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Supplement of

Effect of debris-flow sediment grain-size distribution on fan morphology

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Supplement

Table S1: Inundation areas of respective experimental runs.

	Inundation area* (m^2)	
	Monogranular	Multigranular
Run 1	2.269	2.323
Run 2	2.225	2.047
Run 3	2.354	2.107
Run 4	2.049	2.157
Average	2.224	2.159

* Inundation areas were measured using the DEMs and orthophotos. Note that the inundation area with shallow thickness of <~2.6 mm (i.e., average grain size) in the area with a slope of 3°–6° was excluded because such deposition resulted from the transport of individual sediment particles rather than that by debris flows.

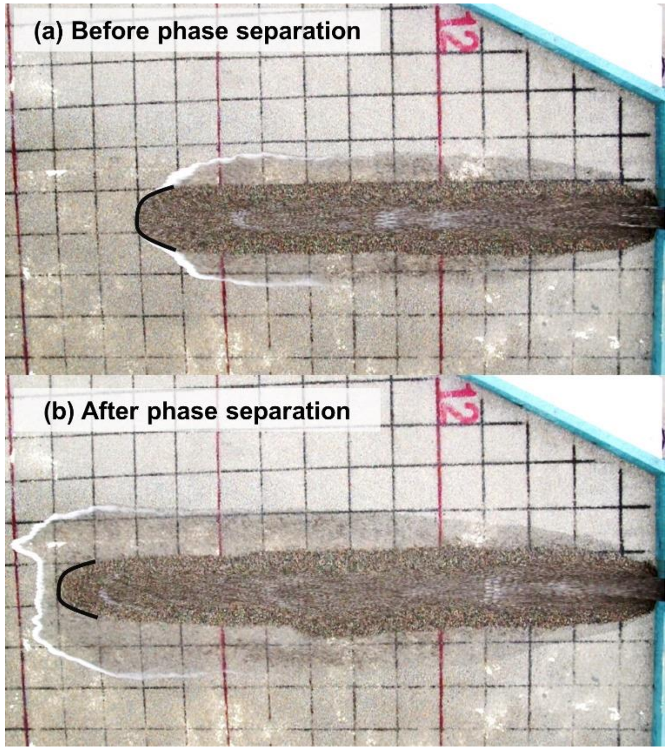


Figure S1: Images extracted from the captured video with respect to flow runout of the monogranular test run4: (a) before the start of phase separation and (b) after the start of phase separation. Drawn grid lines indicate a square grid (0.2 × 0.2 m). The black line indicates the front of the solid phase, whereas the lower edge of the fluid phase is captured by the white line in the video. In (a), the solid and fluid phases are shown descending synchronously; in (b), the fluid phase has reached further downstream owing to phase separation.

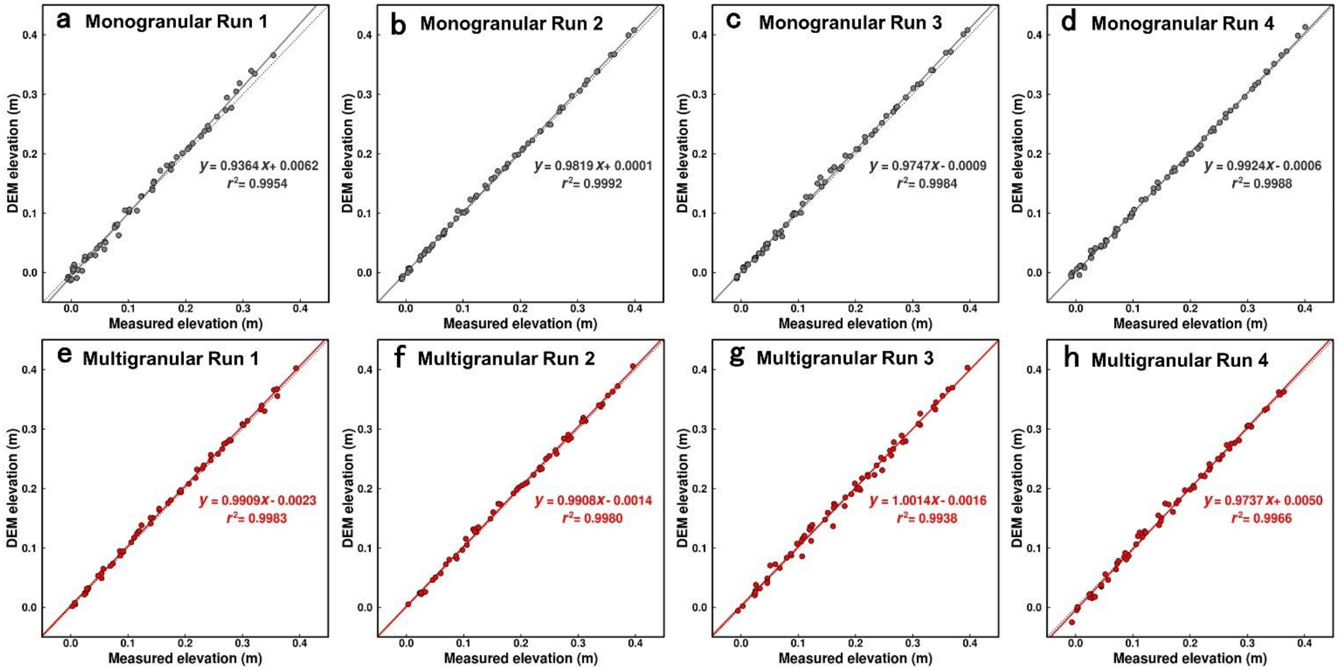
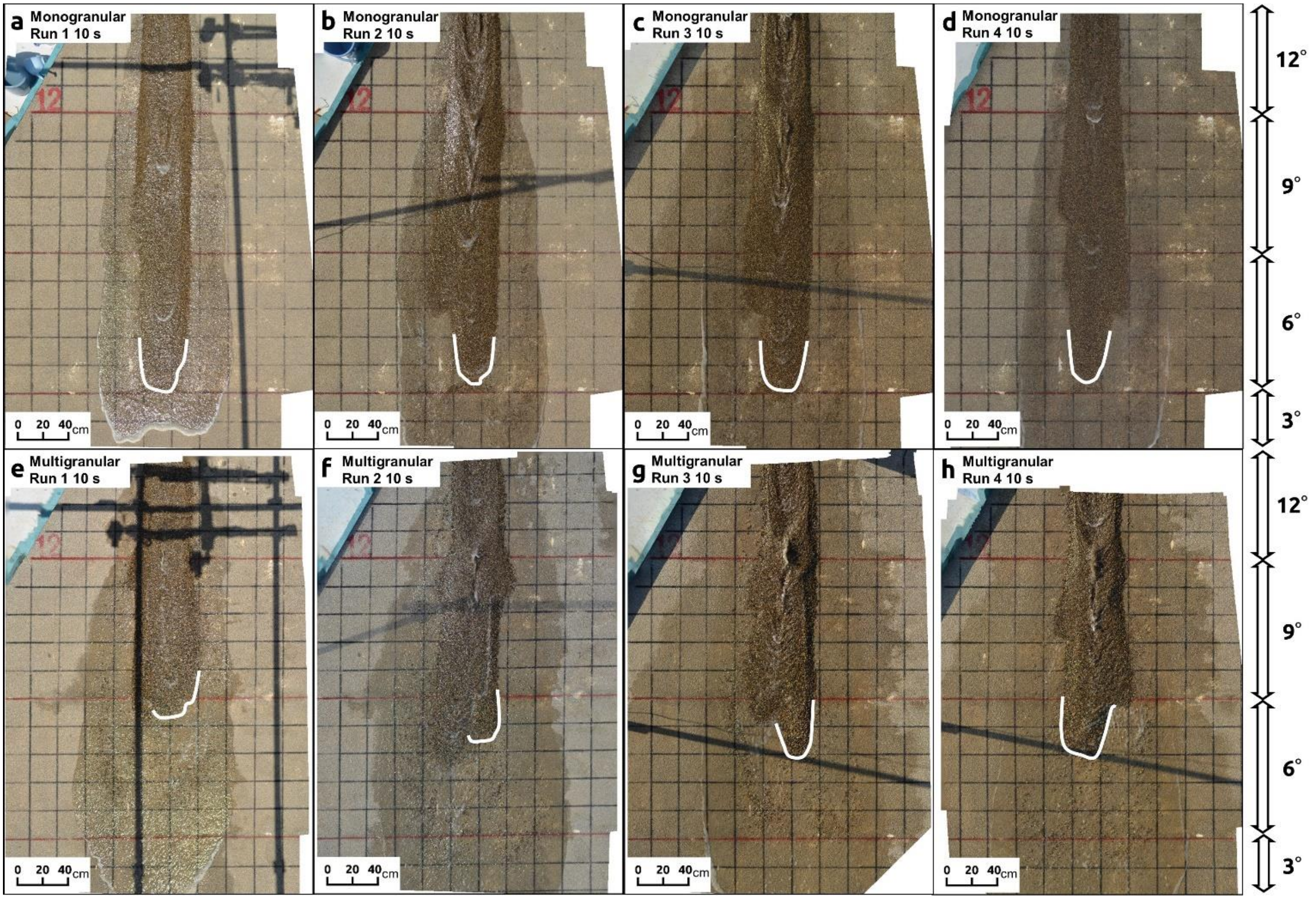


Figure S2: Final topographies of the debris-flow fans: (a)–(d) monogranular flows and (e)–(h) multigranular flows. The elevation is depicted assuming that the area with a 3° slope (i.e., the area furthest downstream from the point where the slope changed from 6° to 3°) has elevation of zero. DEM: digital elevation model.



35 **Figure S3:** Orthophotos 10 s after the start of runout: (a)–(d) monogranular flows and (e)–(h) multigranular flows. The white line indicates the flow front of the solid phase.

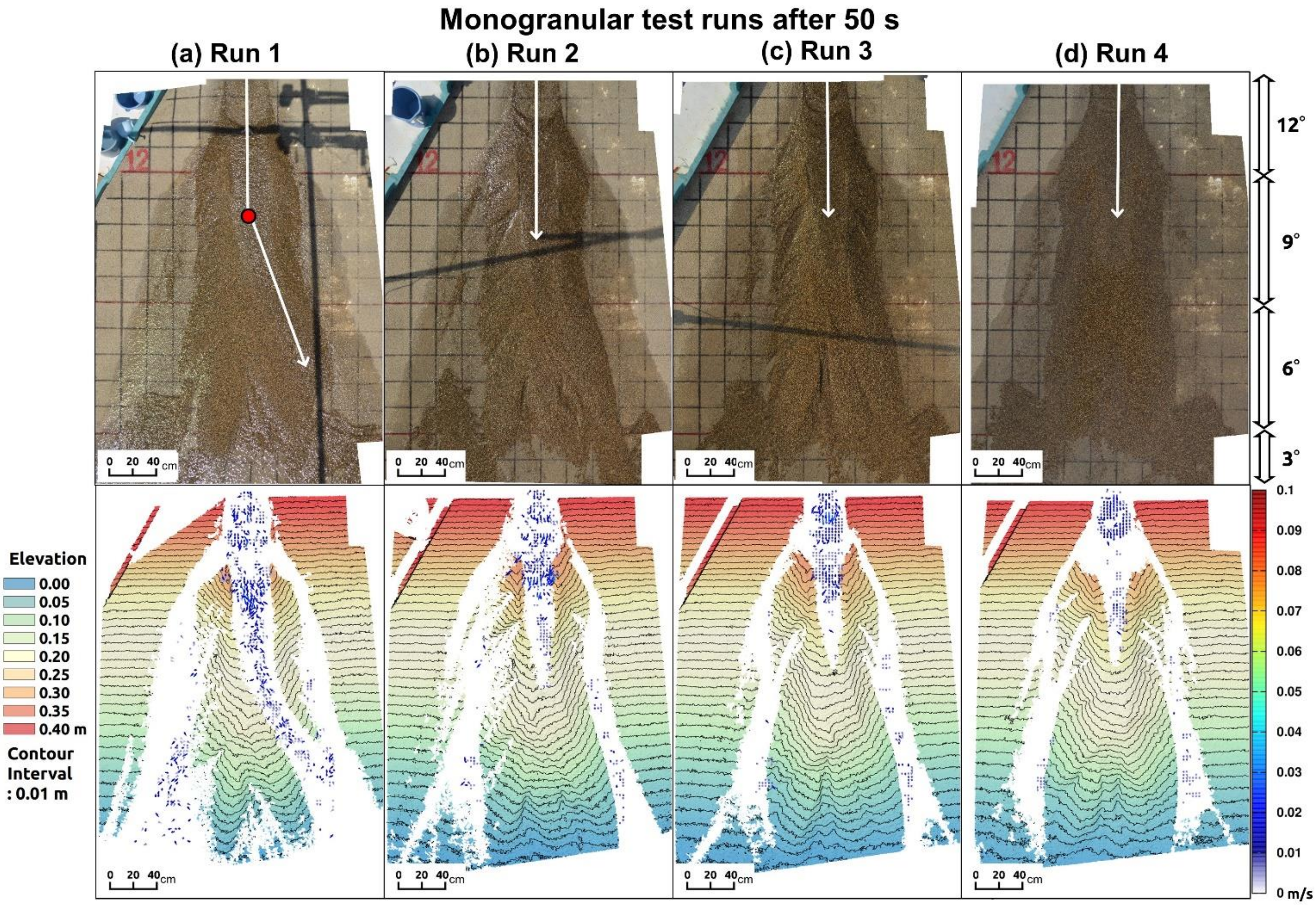


Figure S4: Fan morphology 50 s after the start of runout of the monogranular flows. The upper and lower panels show orthophotos and digital elevation models (DEMs) with flow vectors, respectively. Respective sets of the upper orthophoto and lower DEM represent corresponding results of each experimental test run. The white arrows on the orthophotos indicate the assumed principal direction of flow descent. The red point in the orthophoto of (a) indicates the assumed occurrence point of the avulsion. The elevation of the DEMs is depicted assuming that the area with a 3° slope (i.e., the area furthest downstream from where the slope angle changed from a 6° to 3° slope) has elevation of zero.

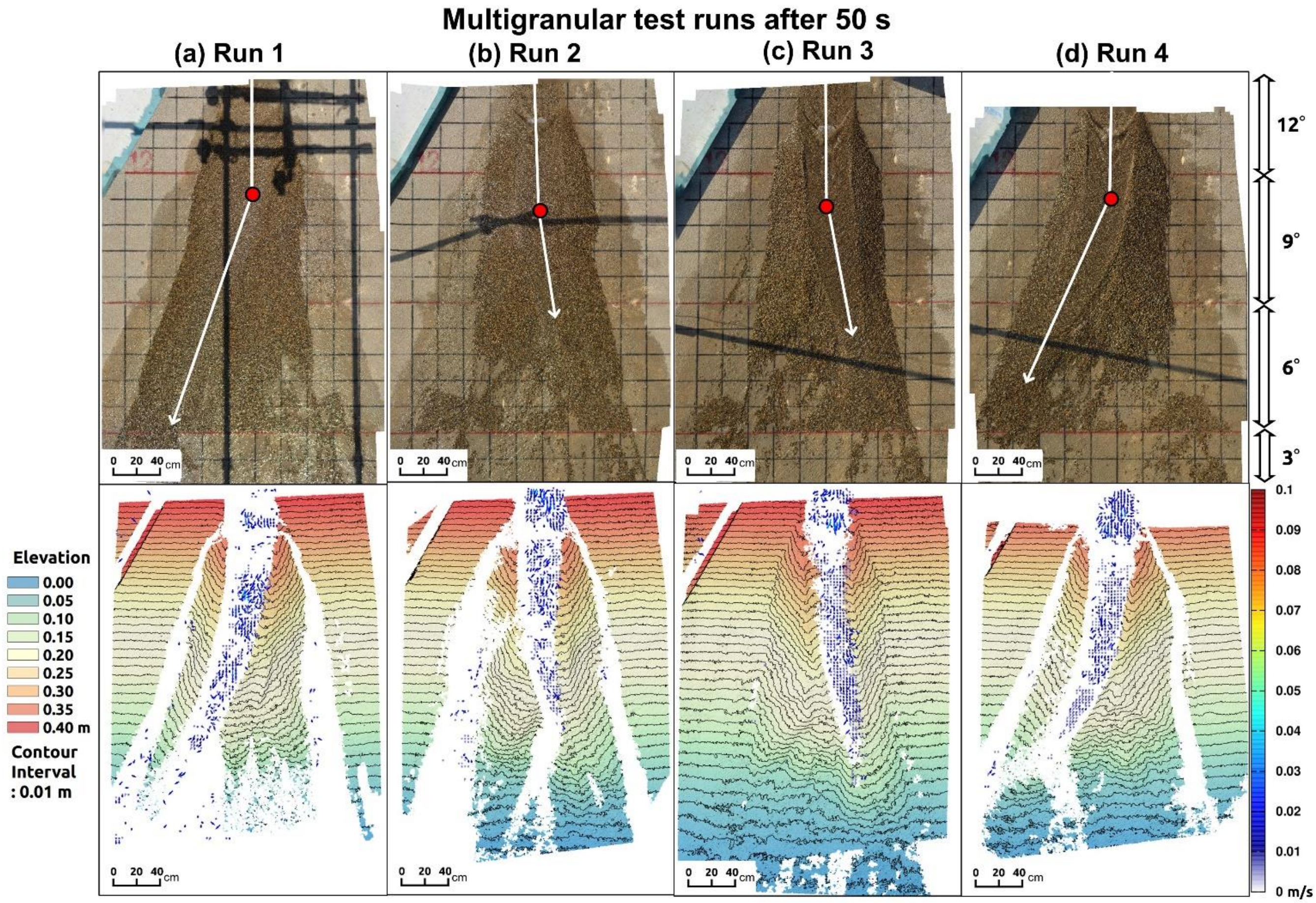


Figure S5: Fan morphology 50 s after the start of runout of the multigranular flows. The upper and lower panels show orthophotos and digital elevation models (DEMs) with flow vectors, respectively. Respective sets of the upper orthophoto and lower DEM represent corresponding results of each experimental test run. The white arrows on the orthophotos indicate the assumed principal direction of flow descent. The red points in the orthophotos indicate the assumed occurrence point of the avulsion. The elevation of the DEMs is depicted assuming that the area with a 3° slope (i.e., the area furthest downstream from where the slope angle changed from a 6° to 3° slope) has elevation of zero.

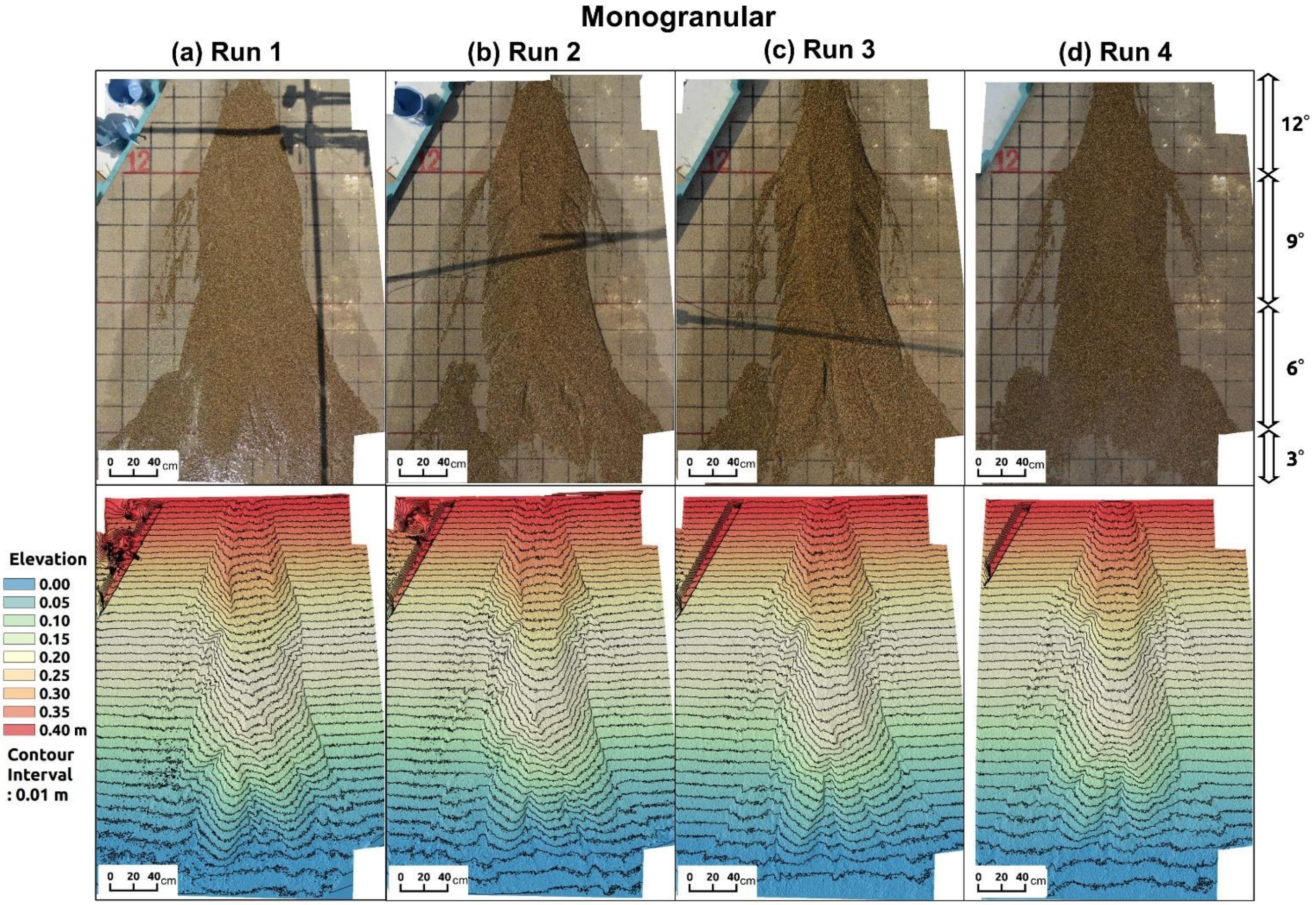
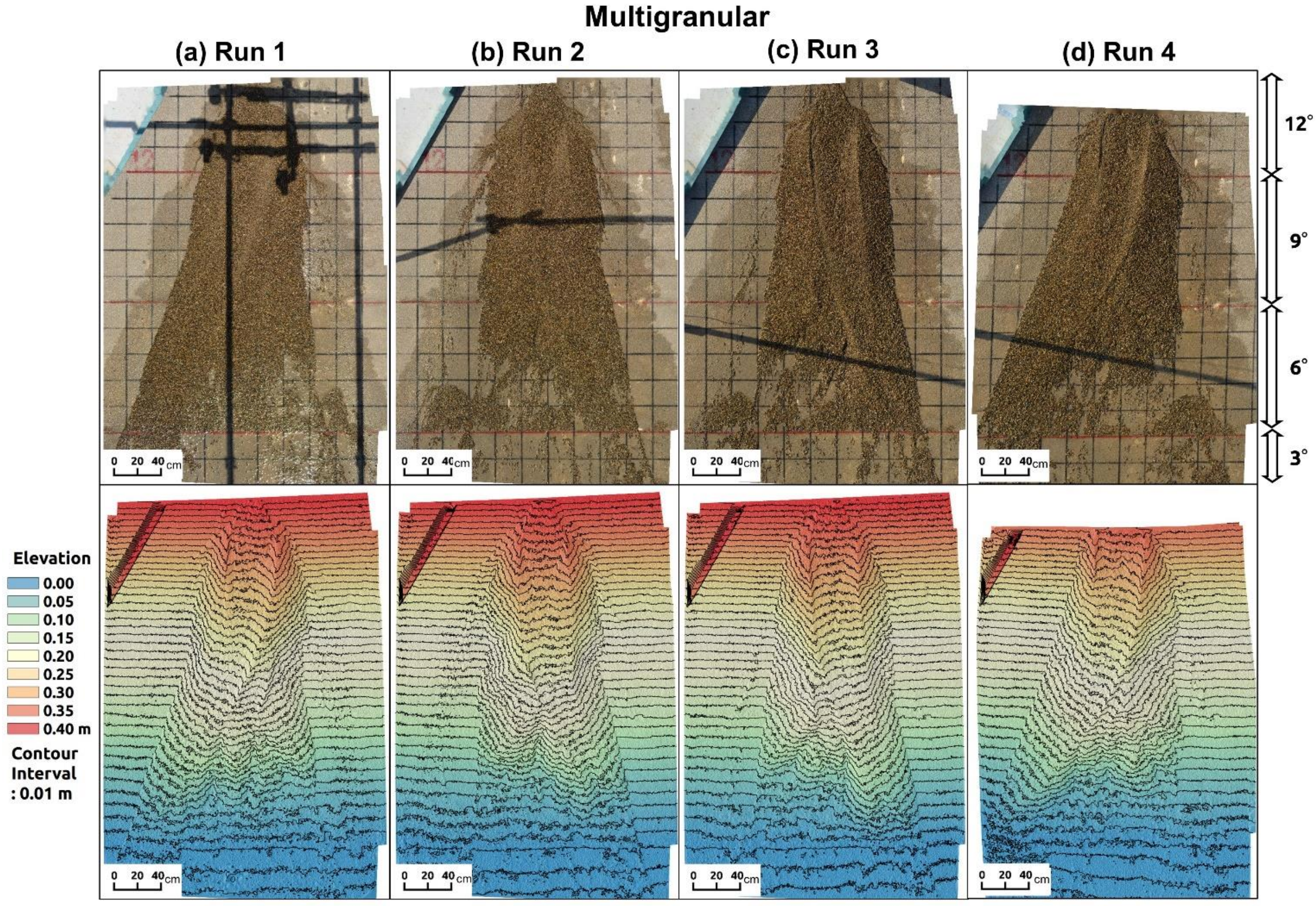


Figure S6: Final topographies of the debris-flow fans of the monogranular flows. The upper and lower panels show orthophotos and digital elevation models (DEMs), respectively. Respective sets of the upper orthophoto and lower DEM represent corresponding results of each experimental test run. The elevation of the DEMs is depicted assuming that the area with a 3° slope (i.e., the area furthest downstream from where the slope angle changed from a 6° to 3° slope) has elevation of zero.



65 **Figure S7:** Final topographies of the debris-flow fans of the multigranular flows. The upper and lower panels show orthophotos and digital elevation models (DEMs), respectively. Respective sets of the upper orthophoto and lower DEM represent corresponding results of each experimental test run. The elevation of the DEMs is depicted assuming that the area with a 3° slope (i.e., the area furthest downstream from where the slope angle changed from a 6° to 3° slope) has elevation of zero.