2*	48	7.8	0.4
4.57	*4.9*	52	10.3	0.5
5.11	*4.9*	55	13.1	0.6
5.94	*6.3*	59	18.1	1.1
7.02	*6.3*	65	25.3	1.6
8.26	*6.3*	71	31.4	2.0
9.64	*6.3*	78	39.7	2.5
11.00	*6.0*	84	45.4	2.7
12.50	*6.3*	89	53.6	3.4
14.10	*6.3*	95	59.7	3.8
15.90	*6.3*	102	66.3	4.2
17.60	*4.9*	108	70.9	3.5
19.70	*4.9*	115	76.6	3.8
22.90	*5.2*	125	82.5	4.3
28.40	*4.9*	141	89.3	4.4
33.60	*2.5*	154	92.8	2.3
36.80	*0.8*	162	95.2	0.8
42.50	*0.8*	176	96.3	0.8
51.60	*0.6*	195	98.2	0.5
			Probability of annual transport	*43.7%*

Sitter

Classified discharge (m^3/s; 1981-2017, 37 years)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
0.75	*0.0*	6	0.0	0.0
1.21	*0.8*	7	0.0	0.0
1.53	*1.6*	9	0.0	0.0
1.84	*2.5*	9	0.0	0.0
2.26	*4.9*	11	0.0	0.0
2.65	*5.2*	11	0.1	0.0
2.99	*4.9*	12	0.2	0.0
3.38	*4.9*	13	0.2	0.0
3.93	*6.3*	14	0.3	0.0
4.52	*6.3*	15	0.3	0.0
5.24	*6.3*	17	0.8	0.1
6.06	*6.3*	18	1.3	0.1
7.03	*6.0*	20	2.2	0.1
8.19	*6.3*	22	3.4	0.2
9.80	*6.3*	24	5.2	0.3
11.80	*6.3*	26	8.1	0.5
13.90	*4.9*	29	12.3	0.6
16.70	*4.9*	32	18.4	0.9
21.80	*5.2*	37	28.9	1.5
32.50	*4.9*	46	49.4	2.4
45.30	*2.5*	55	66.0	1.6
54.30	*0.8*	61	74.3	0.6
71.50	*0.8*	71	85.9	0.7
96.50	*0.6*	83	93.3	0.5
			Probability of annual transport	*10.3%*

Kander

Classified discharge (m^3/s; 1981-2017, 37 years)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
3.47	*0.0*	22	0.1	0.0
4.09	*0.8*	24	0.2	0.0
4.68	*1.6*	26	0.3	0.0
5.27	*2.5*	28	0.5	0.0
6.07	*4.9*	30	0.8	0.0
6.75	*5.2*	32	1.1	0.1
7.46	*4.9*	34	1.5	0.1
8.25	*4.9*	36	2.1	0.1
9.45	*6.3*	39	3.3	0.2
10.90	*6.3*	42	4.9	0.3
12.80	*6.3*	46	7.0	0.4
15.40	*6.3*	50	10.5	0.7
18.50	*6.0*	56	16.1	1.0
22.10	*6.3*	62	22.9	1.4
25.60	*6.3*	67	28.7	1.8
29.40	*6.3*	72	35.2	2.2
32.60	*4.9*	77	40.1	2.0
36.00	*4.9*	81	46.6	2.3
41.20	*5.2*	87	53.0	2.8
49.30	*4.9*	96	63.1	3.1
58.20	*2.5*	105	71.9	1.8
63.20	*0.8*	109	75.0	0.6
71.00	*0.8*	118	79.9	0.7
88.10	*0.6*	131	87.0	0.5
			Probability of annual transport	*22.1%*

Sense

Classified discharge (m^3/s; 1928-2017, 90 years)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
0.95	*0.0*	7	0.0	0.0
1.40	*0.8*	8	0.0	0.0
1.77	*1.6*	9	0.1	0.0
2.06	*2.5*	10	0.0	0.0
2.45	*4.9*	11	0.1	0.0
2.83	*5.2*	12	0.2	0.0
3.16	*4.9*	13	0.3	0.0
3.50	*4.9*	14	0.3	0.0
3.98	*6.3*	15	0.5	0.0
4.53	*6.3*	16	0.9	0.1
5.18	*6.3*	17	1.2	0.1
5.92	*6.3*	18	1.8	0.1
6.70	*6.0*	19	2.6	0.2
7.65	*6.3*	21	3.8	0.2
8.79	*6.3*	22	5.2	0.3
10.30	*6.3*	25	8.0	0.5
11.80	*4.9*	27	11.5	0.6
14.00	*4.9*	29	16.6	0.8
17.50	*5.2*	33	24.9	1.3
24.10	*4.9*	40	40.6	2.0
32.60	*2.5*	46	55.6	1.4
37.70	*0.8*	51	64.9	0.5
48.20	*0.8*	57	76.1	0.6
64.20	*0.6*	67	86.3	0.5
			Probability of annual transport	*9.3%*

Rivers in Peru

PRC-ME3 (Rio Sama)

Classified discharge (m^3/s; 1964-2004, 30 years equ.)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
0.07	*0.75*	8	0.0	0.0
0.17	*1.75*	13	0.4	0.0
0.26	*2.50*	16	1.7	0.0
0.30	*5.00*	18	2.3	0.1
0.35	*5.00*	19	4.3	0.2
0.38	*5.00*	20	5.0	0.2
0.42	*5.00*	21	6.3	0.3
0.48	*5.00*	23	8.9	0.4
0.55	*5.00*	25	11.7	0.6
0.61	*5.00*	26	15.4	0.8
0.68	*5.00*	28	18.3	0.9
0.75	*5.00*	29	22.1	1.1
0.84	*5.00*	31	26.7	1.3
0.92	*5.00*	33	31.9	1.6
1.03	*5.00*	35	36.5	1.8
1.16	*5.00*	37	42.3	2.1
1.34	*5.00*	40	51.2	2.6
1.58	*5.00*	44	59.9	3.0
2.11	*5.00*	52	74.4	3.7
4.22	*5.00*	75	94.8	4.7
10.49	*5.00*	124	99.8	5.0
19.74	*2.50*	176	100.0	2.5
39.08	*1.75*	257	100.0	1.7
61.64	*0.50*	330	100.0	0.5
167.80	*0.25*	571	100.0	0.2
			Probability of annual transport	35.6%

PRC-ME6 (Rio Tambo)

Classified discharge (m^3/s; 1952-2018, 98 years equ.)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
3.58	*0.75*	31	65.5	0.5
4.50	*1.75*	35	76.5	1.3
5.21	*2.50*	38	83.0	2.1
6.18	*5.00*	42	88.4	4.4
6.80	*5.00*	44	91.0	4.5
7.55	*5.00*	47	93.2	4.7
8.20	*5.00*	49	94.3	4.7
8.96	*5.00*	51	95.8	4.8
9.64	*5.00*	53	96.6	4.8
10.42	*5.00*	56	97.4	4.9
11.55	*5.00*	59	98.1	4.9
13.00	*5.00*	63	98.6	4.9
15.31	*5.00*	68	99.4	5.0
17.59	*5.00*	74	99.6	5.0
20.00	*5.00*	79	99.6	5.0
23.28	*5.00*	86	99.8	5.0
28.00	*5.00*	96	99.9	5.0
35.09	*5.00*	108	100.0	5.0
45.97	*5.00*	126	100.0	5.0
70.73	*5.00*	160	100.0	5.0
129.05	*5.00*	221	100.0	5.0
200.00	*2.50*	281	100.0	2.5
418.20	*1.75*	422	100.0	1.8
549.06	*0.50*	491	100.0	0.5
967.00	*0.25*	667	100.0	0.2
			Probability of annual transport	96.5%

PRC-ME7 (Rio Camana)

Classified discharge (m^3/s; 1960-2018, 25 years equ.)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
9.11	*0.75*	10	0.0	0.0
12.56	*1.75*	12	0.0	0.0
14.02	*2.50*	13	0.0	0.0
16.93	*5.00*	14	0.1	0.0
18.20	*5.00*	15	0.1	0.0
20.00	*5.00*	15	0.1	0.0
21.50	*5.00*	16	0.1	0.0
23.30	*5.00*	17	0.1	0.0
25.25	*5.00*	18	0.2	0.0
27.68	*5.00*	18	0.3	0.0
30.50	*5.00*	20	0.3	0.0
33.97	*5.00*	21	0.6	0.0
38.35	*5.00*	22	0.8	0.0
45.00	*5.00*	24	1.1	0.1
53.00	*5.00*	27	1.9	0.1
61.00	*5.00*	29	3.0	0.1
75.00	*5.00*	32	5.1	0.3
91.31	*5.00*	36	8.4	0.4
120.00	*5.00*	42	14.9	0.7
154.48	*5.00*	48	24.4	1.2
225.00	*5.00*	59	43.2	2.2
317.01	*2.50*	71	61.1	1.5
512.14	*1.75*	92	82.8	1.4
800.00	*0.50*	118	94.6	0.5
2000.00	*0.25*	194	99.8	0.2
			Probability of annual transport	8.9%

PRC-ME9 (Rio Ocona)

Classified discharge (m^3/s; 1970-2018, 10 years equ.)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
16.17	*0.75*	14	0.1	0.0
20.94	*1.75*	16	0.4	0.0
23.55	*2.50*	17	0.5	0.0
27.82	*5.00*	18	1.0	0.1
30.00	*5.00*	19	1.3	0.1
31.84	*5.00*	20	1.6	0.1
35.00	*5.00*	21	1.9	0.1
37.00	*5.00*	21	2.0	0.1
40.00	*5.00*	22	3.1	0.2
44.11	*5.00*	24	3.9	0.2
48.49	*5.00*	25	4.8	0.2
54.44	*5.00*	27	6.4	0.3
59.41	*5.00*	28	7.9	0.4
65.00	*5.00*	29	9.8	0.5
75.00	*5.00*	32	14.2	0.7
94.00	*5.00*	36	21.0	1.1
120.17	*5.00*	41	32.6	1.6
155.20	*5.00*	47	45.7	2.3
200.00	*5.00*	54	59.8	3.0
250.00	*5.00*	61	70.8	3.5
350.00	*5.00*	74	84.7	4.2
443.75	*2.50*	84	91.4	2.3
700.00	*1.75*	108	98.1	1.7
852.12	*0.50*	120	99.0	0.5
1248.39	*0.25*	148	99.8	0.2
			Probability of annual transport	23.4%

PRC-ME17 (Rio Chico)

Classified discharge (m^3/s; 1950-2018, 37 years equ.)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
0.19	*0.75*	12	2.2	0.0
0.29	*1.75*	15	7.0	0.1
0.40	*2.50*	18	14.7	0.4
0.65	*5.00*	23	34.2	1.7
0.90	*5.00*	28	51.7	2.6
1.24	*5.00*	33	68.4	3.4
1.64	*5.00*	39	80.9	4.0
2.07	*5.00*	44	88.3	4.4
2.58	*5.00*	50	93.9	4.7
3.14	*5.00*	56	96.5	4.8
3.70	*5.00*	60	97.9	4.9
4.26	*5.00*	66	98.5	4.9
4.85	*5.00*	70	99.3	5.0
5.49	*5.00*	76	99.5	5.0
6.49	*5.00*	82	99.8	5.0
8.39	*5.00*	95	99.9	5.0
12.14	*5.00*	117	100.0	5.0
17.94	*5.00*	145	100.0	5.0
28.05	*5.00*	185	100.0	5.0
47.61	*5.00*	248	100.0	5.0
96.79	*5.00*	366	100.0	5.0
165.72	*2.50*	490	100.0	2.5
299.35	*1.75*	685	100.0	1.8
488.69	*0.50*	896	100.0	0.5
1268.80	*0.25*	1501	100.0	0.2
			Probability of annual transport	85.9%

PRC-ME22 (Rio Lurin)

Classified discharge (m^3/s; 1938-1984, 30 years equ.)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
0.00	*0.75*	0	0.0	0.0
0.00	*1.75*	0	0.0	0.0
0.00	*2.50*	0	0.0	0.0
0.00	*5.00*	0	0.0	0.0
0.00	*5.00*	0	0.0	0.0
0.09	*5.00*	16	2.6	0.1
0.15	*5.00*	22	11.0	0.5
0.26	*5.00*	29	30.8	1.5
0.45	*5.00*	40	60.1	3.0
0.70	*5.00*	51	80.4	4.0
1.00	*5.00*	62	91.6	4.6
1.50	*5.00*	77	97.4	4.9
2.18	*5.00*	95	99.3	5.0
3.00	*5.00*	113	99.8	5.0
4.00	*5.00*	133	99.9	5.0
5.24	*5.00*	154	100.0	5.0
6.83	*5.00*	178	100.0	5.0
8.82	*5.00*	204	100.0	5.0
12.00	*5.00*	241	100.0	5.0
16.32	*5.00*	287	100.0	5.0
24.96	*5.00*	364	100.0	5.0
32.79	*2.50*	421	100.0	2.5
46.10	*1.75*	509	100.0	1.8
60.00	*0.50*	590	100.0	0.5
100.00	*0.25*	777	100.0	0.2
			Probability of annual transport	68.6%

PRC-ME25 (Rio Supe)

Classified discharge (m^3/s; 1964-1973, 4 years equ.)	Probability of quantile appearance (%)	Shear stress (Pa, median)	Probability of transport for quantile (%)	Weighted transport probability (%)
0.08	*0.75*	9	0.0	0.0
0.10	*1.75*	10	0.0	0.0
0.13	*2.50*	11	0.0	0.0
0.23	*5.00*	15	0.2	0.0
0.35	*5.00*	20	0.8	0.0
0.40	*5.00*	21	1.2	0.1
0.50	*5.00*	24	2.2	0.1
0.65	*5.00*	28	4.7	0.2
0.86	*5.00*	32	9.4	0.5
1.20	*5.00*	39	18.6	0.9
1.50	*5.00*	44	28.1	1.4
2.00	*5.00*	52	41.8	2.1
2.60	*5.00*	59	57.0	2.9
3.27	*5.00*	67	68.4	3.4
4.00	*5.00*	75	77.0	3.8
5.06	*5.00*	86	85.4	4.3
6.44	*5.00*	98	92.6	4.6
7.70	*5.00*	108	94.8	4.7
9.53	*5.00*	121	97.7	4.9
12.35	*5.00*	139	99.0	5.0
17.11	*5.00*	167	99.8	5.0
24.57	*2.50*	205	99.9	2.5
36.38	*1.75*	254	100.0	1.7
45.07	*0.50*	286	100.0	0.5
60.00	*0.25*	334	100.0	0.2
			Probability of annual transport	48.9%

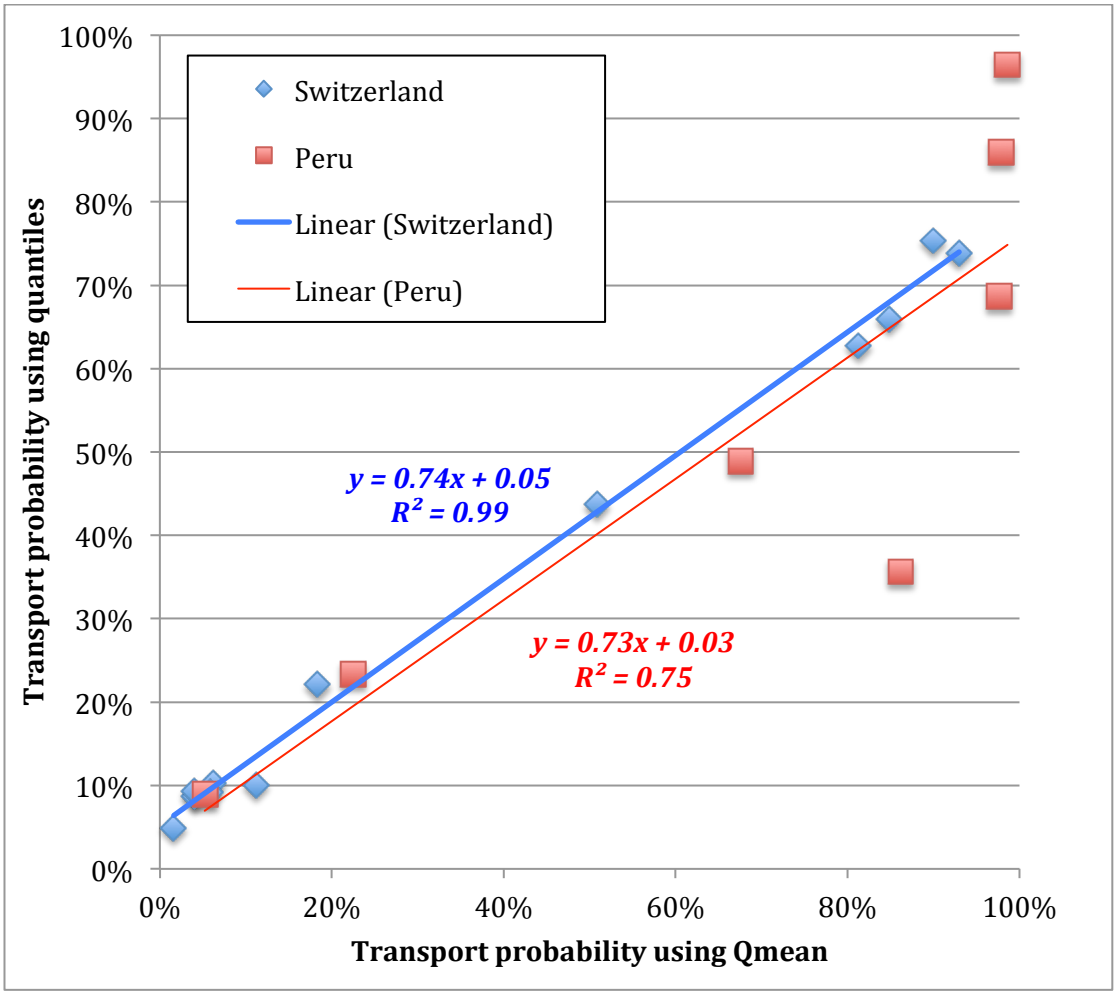

Figure S4: Sensitivity analysis, showing a linear relationship between annual transport time that is based on the mean annual discharge (Q_{mean}), and the transport time that was calculated using discharge quantiles.

Figure S5: Dependency of D96/D50 ratios

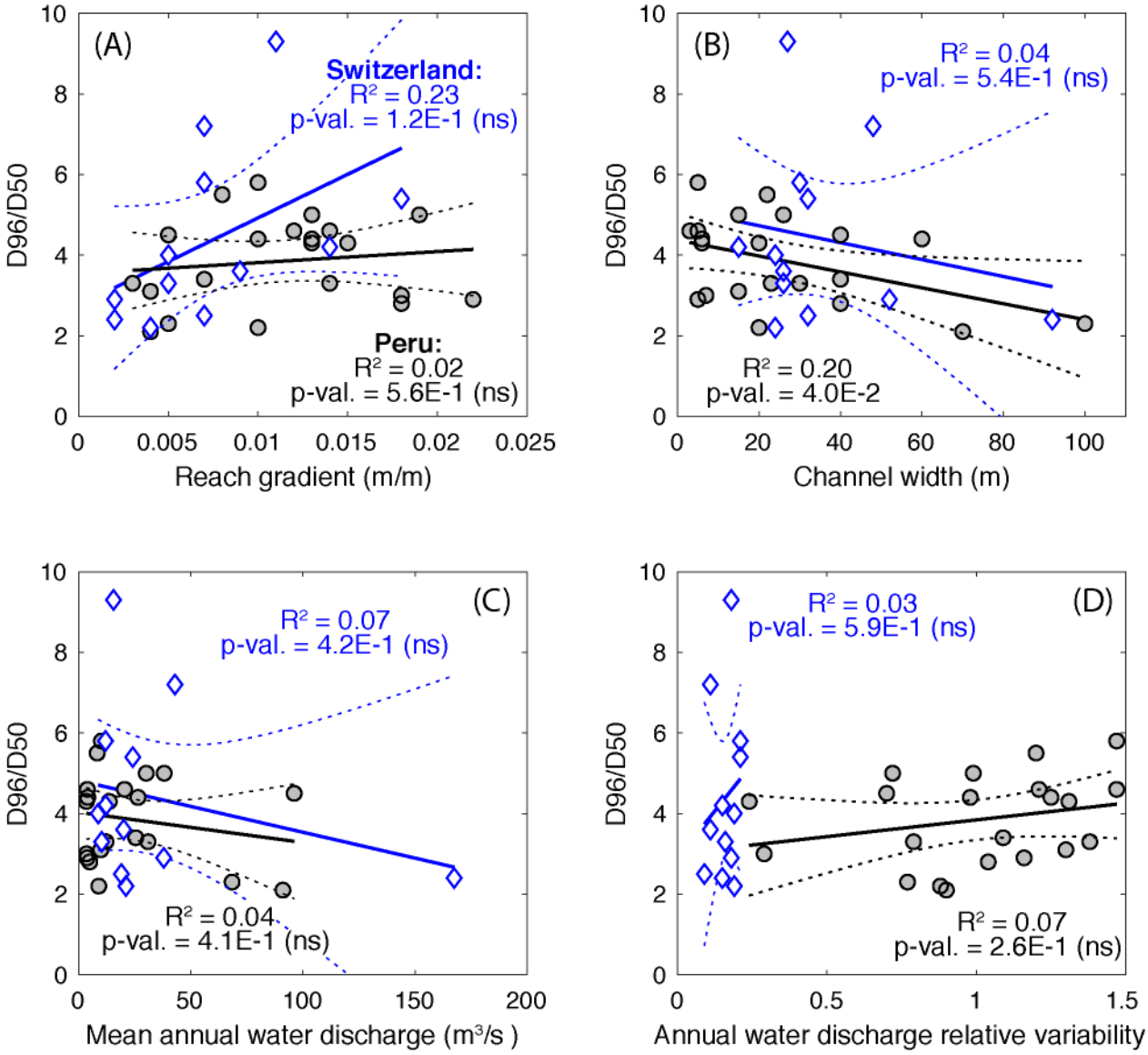

Figure S5: Dependency of the sorting (D96/D50 ratios) on (A) reach gradient, (B) channel width, (C) mean annual discharge and (D) discharge variability. Except fo the negative correlation between sorting and channel width for the Pervian streams (B), all other correlations are statistically not significant. This suggests that the sorting and possibly also the granulometric composition of the material is an independent variable.

Table S6: Sensitivity of transport probability: uncertainties on channel gradient, width and mean annual water discharge for Swiss rivers

TEST #1: Model runs using the parameter for Table 1, main text

TEST #1	Sorting	Crit. shear (median, Pa)	Crit. shear (16^{th} perc., Pa)	Crit. shear (84^{th} perc., Pa)	Shear stress (median, Pa)	Shear stress (16^{th} perc., Pa)	Shear stress (84^{th} perc., Pa)	Prob. of transport
Emme	5.8	21	15	29	31	23	39	**82%**
Landquart	5.4	61	43	82	102	78	130	**90%**
Wald. Littau	9.3	36	26	49	55	43	70	**85%**
Reuss	7.2	26	19	37	48	38	60	**93%**
Rhine	2.4	92	65	127	26	20	33	**0%**
Sarine	2.2	58	41	80	28	21	35	**4%**
Lütschine	2.5	80	57	111	39	31	49	**5%**
Thur	2.9	32	23	45	13	10	17	**1%**
Simme	4.2	85	61	117	87	68	110	**51%**
Sitter	3.3	46	32	63	24	19	30	**7%**
Kander	3.6	84	59	116	58	46	73	**20%**
Sense	4.0	43	31	59	22	17	28	**6%**

TEST #2: Model runs using the same setup as TEST #1, but with reduced uncertainties on widths and slopes (10%)

TEST #2	Sorting	Crit. shear (median, Pa)	Crit. shear (16^{th} perc., Pa)	Crit. shear (84^{th} perc., Pa)	Shear stress (median, Pa)	Shear stress (16^{th} perc., Pa)	Shear stress (84^{th} perc., Pa)	Prob. of transport
Emme	5.8	21	15	29	30	26	36	**85%**
Landquart	5.4	60	43	82	102	86	119	**93%**
Wald. Littau	9.3	36	26	49	55	47	63	**88%**
Reuss	7.2	27	19	36	48	42	54	**96%**
Rhine	2.4	92	65	127	26	23	30	**0%**
Sarine	2.2	58	41	79	27	23	32	**3%**
Lütschine	2.5	80	57	110	39	35	44	**3%**
Thur	2.9	32	23	45	13	11	15	**1%**
Simme	4.2	86	61	118	87	75	99	**51%**
Sitter	3.3	46	33	64	24	21	28	**4%**
Kander	3.6	84	59	115	58	51	65	**16%**
Sense	4.0	43	31	60	22	19	26	**4%**

TEST #3: Model runs as TEST #1, but with 20% rel. uncertainties on discharge, which corresponds to the mean of the observed uncertainties

TEST #3	Sorting	Crit. shear (median, Pa)	Crit. shear (16^{th} perc., Pa)	Crit. shear (84^{th} perc., Pa)	Shear stress (median, Pa)	Shear stress (16^{th} perc., Pa)	Shear stress (84^{th} perc., Pa)	Prob. of transport
Emme	5.8	21	15	29	30	23	39	**82%**
Landquart	5.4	60	42	82	103	79	130	**90%**
Wald. Littau	9.3	36	26	50	55	42	69	**84%**

Reuss	7.2	27	19	37	48	37	61	**92%**
Rhine	2.4	93	65	128	26	20	33	**0%**
Sarine	2.2	57	41	79	27	21	35	**4%**
Lütschine	2.5	80	56	110	39	30	49	**5%**
Thur	2.9	32	23	45	13	10	17	**2%**
Simme	4.2	86	60	119	87	67	110	**51%**
Sitter	3.3	46	33	63	24	18	31	**6%**
Kander	3.6	83	59	116	58	44	73	**18%**
Sense	4.0	44	31	60	22	17	28	**6%**

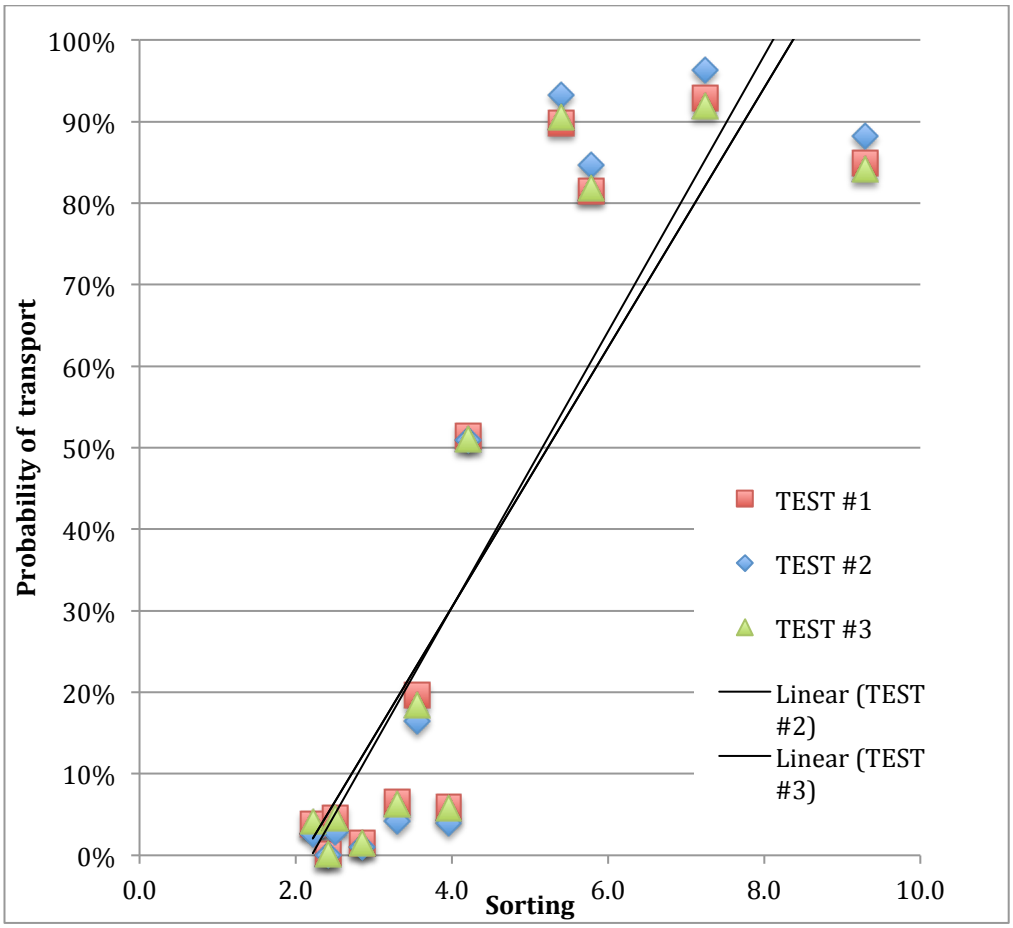

Figure S6, showing results of sensitivity analysis with grain size sorting (D96/D50 ratios) on the x-axis and probability of sediment transport on the y-axis

Table S7: Sensitivity of transport probability: uncertainties on channel gradient, width and mean annual water discharge for Peruvian rivers

TEST #4: Model runs using the parameter for Table 1, main text

TEST #4	Sorting	Crit. shear (median, Pa)	Crit. shear (16^{th} perc., Pa)	Crit. shear (84^{th} perc., Pa)	Shear stress (median, Pa)	Shear stress (16^{th} perc., Pa)	Shear stress (84^{th} perc., Pa)	Prob. of transport
PRC-ME1	4.3	45	32	62	75	58	96	**89%**
PRC-ME3	4.4	40	28	55	84	46	126	**85%**
PRC-ME5	3.0	37	26	51	82	60	107	**96%**
PRC-ME6	5.0	26	18	36	434	243	641	**100%**
PRC-ME802	5.0	43	30	59	191	115	279	**98%**
PRC-ME7	2.3	63	44	86	31	18	45	**9%**
PRC-ME9	2.1	49	35	67	37	21	54	**28%**
PRC-ME1402	4.6	22	15	30	335	183	508	**100%**
PRC-ME15	3.3	46	33	64	19	10	29	**5%**
PRC-ME16	4.3	48	34	66	85	46	130	**80%**
PRC-ME17	5.8	28	19	37	125	68	191	**97%**
PRC-ME19	4.4	33	23	46	48	27	72	**73%**
PRC-ME20	5.5	35	25	48	38	21	57	**55%**
PRC-ME22	2.9	36	26	49	142	79	212	**96%**
PRC-ME39	2.8	75	53	104	43	24	63	**13%**
PRC-ME23	2.2	59	42	82	47	28	69	**33%**
PRC-ME25	4.6	56	39	77	83	46	125	**73%**
PAT-ME	3.3	26	18	36	102	59	148	**97%**
PRC-ME38	3.1	25	17	34	27	15	41	**56%**
PRC-ME27	4.5	39	28	53	61	37	87	**77%**
PRC-ME30	3.4	45	32	63	44	25	65	**46%**

TEST #5: Same as in TEST #4, but doubled channel width and 50% rel. std on width

TEST #5	Sorting	Crit. shear (median, Pa)	Crit. shear (16^{th} perc., Pa)	Crit. shear (84^{th} perc., Pa)	Shear stress (median, Pa)	Shear stress (16^{th} perc., Pa)	Shear stress (84^{th} perc., Pa)	Prob. of transport
PRC-ME1	4.3	45	32	62	52	36	77	**63%**
PRC-ME3	4.4	40	28	54	58	31	98	**71%**
PRC-ME5	3.0	37	26	50	56	39	84	**81%**
PRC-ME6	5.0	26	18	35	300	164	498	**99%**
PRC-ME802	5.0	43	30	59	132	78	215	**95%**
PRC-ME7	2.3	63	44	87	21	12	35	**5%**
PRC-ME9	2.1	49	34	67	25	15	42	**15%**
PRC-ME1402	4.6	22	15	30	230	122	385	**99%**
PRC-ME15	3.3	46	33	64	13	7	22	**3%**
PRC-ME16	4.3	48	34	66	59	31	99	**62%**
PRC-ME17	5.8	27	19	38	86	46	145	**93%**
PRC-ME19	4.4	33	23	46	33	18	55	**50%**
PRC-ME20	5.5	35	24	48	26	14	43	**33%**

PRC-ME22	2.9	36	26	50	98	53	163	**91%**
PRC-ME39	2.8	75	54	104	29	16	48	**7%**
PRC-ME23	2.2	60	42	83	33	18	54	**17%**
PRC-ME25	4.6	56	39	76	56	30	94	**51%**
PAT-ME	3.3	26	18	36	70	40	113	**92%**
PRC-ME38	3.1	25	17	34	19	10	32	**34%**
PRC-ME27	4.5	39	27	54	42	25	68	**55%**
PRC-ME30	3.4	45	32	63	30	16	50	**26%**

TEST #6: Same as in TEST #4, but doubled channel width and 50% rel. std on width and Qmean

TEST #6	Sorting	Crit. shear (median, Pa)	Crit. shear (16^{th} perc., Pa)	Crit. shear (84^{th} perc., Pa)	Shear stress (median, Pa)	Shear stress (16^{th} perc., Pa)	Shear stress (84^{th} perc., Pa)	Prob. of transport
PRC-ME1	4.3	44	31	61	51	32	80	**60%**
PRC-ME3	4.4	40	28	55	49	31	77	**65%**
PRC-ME5	3.0	37	26	51	56	35	88	**78%**
PRC-ME6	5.0	26	18	36	272	169	422	**100%**
PRC-ME802	5.0	44	31	60	129	81	201	**96%**
PRC-ME7	2.3	63	45	87	20	13	32	**4%**
PRC-ME9	2.1	49	35	67	24	15	37	**11%**
PRC-ME1402	4.6	22	15	30	190	118	298	**100%**
PRC-ME15	3.3	46	33	64	11	7	17	**2%**
PRC-ME16	4.3	48	34	66	50	31	77	**54%**
PRC-ME17	5.8	27	19	38	71	44	111	**94%**
PRC-ME19	4.4	33	24	46	31	19	48	**45%**
PRC-ME20	5.5	34	24	47	23	14	36	**24%**
PRC-ME22	2.9	36	26	49	86	54	133	**93%**
PRC-ME39	2.8	76	53	104	26	16	41	**5%**
PRC-ME23	2.2	60	42	82	31	20	49	**14%**
PRC-ME25	4.6	55	39	76	49	31	77	**41%**
PAT-ME	3.3	26	18	36	67	42	105	**94%**
PRC-ME38	3.1	24	17	34	16	10	25	**23%**
PRC-ME27	4.5	39	27	53	41	26	64	**54%**
PRC-ME30	3.4	45	32	62	27	17	42	**19%**

TEST #7: Same as in TEST #4, but 50% rel. std on width and Qmean

TEST #7	Sorting	Crit. shear (median, Pa)	Crit. shear (16^{th} perc., Pa)	Crit. shear (84^{th} perc., Pa)	Shear stress (median, Pa)	Shear stress (16^{th} perc., Pa)	Shear stress (84^{th} perc., Pa)	Prob. of transport
PRC-ME1	4.3	45	32	62	75	47	117	**82%**
PRC-ME3	4.4	40	28	55	72	45	113	**85%**
PRC-ME5	3.0	37	26	51	82	52	129	**91%**
PRC-ME6	5.0	26	18	36	403	253	631	**100%**
PRC-ME802	5.0	43	30	59	188	118	294	**98%**
PRC-ME7	2.3	63	45	86	30	19	47	**11%**
PRC-ME9	2.1	49	35	68	35	22	55	**28%**
PRC-ME1402	4.6	22	15	30	278	175	432	**100%**
PRC-ME15	3.3	46	33	64	16	10	25	**5%**

PRC-ME16	4.3	48	34	65	73	46	114	**78%**
PRC-ME17	5.8	28	19	38	104	65	162	**98%**
PRC-ME19	4.4	33	24	46	45	28	71	**70%**
PRC-ME20	5.5	35	24	47	33	21	52	**47%**
PRC-ME22	2.9	36	25	50	124	78	197	**98%**
PRC-ME39	2.8	76	54	104	38	24	60	**13%**
PRC-ME23	2.2	60	42	82	45	28	70	**32%**
PRC-ME25	4.6	55	39	76	72	45	114	**68%**
PAT-ME	3.3	26	18	36	98	61	155	**98%**
PRC-ME38	3.1	25	17	34	23	15	37	**47%**
PRC-ME27	4.5	39	27	54	60	37	94	**77%**
PRC-ME30	3.4	45	32	62	40	25	62	**42%**

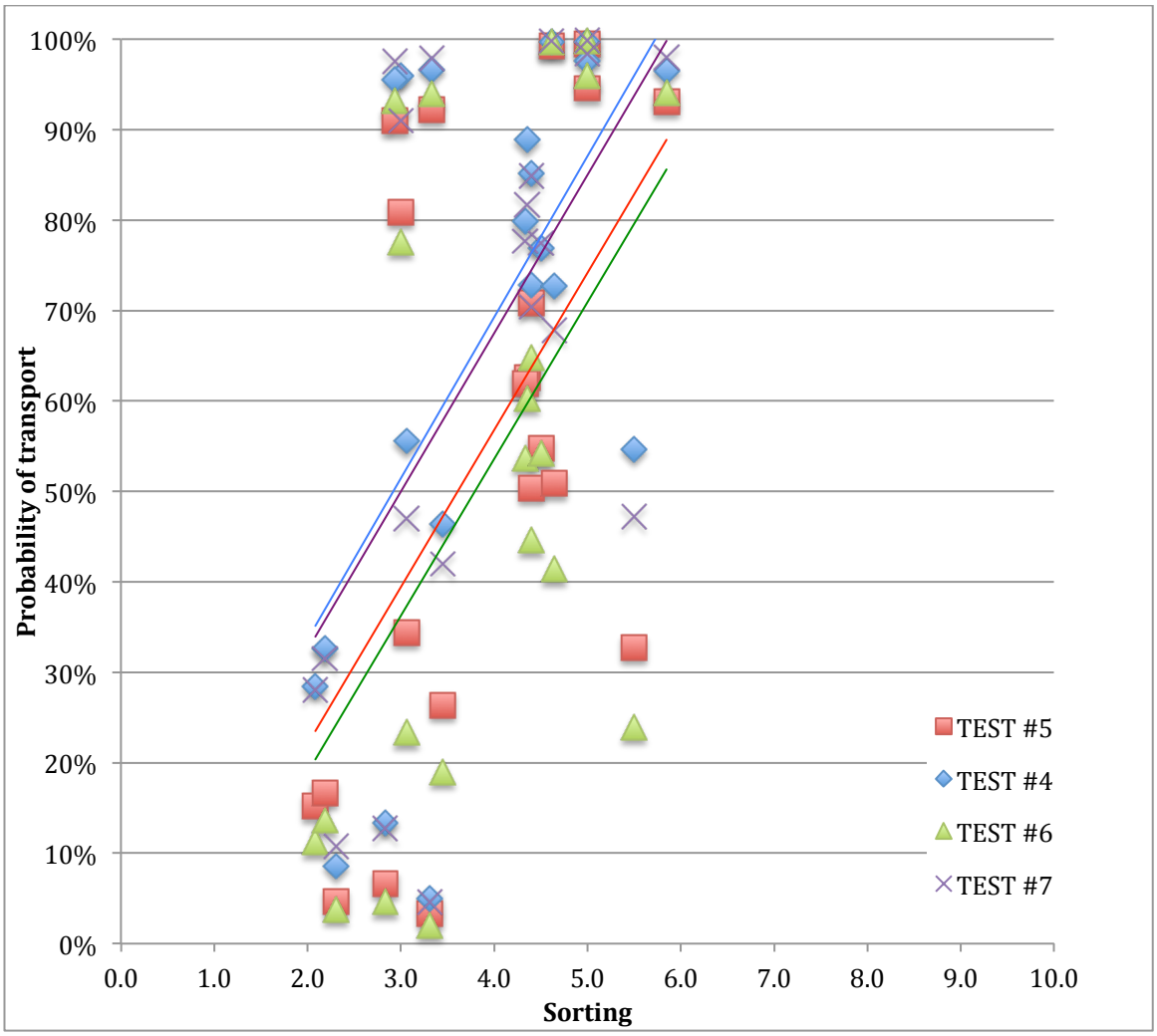

Figure S7, showing results of sensitivity analysis with grain size sorting (D96/D50 ratios) on the x-axis and probability of sediment transport on the y-axis

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Litty, C., Schlunegger, F., and Viveen, W.: Possible threshold controls on sediment grain properties of Peruvian coastal river basins, Earth Surf. Dyn., 5, 571-583, 2017.

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