



Avalanche run-out shortening by a dam: from small-scale laboratory experiments to full-scale observations

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The understanding of the interaction between avalanche flows and avalanche protection structures is of crucial interest for the design of those structures. Small-scale laboratory experiments on granular avalanches interacting with a dam were carried out with different experimental devices. These studies allowed to quantify the maximum run-out shortening as a function of the obstacle height relative to the flow depth. The geometry considered in all these experiments was similar to the configuration at the Ryggfonn full-scale test site (Norway) where more than ten snow avalanches interacting with a dam have been studied. All the data from small-scale granular laboratory experiments and from full-scale Ryggfonn avalanches were revisited and analyzed in terms of the maximum run-out normalized by the dam height as a function of the normalized incoming kinetic energy. A similar trend was highlighted for both laboratories and full-scale site data. The results imply a simple balance between the incoming kinetic energy and the work dissipated locally (by the dam) and downstream of the dam (by friction).