Supporting Information for "Fine sediment in mixed sand-silt environments impact bedform geometry by altering sediment mobility"

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Introduction In these supplementary materials, we provide additional figures and a table belonging to the manuscript "Fine sediment in mixed sand-silt environments impact bedform geometry by altering sediment mobility". We show an images of the sediment used (Figure S1), and the bed scans from all experiments, as interpolated DEMS, hillshade figures, and via profiles (Text S2). In Text S3 and the corresponding figure we extent on the difference between developed and incipient ripples. Text S4 (Figure S6) show the logarithmic velocity profiles of the experiments used to determine the hydraulic roughness via the Law of the Wall (equation 12 in manuscript), and finally, Text S5 (Table S1) shows the critical shear stress calculated with and without correction factor for the hiding exposure effect (equation 14 and A6 in the manuscript).

Text S1: Sediments

see Figure S1

Text S2: Bed elevation profiles

see Figure S2, S3 and S4

Text S3: Ripples on high discharge runs

Linguoid 3D ripples indicate an equilibrium state, while straight 2D ripples are an indication of non-equilibrium (Baas, 1994). Additionally, the size of the 2D ripples is significantly smaller (Figure S5). This, together with visual observation from the authors, shows that the 2D ripples visible on the hillshade figures of some high discharge runs, are artifacts formed by drainage of the flume.

Text S4: Logarithmic velocity profiles

see Figure S6

Text S5: Corrected critical shear stress for hiding-exposure effect

see Table S1

references.bib

References

Baas, Jaco H. (1994). "A flume study on the development and equilibrium morphology of current ripples in very fine sand". In: *Sedimentology* 41.2, pp. 185–209. ISSN: 13653091. DOI: 10.1111/j.1365-3091.1994.tb01400.x.

Parker, Gary et al. (2007). "Physical basis for quasi-universal relations describing bankfull hydraulic geometry of single-thread gravel bed rivers". In: *Journal of Geophysical Research: Earth Surface* 112.4, pp. 1–21. ISSN: 21699011. DOI: 10.1029/2006JF000549.

Patel, Shaileshkumar B, Prem Lal Patel, and Prakash Devidas (2013). *Threshold for initiation of motion of unimodal and bimodal sediments.* Tech. rep. 1, pp. 24–33.

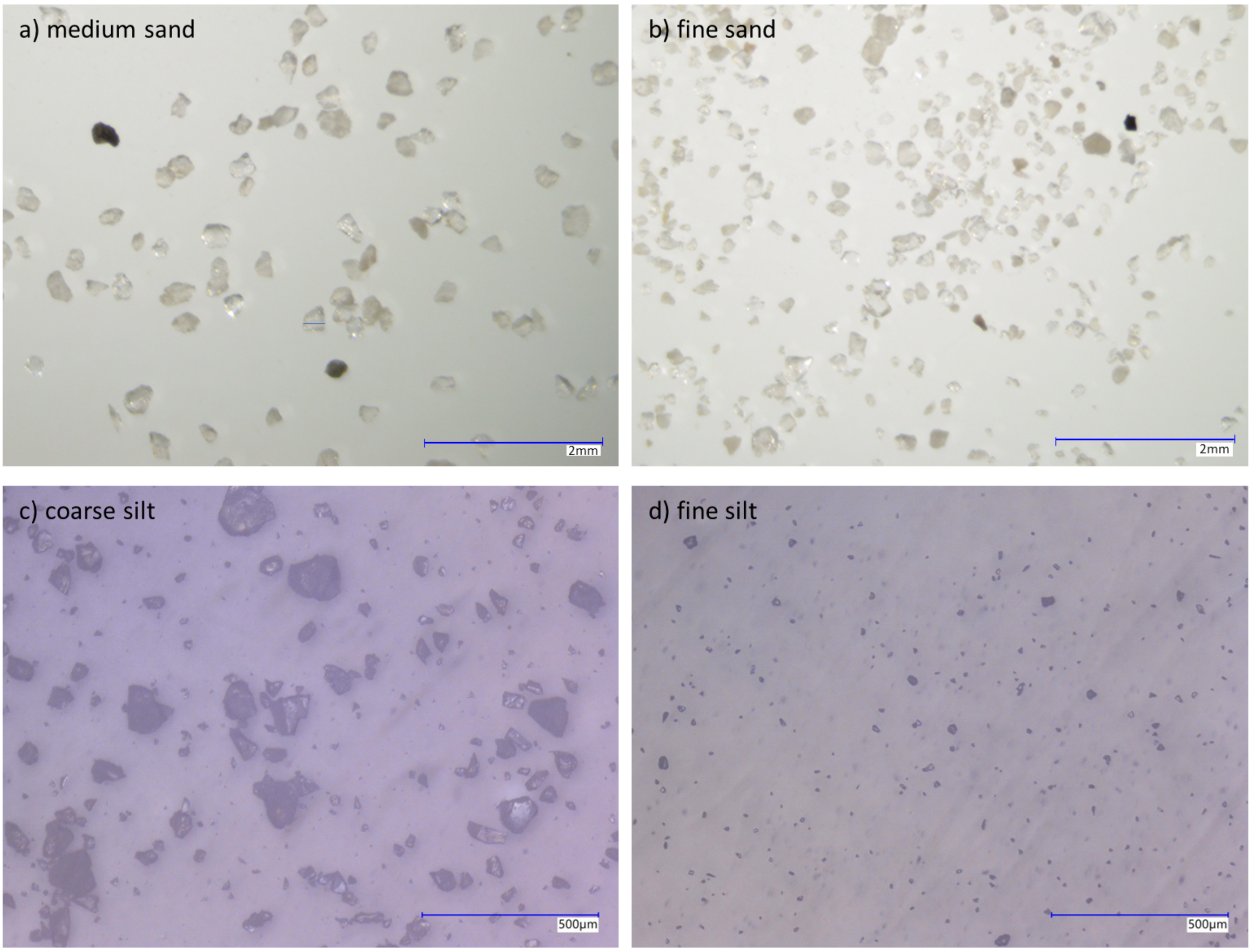

Figure S1. Microscope images of the sediments used in this research. a) medium sand (D_{50} = 256 μm), b) fine sand (D_{50} = 170 μm), c) coarse silt (D_{50} = 37 μm), d) fine silt (D_{50} = 17 μm).

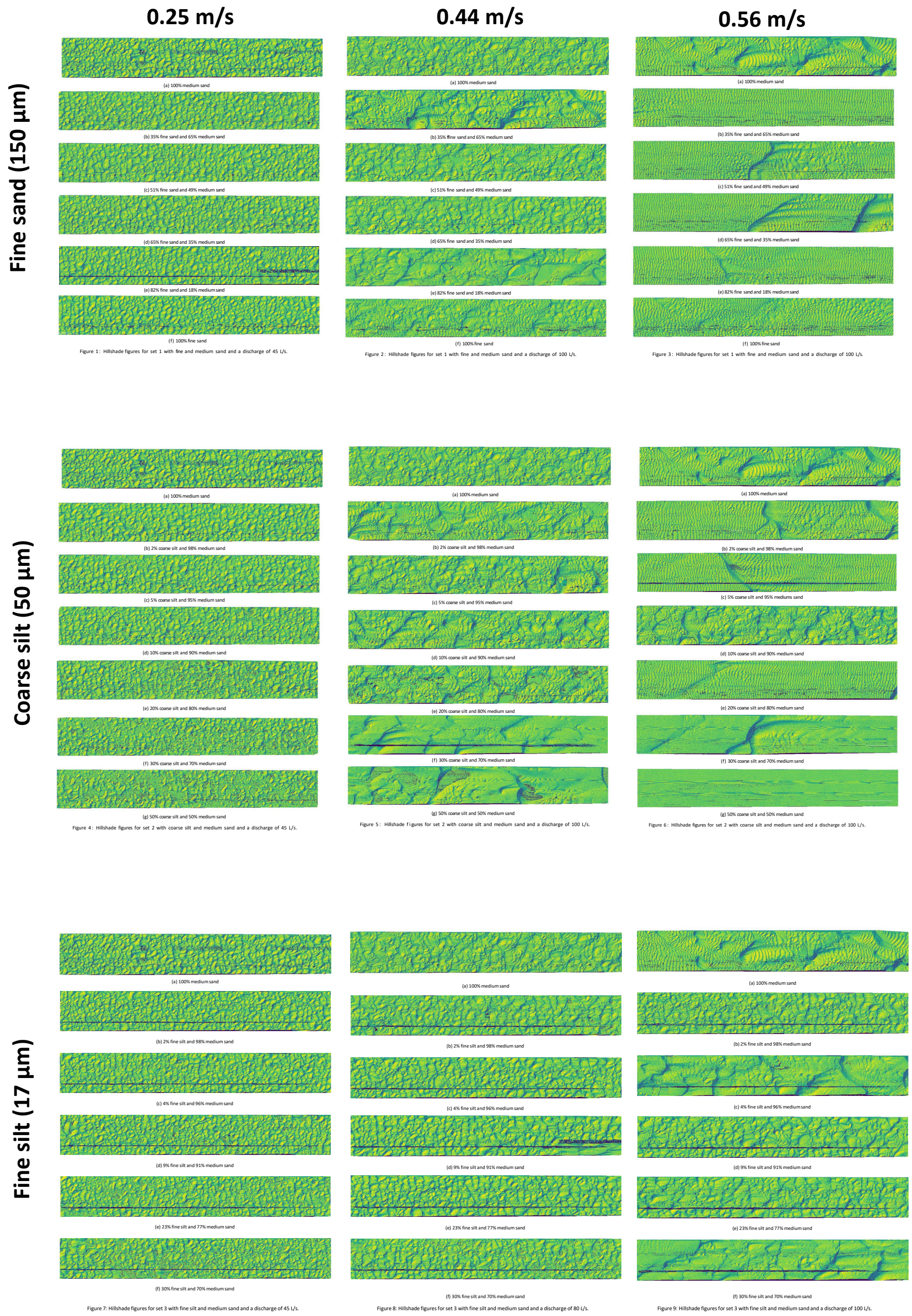

Figure S2. Hillshade figures of the final bed geometry of each experiment

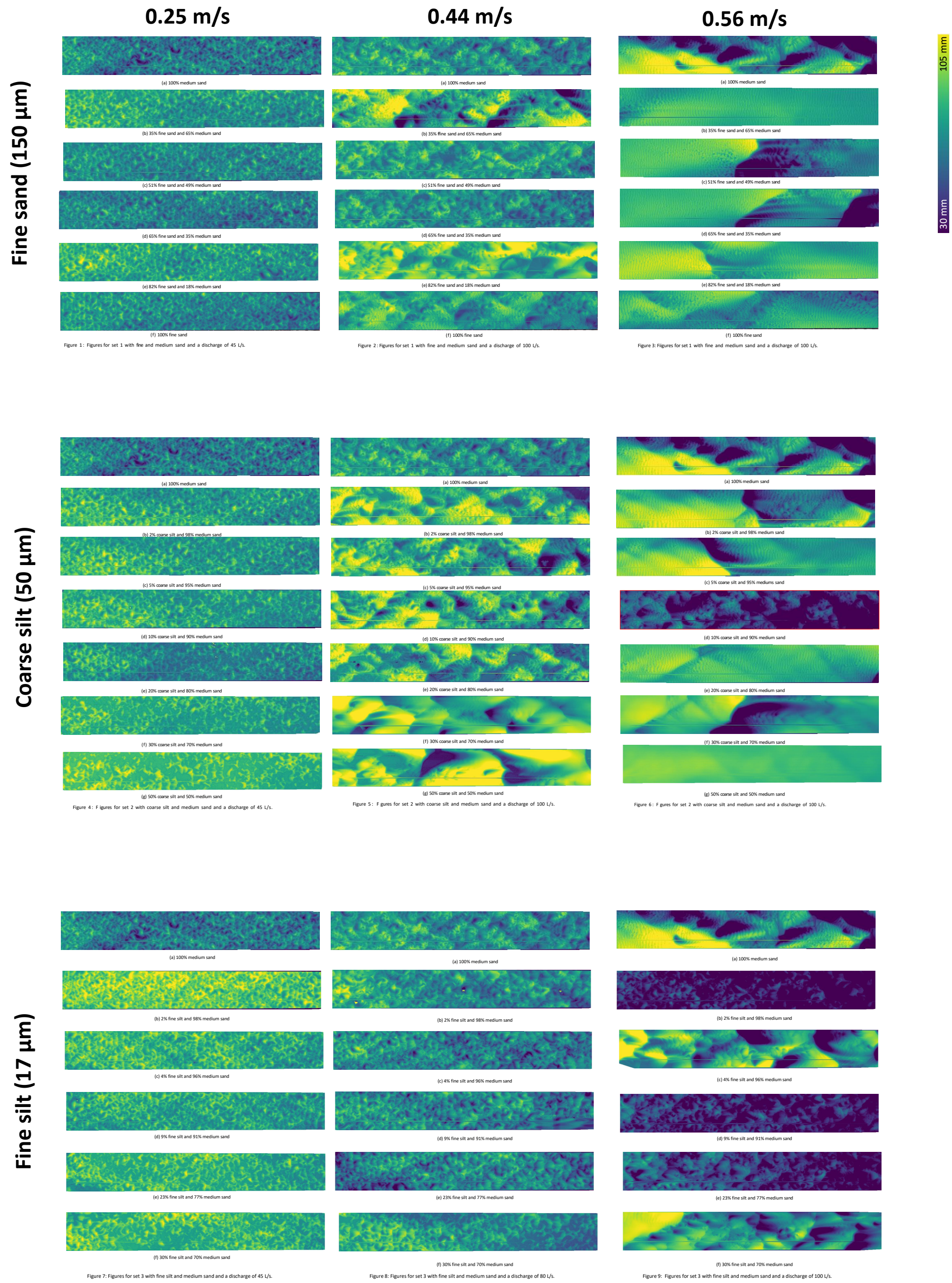

Figure S3. Bed elevation models of the final bed geometry of each experiment

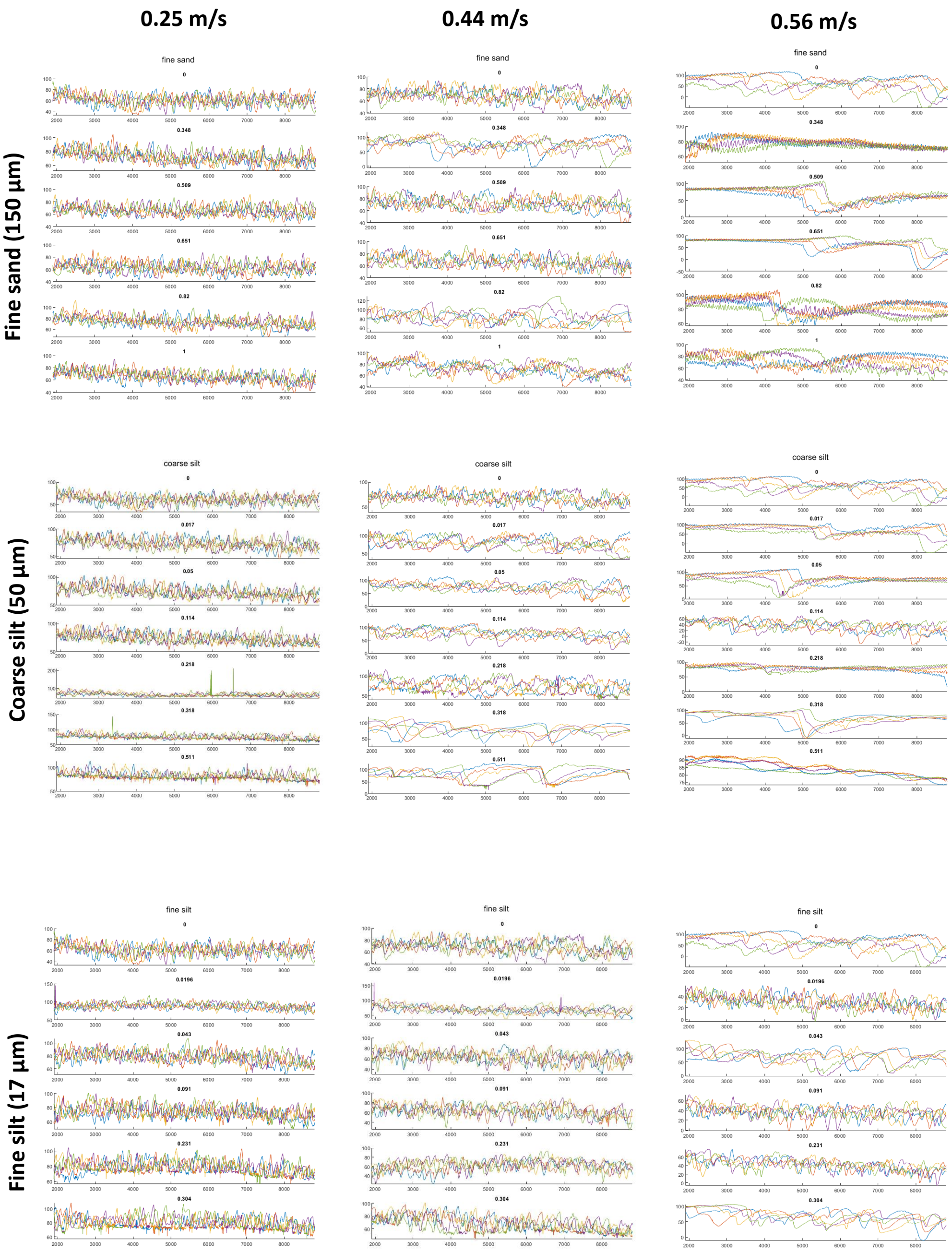

Figure S4. Profiles of the final bed geometry of each experiment, used to determine bedform geometry.

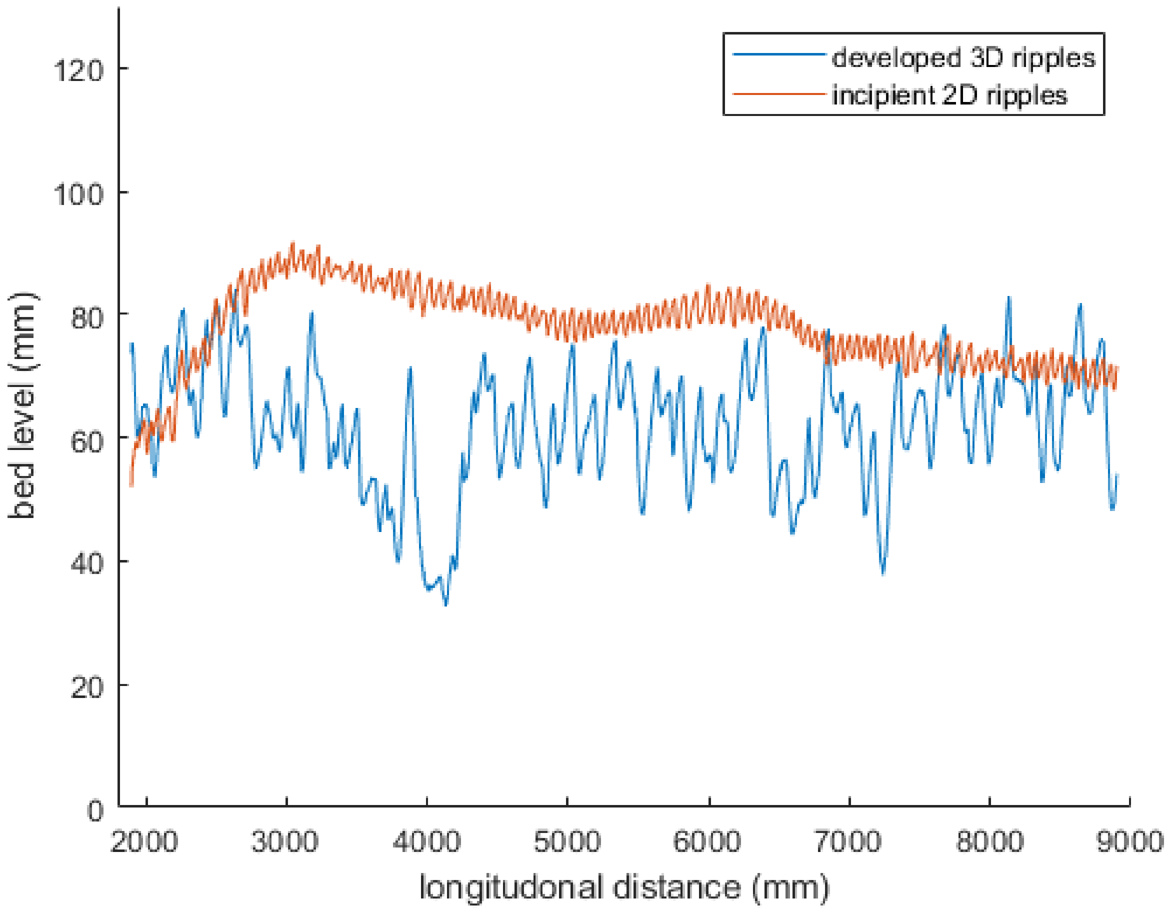

Figure S5. Example profiles with developed 3D ripples (experiment with 82% fine sand and low discharge) and incipient 2D ripples due to drainage (experiment with 51% fine sand and high discharge).

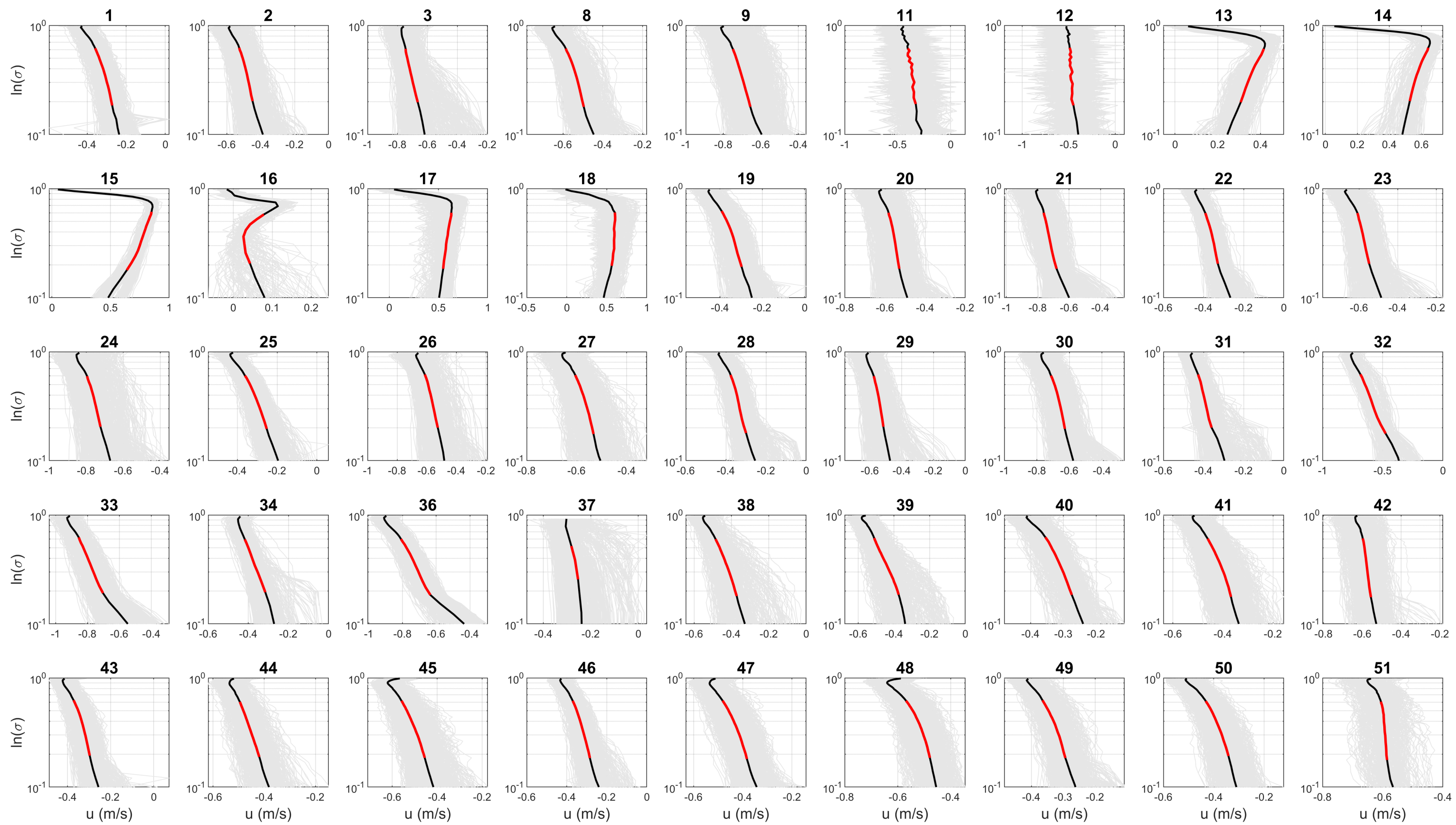

Figure S6. Logarithmic velocity profiles for the all experiments. The logarithmic part of the time-averaged velocity profile as used in the calculations, is indicated bold red. Numbers indicated in the title refer to the experiment numbers as listed in Table 1 in the main text. Experiment 13-18 are excluded from analysis, an mistake in the setup caused erroneous profiles.

Table S1. Characteristics of the sediment mixtures (D_{10}, D_{50}, D_{90}) and their mobility expressed as the critical shear stress θ_c according to Parker et al., 2007 (Par07), and corrected using equation 12 in the main manuscript (Patel et al., 2013) (Pat13).

	Fraction finer sediment in base material	D_{10} (μm)	D_{50} (μm)	D_{90} (μm)	θ_c (-) (Par07)	θ_c sand (-) (Pat13)	θ_c fines (-) (Pat13)
Sediments							
medium sand (base material)	1	172	255.8	378.1	0.021		
fine sand	1	100.6	169.6	284.2	0.031		
coarse silt	1	3.4	37	126.9	0.12		
fine silt	1	2.3	16.8	43.9	0.25		
Mixtures (adding finer sediment to base material)							
Fine sand and medium sand	0.35	131.1	228.2	357.8	0.024	0.02	0.041
	0.51	118.8	213.3	343.3	0.025	0.019	0.038
	0.65	111.2	199.9	329.4	0.027	0.018	0.036
	0.82	105.4	184.3	309.8	0.029	0.015	0.031
Coarse silt and medium sand	0.02	168	254	376.9	0.022	0.022	0.77
	0.05	157.1	250.5	375.3	0.023	0.022	0.76
	0.11	112.8	243.1	371.7	0.023	0.021	0.75
	0.22	32.2	228.8	364.7	0.024	0.020	0.69
	0.32	17.9	211.6	355.8	0.026	0.019	0.58
	0.51	8.8	151.8	331.2	0.034	0.016	0.28
Fine silt and medium sand	0.02	166.8	253.8	376.8	0.022	0.022	3.3
	0.04	158.5	251.3	375.6	0.022	0.022	3.3
	0.09	131.3	245.7	373.1	0.023	0.021	3.3
	0.23	14	226.1	363.6	0.024	0.02	1.6
	0.3	9.8	213	357.2	0.025	0.02	1.0