

## ***Interactive comment on* “Sudden large-volume detachments of low-angle mountain glaciers – more frequent than thought” by Andreas Käab et al.**

### **Anonymous Referee #1**

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#### General comments:

The manuscript reviews exiting and presents new information on glacier instabilities with a focus on glacier detachments. Observations on glacier detachments are extremely rare and, hence, our knowledge is very limited. The manuscript presents a model for glacier detachments and ideas for a first assessment of related hazards. This well-written text is of high importance and as such a welcome contribution.

#### Specific comments:

(1) The title of the manuscript is “Sudden large-volume detachments of low-angle mountain glaciers – more frequent than thought” and, hence, stresses the higher-than

expected frequency as THE main conclusion of the study; otherwise, the second part of the title could be deleted. Throughout the manuscript, the authors repeatedly mention that glacier detachment events are rare and occur more often than thought:

L 80-81: “Our third type of glacier instability, a sudden large-scale detachment of a mountain glacier, is much less frequent than the two types above, [...]” L 804-805: “Our compilation of all (so far) known cases shows that low-angle glacier detachments might have, though rare, more frequently occurred than thought.” L845: “Overall, these events seem to be more frequent than previously thought.”

However, there is no explanation of why these events should occur (significantly) more often than has been reported. If the explanation is simply “because we will find additional ones once we look for them,” the second part of the title is misleading as it suggests the presentation of facts rather than a simple assumption. Yes, of course, it should be assumed that there are more of them because we recently learned about them. I like to suggest the deletion of the second part of the title—it seems to aim at a dramatization that is unnecessary here.

(2) The authors aim to introduce glacier detachment as a new type of glacier instability that is different from glacier surges and from ice-rock avalanches. While the authors introduce an entire chapter on ice-rock avalanches with the goal of clearly separate them from glacier detachments, they do not have a similar chapter on glacier surges. It is not clear, why the ice-rock avalanches receive much more attention. As a solution, Chapter 2 Ice-rock avalanches could be deleted, or the authors shorten it by deleting the list of examples (references are sufficient) and then add a similar chapter on glacier surges.

(3) It is not clear what the prove is for classifying the 1832 Devdorak and 1902 Kolka events as glacier detachments. Please revise.

(4) L 234 introduces the term “striations” for streamlined debris stripes. This is unfortunate as the term glacial striations is already defined. Hence, using the term striation in

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a paper on glaciers is confusing. The term “debris stripes” is sufficient. Please change this throughout the manuscript.

(5) L 775-776: The possibility of a meteorological trigger that resulted in the failure of the Aru glaciers does not necessarily point at climate change. Please be careful with such assumptions. We are not even certain that there was a meteorological event at all.

Technical corrections:

L 170: delete “Devdoraki in Georgian language” as you don’t present local names for all other cases. L 349: you mention “Before-after elevation differences are available in Kääb et al. (2018).” Either simply present them here in one sentence or delete the sentence. L 825: write Rasht (2007). Enlarge the following figures (take advantage of entire width; see, e.g., Fig. 5): 2, 3, 4, 6, 7, 8, 13, 15, 16, 17, 18.

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