Supplementary Information for

New flow relaxation mechanism explains scour fields at the end of submarine channels

by

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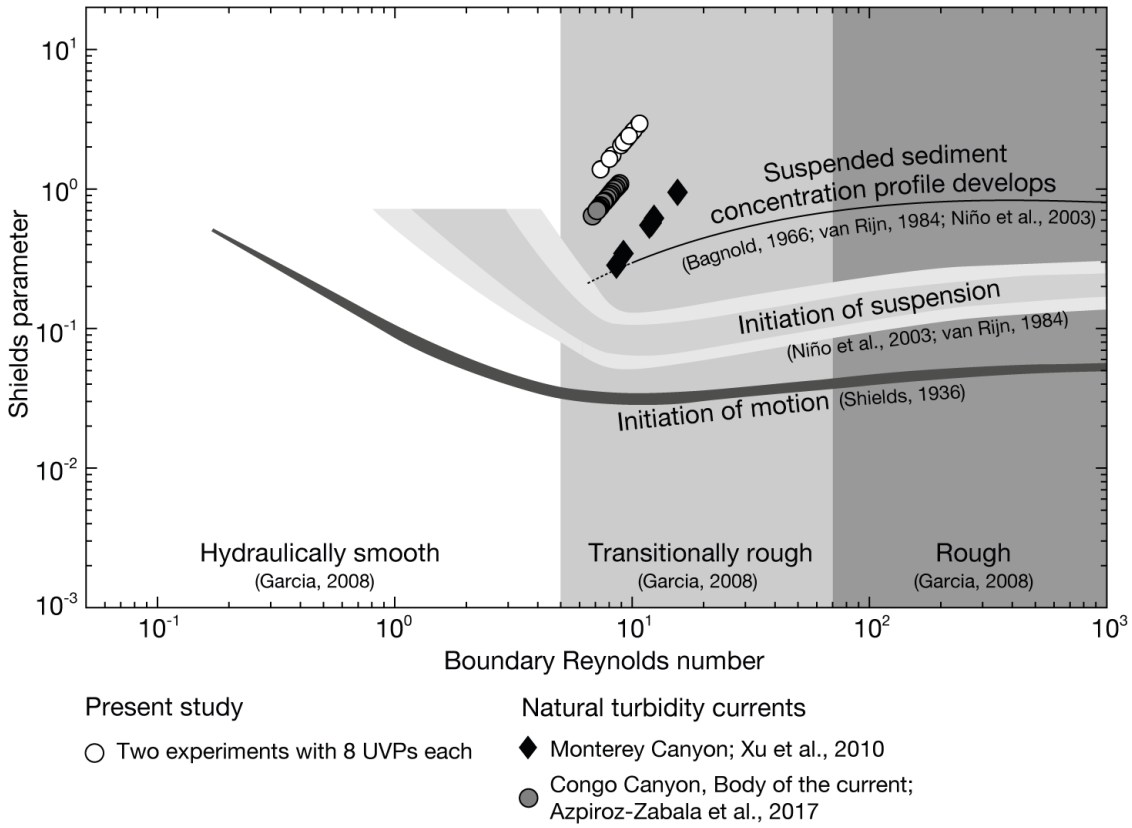
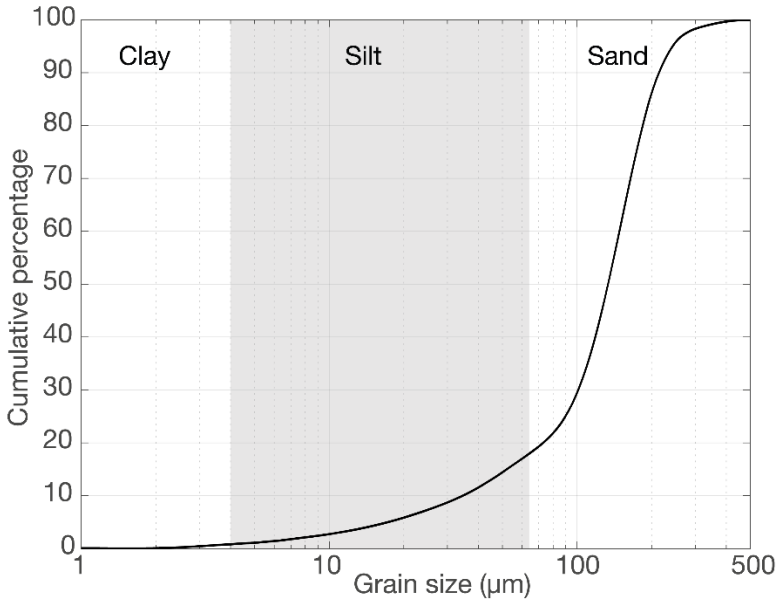
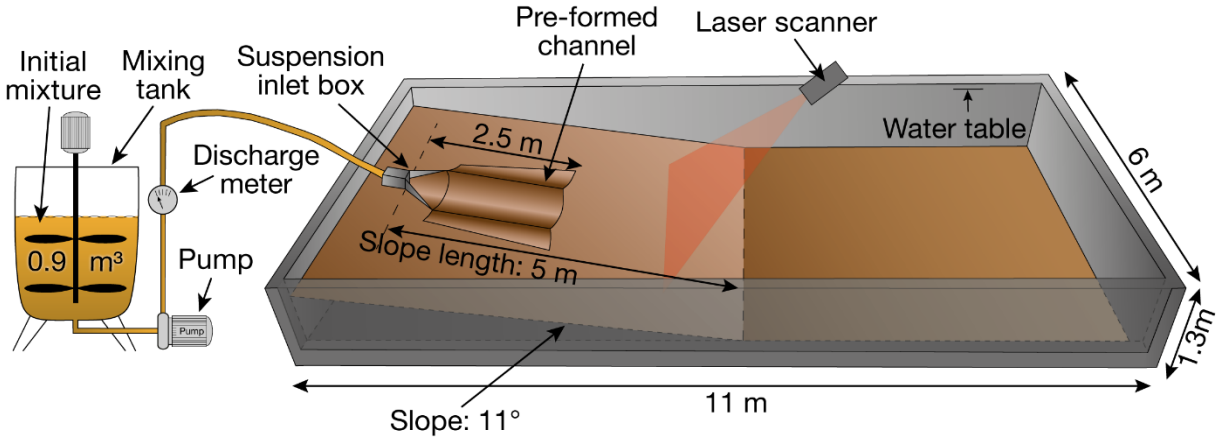
Supplementary Figures



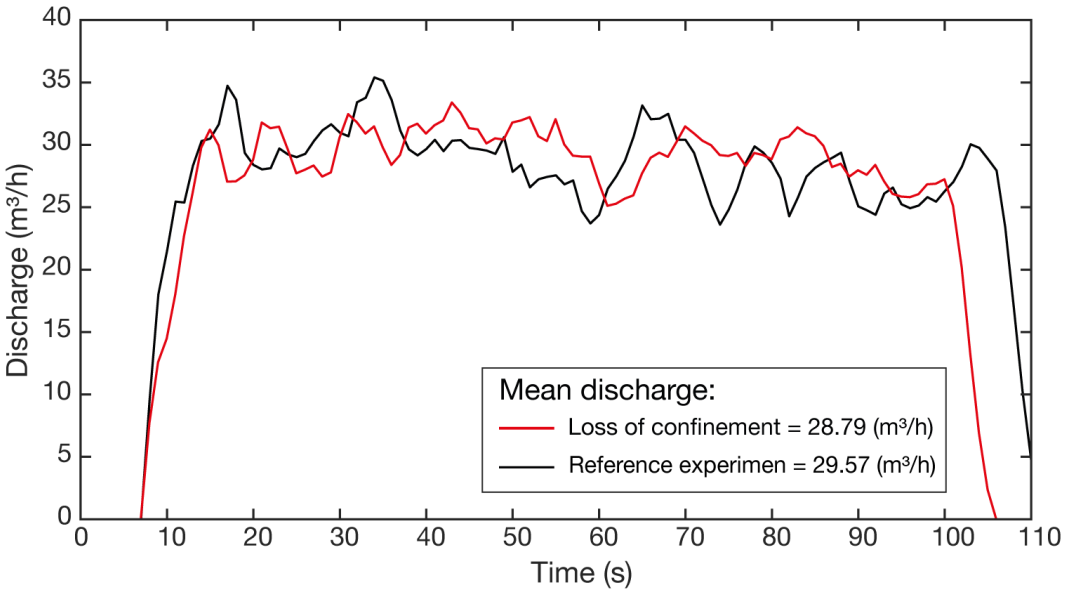
Supplementary Figure 1. Shields mobility diagram. Describes the dominant sediment transport mode for a given set of hydrodynamic conditions. Modified after [1] and [2]. Natural flows were monitored in the Monterey Canyon [3], and the Congo Canyon [4]. For calculation of the Congo Canyon, the body of the current and a grain size of 200 µm was used. Regime boundaries after: [1,5–8]



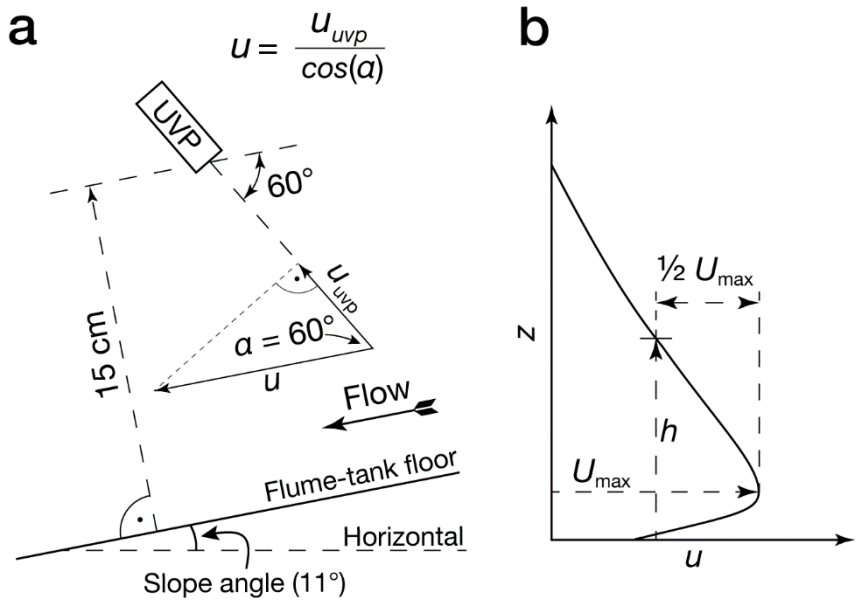
Supplementary Figure 2. Cumulative grain-size distribution. Sand of identical grain size was used for the floor of the flume tank and for the suspended sediment of the turbidity current. Grain size was measured with a laser particle sizer (Malvern Mastersizer 2000).



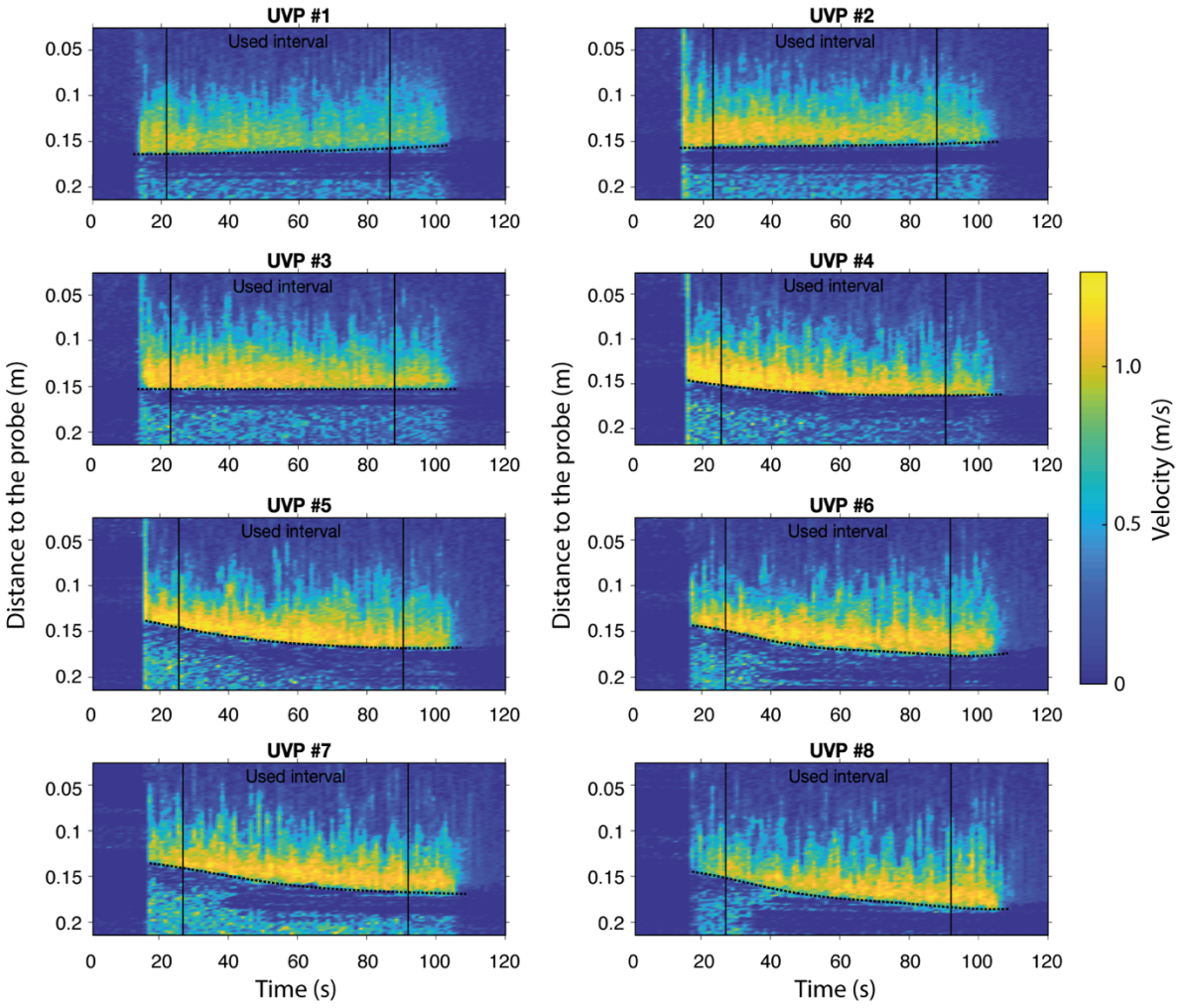
Supplementary Figure 3. Schematic drawing of the experiment setup. Note that the length of the reference (no loss of confinement) experiment extended 5 m further downslope.



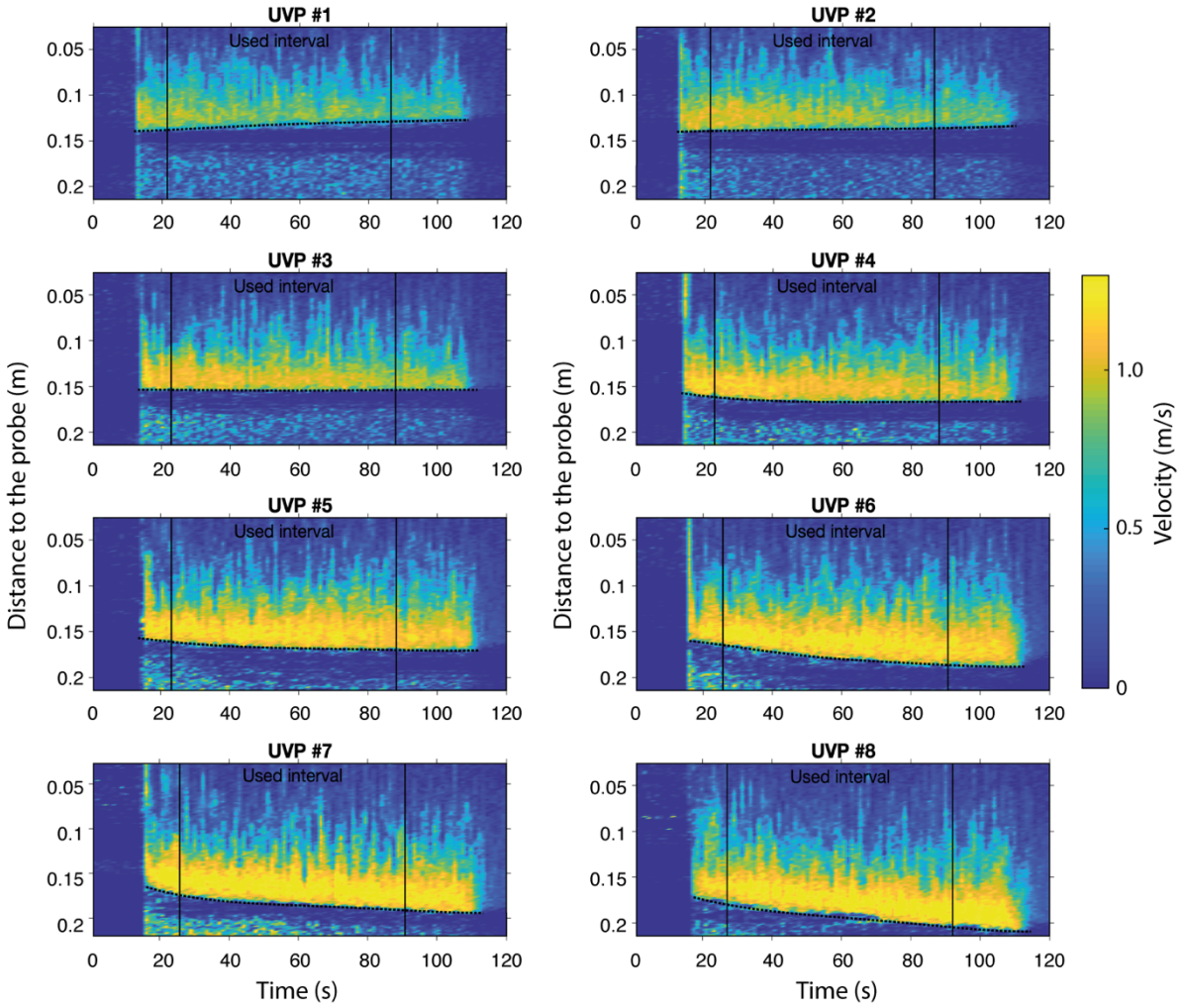
Supplementary Figure 4. Discharge measurements of the two experiments. The discharge was measured with an electromagnetic flow-meter (Krohne Optiflux 2300). The mean discharge was calculated by averaging over the time interval between 15 to 95 s.



Supplementary Figure 5. UVP orientation and parameterization of the velocity profile. **a**,**b**, (**a**) The orientation of the UVP and the trigonometric calculation to calculate bed-parallel velocities. u_{UVP} is the velocity component directed toward the UVP and u is the bed parallel velocity in downflow direction. Not to scale. (**b**) Sketch of a velocity profile illustrating the analysis of the time-averaged velocity profiles. Redrawn from [9].



Supplementary Figure 6. Velocity measurements in the experiment with loss of confinement. The solid vertical lines mark the interval that was used for analysis of the velocity data. The dashed line indicated the position of the bed, where a sharp decrease in velocity occurs.



Supplementary Figure 7. Velocity measurements in the reference experiment. The solid vertical lines mark the interval that was used for analysis of the velocity data. The dashed line indicated the position of the bed, where a sharp decrease in velocity occurs.

Supplementary Tables

UVP acquisition settings	
Manufacturer and type	MET-FLOW; DUO MX
Speed of sound in water (m/s)	1480
Measurement window (mm)	246.79
Number of channels	235
Distance between channel centers (mm)	0.925
Channel width (mm)	3.7
Frequency of the ultrasound beam (MHz)	1
Number of cycles per pulse	5
Number of sound pulses per measurement	32
Minimum on-axis velocity (mm/s)	-1081.9
Maximum on-axis velocity (mm/s)	1073.4
Velocity resolution (mm/s)	8.5
Time between each measurements (s)	1.247

Supplementary Table 1.

Supplementary References

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2. de Leeuw, J., Eggenhuisen, J. T. & Cartigny, M. J. B. Morphodynamics of submarine channel inception revealed by new experimental approach. *Nat. Commun.* **7**, 1–7 (2016).
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