

Response to reviewer comments on the revised manuscript of 'TC-2022-140'

Report #1 by Anonymous Referee #3

Dear reviewer, thank you for reviewing our revised manuscript. Please find our response to your remark below:

The authors addressed the observations raised by the reviewer. Anyway, to reviewers opinion, the authors must further stress that their work does not consider failure or a failure criterion but aims at providing all quantities necessary for a failure assessment.

We have added the following paragraph at the end of section 1 defining the scope of the present work before presenting the model development in section 2. We hope this now conclusively explains the aims and limitations of the manuscript.

In order to account for the crucial effect of layering on failure processes within a snowpack, we propose a new model for layered snow slabs on collapsible weak layers, ~~whose outputs can be used for the implementation of novel failure models. In order to allow for efficient implementation in model chains and for use for extensive parametric studies, a closed-form analytical solution is obtained by utilizing~~. Using the concepts of mechanics of layered composites (Jones, 1998) and weak interfaces (Lenci, 2001), ~~we provide closed-form expressions that allow for real-time computations of snowpack deformations, weak-layer stresses, and the energy release rate of cracks in the weak layer. The work aims at establishing a fast computational framework for the physical analysis of the fracture process that leads to the formation of snow slab avalanches. For this purpose, the model considers discrete configurations of layered slabs supported by a weak layer that have collapsed on a given length. We do not attempt to formulate weak-layer failure criteria or to simulate crack advance but aim at providing the mathematical tools for such exercises.~~