

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC1  
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## **Comment on nhess-2022-11**

Patrizia Köpfli (Referee)

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Referee comment on "Automated avalanche hazard indication mapping on a statewide scale" by Yves Bühler et al., Nat. Hazards Earth Syst. Sci. Discuss.,  
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### **Preliminary remark:**

The referees do not work in research, but in an authority dealing with protection forest and natural hazards. For this reason, the assessment focuses on the results and discussion rather than on the scientific method.

### **General remarks**

The paper «Automated avalanche hazard indication mapping on state wide scale» addresses a relevant scientific topic within the scope of Natural Hazards. The paper presents a new method to generate avalanche hazard indication maps over large regions and especially in regions, where no detailed hazard maps exist. The method described takes the instantaneous protective effect of the forest into account. The paper describes the data used, the methods applied and the results obtained in a sufficient, clear and easy understandable way. The author gives proper credit to previous and related work and indicates clearly his own contribution. The cantonal authorities of canton Grison apply these avalanche hazard indication maps generated with the method described in this paper already for approximately one year. These avalanche hazard indication maps prove to be a valuable tool in daily practice.

Nevertheless, we have some suggestions for clarifications and additions:

- Page 1, line 13-14: For the canton of GR, data from the "SilvaProtect" project are available at the hazard indication map level. However, these only show potential areas with avalanches. In contrast to the maps presented in this paper, the data from

SilvaProtect do not show impact parameters such as avalanche pressure.

- Page 2, lines 1-6: The avalanches in SilvaProtect were originally modeled for the delineation of protective forests. It was not the goal to use it to create a hazard indication map. However, due to the lack of alternatives, the data is sometimes used to identify potential areas with avalanches.
- Figure 1: In this figure, the climatic regions appear for the first time. It would be helpful to explain briefly that these regions are used to regionalize avalanche modeling.
- Page 4, lines 12-13: The standard procedure for snow avalanche hazard mapping in Switzerland defined by the Federal Office for the Environment FOEN defines only three different return periods 30, 100, 300 years. The return period 10 years is optional.
- Chapter 3.2: This chapter is short. It is not possible to understand how the effect of the forest was assessed. Threshold values are mentioned without presenting them. In order to be able to understand the results, the limit values should be presented or it should be shown at the beginning of the section in which paper the limit values can be found (Bebi et al. 2021).
- Page 5, lines 7-8: "The main input datasets are the binary forest information (chapter 3.2) and the digital terrain model (DTM, chapter 3.1)."
- Chapter 4.1: This chapter explains the identification of protection forests. In Switzerland, the cantons are obliged to delineate protection forests. Therefore, a comparison with the existing protection forest delimitation of the canton GR would be interesting.
- Figure 7: The colors shown for maximum pressure lead to misinterpretation. In hazard maps, the colors express the hazard level and not the maximum pressure. We recommend using the colors of the intensity maps (three different greens) to display the maximum pressure.
- Chapter 5.1: For the comparison of the existing hazard map with the modeled ones, it is important to know how the protection forest is considered in the existing hazard maps. Please explain briefly so that the comparison can be understood.
- Figure 10: Both maps show the colors red, blue and yellow, but the colors do not have the same meaning. In hazard maps, the colors express the hazard level. In the avalanche hazard indication map the colors show the maximum pressure. The hazard maps show not only the flow avalanches but also the powder avalanches. In the indication map, only the flow avalanche is taken into account.
- Chapter 5.2: In the modeling only one type of avalanches was modeled (dense flowing part of dry avalanches). In the event analyses, other types of avalanches were probably also recorded. How does this affect the comparison of real data vs. model?
- Page 16, Line 18: Currently we are **simulating** ...